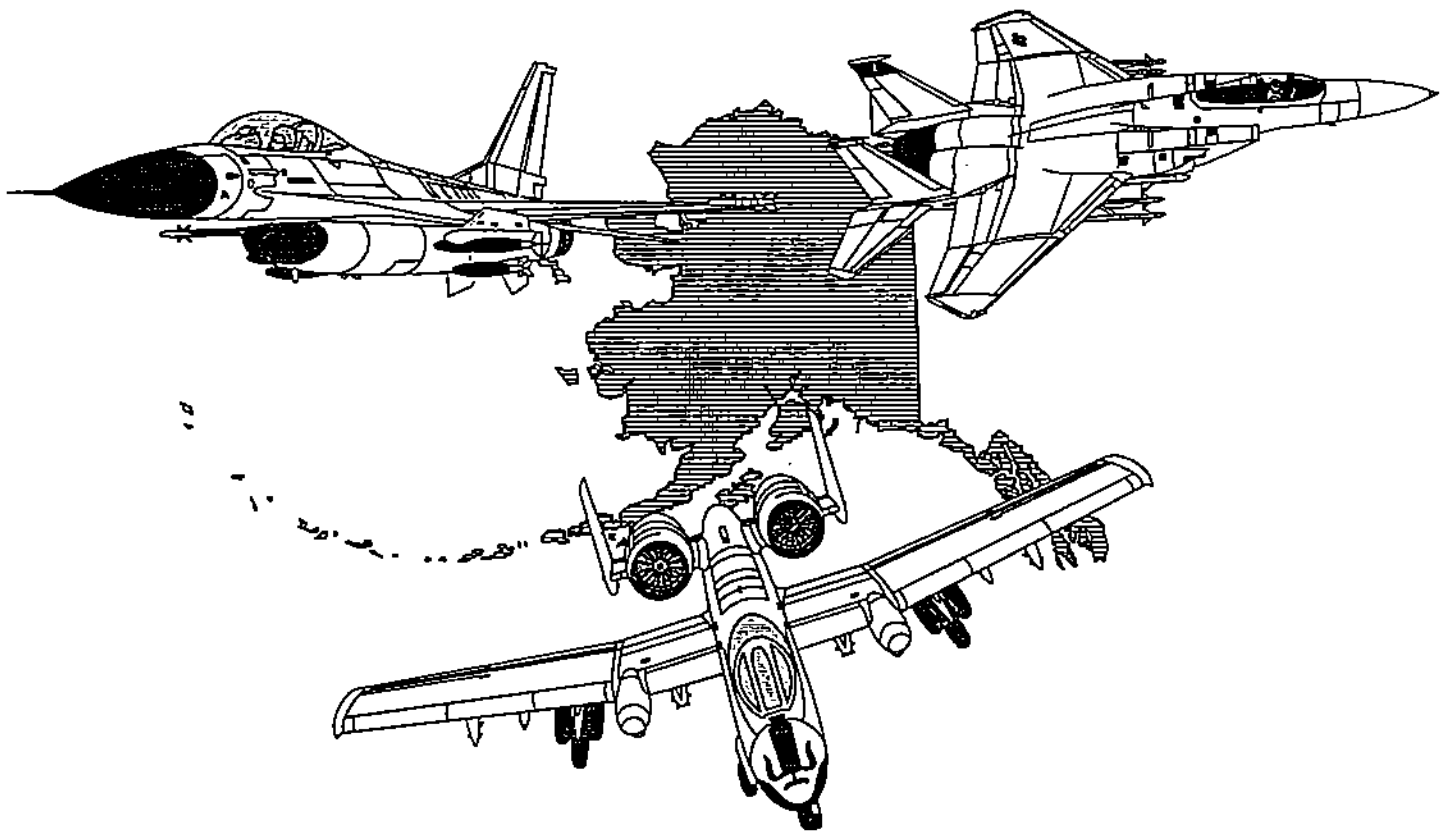


FINAL

Environmental Impact Statement **ALASKA MILITARY OPERATIONS AREAS**

VOLUME I

- *Executive Summary*
- *Purpose of and Need for Proposed Action*
- *Description of the Proposed Action and Alternatives*
- *Affected Environment*



August 1995
Department of the Air Force
11th Air Force
Elmendorf AFB, Alaska



Volume I

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Recruits and novice soldiers were trained morning and afternoon in all types of arms, but veterans and trained soldiers also exercised with their arms once a day without fail. For length of time or number of years does not transmit the art of war, but continual exercise. No matter how many years he has served, an unexercised soldier is forever a raw recruit.

Vegetius

Epitome of Military Science (about 400 A.D.)



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON, DC

MEMORANDUM FOR INTERESTED INDIVIDUALS, ORGANIZATIONS, AND PUBLIC
AND ACADEMIC REFERENCE LIBRARIES

FROM: HQ USAF/CEV
1260 Air Force Pentagon
Washington, DC 20330-1260

SUBJECT: Final Environmental Impact Statement (FEIS) for the Alaska Military Operations
Areas (MOA)

We are pleased to provide you the FEIS for the Alaska Military Operations Areas (MOA). This document is provided in compliance with the regulations of the President's Council on Environmental Quality. This FEIS has been prepared in accordance with the National Environmental Policy Act to analyze the potential environmental consequences of military operations areas in Alaska.

There will be a 30-day comment period for the FEIS beginning September 8, 1995. During this period, any comments on the document can be forwarded by mail to Mr. Jim Hostman, Environmental Management Division, 611 ASG/LGV, 6900 9th Street, Suite 301, Elmendorf AFB, AK 99506-2270; Phone (907) 552-4151.


KENNETH L. REINERTSON
Acting Director of Environment
Office of The Civil Engineer

Attachment:
FEIS



DEPARTMENT OF THE AIR FORCE
PACIFIC AIR FORCES

11 AF/CC
5800 G St Ste 101
Elmendorf AFB AK 99506-2130

19 JUN 1995

To the Reader:

Thank you for participating in the development of the Air Force Military Operations Areas (MOAs) Environmental Impact Statement (EIS) that assesses the potential environmental impacts of the Air Force's proposed adjustments to MOAs in Alaska. This document would not have been possible without the thoughtful comment and involvement we received from over a thousand Alaskan citizens and others. We believe that the EIS is a national trend-setting example of how civilian and military organizations, as well as the public, can work together to balance military readiness while protecting the nation's natural resources. The EIS process has benefited greatly by a constructive, interdisciplinary dialogue. The EIS is, at the same time, the product of the Air Force's commitment to a long-term relationship with the people of Alaska based on mutual respect for the needs of all concerned.

The Air Force is dedicated to sound environmental management. This is evident on the flightline, in our maintenance practices, and with our pilots and how they fly. The positive experience of the Alaska MOA EIS has renewed our environmental commitment throughout all levels of the Air Force. In the April 1995 issue of Air Force Policy Letter Digest, Air Force Secretary Sheila Widnall stated

"We know we have an obligation to the American people to practice and promote positive resource stewardship . . . And we must integrate this with our military training mission."

The Air Force in Alaska is meeting the obligation outlined by the Secretary. We have made over 30 significant modifications, changes, and/or mitigations to the MOA EIS based on comments we received. Specific results of our positive interaction with the people of Alaska include:

RESOURCE PROTECTION

- Protecting certain "at-risk" wildlife populations by restricting overflights during critical life cycle periods
- Protecting the Delta Caribou Herd by establishing a minimum overflight altitude of 3,000 feet above ground level (AGL), over calving areas, in appropriate areas of the BIRCH and EIELSON MOAs from May 15 to June 15

- Protecting Dall sheep by establishing a minimum overflight altitude of 5,000 feet AGL, over lambing areas and spring mineral licks, in appropriate areas of YUKON 1, 2, 3, and 4, BUFFALO, EIELSON, and FOX MOAs May 15 to June 15, and rutting areas from November 15 to December 15
- Reducing potential noise impacts to peregrine falcons and other resources by increasing existing flight avoidance efforts on the Yukon, Charley, and Kandik Rivers, within appropriate areas of YUKON MOAs 1, 2, 3, and 4, and by extending the avoidance period from April 15 to September 15
- Minimizing potential impacts to subsistence/sport hunting and late season recreational activities by conducting no Major Flying Exercises during September
- Minimizing potential impacts to wildlife and recreation activities by ensuring at least 2 weeks between Major Flying Exercises
- Continuously evaluating our environmental efforts, identifying where more changes are needed, and providing information to agencies and the public by establishing a Resource Protection Council with federal, state, and Air Force membership
- Reducing potential impacts to subsistence and other resources by restricting the use of YUKON 5 to Major Flying Exercises

CIVIL AVIATION/SAFETY

- Enhancing safety for civil aviators transiting the MOAs by raising the minimum altitudes of the FALCON and BIRCH MOAs and establishing Visual Flight Rules civil aviation corridors in the BUFFALO MOA along the Richardson and Alaskan Highways
- Enhancing civil aviation access and safety by dividing the YUKON 3 MOA into horizontal and vertical sections and reducing hours of scheduled activation
- Accommodating civil aviation traffic participating in subsistence/hunting and recreation activities by raising the year-round minimum altitude of YUKON 3B (southeast half of YUKON 3 MOA) to 2,000 feet AGL
- Increasing situational awareness of all aviators operating in the interior MOAs by establishing and improving the capabilities of the Special Use Airspace Information System (SUAIS) in EIELSON, BIRCH, BUFFALO, and YUKON 1,2, and 3
- Creating direct dialogue on potential impacts to aviation activities by establishing an Alaska Civil/Military Aviation Advisory Committee (ACMAAC)

NOISE

- Avoiding the creation of aircraft noise around the Gulkana and Delta National Wild and Scenic Rivers, Tangle Lakes area, and Richardson Highway by moving the eastern boundary of the FOX MOA approximately 25 miles west
- Reducing potential noise impacts by raising the minimum altitude of the YUKON 5 and FOX MOAs to 5,000 feet AGL
- Significantly reducing aircraft noise in the Salcha River and Harding Lake areas by moving the northwest boundary of the BIRCH MOA approximately 5 miles to the east
- Significantly reducing aircraft noise in the Salcha River and Harding Lake areas by eliminating the proposed CLEAR CREEK MOA

- Avoiding potential noise impacts to the Lake Clark National Park and Preserve by moving the eastern boundary of the STONY A and NAKNEK 2 MOAs to the west
- Reducing potential noise impacts and enhance civil aviation access to Nowitna Wild and Scenic River by establishing a flight avoidance area, in the GALENA MOA, over the Nowitna River of 2,000 feet AGL and 2 nautical miles either side of the river centerline from May 15 to July 15
- Reducing potential noise impacts to recreation activities by conducting no Major Flying Exercises the week prior to and the week following the 4th of July

PUBLIC INFORMATION EXCHANGE

- Assisting the public in planning activities around Major Flying Exercises by publicizing the annual Major Flying Exercise schedules in publications such as the Milepost, visitor and traveler guides, and various newspapers
- Providing the public information on Air Force aviation activities, MFE schedules, and receiving information and/or concerns about Air Force activities, by continuing the in-state toll free number for Alaska residents (1-800-538-6647)

We believe the MOA EIS is an example of how government agencies can cooperate and respond to citizen comments. This process does not conclude here. It is dynamic and, while we believe each operational requirement has been thoroughly examined and mitigated, we remain committed to achieving a balance between wartime readiness and environmental protection.

In that spirit, I am pleased to present the Alaska Military Operations Areas Environmental Impact Statement.


 LAWRENCE E. BOESE
 Lieutenant General, USAF
 Commander

Cover Sheet

FINAL ENVIRONMENTAL IMPACT STATEMENT ALASKA MILITARY OPERATIONS AREAS

Lead Agency: U.S. Air Force, Pacific Air Forces

Cooperating Agency: U. S. Department of Transportation, Federal Aviation Administration

Proposed Action: Convert seven previously utilized temporary Military Operations Areas (TMOAs) in Alaska to permanent Military Operations Areas (MOAs); modify five existing permanent MOAs (times of operation, vertical dimensions, and internal boundaries); create two new permanent MOAs; conduct supersonic aircraft operations in nine (existing or new) MOAs; standardize floors for supersonic operations in three existing MOAs that already have supersonic operations; conduct routine flying training, joint/combined flying training, and up to six Major Flying Exercises (MFEs) per year (involving 100 aircraft in a maximum of 200 sorties per MFE-day) in the proposed MOA structure and existing air-to-ground weapons ranges; and authorize use of chaff and flares for routine and MFE training in all permanent MOAs.

Contact: Inquiries or comments on this document should be received by October 10, 1995, and directed to the address below:

MOA EIS Team
611 ASG/LGV
6900 9th Street, Ste. 301
Elmendorf AFB, AK 99506-2270
Phone: (907) 552-1807/552-4151
Fax: (907) 552-5287

Designation: *Final Environmental Impact Statement*

Abstract: This Final Environmental Impact Statement has been prepared in accordance with the National Environmental Policy Act to assess the potential direct, indirect, and cumulative impacts of the Proposed and Alternative Actions considered by the U. S. Air Force for restructuring Military Operations Areas (MOAs) in Alaska. This document examines the potential effects on airspace management, aviation safety, hazardous materials and operations, biological resources, recreational resources, subsistence, land use, air quality, and socioeconomics. The environmental consequences of all alternatives are analyzed and presented. The Air Force has selected Alternative A—Modified as the Preferred Alternative.

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INTRODUCTION

This is a brief summary of the Final Environmental Impact Statement (Final EIS), which addresses the important issues and concerns associated with restructuring of Air Force Special Use Airspace in Alaska and examines the potential environmental consequences of five different alternatives. These issues and concerns were determined over a two-year period by soliciting input and opinions from all sectors of the public with an interest in airspace and aircraft operations and the resources potentially affected. In response to public comment on the Draft EIS, new information was included in the Final EIS, additional possible mitigation measures were identified, and a new alternative (Alternative A—Modified) was evaluated and designated as the Air Force's Preferred Alternative.

This Final EIS completes the process of evaluating five different alternatives, including a No Action Alternative, for restructuring and using Air Force Special Use Airspace in Alaska. In general, the Air Force proposes to:

- Convert some previously utilized Temporary Military Operations Areas (TMOAs) to permanent MOAs;
- Modify some existing permanent MOAs;
- Create some new permanent MOAs;
- Continue to conduct supersonic aircraft operations in the currently authorized STONY A and B MOAs, SUSITNA MOA, YUKON 2 MOA, and YUKON 1 MOA (MFEs only); add supersonic aircraft operations in YUKON 1 MOA (routine and MFE training), YUKON 3 (High), 4 and 5 MOAs, and FOX MOA;
- Continue to conduct routine and joint/combined training with Alaska-based and deployed aircraft; and
- Continue to conduct up to six MFEs per year (not to exceed 60 days per year), but increase the number of authorized MFE aircraft from 85 to 100 and increase the number of MFE sorties from 150 to 200 per MFE-day;
- Continue to use chaff and flares during routine and MFE training as presently allowed in YUKON 1, YUKON 2, SUSITNA, STONY A, STONY B, NAKNEK 1, NAKNEK 2, and GALENA MOAs, and authorize use of chaff and flares for routine and MFE training in all new permanent MOAs in accordance with current 11th Air Force directives for safe employment.

A MOA is Special Use Airspace designated for nonhazardous military flight training activities such as air combat tactics, transition, formation training, and aerobatics. MOAs are depicted on various aviation charts so that pilots can be aware of their location and parameters. The MOAs considered in this EIS are located in the Northern Interior, Southern Interior, Southcentral, and Western Regions of Alaska.

BACKGROUND

The mission of the Air Force is defined by the National Command Authority (i.e., the President and the Secretary of Defense). The directives of the National Command Authority are translated into regulations and instructions issued by Department of Defense (DoD) commanders. As part of the Pacific Air Forces (PACAF), the mission of the 11th Air Force is first defined in the Commander-in-Chief, United States Pacific Command Instruction S3050.6 (*Pacific Command Strategy*) as follows:

"...to maintain the security of and defend the United States against attack throughout the Pacific Theater; to support and advance the national policies and interests of the United States; ...and to prepare plans, conduct operations, and coordinate activities of PACAF forces in consonance with higher authorities directives."

This mission is further defined through 11th Air Force directives to include offensive and defensive counter air, air interdiction, close air support and forward air control, suppression of enemy defenses, electronic combat, air refueling, and theater airlift. This variety of missions coupled with the number and types of aircraft and their related weapons systems require large and varied airspace, approved for both subsonic and supersonic operations.

Although the Alaska MOA structure has changed little since it was established in 1976, there have been considerable changes in the tasking, composition, numbers, capabilities, weapons systems, training programs, and airspace requirements of the aircraft assigned to Elmendorf and Eielson Air Force Bases (AFBs). The scope and complexity of Alaska-based unit taskings

has increased considerably with the focus of air operations now including support for more complex, world-wide contingency air operations. During the 1980s, F-15Cs replaced the F-4 aircraft at Elmendorf AFB and A-10s replaced the F-4s at Eielson AFB. In 1991, Elmendorf AFB gained an additional squadron of F-15Es, and Eielson AFB gained a squadron of F-16Cs. The F-15s and F-16Cs brought new technological dimensions to Alaskan air forces, such as supersonic flight and Advanced Medium Range Air-to-Air Missile capabilities. Other units throughout PACAF have undergone similar changes. These changes collectively required a revision of training programs to assure readiness. The existing Alaska MOA airspace no longer meets the requirements of these updated training programs and unduly hampers the ability of Alaska-based units to meet their more diverse and demanding responsibilities.

With the closing of Clark Air Base in the Philippines in 1991, Alaska became the closest U.S.-controlled tactical flying training area available to PACAF forces and U.S. allies in the Pacific. Consequently, in addition to aircraft permanently assigned to Alaska, other aircraft deploy here to participate in joint/combined flying training and MFEs like Cope Thunder. MFEs are designed to give aircrews their first taste of mock air warfare, ultimately increasing their chance of survival in real combat environments. The complex combat scenarios and advanced capabilities of many of the participating aircraft (e.g., supersonic flight) require large parcels of airspace. MFE airspace must also provide access to air-to-ground weapons ranges and use of ground-based threat radar and weapon system simulators. Exercise support missions such as air refueling, command and control, search and rescue, fighter escort, and electronic warfare further increase the amount of airspace required for MFEs. The existing Alaska MOA structure fails to fully support the Air Force's commitment to conduct MFEs and joint/combined training.

PURPOSE AND NEED

The purpose of the Proposed Action is to restructure and upgrade the MOAs in Alaska. The Proposed Action is needed to ensure that military aircrews are able to receive comprehensive and realistic tactical flying training in as safe an airspace as possible. This specific need stems from the larger need to secure the continued fighting efficiency and effectiveness of U.S. and allied air forces by providing airspace that allows these forces to train to U.S. Air Force (USAF) standards. The existing Alaska MOA structure imposes significant restrictions and inefficiencies on training opportunities, training realism, and the full use of all capabilities of the sophisticated aircraft/weapons systems presently based in Alaska. These restrictions significantly limit 11th Air Force (11 AF) units' abilities to more fully develop their combat capability in order to meet more demanding and complex wartime requirements.

The existing Alaska MOA structure lacks day-to-day, mutually accessible MOA airspace between Elmendorf and Eielson AFBs, precluding the accomplishment of significant routine training and, in particular, Dissimilar Air Combat Training (DACT) and Composite Force Training (CFT). DACT and CFT are critical air combat training building blocks that are readily available to other military aviation units throughout the continental United States. The lack of mutually accessible airspace suitable to conduct these critical categories of training unduly hampers Alaska-based units ability to achieve and maintain assigned combat readiness levels.

The existing Alaska MOA structure also lacks direct linkage between the MOAs and the Oklahoma (R-2202) and Blair Lakes (R-2211) air-to-ground weapons ranges and their associated ground based threat radar weapon system simulators. The isolation of these ranges from the MOA structure eliminates the ability to design realistic aircrew routine training scenarios that would integrate the most basic phases of a ground attack mission (ingress, attack, and egress). This lack of realism significantly restricts the efficient development of combat capability.

The tasking, composition, numbers, capabilities, and associated readiness training programs have changed. These changes have required Alaska-based units to further segment individual permanent MOAs, laterally and vertically, to accommodate simultaneous, de-conflicted use by separate flights of aircraft conducting independent training scenarios. This segmentation of individual MOAs often yields lateral and/or vertical airspace dimensions that are well below the standards specified in the *U.S. Air Force Airspace Master Plan* (1993). Increases in the scope and complexity of Alaska-based unit taskings further amplifies the negative impact of MOA segmentation on the ability to conduct realistic air combat training to achieve assigned readiness levels.

The existing Alaska MOA structure is inadequate to support the Air Force's commitment to conduct the most realistic and effective MFEs and joint/combined training possible. A number of TMOAs were negotiated and established and activated as required for each MFE. However, under Federal Aviation Administration (FAA) regulations, establishing and activating TMOAs takes a minimum of four months lead time to process through environmental and FAA channels. Furthermore, TMOAs are rarely charted on civilian or DoD aviation charts and are typically activated by the Notice to Airmen (NOTAM) system prior to each use. Converting previously utilized TMOAs to permanent MOAs, as proposed, would allow this airspace to be charted and make information pertaining to airspace boundaries readily available to all aviators.

The existing Alaska MOA structure possesses several characteristics that must be preserved when considering and evaluating the airspace restructuring alternatives. The MOAs must continue to be:

- accessible,
- geographically dispersed within the accessible region to deal with Alaska's often adverse weather,
- suitably sized,
- arrayed to minimize interference with civilian route structures, and
- equipped with a suitable degree of lateral segmentation to provide for flexible FAA management of civilian and military access and operations within these MOAs.

Establishing a single, regional-sized MOA would not permit the designation of varied floors or ceilings where necessary to avoid other FAA route/airspace structures or environmentally sensitive areas. A tailored array of contiguous, multiple MOAs possessing different floors/ceilings where necessary that achieves military readiness requirements, provides for civil aviation access, allows efficient FAA management of MOA access, and is sensitive to environmental concerns is the most prudent and balanced restructuring concept.

PLANNING PROCESS

The National Environmental Policy Act (NEPA) requires that any agency proposing a major federal action prepare a detailed statement on the environmental impact of the proposed action, alternatives to the proposed action, and any adverse effects that cannot be avoided should the proposed or alternative action be implemented. The term "major" does not refer to the size of the action, but to the significance of its potential impact. The Council on Environmental Quality (CEQ) regulations for implementing NEPA also require agencies to seek public and agency input during the preparation of an EIS through a process known as scoping and, later, through public hearings on the Draft EIS.

This environmental impact analysis process started on July 9, 1993, with the Air Force's publication of a Notice of Intent to prepare this EIS in the *Federal Register*. From September 20 through November 15, 1993, public scoping meetings were held in 14 locations throughout the state to give the public an opportunity to voice concerns regarding the Proposed Action and identify issues they wished to see addressed in the EIS. The Air Force delayed public scoping meetings until late September to avoid conflict with summer subsistence and recreation activities. Following publication of the Notice of Intent, meetings were announced in regional and local Alaska newspapers and then again at least two weeks prior to each meeting. The Air Force also solicited input from federal, state, and local agencies, Alaska Native groups, and civil aviation groups. As a result of this solicitation of input, an additional alternative was identified which resulted in an additional scoping meeting in Tok on February 8, 1994. All relevant issues identified through the scoping process have been addressed in this Final EIS. This EIS is intended to provide the decision-maker with an environmental disclosure sufficiently detailed to enable an informed decision among alternatives. Of equal importance, the preparation of the EIS facilitated broad and active participation by the public, agencies, and other interested organizations in the planning process.

The Notice of Availability of the Draft EIS was published in the *Federal Register* on 2 September 1994. Public hearings were conducted in September and October, 1994, at the same locations visited during scoping, and provided an opportunity for the public to comment on the findings presented in the Draft EIS. The public comment period, initially planned to close on October 31, 1994, was extended by the Air Force to November 30, 1994, to allow more time for the public to study and comment on the Draft EIS. All substantive comments received within the public comment period were considered and

included in this Final EIS. Comments received after the close of the comment period were reviewed and the issues raised were found to be similar to those received during the comment period.

The Secretary of the Air Force or her designee will decide which of the alternatives to implement. Concurrent with the development and release of the Final EIS, the FAA will circularize (present for public review) an Aeronautical Study in accordance with *FAA Handbook 7400.2*. The results of this study, along with the Final EIS, will form the basis of FAA's decision regarding the proposal for restructuring MOAs in Alaska and the Air Force's Record of Decision. It is important to note that the FAA has final authority for approving, modifying, or denying a proposal to establish airspace, including MOAs. Following completion of the FAA Aeronautical Study, the Air Force will publish its Record of Decision identifying the Preferred Alternative and all mitigation measures to be implemented. The Record of Decision is anticipated for release in the winter of 1995-96. Approval and charting of the airspace in its final form and implementation of the Preferred Alternative would follow in the spring of 1996.

ISSUES SUMMARY

The range of issues and concerns expressed through verbal and written comments on the Draft EIS were similar to those raised during scoping. Some 214 written comments were received from individuals, agencies, and other interested groups. Comments were also recorded at the 15 public hearings and through the statewide toll-free phone number established to receive input and disseminate information pertaining to the EIS. Issues continued to vary considerably from one location to another, but the key issues remained constant and it is these key issues that are addressed in the Final EIS:

- ✦ **Airspace Management, Aircraft Operations, and Aviation Safety.** Potential hazards of military flight operations in areas of heavy civilian and/or non-DoD agency aircraft activities; potential impacts on public use of airspace by private and commercial pilots; possible impacts on public use airports and air traffic control services provided by the FAA; and potential increases in aircraft mishap rates.
- ✦ **Chaff and Flares/Hazardous Operations.** Potential impacts associated with the use of chaff and flares, airborne lasers, and munitions; and possible impacts on emergency response procedures associated with fire management, hazardous material and hazardous waste handling, and fuel jettison.
- ✦ **Wildlife.** Potential long- and short-term impacts on biodiversity, protected species, and specific animal populations due to repeated exposure to aircraft noise.
- ✦ **Recreation.** Potential for military aircraft overflights and associated noise to affect recreation resources and the recreation experience.
- ✦ **Subsistence.** Potential impacts of aircraft overflights on subsistence resources and subsistence activities, particularly on public lands.
- ✦ **Land Use.** Potential for increased noise levels due to military aircraft overflights to affect land status, use, or management policies; wilderness values; aesthetic characteristics; and the quality of life.
- ✦ **Air Quality.** Potential for increased aircraft emissions of criteria air pollutants to affect air quality, particularly in the Anchorage and Fairbanks carbon monoxide nonattainment areas and the Denali National Park and Preserve Prevention of Significant Deterioration Class I air quality area.
- ✦ **Socioeconomics.** Potential for increases in transient military personnel and aircraft activity associated with MFEs to affect local economies.

DESCRIPTION OF THE ALTERNATIVES

Features Common to All Alternatives

Four factors were considered in identifying alternatives: 1) aircraft operational parameters, 2) existing facilities and assets, 3) existing airspace infrastructure, and 4) the tactical flying training program and airspace standards. An alternative had to meet strict criteria associated with these factors in order to meet the combat readiness requirements of the Air Force in Alaska and be considered a reasonable alternative.

Routine training involves aircraft departing from their base, participating in training missions that have one or more objectives (e.g., counter air, air interdiction, close air support, forward air control, suppression of enemy defenses), and returning to base. This scenario (take-off, training flight, and full-stop landing) is called a "sortie." Because an aircraft can pass through one or more MOAs while conducting one sortie, several operations may be conducted during one sortie. For the purposes of this EIS, operations are the number of times an aircraft conducting 11th Air Force flying training on a routine or MFE flying day would "pass" through a MOA.

Routine training (which includes joint and combined training for analysis purposes) would occur throughout the year. However, due to fiscal constraints, these training activities would occur over an average of 240 days per year, including 60 days of MFE training. This assumption does not imply that flying activities would only take place 240 days per year. Rather, it means that the number of flying hours allocated to 11th Air Force units through the annual budget are typically distributed over 240 days per year in order to assure unit combat readiness throughout the year (see Appendix E).

Routine training (including joint and combined training) could take place Monday through Friday, between 7:00 a.m. and 10:00 p.m.¹ Training could also take place, on average, up to two weekends per quarter. In general, routine training activities would occur at a reduced level during certain periods such as around Thanksgiving and Christmas or when 11th Air Force units are deployed out of the state for other training.

Exercise training includes MFEs, Low-Altitude Navigation and Targeting Infrared for Night (LANTIRN) exercises, weapons training deployments, Air National Guard and Air Force Reserve deployments, and multinational exercises. Exercises integrate air-to-air and air-to-ground missions as well as support missions such as airborne command and control, electronic combat, tactical airlift, and search and rescue. Participants in MFEs may include aircraft from other U.S. military services, North Atlantic Treaty Organization (NATO) allies, and allies from other nations. During an MFE, a combat scenario is developed and roles are given to participating aircraft. Ground forces position simulated air defenses throughout the training area to provide, in conjunction with airborne defenses, a realistic air defense environment. Participating aircraft are temporarily assigned to an airbase in Alaska from which they depart and to which they return at the end of a sortie. During an exercise, aircraft typically accomplish two sorties per day.

MFE training would occur no more than 60 days per year (up to 6 exercises per year). Typically, one exercise would take place some time between February and April, four exercises between May and August, and one more exercise between October and November. Generally, an MFE would run for 10 flying days, but could last for as many as 15 flying days. MFE training would peak during the summer months (June through August); no MFEs would occur during the winter months of December and January. MFEs would normally occur Monday through Friday, 8:00 a.m. to 6:00 p.m.¹ Training on weekends may also occur, an average of two weekends per quarter. In general, exercise operations would take place for 2 hours before noon (12:00 noon.) and 2 hours after noon (12:00 noon.) each exercise day. The morning and afternoon periods could run consecutively. During an exercise, the total number of daily aircraft sorties (exercise and routine training sorties) from Eielson AFB may increase as much as 174 percent over routine daily training sorties. At Elmendorf AFB, the total number of daily aircraft sorties (exercise and routine training sorties) may increase as much as 95 percent over routine daily training sorties. Flight operations during an exercise would normally use Northern Interior, Southern Interior, and

¹Sometimes it may be necessary for the Air Force to train outside the published hours. This would require that a special Notice to Airman (NOTAM) advisory be approved and issued by the FAA. However, the Air Force would plan MOA operations to begin after 7:00 a.m. local time and cease before 10:00 p.m. local time.

Southcentral MOAs (except for SUSITNA MOA), and would include use of the air-to-ground weapons ranges. MFE training may involve as many as 100 aircraft per day, each flying as many as 2 sorties per day, for a total of 200 MFE sorties per day (except under the No Action Alternative).

Included in the 60 MFE-day period, a maximum of two nighttime MFEs could be conducted each year, for a maximum of 30 days annually. Night MFEs would usually be scheduled for February/March and October/November. During these MFEs, aircraft landings could take place at Eielson and Elmendorf AFBs between 10:00 p.m. and 11:00 p.m., but all landings would be completed by 11:00 p.m. Aircraft operations in the MOAs and aircraft take-offs from the bases would not occur after 10:00 p.m. Night MFE operations would be limited to 10 percent of the total daily MFE sorties, or an average of 20 sorties per night.

Table ES-1 summarizes the average daily aircraft activity by MOA for each alternative. A couple of definitions of terms used in this table are in order. A "routine training day" is a day during which only routine flying training is conducted. An "MFE training day" is a day during which MFEs and routine flying training are conducted. MOA aircraft activity data are based on the average of 240 training days per year. Numbers in Table ES-1 depict the maximum anticipated average number of times an aircraft conducting routine or MFE flying training would "pass" through a MOA on a routine or MFE training day.

Table ES-1 Average Daily Aircraft Operations by MOA for Each Alternative.¹

MOA (TMOA)	No Action Alternative (TMOA)		Proposed Action		Alternative A		Alternative B		Alternative A-Modified	
	Routine training day	MFE training day ²	Routine training day	MFE training day ²	Routine training day	MFE training day ²	Routine training day	MFE training day ²	Routine training day	MFE training day ²
NORTHERN INTERIOR REGION										
YUKON 1	11	149	18	206	PA ³	PA	PA	PA	PA	PA
YUKON 2	14	152	12	201	PA	PA	PA	PA	PA	PA
YUKON 3 (YUKON 3)	N/A ⁴	119	8	166	PA	PA	PA	PA	PA	PA
YUKON 4 (YUKON 3)	N/A	N/A	7	164	PA	PA	N/A	N/A	PA	PA
YUKON 5 (YUKON 4)	N/A	132	<1	170	PA	PA	N/A	N/A	N/A	PA
YUKON 6 (YUKON 1A)	N/A	70	14	107	PA	PA	PA	PA	PA	PA
SOUTHERN INTERIOR REGION										
BUFFALO (BUFFLO)	N/A	140	12	86	PA	PA	PA	PA	PA	PA
BIRCH (EIELSON A)	N/A	140	14	145	17	152	PA	PA	17	152
EIELSON (EIELSON B)	N/A	140	11	105	13	111	PA	PA	13	111
FALCON	N/A	N/A	5	13	PA	PA	PA	PA	PA	PA
CLEAR CREEK	N/A	N/A	5	13	N/A	N/A	PA	PA	N/A	N/A
SOUTHCENTRAL REGION										
FOX (FOX 1)	N/A	50	16	80	PA	PA	PA	PA	PA	PA
TANANA (FOX 2)	N/A	50	N/A	N/A	N/A	N/A	8	164	N/A	N/A
SUSITNA	8	7	3	3	PA	PA	PA	PA	PA	PA
WESTERN REGION ⁵										
NAKNEK 1	7	6	5	4	PA	PA	PA	PA	PA	PA
NAKNEK 2	4	4	3	3	PA	PA	PA	PA	PA	PA
STONY A ³	18	23	17	23	PA	PA	PA	PA	PA	PA
STONY B ³	8	13	7	13	PA	PA	PA	PA	PA	PA
(STONY C) ³	N/A	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GALENA	<1	<1	<1	<1	PA	PA	PA	PA	PA	PA

Source: see Appendix E, Distribution of MOA Sorties worksheets. Fractions have been rounded up to the next highest whole number; where operations in a MOA were determined to be less than 1 per day, this has been indicated by "<1."

¹ Numbers in this table depict the anticipated average number of times an aircraft conducting 11th Air Force flying training on a routine or MFE flying day would "pass" through a MOA. Because an aircraft can pass through one or more MOAs while conducting one "sortie" (one take-off, training flight, and full-stop landing), it would be incorrect to add the total operations depicted in this table to determine the total number of sorties generating specified MOA activity. Please refer to Table 2-6 for sortie numbers.

² Numbers on MFE training days include routine and MFE activity: routine training typically would continue to occur at slightly reduced rates during MFEs.

³ PA indicates that the number would be the same as under the Proposed Action (PA).

⁴ N/A means not applicable to this MOA. (See description of training operations conducted in each MOA in sections 2.4.2 through 2.4.6).

⁵ Numbers in MFE training day column for the Western Region reflect routine training and limited air-to-air surge exercise training rather than MFE training.

Proposed Action—Key Elements

Specifically, the Proposed Action would: 1) convert seven previously utilized TMOAs—YUKON 3, YUKON 4, YUKON 1A, BUFLO, EIELSON A, EIELSON B, and FOX 1—to the permanent MOAs YUKON 3, YUKON 4, YUKON 5, YUKON 6, BUFFALO, BIRCH, EIELSON, and FOX; 2) modify the times of operation, vertical dimensions, and/or internal boundaries of five existing MOAs (YUKON 1, STONY B, NAKNEK 1, NAKNEK 2, and GALENA MOAs); 3) create two new permanent MOAs—CLEAR CREEK and FALCON; 4) conduct supersonic aircraft operations down to 5,000 feet above ground level (AGL) in nine YUKON 1, YUKON 2, YUKON 3, YUKON 4, YUKON 5, SUSITNA, FOX, STONY A, and STONY B MOAs; 5) standardize floors for supersonic operations in three existing MOAs (YUKON 1, STONY A, and STONY B) at 5,000 AGL; 6) conduct routine and joint/combined flying training with Alaska-based and deployed aircraft; 7) conduct up to six MFEs per year involving up to 100 aircraft in a maximum of 200 sorties per MFE-day, using the proposed MOA structure and existing air-to-ground weapons ranges; and 8) use chaff and flares during routine and MFE training in selected permanent MOAs in accordance with 11th Air Force directives for safe employment. An overview of the Proposed Action, which would encompass an estimated 63,420 square miles, is presented in Figure ES-1.

Compared to existing conditions (i.e., the No Action Alternative), increases in the number of aircraft operations in some MOAs would be quite small and operations on other MOAs would actually decrease (for example, in the YUKON 2, SUSITNA, NAKNEK, and STONY MOAs). In other cases, particularly in the YUKON 1-6 and FOX MOAs, the increases would be more substantial, with MOA operations increasing up to 16 operations on routine training days and between 30 and 57 operations on MFE training days.

Positive aspects of the Proposed Action include: 1) raising the floor of the YUKON 1 MOA from the surface to 100 feet AGL; 2) raising the floor of the YUKON 4 TMOA from 2,000 feet AGL to 3,000 feet AGL; 3) eliminating the FOX 2 and STONY C TMOAs entirely; 4) reducing the standard hours of operation in the NAKNEK 1 and NAKNEK 2 MOAs from 6:00 a.m. to 6:00 p.m., Monday through Friday to 10:00 a.m. to 3:00 p.m., Monday through Friday; 5) reducing the standard hours of operation in the GALENA MOA from 8:00 a.m. to 6:00 p.m., Monday through Friday to activation by the Notice to Airmen System for infrequent use; and 6) decreasing routine aircraft operations in some of the existing permanent MOAs, although the decreases would be relatively minor.

Potential negative aspects of the Proposed Action include: 1) authorizing the YUKON 1, YUKON 3, YUKON 4, YUKON 5, and FOX MOAs for supersonic operations down to 5,000 feet AGL during routine and MFE flying training; 2) lowering the floor of the BUFFALO MOA from 1,000 feet AGL to 300 feet AGL; and 3) lowering the floor of the STONY B MOA from 3,000 feet AGL to 100 feet AGL. Converting the TMOAs to permanent MOAs would make them available for routine flying training year-round. Increases in the number of military aircraft operations are likely to be most discernible in the BUFFALO, BIRCH, EIELSON, CLEAR CREEK, and FALCON MOAs with an average of 5 to 14 routine flying training operations per day; and in the FOX MOA with 16 per day.

Alternative A—Key Elements

The Proposed Action and Alternative A are identical except that the CLEAR CREEK MOA (approximately 400 square miles) would not be established and the relatively low number of aircraft training operations planned for this MOA (5 per routine training day and 13 per MFE training day) would be conducted instead in the FALCON and EIELSON MOAs. An overview of Alternative A is presented in Figure ES-2. This alternative was developed based on public input received during the scoping process. Alternative A reasonably satisfies the mandatory criteria established by the Air Force. The positive and negative aspects described for the Proposed Action are true of this alternative as well, with the additional positive aspect that resources underlying the proposed CLEAR CREEK MOA would not be affected. Alternative A would encompass approximately 63,020 square miles.

Alternative B—Key Elements

Under Alternative B, the YUKON 4 and YUKON 5 MOAs (approximately 8,030 square miles) would not be established and another new supersonic MOA, the TANANA MOA, would be created (approximately 6,810 square miles). All other elements of Alternative B are identical to the Proposed Action. An overview of Alternative B is presented in Figure ES-3.

This alternative was also developed in response to public comments received during scoping concerning other possible locations for MOAs. This alternative reasonably satisfies the mandatory criteria used by the Air Force. Because this alternative is similar in many respects to the Proposed Action, most of the positive and negative aspects described for the Proposed Action are true of this alternative as well. There are two notable differences, however: 1) any negative aspects associated with establishing the YUKON 4 and YUKON 5 MOAs would not be realized; and 2) any positive elements of eliminating the FOX 2 TMOA would be negated by establishment of the TANANA MOA, which would cover essentially the same territory plus substantially more and would be authorized for supersonic operations down to 5,000 feet AGL. Alternative B would overlie about 62,200 square miles.

Alternative A—Modified (Preferred Alternative)—Key Elements

Alternative A—Modified was developed in response to comments received on the Draft EIS. It differs from the Proposed Action and Alternative A in the following ways: 1) the CLEAR CREEK MOA would not be established, 2) the external boundaries of the STONY A, NAKNEK 2, BIRCH, and FOX MOAs would be altered to reduce the overall size of these MOAs and preclude the potential for direct overflight of sensitive resources, 3) the floors of the FOX and YUKON 5 MOAs would be 5,000 feet AGL rather than 3,000 feet AGL, 4) the YUKON 5 MOA would be used for MFEs only, 5) the floor of the YUKON 3B MOA (the southeastern half of the proposed YUKON 3 MOA) would be 2,000 feet AGL rather than 100 feet AGL, and 6) the floor for supersonic operations would be 5,000 feet AGL or 12,000 feet mean sea level (MSL), whichever is higher, in YUKON 1, YUKON 2, YUKON 3, YUKON 4, YUKON 5, SUSITNA, FOX, STONY A, and STONY B MOAs. An overview of Alternative A—Modified is presented in Figure ES-4. This alternative would encompass roughly 60,780 square miles.

No Action Alternative—Key Elements

The No Action Alternative would maintain the status quo. 11th Air Force would continue to apply for some or all of the nine previously utilized TMOAs (YUKON 3, YUKON 4, YUKON 1A, FOX 1, FOX 2, STONY C, BUFLO, EIELSON A, and EIELSON B) up to six times each year in order to conduct MFEs. The times of operations, vertical dimensions, and internal boundaries of the existing YUKON 1, YUKON 2, SUSITNA, STONY A, STONY B, NAKNEK 1, NAKNEK 2, and GALENA MOAs would remain the same. Supersonic operations would only be conducted in YUKON 2, SUSITNA, STONY A, and STONY B MOAs; and in YUKON 1 MOA during MFEs. The floors of these MOAs for supersonic operations would continue to be 5,000 feet AGL or 10,000 feet MSL, whichever is higher. Routine and joint/combined flying training by Alaska-based and deployed aircraft would be conducted only in permanent airspace. MFEs would be conducted in the MOA/TMOA structure with up to 85 aircraft participating in a maximum of 150 sorties per MFE-day. An overview of the No Action Alternative, which would involve about 70,970 square miles, is presented in Figure ES-5.

Figure ES-1 Overview of the Proposed Action

Alaska Military Operations Areas Environmental Impact Statement — Proposed Action —

-  Existing Military Operations Areas (MOAs)
-  Proposed New MOAs
-  Proposed Conversion of Temporary MOAs to Permanent MOAs

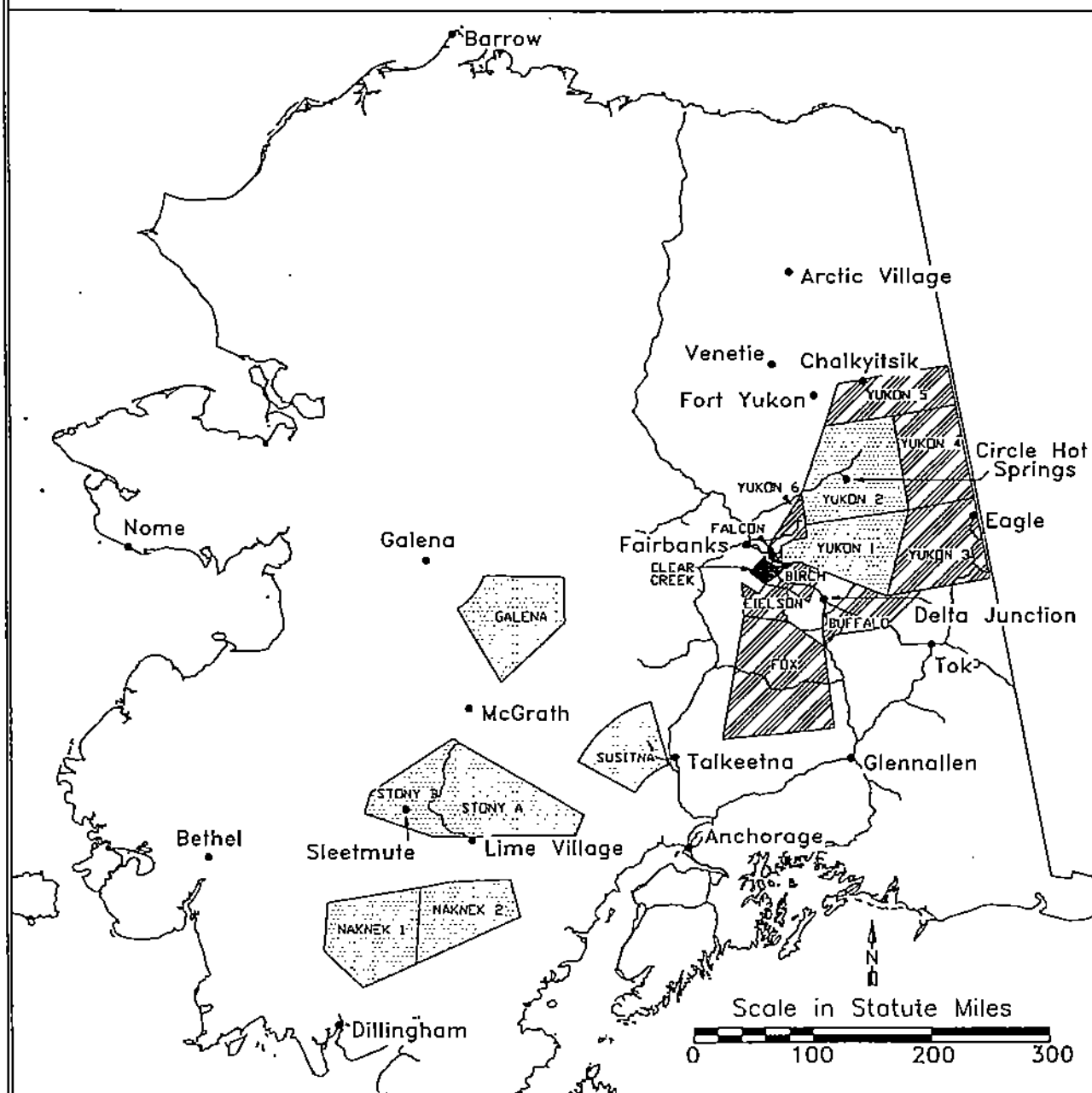


Figure ES-2 Overview of Alternative A

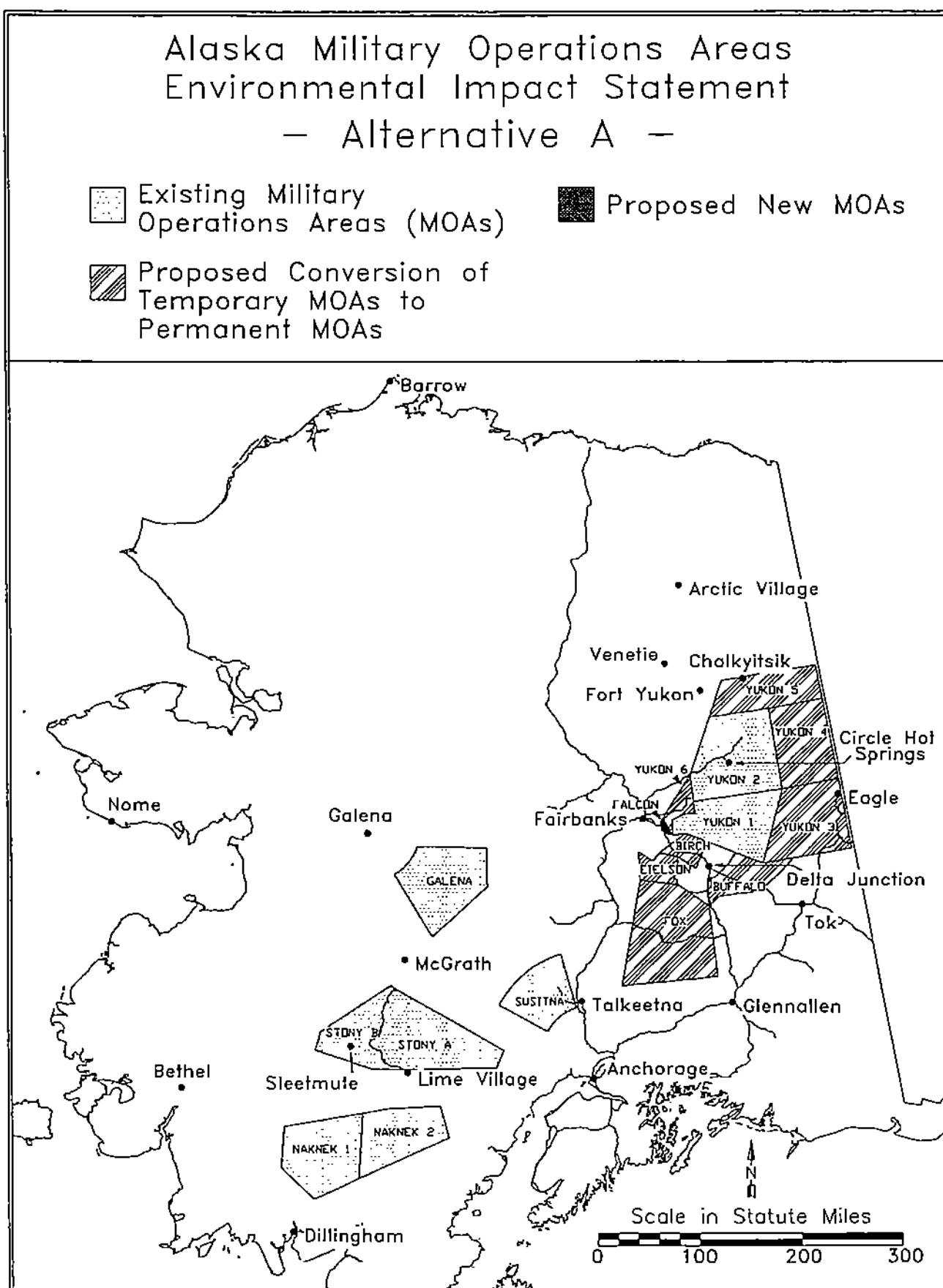


Figure ES-3 Overview of Alternative B

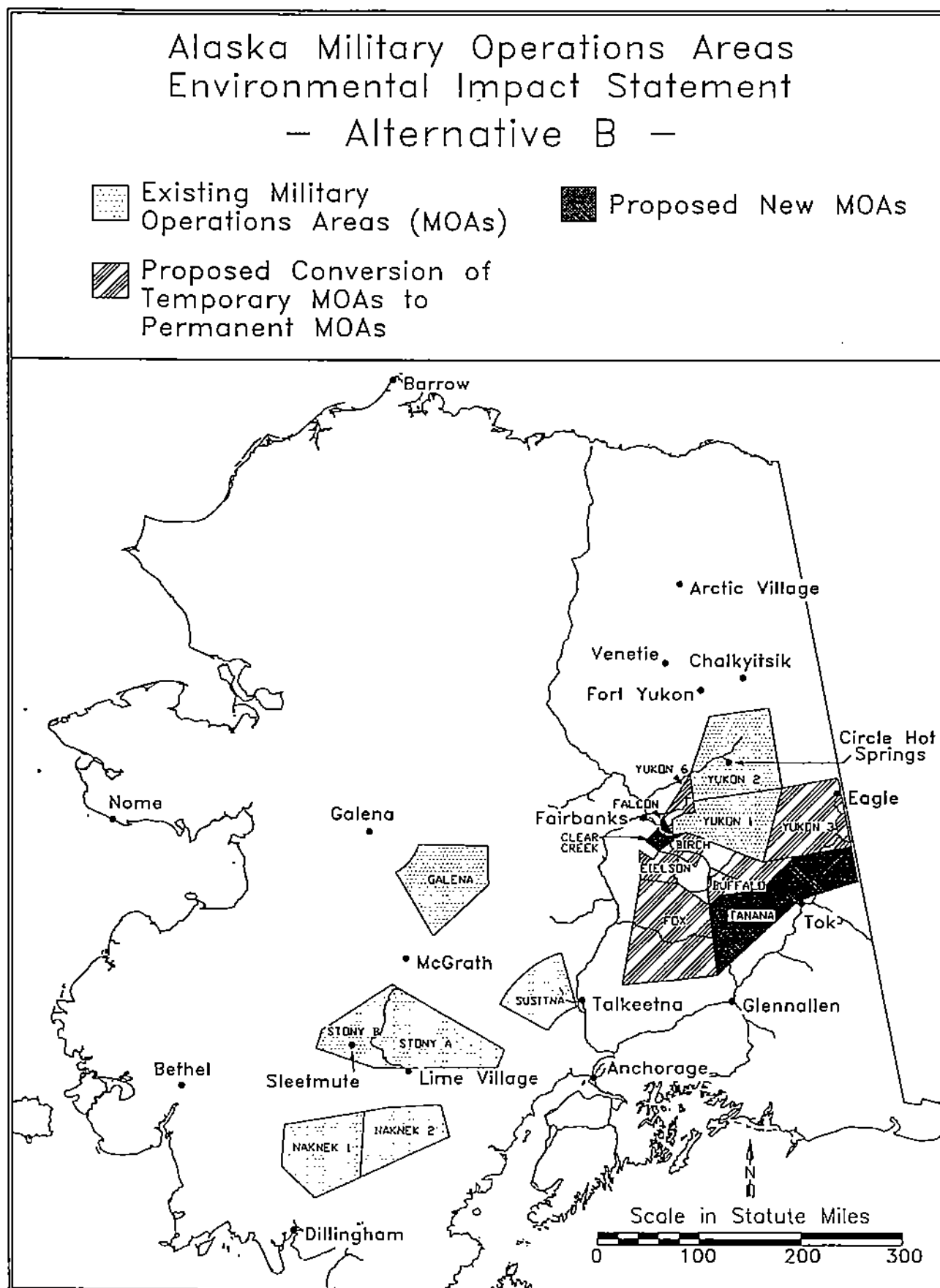


Figure ES-4 Overview of Alternative A--Modified

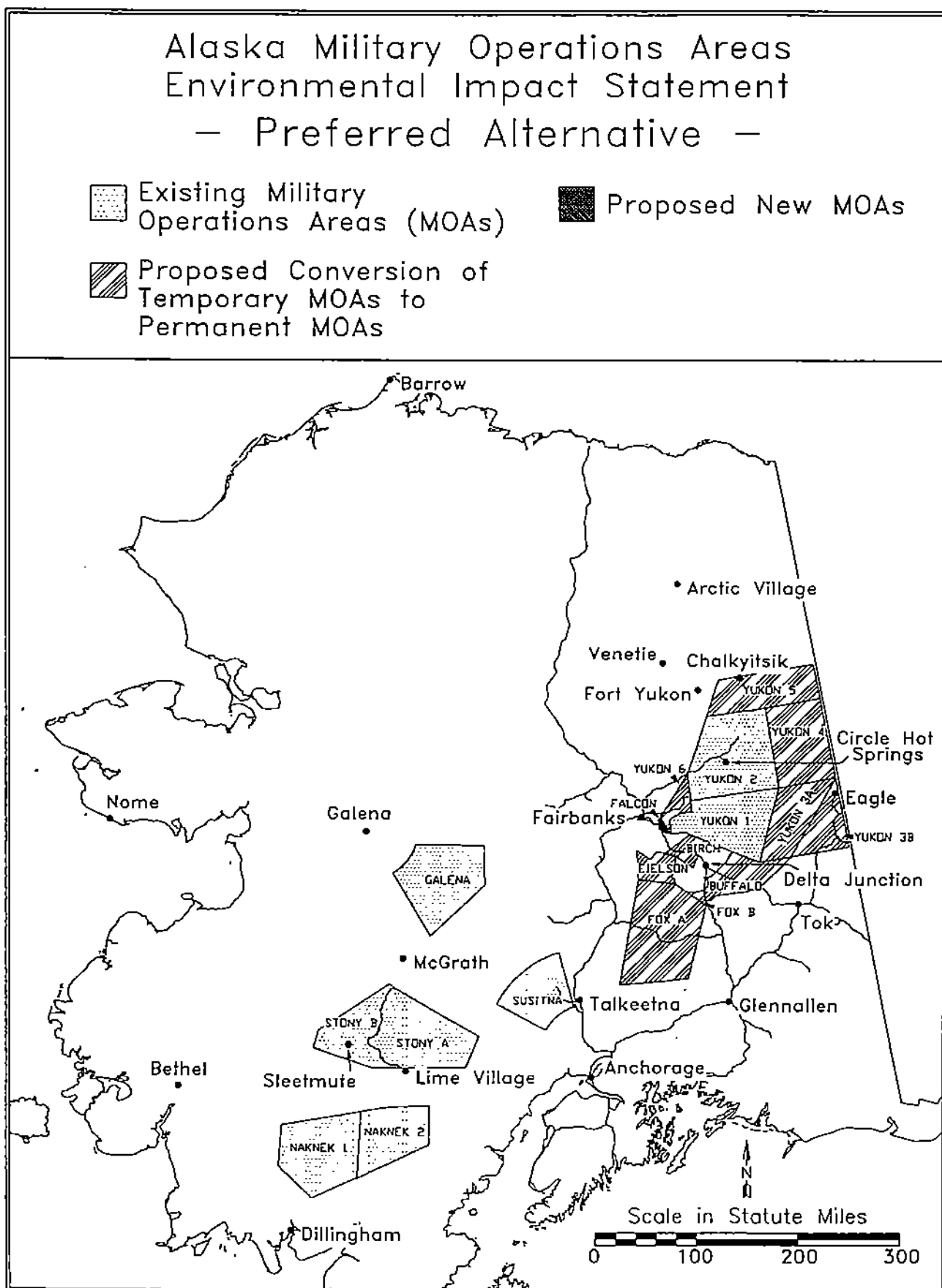
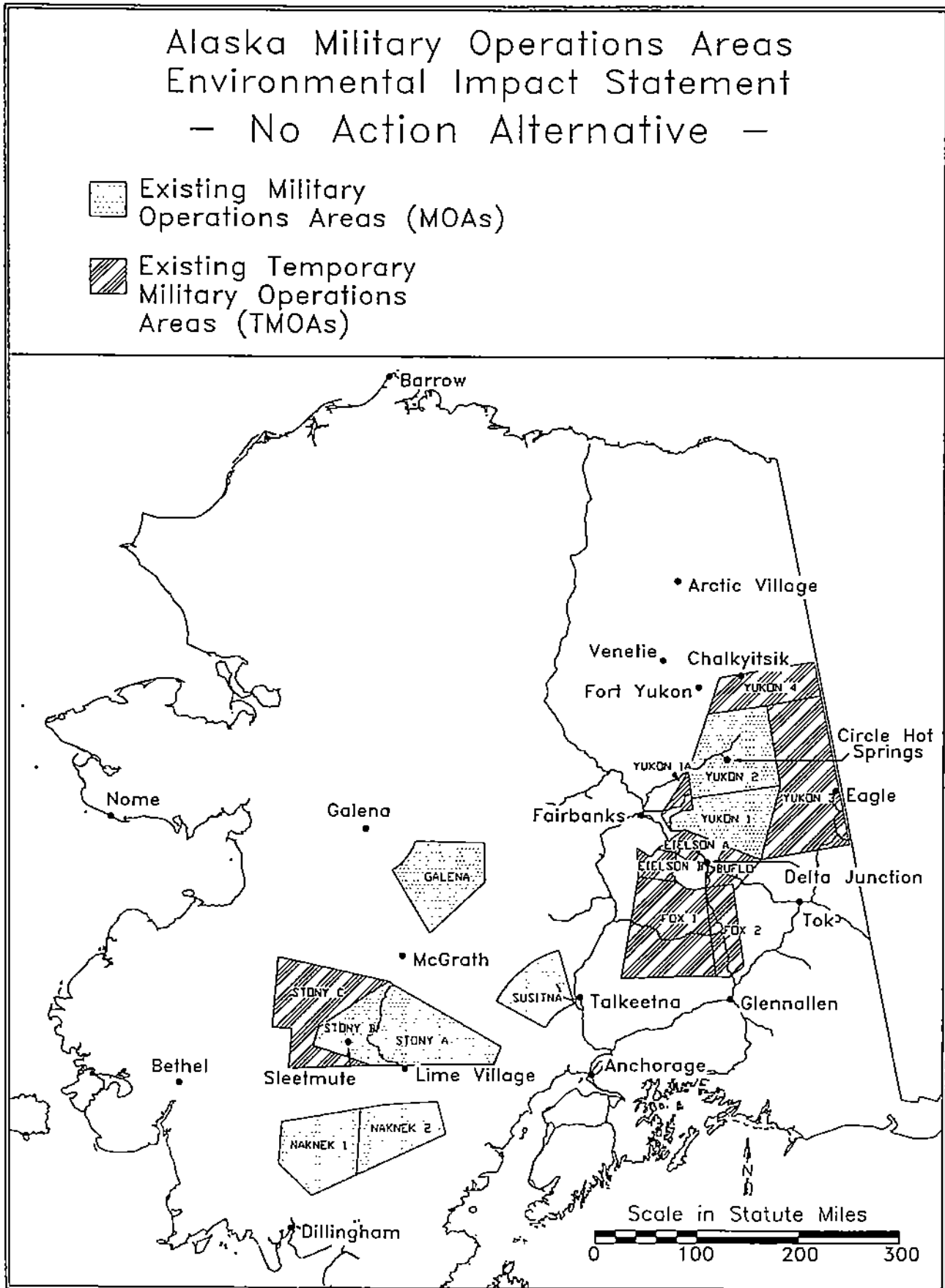


Figure ES-5 Overview of the No Action Alternative



ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

Determining Environmental Consequences

Existing environmental conditions provided the basis for analyzing the potential effects of the alternatives. The impact analysis relied on a mix of established methodologies (e.g., for land use and air quality) and methodologies developed specifically for this EIS in the absence of established approaches (e.g., for recreation and subsistence). Because implementation of any alternative, including the No Action Alternative, would affect the environment, the methodologies were designed to predict not only what impact was likely to result, but also the probable severity of the impact. Thus, impact levels were defined broadly as none or negligible (Level I Impacts); adverse, but not significant (Level II Impacts); and significantly adverse (Level III Impacts). Direct and indirect effects were considered, as were short-term, long-term, and potential cumulative effects.

Resources for which adverse impacts (Level II) or significantly adverse impacts (Level III) are predicted are identified; resources not specifically mentioned are expected to sustain no or negligible impacts (Level I). Note that the FAA assumes responsibility for assessing impact levels (I, II, or III) with regard to airspace management, aircraft operations, and aviation safety through its circularization process for the Air Force's airspace proposal. Consequently, except for mishap potential for military aircraft using the airspace, the Final EIS does not predict impacts to these resource elements.

Effects that Do Not Vary Significantly Among Alternatives

Chaff, Flares, and Hazardous Operations (Sections 3.3 and 4.3)¹

The airspace approved for use of chaff and flares would increase, but existing employment procedures preclude any increased risk of wildland fires or other environmental degradation (Level I Impacts). The use of airborne lasers in the MOAs would be restricted to the eye-safe "training" mode to avoid any potential injury to humans (Level I Impacts). Munitions expenditures would not increase, nor would they exceed the annual range cleanup capability (Level I Impacts). The slightly higher number of MFE sorties could incrementally increase the occurrence of emergency fuel jettisoning, but existing procedures designed to avoid environmental degradation accommodate this increase (Level I Impacts).

The types of hazardous materials present at the bases would not change, and any increase in the amounts of hazardous materials present or the amounts of hazardous waste generated would be expected to be negligible. The handling and use of hazardous materials would remain subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Emergency Planning and Community Right-to-Know Act, Air Force Occupational Safety and Health standards, and state regulations. Additional hazardous waste, regardless of quantity, would continue to be handled in accordance with the procedures for large quantity generators established by the Resource Conservation and Recovery Act. Actual discharges of hazardous materials and hazardous wastes are possible and would be reported in accordance with state and federal law, although the potential for such occurrences is thought to be slight. Releases would be the subject of immediate response by trained personnel, and the potential for damage to human health or the environment is minimal (Level I Impacts).

Land Use (Sections 3.8 and 4.8)

Potential adverse effects to land use are anticipated for areas that have not been previously exposed to average sound levels considered by the American National Standards Institute to be incompatible or marginally compatible with the predominant land use (Level II Impacts). Level II Impacts are predicted for 689 on-base residents of Eielson AFB who were not previously exposed to Day-Night Average Sound Levels (DNL) greater than 65 decibels, 176 of whom are predicted to be "Highly Annoyed" by this exposure. Level II impacts are also predicted for 504 residents located off-base, but adjacent to

¹Section numbers refer to the location of more detailed information in the *Final EIS* about existing conditions and environmental consequences.

Elmendorf AFB, who were not previously exposed to DNL greater than 65 decibels, 106 of whom are anticipated to be "Highly Annoyed."

Air Quality (Sections 3.9 and 4.9)

Emissions of criteria air pollutants due to increased aircraft operations during MFEs would result in negligible (Level I) impacts) to the Fairbanks and Anchorage carbon monoxide nonattainment areas, the Denali National Park and Preserve Prevention of Significant Deterioration Class I air quality area, and all other areas within the Region of Influence.

Socioeconomics (Sections 3.10 and 4.10)

The local economies of Eielson and Elmendorf AFBs would experience beneficial financial input from transient personnel associated with MFEs. At Eielson AFB, a maximum estimate of 1,015 transient personnel per MFE, each staying 15 days and spending an average of \$55.00 per day, would result in \$837,375.00 spent per MFE; or a total of \$5,024,250.00 spent annually (6 MFEs per year), most within the Fairbanks North Star Borough and surrounding region. At Elmendorf AFB, a maximum estimate of 322 transient personnel per MFE, each staying 15 days and also spending an average of \$55.00 per day, would result in \$265,650.00 spent per MFE; or a total of \$1,593,900.00 spent annually (6 MFEs per year), most within the Municipality of Anchorage and surrounding region.

There is no evidence that recreationists would choose to go elsewhere to recreate on the basis of exposure to or knowledge of aircraft overflights. Therefore, potential impacts to commercial recreation resources and activities under the existing and proposed MOAs are predicted to be Level I or less.

Effects on Resources that Vary Among Alternatives

Airspace Management, Aircraft Operations, and Aviation Safety (Sections 3.2 and 4.2)

Proposed Action and Alternative A

There would be increased potential for incidental interaction between military and civil aviation and occasional disruption of civil aviation in YUKON 3, YUKON 4, BIRCH, EIELSON, BUFFALO, and STONY B MOAs.

Alternative B

There would be increased potential for midair collision between military and civil aircraft in areas of high civil aviation activity in the TANANA MOA. Also predicted in the TANANA MOA is the probable closure of V-481, V-444, and V-515 to IFR traffic necessitating changes in existing FAA preferred routings and complete restructuring of 11th Air Force and FAA procedures for coordinating airspace use.

Alternative A—Modified

The potential for interaction between military and civil aviation and disruption of civil aviation would be reduced in the YUKON 3, BUFFALO, and BIRCH MOAs with the creation of civil flight corridors and elevation of these MOA floors as compared to the Proposed Action.

No Action Alternative

Occasional disruptions of civil flight activities are possible with activation of TMOAs along the Alaska and Richardson highways during MFEs. No impact would be expected along the Holitna and Kuskokwim drainages under the STONY B MOA.

Biological Resources (Sections 3.5 and 4.5)

Proposed Action

Significant adverse impacts to wildlife are defined as impacts that may help cause or maintain substantial reduction or large-scale dislocation of local, regional, or entire wildlife populations (Level III Impacts). Adverse impacts are defined as impacts that may help cause or maintain minor reduction or displacement of local, regional, or entire wildlife populations (Level II Impacts). Potential Level III and Level II impacts would generally result from cumulative rather than direct or indirect effects of military aircraft overflight. As the potential Level II impacts identified encompass such large areas, they are described in general terms only.

Consultation with the U.S. Fish and Wildlife Service, in accordance with Section 7 of the Endangered Species Act, identified the American peregrine falcon (*Falco peregrinus anatum*) as the only protected species of concern. Because nest-avoidance restrictions stipulated in a 1993 Biological Opinion and 1994 supplement would remain in force, no significant adverse impact to protected species is anticipated.

Level III Impacts are possible for the following biological resources:

- Trumpeter swans nesting along the west fork of the Gulkana River under the FOX MOA and, to a lesser degree, along the three major drainages beneath the SUSITNA MOA;
- The Delta Caribou Herd located under the CLEAR CREEK, BIRCH, EIELSON, and FOX MOAs, and on the Oklahoma and Blair Lakes air-to-ground weapons ranges; and
- Dall sheep populations in the northern Alaska Range and the Tanana Hills under the YUKON 1-4, BUFFALO, EIELSON, and FOX MOAs, and on the Oklahoma air-to-ground weapons range.

Level II Impacts are possible for the following biological resources:

- Peregrine falcon nest sites located outside existing Flight Avoidance Areas and under MOAs with floors lower than 2,000 feet AGL or supersonic aircraft operations;
- Waterfowl concentration and breeding areas located under MOAs with floors lower than 2,000 feet AGL or supersonic aircraft operations;
- Raptor breeding areas and nesting concentrations located under MOAs with floors lower than 2,000 feet AGL or supersonic aircraft operations;
- Caribou critical-season habitat (calving, post-calving, summer concentration, rutting, and wintering) located under MOAs with floors lower than 3,000 feet AGL or supersonic aircraft operations;
- Moose critical-season habitat (calving, rutting, and wintering) located under MOAs with floors lower than 3,000 feet AGL or supersonic aircraft operations;
- Dall sheep general habitat located under MOAs with floors lower than 5,000 feet AGL or supersonic aircraft operations;
- Brown and black bear critical-season habitat (breeding, den site selection, cub rearing, and concentrations on seasonally important food sources) located under MOAs with floors lower than 3,000 feet AGL or supersonic aircraft operations; and
- Wolves dependent on caribou or moose populations susceptible to adverse impacts.

Alternative A

With regard to biological resources, the only appreciable difference between this alternative and the Proposed Action is that slightly less Delta caribou herd winter range would be affected with elimination of the CLEAR CREEK MOA.

Alternative B

This alternative differs most notably from the Proposed Action in that significant adverse impacts could also accrue to a few trumpeter swan nesting areas along the Tanana River under the TANANA MOA and to considerably more Dall sheep habitat under the TANANA MOA. This alternative would affect less waterfowl breeding area, and slightly more raptor breeding and nesting concentration areas and critical-season moose habitat.

Alternative A—Modified

This alternative differs from the Proposed Action in several ways. Potential Level III impacts to trumpeter swans would be substantially reduced by shifting the eastern boundary of the FOX MOA west and away from breeding areas. Potential Level III impacts to the Delta caribou herd would be reduced with elimination of the CLEAR CREEK MOA and reduction in size of the BIRCH MOA (i.e., shifted away from the Salcha River). In addition, raising the floors of the FOX and YUKON 5 MOAs to 5,000 feet AGL limiting YUKON 5 to MFEs only would minimize the potential for adverse effects to wildlife populations under these MOAs, although supersonic operations would still be authorized.

No Action Alternative

This alternative would eliminate the potential for Level III Impacts to the major Gulkana River trumpeter swan populations under the FOX TMOAs, although it would affect more waterfowl concentration area and less waterfowl breeding area than the Proposed Action. One half of the identified peregrine falcon nest sites would be affected. Slightly less Delta caribou herd winter range and substantially less critical-season caribou habitat overall would be affected. Less critical-season moose habitat and less brown bear habitat, but slightly more Dall sheep general habitat would be affected.

Recreation Resources (Sections 3.6 and 4.6)

Proposed Action

Significant adverse impacts to recreation uses and areas are considered to be impacts that would be inconsistent with an area's Recreation Opportunity Setting and that could permanently alter the setting (Level III Impacts). Adverse impacts are defined as impacts that would be inconsistent with an area's Recreation Opportunity Setting and that could temporarily alter the setting (Level II Impacts). In general, significant adverse impacts could occur in high sensitivity recreation areas subjected to intensive low-altitude overflight, while adverse impacts would be more likely to occur in recreation areas of medium sensitivity or in high sensitivity areas exposed to less intensive aircraft overflight. Intensive low-altitude overflights capable of producing Level III or Level II Impacts are most likely to occur during MFEs, when large numbers of low-flying aircraft could pass through an area within a period of a few hours each day, for up to 10 to 15 days at a time.

Level III Impacts to recreation resources are predicted for the following:

- Fortymile National Wild, Scenic, and Recreational River under the YUKON 3 MOA—87 percent of designated river affected;
- Yukon-Charley Rivers National Preserve and Charley National Wild River under the YUKON 3 and YUKON 4 MOAs—54 percent affected;
- Gulkana National Wild River (Middle and West Forks) under the FOX MOA—47 percent and 50 percent affected, respectively;
- Delta National Wild, Scenic, and Recreational River under the FOX MOA—48 percent affected;
- Twenty-three trails located along the Denali Highway under the FOX MOA; and
- Proposed West Fork Gulkana River Area of Critical Environmental Concern under the FOX MOA.

Level II Impacts to recreation resources are predicted for the following:

- Steese National Conservation Area and Birch Creek National Wild River under the YUKON 2 MOA;
- Walker Fork Campground under the YUKON 3 MOA;
- Taylor Highway under the YUKON 3 MOA—50 percent affected;
- Yukon-Charley Rivers National Preserve and Charley National Wild River under the YUKON 1 and YUKON 2 MOAs—46 percent affected; and
- Tangle Lakes, Tangle River, and Brushkana Campgrounds and Tangle River National Register Archaeological District under the FOX MOA.

Alternative A

Under Alternative A, the Salcha River State Recreation Site would not be affected at all and only 29 percent of the Tanana Valley State Forest would be affected compared to 35 percent under the Proposed Action.

Alternative B

There are two notable differences between this alternative and the Proposed Action. One, this alternative would result in potentially significant adverse impacts (Level III Impacts) to the main stem of the Gulkana National Wild River (96 percent affected) and twelve trails located along the Richardson Highway; and adverse impacts (Level II Impacts) to the West Fork Campground. Two, Alternative B would affect only 61 percent of the Yukon-Charley Rivers National Preserve rather than 100 percent, and significant adverse impacts are predicted for only 15 percent of the preserve instead of 54 percent. Otherwise, the same recreation areas predicted to sustain Level III and Level II Impacts under the Proposed Action would be affected; however, in most cases Alternative B would affect substantially more of each area. Specific differences in the amount of area affected are highlighted as follows:

- Fortymile National Wild, Scenic, and Recreational River under the YUKON 3 and TANANA MOAs—97 percent affected;
- Gulkana National Wild River (Middle Fork) under the FOX MOA and TANANA MOAs—100 percent affected;
- Gulkana National Wild River (West Fork) under the FOX MOA and TANANA MOAs—97 percent affected;
- Delta National Wild, Scenic, and Recreational River under the FOX MOA and TANANA MOAs—100 percent affected;
- Portions of some 23 trails located along the Denali Highway under the FOX and TANANA MOAs; and
- Taylor Highway—100 percent affected.

Alternative A—Modified

This alternative differs in a number of ways from the Proposed Action. Potential impacts to much of the Fortymile National Wild and Scenic River system, the Taylor Highway, and the Walker Fork Campground would be reduced to negligible (Level I) by raising the floor of the southeastern portion of the YUKON 3 MOA (YUKON 3B) to 2,000 feet AGL. Impacts to the Delta National Wild and Scenic River, the main stem and middle forks of the Gulkana National Wild River, and the Tangle Lakes/Tangle River area would be eliminated by shifting the eastern boundary of the FOX MOA westward. Raising the floor of the FOX MOA to 5,000 feet AGL would reduce predicted impacts to the Denali Highway, Brushkana Campground, Proposed West Fork Area of Critical Environmental Concern, and the small segment of the west fork of the Gulkana River that would remain under the MOA to Level I. Predicted impacts to the Steese National Conservation Area, Birch Creek National Wild River, Yukon-Charley Rivers National Preserve, and Charley National Wild River would not differ from the Proposed Action.

No Action Alternative

Many recreation resources would sustain the same level of impacts as predicted for the Proposed Action. However, for resources located under TMOAs these impacts would occur only during MFEs. Specific differences in predicted impacts between the two alternatives are outlined below:

- Fortymile National Wild, Scenic, and Recreational River and the Yukon-Charley Rivers National Preserve and Charley National Wild River would see Level I Impacts during MFEs and none at other times, compared to Level III Impacts under the Proposed Action;
- Gulkana National Wild River (Middle and West Forks), Delta National Wild, Scenic, and Recreational River, twenty-three trails located along the Denali Highway, and the Proposed West Fork Gulkana River Area of Critical Environmental Concern would experience Level II Impacts during MFEs and none at other times, compared to Level III Impacts under the Proposed Action;
- Tangle Lakes, Tangle River, and Brushkana Campgrounds and Tangle River National Register Archaeological District and the Taylor Highway would sustain Level I Impacts during MFEs and none at other times, compared to Level II Impacts under the Proposed Action; and
- Gulkana National Wild River (Main Stem) and twelve trails located along the Richardson Highway would see Level II Impacts during MFEs and none at other times, compared to no impacts under the Proposed Action by virtue of not being located under any MOAs. Similarly, the Innoko National Wildlife Refuge would experience Level I Impacts during surge exercises in STONY C TMOA, while it would sustain no impacts under the Proposed Action.

Subsistence Resources (Sections 3.7 and 4.7)

Proposed Action

Significant adverse impacts to subsistence are characterized as repetitive, concentrated impacts from aircraft overflights that could increase the level of effort required to harvest subsistence resources by an estimated 2 to 7 days, subsequently increasing the likelihood of reduced harvest levels during the primary or critical subsistence season for communities with a high sensitivity ranking (Level III Impacts). Adverse impacts are defined as impacts that could increase the level of effort required to harvest subsistence resources by an estimated 2 to 7 days, subsequently increasing the likelihood of reduced harvest levels during the critical subsistence season for communities with a medium sensitivity ranking (Level II Impacts). Again, repetitive low-altitude overflights likely to produce Level III or Level II Impacts are most probable during MFEs.

Level III Impacts to subsistence are predicted for the following communities:

- Eagle Village during MFEs conducted August through September in YUKON 3 MOA; and
- Dot Lake and Healy Lake during MFEs conducted August through September in BUFFALO MOA.

Level II Impacts to subsistence are predicted for the following communities:

- Circle during MFEs conducted August through September in YUKON 2 MOA;
- Eagle City and Chicken during MFEs conducted August through September in YUKON 3 MOA; and
- Lime Village during surge exercises and routine flying training conducted in STONY A and STONY B MOAs during April through May and mid-August through October.

Alternative A

With regard to subsistence, there is no appreciable difference between this alternative and the Proposed Action.

Alternative B

In addition to the villages expected to sustain Level III and Level II Impacts under the Proposed Action, significant adverse impacts are predicted for the communities of Tanacross, Dot Lake, and Healy Lake during MFEs conducted August through September in the TANANA MOA. Adverse impacts are predicted as well for Dot Lake during MFEs conducted in December through February in the BUFFALO MOA, and for Tanacross during MFEs conducted in December through February in the TANANA MOA.

Alternative A—Modified

Potential impacts to subsistence would not differ substantially from the Proposed Action, but some distinctions would occur. Most notably, raising the floor of the southeastern portion of YUKON 3 MOA (YUKON 3B) to 2,000 feet AGL would reduce average and single event noise levels and any associated effects on subsistence resources or activities for the communities of Eagle Village, Eagle City, and Chicken.

No Action Alternative

For the most part, impacts to subsistence resources predicted for the No Action Alternative are similar to those anticipated for the Proposed Action. A notable difference is that Dot Lake, Red Devil, Sleetmute, and Stony River would be less affected and less likely to sustain adverse impacts under this alternative. On the other hand, adverse impacts (Level II Impacts) are predicted for the community of Chuathbaluk during surge exercises in the STONY C TMOA in August and September.

Comparison of the Environmental Consequences of the Alternatives

Table ES-2 summarizes, for comparison, the major potential effects of each alternative on the resources of concern that were identified through scoping (described in Chapter 3 and analyzed in Chapter 4). The most obvious and direct effect of any of the alternatives would be the exposure of resources to aircraft activity and noise. The primary source of impact would be noise; for many resources, methods for evaluating impacts from exposure to increased or more frequent noise are not fully mature. In keeping with the goals of the National Environmental Policy Act (NEPA), the methodologies employed in this

EIS were designed to use quantifiable variables to assess what, in many cases, are subjective effects. But the probability that any of the alternatives would result in long-term, cumulative impacts is difficult to precisely estimate due to the complexity of the many variables involved and, in some instances, the low probability of measurable impacts occurring. In the larger context of other human-caused and natural disturbances of the environment, any impacts stemming from the proposed changes in airspace configuration and use would, in all likelihood, be relatively minor. However, the extent to which they would contribute to the total cumulative impact on a resource is important. Evidence of such impacts can only be determined through an impact monitoring program designed to detect changes in biological, social, and/or physical parameters. Detection of changes that exceed the acceptable level or threshold (as determined by the appropriate regulatory or management agency, in consultation with the Air Force) would trigger a mitigation response. A complete discussion of the impact assessment process and outcome is found in Chapter 4.

Table ES-2 Environmental Consequences of the Alternatives¹

Resource	No Action Alternative	Proposed Action	Alternative A	Alternative B	Alternative A—Modified
Airspace Management, Aircraft Operations, Aviation Safety					
Airspace Management, Aircraft Operations, and Aviation Safety	Negligible Impact.	Potential Adverse Impact: YUKON 3 and 4, BIRCH, EIELSON, BUFFALO, and STONY B MOAs.	Potential Adverse Impact: YUKON 3 and 4, BIRCH, EIELSON, BUFFALO, and STONY B MOAs.	Potential Significant Adverse Impact: TANANA MOA. Potential Adverse Impact: YUKON 3 and 4, BIRCH, EIELSON, BUFFALO, and STONY B MOAs.	Potential Adverse Impact: STONY B MOA.
Chaff, Flares, and Hazardous Operations					
Chaff, Flares, and Hazardous Operations	Negligible Impact.	Negligible Impact.	Negligible Impact.	Negligible Impact.	Negligible Impact.
Biological Resources					
American peregrine falcon	Potential Adverse Impact: falcons nesting outside Flight Avoidance Area #17.	Potential Adverse Impact: falcons nesting outside Flight Avoidance Area #17.	Potential Adverse Impact: falcons nesting outside Flight Avoidance Area #17.	Potential Adverse Impact: falcons nesting outside Flight Avoidance Area #17.	Potential Adverse Impact: falcons nesting outside Flight Avoidance Area #17.
Waterfowl	Potential Significant Adverse Impact: trumpeter swan breeding areas under SUSITNA MOA.	Potential Significant Adverse Impact: trumpeter swan breeding areas under SUSITNA and FOX MOAs.	Potential Significant Adverse Impact: trumpeter swan breeding areas under SUSITNA and FOX MOAs.	Potential Significant Adverse Impact: trumpeter swan breeding areas under SUSITNA, FOX, and TANANA MOAs.	Potential Significant Adverse Impact: trumpeter swan breeding areas under SUSITNA and FOX MOAs, but breeding areas under FOX largely avoided.
Raptors	Potential Adverse Impact: breeding and nesting concentration areas overflow below 2,000 ft AGL or at supersonic speed.	Potential Adverse Impact: breeding and nesting concentration areas overflow below 2,000 ft AGL or at supersonic speed.	Potential Adverse Impact: breeding and nesting concentration areas overflow below 2,000 ft AGL or at supersonic speed.	Potential Adverse Impact: breeding and nesting concentration areas overflow below 2,000 ft AGL or at supersonic speed.	Potential Adverse Impact: breeding and nesting concentration areas overflow below 2,000 ft AGL or at supersonic speed.
Caribou	Potential Significant Adverse Impact: Delta herd under EIELSON A and B, and FOX 1 and 2 MOAs, and on Oklahoma and Blair Lakes ranges if key life cycle phase overflow.	Potential Significant Adverse Impact: Delta herd under CLEAR CREEK, BIRCH, EIELSON, and FOX MOAs, and on Oklahoma and Blair Lakes ranges.	Potential Significant Adverse Impact: Delta herd under BIRCH, EIELSON, and FOX MOAs, and on Oklahoma and Blair Lakes ranges.	Potential Significant Adverse Impact: Delta herd under CLEAR CREEK, BIRCH, EIELSON, and FOX MOAs, and on Oklahoma and Blair Lakes ranges.	Potential Significant Adverse Impact: Delta caribou herd under BIRCH, EIELSON, and FOX MOAs, and on Oklahoma and Blair Lakes ranges.
Moose	Potential Adverse Impact: critical life cycle habitat overflow below 3,000 ft AGL or at supersonic speed.	Potential Adverse Impact: critical life cycle habitat overflow below 3,000 ft AGL or at supersonic speed.	Potential Adverse Impact: critical life cycle habitat overflow below 3,000 ft AGL or at supersonic speed.	Potential Adverse Impact: critical life cycle habitat overflow below 3,000 ft AGL or at supersonic speed.	Potential Adverse Impact: critical life cycle habitat overflow below 3,000 ft AGL or at supersonic speed.

Resource	No Action Alternative	Proposed Action	Alternative A	Alternative B	Alternative A—Modified
Deer sheep	Potential Significant Adverse Impact: YUKON 1-4, BUFFALO, EIELSON, and FOX 1 and 2 MOAs, and Oklahoma range. Potential Adverse Impact: critical life cycle habitat overflown below 5,000 ft AGL or at supersonic speed.	Potential Significant Adverse Impact: YUKON 1-4, BUFFALO, EIELSON, and FOX MOAs, and Oklahoma range. Potential Adverse Impact: critical life cycle habitat overflown below 5,000 ft AGL or at supersonic speed.	Potential Significant Adverse Impact: YUKON 1-4, BUFFALO, EIELSON, and FOX MOAs, and Oklahoma range. Potential Adverse Impact: critical life cycle habitat overflown below 5,000 ft AGL or at supersonic speed.	Potential Significant Adverse Impact: YUKON 1-4, BUFFALO, EIELSON, and FOX MOAs, and Oklahoma range. Potential Adverse Impact: critical life cycle habitat overflown below 5,000 ft AGL or at supersonic speed.	Potential Significant Adverse Impact: YUKON 1-4, BUFFALO, EIELSON, and FOX MOAs, and Oklahoma range. Potential Adverse Impact: critical life cycle habitat overflown below 5,000 ft AGL or at supersonic speed.
Brown and Black Bears	Potential Adverse Impact (localized to individuals): overflights below 3,000 ft AGL or at supersonic speed.	Potential Adverse Impact (localized to individuals): overflights below 3,000 ft AGL or at supersonic speed.	Potential Adverse Impact (localized to individuals): overflights below 3,000 ft AGL or at supersonic speed.	Potential Adverse Impact (localized to individuals): overflights below 3,000 ft AGL or at supersonic speed.	Potential Adverse Impact (localized to individuals): overflights below 3,000 ft AGL or at supersonic speed.
Wolves	Potential Adverse Impact: if prey species (caribou or moose) sustain Level II or higher impacts.	Potential Adverse Impact: if prey species (caribou or moose) sustain Level II or higher impacts.	Potential Adverse Impact: if prey species (caribou or moose) sustain Level II or higher impacts.	Potential Adverse Impact: if prey species (caribou or moose) sustain Level II or higher impacts.	Potential Adverse Impact: if prey species (caribou or moose) sustain Level II or higher impacts.
Recreation					
Steele National Conservation Area and Birch Creek National Wild River	Potential Adverse Impact: YUKON 2 MOA.	Potential Adverse Impact: YUKON 2 MOA.	Potential Adverse Impact: YUKON 2 MOA.	Potential Adverse Impact: YUKON 2 MOA.	Potential Adverse Impact: YUKON 2 MOA.
Yukon-Charley Rivers National Preserve and Charley National Wild River	Potential Adverse Impact: YUKON 1 and 2 MOAs. Potential Significant Adverse Impact: YUKON 3 TMOA during MFEs.	Potential Adverse Impact: YUKON 1 and 2 MOAs. Potential Significant Adverse Impact: YUKON 3 and 4 MOAs.	Potential Adverse Impact: YUKON 1 and 2 MOAs. Potential Significant Adverse Impact: YUKON 3 and 4 MOAs.	Potential Adverse Impact: YUKON 1 and 2 MOAs. Potential Significant Adverse Impact: YUKON 3 and 4 MOAs.	Potential Adverse Impact: YUKON 1 and 2 MOAs. Potential Significant Adverse Impact: YUKON 3 and 4 MOAs.
Fortymile National Wild & Scenic River	Negligible Impact: YUKON 3 TMOA during MFEs.	Potential Significant Adverse Impact: YUKON 3 MOA.	Potential Significant Adverse Impact: YUKON 3 MOA.	Potential Significant Adverse Impact: YUKON 3 and TANANA MOAs.	Potential Significant Adverse Impact: YUKON 3A MOA. Negligible Impact: YUKON 3B MOA (2,000 ft AGL Floor).
Taylor Highway	Negligible Impact: YUKON 3 TMOA during MFEs.	Potential Adverse Impact: YUKON 3 MOA.	Potential Adverse Impact: YUKON 3 MOA.	Potential Adverse Impact: YUKON 3 and TANANA MOAs.	Negligible Impact: YUKON 3B MOA (2,000 ft AGL Floor).
Walker Park Campground	Negligible Impact: YUKON 3 TMOA during MFEs.	Potential Adverse Impact: YUKON 3 MOA.	Potential Adverse Impact: YUKON 3 MOA.	Potential Adverse Impact: YUKON 3 MOA.	Negligible Impact: YUKON 3B MOA (2,000 ft AGL Floor).
Chilkana National Wild River Main Stem	Potential Adverse Impact: FOX TMOAs during MFEs.	Not affected.	Not affected.	Potential Significant Adverse Impact: TANANA MOA.	Not affected.
Chilkana National Wild River Middle Fork	Potential Adverse Impact: FOX TMOAs during MFEs.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX and TANANA MOAs.	Not affected.
Chilkana National Wild River West Fork	Potential Adverse Impact: FOX TMOAs during MFEs.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX and TANANA MOAs.	Negligible Impact: FOX A MOA (5,000 ft AGL Floor).

Resource	No Action Alternative	Proposed Action	Alternative A	Alternative B	Alternative A—Modified
Delta National Wild River	Potential Adverse Impact: FOX TMOAs during MFEs.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX and TANANA MOAs.	Not affected.
Dendali Highway	Potential Adverse Impact: FOX TMOAs during MFEs.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX and TANANA MOAs.	Negligible Impact: FOX A MOA (\$,000 ft AGL Floor).
Tangle Lakes & Tangle River Campgrounds; Tangle Lakes National Register Archaeological District	Negligible Impact: FOX TMOAs during MFEs.	Potential Adverse Impact: FOX MOA.	Potential Adverse Impact: FOX MOA.	Potential Adverse Impact: FOX MOA.	Not affected.
Brushkana Campground	Negligible Impact: FOX TMOAs during MFEs.	Potential Adverse Impact: FOX MOA.	Potential Adverse Impact: FOX MOA.	Potential Adverse Impact: FOX MOA.	Negligible Impact: FOX A MOA (\$,000 ft AGL Floor).
Proposed West Fork Area of Critical Environmental Concern	Potential Adverse Impact: FOX TMOAs during MFEs.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX and TANANA MOAs.	Negligible Impact: FOX A MOA (\$,000 ft AGL Floor).
Richardson Highway	Potential Adverse Impact: FOX 2 TMOA during MFEs.	Not affected.	Not affected.	Potential Significant Adverse Impact: TANANA MOA.	Not affected.
West Fork Campground	Not affected.	Not affected.	Not affected.	Potential Adverse Impact: TANANA MOA.	Not affected.
Subsistence					
Circle	Potential Adverse Impact: YUKON 2 MOA during MFEs in Aug-Sep.	Potential Adverse Impact: YUKON 2 MOA during MFEs in Aug-Sep.	Potential Adverse Impact: YUKON 2 MOA during MFEs in Aug-Sep.	Potential Adverse Impact: YUKON 2 MOA during MFEs in Aug-Sep.	Potential Adverse Impact: YUKON 2 MOA during MFEs in Aug-Sep.
Eagle Village	Negligible Impact.	Potential Significant Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Significant Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Significant Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Adverse to Significant Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.
Eagle City	Negligible Impact.	Potential Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Adverse to Significant Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.
Chicken	Negligible Impact.	Potential Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Adverse to Significant Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.
Dot Lake	Potential Adverse Impact: BUFLO TMOA during MFEs in Aug-Sep.	Potential Significant Adverse Impact: BUFFALO MOA during MFEs in Aug-Sep.	Potential Significant Adverse Impact: BUFFALO MOA during MFEs in Aug-Sep.	Potential Significant Adverse Impact: BUFFALO and TANANA MOAs during MFEs in Aug-Sep.	Potential Adverse to Significant Adverse Impact: BUFFALO MOA during MFEs in Aug-Sep.
Healy Lake	Potential Significant Adverse Impact: BUFLO TMOA during MFEs in Aug-Sep.	Potential Significant Adverse Impact: BUFFALO MOA during MFEs in Aug-Sep.	Potential Significant Adverse Impact: BUFFALO MOA during MFEs in Aug-Sep.	Potential Significant Adverse Impact: BUFFALO and TANANA MOAs during MFEs in Aug-Sep.	Potential Adverse to Significant Adverse Impact: BUFFALO MOA during MFEs in Aug-Sep.

Resource	No. Action Alternative	Proposed Action	Alternative A	Alternative B	Alternative A—Modified
Tanacross	Negligible Impact.	Negligible Impact.	Negligible Impact.	Potential Significant Adverse Impact: TANANA MOA during MFEs in Aug-Sep. Potential Adverse Impact: TANANA MOA during MFEs in Dec-Feb.	Negligible Impact.
Lime Village	Potential Adverse Impact: STONY A MOA in mid-Aug-Sep.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.
Nupuruk	Potential Adverse Impact: STONY B MOA and STONY C TMOA during surge training in Aug-Sep.	Potential Adverse Impact: STONY B MOA in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY B MOA in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY B MOA in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY B MOA in Apr-May, mid-Aug-Oct.
Red Devil	Negligible Impact: STONY B MOA surge training in mid-Aug-Sep, mid-Apr-mid-May.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.
Sledmiute	Negligible Impact: STONY B MOA during surge training in Aug-Sep, mid-Apr-mid-May.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.
Stony River	Negligible Impact: STONY B MOA during surge training in Aug-Sep, mid-Apr-mid-May.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.
Chualituk	Potential Adverse Impact: STONY B MOA and STONY C TMOA during surge training in Aug-Sep.	Negligible Impact: STONY B MOA in Apr-May, Aug-Sep.	Negligible Impact: STONY B MOA in Apr-May, Aug-Sep.	Negligible Impact: STONY B MOA in Apr-May, Aug-Sep.	Negligible Impact: STONY B MOA in Apr-May, Aug-Sep.
Land Use					
Elleovik AFB (on-base)	Negligible Impact: 919 residents exposed to DNL $\geq$ 65 dB; 193 residents predicted to be Highly Annoyed ² .	Potential Adverse Impact: 1,608 residents exposed to DNL $\geq$ 65 dB, an increase of 689; 369 residents predicted to be Highly Annoyed, an increase of 176.	Potential Adverse Impact: 1,608 residents exposed to DNL $\geq$ 65 dB, an increase of 689; 369 residents predicted to be Highly Annoyed, an increase of 176.	Potential Adverse Impact: 1,608 residents exposed to DNL $\geq$ 65 dB, an increase of 689; 369 residents predicted to be Highly Annoyed, an increase of 176.	Potential Adverse Impact: 1,608 residents exposed to DNL $\geq$ 65 dB, an increase of 689; 369 residents predicted to be Highly Annoyed, an increase of 176.
Elmendorf AFB (off-base)	Negligible Impact: 497 residents exposed to DNL $\geq$ 65 dB; 104 residents predicted to be Highly Annoyed.	Potential Adverse Impact: 1,001 residents exposed to DNL $\geq$ 65 dB, an increase of 504; 210 residents predicted to be Highly Annoyed, an increase of 106.	Potential Adverse Impact: 1,001 residents exposed to DNL $\geq$ 65 dB, an increase of 504; 210 residents predicted to be Highly Annoyed, an increase of 106.	Potential Adverse Impact: 1,001 residents exposed to DNL $\geq$ 65 dB, an increase of 504; 210 residents predicted to be Highly Annoyed, an increase of 106.	Potential Adverse Impact: 1,001 residents exposed to DNL $\geq$ 65 dB, an increase of 504; 210 residents predicted to be Highly Annoyed, an increase of 106.

¹ If a resource is not specifically mentioned, negligible or no impacts are predicted.

² Day-Night Average A-Weighted Sound Level (DNL).

Proposed Mitigation Measures to Reduce or Eliminate Adverse Impacts

A number of mitigation measures in addition to the ones identified by the Air Force in the Draft EIS were suggested during the public comment period. Many of these mitigations were judged reasonable by the Air Force. Some were used to develop Alternative A—Modified (the Preferred Alternative); others could also be applied individually or in various combinations to any of the alternatives considered in the EIS. Table ES-3 presents mitigation measures that may be used to avoid or minimize potential environmental impacts. For the most part, impacts and mitigation fall into two categories: 1) potential conflicts with general aviation, and 2) noise concerns. Noise impact mitigations were developed for the F-15 and F-16 aircraft—the aircraft that would be the predominant users of the MOAs. Although other aircraft capable of producing slightly higher noise levels would occasionally use the airspace, there is only about a 2 to 4 decibel (dB) difference in single-event maximum noise levels between these aircraft and the F-15 and F-16, use levels projected for these aircraft are low, and their activities would be dispersed over large areas. Given these factors, mitigation designed to alleviate noise impacts from F-15 and F-16 aircraft should be sufficient. The mitigations listed are technically feasible measures the Air Force would be able to execute.

Measures designed to mitigate the noise-derived adverse impacts identified in this analysis were developed based on a review of pertinent background information, including an Interagency Agreement between the National Park Service, U.S. Fish and Wildlife Service, Bureau of Land Management, and the Federal Aviation Administration (1993) that encourages pilots making VFR flights over noise sensitive areas to ". . . make every effort to fly not less than 2,000 feet above the surface, weather permitting. . ." A recently completed study prepared for the National Park Service examined the effect of aircraft altitude on sound levels on the ground (Anderson and Horonjeff 1992). Briefly, this study suggested that enforcing minimum altitude restrictions is an effective mitigation only when aircraft are operating at relatively low altitudes to begin with. The greatest acoustical benefit occurs when aircraft slant distance (height above ground) is increased from 125 feet to 1,000 feet (decreasing maximum sound level by 24 dB), then to 2,000 feet (an additional 8 dB decrease), and then to 3,000 feet (an additional 5 dB decrease). Increasing slant distance further, from 3,000 to 5,000 feet, results in moderate to substantial sound level reductions (roughly a 4 dB reduction for each 1,000-foot increase). Beyond 5,000 feet, each 1,000-foot increase produces only a "very small" reduction in sound level (about 2 dB for each 1,000-foot step) (ibid.). The study concluded that minimum altitude restrictions over NPS units should be applied on a case-by-case basis for site-specific sensitivities and declined to recommend any minimum altitude restriction for NPS units in general.

For some short- and long-term effects, impacts cannot be precisely estimated now due to their complexity or the low probability of their occurrence. Additional information will be required to develop suitable mitigation. Actual impacts will be measured through an impact monitoring program designed to detect changes in biological, social, and/or physical parameters. Detection of changes that exceed the maximum acceptable level or threshold (as determined by the appropriate regulatory agency or agencies) would trigger a mitigation response plan.

In its Record of Decision (ROD), the Air Force will identify which mitigation measures will be adopted and which, if any, will not, with an explanation of why they will not be adopted. The ROD will also include a mitigation implementation and monitoring plan.

Table ES-3 Potential Mitigation Measures

Mitigation	MOA(s) Affected	Resource(s) Mitigated	Effectiveness
MOA Altitude (Floor or Ceiling) and Internal Boundary Changes			
Raise the minimum altitude (floor) to 5,000 ft AGL.	YUKON 5 FOX	Aviation Safety Biological Resources Recreation Subsistence Land Use	This would reduce single-event and average noise levels, and improve civil aviation access.
Raise the minimum altitude (floor) to 500 ft AGL.	BIRCH FALCON CLEAR CREEK*	Aviation Safety	This would improve civil aviation access along major VFR flyways, including the Alaska and Richardson highways and the trans-Alaska oil pipeline.
Establish a civilian flight corridor at 4,000 ft MSL to 6,000 ft MSL to protect the VFR hemispheric altitudes of 4,500 ft MSL and 5,500 ft MSL, 2 nautical miles (NM) either side of the Alaska Highway. Establish a civilian flight corridor at 4,000 ft MSL to 6,000 ft MSL to protect the VFR hemispheric altitudes of 4,500 ft MSL and 5,500 ft MSL, ½ NM either side of the Richardson Highway.	BUFFALO TANANA (Alt. B)	Aviation Safety	This would improve civil aviation access along major VFR flyways, including the Alaska and Richardson highways and the trans-Alaska oil pipeline.
Raise the floor to 500 ft AGL below the civilian flight corridor, 2 NM either side of the Alaska Highway and ½ NM either side of the Richardson Highway.	BUFFALO TANANA (Alt. B)	Aviation Safety	This would improve civil aviation access along major VFR flyways, including the Alaska and Richardson highways and the trans-Alaska oil pipeline.
Raise the floor to 5,000 ft AGL west of the line from 63°37'00" N, 145°00'00"W to 62°47'37"N, 145°00'00"W.	TANANA (Alt. B)	Aviation Safety Recreation Subsistence Land Use	This would reduce single-event and average noise levels and potential impacts to the Tangle Lakes/Tangle River area, Gulkana and Delta National Wild Rivers, Denali Highway, Proposed West Fork of the Gulkana River ACEC, and Richardson Highway.

Mitigation	MOA(s) Affected	Resource(s) Mitigated	Effectiveness
Raise the floor to 2,000 ft AGL east of the line from 64°59'59"N, 143°00'00"W to 63°23'00"N, 143°05'00"W.	TANANA (Alt. B)	Aviation Safety Recreation Subsistence Land Use	This would reduce single-event and average noise levels and potential impacts to the Fortymile National Wild River, Taylor Highway, and West Fork Campground; and improve civil aviation access to Eagle, Chicken, and Boundary from Tok.
Divide the MOA into horizontal and vertical sections and raise the floor to 2,000 ft AGL east and south of the line running from the northeast corner of YUKON 3 MOA to the intersection with the northeast corner of BUFFALO MOA (from 64°59'59"N, 141°05'00"W to 63°59'59"N, 143°00'00"W).	YUKON 3A (Low) YUKON 3B (Low) YUKON 3 (High)	Aviation Safety Recreation Subsistence	This would reduce single-event and average noise levels and potential impacts to the Fortymile National Wild River, Taylor Highway, and Walker Fork Campground; and improve civil aviation access to Eagle, Chicken, and Boundary from Tok.
MOA External Boundary Changes			
Move the northwest boundary approximately 5 NM to the southeast (terminal points at 64°31'17"N, 146°09'31"W and 64°17'43"N, 147°03'29"W).	BIRCH	Aviation Safety Recreation Subsistence Land Use	This would avoid the Salcha River and Harding Lake areas. Resources and activities in these areas would not be exposed to direct aircraft overflights and associated noise levels.
Move the southeast corner approximately 20 NM to the west (terminal points at 63°30'00"N, 145°54'00"W and 62°30'00"N, 146°43'19"W).	FOX	Aviation Safety Biological Resources Recreation Subsistence Land Use	This would avoid the Gulkana and Delta National Wild Rivers, Tangle Lakes area, Richardson Highway, proposed West Fork of the Gulkana River ACEC, and trumpeter swan nesting areas. Resources and activities in these areas would not be exposed to direct aircraft overflights and associated noise levels.
Move the eastern boundary approximately 20 NM to the west (terminal points at 61°51'22"N, 153°14'44"W and 61°25'01"N, 153°38'39"W).	STONY A	Recreation	This would avoid Lake Clark National Park and Preserve, and prevent visitors and resources from being exposed to direct aircraft overflights and associated noise levels.

Mitigation	MOA(s) Affected	Resource(s) Mitigated	Effectiveness
Move the eastern boundary approximately 10 NM to the west (terminal points at 60°52'33"N, 154°43'15"W and 60°18'58"N, 154°43'15"W).	NAKNEK 2	Recreation	This would avoid Lake Clark National Park and Preserve, and prevent visitors and resources from being exposed to direct aircraft overflights and associated noise levels.
Use Restrictions — MFEs			
Conduct no MFEs during September, December, or January.	All MOAs	Aviation Safety Recreation Subsistence Land Use	This would minimize potential impacts to sport and subsistence hunting and other late season recreation and aviation activities.
Provide a minimum 2-week break between MFEs.	All MOAs	Biological Resources Recreation Land Use	This would minimize potential impacts to wildlife and recreationists by providing periods when outdoor activities could be planned to avoid MFEs and providing quiet periods for wildlife.
Conduct no MFEs the week prior to and the week following the 4th of July.	All MOAs	Recreation	This would minimize potential impacts during one of the highest recreation use periods of the year.
Limit use to MFEs only.	YUKON 5 th	Aviation Safety Biological Resources Recreation Subsistence	This would maintain the <i>status quo</i> for military aircraft operations in the area.
Use Restrictions — Supersonic Operations			
Limit supersonic operations to Functional Check Flights (FCFs) and Operational Check Flights (OCFs) along an east/west line south of the Denali National Park and Preserve.	SUSITNA	Recreation	This would minimize potential noise (sonic boom) effects on the resources and users of Denali National Park and Preserve and the community of Petersville.
Conduct supersonic operations at or above 5,000 ft AGL or 12,000 ft MSL, whichever is higher. NOTE: Supersonic operations in STONY A and B MOAs would continue to be conducted at or above 5,000 ft AGL or 10,000 ft MSL, whichever is higher.	YUKON 1-5 SUSITNA FOX TANANA (All. B)	Biological Resources Recreation Subsistence Land Use	This would reduce the maximum peak overpressures from sonic booms, minimizing potential impacts associated with supersonic operations.

Mitigation	MOA(s) Affected	Resource(s) Mitigated	Effectiveness
Flight Avoidance Areas and Overflight/Operational Restrictions			
Establish a Flight Avoidance Area over the Kuskokwim and Holita rivers (east and south of the community of Red Devil) of 2,000 ft AGL and 2 NM either side of the river centerlines. Effective from May 15 to September 15.	STONY B	Biological Resources Aviation Safety Land Use	This would improve civil aviation access to communities along the rivers; and would reduce single-event and average noise levels and potential impacts to residents, subsistence users, recreationists, and wildlife along the rivers.
Increase the existing peregrine falcon Flight Avoidance Areas (2,000 ft AGL and 2 NM either side of the river centerline) on the Charley, Kandik, and Yukon rivers to extend from April 15 to September 15.	YUKON 1-4	Biological Resources Recreation Aviation Safety	This would reduce noise levels and enhance civil aviation access along the rivers.
Establish a Flight Avoidance Area over the Nowitna National Wild River (2,000 ft AGL and 2 NM either side of the river centerline) from May 15 to July 15.	GALENA	Biological Resources Recreation Aviation Safety	This would reduce noise levels and enhance civil aviation access along the river.
Protect "at-risk" wildlife populations by restricting overflights during critical life-cycle periods. "At-risk" populations and temporal and spatial protection parameters to be established through consultation with management agencies, and the smallest practicable and effective area mitigated.	All MOAs	Biological Resources	This would reduce noise levels and the potential for negative behavioral responses. The focus on "at risk" populations during critical life-cycle periods minimizes the likelihood of long-term negative effects.
Protect the Delta caribou herd by establishing a minimum overflight altitude of 3,000 ft AGL over calving areas (nominally from May 15 to June 15).	BIRCH EIELSON	Biological Resources	This would reduce noise levels and the potential for negative behavioral responses.
Protect Dall sheep in the Northern Alaska Range and the Tanana Hills by establishing a minimum overflight altitude of 5,000 ft AGL over lambing areas and spring mineral licks (nominally from May 15 to June 15) and over rutting areas (nominally from November 15 to December 15).	YUKON 1-4 BUFFALO EIELSON FOX	Biological Resources	This would reduce noise levels and the potential for negative behavioral responses.

Mitigation	MOA(s) Affected	Resource(s) Mitigated	Effectiveness
Communication and Information Exchange			
Continue to provide the Special Use Airspace Information Service (SUAIS).	EIELSON BIRCH BUFFALO YUKON 1, 2, and 3	Aviation Safety	This would increase situational awareness of all aviators operating in the Interior MOAs.
Continue the in-state toll free number (1-800-538-6647).	All MOAs	Recreation Subsistence Land Use	This would provide the public with a mechanism for obtaining information on Air Force aviation activities and MFE schedules, and conveying information and/or concerns to the Air Force (see Appendix O).
Notify Alaska press outlets of the annual MFE schedule for release in publications such as the <i>Milepost</i> , visitor and travel guides, and various newspapers.	All MOAs	Aviation Safety Recreation Subsistence Land Use	This would enable individuals to plan activities around the MFE schedule if they wished.
Continue operation of the Alaska Civil/Military Aviation Advisory Committee (ACMAAC).	All MOAs	Airspace Management Aviation Safety	This would provide for direct dialogue between airspace users to resolve potential impacts to aviation activities.
Establish a Resource Protection Council consisting of three inter-agency (federal, state, and Air Force) coordination teams: 1) Resource Protection/Mitigation, 2) Public Information, and 3) Research and Monitoring.	All MOAs	Biological Resources Recreation Subsistence Land Use	This would provide a forum for monitoring the efficacy of mitigation measures, providing information to the public, and identifying and filling data gaps.

Note: Unless otherwise indicated, mitigation would be year-round.

¹Under Alternative A—Modified, the CLEAR CREEK MOA would not be established.

²Under Alternative A—Modified, the floors of YUKON 5 MOA and FOX MOA would be 5,000 ft AGL year-round.

³Area of Critical Environmental Concern (ACEC).

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Distribution of the Final EIS

The Final EIS and/or Executive Summary were distributed to 940 individuals, agencies, and organizations. The Final EIS is also available for public review at the following locations:

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ACRONYMS AND ABBREVIATIONS

11 AF	11th Air Force
176 CG	176th Composite Group
18 FS	18th Fighter Squadron
3 WG	3rd Wing
354 FW	354th Fighter Wing
355 FS	355th Fighter Squadron
517 ALS	517th Airlift Squadron
AAA	Antiaircraft Artillery
AAC	Alaska Administrative Code
AATA	Anchorage, Alaska Terminal Area
ACBT	Air Combat Training
ACC	Air Combat Command
ACEC	Area of Critical Environmental Concern
ACM	Air Combat Maneuvering
ACMAAC	Alaska Civil/Military Aviation Advisory Committee
ACMI	Air Combat Maneuvering Instrumentation
ACMP	Alaska Coastal Management Program
ACT	Air Combat Tactics
AD	Air Defense
ADCED	Alaska Department of Commerce and Economic Development
ADCRA	Alaska Department of Community and Regional Affairs
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADL	Alaska Department of Labor
ADNR	Alaska Department of Natural Resources
ADOT	Alaska Department of Transportation
ADP	Alaska Division of Parks (ADNR)
AF	U.S. Air Force
AFB	Air Force Base
AFI	Air Force Instruction
AFM	Air Force Manual
AFOSH	Air Force Occupational Safety and Health
AFR	Air Force Regulation
AFS	Air Force Station; Alaska Fire Service
AGL	Above Ground Level (altitude in feet)
AGM	Air-to-Ground Missile
AI	Air Interdiction
AICUZ	Air Installation Compatible Use Zone
AIFCC	Alaska Interagency Fire Coordination Center
AIRFA	American Indian Religious Freedom Act
AL ₂ O ₃	Aluminum Oxide
ALS	Airlift Squadron
AMRAAM	Advanced Medium-Range Air-to-Air Missile
ANCLUC	Airport Noise Control and Land Use Compatibility
ANCSA	Alaska Native Claims Settlement Act
ANG	Air National Guard
ANILCA	Alaska National Interest Lands Conservation Act
ANSI	American National Standards Institute
AQAM	Air Quality Assessment Model
AR	Air Refueling

ARSA	Airport Radar Service Area
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
ATIS	Air Traffic Information Service
AWACS	Airborne Warning and Control System
AWRTA	Alaska Wilderness Recreation and Tourism Association
BAM	Bird Avoidance Model
BASH	Bird-Aircraft Strike Hazard
BBAP	Bristol Bay Area Plan
BFM	Basic Fighter Maneuvering
BIA	U.S. Bureau of Indian Affairs (DOI)
BLM	U.S. Bureau of Land Management (DOI)
C ³	Command, Control, and Communication
C ³ CM	Command, Control, and Communication Countermeasure
CA	Counter Air
CAA	Clean Air Act
CAS	Close Air Support
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Controlled Fire Area
CFR	Code of Federal Regulations
CFT	Composite Force Training
CHABA	Committee on Hearing, Bioacoustics and Biomechanics
CO	Carbon Monoxide
CRBAP	Copper River Basin Area Plan
CSU	Conservation System Unit
CYRMP	Central Yukon Resource Management Plan
CZMA	Coastal Zone Management Act
DACT	Dissimilar Air Combat Training
dB	Decibel
DCA	Defensive Counter Air
DDT	Dichloro-diphenyl Trichloroethane
DLG	Digital Line Graph
DNL	Day-Night Average A-Weighted Sound Level
DNPP	Denali National Park and Preserve
DoD	U.S. Department of Defense
DOI	U.S. Department of the Interior
DOPAA	Description of Proposed Action and Alternatives
DOT	U.S. Department of Transportation
DSPMP	Denali State Park Master Plan
DTIC	Defense Technical Information Center
DU	Depleted Uranium
DZ	Drop Zone
EA	Environmental Assessment
EC	Electronic Combat or Countermeasure
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
ELF	Extremely Low Frequency
EMF	Electric and Magnetic Fields
EMI	Electromagnetic Interference
EMR	Electromagnetic Radiation

EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPU	Emergency Power Unit
ESA	Endangered Species Act
EW	Electronic Warfare
F	Fahrenheit
FAA	Federal Aviation Administration (DOT)
FAC	Forward Air Control
FAM	Familiarization
FAR	Federal Aviation Regulation
FAX	Telefacsimile
FCF	Functional Check Flight
FCIF	Flight Crew Information File
FFAR	Fold-Fin with High Explosive Warhead
FICON	Federal Interagency Committee on Noise (1992)
FICUN	Federal Interagency Committee on Urban Noise (1980)
FL	Flight Level (altitude, in thousands of feet, above Mean Sea Level)
FLIP	Flight Information Publication
FLPMA	Federal Land Management Policy Act
FNSB	Fairbanks North Star Borough
FONSI	Finding of No Significant Impact
FR	Federal Register
FS	Fighter Squadron
FSB	Federal Subsistence Board
FSS	Flight Service Station
ft ²	Square Foot (feet)
ft ³	Cubic Foot (feet)
FW	Fighter Wing
FY	Fiscal Year
GAO	General Accounting Office
GCI	Ground-Controlled Intercept
GEIS	Generic Environmental Impact Statement
GIS	Geographic Information System
GMU	Game Management Unit
GPS	Global Positioning System
GRASS	Geographical Analysis Support System
HA	Highly Annoyed
HC	Hydrocarbons
HE	High Explosive
HEI	High Explosive Incendiary
HERO	Hazard of Electromagnetic Radiation to Ordnance
HTH	High-Test Hypochlorite
HUD	U.S. Department of Housing and Urban Development; Heads Up Display
Hz	Hertz
IAS	Indicated Airspeed
IDT	Interdisciplinary Team
IFR	Instrument Flight Rules
IICEP	Intergovernmental Interagency Coordination for Environmental Planning
IMC	Instrument Meteorological Conditions
INM	Integrated Noise Model
IR	Instrument Route
IRP	Installation Restoration Program

KAP	Kuskokwim Area Plan
KIAS	Knots of Indicated Airspeed
LANTIRN	Low-Altitude Navigation and Targeting Infrared for Night
LATN	Low-Altitude Tactical Navigation
L_{cda}	Symbol for C-Weighted Day-Night Average Sound Level
L_{dnmr}	Symbol for Onset Rate Adjusted Monthly Day-Night Average A-Weighted Sound Level
L_{eq}	Symbol for Long-Term A-Weighted Equivalent Sound Level
L_{max}	Symbol for A-Weighted Maximum Sound Level
LOA	Letter of Agreement
LOWAT	Low-Altitude Air-to-Air Training
Ltd.	Limited
m^3	Cubic Meter
MAILS	Multiple Aircraft Instantaneous Line Source
MAJCOM	Major Command
MAMS	Military Airspace Management System
MDS	Measurement and Debriefing System
MEA	Minimum Enroute Altitude
MFE	Major Flying Exercise
mg/kg	Milligrams per Kilogram
mg/ m^3	Milligrams per Cubic Meter
MgO	Magnesium Oxide
MHz	Megahertz
MOA	Military Operations Area
MOAMAP	Noise Model for Military Operations Areas
mph	Miles per Hour
MSL	Mean Sea Level
MTR	Military Training Route
NAA	No Action Alternative
NAAQS	National Ambient Air Quality Standard
NAS	National Airspace System
NASA	National Aeronautic and Space Agency
NATO	North Atlantic Treaty Organization
NCA	Noise Control Act
NCRP	Noise Complaint Review Panel
NEPA	National Environmental Policy Act
NGB	National Guard Bureau
NHPA	National Historic Preservation Act
NHT	National Historic Trail
NIOSH	National Institute for Occupational Safety and Health
NIPTS	Noise-Induced Permanent Threshold Shift
NM	Nautical Mile
NNWR	Nowitna National Wildlife Refuge
NOA	Notice of Availability
NOI	Notice of Intent
NOISEMAP	DoD Noise Model for Airfields
NOTAM	Notice to Airmen
NO_x	Nitrogen Oxide
NP	National Park
NPP	National Park and Preserve
NPS	U.S. National Park Service (DOI)
NRAD	National Register Archaeological District
NTIS	National Technical Information Service

NWR	National Wildlife Refuge
NWSR	National Wild and Scenic River
OCA	Offensive Counter Air
OCF	Operational Check Flight
OPLAN	Operations Plan
OTA	Office of Technology Assessment
Ap	Peak Overpressure
PACAF	Pacific Air Forces
PCB	Polychlorinated Biphenyl
PDF	Probability Density Function
P.L.	Public Law
PM ₁₀	Particulate Matter
POL	Petroleum, Oil, Lubricant
ppm	parts per million
PSD	Prevention of Significant Deterioration
psf	pounds per square foot
PTS	Permanent Threshold Shift
RA	Restricted Area
RAF	Royal Air Force
RCO	Remote Communications Outlet
RCRA	Resource Conservation and Recovery Act
RNAs	Research Natural Areas
ROD	Record of Decision
ROS	Recreation Opportunity Setting
ROUTEMAP	DoD Noise Model for Military Training Routes
RRMP	Recreation Rivers Management Plan
SAC	Strategic Air Command
SAF/MI	Assistant Secretary of the Air Force for Manpower, Reserve Affairs, Installations and Environment
SAM	Surface-to-Air Missile
SAP	Susitna Area Plan
SDA	Same Day Airborne
SEAD	Suppression of Enemy Air Defenses
SEL	Sound Exposure Level
SF	State Forest
SIP	State Implementation Plan
SHPO	State Historic Preservation Officer (Alaska)
SiO ₂	Silica Oxide
SKE	Station Keeping Equipment
SO ₂	Sulfur Dioxide
SP	State Park
SPL	Sound Pressure Level (Third Octave Band)
SR	Slow Speed Low-Altitude Training Route
SRA	State Recreation Area
SRS	State Recreation Site
SS	Supersonic
SUA	Special Use Airspace
SUAIS	Special Use Airspace Information Service
SWR	State Wildlife Refuge
SWS	State Wildlife Sanctuary
TACAN	Tactical Air Navigation
TACM	Tactical Airlift Manual
TBAP	Tanana Basin Area Plan

TCA	Terminal Control Area
TMOA	Temporary Military Operations Area
T.O.	Technical Order
TP	Target Practice
TTS	Temporary Threshold Shift
TVSF	Tanana Valley State Forest
USA	United States Army
USAF	United States Air Force
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service (DOI)
USGS	U.S. Geological Survey (DOI)
VFR	Visual Flight Rules
VGA	Video Graphics Array
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VR	Visual Route
WA	Warning Area
WG	Wing
WG/SE	Wing Flying Safety Office
WSMR	White Sands Missile Range
WTD	Weapons Training Deployment
WTSPMP	Wood-Tikchik State Park Management Plan
YMDS	Yukon Measurement and Debriefing System
$\mu\text{g}/\text{m}^3$	Micrograms per Cubic Meter

Changes Between the Draft and Final EIS

The following changes were made between the Draft and Final EIS. Minor corrections and edits are not included in this list.

Chapter 1

- The discussion of the Air Force's Need for the Proposed Action was expanded and clarified (section 1.3).
- The discussion of Issues Not Addressed in this EIS was revised (section 1.6.2).

Chapter 2

- A more detailed explanation of the purpose of supersonic operations in air combat training was added to the section on Criteria Used to Formulate the Alternatives (section 2.1.1.2).
- Text was added to the Operational Assumptions for All Alternatives to explain the proposed hours of operation for the MOAs (section 2.2.1).
- A statement was added to Operational Assumptions for All Alternatives to clarify the projected number of MFE aircraft and sorties (section 2.2.2).
- Text was added to the General Description of the Alternatives to clarify the Air Force's proposed use of chaff and flares in permanent MOAs for routine and MFE training (sections 2.3.1 to 2.3.5).
- A brief description of Alternative A—Modified was added to the General Description of the Alternatives (section 2.3.5).
- A general description of the total land area involved in each alternative was added to the General Description of the Alternatives (section 2.3.6).
- Figure 2-5 was added to depict Alternative A—Modified.
- A detailed description of Alternative A—Modified was added to the Detailed Descriptions of the Alternatives (section 2.4.5).
- Tables 2-2 through 2-5 were revised to include a column for Alternative A—Modified (section 2.4.7).
- The Comparison of Environmental Effects section of the Draft EIS (section 2.8) was replaced with a new section entitled Comparison of Alternatives (section 2.6). Table 2-8 in the Draft EIS was replaced with a new Table 2-9 with information on Alternative A—Modified added.
- A section on Potential Mitigation Measures was added (section 2.7). Table 2-10 in this section presents mitigation measures that could be used to avoid or minimize potential environmental impacts.
- Alternative A—Modified was identified as the Preferred Alternative (section 2.8).
- The No Action Alternative was identified as the Environmentally Preferable Alternative (section 2.9). Table 2-11 was added to compare the No Action Alternative with Alternative A—Modified using quantifiable variables.

- A discussion of the Operational Suitability of the Alternatives was added to compare the operational utility of the No Action Alternative, the Proposed Action, and Alternative A—Modified (the Preferred Alternative) (section 2.10).

Chapter 3

- Information on the Special Use Airspace Information Service (SUAIS) was updated in the sections on Airspace Use, Aircraft Operations, and Aviation Safety for the Northern Interior and Southern Interior Regions (sections 3.2.2 and 3.2.3).
- The discussion of aircraft mishap rates in the section on Accident Potential was expanded to include aircraft operating in Alaska airspace during routine and MFE training (section 3.2.6.3).
- Additional information on supersonic events and noise levels was added to the Noise section (sections 3.3.1, 3.3.3.1, 3.3.5.1, and 3.3.6.1).
- The Noise section was also expanded to include discussion of the contribution of other noise sources to the total noise environment in the MOAs (section 3.3).
- A discussion of Hazardous Materials and Wastes was added (section 3.4.5.3).
- A discussion of urban recreation was added to General Methods and Assumptions for Recreation (section 3.6.1.1).
- Visitor use data for National Park Service units was revised in the Recreation section (Tables 3-4, 3-5, 3-6, and 3-7).
- Additional information on recreational resources, facilities, and uses under the FOX MOA was added to the section on Recreation in the Southcentral Region (section 3.6.4.2.).
- Information was added to the Commercial Recreation section (section 3.6.7).
- Text clarifying state and federal subsistence regulations was added to the Subsistence section (section 3.7.1).
- An explanation of how community subsistence use areas were identified was also added to the Subsistence section (section 3.7.2).
- Discussion of the Federal Conservation System Units in the Region of Influence was added to the Land Use section (section 3.8.6).
- Information on private and commercial properties under the FOX MOA was added to the Land Use section (section 3.8.4.2).

Chapter 4

- Information regarding the potential environmental consequences of Alternative A—Modified was added to each resource section.
- All discussion of impact levels (i.e., Level I, II, or III) was deleted from the section on Airspace Management, Aircraft Operations, and Aviation Safety in accordance with direction from the Federal Aviation Administration (FAA ATM-400) (section 4.2). Impact levels will be assessed by FAA through its circularization of the Air Force's airspace proposal.
- Information on the Special Use Airspace Information Service (SUAIS) was updated in the section on Airspace Use, Aircraft Operations, and Aviation Safety for the Northern Interior and Southern Interior Regions (sections 4.2.2.1 and 4.2.2.2).
- Technical corrections were made to airspace terminology in the section on Airspace Management, Aircraft Operations, and Aviation Safety per comments from the FAA (section 4.2).
- The discussion of aircraft mishap rates in the section on Accident Potential was expanded to include aircraft operating in Alaska airspace during routine and MFE training (section 4.2.7).
- Information was added to the section on Noise Issues/Concerns regarding supersonic noise modelling, potential impacts of supersonic operations on humans, and the average number of sonic booms expected per month for each MOA (section 4.3.1).
- A conclusion regarding the environmental consequences of the use of chaff was added to the section on Chaff and Flares (section 4.4.2.1).
- The types of munitions authorized for use on the air-to-ground weapons ranges was clarified in the section on Munitions Use and Handling (section 4.4.2.3).
- A discussion of Hazardous Materials was added to section 4.4.2.4, including information on the hazardous materials stored on-base (including hydrazine), disaster preparedness, and emergency response procedures (on- and off-base).
- A discussion of the potential effects of noise on animal hearing was added to the section on Potential Biological Effects (section 4.5.1.3).
- The discussion of potential adverse impacts to land use at Eielson and Elmendorf AFBs was clarified in the sections on Environmental Consequences (sections 4.8.3.1 and 4.8.3.2).
- Information on Other Environmental Consequences (cumulative impacts, unavoidable adverse impacts, relationship of short-term uses and long-term productivity, and irreversible and irretrievable commitments of resources) was moved to the end of Chapter 4 (section 4.11).
- Discussion of possible mitigation measures was moved to the end of Chapter 4 (section 4.12). This section includes a table that outlines the mitigations, the MOAs they would occur in, the resources they would mitigate, and the predicted efficacy of each mitigation.

Chapter 5

- Documents reviewed during preparation of the Final EIS were added to this chapter.

Chapter 6

- Persons and agencies contacted during preparation of the Final EIS were added to this chapter.

Chapter 7

- Additional Air Force and consulting staff who contributed to preparation and/or review of the Final EIS were added to this chapter.

Chapter 8

- The Final EIS distribution list was revised to include all agencies, organizations, and individuals scheduled to receive the complete EIS. The list of libraries and other facilities where the Final EIS will be available for review was also revised to include additional sites.

Chapter 9

- The index was re-generated for the Final EIS.

CHAPTER 1

PURPOSE OF AND NEED FOR PROPOSED ACTION

The Commander, Pacific Air Forces (PACAF), proposes to convert previously utilized Temporary Military Operations Areas (TMOAs) in Alaska to permanent Military Operations Areas (MOAs); modify some existing permanent MOAs; create new permanent MOAs; conduct supersonic aircraft operations in certain MOAs; and conduct routine flying training, joint/combined flying training, and Major Flying Exercises (MFEs) in certain MOAs. This chapter presents the purpose of and need for the Proposed Action; identifies the decision-maker and the decision to be made; outlines the environmental impact analysis process; presents the scope of the environmental analysis; and lists applicable regulatory requirements.

1.1 Introduction

This Environmental Impact Statement (EIS) has been organized into four volumes. Volume I contains the Table of Contents and Chapters 1 through 3. Volume II contains Chapters 4 through 9. Technical appendices are located in Volume III. Volume IV contains comments received on the Draft EIS (written letters and hearing transcripts) and the Air Force's responses to them. The Table of Contents for the entire document is located in Volume I; thereafter, each volume contains a Table of Contents specific to that volume.

A considerable effort has been made to prepare a concise document using a minimum number of acronyms and minimal Air Force or military jargon. Some use of acronyms is necessary and useful. A list of acronyms is included in Volume I following the Table of Contents. A list of references is provided in Chapter 5; this list has been organized into sections corresponding with the relevant sections of the EIS (e.g., the reference list under the heading "Noise" corresponds to the EIS sections on noise). There is one index for the EIS, which has been included as Chapter 9 in Volume II. The index lists topics discussed in the EIS and gives the page number(s) where they are mentioned.

1.2 Purpose of the Proposed Action

The purpose of the Proposed Action is to restructure and upgrade the MOAs in Alaska.

1.3 Need for Proposed Action

The Proposed Action is needed to ensure that military aircrews are able to receive comprehensive and realistic tactical flying training in as safe an airspace as possible. This specific need stems from the larger need to secure the continued fighting efficiency and effectiveness of U.S. and allied air forces by providing airspace that allows these forces to train to U.S. Air Force (USAF) standards. The existing MOA structure imposes significant restrictions and inefficiencies on training opportunities, training realism, and the full use of all capabilities of the sophisticated aircraft/weapons systems presently based in Alaska. These restrictions significantly limit 11th Air Force (11 AF) units' abilities to more fully develop their combat capability in order to meet more demanding and complex wartime requirements.

The existing Alaska MOA structure lacks day-to-day, mutually accessible MOA airspace between Elmendorf and Eielson AFBs, precluding the accomplishment of significant routine training and, in particular, Dissimilar Air Combat Training (DACT) and Composite Force Training (CFT). DACT and CFT are critical air combat training building blocks that are readily available to other military aviation units throughout the continental United States.

The lack of mutually accessible airspace suitable to conduct these critical categories of training unduly hampers Alaskan units ability to achieve and maintain assigned combat readiness levels.

The existing Alaska MOA structure also lacks direct linkage between the MOAs and the Oklahoma (R-2202) and Blair Lakes (R-2211) air-to-ground weapons ranges and their associated ground based threat radar weapon system simulators. The isolation of these ranges from the MOA structure eliminates the ability to design realistic aircrew routine training scenarios that would integrate the most basic phases of a ground attack mission (ingress, attack, and egress). This lack of realism significantly restricts the efficient development of combat capability.

The tasking, composition, numbers, capabilities, and associated readiness training programs have changed. These changes have required Alaska-based units to further segment individual permanent MOAs, laterally and vertically, to accommodate simultaneous, de-conflicted use by separate flights of aircraft conducting independent training scenarios. This segmentation of individual MOAs often yields lateral and/or vertical airspace dimensions that are well below the standards specified in the *U.S. Air Force Airspace Master Plan* (1993b). Increases in the scope and complexity of Alaska-based unit taskings further amplifies the negative impact of MOA segmentation on the ability to conduct realistic air combat training to achieve assigned readiness levels.

The existing Alaska MOA structure is inadequate to support the Air Force's commitment to conduct the most realistic and effective MFEs and joint/combined training possible. A number of TMOAs were negotiated and established and activated as required for each MFE. However, under Federal Aviation Administration (FAA) regulations, establishing and activating TMOAs takes a minimum of four months lead time to process through environmental and FAA channels. Furthermore, TMOAs are rarely charted on civilian or DoD aviation charts and are typically activated by the Notice to Airmen (NOTAM) system prior to each use. Converting previously utilized TMOAs to permanent MOAs, as proposed, would allow this airspace to be charted and make information pertaining to airspace boundaries readily available to all aviators.

The existing Alaska MOA structure possesses several characteristics that must be preserved when considering and evaluating the airspace restructuring alternatives. The MOAs must continue to be:

- accessible,
- geographically dispersed within the accessible region to deal with Alaska's often adverse weather,
- suitably sized,
- arrayed to minimize interference with civilian route structures, and
- equipped with a suitable degree of lateral segmentation to provide for flexible FAA management of civilian and military access and operations within these MOAs.

Establishment of a single, regional-sized MOA would not permit the designation of varied floors or ceilings where necessary to avoid other FAA route/airspace structures or environmentally sensitive areas. A tailored array of contiguous, multiple MOAs, possessing different floors/ceilings where necessary, that achieves military readiness requirements, provides for civil aviation access, allows efficient FAA management of MOA access, and is sensitive to environmental concerns is the most prudent and balanced restructuring concept.

1.3.1 11th Air Force Mission and Background of the Proposed Action

1.3.1.1 11th Air Force Mission

The Air Force mission is directed by the National Command Authority (i.e., the President and the Secretary of Defense). The directives of the National Command Authority are translated into regulations and instructions issued in ever-increasing detail by successive Department of Defense (DoD) commanders. As part of PACAF, the 11th Air Force mission is first defined in the Commander-in-Chief, United States Pacific Command Instruction S3050.6 (*Pacific Command Strategy*):

"...to maintain the security of and defend the United States against attack throughout the Pacific Theater; to support and advance the national policies and interests of the United States; ...and to prepare plans, conduct operations, and coordinate activities of PACAF forces in consonance with higher authorities [sic] directives."

The Commander, PACAF, then specifically defines the mission of each Numbered Air Force under his command, which includes 11th Air Force, in PACAF regulation 23-5, as follows:

"Ensure assigned combat units are organized, trained and equipped to maintain operational readiness following USAF directives and procedures."

"Be prepared to conduct air combat operations . . ."

"Conduct both unilateral and bilateral planning, training, exercises and operations for defense cooperation with friendly forces, as directed."

"Develop tactics/techniques of aerial warfare, determine requirements for new weapons/weapons systems and improve the use of current weapons systems."

These functions and responsibilities are subsequently translated into specific missions, roles, tasks, and requirements for each type of aircraft and aircrew. From these, the training requirements and proficiency levels to be attained are determined and promulgated in the multi-command 51-series regulations. The specific missions, roles, and tasks in turn determine airspace requirements.

The specific missions assigned to the 11th Air Force are offensive and defensive counter air, air interdiction, close air support and forward air control, suppression of enemy defenses, electronic combat, air refueling, and tactical airlift. This variety of missions, coupled with the number and types of aircraft and their related weapons systems, requires large and varied airspace, approved for both subsonic and supersonic operations. The characteristics of these missions are detailed in Appendix C.

1.3.1.2 Background of the Proposed Action

While the Alaska MOA structure has changed little since it was established in 1976, there have been significant changes in the tasking composition, numbers, capabilities, training programs, and airspace requirements of the aircraft assigned to Elmendorf and Eielson Air Force Bases (AFBs) and other PACAF units. The scope and complexity of Alaskan unit tasking has increased considerably with the focus of air operations now including support for more complex worldwide contingency air operations. The weapon systems used on board these aircraft have also increased in complexity, operational performance, and reach. During the 1980s, F-4 aircraft were replaced by F-15Cs at Elmendorf and A-10s at Eielson. In 1991, Elmendorf gained a squadron of F-15Es, and Eielson activated a squadron of F-16Cs to replace most of the A-10s, retaining a few OA-10 aircraft. The F-15E and F-16C aircraft added new technological dimensions to Alaskan forces, such as Low-Altitude Navigation and Targeting Infrared for Night (system) (LANTIRN) and Advanced Medium Range Air-to-Air

Missile capabilities. Since December 1990, the number of fighter aircraft assigned to Alaska has increased approximately 33 percent with a corresponding 33 percent increase in annual sorties (one sortie equals a take-off, training flight, and full-stop landing). With the exception of the OA-10, all of these aircraft are capable of supersonic flight (see Appendix C for a description of aircraft types).

With the closing of Clark Air Base in the Philippines, Alaska became the closest U.S.-controlled tactical flying training area available to PACAF forces and U.S. allies in the Pacific. Consequently, in addition to aircraft permanently assigned to Alaska, other aircraft deploy here to participate in joint/combined training and MFEs. Joint training generally involves aircraft from other U.S. military services while combined training could involve aircraft from the North Atlantic Treaty Organization (NATO) allies or other friendly nations. Joint/combined training may occur as part of routine daily training or as part of an MFE. Deployed aircraft may include all types currently in the DoD inventory, as well as similar allied aircraft. MFEs incorporate the most realistic and all-encompassing training scenarios the Air Force can provide. Based on the experience of operations such as DESERT STORM, the complexity and operational requirements of these exercises have increased significantly. In addition, many of the participating aircraft can operate at supersonic airspeeds and require adequate airspace in which to conduct supersonic operations. Another requirement is that the airspace provides access to air-to-ground weapons ranges and use of ground-based threat radar and weapon system simulators. MFEs also require large parcels of airspace to accommodate the support missions of air refueling, command and control, search and rescue, fighter escort, and electronic warfare.

For the purposes of this EIS, variants of historically utilized MFE TMOAs are referred to as "previously utilized" and are proposed to be "converted" even though the subject TMOAs currently "exist" only for limited periods of time for the conduct of MFEs. The use of the terms "previously utilized" and "converted" are not intended to contradict this fact. Although the subject TMOAs do not necessarily "exist" and may or may not be approved by the FAA in the future, a desired delineated airspace and its underlying geography and resources had to be defined for the purpose of analysis.

1.4 Decision To Be Made

The Secretary of the Air Force or her designee will decide whether to implement the Proposed Action or one of the Alternative Actions, including the No Action Alternative. In making the decision, the Secretary will consider the findings presented in the Final EIS. Environmental, economic, technical, and other factors will be considered. It is important to note that although the Secretary is responsible for choosing one of the alternatives presented in this EIS, the FAA has final authority for approving or denying any proposal to establish airspace, including MOAs.

A Record of Decision, in which the decision-maker will select one of the alternatives, will be published no sooner than 30 days after notification in the *Federal Register* of the filing of the Final EIS. Following completion of the Final EIS and subsequent Record of Decision, airspace approval and implementation of the selected alternative would take place in the spring of 1996.

1.5 Environmental Impact Analysis Process

The environmental impact analysis process is described in detail in Appendix A, along with a chronology of events for this EIS.

1.5.1 Scoping

The Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act of 1969 (NEPA) require an early and open process for identifying significant issues related to a proposed action. This process is called scoping. As part of the scoping process for this EIS, the 11th Air Force invited agency and public participation to assist in defining the issues to be analyzed. The Notice of Intent (NOI) to prepare an

EIS was published in the *Federal Register* on July 9, 1993. Public scoping meetings were announced in regional and local newspapers following publication of the NOI and again at least 2 weeks prior to each meeting. The formal scoping comment period extended through October 31, 1993. However, because the policy of the 11th Air Force Commander is that comments can be forwarded at any time, comments received as late as November 23, 1993, were integrated into the scoping report. The scoping report is part of the Administrative Record for this EIS.

1.5.1.1 Public Involvement

In an effort to permit the widest participation by the people of Alaska, the Air Force delayed public scoping meetings until late September 1993 to allow Alaskans to complete seasonal subsistence and recreation activities. The 11th Air Force established an Environmental Issues Team to conduct the scoping meetings and collect comments on the Proposed Action. Public scoping meetings were held from September 20, 1993, through November 15, 1993, at these 14 locations:

- East Anchorage High School, Anchorage; September 20, 1993; 23 attendees¹
- Noel Wien Library, Fairbanks; September 21, 1993; 68 attendees
- Delta School, Delta Junction; September 22, 1993; 12 attendees
- Circle Hot Springs Resort, Circle Hot Springs; September 23, 1993; 12 attendees²
- Glennallen High School, Glennallen; September 27, 1993; 4 attendees
- Talkeetna Elementary School, Talkeetna; September 28, 1993; 9 attendees
- McGrath School, McGrath; September 29, 1993; 6 attendees
- Eagle School, Eagle; September 30, 1993; 11 attendees
- Native Village Building, Fort Yukon; October 4, 1993; 9 attendees
- Community Hall, Chalkyitsik; October 5, 1993; 11 attendees
- Community Hall, Venetie; October 6, 1993; 25 attendees
- Old Community Hall, Arctic Village; October 7, 1993; 13 attendees
- Lime Village School, Lime Village; October 11, 1993; 10 attendees
- Sleetmute School, Sleetmute; November 15, 1993; 4 attendees³

1.5.1.2 Agency Scoping

Scoping meetings were held with 11 federal, state, and local agencies to solicit their input and assistance in defining the issues for the EIS. Meetings were also held with civil aviation groups.

1.5.1.3 Issues Identification

During the formal scoping process, issues of concern were identified through verbal and written comments from the public, agencies, and other interested groups. Issues were also identified as part of the data collection effort, which began at approximately the same time as the scoping process. Issues varied considerably from one location to another. However, a number of key issues were identified and will be addressed in this EIS. These are outlined in section 1.6.1.

¹For each meeting, the number given reflects the number of attendees who signed in at the door. Not all attendees necessarily signed in at any given meeting; therefore, the numbers presented here are approximate.

²The meeting was originally scheduled for the town of Circle, but was relocated to Circle Hot Springs to allow more participation by local residents.

³The original scoping meeting in Sleetmute, scheduled for October 13, 1993, was postponed due to inclement weather. The meeting was held via teleconference on November 15, 1993.

1.5.2 Draft EIS

The Draft EIS was the culmination of the scoping process and issues identification as previously outlined, and presented the results of the analyses conducted to determine environmental consequences of the Proposed Action and Alternatives. Public hearings were held in late September and October 1994; the dates, times, and locations for these hearings were announced in regional and local newspapers following publication of the Notice of Availability of the Draft EIS in the *Federal Register* on September 2, 1994. The hearings provided an opportunity for the public to formally comment on and respond to the findings in the Draft EIS. The public comment period closed November 30, 1994, 90 days after publication of the Notice of Availability. All comments received within the public comment period were considered and included in the Final EIS. Comments received after the close of the comment period were reviewed, and the issues they raised were similar to those received during the comment period.

1.6 Scope of the Environmental Analysis

1.6.1 Issues Addressed in this EIS

Analyses to determine the environmental consequences of the Proposed Action and Alternatives were conducted for the following issues.

- **Airspace Management, Aircraft Operations, and Aviation Safety.** Potential hazards of military flight operations in areas of heavy civilian and/or non-DoD agency aircraft activities; potential impacts on public use of airspace by private and commercial pilots; possible impacts on public use airports and air traffic control services provided by the FAA; and potential increases in aircraft mishap rates.
- **Chaff and Flares/Hazardous Operations.** Potential impacts associated with the use of chaff and flares, airborne lasers, munitions, and hazardous materials or wastes; and possible impacts on emergency response procedures such as fire management and fuel jettison.
- **Wildlife.** Potential long- and short-term impacts on biodiversity, protected species, and specific animal populations due to repeated exposure to aircraft noise.
- **Recreation.** Potential for military aircraft overflights and associated noise to affect recreation resources and the recreation experience.
- **Subsistence.** Potential impacts of aircraft overflights on subsistence resources and subsistence activities, particularly on public lands.
- **Land Use.** Potential for increased noise levels due to military aircraft overflights to affect land status, use, or management policies; wilderness values; aesthetic characteristics; and the quality of life.
- **Air Quality.** Potential for increased aircraft emissions of criteria air pollutants to affect air quality, particularly in the Anchorage and Fairbanks carbon monoxide nonattainment areas and the Denali National Park and Preserve Prevention of Significant Deterioration Class I air quality area.
- **Socioeconomics.** Potential for increases in transient military personnel and aircraft activity associated with MFEs to affect local economies.

1.6.2 Issues Not Addressed in this EIS

1.6.2.1 Cultural Resources

Cultural resources are defined here to include prehistoric structures, ruins, archaeological sites, and historical buildings and dwellings. Traditional Native use sites were not identified during scoping or analysis. Although a general public concern for cultural resources was expressed during scoping, consultations with the State Historic Preservation Officer (SHPO), results of the scoping and data collection efforts, and previous analyses of similar

(i.e., airspace) actions as assessed in the *Environmental Assessment of the Expansion and Upgrade of Military Training Routes, Alaska* (USAF 1992c) and the *Environmental Assessment of Major Flying Exercises in Alaska* (USAF 1993a) identified no impacts or significant issues with regard to Alaska's cultural resources. Preliminary scoping and consultation with the SHPO resulted in the determination that the Proposed Action would have No Adverse Effect to cultural resources. See correspondence in Appendix L. No effects to cultural resources are anticipated; therefore, this issue is not addressed in this EIS.

1.6.2.2 Hazardous Materials and Emergency Response Procedures

No increases in the amount of hazardous materials transported, stored, or used would be anticipated as a result of implementation of the Proposed Action or Alternatives. Transportation, storage, and use of petroleum, oils, lubricants, and fire-retarding agents used under these activities are and would continue to be handled under existing management plans and emergency response procedures. The following is a partial list of documents, which are on file at Eielson AFB, 354th Civil Engineering Squadron (354 CES/CEV) and Elmendorf AFB, 3rd Civil Engineering Squadron (3 CES/CEV), as appropriate, that govern hazardous materials management and emergency response procedures. These documents are hereby incorporated by reference:

- U.S. Air Force. 1993. *3rd Wing OPLAN 355-1: Disaster Preparedness*. Elmendorf AFB, Alaska: 3 WG/CC.
- _____. 1993. *Eielson AFB OPLAN 355-1: Disaster Preparedness*. Eielson AFB, Alaska: 354 SPTG/CC.
- _____. 1994. *3rd Wing OPLAN 19-1: Spill Response*. Elmendorf AFB, Alaska: 3 WG/CC.
- _____. 1994. *3rd Wing OPLAN 127-1: Mishap Response*. Elmendorf AFB, Alaska: 3 WG/CC.

1.7 Legal Mandates and Authorities

Under NEPA, federal agencies must consider the environmental consequences of proposed actions in their decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions. This EIS was prepared in accordance with CEQ and Air Force regulations for implementing NEPA (*Title 40 of the Code of Federal Regulations [CFR] Parts 1500-1508; Air Force Regulation [AFR] 19-2*).

Analyses required by NEPA and conducted for this EIS include the following:

- analyses of direct and indirect effects (*40 CFR 1508.8*);
- cumulative effects (*40 CFR 1508.7*);
- other potential effects, including possible conflicts between the Proposed Action and the objectives of federal, regional, state, or local land use plans, policies, or controls for the area concerned [*40 CFR 1502.16(c)*];
- adverse environmental effects that cannot be avoided (*40 CFR 1502.16*);
- the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity (*40 CFR 1502.16*);
- irreversible or irretrievable commitments of resources (*40 CFR 1502.16*); and
- energy and natural or depletable resource requirements and conservation potential [*40 CFR 1502.16(e), (f)*].

1.7.1 Interagency Coordination

Federal, state, and local agencies with jurisdictions that could be affected by the Proposed Action or Alternatives were notified and consulted. This coordination fulfills the Intergovernmental Coordination Act and Executive Order 12372, which require federal agencies to cooperate with and consider state and local views in implementing a federal proposal. This Executive Order is implemented by the Air Force through the Intergovernmental Interagency Coordination for Environmental Planning (IICEP) (AFR 19-9).

1.7.2 Cooperating Agencies

The FAA is a cooperating agency in this EIS. The FAA is the sole agency charged with managing safely and effectively all airspace over the United States. The FAA is required to give full consideration to the requirements of national defense and of commercial and general aviation, and to the public right of freedom of transit through the navigable airspace (see section 1.7.3.3).

Public lands, both state and federal, underlie much of the proposed airspace. Federal agencies with jurisdiction over these lands were requested by the Air Force to be cooperating agencies. However, these agencies chose to decline this request.

1.7.3 Applicable Regulatory Requirements

The CEQ regulations require the EIS to list all federal permits, licenses, or other entitlements that must be obtained prior to implementing any of the alternatives [40 CFR 1502.25(b)]. This section briefly describes the laws and regulations that apply to the Proposed Action and Alternatives, and the steps taken (or to be taken) to ensure compliance with these regulations.

1.7.3.1 The Endangered Species Act of 1973

The Endangered Species Act of 1973, as amended (16 United States Code [U.S.C.] sec. 1531 et seq.), protects proposed and listed threatened or endangered species. Formal consultation with the U.S. Fish and Wildlife Service (USFWS) is required under Section 7 of the Endangered Species Act for federal projects where such actions could directly or indirectly affect any proposed or listed species. The 11th Air Force completed formal consultation with the USFWS on March 31, 1993, at which time the USFWS issued a Biological Opinion regarding the Proposed Action and the No Action Alternative. This Biological Opinion included the existing permanent MOAs and the proposed new MOAs. The only species considered by the USFWS was the American peregrine falcon (*Falco peregrinus anatum*). The Biological Opinion stipulated an authorized level of incidental take, reasonable and prudent measures to minimize the impact of take, and other terms and conditions related to the authorization of incidental take. These measures, terms, and conditions were subsequently implemented by the 11th Air Force. On March 30, 1994, the 11th Air Force re-initiated formal consultation with the USFWS regarding airspace proposed as part of Alternative B. Consultation was completed on April 18, 1994, at which time the USFWS issued a letter to the 11th Air Force authorizing an increased level of incidental take of American peregrine falcon (from 5 to 6 per year); all other aspects of the March 31, 1993, Biological Opinion remain in effect. Because the airspace proposed under Alternative A and Alternative A--Modified is encompassed by the airspace described under the Proposed Action, the stipulations of the March 31, 1993, Biological Opinion apply to these alternatives as well. See Appendix I for correspondence pertaining to this consultation.

1.7.3.2 The Clean Air Act of 1963

The Clean Air Act of 1963, as amended (42 U.S.C. 7401 et seq.), is intended to protect and enhance the quality of the Nation's air resources. Requirements for conformity with state or federal air quality implementation plans first appeared in the Clean Air Act Amendments of 1977. Since then, the provisions have gone through a series of refinements, the most recent of which were published in November 1993. At the present time, conformity

determinations are required for federal actions that have the potential to affect air quality in nonattainment areas. Elements of the Proposed Action and Alternatives associated with Eielson and Elmendorf AFBs are close to carbon monoxide nonattainment areas. However, emissions of carbon monoxide (the only criteria pollutant of concern) associated with the Proposed Action and Alternatives would not exceed de minimis levels in these areas. Therefore, neither conformity determinations nor coordination with Alaska Department of Environmental Conservation (ADEC) is required.

1.7.3.3 The Federal Aviation Act of 1958

The Federal Aviation Act of 1958, as amended (*re-codified in 49 U.S.C., refer to Disposition Table at p.1 of the 1995 Pocket Part of U.S.C. Annotated*), gives the FAA broad authority and responsibility to regulate the operation of aircraft and the use of the navigable airspace, and to establish safety standards for and regulate the certification of airmen, aircraft, and air carriers. As noted in section 1.4, the FAA has final authority for approving, modifying, or denying any proposal to establish airspace, including MOAs.

1.7.3.4 The National Historic Preservation Act of 1966

The National Historic Preservation Act of 1966, as amended (*16 U.S.C. 470*), requires federal agencies to consider historic properties in their planning efforts. In particular, Section 106 of the act stipulates that federal agencies take into account the potential effects of their actions on historic properties and provide the Advisory Council on Historic Preservation (the Council, an independent federal agency) an opportunity to comment on agency undertakings that could affect historic properties. The Council has reviewed the Determination of No Adverse Effect to cultural resources (see section 1.6.2.1) and does not object to its finding. See Appendix L for correspondence pertaining to coordination with the Alaska SHPO and the Council.

1.7.3.5 Executive Order 12898

Executive Order 12898 (*Federal Actions To Address Environmental Justice In Minority and Low-Income Populations*) directs federal executive branch agencies to analyze, as part of the environmental impact analysis process required by NEPA, "disproportionately high adverse human health or environmental effects . . . on minority populations and low-income populations . . ." An additional goal of Executive Order 12898 is to encourage and facilitate minority and low-income population participation in the formation of policies and the making of decisions affecting them. From the early days of the EIS, Alaska Native organizations and Alaska Native and rural communities were briefed on the Proposed Action and Alternatives and were actively consulted on issues of concern to Alaska Natives. The EIS identified potential significantly adverse impacts in two areas that might disproportionately affect the identified minority and low-income populations because of the geographic area potentially impacted and because of the importance of the resource to minority and/or low-income populations. Those areas are subsistence and recreation. However, implementation of suitable mitigations would result in a general decrease in potential impacts on subsistence and recreation. Any possible disproportionate effects upon minority and low-income individuals would, therefore, either be eliminated or reduced from significantly adverse. See Appendix P for the complete analysis concerning Executive Order 12898.

1.7.4 Relevant NEPA Documents

Military aircraft operations in existing permanent and previously utilized TMOAs; at the Blair Lakes (R-2211), Stuart Creek (R-2205), and Oklahoma (R-2202) air-to-ground weapons ranges; along MTRs; and at Eielson and Elmendorf AFBs consist of routine training, joint/combined training, and MFE activities. NEPA documents pertaining to military operations in Alaska include, but are not limited to, the following:

- U.S. Air Force. 1991. *Environmental Assessment: Proposed Beddown of F-15E Squadron, Elmendorf AFB, Alaska*. Elmendorf AFB, Alaska: 11 AF.

- _____. 1991. *Environmental Assessment: Proposed Conversion to F-16C/D Squadron, Eielson AFB, Alaska*. Elmendorf AFB, Alaska: 11 AF.
- _____. 1992. *Environmental Assessment of the Upgrade of Target Arrays: Fort Wainwright and Fort Greely, Alaska*. Elmendorf AFB, Alaska: 11 AF. Prepared by Louis Berger & Associates, Inc.
- _____. 1992. *Environmental Assessment of the Expansion and Upgrade of Military Training Routes, Alaska*. Elmendorf AFB, Alaska: 11 AF. Prepared by ENSR Consulting and Engineering.
- _____. 1993. *Environmental Assessment of Major Flying Exercises in Alaska*. Elmendorf AFB, Alaska: 11 AF. Prepared by Spectrum Sciences & Software, Inc.
- _____. 1993. *Yukon Measurement and Debriefing System: Environmental Assessment*. Elmendorf AFB, Alaska: 11 AF. Prepared by Spectrum Sciences & Software, Inc.

These documents are incorporated by reference in this EIS. Copies of these documents may be found in repository libraries in Anchorage and Fairbanks.

CHAPTER 2

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter presents the criteria used to formulate the alternatives; outlines the operational assumptions made in constructing the alternatives and conducting the analyses; describes in detail the alternatives studied in this EIS, including the Proposed Action and No Action Alternative; describes the alternatives that were eliminated from study; compares the environmental consequences and operational utility of the alternatives; and identifies the preferred alternative and the environmentally preferable alternative. For a more complete description of all alternatives that were identified and evaluated, please refer to Appendix N.

2.1 Criteria Used to Formulate the Alternatives

Relevant environmental issues (outlined in section 1.6.1) and alternative selection criteria were used to formulate the alternatives, including the mitigation measures. Alternative selection criteria are based on the operational parameters and training needs of the Air Force in Alaska. These criteria are mandatory; that is, an alternative *must* satisfy the criteria in order to achieve Air Force training needs.

Four factors define the criteria established for selecting alternatives: aircraft operational parameters (see section 2.1.1), facilities and assets (see section 2.1.2), existing airspace infrastructure (see section 2.1.3), and tactical flying training program and airspace standards (see section 2.1.4). These are outlined in the following sections. Please refer to Appendix C for detailed descriptions of operational missions, the tactical flying training program in Alaska, and aircraft characteristics.

2.1.1 Aircraft Operational Parameters

2.1.1.1 Effective Training Range

Effective training range is the maximum distance an aircraft can travel from its home base to conduct valid training and still have adequate fuel supplies, without air refueling, to return to base. For aircraft engaged in air-to-ground training missions, approximately 90 percent of tactical flying missions include operations on one or more of the air-to-ground weapons ranges. The four types of tactical fighter aircraft assigned to the 11th Air Force (11 AF) have the following effective training ranges, given in nautical miles (NM):

■	F-15C/D (Elmendorf)	225 NM
■	F-15E (Elmendorf)	400 NM
■	F-16C/D (Eielson)	200 NM
■	OA-10 (Eielson)	165 NM

If airspace is not located within these distances, air refueling or landing at an alternate base for refueling is necessary to complete training. Air refueling is not available on a routine basis. Landing to refuel at other than the home base is expensive, inefficient, and not possible when there is no suitable alternate base.

2.1.1.2 Airspeed

Tactical fighter aircraft assigned to the 11th Air Force can operate from very low subsonic airspeeds to supersonic airspeeds, with the exception of the OA-10, which does not operate at supersonic speeds. Although most training

events require only subsonic airspeed operations, some must be accomplished at supersonic airspeed to be effective. Operations at supersonic airspeeds require larger airspaces than operations at subsonic speeds. The requirement to accomplish some training operations at supersonic airspeeds directly affects size (vertical and lateral dimensions) and shape criteria for Military Operations Areas (MOAs).

Proficient application of supersonic operations is a critical skill that demands routine practice to survive in the modern day air combat arena. Gains in air-to-air missile capabilities further stress the importance of aircrews being adept in separation/escape skills. Aircrews who are prevented from practicing these critical skills correctly will be ill-prepared for the dynamic and demanding air combat arena.

Most supersonic flight activity is completed at altitudes above 25,000 to 30,000 feet Mean Sea Level (MSL). This is the altitude where the greatest tactical advantage can be acquired over a potential adversary. For example, the higher you fly at fast (supersonic) speeds, the farther an air-to-air missile will travel. Maneuvering close-in to an adversary is normally most effectively conducted at subsonic speeds in the medium altitude band (5,000 to 25,000 feet Above Ground Level [AGL]). This altitude and airspeed region maximizes aircraft maneuvering abilities in order to gain or maintain offensive advantage. To be fully combat ready, aircrews must also be proficient in recognizing the need to safely separate and escape when placed at a disadvantage. Separation sometimes demands an acceleration to supersonic airspeed in order to escape and survive. The ability to accelerate quickly in this altitude band is enhanced by descending in altitude. These variables periodically require supersonic separation between 5,000 and 10,000 feet AGL. In reality, the variety of combat readiness training missions and the multitude of training objectives on any given mission limit the frequency of supersonic operations. Additionally, supersonic operations are quickly terminated due to high fuel consumption rates. Fuel consciousness is an important aspect of mission planning and a survival skill for all aircrews. Given the high costs of supersonic training, aircrews selectively integrate supersonic operations only when they are absolutely necessary to achieve core readiness training objectives.

2.1.2 Facilities and Assets

Training missions combine various events to create realistic combat scenarios. These missions need airspace that is accessible to a variety of fixed facilities and fixed, transportable, or mobile assets. Facilities include the airbases (Elmendorf and Eielson AFBs), air-to-ground weapons ranges (Oklahoma [R-2202], Stuart Creek [R-2205], and Blair Lakes [R-2211]), and constructed training feedback systems such as the Alaska Air Combat Maneuvering Instrumentation (ACMI) system located in the existing STONY A MOA. A second training feedback system is the Yukon Measurement and Debriefing System (Yukon MDS). Electronic combat assets may be either fixed, transportable, or mobile. Airborne electronic combat assets such as the E-3 Airborne Warning and Control System (AWACS) aircraft can be used anywhere within authorized airspace. Fixed and mobile assets include electronic combat devices.

2.1.3 Existing Airspace Infrastructure

Existing military airspace in Alaska is comprised of Special Use Airspace (SUA) and other types of airspace for special use. SUA in Alaska consists of MOAs, Restricted Areas (RAs) located over the three air-to-ground weapons ranges (Oklahoma [R-2202], Stuart Creek [R-2205], and Blair Lakes [R-2211]), and a Warning Area over Blyling Sound. Other airspace for special use in Alaska consists of Military Training Routes (MTRs), Air Traffic Control Assigned Airspace (ATCAA), Air Refueling Anchors/Tracks, Low-Altitude Tactical Navigation (LATN) areas, Controlled Firing Areas, and Slow Speed Low-Altitude Training Routes. Training missions need airspace that is accessible to other Special Use and other airspace categories.

An airspace restructuring alternative must consider existing civilian airspace in order to avoid or minimize conflicts with civil aviation. Civilian airspace in Alaska includes federal airways, both Victor Routes (up to 17,999 feet MSL) and Jet Routes (18,000 feet MSL and above); Class C airspace at Anchorage International Airport; Class D airspace at the Fairbanks International Airport, Lake Hood, Merrill Field, and Elmendorf and

Eielson AFBs; and Air Traffic Control facilities (radar and communications coverage). There is also extensive Visual Flight Rules (VFR) traffic throughout the state, much of it on regularly used (although uncharted) routes. Refer to Appendix D of this EIS for a more detailed description of military and civilian airspace categories.

2.1.4 Tactical Flying Training Program and Airspace Standards

The missions that comprise aircrew tactical flying training programs (see Appendix C for a description of training program and characteristics) determine airspace requirements. Recommended airspace standards for the missions of most aircraft in the Air Force inventory are outlined in the *U.S. Air Force Airspace Master Plan* (1993b). These standards include lateral (miles) and vertical (feet) dimensions, speed (supersonic or subsonic, above or below 250 knots), timing, proximity to base (miles), and linkage to other airspace or weapons ranges. Local (11 AF) and PACAF directives along with FAA regulations and recommendations further determine specific requirements and criteria for MOAs in Alaska.

A MOA restructuring alternative must contain adequate airspace in which to safely conduct all of the required missions and training events, must be within the effective training range of 11th Air Force-assigned tactical fighter aircraft, and must utilize existing facilities and assets. In order to conduct realistic and effective Major Flying Exercise (MFE) training, the alternative must also contain contiguous MOA airspace that has the following characteristics:

- is 200 to 300 NM long by 80 to 120 NM wide;
- extends vertically from as low as 100 feet AGL to 17,999 feet MSL;
- is suitably connected to an ATCAA (18,000 feet MSL to 50,000 feet MSL), existing air-to-ground weapons range(s), and electronic combat assets;
- contains suitably sized and suitably located MOAs that are authorized for supersonic operations; and
- is normally available for a minimum of 2 hours before noon (12:00 noon) and 2 hours after noon (12:00 noon) for exercise operations each exercise flying day (a total of 60 flying days per year are allocated for MFEs and are part of the total number of flying days per year allocated for routine flying training, averaged for analytical purposes at 240 flying days). The morning and afternoon flying periods could abut each other during some exercises.

The alternative must also contain a series of discrete MOAs, some geographically dispersed, to provide adequate flexibility to accomplish training in the event of adverse weather conditions or temporary FAA restrictions to allow transit by non-participating aircraft (including general aviation, search and rescue, medical evacuation, and firefighting aircraft).

2.2 Operational Assumptions for All Alternatives

11th Air Force routine and joint/combined flying training can occur on any given day throughout the year. However, Air Force units are allocated only a certain number of flying hours each fiscal year, and this allocation limits the number of days available to each unit for routine flying training. Currently the 11th Air Force can conduct MFE training no more than 60 days per year. Routine training also occurs during these 60 days, but generally at a reduced level (on average, routine training activities during an MFE are reduced approximately 10 percent). These limitations would remain in effect under all of the Alternatives. Routine and MFE training includes the use of chaff and flares and various ordnance (discussed in detail in sections 3.4 and 4.4).

For the purposes of analysis, the following operational assumptions have been made. For a detailed explanation of how these assumptions were developed (see Appendix E).

A "training day" is considered to be any day that the 11th Air Force is conducting flying training. A "routine training day" is a day during which only routine flying training is being conducted; routine training includes the day-to-day training conducted by aircraft operating from Eielson and Elmendorf AFBs as well as joint and combined training. An "MFE training day" is a day during which MFEs and routine training can be conducted. For a description of the aircraft participating in routine and MFE training and the operational missions conducted (see Appendix C).

2.2.1 Routine Training

Routine training involves aircraft departing from their base, participating in training missions that have one or more objectives (e.g., counter air, air interdiction, close air support, forward air control, suppression of enemy defenses), and returning to base. This scenario (take-off, training flight, and full-stop landing) is called a "sortie." Because an aircraft can pass through one or more MOAs while conducting one sortie, several operations may be conducted during one sortie. For the purposes of this EIS, operations are the number of times an aircraft conducting 11th Air Force flying training on a routine or MFE flying day would "pass" through a MOA.

Routine training (which includes joint and combined training for analysis purposes) would occur throughout the year. However, due to fiscal constraints, these training activities would occur over an average of 240 days per year, including 60 days of MFE training. This assumption does not imply that flying activities would only take place 240 days per year. Rather, it means that the number of flying hours allocated to 11th Air Force units through the annual budget are typically distributed over 240 days per year in order to assure unit combat readiness throughout the year (see Appendix E).

Routine training (including joint and combined training) could take place Monday through Friday, between 7:00 a.m. and 10:00 p.m.¹ Training could also take place, on average, up to two weekends per quarter. In general, routine training activities would occur at a reduced level during certain periods such as around Thanksgiving and Christmas or when 11th Air Force units are deployed out of the state for other training.

2.2.2 Exercise Training

Exercise training includes MFEs, Low-Altitude Navigation and Targeting Infrared for Night (LANTIRN) exercises, weapons training deployments, Air National Guard and Air Force Reserve deployments, and multinational exercises. Exercises integrate air-to-air and air-to-ground missions as well as support missions such as airborne command and control, electronic combat, tactical airlift, and search and rescue. Participants in MFEs may include aircraft from other U.S. military services, North Atlantic Treaty Organization (NATO) allies, and allies from other nations. During an MFE, a combat scenario is developed and roles are given to participating aircraft. Ground forces position simulated air defenses throughout the training area to provide, in conjunction with airborne defenses, a realistic air defense environment. Participating aircraft are temporarily assigned to an airbase in Alaska from which they depart and to which they return at the end of a sortie. During an exercise, aircraft typically accomplish two sorties per day.

MFE training would occur no more than 60 days per year (up to 6 exercises per year). Typically, one exercise would take place some time between February and April, four exercises between May and August, and one more exercise between October and November. Generally, an MFE would run for 10 flying days, but could last for as many as 15 flying days. MFE training would peak during the summer months (June through August); no MFEs would occur during the winter months of December and January. MFEs would normally occur Monday through Friday, 8:00 a.m. to 6:00 p.m.¹ Training on weekends may also occur, an average of two weekends per

¹Sometimes it may be necessary for the Air Force to train outside the published hours. This would require that a special Notice to Airman (NOTAM) advisory be approved and issued by the FAA. However, the Air Force would plan MOA operations to begin after 7:00 a.m. local time and cease before 10:00 p.m. local time.

quarter. In general, exercise operations would take place for 2 hours before noon (12:00 noon.) and 2 hours after noon (12:00 noon.) each exercise day. The morning and afternoon periods could run consecutively. During an exercise, the total number of daily aircraft sorties (exercise and routine training sorties) from Eielson AFB may increase as much as 174 percent over routine daily training sorties. At Elmendorf AFB, the total number of daily aircraft sorties (exercise and routine training sorties) may increase as much as 95 percent over routine daily training sorties. Flight operations during an exercise would normally use Northern Interior, Southern Interior, and Southcentral MOAs (except for SUSITNA MOA), and would include use of the air-to-ground weapons ranges. MFE training may involve as many as 100 aircraft per day, each flying as many as 2 sorties per day, for a total of 200 MFE sorties per day (except under the No Action Alternative).

Included in the 60 MFE-day period, a maximum of two nighttime MFEs could be conducted each year, for a maximum of 30 days annually. Night MFEs would usually be scheduled for February/March and October/November. During these MFEs, aircraft landings could take place at Eielson and Elmendorf AFBs between 10:00 p.m. and 11:00 p.m., but all landings would be completed by 11:00 p.m. Aircraft operations in the MOAs and aircraft take-offs from the bases would not occur after 10:00 p.m. Night MFE operations would be limited to 10 percent of the total daily MFE sorties, or an average of 20 sorties per night.

2.3 General Description of the Alternatives

This section presents overviews of the five alternatives, including the No Action Alternative. Figures showing each alternative are located at the end of this section. Detailed descriptions of the MOA configurations and aircraft activities for each of the alternatives follow in section 2.4.

2.3.1 Proposed Action

An overview of the Proposed Action is presented in Figure 2-1. Specifically, the Proposed Action would:

- Convert seven previously utilized Temporary MOAs (TMOAs)—YUKON 3, YUKON 4, YUKON 1A, BUFLO, EIELSON A, EIELSON B, and FOX 1—to permanent MOAs—YUKON 3, YUKON 4, YUKON 5, YUKON 6, BUFFALO, BIRCH, EIELSON, and FOX, respectively;
- Modify five existing MOAs—YUKON 1, STONY B, NAKNEK 1, NAKNEK 2, and GALENA— (times of operation, vertical dimensions, and internal boundaries);
- Create two new permanent MOAs—CLEAR CREEK and FALCON;
- Continue to conduct supersonic aircraft operations in the currently authorized STONY A and B MOAs, SUSITNA MOA, YUKON 2 MOA, and YUKON 1 MOA (MFEs only); add supersonic aircraft operations in YUKON 1 MOA (routine and MFE training), YUKON 3, 4, and 5 MOAs, and FOX MOA;
- Standardize floors for supersonic operations in three existing MOAs that already have supersonic operations—YUKON 2, STONY A, and STONY B;
- Continue to conduct routine and joint/combined training with Alaska-based and deployed aircraft;
- Conduct up to six MFEs per year (not to exceed 60 days per year), but increase the number of authorized MFE aircraft from 85 to 100 and increase the number of MFE sorties from 150 to 200 per MFE-day using the Proposed Action MOA structure and existing air-to-ground weapons ranges; and
- Continue to use chaff and flares as in YUKON 1, YUKON 2, SUSITNA, STONY A, STONY B, NAKNEK 1, NAKNEK 2, and GALENA MOAs, and authorize use of chaff and flares for routine and MFE training in all new permanent MOAs in accordance with current 11th Air Force directives (see section 3.4.2.4).

2.3.2 No Action Alternative

An overview of the No Action Alternative is presented in Figure 2-2. Specifically, the No Action Alternative would maintain the status quo for routine training and MFEs, as follows:

- Continue to apply for activation of some or all of the previously utilized TMOAs—YUKON 3, YUKON 4, YUKON 1A, FOX 1, FOX 2, STONY C, BUFLO, EIELSON A, and EIELSON B—up to six times per year to provide airspace for conducting effective and realistic MFEs;
- Times of operation, vertical dimensions, and internal boundaries of all permanent MOAs—YUKON 1, YUKON 2, SUSITNA, STONY A, STONY B, NAKNEK 1, NAKNEK 2, and GALENA—would remain the same;
- Continue to conduct supersonic aircraft operations in YUKON 1 (MFE only), YUKON 2, SUSITNA, STONY A, and STONY B MOAs;
- Continue to conduct routine and joint/combined training with Alaska-based and deployed aircraft; and
- Conduct up to six MFEs per year (not to exceed 60 days per year) involving as many as 85 aircraft in a maximum of 150 sorties per MFE-day using existing MOAs and approved TMOAs and air-to-ground weapons ranges; and
- Continue to use chaff and flares during routine and MFE training in permanent MOAs in accordance with current 11th Air Force directives (see section 3.4.2.4).

The No Action Alternative provides the baseline for comparison among the alternatives. It reflects the actions the Air Force currently takes, and would continue to take in the event neither the Proposed Action nor any of its alternatives were implemented, to ensure the conduct of effective routine training and MFEs. Because the No Action Alternative provides the baseline for comparison, tables presenting all of the alternatives list the No Action Alternative first.

2.3.3 Alternative A (No CLEAR CREEK MOA Alternative)

An overview of Alternative A is presented in Figure 2-3. This alternative (the No CLEAR CREEK MOA Alternative) was developed based on public response received during the scoping process that suggested the Air Force evaluate an alternative that did not include the CLEAR CREEK MOA. Alternative A is included because it satisfies the mandatory criteria established by 11th Air Force to identify reasonable alternatives (see section 2.1), although it provides less than optimal access to the Blair Lakes range (R-2211). Specifically, Alternative A would:

- Be the same as the Proposed Action, except that only one new MOA would be established, FALCON. CLEAR CREEK MOA would not be established. Aircraft training operations planned for the CLEAR CREEK MOA under the Proposed Action would be conducted instead in the proposed BIRCH and EIELSON MOAs.

2.3.4 Alternative B (TANANA MOA Alternative)

An overview of Alternative B is presented in Figure 2-4. This alternative (the TANANA MOA Alternative) was developed in response to public comments received during scoping concerning other possible locations for MOAs. Following scoping, the 11th Air Force applied the mandatory criteria used to formulate and evaluate the alternatives (see section 2.1) to scrutinize every alternative suggested during scoping. Alternative B was found to satisfy these criteria and is, therefore, included. Specifically, Alternative B would:

- Convert six previously utilized TMOAs—YUKON 3, YUKON 1A, FOX 1, BUFLO, EIELSON A, and EIELSON B—to permanent MOAs—YUKON 3, YUKON 6, FOX, BUFFALO, BIRCH, and EIELSON, respectively;
- Modify five existing MOAs—YUKON 1, STONY B, NAKNEK 1, NAKNEK 2, and GALENA—(times of operation, vertical dimensions, and internal boundaries);
- Create three new permanent MOAs—CLEAR CREEK, FALCON, and TANANA;
- Continue to conduct supersonic aircraft operations in the currently authorized STONY A and B MOAs, SUSITNA MOA, YUKON 2 MOA, and YUKON 1 MOA (MFEs only); add supersonic aircraft operations in YUKON 1 MOA (routine and MFE training), YUKON 3 MOA, and FOX MOA;
- Standardize floors for supersonic operations in three existing MOAs that already have supersonic operations—YUKON 2, STONY A, and STONY B;
- Continue to conduct routine and joint/combined training with Alaska-based and deployed aircraft;
- Conduct up to six MFEs per year (not to exceed 60 days per year), but increase the number of authorized MFE aircraft from 85 to 100 and increase the number of MFE sorties from 150 to 200 per MFE-day using the Alternative B MOA structure and existing air-to-ground weapons ranges; and
- Continue to use chaff and flares in YUKON 1, YUKON 2, SUSITNA, STONY A, STONY B, NAKNEK 1, NAKNEK 2, and GALENA MOAs, and authorize use of chaff and flares for routine and MFE training in all new permanent MOAs in accordance with current 11th Air Force directives (see section 3.4.2.4).

2.3.5 Alternative A—Modified

An overview of Alternative A—Modified is presented in Figure 2-5. This alternative was developed in response to comments received on the Draft EIS. After the comment period ended, the 11th Air Force contemplated the suggestions made for modifying the Proposed and Alternative Actions analyzed in the Draft EIS using the mandatory criteria outlined in section 2.1 and Appendix N. Alternative A—Modified satisfied the mandatory criteria, although with less than optimum utility for training purposes in some cases. Specifically, this alternative would:

- Convert seven previously utilized TMOAs—YUKON 3, YUKON 4, YUKON 1A, BUFLO, EIELSON A, EIELSON B, and FOX 1—to permanent MOAs—YUKON 3 (A, B, and High), YUKON 4, YUKON 5, YUKON 6, BUFFALO, BIRCH, EIELSON, and FOX, respectively;
- Modify five existing MOAs—YUKON 1, STONY B, NAKNEK 1, NAKNEK 2, and GALENA—(times of operation, vertical dimensions, and internal boundaries);
- Create one new permanent MOA—FALCON;
- Modify the external boundaries of STONY A and NAKNEK 2 (existing permanent MOAs) and BIRCH and FOX (previously utilized TMOAs proposed for conversion to permanent), making each of them smaller in total area;
- Modify the proposed FOX and YUKON 5 MOAs by raising the floors to 5,000 feet AGL, the proposed YUKON 3B MOA by raising the floor to 2,000 feet AGL, and the proposed BIRCH and FALCON MOAs by raising the floors to 500 feet AGL;
- Continue to conduct supersonic aircraft operations in the currently authorized STONY A and B MOAs, SUSITNA MOA, YUKON 2 MOA, and YUKON 1 MOA (MFEs only); add supersonic aircraft operations in YUKON 1 MOA (routine and MFE training), YUKON 3 (High), 4, and 5 MOAs, and FOX MOA;
- Authorize supersonic operations in selected existing or new MOAs down to 5,000 feet AGL or 12,000 feet MSL, whichever is higher, as compared to 5,000 feet AGL under the Proposed Action;

- Continue to conduct routine and joint/combined training with Alaska-based and deployed aircraft;
- Conduct up to six MFEs per year (not to exceed 60 days per year), but increase the number of authorized MFE aircraft from 85 to 100 and increase the number of MFE sorties from 150 to 200 per MFE-day using the Alternative A—Modified MOA structure and existing air-to-ground weapons ranges;
- Limit use of YUKON 5 MOA to MFEs only; and
- Continue to use chaff and flares in YUKON 1, YUKON 2, SUSITNA, STONY A, STONY B, NAKNEK 1, NAKNEK 2, and GALENA MOAs, and authorize use of chaff and flares for routine and MFE training in all new permanent MOAs except FALCON MOA in accordance with current 11th Air Force directives (see section 3.4.2.4).

2.3.6 Land Area Encompassed by the Proposed and Alternative Actions

Table 2-1 presents the land area that would be located beneath the MOAs under each alternative. Some 37,760 square miles would underlie existing permanent MOAs in each of the alternatives except Alternative A—Modified, which would encompass slightly less area due to a reduction in the size of STONY A and NAKNEK 2 MOAs. The Proposed Action would convert previously utilized TMOAs and/or establish new MOAs over an estimated 25,660 square miles. Alternative A—Modified would encompass slightly less area with 24,150 square miles under converted TMOAs and/or new MOAs.

Table 2-1 Land Area Encompassed by Existing and Proposed Military Operations Areas

Alternative	Area in Square Miles	Area in Acres
No Action Alternative	70,970	45,420,800
Existing Permanent MOAs ¹	37,760	24,166,400
Previously Utilized Temporary MOAs ²	33,210	21,254,400
Proposed Action	63,420	40,588,800
Existing Permanent MOAs ¹	37,760	24,166,400
Proposed New MOAs ³	25,660	16,422,400
Alternative A (No CLEAR CREEK MOA Alt.)	63,020	40,332,800
Existing Permanent MOAs ¹	37,760	24,166,400
Proposed New MOAs ⁴	25,260	16,166,400
Alternative B (TANANA MOA Alt.)	62,200	39,808,000
Existing Permanent MOAs ¹	37,760	24,166,400
Proposed New MOAs ⁵	24,440	15,641,600
Alternative A—Modified	60,780	38,899,200
Existing Permanent MOAs ¹	36,630 ⁷	23,443,200 ⁷
Proposed New MOAs ⁶	24,150	15,456,000

¹YUKON 1 and 2, STONY A and B, NAKNEK 1 and 2, GALENA, and SUSITNA.

²BUFLO, EIELSON A and B, FOX 1 and 2, STONY C, YUKON 1A, YUKON 3, and YUKON 4.

³BUFFALO, BIRCH, CLEAR CREEK, EIELSON, FALCON, FOX, YUKON 3 (A and B), YUKON 4, YUKON 5, and YUKON 6.

⁴BUFFALO, BIRCH, EIELSON, FALCON, FOX, YUKON 3 (A and B), YUKON 4, YUKON 5, and YUKON 6.

⁵BUFFALO, BIRCH, CLEAR CREEK, EIELSON, FALCON, FOX, YUKON 3 (A and B), YUKON 6, and TANANA.

⁶BUFFALO, BIRCH, EIELSON, FALCON, FOX, YUKON 3 (A and B), YUKON 4, YUKON 5, and YUKON 6.

⁷Under Alternative A—Modified, the existing permanent MOAs would be reduced by 1,130 square miles (723,200 acres) to avoid overflight of Lake Clark National Park and Preserve.

Figure 2-1
Overview
Proposed Action

Legend:

-  Existing Permanent MOA
-  Proposed Temporary MOA Conversion
-  Proposed New MOA
-  Air-to-Ground Weapons Range

Restricted Airspace is shown by solid lines around the ranges.

Sources:

Features: USGS - 1:2,000,000 DLG Data
Airspace: US Air Force, 11AF
Cities/
Towns: AK DCRA & USGS - Dictionary of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection



Scale in Statute Miles

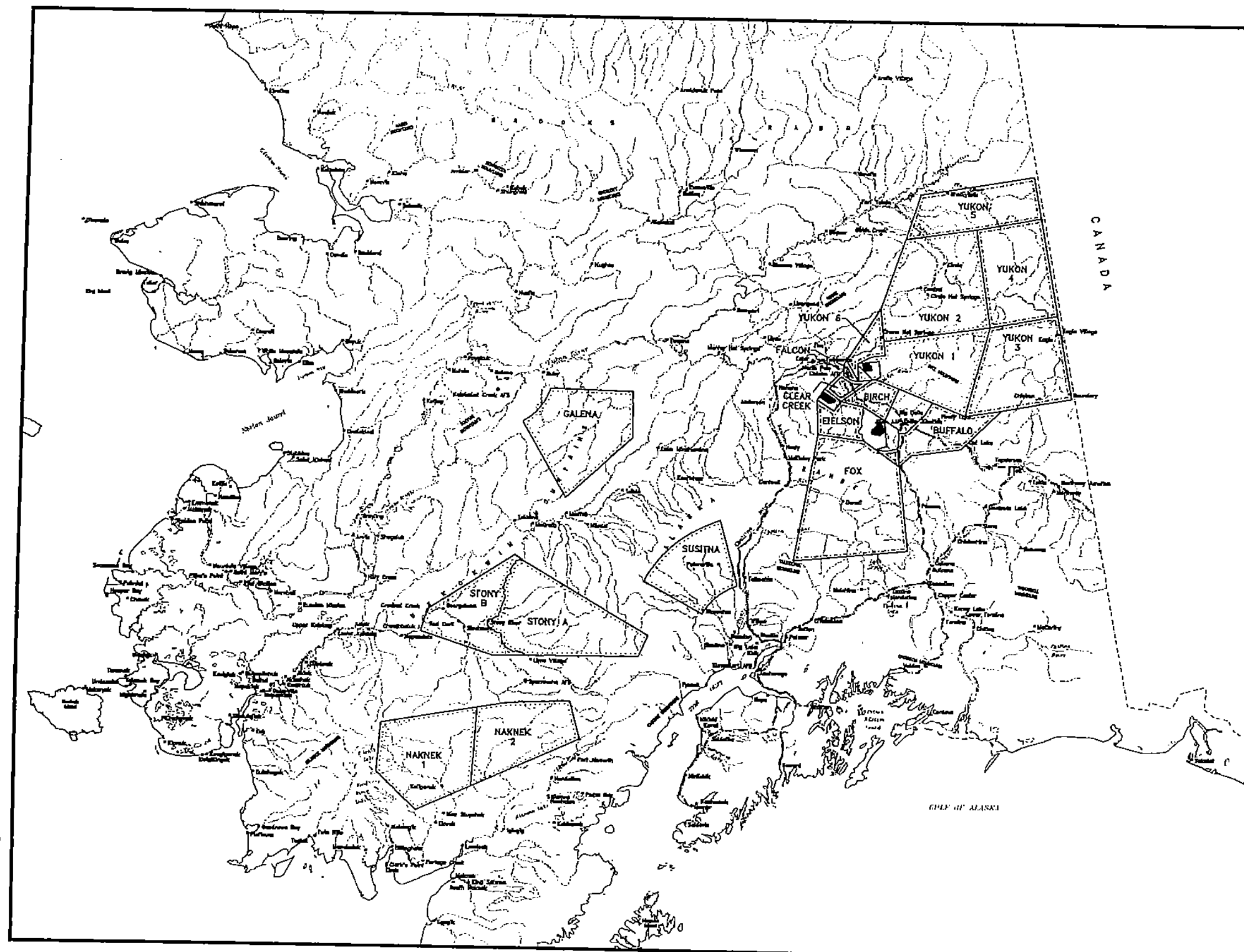
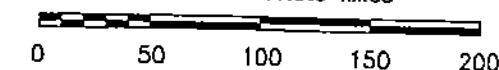


Figure 2-2
Overview
No Action Alternative

Legend:

-  Existing Permanent MOA
-  Previously Utilized Temporary MOA
-  Air-to-Ground Weapons Range

Restricted Airspace is shown by solid lines around the ranges.

Sources:

Features: USGS - 1:2,000,000 DLG Data
 Airspace: US Air Force, 11AF
 Cities/
 Towns: AK DCRA & USGS - Dictionary of Alaska Place Names

Map Projection: Albers Equal-Area Conic Projection



Scale in Statute Miles

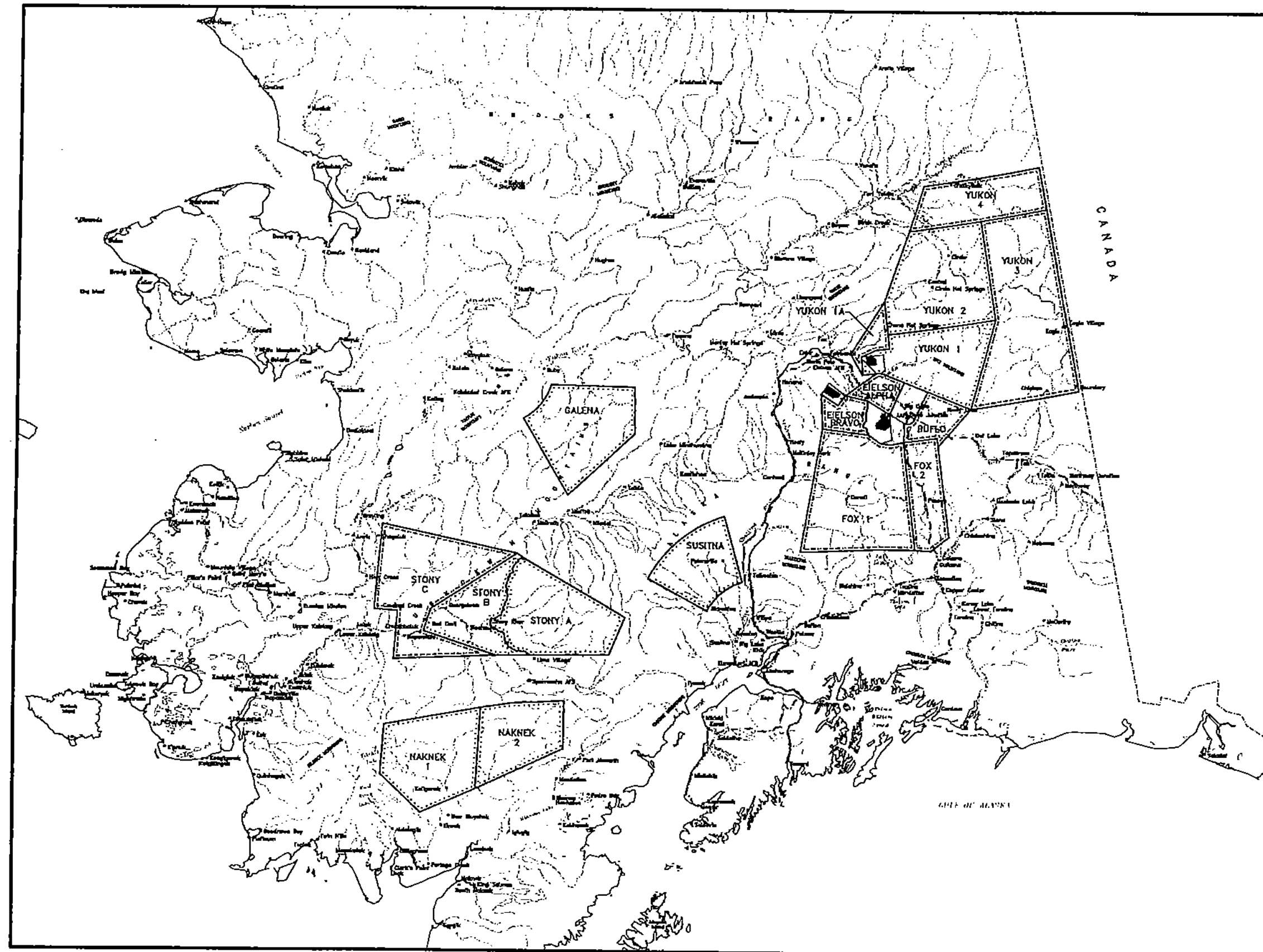
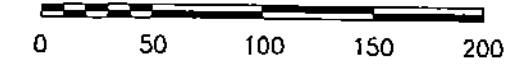


Figure 2-3
Overview
Alternative A

Legend:

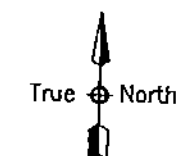
-  Existing Permanent MOA
-  Proposed Temporary MOA Conversion
-  Proposed New MOA
-  Air-to-Ground Weapons Range

Restricted Airspace is shown by solid lines around the ranges.

Sources:

Features: USGS - 1:2,000,000 DLG Data
Airspace: US Air Force, 11AF
Cities/
Towns: AK DCRA & USGS - Dictionary of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection



Scale in Statute Miles

0 50 100 150 200

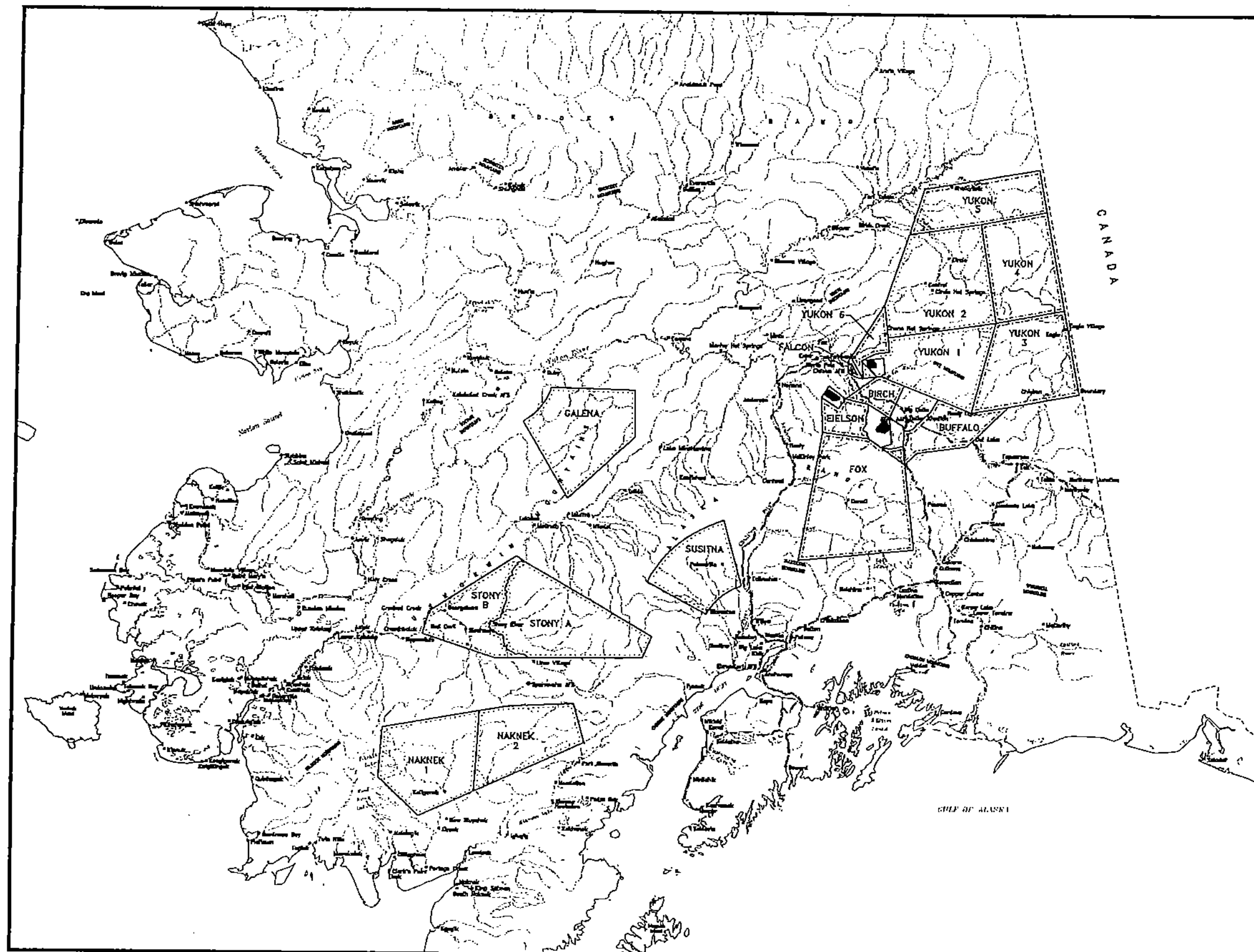


Figure 2-4
Overview
Alternative B

Legend:

-  Existing Permanent MOA
 -  Proposed Temporary MOA Conversion
 -  Proposed New MOA
 -  Air-to-Ground Weapons Range
- Restricted Airspace is shown by solid lines around the ranges.

Sources:

Features: USGS - 1:2,000,000 DLG Data
 Airspace: US Air Force, 11AF
 Cities/
 Towns: AK DCRA & USGS - Dictionary of Alaska Place Names

Map Projection: Albers Equal-Area
 Conic Projection



Scale in Statute Miles

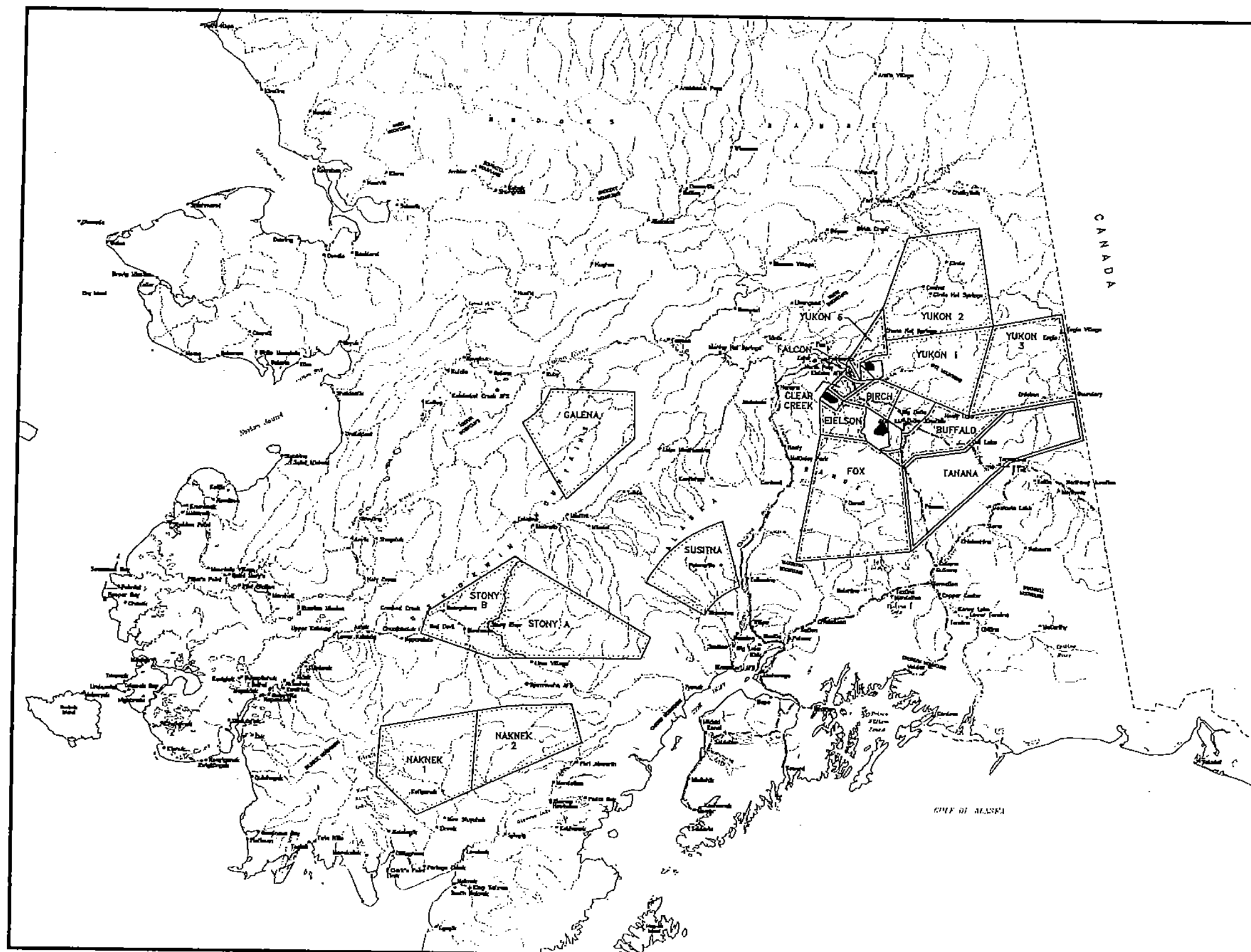
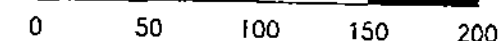


Figure 2-5
Overview
Alternative A — Modified
(Preferred Alternative)

Legend:

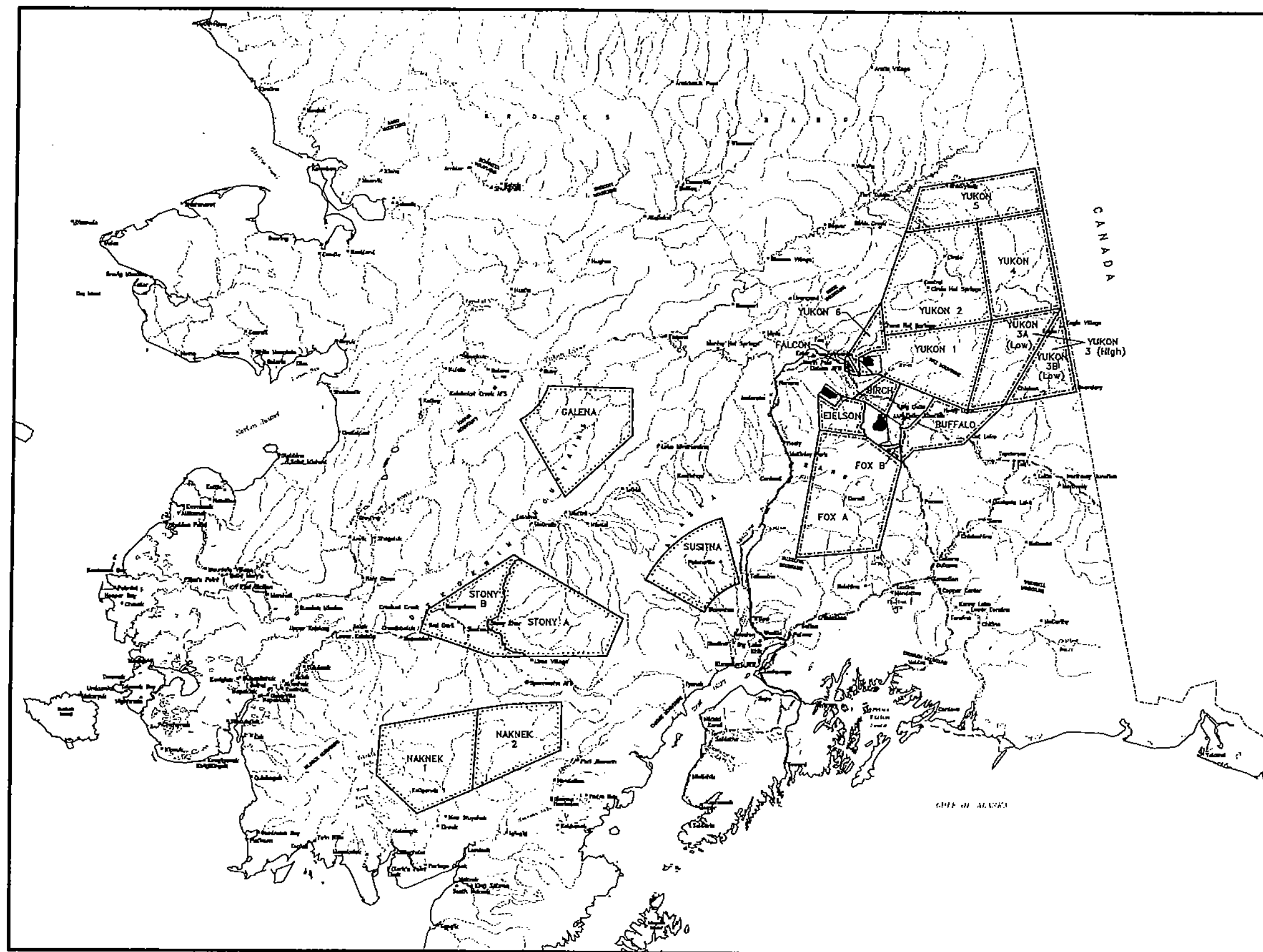
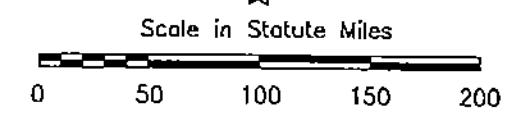
-  Existing Permanent MOA
 -  Proposed Temporary MOA Conversion
 -  Proposed New MOA
 -  Air-to-Ground Weapons Range
- Restricted Airspace is shown by solid lines around the ranges.

Sources:

Features: USGS — 1:2,000,000 DLG Data
 Airspace: US Air Force, 11AF
 Cities/
 Towns: AK DCRA & USGS — Dictionary of Alaska Place Names

Note: Yukon 3 (High) lies over the top of Yukon 3A and 3B.

Map Projection: Albers Equal-Area Conic Projection



2.4 Detailed Descriptions of the Alternatives

Sections 2.4.2 through 2.4.6 contain detailed descriptions of the MOA configurations and the aircraft operations that would be conducted in each MOA under each Alternative. In order to simplify the analyses made in Chapter 4, these MOAs have been divided and presented throughout the document in four regions: Northern Interior Region (Proposed YUKON 1, 2, 3, 4, 5, and 6 MOAs); Southern Interior Region (Proposed BUFFALO, BIRCH, EIELSON, FALCON, and CLEAR CREEK MOAs); Southcentral Region (Proposed FOX, TANANA [Alternative B], and SUSITNA MOAs); and Western Region (Proposed and existing STONY A and B, NAKNEK 1 and 2, and GALENA MOAs). The information in these sections is presented in section 2.4.7 in tabular format to facilitate comparing the alternatives. In addition, aircraft activities from the bases, in the MOAs, and on the air-to-ground weapons ranges are summarized for each Alternative in sections 2.4.8 through 2.4.10; supersonic operations are explained in section 2.4.11.

Note that for all Alternatives, routine training would occur throughout the year over an assumed average of 240 days per year. MFEs could occur as many as 6 times per year, for a maximum total of 60 days annually (typically 10 days each exercise). Please see section 2.2 and Appendix C for further explanation of routine and MFE aircraft training operations. Geographic coordinates (latitude, longitude, and altitude designations) for the existing and proposed MOAs under each Alternative are listed in Appendix B. For a more detailed explanation of how the levels of aircraft activity were calculated, refer to Appendix E.

Sometimes it may be necessary for the Air Force to train outside the published hours. This would require that a special NOTAM advisory be approved and issued by the FAA. However, the Air Force would plan MOA operations to begin after 7:00 a.m. local time and cease before 10:00 p.m. local time.

Detailed maps depicting the MOAs in each of the four regions can be found in section 3.2 for the No Action Alternative and section 4.2 for the Proposed Action and Alternatives A, B, and A—Modified.

2.4.1 Environmental Protection Measures Common to All Alternatives

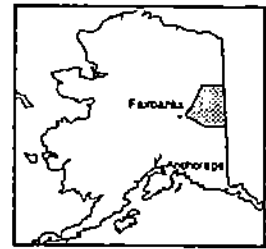
The 11th Air Force maintains a *Noise/Flight Sensitive Area List*, which details Flight Avoidance Areas around specific sites considered sensitive to aircraft noise and/or overflight. These sites currently include residential areas, biologically sensitive areas, recreation areas, and high traffic areas (either ground vehicles or aircraft). The restriction parameters are the geographic coordinates (i.e., the size and shape of the avoidance area), altitudes (e.g., surface to 3,000 feet AGL, surface to 1,500 feet AGL, etc.), and time of year (e.g., May 1 to September 30, continuous, etc.). The list is self-imposed and is updated as environmental sensitivities change. However, for this analysis, the current list is considered to be part of the existing environment, and these Flight Avoidance Areas are taken into account in the analysis of environmental consequences for each alternative. The *Noise/Flight Sensitive Area List* is reproduced in Appendix B, which also contains maps of the individual MOAs depicting the location, relative size, and shape of the applicable Flight Avoidance Areas.

2.4.2 Proposed Action

2.4.2.1 Northern Interior Region

YUKON 1 MOA

The floor of the YUKON 1 MOA would be raised from the surface to 100 feet AGL, and the ceiling would continue to be 17,999 feet MSL. Approximate lateral dimensions would continue to be 90 NM by 50 NM. Hours of operation would continue to be 8:00 a.m. to 6:00 p.m., Monday through Friday, and other times by NOTAM system. Supersonic operations down to 5,000 feet AGL would be authorized.



The YUKON 1 MOA would continue to be used for routine daily training from Eielson and Elmendorf AFBs and for MFEs. Routine and MFE training generally would consist of air combat training, fighter intercept training, basic fighter maneuvers, and low-altitude fighter operations (air-to-air and air-to-ground training). Average daily aircraft operations rates would not be expected to exceed 18 aircraft operations per day during routine training, or 206 aircraft operations per day during MFE training.

YUKON 2 MOA

The altitudes of the YUKON 2 MOA would continue to be 100 feet AGL to 17,999 feet MSL. Approximate lateral dimensions would continue to be 80 NM by 60 NM. Hours of operation would continue to be 8:00 a.m. to 6:00 p.m., Monday through Friday, and other times by NOTAM. Supersonic operations would be authorized, and the floor for supersonic operations would be standardized at 5,000 feet AGL.

The YUKON 2 MOA would continue to be used for routine daily training from Eielson and Elmendorf AFBs and for MFEs. Routine and MFE training generally would consist of air combat training, fighter intercept training, basic fighter maneuvers, and low-altitude fighter operations (air-to-air and air-to-ground training). Average daily aircraft operations rates would not be expected to exceed 12 aircraft operations per day during routine training, or 201 aircraft operations per day during MFE training.

YUKON 3 and 4 MOAs

The previously utilized YUKON 3 TMOA would be divided to create two permanent MOAs, YUKON 3 MOA and YUKON 4 MOA. The floors of these MOAs would be lowered to 100 feet AGL, and the ceilings would continue to be 17,999 feet MSL. Approximate lateral dimensions would be 50 NM by 60 NM for YUKON 3 MOA and 50 NM by 40 NM for YUKON 4 MOA. Hours of operation would be 10:00 a.m. to 3:00 p.m., Monday through Friday, and other times by NOTAM. Supersonic operations down to 5,000 feet AGL would be authorized.

The YUKON 3 and YUKON 4 MOAs would be used for routine daily training from Eielson and Elmendorf AFBs, and would continue to be used for MFEs. Routine and MFE training generally would consist of air combat training, fighter intercept training, and low-altitude fighter operations (air-to-air and air-to-ground training). During routine training, average daily aircraft operations rates would not be expected to exceed eight aircraft operations per day in YUKON 3 MOA and seven aircraft operations per day in YUKON 4 MOA; during MFE training, average daily aircraft operations rates would not be expected to exceed 166 aircraft operations per day in YUKON 3 MOA and 164 aircraft operations per day in YUKON 4 MOA.

YUKON 5 MOA

The previously utilized YUKON 4 TMOA would be converted to the permanent YUKON 5 MOA. The floor of the MOA would be raised to 3,000 feet AGL, and the ceiling of the MOA would continue to be 17,999 feet

MSL. Approximate lateral dimensions would be 90 NM by 30 NM. Hours of operation would be by NOTAM only. Supersonic operations down to 5,000 feet AGL would be authorized.

The YUKON 5 MOA would be used for routine daily training from Eielson and Elmendorf AFBs, and would continue to be used for MFEs. Routine and MFE training generally would consist of air combat training and fighter intercept training (air-to-air training). Average daily aircraft operations rates would not be expected to exceed 1 (0.39) aircraft operations per day during routine training, or 170 aircraft operations per day during MFE training.

YUKON 6 MOA

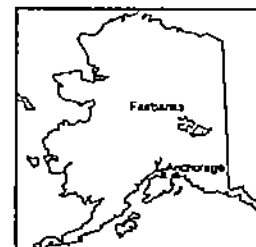
The previously utilized YUKON 1A TMOA would be converted to the permanent YUKON 6 MOA. The altitudes of the MOA would continue to be 100 feet AGL to 17,999 feet MSL. Approximate lateral dimensions would continue to be a triangular shape 45 NM by 35 NM by 25 NM. Hours of operation would be 8:00 a.m. to 6:00 p.m., Monday through Friday, and other times by NOTAM. Supersonic operations would not be authorized.

The YUKON 6 MOA would be used for routine daily training from Eielson and Elmendorf AFBs, and would continue to be used for MFEs. Routine and MFE training generally would consist of transition between the YUKON 1 MOA and the Stuart Creek air-to-ground weapons range (R-2205), low-altitude ingress/egress to Eielson AFB for simulated airfield attack, low-altitude step-down training, low-altitude tactical navigation, air combat training, fighter intercept training, and basic fighter maneuvers. Average daily aircraft operations rates would not be expected to exceed 14 aircraft operations per day during routine training, or 107 aircraft operations per day during MFE training.

2.4.2.2 Southern Interior Region

BUFFALO MOA

The previously utilized BUFLO TMOA would be converted to the permanent BUFFALO MOA. The floor of the MOA would be lowered to 300 feet AGL with a ceiling of 6,999 feet MSL. Approximate lateral dimensions would be 60 NM by 45 NM, narrowing to 25 NM. Hours of operation would be 8:00 a.m. to 6:00 p.m., Monday through Friday, and other times by NOTAM. Supersonic operations would not be authorized.



The BUFFALO MOA would be used for routine daily training from Eielson and Elmendorf AFBs, and would continue to be used for MFEs. Routine and MFE training generally would consist of transition between the southeastern portion of the YUKON 1 MOA and the Oklahoma air-to-ground weapons range (R-2202), and practice of low-altitude tactics, formation, and navigation. Average daily aircraft operations rates would not be expected to exceed 12 aircraft operations per day during routine training, or 86 aircraft operations per day during MFE training.

BIRCH MOA

The previously utilized EIELSON A TMOA would be converted to the permanent BIRCH MOA. The altitudes of the MOA would be 100 feet AGL to 4,000 feet MSL. Approximate lateral dimensions would continue to be 20 NM by 30 NM. Hours of operation would be 8:00 a.m. to 6:00 p.m., Monday through Friday, and other times by NOTAM. Supersonic operations would not be authorized.

The BIRCH MOA would be used for routine daily training from Eielson and Elmendorf AFBs, and would continue to be used for MFEs. Routine and MFE training generally would consist of transition between the southern portion of the YUKON 1 MOA and the Oklahoma (R-2202) and Blair Lakes (R-2211) ranges, and

practice of low-altitude tactics, formation, and navigation. Average daily aircraft operations rates would not be expected to exceed 14 aircraft operations per day during routine training, or 145 aircraft operations per day during MFE training.

EIELSON MOA

The previously utilized EIELSON B TMOA would be converted to the permanent EIELSON MOA. The altitudes of the MOA would continue to be 100 feet AGL to 17,999 feet MSL. Approximate lateral dimensions would continue to be 30 NM by 30 NM. Hours of operation would be 8:00 a.m. to 6:00 p.m., Monday through Friday, and other times by NOTAM. Supersonic operations would not be authorized.

The EIELSON MOA would be used for routine daily training from Eielson and Elmendorf AFBs, and would continue to be used for MFEs. Routine and MFE training generally would consist of low-altitude intercept training, air combat training, formation training, and low-altitude tactical navigation between the Oklahoma (R-2202) and Blair Lakes (R-2211) ranges. Average daily aircraft operations rates would not be expected to exceed 11 aircraft operations per day during routine training, or 105 aircraft operations per day during MFE training.

FALCON MOA

A new permanent FALCON MOA would be established. The altitudes of the MOA would be 100 feet AGL to 17,999 feet MSL. Approximate lateral dimensions would be 9 NM by 17 NM. Hours of operation would be by NOTAM only. Supersonic operations would not be authorized.

The FALCON MOA would be used for routine daily training from Eielson and Elmendorf AFBs, and would be used for MFEs. Routine and MFE training generally would consist of transition to and from the Stuart Creek air-to-ground weapons range (R-2205) and the YUKON 1 and 6 MOAs, low-altitude ingress/egress to and from Eielson AFB for simulated airfield attacks, low-altitude step-down training, and low-altitude tactical navigation. Average daily aircraft operations rates would not be expected to exceed 5 aircraft operations per day during routine training, or 13 aircraft operations per day during MFE training.

CLEAR CREEK MOA

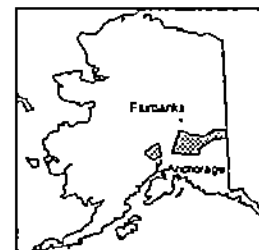
A new permanent CLEAR CREEK MOA would be established. The altitudes of the MOA would be 3,000 feet MSL to 5,000 feet MSL. Approximate lateral dimensions would be 18 NM by 20 NM. Hours of operation would be by NOTAM only. Supersonic operations would not be authorized.

The CLEAR CREEK MOA would be used for routine daily training from Eielson and Elmendorf AFBs, and would be used for MFEs. Routine and MFE training generally would consist of transition between the Blair Lakes air-to-ground weapons range (R-2211) and the YUKON 1, YUKON 6, BIRCH, and FALCON MOAs, and practice of low-altitude tactics, formation, and navigation. Average daily aircraft operations rates would not be expected to exceed 5 aircraft operations per day during routine training, or 13 aircraft operations per day during MFE training.

2.4.2.3 Southcentral Region

FOX MOA

The previously utilized FOX 1 TMOA would be converted to the permanent FOX MOA. The altitudes of the MOA would continue to be 3,000 feet AGL to 17,999 feet MSL. A very small portion of the northeast corner of the FOX MOA would overlap (above) the BUFFALO MOA and have a floor of 7,000 feet MSL (see Appendix B, page B-13, Figure B-12). If the FOX MOA airspace is approved the FOX MOA would probably be



charted as two separate MOAs (e.g., FOX A and FOX B [portion above BUFFALO MOA]). Approximate lateral dimensions would be 75 NM by 85 NM. Hours of operation would be 8:00 a.m. to 4:00 p.m., Monday through Friday, and other times by NOTAM. Supersonic operations down to 5,000 feet AGL would be authorized.

The FOX MOA would be used for routine daily training from Eielson and Elmendorf AFBs, and would continue to be used for MFEs. Routine training generally would consist of air combat training, basic fighter maneuvers, and fighter intercept training; MFE training generally would consist of pre-exercise marshalling, pre-engagement air refueling, orbiting of electronic warfare command and control aircraft, air combat training, and post-exercise regrouping prior to returning to base. The FOX MOA would markedly enhance routine air-to-air combat training by providing an area, located within the effective training ranges of F-16 aircraft from Eielson AFB and F-15 aircraft from Elmendorf AFB, of sufficient size for dissimilar air combat training and composite force training. Average daily aircraft operations rates would not be expected to exceed 16 aircraft operations per day during routine training, or 80 aircraft operations per day during MFE training.

TANANA MOA

The TANANA MOA would not be established.

SUSITNA MOA

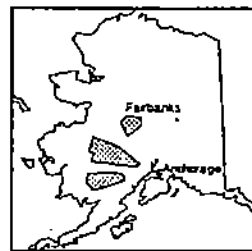
The airspace configuration and types of aircraft operations conducted in the SUSITNA MOA would not change. The altitudes of the MOA would continue to be 5,000 feet AGL/10,000 feet MSL (whichever is higher) to 17,999 feet MSL. Approximate lateral dimensions would continue to be a pie shape 60 NM by 45 NM. Hours of operation would continue to be 8:00 a.m. to 6:00 p.m., Monday through Friday, and other times by NOTAM. Supersonic operations down to 5,000 feet AGL/10,000 feet MSL (whichever is higher) would continue to be authorized.

The SUSITNA MOA would be used for routine daily training from Eielson and Elmendorf AFBs and for limited air-to-air surge exercises. MFE training would not be conducted in the MOA. Routine and surge training would primarily consist of air combat training, fighter intercept training, and basic fighter maneuvers. With the creation of the FOX MOA for air-to-air training, routine training in the SUSITNA MOA would be expected to decrease slightly. During routine training, average daily aircraft operations rates would not be expected to exceed three aircraft operations per day; during MFE training, average daily aircraft operations for routine training would also not be expected to exceed three aircraft operations per day.

2.4.2.4 Western Region

STONY A and B MOAs, STONY C TMOA

The altitudes of the STONY A MOA would continue to be 100 feet AGL to 17,999 feet MSL; the altitudes of the STONY B MOA would be redefined to be 100 feet AGL to 17,999 feet MSL. Approximate lateral dimensions would continue to be 105 NM by 70 NM, decreasing to 20 NM for STONY A MOA, and 50 NM by 70 NM, decreasing to 20 NM for STONY B MOA. Hours of operation would continue to be 8:00 a.m. to 6:00 p.m., Monday through Friday, and other times by NOTAM in STONY A MOA; and hours of operation would be increased to 8:00 a.m. to 6:00 p.m., Monday through Friday, and other times by NOTAM in STONY B MOA. Supersonic operations would be authorized, and the floor for supersonic operations would be standardized at 5,000 feet AGL. The STONY C TMOA would not be retained, nor would it be converted to a permanent MOA.



The STONY MOAs would continue to be used for routine daily training from Elmendorf AFB and for limited air-to-air surge exercises. Routine and surge exercise training generally would consist of air combat training, fighter intercept training, basic fighter maneuvers, and low-altitude fighter operations of all types. The Alaska Air Combat Maneuvering Instrumentation system (ACMI), located in STONY A MOA, with coverage of both STONY A and B MOAs, would continue to be a valuable training asset. During routine training, average daily aircraft operations rates would not be expected to exceed 17 aircraft operations per day in STONY A MOA and 7 aircraft operations per day in STONY B MOA; during surge exercises, average daily aircraft operations rates would not be expected to exceed 23 per day in STONY A MOA, and 13 per day in STONY B MOA.

NAKNEK 1 and 2 MOAs

The existing internal boundary between NAKNEK 1 and 2 MOAs would be redefined. Presently, this boundary is defined as the 340° radial (magnetic) off the King Salmon TACAN (Tactical Air Navigation); see Appendix B for literal boundary definitions. To eliminate dependence on external navigation aids, the boundary would be redefined along the same line in terms of latitude and longitude. The MOA floors would continue to be 3,000 feet AGL; the ceilings would continue to be 17,999 feet MSL. Approximate lateral dimensions would continue to be 70 NM by 45 NM for NAKNEK 1 MOA and 80 NM by 35 NM for NAKNEK 2 MOA. Hours of operation in both MOAs would be reduced to 10:00 a.m. to 3:00 p.m., Monday through Friday, and other times by NOTAM. Supersonic operations would not be authorized.

The NAKNEK 1 and 2 MOAs would be used for routine daily training from Elmendorf AFB. MFE training would not be conducted in the MOAs. Routine training would primarily consist of air combat training, fighter intercept training, and basic fighter maneuvers. During routine training, average daily aircraft operations rates would not be expected to exceed five aircraft operations per day in NAKNEK 1 MOA and three aircraft operations per day in NAKNEK 2 MOA; during MFE training, average daily aircraft operations for routine training would not be expected to exceed four aircraft operations per day in NAKNEK 1 MOA and three aircraft operations per day in NAKNEK 2 MOA.

GALENA MOA

The airspace configuration and types of aircraft operations conducted in the GALENA MOA would not change. The altitudes of the MOA would continue to be 1,000 feet AGL to 17,999 feet MSL. Approximate lateral dimensions would continue to be a pie shape 70 NM by 25 NM at its narrowest point, and 50 NM wide on average. However, regularly scheduled hours of operation would be eliminated, and instead the MOA would be activated by NOTAM for limited periods during the conduct of exercises (not MFEs) at Galena Air Force Station. Supersonic operations would not be authorized.

The GALENA MOA would normally not be used for routine training but would be used by aircraft participating in exercises at Galena Air Force Station. MFE training would not be conducted in the MOA. Training would primarily consist of air combat training, fighter intercept training, and basic fighter maneuvers. During routine training, average daily aircraft operations rates would be expected to be less than one (0.19) aircraft operation per day; during MFE training, average daily aircraft operations for routine training would also be expected to be less than one (0.18) aircraft operation per day.

The GALENA MOA, as a NOTAM-activated MOA with no published hours, would be used predominantly for limited exercises and very infrequently for routine training when weather in other MOAs necessitated its limited use. Exercise use would center upon activation for limited Alaskan Air Sovereignty (air defense) scenarios. A typical scenario would involve 2 to 4 F-15s deployed to Galena Airport and activation of the GALENA MOA for 2 to 3 hours in the morning and 2 to 3 hours in the afternoon. Exercises would normally last 2 to 4 days to fully exercise airborne and ground-based participants. Upon completion of the exercise, the GALENA MOA would be de-activated.

2.4.3 No Action Alternative (Existing MOAs and Previously Utilized TMOAs)

2.4.3.1 Northern Interior Region

YUKON 1 MOA

The altitude of the YUKON 1 MOA would continue to be surface to 17,999 feet MSL. Approximate lateral dimensions would continue to be 90 NM by 50 NM. Hours of operation would continue to be 8:00 a.m. to 6:00 p.m., Monday through Friday, and other times by NOTAM. Supersonic operations during routine training would not be authorized; however, supersonic operations down to 5,000 feet AGL/10,000 feet MSL (whichever is higher) would continue to be authorized during MFEs.

The YUKON 1 MOA would continue to be used for routine daily training from Eielson and Elmendorf AFBs and for MFEs. Routine and MFE training generally would consist of air combat training, fighter intercept training, basic fighter maneuvers, and low-altitude fighter operations (air-to-air and air-to-ground training). Average daily aircraft operations rates would not be expected to exceed 11 aircraft operations per day during routine training, or 149 aircraft operations per day during MFE training.

YUKON 2 MOA

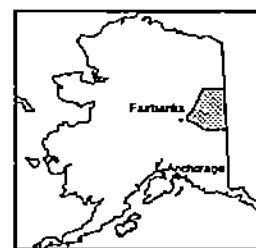
The altitudes of the YUKON 2 MOA would continue to be 100 feet AGL to 17,999 feet MSL. Approximate lateral dimensions would continue to be 80 NM by 60 NM. Hours of operation would continue to be 8:00 a.m. to 6:00 p.m., Monday through Friday, and other times by NOTAM. Supersonic operations during routine and MFE training would continue to be authorized down to 5,000 feet AGL/10,000 feet MSL (whichever is higher).

The YUKON 2 MOA would continue to be used for routine daily training from Eielson and Elmendorf AFBs and for MFEs. Routine and MFE training generally would consist of air combat training, fighter intercept training, basic fighter maneuvers, and low-altitude fighter operations (air-to-air and air-to-ground training). Average daily aircraft operations rates would not be expected to exceed 14 aircraft operations per day during routine training, or 152 aircraft operations per day during MFE training.

YUKON 3 and 4 MOAs

The permanent YUKON 3 and 4 MOAs would not be established. Instead, the YUKON 3 TMOA would continue to be established for MFEs only. Altitudes of the TMOA would continue to be 3,000 feet AGL to 17,999 feet MSL. Approximate lateral dimensions would continue to be 100 NM by 50 NM. Normal hours of operation would continue to be between 6:00 a.m. and 6:00 p.m., Monday through Friday. Supersonic operations would not be authorized.

Routine training would not be conducted in the YUKON 3 TMOA. MFE training generally would consist of air combat training, fighter intercept training, and low-altitude fighter operations (air-to-air and air-to-ground training). During MFEs, average daily aircraft operations rates would not be expected to exceed 119 aircraft operations per day.



YUKON 5 MOA

The permanent YUKON 5 MOA would not be established. Instead, the YUKON 4 TMOA would continue to be established for MFEs only. Altitudes of the TMOA would continue to be 2,000 feet AGL to 17,999 feet MSL. Approximate lateral dimensions would continue to be 90 NM by 30 NM. Hours of operation would normally occur between 6:00 a.m. and 6:00 p.m., Monday through Friday. Supersonic operations would not be authorized.

Routine training would not be conducted in the YUKON 4 TMOA. The TMOA would continue to be established for MFEs only. MFE training generally would consist of air combat training and fighter intercept training (air-to-air training). During MFEs, average daily aircraft operations rates would not be expected to exceed 132 aircraft operations per day.

YUKON 6 MOA

The permanent YUKON 6 MOA would not be established. Instead, the YUKON 1A TMOA would continue to be established for MFEs only. Altitudes of the TMOA would continue to be 100 feet AGL to 17,999 feet MSL. Approximate lateral dimensions would continue to be a triangular shape 45 NM by 35 NM by 25 NM. Hours of operation would normally occur between 6:00 a.m. and 6:00 p.m., Monday through Friday. Supersonic operations would not be authorized.

Routine training would not be conducted in the YUKON 1A TMOA. The TMOA would continue to be established for MFEs only. MFE training generally would consist of transition between the YUKON 1 MOA and the Stuart Creek air-to-ground weapons range (R-2205), low-altitude ingress/egress to Eielson AFB for simulated airfield attack, low-altitude step-down training, low-altitude tactical navigation, air combat training, fighter intercept training, and basic fighter maneuvers (air-to-air and air-to-ground training). During MFEs, average daily aircraft operations rates would not be expected to exceed 70 aircraft operations per day.

2.4.3.2 Southern Interior Region

BUFFALO MOA

The permanent BUFFALO MOA would not be established. Instead, the BUFLO TMOA would continue to be established for MFEs only. Altitudes of the TMOA would continue to be 1,000 feet AGL to 7,000 feet MSL. Approximate lateral dimensions would continue to be 45 NM by 30 NM. Hours of operation would normally occur between 6:00 a.m. and 6:00 p.m., Monday through Friday. Supersonic operations would not be authorized.



Routine training would not be conducted in the BUFLO TMOA. The TMOA would continue to be established for MFEs only. MFE training generally would consist of transition between the southeastern portion of the YUKON 1 MOA and the Oklahoma air-to-ground weapons range (R-2202), and practice of low-altitude tactics, formation, and navigation. During MFEs, average daily aircraft operations rates would not be expected to exceed 140 aircraft operations per day.

BIRCH MOA

The permanent BIRCH MOA would not be established. Instead, the EIELSON A TMOA would continue to be established for MFEs only. Altitudes of the TMOA would continue to be 100 feet AGL to 4,000 feet MSL. Approximate lateral dimensions would continue to be 20 NM by 30 NM. Hours of operation would normally occur between 6:00 a.m. and 6:00 p.m., Monday through Friday. Supersonic operations would not be authorized.

Routine training would not be conducted in the EIELSON A TMOA. The TMOA would continue to be established for MFEs only. MFE training generally would consist of transition between the southern portion of the YUKON 1 MOA and the Oklahoma (R-2202) and Blair Lakes (R-2211) ranges, and practice of low-altitude tactics, formation, and navigation. During MFEs, average daily aircraft operations rates would not be expected to exceed 140 aircraft operations per day.

EIELSON MOA

The permanent EIELSON MOA would not be established. Instead, the EIELSON B TMOA would continue to be established for MFEs only. Altitudes of the TMOA would continue to be 100 feet AGL to 17,999 feet MSL. Approximate lateral dimensions would continue to be 30 NM by 30 NM. Hours of operation would normally occur between 6:00 a.m. and 6:00 p.m., Monday through Friday. Supersonic operations would not be authorized.

Routine training would not be conducted in the EIELSON B TMOA. The TMOA would continue to be established for MFEs only. MFE training generally would consist of low-altitude intercept training, air combat training, formation training, and low-altitude tactical navigation between the Oklahoma (R-2202) and Blair Lakes (R-2211) ranges. During MFEs, average daily aircraft operations rates would not be expected to exceed 140 aircraft operations per day.

FALCON MOA

The permanent FALCON MOA would not be established.

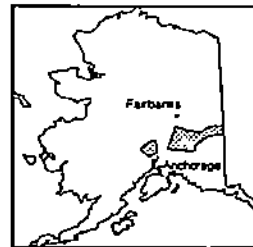
CLEAR CREEK MOA

The permanent CLEAR CREEK MOA would not be established.

2.4.3.3 Southcentral Region

FOX MOA

The permanent FOX MOA would not be established. Instead, the FOX 1 and 2 TMOAs would continue to be established for MFEs only. Altitudes of the FOX 1 TMOA would continue to be 3,000 feet AGL to 17,999 feet MSL; altitudes of the FOX 2 TMOA would continue to be 14,000 feet AGL to 17,999 feet MSL. Approximate lateral dimensions of the FOX 1 TMOA would continue to be 80 NM by 80 NM; approximate lateral dimensions of the FOX 2 TMOA would continue to be 80 NM by 25 NM. Hours of operation would continue to normally occur between 6:00 a.m. and 6:00 p.m., Monday through Friday. Supersonic operations would not be authorized.



Routine training would not be conducted in the FOX 1 and 2 TMOAs. The TMOAs would continue to be used for MFEs only. MFE training generally would consist of pre-exercise marshalling, pre-engagement air refueling, air-to-air engagements, orbiting of electronic warfare command and control aircraft, and post-exercise regrouping prior to returning to base. During MFEs, average daily aircraft operations rates would not be expected to exceed 50 aircraft operations per day in the FOX 1 TMOA and 50 aircraft operations per day in the FOX 2 TMOA.

TANANA MOA

The TANANA MOA would not be established.

SUSITNA MOA

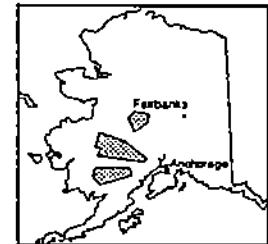
The SUSITNA MOA would continue to have altitudes of 5,000 feet AGL/10,000 feet MSL (whichever is higher) to 17,999 feet MSL. Approximate lateral dimensions would continue to be a pie shape 60 NM by 45 NM. Hours of operation would continue to be 8:00 a.m. to 6:00 p.m., Monday through Friday, and other times by NOTAM. Supersonic operations down to 5,000 feet AGL/10,000 feet MSL (whichever is higher) would continue to be authorized.

The SUSITNA MOA would be used for routine daily training from Eielson and Elmendorf AFBs. MFE training would not be conducted in the MOA. Routine training would primarily consist of air combat training, fighter intercept training, and basic fighter maneuvers. During routine training, average daily aircraft operations rates would not be expected to exceed eight aircraft operations per day; during MFE training, average daily aircraft operations for routine training would not be expected to exceed seven aircraft operations per day.

2.4.3.4 Western Region

STONY A and B MOAs, and STONY C TMOA

The STONY C TMOA would continue to be available for activation and use for limited air-to-air surge exercises only. The floors of STONY A MOA and STONY C TMOA would continue to be 100 feet AGL, the floor of STONY B MOA would continue to be 3,000 feet AGL, and the ceilings of all three MOAs would continue to be 17,999 feet MSL. Approximate lateral dimensions would continue to be 105 NM by 70 NM, decreasing to 20 NM for STONY A MOA; 50 NM by 70 NM, decreasing to 20 NM for STONY B MOA; and an irregular shape varying from 20 NM to 100 NM by 100 NM for STONY C TMOA. Hours of operation would continue to be 8:00 a.m. to 6:00 p.m., Monday through Friday, and other times by NOTAM, in STONY A MOA; hours of operation would continue to be by NOTAM only in STONY B MOA; and hours of operation would continue to be 6:00 a.m. to 6:00 p.m., Monday through Friday, and other times by NOTAM, in STONY C TMOA (during surge exercises). Supersonic operations down to 5,000 feet AGL or 10,000 feet MSL (whichever is higher) would continue to be authorized in the STONY A and B MOAs; supersonic operations would not be authorized in the STONY C TMOA.



The STONY A and B MOAs would continue to be used for routine daily training from Elmendorf AFB; the STONY A and B MOAs and the STONY C TMOA would continue to be used for limited air-to-air surge exercises. Routine and exercise training generally would consist of air combat training, fighter intercept training, basic fighter maneuvers, and low-altitude fighter operations. The Alaska ACMI, located in STONY A MOA, with coverage of both STONY A and B MOAs, would continue to be a valuable training asset. During routine training, average daily aircraft operations rates would not be expected to exceed 18 aircraft operations per day in STONY A MOA and 8 aircraft operations per day in STONY B MOA; during surge exercises, average daily aircraft operations rates would not be expected to exceed 23 per day in STONY A MOA, 13 per day in STONY B MOA, and 5 per day in STONY C TMOA.

NAKNEK 1 and 2 MOAs

The internal boundary between the NAKNEK 1 and 2 MOAs would continue to be defined by a TACAN range and bearing. The MOA floor would continue to be 3,000 feet AGL; the ceilings would continue to be 17,999 feet MSL. Approximate lateral dimensions would continue to be 70 NM by 45 NM for NAKNEK 1 MOA and 80 NM by 35 NM for NAKNEK 2 MOA. Hours of operation in both MOAs would continue to be 8:00 a.m. to 6:00 p.m., Monday through Friday, and other times by NOTAM. Supersonic operations would not be authorized in the NAKNEK MOAs.

The NAKNEK 1 and 2 MOAs would continue to be used for routine daily training from Elmendorf AFB and King Salmon Air Force Station. MFE training would not be conducted in the MOAs. Routine training would primarily consist of air combat training, fighter intercept training, and basic fighter maneuvers. During routine training, average daily aircraft operations rates would not be expected to exceed seven aircraft operations per day in NAKNEK 1 MOA and four aircraft operations per day in NAKNEK 2 MOA; during MFE training, average daily aircraft operations for routine training would not be expected to exceed six aircraft operations per day in NAKNEK 1 MOA and four aircraft operations per day in NAKNEK 2 MOA.

GALENA MOA

The MOA would continue to have altitudes of 1,000 feet AGL to 17,999 feet MSL. Approximate lateral dimensions would continue to be a pie shape 70 NM by 25 NM at its narrowest point, and 50 NM wide on average. Hours of operation would continue to be 8:00 a.m. to 6:00 p.m., Monday through Friday, and other times by NOTAM. Supersonic operations would not be authorized.

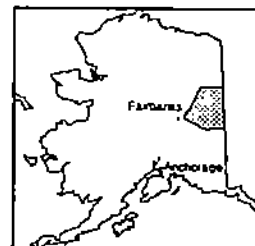
The MOA would continue to be used for routine training by aircraft temporarily stationed at Galena Air Force Station. MFE training would not be conducted in the MOA. Routine training would primarily consist of air combat training, fighter intercept training, and basic fighter maneuvers. During routine training, average daily aircraft operations rates would be expected to be less than one (0.38) aircraft operation per day; during MFE training, average daily aircraft operations for routine training would also be expected to be less than one (0.35) aircraft operation per day.

2.4.4 Alternative A (No CLEAR CREEK MOA Alternative)

2.4.4.1 Northern Interior Region

YUKON 1 MOA

The YUKON 1 MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.



YUKON 2 MOA

The YUKON 2 MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

YUKON 3 and 4 MOAs

The YUKON 3 TMOA would be divided to create the permanent YUKON 3 and 4 MOAs, and these MOAs would have the same configurations, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

YUKON 5 MOA

The YUKON 5 MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

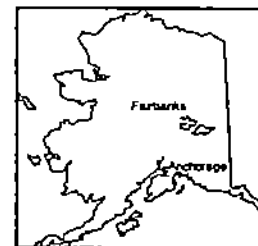
YUKON 6 MOA

The YUKON 6 MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

2.4.4.2 Southern Interior Region

BUFFALO MOA

The BUFFALO MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.



BIRCH MOA

The BIRCH MOA would have the same configuration and types of aircraft operations as described under the Proposed Action. However, operations that would have occurred in the CLEAR CREEK MOA under the Proposed Action would be reallocated to the BIRCH and EIELSON MOAs. Therefore, under this alternative, average daily aircraft operations rates would not be expected to exceed 17 aircraft operations per day during routine training, or 152 aircraft operations per day during MFE training.

EIELSON MOA

The EIELSON MOA would have the same configuration and types of aircraft operations as described under the Proposed Action. However, operations that would have occurred in the CLEAR CREEK MOA under the Proposed Action would be reallocated to the BIRCH and EIELSON MOAs. Therefore, under this alternative, average daily aircraft operations rates in the EIELSON MOA would not be expected to exceed 13 aircraft operations per day during routine training, or 111 aircraft operations per day during MFE training.

FALCON MOA

The FALCON MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

CLEAR CREEK MOA

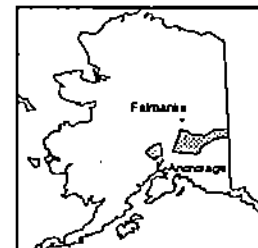
The CLEAR CREEK MOA would not be established. Instead, operations that would have occurred in the CLEAR CREEK MOA under the Proposed Action would be reallocated to the BIRCH and EIELSON MOAs.

This Alternative would eliminate the direct link between the YUKON 1 and 6 MOAs and the Blair Lakes air-to-ground weapons range airspace (R-2211), which would be available under the Proposed Action. Indirect access to the Blair Lakes range (R-2211) would be available by transiting the proposed BIRCH and EIELSON MOAs.

2.4.4.3 Southcentral Region

FOX MOA

The FOX MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.



TANANA MOA

The TANANA MOA would not be established.

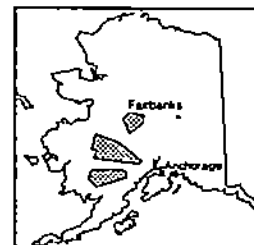
SUSITNA MOA

The SUSITNA MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

2.4.4.4 Western Region

STONY A and B MOAs, and STONY C TMOA

The STONY A and B MOAs would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action. The STONY C TMOA would not be established.



NAKNEK 1 and 2 MOAs

The NAKNEK 1 and 2 MOAs would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

GALENA MOA

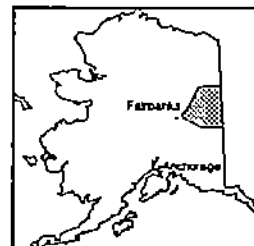
The GALENA MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

2.4.5 Alternative B (TANANA MOA Alternative)

2.4.5.1 Northern Interior Region

YUKON 1 MOA

The YUKON 1 MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.



YUKON 2 MOA

The YUKON 2 MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

YUKON 3 and 4 MOAs

The YUKON 3 TMOA would be divided to create the permanent YUKON 3 MOA, and this MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action for YUKON 3 MOA. However, the YUKON 4 MOA, as described under the Proposed Action, would not be established. Instead a new permanent MOA, the TANANA MOA, would be established south of the proposed YUKON 3 MOA (see section 2.4.5.3).

YUKON 5 MOA

The YUKON 5 MOA (as described under the Proposed Action) would not be established. Instead a new permanent MOA, the TANANA MOA, would be established south of the proposed YUKON 3 MOA.

YUKON 6 MOA

The YUKON 6 MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

2.4.5.2 Southern Interior Region

BUFFALO MOA

The BUFFALO MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

BIRCH MOA

The BIRCH MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

EIELSON MOA

The EIELSON MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

FALCON MOA

The FALCON MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

CLEAR CREEK MOA

The CLEAR CREEK MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

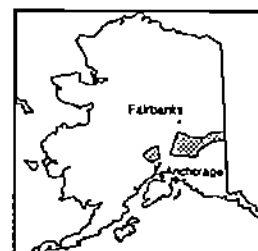
2.4.5.3 Southcentral Region

FOX MOA

The FOX MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action. Additionally, under this Alternative most of the FOX 2 TMOA would become part of a new permanent MOA, the TANANA MOA.

TANANA MOA

A new permanent TANANA MOA would be established, and the proposed YUKON 4 and YUKON 5 MOAs would not be established (see section 2.4.1.1). The altitudes of the TANANA MOA would be 300 feet AGL to 17,999 feet MSL in the eastern section and 3,000 feet AGL to 17,999 feet MSL in the western section to accommodate the high level of low-altitude non-military aviation that transits between Gulkana and Delta Junction along the Richardson Highway. Approximate lateral dimensions would be an irregular shape averaging 50 NM by 150 NM (see Appendix B for geographical coordinates). The MOA would lie south of the proposed YUKON 3 MOA, southeast of the proposed BUFFALO MOA, and east of the proposed FOX MOA, and would share common boundaries with these three MOAs (see Figure 2-4). Hours of operation would be 8:00 a.m. to 6:00



p.m., Monday through Friday, and other times by NOTAM. Supersonic operations down to 5,000 feet AGL would be authorized.

The TANANA MOA would be used for routine daily training from Eielson and Elmendorf AFBs, and for MFEs. Training primarily would consist of air combat training and fighter intercept training, with some use by F-16Cs and F-15Es for low-altitude tactical navigation training, low-altitude step-down training, and simulated low-altitude surface attack tactics. Average daily aircraft operations rates would not be expected to exceed 8 aircraft operations per day during routine training, or 164 aircraft operations per day during MFE training.

SUSITNA MOA

The SUSITNA MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

2.4.5.4 Western Region

STONY A and B MOAs, and STONY C TMOA

The STONY A and B MOAs would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action. The STONY C TMOA would not be established.



NAKNEK 1 and 2 MOAs

The NAKNEK 1 and 2 MOAs would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

GALENA MOA

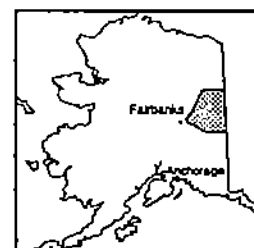
The GALENA MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

2.4.6 Alternative A—Modified

2.4.6.1 Northern Interior Region

YUKON 1 MOA

The YUKON 1 MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action, except for supersonic operations. Supersonic operations in the YUKON 1 MOA would be authorized down to 5,000 feet AGL or 12,000 feet MSL, whichever is higher, as compared to 5,000 feet AGL under the Proposed Action.



YUKON 2 MOA

The YUKON 2 MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action, except for supersonic operations. Supersonic operations in the YUKON 2 MOA would be authorized down to 5,000 feet AGL or 12,000 feet MSL, whichever is higher, as compared to 5,000 feet AGL under the Proposed Action.

YUKON 3 and 4 MOAs

The YUKON 3 TMOA would be divided to create four permanent YUKON 3A (Low), YUKON 3B (Low), YUKON 3 (High) and YUKON 4 MOAs. The YUKON 3A (Low) and 3B (Low) MOAs would lie directly under the YUKON 3 (High) MOA. Lateral division to create the YUKON 3A (Low) and 3B (Low) MOAs would be along a northeast to southwest line extending from the northeast corner of the YUKON 3 MOA (as described under the Proposed Action) to the northeast corner of the BUFFALO MOA (as described under the Proposed Action). YUKON 3A (Low) would be north and west of the line, YUKON 3B (Low) would encompass the area south and east of the line. YUKON 3A (Low) would extend from 100 feet AGL up to 9,999 feet MSL. YUKON 3B (Low) would extend from 2,000 feet AGL up to 9,999 feet MSL. YUKON 3 (High) would start at 10,000 feet MSL and extend up to 17,999 feet MSL. YUKON 4 MOA would have the same configuration as described under the Proposed Action. Approximate lateral dimensions would be 50 NM by 60 NM for YUKON 3A and 3B combined and 50 NM by 40 NM for the YUKON 4 MOA. Hours of normal operation for the YUKON 3 (High) and 4 MOAs would be the same as described under the Proposed Action (10:00 a.m. to 3:00 p.m., Monday through Friday). Hours of operation for the YUKON 3A (Low) and 3B (Low) MOAs would be from 10:00 a.m. to 11:30 a.m. and from 1:30 p.m. to 3:00 p.m., Monday through Friday. NOTAM activation of the MOAs for any day outside of normal operations is limited to 7:00 a.m. to 10:00 p.m. on requested day(s). Supersonic operations in the YUKON 3 (High) and 4 MOAs would be authorized down to 5,000 feet AGL or 12,000 feet MSL, whichever is higher, as compared to 5,000 feet AGL under the Proposed Action. Supersonic operations would not be authorized in YUKON 3A (Low) or 3B (Low) MOAs. During routine training, average daily aircraft operations rates would not be expected to exceed 8 aircraft operations per day in the YUKON 3 (High), 3A (Low), and 3B (Low) MOAs (combined) and 7 operations per day in the YUKON 4 MOA. During MFE training, average daily aircraft operations rates would not be expected to exceed 166 aircraft operations per day in the YUKON 3 (High), 3A (Low), and 3B (Low) MOAs (combined) and 164 aircraft operations per day in the YUKON 4 MOA.

YUKON 5 MOA

The YUKON 5 MOA would have the same lateral configuration as described under the Proposed Action. The floor of the YUKON 5 MOA would be 5,000 feet AGL, and the MOA would extend up to 17,999 feet MSL. Supersonic operations in the YUKON 5 MOA would be authorized down to 5,000 feet AGL or 12,000 feet MSL, whichever is higher, as compared to 5,000 feet AGL under the Proposed Action. The YUKON 5 MOA would only be activated for MFE training; routine daily training would not be conducted in the MOA. The MOA could only be activated for up to 60 days per year for MFE training; during an MFE, the hours of operation and average daily MFE aircraft operations rates would be the same as described under the Proposed Action for YUKON 5 MOA.

YUKON 6 MOA

The YUKON 6 MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

2.4.6.2 Southern Interior Region

BUFFALO MOA

The BUFFALO MOA would have the same configuration (except as noted below), types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action. Four civil flight corridors (military exclusion areas) would be established through the BUFFALO MOA. Civil flight corridors extending from the surface to 500 feet AGL would be established 2 NM either side of the Alaska Highway and ½ NM either side of the Richardson Highway to contain westbound civil flight traffic at 4,500 feet MSL and



eastbound traffic at 5,500 feet MSL. Two other civil flight corridors would be established: one from 4,000 feet MSL to 6,000 feet MSL, 2 NM either side of the Alaska Highway; and one from 4,000 feet MSL to 6,000 feet MSL, ½ NM either side of the Richardson Highway.

BIRCH MOA

The BIRCH MOA would have the same configuration (except as noted below), types of aircraft operations, and average daily aircraft operations rates as described under Alternative A. The western boundary of the BIRCH MOA would be shifted approximately 5 NM to the southeast, and the floor throughout the entire MOA would be raised from 100 feet AGL to 500 feet AGL.

EIELSON MOA

The EIELSON MOA would have the same configuration (except as noted below), types of aircraft operations, and average daily aircraft operations rates as described under Alternative A.

FALCON MOA

The FALCON MOA would have the same configuration (except as noted below), types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action. The floor throughout the entire MOA would be raised from 100 feet AGL to 500 feet AGL. Use of chaff and flares would not be authorized in the FALCON MOA.

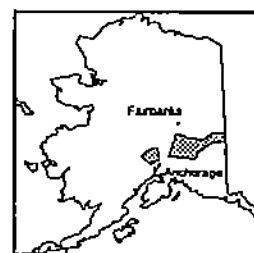
CLEAR CREEK MOA

The CLEAR CREEK MOA would not be established. Operations planned for this MOA under the Proposed Action would be reallocated to the BIRCH and EIELSON MOAs. This would eliminate the direct link between the YUKON 1 and 6 MOAs and the Blair Lakes air-to-ground weapons range airspace (R-2211), which would be available under the Proposed Action. Indirect access to the Blair Lakes range (R-2211) would be available by transiting the proposed BIRCH and EIELSON MOAs.

2.4.6.3 Southcentral Region

FOX MOA

The FOX MOA would have the same configuration (except as noted below), types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action. The southeastern corner of the FOX MOA would be moved approximately 20 NM to the west. The floor throughout the MOA would be raised from 3,000 feet AGL to 5,000 feet AGL.¹ As under the Proposed Action, a very small portion of the northeast corner of the FOX MOA would overlap (above) the BUFFALO MOA and have a floor of 7,000 feet AGL (see Appendix B, page B-13, Figure B-12). If the FOX MOA airspace is approved the FOX MOA would probably charted as two separate MOAs (e.g., FOX A and FOX B [portion above BUFFALO MOA]). Supersonic operations in the FOX MOA would be authorized down to 5,000 feet AGL or 12,000 feet MSL, whichever is higher, as compared to 5,000 feet AGL under the Proposed Action.



¹The northeast corner of the FOX MOA (FOX B) overlapping the BUFFALO MOA would have a floor of 7,000 feet MSL.

TANANA MOA

The TANANA MOA would not be established.

SUSITNA MOA

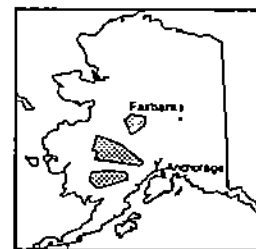
The SUSITNA MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action, except for supersonic operations. Supersonic operations in the SUSITNA MOA would be authorized down to 5,000 feet AGL or 12,000 feet MSL, whichever is higher, as compared to 5,000 feet AGL or 10,000 feet MSL, whichever is higher, under the Proposed Action. However, supersonic operations would be limited to Functional Check Flights (FCFs) and Operational Check Flights (OCFs) along an east/west line south of Denali National Park and Preserve (NPP).

FCFs are completed after major aircraft repairs or periodic inspections. Only experienced aircrews are qualified for these flights. Detailed flight checklists are used to conduct the flights to ensure safe testing of aircraft systems. Much of an FCF sortie is conducted above 20,000 feet MSL to ensure aircraft systems can operate at higher altitudes. Supersonic flight is conducted on a limited portion of the FCF profile above 20,000 feet MSL. Higher altitudes test the aircraft's supersonic capability and ensure that aircraft engines can operate at all altitude regimes. On the average, 2 to 3 FCF sorties are completed per week. OCFs are flown after limited aircraft repairs. Approximately 4 to 5 OCFs are flown per week. Supersonic flight is not necessarily required on an OCF sortie unless the maintenance actions were related to supersonic operations. Like FCF profiles, OCF missions use altitudes above 20,000 feet MSL to complete supersonic flight operation tests. Supersonic operations in the SUSITNA MOA under Alternative A—Modified would be limited to FCF and OCF profiles, and would occur south of the 63° 30' North latitude in a general east to west or west to east direction.

2.4.6.4 Western Region

STONY A and B MOAs, and STONY C TMOA

The STONY A and B MOAs would have the same configuration (except as noted below), types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action. The eastern boundary of STONY A MOA would be moved approximately 20 NM to the west. Supersonic operations down to 5,000 feet AGL or 10,000 MSL, whichever is higher, would continue to be authorized in the STONY A and STONY B MOAs. As in the Proposed Action, the STONY C TMOA would not be retained, nor would it be converted to a permanent MOA.



NAKNEK 1 and 2 MOAs

The NAKNEK 1 and 2 MOAs would have the same configuration (except as noted below), types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action. The eastern boundary of NAKNEK 2 MOA would be moved approximately 10 NM to the west.

GALENA MOA

The GALENA MOA would have the same configuration, types of aircraft operations, and average daily aircraft operations rates as described under the Proposed Action.

2.4.7 Comparison Table for Airspace for All Alternatives

Table 2-2 through Table 2-5 summarize the information in sections 2.4.2 through 2.4.6. To facilitate comparison between alternatives, these tables (and all alternatives comparison tables in the EIS) begin with the No Action Alternative (NAA).

Table 2-2 NORTHERN INTERIOR REGION MOAs

MOA SPECIFICATION	NO ACTION ALTERNATIVE (MOAs / TMOAs)	PROPOSED ACTION	ALTERNATIVE A (NO CLEAR CREEK MOA ALTERNATIVE)	ALTERNATIVE B (TANANA MOA ALTERNATIVE)	ALTERNATIVE A-MODIFIED
Permanent YUKON 1	Permanent YUKON 1	Permanent YUKON 1	Permanent YUKON 1	Permanent YUKON 1	Permanent YUKON 1
Altitudes	Surface to 17,999 ft MSL.	100 ft AGL to 17,999 ft MSL.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Lateral Dimensions ¹	Average 90 NM by 50 NM.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Published Times of Use	8:00 a.m. - 6:00 p.m., Monday - Friday; other times by NOTAM. ²	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Supersonic	Authorized for MFE training only down to 5,000 ft AGL or 10,000 ft MSL, whichever is higher.	5,000 ft AGL or higher for routine and MFE training.	Same as Proposed Action.	Same as Proposed Action.	5,000 ft AGL or 12,000 ft MSL, whichever is higher, for routine and MFE training.
Training Operations	Conduct routine and MFE training operations.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Permanent YUKON 2	Permanent YUKON 2	Permanent YUKON 2	Permanent YUKON 2	Permanent YUKON 2	Permanent YUKON 2
Altitudes	100 ft AGL to 17,999 ft MSL.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Lateral Dimensions ¹	Average 80 NM by 60 NM.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Published Times of Use	8:00 a.m. - 6:00 p.m., Monday - Friday; other times by NOTAM. ²	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Supersonic	At or above 5,000 ft AGL or 10,000 ft MSL, whichever is higher.	Standardize floor for supersonic at 5,000 ft AGL or higher.	Same as Proposed Action.	Same as Proposed Action.	5,000 ft AGL or 12,000 ft MSL, whichever is higher for routine and MFE training.
Training Operations	Routine and MFE training operations.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.

Table 2-2 Continued

MOA SPECIFICATION	NO ACTION ALTERNATIVE (MOAs / TMOAs)	PROPOSED ACTION	ALTERNATIVE A (No CLEAR CREEK MOA ALTERNATIVE)	ALTERNATIVE B (TANANA MOA ALTERNATIVE)	ALTERNATIVE A—MODIFIED
Temporary YUKON 3	Temporary YUKON 3	Permanent YUKON 3	Permanent YUKON 3	Permanent YUKON 3	Permanent YUKON 3 A/B
Altitudes	3,000 ft AGL to 17,999 ft MSL.	100 ft AGL to 17,999 ft MSL.	Same as Proposed Action.	Same as Proposed Action.	YUKON 3 (High): 10,000 ft MSL to 17,999 ft MSL. YUKON 3A (Low): 100 ft AGL to 9,999 ft MSL. YUKON 3B (Low): 2,000 ft AGL to 9,999 ft MSL.
Lateral Dimensions ¹	Average 100 NM by 50 NM.	Average 50 NM by 60 NM.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Published Times of Use	Six 2-week (10 flying days) MFEs per year (for a total of 60 flying days per year). Normally occurring Monday - Friday, 6:00 a.m. - 6:00 p.m. ²	10:00 a.m. - 3:00 p.m., Monday - Friday; other times by NOTAM. ³	Same as Proposed Action.	Same as Proposed Action.	YUKON 3 A/B (Low): 10:00 a.m. - 11:30 a.m., 1:30 p.m. - 3:00 p.m., Monday - Friday; other times by NOTAM. ³ YUKON 3 (High): Same as Proposed Action.
Supersonic	Not authorized.	5,000 ft AGL or higher.	Same as Proposed Action.	Same as Proposed Action.	YUKON 3 A/B (Low): Not authorized. YUKON 3 (High): 5,000 ft AGL or 12,000 ft MSL, whichever is higher.
Training Operations	Conduct MFE training only.	Conduct routine and MFE training operations.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.

Table 2-2 Continued

MOA SPECIFICATION	NO ACTION ALTERNATIVE (MOAs/TMOAs)	PROPOSED ACTION	ALTERNATIVE A (NO CLEAR CREEK MOA ALTERNATIVE)	ALTERNATIVE B (TANANA MOA ALTERNATIVE)	ALTERNATIVE A--MODIFIED
Temporary YUKON 3	Temporary YUKON 3	Permanent YUKON 4	Permanent YUKON 4	Not part of Alternative B	Permanent YUKON 4
Altitudes	3,000 ft AGL to 17,999 ft MSL.	100 ft AGL to 17,999 ft MSL.	Same as Proposed Action.		Same as Proposed Action.
Lateral Dimensions	Average 100 NM by 50 NM.	Average 50 NM by 40 NM.	Same as Proposed Action.		Same as Proposed Action.
Published Times of Use	Six 2-week (10 flying days) MFEs per year (for a total of 60 flying days per year). Normally occurring Monday - Friday, 6:00 a.m. - 6:00 p.m. ²	10:00 a.m. - 3:00 p.m., Monday - Friday; other times by NOTAM. ²	Same as Proposed Action.		Same as Proposed Action.
Supersonic	Not authorized.	5,000 ft AGL or higher.	Same as Proposed Action.		5,000 ft AGL or 12,000 ft MSL, whichever is higher.
Training Operations	Conduct MFE training only.	Conduct routine and MFE training operations.	Same as Proposed Action.		Same as Proposed Action.

Table 2-2 Continued

MOA SPECIFICATION	NO ACTION ALTERNATIVE (MOAs/TMOAs)	PROPOSED ACTION	ALTERNATIVE A (No CLEAR CREEK MOA ALTERNATIVE)	ALTERNATIVE B (TANANA MOA ALTERNATIVE)	ALTERNATIVE A-MODIFIED
Temporary YUKON 4	Temporary YUKON 4	Permanent YUKON 5	Permanent YUKON 5	Not part of Alternative B	Permanent YUKON 5
Altitudes	2,000 ft AGL to 17,999 ft MSL.	3,000 ft AGL to 17,999 ft MSL.	Same as Proposed Action.		5,000 ft AGL to 17,999 ft MSL.
Lateral Dimensions ¹	Average 90 NM by 30 NM.	Average 90 NM by 30 NM.	Same as Proposed Action.		Same as Proposed Action.
Published Times of Use	Six 2-week (10 flying days) MFEs per year (for a total of 60 flying days per year). Normally occurring Monday - Friday, 6:00 a.m. - 6:00 p.m. ²	MOA activated by NOTAM. ²	Same as Proposed Action.		Same as Proposed Action.
Supersonic	Not authorized.	5,000 ft AGL or higher.	Same as Proposed Action.		5,000 ft AGL or 12,000 ft MSL, whichever is higher.
Training Operations	Conduct MFE operations only.	Conduct routine and MFE training operations.	Same as Proposed Action.		No change from NAA.
Temporary YUKON 1A	Temporary YUKON 1A	Permanent YUKON 6	Permanent YUKON 6	Permanent YUKON 6	Permanent YUKON 6
Altitudes	100 ft AGL to 17,999 ft MSL.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Lateral Dimensions ¹	Triangular in shape; average 45 NM by 35 NM by 25 NM.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Published Times of Use	Six 2-week (10 flying days) MFEs per year (for a total of 60 flying days per year). Normally occurring Monday - Friday, 6:00 a.m. - 6:00 p.m. ²	8:00 a.m. - 6:00 p.m., Monday - Friday; other times by NOTAM. ²	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Supersonic	Not authorized.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Training Operations	Conduct MFE training only.	Conduct routine and MFE training operations.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.

¹ All lateral distances are given in Nautical Miles (NM) and are approximate.² Sometimes it may be necessary for the Air Force to train outside the published hours. This would require that a special Notice to Airman (NOTAM) advisory be approved and issued by the FAA. However, the Air Force would plan MOA operations to begin after 7:00 a.m. local time and cease before 10:00 p.m. local time.

Table 2-3 SOUTHERN INTERIOR REGION MOAs

MOA SPECIFICATION	NO ACTION ALTERNATIVE (MOAs / TMOAs)	PROPOSED ACTION	ALTERNATIVE A (NO CLEAR CREEK MOA ALTERNATIVE)	ALTERNATIVE B (TANANA MOA ALTERNATIVE)	ALTERNATIVE A--MODIFIED
Temporary BUFFLO	Temporary BUFFLO	Permanent BUFFALO	Permanent BUFFALO	Permanent BUFFALO	Permanent BUFFALO
Altitudes	1,000 ft AGL to 7,000 ft MSL.	300 ft AGL to 6,999 ft MSL.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action, with civil flight corridors.
Lateral Dimensions ¹	45 NM by 30 NM.	60 NM by 45 NM, narrowing to 25 NM.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Published Times of Use	Six 2-week (10 flying days) MFEs per year (for a total of 60 flying days per year). Normally occurring Monday - Friday, 6:00 a.m. - 6:00 p.m. ²	8:00 a.m. - 6:00 p.m., Monday - Friday; other times by NOTAM. ²	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Supersonic	Not authorized.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Training Operations	Conduct MFE training operations only.	Routine and MFE training operations.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Temporary EIELSON A	Temporary EIELSON A	Permanent BIRCH	Permanent BIRCH	Permanent BIRCH	Permanent BIRCH
Altitudes	100 ft AGL to 4,000 ft MSL.	No change from NAA.	No change from NAA.	No change from NAA.	500 ft AGL to 4,000 ft MSL.
Lateral Dimensions ¹	Average 20 NM by 30 NM.	No change from NAA.	No change from NAA.	No change from NAA.	Average 20 NM by 25 NM.
Published Times of Use	Six 2-week (10 flying days) MFEs per year (for a total of 60 flying days per year). Normally occurring Monday - Friday, 6:00 a.m. - 6:00 p.m. ²	8:00 a.m. - 6:00 p.m., Monday - Friday; other times by NOTAM. ²	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Supersonic	Not authorized.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Training Operations	Conduct MFE operations only.	Conduct routine and MFE training operations.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.

Table 2-3 Continued

MOA SPECIFICATION	NO ACTION ALTERNATIVE (MOAs / TMOAs)	PROPOSED ACTION	ALTERNATIVE A (NO CLEAR CREEK MOA ALTERNATIVE)	ALTERNATIVE B (TANANA MOA ALTERNATIVE)	ALTERNATIVE A—MODIFIED
Temporary EIELSON B	Temporary EIELSON B	Permanent EIELSON	Permanent EIELSON	Permanent EIELSON	Permanent EIELSON
Altitudes	100 ft AGL to 17,999 ft MSL.	No change from NAA.	No change from NAA.	No change from NAA.	100 ft AGL to 17,999 ft MSL.
Lateral Dimensions ¹	Average 30 NM by 30 NM.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Published Times of Use	Six 2-week (10 flying days) MFEs per year (for a total of 60 flying days per year). Normally occurring Monday - Friday, 6:00 a.m. - 6:00 p.m. ²	8:00 a.m. - 6:00 p.m., Monday - Friday; other times by NOTAM. ²	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Supersonic	Not authorized.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Training Operations	Conduct MFE training operations only.	Conduct routine and MFE training operations.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
FALCON	Not part of NAA	Permanent FALCON	Permanent FALCON	Permanent FALCON	Permanent FALCON
Altitudes		100 ft AGL to 17,999 ft MSL.	Same as Proposed Action.	Same as Proposed Action.	500 ft AGL to 17,999 ft MSL.
Lateral Dimensions ¹		9 NM by 17 NM.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Published Times of Use		MOA activated by NOTAM. ²	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Supersonic		Not authorized.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Training Operations		Conduct routine training and MFE operations.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.

Table 2-3 Continued

MOA SPECIFICATION	NO ACTION ALTERNATIVE (MOAs / TMOAs)	PROPOSED ACTION	ALTERNATIVE A (No CLEAR CREEK MOA ALTERNATIVE)	ALTERNATIVE B (TANANA MOA ALTERNATIVE)	ALTERNATIVE A—MODIFIED
CLEAR CREEK	Not part of NAA	Permanent CLEAR CREEK	Not part of Alternative A	Permanent CLEAR CREEK	Not part of Alternative A—Modified
Altitudes		3,000 ft MSL to 5,000 ft MSL.		Same as Proposed Action.	
Lateral Dimensions ¹		Average 18 NM by 20 NM.		Same as Proposed Action.	
Published Times of Use		MOA activated by NOTAM. ²		Same as Proposed Action.	
Supersonic		Not authorized.		Same as Proposed Action.	
Training Operations		Conduct routine and MFE training operations.		Same as Proposed Action.	

¹ All lateral distances are given in Nautical Miles (NM) and are approximate.

² Sometimes it may be necessary for the Air Force to train outside the published hours. This would require that a special Notice to Airman (NOTAM) advisory be approved and issued by the FAA. However, the Air Force would plan MOA operations to begin after 7:00 a.m. local time and cease before 10:00 p.m. local time.

Table 2-4 SOUTHCENTRAL REGION MOAs

MOA SPECIFICATION	NO ACTION ALTERNATIVE (MOAs / TMOAs)	PROPOSED ACTION	ALTERNATIVE A (No CLEAR CREEK MOA ALTERNATIVE)	ALTERNATIVE B (TANANA MOA ALTERNATIVE)	ALTERNATIVE D (A - MODIFIED)
Temporary FOX 1	Temporary FOX 1	Permanent FOX	Permanent FOX	Permanent FOX	Permanent FOX
Altitudes	3,000 ft AGL to 17,999 ft MSL.	No change from NAA.	No change from NAA.	No change from NAA.	5,000 ft AGL to 17,999 ft MSL.
Lateral Dimensions ¹	Average 80 NM by 80 NM.	No change from NAA.	No change from NAA.	No change from NAA.	Average 80 NM by 60 NM.
Published Times of Use	Six 2-week (10 flying days) MFEs per year (for a total of 60 flying days per year). Normally occurring Monday - Friday, 6:00 a.m. - 6:00 p.m. ²	8:00 a.m. - 4:00 p.m., Monday - Friday; other times by NOTAM. ²	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Supersonic	Not authorized.	5,000 ft AGL or higher.	Same as Proposed Action.	Same as Proposed Action.	5,000 ft AGL or 12,000 ft MSL, whichever is higher.
Training Operations	Conduct MFE training operations only.	Conduct routine and MFE training operations.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Temporary FOX 2	Temporary FOX 2	Not part of Proposed Action	Not part of Alternative A	See TANANA	Not part of Alternative A - Modified
Altitudes	14,000 ft AGL to 17,999 ft MSL.				
Lateral Dimensions ¹	Average 80 NM by 25 NM.				
Published Times of Use	Same as Temporary FOX 1 MOA.				
Supersonic	Not authorized.				
Training Operations	Conduct MFE training operations only.				

Table 2-4 Continued

MOA SPECIFICATION	NO ACTION ALTERNATIVE (MOAs / TMOAs)	PROPOSED ACTION	ALTERNATIVE A (No CLEAR CREEK MOA ALTERNATIVE)	ALTERNATIVE B (TANANA MOA ALTERNATIVE)	ALTERNATIVE A - MODIFIED
TANANA	Not part of NAA	Not part of Proposed Action	Not part of Alternative A	Permanent TANANA	Not part of Alternative A—Modified
Altitudes	(A portion of the Temporary FOX 2 TMOA would become part of TANANA MOA. See Temporary FOX 2 TMOA, previous page.)			Eastern section: 300 ft AGL to 17,999 ft MSL. Western section: 3,000 ft AGL to 17,999 ft MSL.	
Lateral Dimensions ¹				Irregular shape; average 50 NM wide by 150 NM long.	
Published Times of Use				8:00 a.m. - 6:00 p.m., Monday - Friday; other times by NOTAM. ²	
Supersonic				5,000 ft AGL or higher.	
Training Operations				Conduct routine and MFE training operations.	
Permanent SUSITNA	Permanent SUSITNA	Permanent SUSITNA	Permanent SUSITNA	Permanent SUSITNA	Permanent SUSITNA
Altitudes	5,000 ft AGL or 10,000 ft MSL, whichever is higher, to 17,999 ft MSL.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Lateral Dimensions ¹	Pie shaped; average 60 NM wide by 45 NM long.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Published Times of Use	8:00 a.m. - 6:00 p.m., Monday - Friday; other times by NOTAM. ²	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Supersonic	At or above 5,000 ft AGL or 10,000 ft MSL, whichever is higher.	No change from NAA.	No change from NAA.	No change from NAA.	5,000 ft AGL or 10,000 ft MSL, whichever is higher, limited to FCFs/OCCFs south of Denali NPP.
Training Operations	Conduct routine training operations only.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.

¹ All lateral distances are given in Nautical Miles (NM) and are approximate.² Sometimes it may be necessary for the Air Force to train outside the published hours. This would require that a special Notice to Airman (NOTAM) advisory be approved and issued by the FAA. However, the Air Force would plan MOA operations to begin after 7:00 a.m. local time and cease before 10:00 p.m. local time.

Table 2-5 WESTERN REGION MOAs

MOA SPECIFICATION	NO ACTION ALTERNATIVE (MOAs / TMOAs)	PROPOSED ACTION	ALTERNATIVE A (No CLEAR CREEK MOA ALTERNATIVE)	ALTERNATIVE B (TANANA MOA ALTERNATIVE)	ALTERNATIVE A—MODIFIED
Permanent STONY A	Permanent STONY A	Permanent STONY A	Permanent STONY A	Permanent STONY A	Permanent STONY A
Altitudes	100 ft AGL to 17,999 ft MSL.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Lateral Dimensions ¹	Average 105 NM long by 70 NM wide decreasing to 20 NM wide.	No change from NAA.	No change from NAA.	No change from NAA.	Average 85 NM long by 70 NM wide decreasing to 30 NM wide.
Published Times of Use	8:00 a.m. - 6:00 p.m., Monday - Friday; other times by NOTAM. ²	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Supersonic	At or above 5,000 ft AGL or 10,000 ft MSL, whichever is higher.	5,000 ft AGL or higher.	Same as Proposed Action.	Same as Proposed Action.	No change from NAA.
Training Operations	Conduct routine and surge exercise training operations.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Permanent STONY B	Permanent STONY B	Permanent STONY B	Permanent STONY B	Permanent STONY B	Permanent STONY B
Altitudes	3,000 ft AGL to 17,999 ft MSL.	100 ft AGL to 17,999 ft MSL.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Lateral Dimensions ¹	Average 50 NM long by 70 NM wide decreasing to 20 NM wide.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Published Times of Use	MOA would be activated by NOTAM. ²	8:00 a.m. - 6:00 p.m., Monday - Friday; other times by NOTAM. ²	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Supersonic	At or above 5,000 ft AGL or 10,000 ft MSL, whichever is higher.	5,000 ft AGL or higher.	Same as Proposed Action.	Same as Proposed Action.	No change from NAA.
Training Operations	Conduct routine and surge exercise training operations.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.

Table 2-5 Continued

MOA SPECIFICATION	NO ACTION ALTERNATIVE (MOAs / TMOAs)	PROPOSED ACTION	ALTERNATIVE A (No CLEAR CREEK MOA ALTERNATIVE)	ALTERNATIVE B (TANANA MOA ALTERNATIVE)	ALTERNATIVE A—MODIFIED
Temporary STONY C	Temporary STONY C	Not Part of Proposed Action	Not Part of Alternative A	Not Part of Alternative B	Not part of Alternative A—Modified
Altitudes	100 ft to 17,999 ft AGL.				
Lateral Dimensions ¹	Irregular shape; dimensions vary from 20 to 100 NM wide by 100 NM long.				
Published Times of Use	6:00 a.m. to 6 p.m., Monday - Friday; other times by NOTAM. ²				
Supersonic	Not authorized.				
Training Operations	Conduct surge exercise training operations only.				
Permanent NAKNEK 1	Permanent NAKNEK 1	Permanent NAKNEK 1	Permanent NAKNEK 1	Permanent NAKNEK 1	Permanent NAKNEK 1
Altitudes	Variable 3,000-8,000 ft AGL to 17,999 ft MSL.	Standardize floor at 3,000 ft AGL.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Lateral Dimensions ¹	Average 70 NM by 45 NM.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Published Times of Use	8:00 a.m. - 6:00 p.m., Monday - Friday; other times by NOTAM. ²	10:00 a.m. - 3:00 p.m., Monday - Friday; other times by NOTAM. ²	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Supersonic	Not authorized.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Training Operations	Conduct routine training operations.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.

Table 2-5 Continued

MOA SPECIFICATION	NO ACTION ALTERNATIVE (MOAs / TMOAs)	PROPOSED ACTION	ALTERNATIVE A (No CLEAR CREEK MOA ALTERNATIVE)	ALTERNATIVE B (TANANA MOA ALTERNATIVE)	ALTERNATIVE A-MODIFIED
Permanent NAKNEK 2	Permanent NAKNEK 2	Permanent NAKNEK 2	Permanent NAKNEK 2	Permanent NAKNEK 2	Permanent NAKNEK 2
Altitudes	Variable 3,000-8,000 ft AGL to 17,999 ft MSL.	Standardize floor at 3,000 ft AGL.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Lateral Dimensions ¹	Average 80 NM long by 35 NM wide.	No change from NAA.	No change from NAA.	No change from NAA.	Average 65 NM long by 35 NM wide.
Published Times of Use	8:00 a.m. - 6:00 p.m., Monday - Friday; other times by NOTAM. ²	10:00 a.m. - 3:00 p.m., Monday - Friday; other times by NOTAM. ²	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Supersonic	Not authorized.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Training Operations	Conduct routine training operations only.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Permanent GALENA	Permanent GALENA	Permanent GALENA	Permanent GALENA	Permanent GALENA	Permanent GALENA
Altitudes	1,000 ft AGL to 17,999 ft MSL.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Lateral Dimensions ¹	Pie shaped; longest axis 70 NM; narrowest point 25 NM; average width 50 NM.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Published Times of Use	Intermittent 8:00 a.m. - 6:00 p.m., Monday - Friday; as advertised by NOTAM. ²	MOA activated by NOTAM ² ; infrequent use would be expected.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Supersonic	Not authorized.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.
Training Operations	Conduct routine training operations only.	No change from NAA.	No change from NAA.	No change from NAA.	No change from NAA.

¹ All lateral distances are given in Nautical Miles (NM) and are approximate.

² Sometimes it may be necessary for the Air Force to train outside the published hours. This would require that a special Notice to Airman (NOTAM) advisory be approved and issued by the FAA. However, the Air Force would plan MOA operations to begin after 7:00 a.m. local time and cease before 10:00 p.m. local time.

2.4.8 Average Daily Aircraft Activity by MOA for Each Alternative

Table 2-7 (following page) summarizes the average daily aircraft activity by MOA; numbers in this table are derived from Appendix E. MOA aircraft activity data presented in this table are based on the 240-day average described in section 2.2. An aircraft conducting one sortie (one take-off, training flight, and full-stop landing) can use one or more MOAs to accomplish training. As such, it would be incorrect to add the total MOA activity columns to determine total daily sortie numbers. Refer to Table 2-6 for average daily sorties from Eielson and Elmendorf AFBs. Aircraft activities in the MOAs would include the full spectrum of mission taskings (air-to-air and air-to-ground with releases over restricted areas only) assigned to the squadrons at both Eielson and Elmendorf AFBs. A detailed explanation of sortie and activity numbers and the methodology and analysis used is presented in Appendix E.

2.4.9 Average Daily Activities from Eielson and Elmendorf Air Force Bases

Table 2-6 summarizes the expected number of daily sorties that would be flown from Eielson AFB and Elmendorf AFB by assigned aircraft, deployed training aircraft, and transient aircraft on routine training days and on MFE training days.

Table 2-6 Average Daily Sorties from Eielson and Elmendorf AFBs under Each Alternative¹

Air Force Base	No Action Alternative		Proposed Action Alternative A Alternative B Alternative A—Modified	
	Routine Training Day	MFE Training Day ²	Routine Training Day	MFE Training Day ²
Elmendorf	84	132	84	164
Eielson	62	142	62	170

Source: see Appendix E.

¹ One sortie equals one take-off, training flight, and full-stop landing. Sortie numbers are determined according to fiscal allocations for 11th Air Force flying operations.

² Sorties on MFE training days, as depicted in this column, include routine training sorties and MFE training sorties. Routine training would continue to occur while MFEs are conducted but would occur at a rate reduced from normal routine training levels. For a breakdown of aircraft types participating in routine and/or MFE training, see Appendix C.

2.4.10 Aircraft Operations on Air-to-Ground Weapons Ranges for Each Alternative

A single aircraft typically uses only one air-to-ground weapons range during a sortie. An exception to this are the OA-10 aircraft, which sometimes use two ranges in a single sortie to practice both weapons delivery and the control of other aircraft delivering weapons in a tactical scenario. Daily use during an MFE would be greater than during routine training because up to 60 percent of the aircraft involved in an exercise would use the air-to-ground weapons ranges. Approximately 50 percent would use the Stuart Creek range (R-2205), and approximately 50 percent would use the Oklahoma range (R-2202). Blair Lakes range would not be used during MFEs; however, the airspace (R-2211) encompassing the range would be used by MFE aircraft as an orbiting area while awaiting sequencing for arrival back to Eielson AFB.

Table 2-7 Average Daily Aircraft Operations by MOA for Each Alternative¹

MOA (TMOA)	No Action Alternative (TMOA)		Proposed Action		Alternative A		Alternative B		Alternative A—Modified	
	Routine training day	MFE training day ²	Routine training day	MFE training day ²	Routine training day	MFE training day ²	Routine training day	MFE training day ²	Routine training day	MFE training day ²
NORTHERN INTERIOR REGION										
YUKON 1	11	149	18	206	PA ³	PA	PA	PA	PA	PA
YUKON 2	14	152	12	201	PA	PA	PA	PA	PA	PA
YUKON 3 (YUKON 3)	N/A ⁴	119	8	166	PA	PA	PA	PA	PA	PA
YUKON 4 (YUKON 3)	N/A	N/A	7	164	PA	PA	N/A	N/A	PA	PA
YUKON 5 (YUKON 4)	N/A	132	<1	170	PA	PA	N/A	N/A	N/A	PA
YUKON 6 (YUKON 1A)	N/A	70	14	107	PA	PA	PA	PA	PA	PA
SOUTHERN INTERIOR REGION										
BUFFALO (BUFLO)	N/A	140	12	86	PA	PA	PA	PA	PA	PA
BIRCH (EIELSON A)	N/A	140	14	145	17	152	PA	PA	17	152
EIELSON (EIELSON B)	N/A	140	11	105	13	111	PA	PA	13	111
FALCON	N/A	N/A	5	13	PA	PA	PA	PA	PA	PA
CLEAR CREEK	N/A	N/A	5	13	N/A	N/A	PA	PA	N/A	N/A
SOUTHCENTRAL REGION										
FOX (FOX 1)	N/A	50	16	80	PA	PA	PA	PA	PA	PA
TANANA (FOX 2)	N/A	50	N/A	N/A	N/A	N/A	8	164	N/A	N/A
SUSITNA	8	7	3	3	PA	PA	PA	PA	PA	PA
WESTERN REGION⁵										
NAKNEK 1	7	6	5	4	PA	PA	PA	PA	PA	PA
NAKNEK 2	4	4	3	3	PA	PA	PA	PA	PA	PA
STONY A ⁶	18	23	17	23	PA	PA	PA	PA	PA	PA
STONY B ⁶	8	13	7	13	PA	PA	PA	PA	PA	PA
(STONY C) ⁶	N/A	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GALENA	<1	<1	<1	<1	PA	PA	PA	PA	PA	PA

Source: see Appendix E, Distribution of MOA Sorties worksheets. Fractions have been rounded up to the next highest whole number; where operations in a MOA were determined to be less than 1 per day, this has been indicated by "<1."

¹ Numbers in this table depict the anticipated average number of times an aircraft conducting 11th Air Force flying training on a routine or MFE flying day would "pass" through a MOA. Because an aircraft can pass through one or more MOAs while conducting one "sortie" (one take-off, training flight, and full-stop landing), it would be incorrect to add the total operations depicted in this table to determine the total number of sorties generating specified MOA activity. Please refer to Table 2-6 for sortie numbers.

² Numbers on MFE training days include routine and MFE activity: routine training typically would continue to occur at slightly reduced rates during MFEs.

³ PA indicates that the number would be the same as under the Proposed Action (PA).

⁴ N/A means not applicable to this MOA. (See description of training operations conducted in each MOA in sections 2.4.2 through 2.4.6).

⁵ Numbers in MFE training day column for the Western Region reflect routine training and limited air-to-air surge exercise training rather than MFE training.

Table 2-8 summarizes the anticipated aircraft activities on the air-to-ground weapons ranges (Oklahoma [R-2202], Blair Lakes [R-2211], and Stuart Creek [R-2205]) under each alternative.

Table 2-8 Average Daily Aircraft Operations on the Air-to-Ground Weapons Ranges (Restricted Airspace) for Each Alternative

Air-to-Ground Weapons Range (Restricted Airspace)	No Action Alternative		Proposed Action		Alternative A		Alternative B		Alternative A—Modified	
	Routine Training Day	MFE Training Day	Routine Training Day	MFE Training Day	Routine Training Day	MFE Training Day	Routine Training Day	MFE Training Day	Routine Training Day	MFE Training Day
Oklahoma Range (R-2202)	12	56	12	72	12	72	12	72	12	72
Stuart Creek Range (R-2205)	14	58	13	73	13	73	13	73	13	73
Blair Lakes Range (R-2211)	10	9	11	10	11	10	11	10	11	10

Source: Appendix E.

This EIS does not assess the potential effects of the types or amounts of munitions, chaff, and flares that would be used on the three air-to-ground weapons ranges. The use of these materials on the weapons ranges are detailed and analyzed in a number of existing environmental documents, which are listed in section 1.7.4 and are hereby incorporated by reference. None of the Alternatives in this EIS would use types or quantities of munitions, chaff, or flares in excess of what has been analyzed in these documents.

2.4.11 Supersonic Aircraft Operations

Air Force regulations permit supersonic flight above 30,000 feet MSL in all airspace. As MOA airspace does not go above 17,999 feet MSL, supersonic operations in MOAs must be authorized by the Air Force (*Air Force Instruction [AFI] 13-201*). Under the Proposed Action and Alternatives A, B, and A—Modified, supersonic flight below 30,000 feet MSL would take place in the following MOAs and associated ATCAA airspace: YUKON 1 through 5, FOX, SUSITNA, STONY A and B, and TANANA (Alternative B only). ATCAAs are usually associated with MOAs to permit increased vertical maneuvering above 17,999 feet MSL. ATCAAs are not published on aeronautical charts, but non-participating aircraft are separated from military aircraft by air traffic control. Under the No Action Alternative, supersonic flight would occur in the following contiguous MOA/ATCAA airspace: YUKON 1 (MFE only) and 2, SUSITNA, and STONY A and B. Supersonic flight would occur during maneuvering associated with air combat training. Supersonic operations would be brief, lasting from a few seconds to a few minutes. Supersonic flight would usually occur at higher altitudes (e.g., above 20,000 feet MSL), but would be authorized down to 5,000 feet AGL (or in some MOAs, 5,000 feet AGL/10,000 feet MSL, whichever was higher) as certain mission requirements would necessitate supersonic flight at lower altitudes.

In general for all alternatives, approximately 50 percent of all sorties on a routine training day would involve some training in air-to-air tactics that could result in supersonic events. During an MFE, up to 35 percent of the participating aircraft would engage in air-to-air tactics that could result in supersonic flight. For all alternatives, all routine and MFE low-altitude missions (i.e., below 5,000 feet AGL) would be flown at subsonic airspeeds between 250 and 550 knots (285 to 630 mph). See Appendix E for additional information regarding supersonic operations and methodologies.

2.5 Alternatives Eliminated from Further Consideration

2.5.1 Use the MTR Structure for Routine Training and to Conduct MFEs

Although the newly revised MTR structure provides opportunities for low-altitude navigation training, the ability to maneuver for tactical threat avoidance (both laterally and vertically) is limited. Typically, MTRs are 8 to 10 miles wide and only encompass airspace up to 1,500 feet AGL, and are thus not suitable for tactical maneuvering air-to-air or air-to-ground engagements. U.S. Air Force regulations preclude, for safety reasons, air combat training on MTRs, and hence the MTRs are not suitable as an alternative for MFEs. For these reasons, the use of MTRs as the sole enhancement to routine training and MFEs was eliminated from further consideration.

2.5.2 Conduct Routine Training and MFEs in Existing Permanent MOAs Only

This alternative would restrict the number and scope of MFEs because of conflicts with routine training demands. Available air-to-ground targets would be concentrated in the Stuart Creek air-to-ground weapons range. Activities on the Oklahoma air-to-ground weapons range would be limited to those occurring as part of routine training operations since the existing permanent MOAs (without the TMOAs) do not provide access to this range. The only low-altitude supersonic flight areas used would be those currently approved in the YUKON 2, STONY A, and STONY B MOAs. Selection of this alternative would result in unrealistic exercise scenarios. Thus, this alternative was eliminated from further consideration.

2.5.3 Establish New TMOAs and Conduct MFEs in Existing Permanent MOAs and New TMOAs

Other airspaces in Alaska were evaluated as potential sites for new TMOAs. None were found to contain the necessary air-to-ground weapons ranges with sufficient adjacent maneuvering airspace within 150 to 200 NM of either Eielson or Elmendorf AFB. Thus, the establishment and use of other, new TMOAs in Alaska was eliminated from further consideration.

The FAA *Handbook 7400.2* (Chapter 31, Military Operations Areas; Section 1, Policy; Paragraph 31-5) states that MOAs should be located "to the extent possible" away from federal airways and regularly used VFR routes. This guidance is intended to minimize the inherent interaction and associated delays for the military's full use of a MOA, as well as delays to civil IFR clearances through MOAs when they are co-located. The FAA, as the National Airspace Manager, seeks to minimize undue interaction by streamlining the airspace system to maximize its capacity to support both military and civilian use. The airspace design phase is the most critical to achieving this goal of minimum interference.

2.5.4 Conduct MFEs in Airspace Outside of Alaska

Other locations in the Pacific Theater of Operations, but outside of Alaska, were considered for the conduct of PACAF-sponsored MFEs. None offered adequate airspace and facilities to accommodate the number, scale, or size of the MFEs proposed. Airspace located outside the Pacific Theater of Operations was eliminated due to its distance from Alaska and other PACAF bases, and the extensive flying time involved. Thus, this alternative was eliminated from further consideration.

2.5.5 Create Other Permanent MOAs in Alaska

Other airspaces in Alaska were evaluated as potential sites for new permanent MOAs. Airspaces to the north and west of Eielson AFB were selected as possible candidates, being the only other large airspaces available in Alaska that would not conflict with FAA airways. However, these airspaces did not contain the required air-to-ground weapons ranges and adequate adjacent maneuvering airspace, nor did they lie completely within 150 to 200 NM

of either Eielson or Elmendorf AFB. Additionally, they did not provide contiguous airspace adequate to meet training needs. Thus, the creation of other permanent MOAs in Alaska was eliminated from further consideration.

2.6 Comparison of Alternatives

Table 2-9 summarizes, for comparison, the major potential effects of each alternative on the resources of concern that were identified through scoping (described in Chapter 3 and analyzed in Chapter 4). The most obvious and direct effect of any of the alternatives would be the exposure of resources to aircraft activity and noise. The primary source of impact would be noise; for many resources, methods for evaluating impacts from exposure to increased or more frequent noise are not fully mature. In keeping with the goals of the National Environmental Policy Act (NEPA), the methodologies employed in this EIS were designed to use quantifiable variables to assess what, in many cases, are subjective effects. But the probability that any of the alternatives would result in long-term, cumulative impacts is difficult to precisely estimate due to the complexity of the many variables involved and, in some instances, the low probability of measurable impacts occurring. In the larger context of other human-caused and natural disturbances of the environment, any impacts stemming from the proposed changes in airspace configuration and use would, in all likelihood, be relatively minor. However, the extent to which they would contribute to the total cumulative impact on a resource is important. Evidence of such impacts can only be determined through an impact monitoring program designed to detect changes in biological, social, and/or physical parameters. Detection of changes that exceed the acceptable level or threshold (as determined by the appropriate regulatory or management agency, in consultation with the Air Force) would trigger a mitigation response. A complete discussion of the impact assessment process and outcome is found in Chapter 4.

Table 2-9 Environmental Consequences of the Alternatives¹

Resource	No Action Alternative	Proposed Action	Alternative A	Alternative B	Alternative A—Modified
Airspace Management, Aircraft Operations, Aviation Safety					
Airspace Management, Aircraft Operations, and Aviation Safety	Negligible Impact.	Potential Adverse Impact: YUKON 3 and 4, BIRCH, EIELSON, BUFFALO, and STONY B MOAs.	Potential Adverse Impact: YUKON 3 and 4, BIRCH, EIELSON, BUFFALO, and STONY B MOAs.	Potential Significant Adverse Impact: TANANA MOA. Potential Adverse Impact: YUKON 3 and 4, BIRCH, EIELSON, BUFFALO, and STONY B MOAs.	Potential Adverse Impact: STONY B MOA.
Chaff, Flares, and Hazardous Operations					
Chaff, Flares, and Hazardous Operations	Negligible Impact.	Negligible Impact.	Negligible Impact.	Negligible Impact.	Negligible Impact.
Biological Resources					
American peregrine falcon	Potential Adverse Impact: falcons nesting outside Flight Avoidance Area #17.	Potential Adverse Impact: falcons nesting outside Flight Avoidance Area #17.	Potential Adverse Impact: falcons nesting outside Flight Avoidance Area #17.	Potential Adverse Impact: falcons nesting outside Flight Avoidance Area #17.	Potential Adverse Impact: falcons nesting outside Flight Avoidance Area #17.
Waterfowl	Potential Significant Adverse Impact: trumpeter swan breeding areas under SUSITNA MOA.	Potential Significant Adverse Impact: trumpeter swan breeding areas under SUSITNA and FOX MOAs.	Potential Significant Adverse Impact: trumpeter swan breeding areas under SUSITNA and FOX MOAs.	Potential Significant Adverse Impact: trumpeter swan breeding areas under SUSITNA, FOX, and TANANA MOAs.	Potential Significant Adverse Impact: trumpeter swan breeding areas under SUSITNA and FOX MOAs, but breeding areas under FOX largely avoided.
Raptors	Potential Adverse Impact: breeding and nesting concentration areas overflow below 2,000 ft AGL or at supersonic speed.	Potential Adverse Impact: breeding and nesting concentration areas overflow below 2,000 ft AGL or at supersonic speed.	Potential Adverse Impact: breeding and nesting concentration areas overflow below 2,000 ft AGL or at supersonic speed.	Potential Adverse Impact: breeding and nesting concentration areas overflow below 2,000 ft AGL or at supersonic speed.	Potential Adverse Impact: breeding and nesting concentration areas overflow below 2,000 ft AGL or at supersonic speed.
Caribou	Potential Significant Adverse Impact: Delta herd under EIELSON A and B, and FOX 1 and 2 MOAs, and on Oklahoma and Blair Lakes ranges if key life cycle phase overflow. Potential Adverse Impact: calving, summer concentration, rutting, or wintering areas overflow below 3,000 ft AGL or at supersonic speed.	Potential Significant Adverse Impact: Delta herd under CLEAR CREEK, BIRCH, EIELSON, and FOX MOAs, and on Oklahoma and Blair Lakes ranges. Potential Adverse Impact: calving, summer concentration, rutting, or wintering areas overflow below 3,000 ft AGL or at supersonic speed.	Potential Significant Adverse Impact: Delta herd under BIRCH, EIELSON, and FOX MOAs, and on Oklahoma and Blair Lakes ranges. Potential Adverse Impact: calving, summer concentration, rutting, or wintering areas overflow below 3,000 ft AGL or at supersonic speed.	Potential Significant Adverse Impact: Delta herd under CLEAR CREEK, BIRCH, EIELSON, and FOX MOAs, and on Oklahoma and Blair Lakes ranges. Potential Adverse Impact: calving, summer concentration, rutting, or wintering areas overflow below 3,000 ft AGL or at supersonic speed.	Potential Significant Adverse Impact: Delta caribou herd under BIRCH, EIELSON, and FOX MOAs, and on Oklahoma and Blair Lakes ranges. Potential Adverse Impact: calving, summer concentration, rutting, or wintering areas overflow below 3,000 ft AGL or at supersonic speed.
Moose	Potential Adverse Impact: critical life cycle habitat overflow below 3,000 ft AGL or at supersonic speed.	Potential Adverse Impact: critical life cycle habitat overflow below 3,000 ft AGL or at supersonic speed.	Potential Adverse Impact: critical life cycle habitat overflow below 3,000 ft AGL or at supersonic speed.	Potential Adverse Impact: critical life cycle habitat overflow below 3,000 ft AGL or at supersonic speed.	Potential Adverse Impact: critical life cycle habitat overflow below 3,000 ft AGL or at supersonic speed.

Table 2-9 Continued

Resource	No Action Alternative	Proposed Action	Alternative A	Alternative B	Alternative A—Modified
Dall sheep	Potential Significant Adverse Impact: YUKON 1-4, BUFFALO, EIELSON B, and FOX 1 and 2 MOAs, and Oklahoma range. Potential Adverse Impact: critical life cycle habitat overflown below 5,000 ft AGL or at supersonic speed.	Potential Significant Adverse Impact: YUKON 1-4, BUFFALO, EIELSON, and FOX MOAs, and Oklahoma range. Potential Adverse Impact: critical life cycle habitat overflown below 5,000 ft AGL or at supersonic speed.	Potential Significant Adverse Impact: YUKON 1-4, BUFFALO, EIELSON, and FOX MOAs, and Oklahoma range. Potential Adverse Impact: critical life cycle habitat overflown below 5,000 ft AGL or at supersonic speed.	Potential Significant Adverse Impact: YUKON 1-4, BUFFALO, EIELSON, and FOX MOAs, and Oklahoma range. Potential Adverse Impact: critical life cycle habitat overflown below 5,000 ft AGL or at supersonic speed.	Potential Significant Adverse Impact: YUKON 1-4, BUFFALO, EIELSON, and FOX MOAs, and Oklahoma range. Potential Adverse Impact: critical life cycle habitat overflown below 5,000 ft AGL or at supersonic speed.
Brown and Black Bears	Potential Adverse Impact (localized to individuals): overflights below 3,000 ft AGL or at supersonic speed.	Potential Adverse Impact (localized to individuals): overflights below 3,000 ft AGL or at supersonic speed.	Potential Adverse Impact (localized to individuals): overflights below 3,000 ft AGL or at supersonic speed.	Potential Adverse Impact (localized to individuals): overflights below 3,000 ft AGL or at supersonic speed.	Potential Adverse Impact (localized to individuals): overflights below 3,000 ft AGL or at supersonic speed.
Wolves	Potential Adverse Impact: if prey species (caribou or moose) sustain Level II or higher impacts.	Potential Adverse Impact: if prey species (caribou or moose) sustain Level II or higher impacts.	Potential Adverse Impact: if prey species (caribou or moose) sustain Level II or higher impacts.	Potential Adverse Impact: if prey species (caribou or moose) sustain Level II or higher impacts.	Potential Adverse Impact: if prey species (caribou or moose) sustain Level II or higher impacts.
Recreation					
Steele National Conservation Area and Birch Creek National Wild River	Potential Adverse Impact: YUKON 2 MOA.	Potential Adverse Impact: YUKON 2 MOA.	Potential Adverse Impact: YUKON 2 MOA.	Potential Adverse Impact: YUKON 2 MOA.	Potential Adverse Impact: YUKON 2 MOA.
Yukon-Charley Rivers National Preserve and Charley National Wild River	Potential Adverse Impact: YUKON 1 and 2 MOAs. Potential Significant Adverse Impact: YUKON 3 TMOA during MFEs.	Potential Adverse Impact: YUKON 1 and 2 MOAs. Potential Significant Adverse Impact: YUKON 3 and 4 MOAs.	Potential Adverse Impact: YUKON 1 and 2 MOAs. Potential Significant Adverse Impact: YUKON 3 and 4 MOAs.	Potential Adverse Impact: YUKON 1 and 2 MOAs. Potential Significant Adverse Impact: YUKON 3 and 4 MOAs.	Potential Adverse Impact: YUKON 1 and 2 MOAs. Potential Significant Adverse Impact: YUKON 3 and 4 MOAs.
Fortymile National Wild & Scenic River	Negligible Impact: YUKON 3 TMOA during MFEs.	Potential Significant Adverse Impact: YUKON 3 MOA.	Potential Significant Adverse Impact: YUKON 3 MOA.	Potential Significant Adverse Impact: YUKON 3 and TANANA MOAs.	Potential Significant Adverse Impact: YUKON 3A MOA. Negligible Impact: YUKON 3B MOA (2,000 ft AGL Floor).
Taylor Highway	Negligible Impact: YUKON 3 TMOA during MFEs.	Potential Adverse Impact: YUKON 3 MOA.	Potential Adverse Impact: YUKON 3 MOA.	Potential Adverse Impact: YUKON 3 and TANANA MOAs.	Negligible Impact: YUKON 3B MOA (2,000 ft AGL Floor).
Walker Fork Campground	Negligible Impact: YUKON 3 TMOA during MFEs.	Potential Adverse Impact: YUKON 3 MOA.	Potential Adverse Impact: YUKON 3 MOA.	Potential Adverse Impact: YUKON 3 MOA.	Negligible Impact: YUKON 3B MOA (2,000 ft AGL Floor).
Gulkana National Wild River Main Stem	Potential Adverse Impact: FOX TMOAs during MFEs.	Not affected.	Not affected.	Potential Significant Adverse Impact: TANANA MOA.	Not affected.
Gulkana National Wild River Middle Fork	Potential Adverse Impact: FOX TMOAs during MFEs.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX and TANANA MOAs.	Not affected.
Gulkana National Wild River West Fork	Potential Adverse Impact: FOX TMOAs during MFEs.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX and TANANA MOAs.	Negligible Impact: FOX A MOA (5,000 ft AGL Floor).

Table 2-9 Continued

Resource	No. Action Alternative	Proposed Action	Alternative A	Alternative B	Alternative A—Modified
Delta National Wild River	Potential Adverse Impact: FOX TMOAs during MFEs.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX and TANANA MOAs.	Not affected.
Denali Highway	Potential Adverse Impact: FOX TMOAs during MFEs.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX and TANANA MOAs.	Negligible Impact: FOX A MOA (5,000 ft AGL Floor).
Tangle Lakes & Tangle River Campgrounds; Tangle Lakes National Register Archaeological District	Negligible Impact: FOX TMOAs during MFEs.	Potential Adverse Impact: FOX MOA.	Potential Adverse Impact: FOX MOA.	Potential Adverse Impact: FOX MOA.	Not affected.
Brusikana Campground	Negligible Impact: FOX TMOAs during MFEs.	Potential Adverse Impact: FOX MOA.	Potential Adverse Impact: FOX MOA.	Potential Adverse Impact: FOX MOA.	Negligible Impact: FOX A MOA (5,000 ft AGL Floor).
Proposed West Fork Area of Critical Environmental Concern	Potential Adverse Impact: FOX TMOAs during MFEs.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX MOA.	Potential Significant Adverse Impact: FOX and TANANA MOAs.	Negligible Impact: FOX A MOA (5,000 ft AGL Floor).
Richardson Highway	Potential Adverse Impact: FOX 2 TMOA during MFEs.	Not affected.	Not affected.	Potential Significant Adverse Impact: TANANA MOA.	Not affected.
West Fork Campground	Not affected.	Not affected.	Not affected.	Potential Adverse Impact: TANANA MOA.	Not affected.
Substance					
Circle	Potential Adverse Impact: YUKON 2 MOA during MFEs in Aug-Sep.	Potential Adverse Impact: YUKON 2 MOA during MFEs in Aug-Sep.	Potential Adverse Impact: YUKON 2 MOA during MFEs in Aug-Sep.	Potential Adverse Impact: YUKON 2 MOA during MFEs in Aug-Sep.	Potential Adverse Impact: YUKON 2 MOA during MFEs in Aug-Sep.
Eagle Village	Negligible Impact.	Potential Significant Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Significant Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Significant Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Adverse to Significant Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.
Eagle City	Negligible Impact.	Potential Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Adverse to Significant Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.
Chicken	Negligible Impact.	Potential Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.	Potential Adverse to Significant Adverse Impact: YUKON 3 MOA during MFEs in Aug-Sep.
Dot Lake	Potential Adverse Impact: BUFLO TMOA during MFEs in Aug-Sep.	Potential Significant Adverse Impact: BUFFALO MOA during MFEs in Aug-Sep.	Potential Significant Adverse Impact: BUFFALO MOA during MFEs in Aug-Sep.	Potential Significant Adverse Impact: BUFFALO and TANANA MOAs during MFEs in Aug-Sep.	Potential Adverse to Significant Adverse Impact: BUFFALO MOA during MFEs in Aug-Sep.
Healy Lake	Potential Significant Adverse Impact: BUFLO TMOA during MFEs in Aug-Sep.	Potential Significant Adverse Impact: BUFFALO MOA during MFEs in Aug-Sep.	Potential Significant Adverse Impact: BUFFALO MOA during MFEs in Aug-Sep.	Potential Significant Adverse Impact: BUFFALO and TANANA MOAs during MFEs in Aug-Sep.	Potential Adverse to Significant Adverse Impact: BUFFALO MOA during MFEs in Aug-Sep.

Table 2-9 Continued

Resource	No Action Alternative	Proposed Action	Alternative A	Alternative B	Alternative A—Modified
Tanacross	Negligible Impact.	Negligible Impact.	Negligible Impact.	Potential Significant Adverse Impact: TANANA MOA during MFEs in Aug-Sep. Potential Adverse Impact: TANANA MOA during MFEs in Dec-Feb.	Negligible Impact.
Lime Village	Potential Adverse Impact: STONY A MOA in mid-Aug-Sep.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.
Nipamniute	Potential Adverse Impact: STONY B MOA and STONY C TMOA during surge training in Aug-Sep.	Potential Adverse Impact: STONY B MOA in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY B MOA in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY B MOA in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY B MOA in Apr-May, mid-Aug-Oct.
Red Devil	Negligible Impact: STONY B MOA surge training in mid-Aug-Sep, mid-Apr-mid-May.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.
Siecinuute	Negligible Impact: STONY B MOA during surge training in Aug-Sep, mid-Apr-mid-May.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.
Stony River	Negligible Impact: STONY B MOA during surge training in Aug-Sep, mid-Apr-mid-May.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.	Potential Adverse Impact: STONY A and B MOAs in Apr-May, mid-Aug-Oct.
Chuvathaluk	Potential Adverse Impact: STONY B MOA and STONY C TMOA during surge training in Aug-Sep.	Negligible Impact: STONY B MOA in Apr-May, Aug-Sep.	Negligible Impact: STONY B MOA in Apr-May, Aug-Sep.	Negligible Impact: STONY B MOA in Apr-May, Aug-Sep.	Negligible Impact: STONY B MOA in Apr-May, Aug-Sep.
Land Use					
Eielson AFB (on-base)	Negligible Impact: 919 residents exposed to DNL $\geq$ 65 dB; 193 residents predicted to be Highly Annoyed ² .	Potential Adverse Impact: 1,608 residents exposed to DNL $\geq$ 65 dB, an increase of 689; 369 residents predicted to be Highly Annoyed, an increase of 176.	Potential Adverse Impact: 1,608 residents exposed to DNL $\geq$ 65 dB, an increase of 689; 369 residents predicted to be Highly Annoyed, an increase of 176.	Potential Adverse Impact: 1,608 residents exposed to DNL $\geq$ 65 dB, an increase of 689; 369 residents predicted to be Highly Annoyed, an increase of 176.	Potential Adverse Impact: 1,608 residents exposed to DNL $\geq$ 65 dB, an increase of 689; 369 residents predicted to be Highly Annoyed, an increase of 176.
Elmendorf AFB (off-base)	Negligible Impact: 497 residents exposed to DNL $\geq$ 65 dB; 104 residents predicted to be Highly Annoyed.	Potential Adverse Impact: 1,001 residents exposed to DNL $\geq$ 65 dB, an increase of 504; 210 residents predicted to be Highly Annoyed, an increase of 106.	Potential Adverse Impact: 1,001 residents exposed to DNL $\geq$ 65 dB, an increase of 504; 210 residents predicted to be Highly Annoyed, an increase of 106.	Potential Adverse Impact: 1,001 residents exposed to DNL $\geq$ 65 dB, an increase of 504; 210 residents predicted to be Highly Annoyed, an increase of 106.	Potential Adverse Impact: 1,001 residents exposed to DNL $\geq$ 65 dB, an increase of 504; 210 residents predicted to be Highly Annoyed, an increase of 106.

¹ If a resource is not specifically mentioned, negligible or no impacts are predicted.² Day-Night Average A-Weighted Sound Level (DNL).

2.7 Potential Mitigation Measures

Table 2-10 presents mitigation measures that may be used to avoid or minimize potential environmental impacts. For the most part, impacts and mitigation fall into two categories: 1) potential conflicts with general aviation, and 2) noise concerns. Noise impact mitigations were developed for the F-15 and F-16 aircraft—the aircraft that would be the predominant users of the MOAs. Although other aircraft capable of producing slightly higher noise levels would occasionally use the airspace, there is only about a 2 to 4 decibel (dB) difference in single-event maximum noise levels between these aircraft and the F-15 and F-16, use levels projected for these aircraft are low, and their activities would be dispersed over large areas. Given these factors, mitigation designed to alleviate noise impacts from F-15 and F-16 aircraft should be sufficient. The mitigations listed are technically feasible measures the Air Force would be able to execute.

Measures designed to mitigate the noise-derived adverse impacts identified in this analysis were developed based on a review of pertinent background information, including an Interagency Agreement between the NPS, USFWS, BLM, and FAA (1993) that encourages pilots making VFR flights over noise sensitive areas to ". . . make every effort to fly not less than 2,000 feet above the surface, weather permitting. . ." and a recently completed study prepared for the NPS by Anderson and Horonjeff (1992). The NPS study examined the effect of aircraft altitude on sound levels on the ground. Briefly, it suggested that enforcing minimum altitude restrictions above NPS units is an effective mitigation only when aircraft are operating at relatively low altitudes to begin with. The greatest acoustical benefit occurs when aircraft slant distance (height above ground) is increased from 125 feet to 1,000 feet (decreasing maximum sound level by 24 dB), then to 2,000 feet (an additional 8 dB decrease), and then to 3,000 feet (an additional 5 dB decrease). Increasing slant distance further, from 3,000 to 5,000 feet, results in moderate to substantial sound level reductions (roughly a 4 dB reduction for each 1,000-foot increase). Beyond 5,000 feet, each 1,000-foot increase produces only a "very small" reduction in sound level (about 2 dB for each 1,000-foot step) (ibid.). The study concluded that minimum altitude restrictions over NPS units should be applied on a case-by-case basis for site-specific sensitivities and declined to recommend any minimum altitude restriction for NPS units in general.

For some short- and long-term effects, impacts cannot be precisely estimated now due to their complexity or the low probability of their occurrence. Additional information will be required to develop suitable mitigation. Actual impacts will be measured through an impact monitoring program designed to detect changes in biological, social, and/or physical parameters. Detection of changes that exceed the maximum acceptable level or threshold (as determined by the appropriate regulatory agency or agencies) would trigger a mitigation response plan.

In its Record of Decision (ROD), the Air Force will identify which mitigation measures will be adopted and which, if any, will not, with an explanation of why they will not be adopted. The ROD will also include a mitigation implementation and monitoring plan.

Table 2-10 Potential Mitigation Measures

Mitigation	MOA(s) Affected	Resource(s) Mitigated	Effectiveness
MOA Altitude (Floor or Ceiling) and Internal Boundary Changes			
Raise the minimum altitude (floor) to 5,000 ft AGL.	YUKON 5 FOX	Aviation Safety Biological Resources Recreation Subsistence Land Use	This would reduce single-event and average noise levels, and improve civil aviation access.
Raise the minimum altitude (floor) to 500 ft AGL.	BIRCH FALCON CLEAR CREEK"	Aviation Safety	This would improve civil aviation access along major VFR flyways, including the Alaska and Richardson highways and the trans-Alaska oil pipeline.
Establish a civilian flight corridor at 4,000 ft MSL to 6,000 ft MSL to protect the VFR hemispheric altitudes of 4,500 ft MSL and 5,500 ft MSL, 2 nautical miles (NM) either side of the Alaska Highway. Establish a civilian flight corridor at 4,000 ft MSL to 6,000 ft MSL to protect the VFR hemispheric altitudes of 4,500 ft MSL and 5,500 ft MSL, ½ NM either side of the Richardson Highway.	BUFFALO TANANA (Alt. B)	Aviation Safety	This would improve civil aviation access along major VFR flyways, including the Alaska and Richardson highways and the trans-Alaska oil pipeline.
Raise the floor to 500 ft AGL below the civilian flight corridor, 2 NM either side of the Alaska Highway and ½ NM either side of the Richardson Highway.	BUFFALO TANANA (Alt. B)	Aviation Safety	This would improve civil aviation access along major VFR flyways, including the Alaska and Richardson highways and the trans-Alaska oil pipeline.
Raise the floor to 5,000 ft AGL west of the line from 63°37'00" N, 145°00'00"W to 62°47'37"N, 145°00'00"W.	TANANA (Alt. B)	Aviation Safety Recreation Subsistence Land Use	This would reduce single-event and average noise levels and potential impacts to the Tangle Lakes/Tangle River area, Gulkana and Delta National Wild Rivers, Denali Highway, Proposed West Fork of the Gulkana River ACEC ¹ , and Richardson Highway.

Table 2-10 Continued

Mitigation	MOA(s) Affected	Resource(s) Mitigated	Effectiveness
Raise the floor to 2,000 ft AGL east of the line from 64°59'59"N, 143°00'00"W to 63°23'00"N, 143°05'00"W.	TANANA (Alt. B)	Aviation Safety Recreation Subsistence Land Use	This would reduce single-event and average noise levels and potential impacts to the Fortymile National Wild River, Taylor Highway, and West Fork Campground; and improve civil aviation access to Eagle, Chicken, and Boundary from Tok.
Divide the MOA into horizontal and vertical sections and raise the floor to 2,000 ft AGL east and south of the line running from the northeast corner of YUKON 3 MOA to the intersection with the northeast corner of BUFFALO MOA (from 64°59'59"N, 141°05'00"W to 63°59'59"N, 143°00'00"W).	YUKON 3A (Low) YUKON 3B (Low) YUKON 3 (High)	Aviation Safety Recreation Subsistence	This would reduce single-event and average noise levels and potential impacts to the Fortymile National Wild River, Taylor Highway, and Walker Fork Campground; and improve civil aviation access to Eagle, Chicken, and Boundary from Tok.
MOA External Boundary Changes			
Move the northwest boundary approximately 5 NM to the southeast (terminal points at 64°31'17"N, 146°09'31"W and 64°17'43"N, 147°03'29"W).	BIRCH	Aviation Safety Recreation Subsistence Land Use	This would avoid the Salcha River and Harding Lake areas. Resources and activities in these areas would not be exposed to direct aircraft overflights and associated noise levels.
Move the southeast corner approximately 20 NM to the west (terminal points at 63°30'00"N, 145°54'00"W and 62°30'00"N, 146°43'19"W).	FOX	Aviation Safety Biological Resources Recreation Subsistence Land Use	This would avoid the Gulkana and Delta National Wild Rivers, Tangle Lakes area, Richardson Highway, proposed West Fork of the Gulkana River ACEC, and trumpeter swan nesting areas. Resources and activities in these areas would not be exposed to direct aircraft overflights and associated noise levels.
Move the eastern boundary approximately 20 NM to the west (terminal points at 61°51'22"N, 153°14'44"W and 61°25'01"N, 153°38'39"W).	STONY A	Recreation	This would avoid Lake Clark National Park and Preserve, and prevent visitors and resources from being exposed to direct aircraft overflights and associated noise levels.

Table 2-10 Continued

Mitigation	MOA(s) Affected	Resource(s) Mitigated	Effectiveness
Move the eastern boundary approximately 10 NM to the west (terminal points at 60°52'33"N, 154°43'15"W and 60°18'58"N, 154°43'15"W).	NAKNEK 2	Recreation	This would avoid Lake Clark National Park and Preserve, and prevent visitors and resources from being exposed to direct aircraft overflights and associated noise levels.
Use Restrictions — MFEs			
Conduct no MFEs during September, December, or January.	All MOAs	Aviation Safety Recreation Subsistence Land Use	This would minimize potential impacts to sport and subsistence hunting and other late season recreation and aviation activities.
Provide a minimum 2-week break between MFEs.	All MOAs	Biological Resources Recreation Land Use	This would minimize potential impacts to wildlife and recreationists by providing periods when outdoor activities could be planned to avoid MFEs and providing quiet periods for wildlife.
Conduct no MFEs the week prior to and the week following the 4th of July.	All MOAs	Recreation	This would minimize potential impacts during one of the highest recreation use periods of the year.
Limit use to MFEs only.	YUKON 5 th	Aviation Safety Biological Resources Recreation Subsistence	This would maintain the <i>status quo</i> for military aircraft operations in the area.
Use Restrictions — Supersonic Operations			
Limit supersonic operations to Functional Check Flights (FCFs) and Operational Check Flights (OCFs) along an east/west line south of the Denali National Park and Preserve.	SUSITNA	Recreation	This would minimize potential noise (sonic boom) effects on the resources and users of Denali National Park and Preserve and the community of Petersville.
Conduct supersonic operations at or above 5,000 ft AGL or 12,000 ft MSL, whichever is higher. NOTE: Supersonic operations in STONY A and B MOAs would continue to be conducted at or above 5,000 ft AGL or 10,000 ft MSL, whichever is higher.	YUKON 1-5 SUSITNA FOX TANANA (Alt. B)	Biological Resources Recreation Subsistence Land Use	This would reduce the maximum peak overpressures from sonic booms, minimizing potential impacts associated with supersonic operations.

Table 2-10 Continued

Mitigation	MOA(s) Affected	Resource(s) Mitigated	Effectiveness
Flight Avoidance Areas and Overflight/Operational Restrictions			
Establish a Flight Avoidance Area over the Kuskokwim and Holitna rivers (east and south of the community of Red Devil) of 2,000 ft AGL and 2 NM either side of the river centerlines. Effective from May 15 to September 15.	STONY B	Biological Resources Aviation Safety Land Use	This would improve civil aviation access to communities along the rivers; and would reduce single-event and average noise levels and potential impacts to residents, subsistence users, recreationists, and wildlife along the rivers.
Increase the existing peregrine falcon Flight Avoidance Areas (2,000 ft AGL and 2 NM either side of the river centerline) on the Charley, Kandik, and Yukon rivers to extend from April 15 to September 15.	YUKON 1-4	Biological Resources Recreation Aviation Safety	This would reduce noise levels and enhance civil aviation access along the rivers.
Establish a Flight Avoidance Area over the Nowitna National Wild River (2,000 ft AGL and 2 NM either side of the river centerline) from May 15 to July 15.	GALENA	Biological Resources Recreation Aviation Safety	This would reduce noise levels and enhance civil aviation access along the river.
Protect "at-risk" wildlife populations by restricting overflights during critical lifecycle periods. "At-risk" populations and temporal and spatial protection parameters to be established through consultation with management agencies, and the smallest practicable and effective area mitigated.	All MOAs	Biological Resources	This would reduce noise levels and the potential for negative behavioral responses. The focus on "at risk" populations during critical lifecycle periods minimizes the likelihood of long-term negative effects.
Protect the Delta caribou herd by establishing a minimum overflight altitude of 3,000 ft AGL over calving areas (nominally from May 15 to June 15).	BIRCH EIELSON	Biological Resources	This would reduce noise levels and the potential for negative behavioral responses.
Protect Dall sheep in the Northern Alaska Range and the Tanana Hills by establishing a minimum overflight altitude of 5,000 ft AGL over lambing areas and spring mineral licks (nominally from May 15 to June 15) and over rutting areas (nominally from November 15 to December 15).	YUKON 1-4 BUFFALO EIELSON FOX	Biological Resources	This would reduce noise levels and the potential for negative behavioral responses.

Table 2-10 Continued

Mitigation	MOA(s) Affected	Resource(s) Mitigated	Effectiveness
Communication and Information Exchange			
Continue to provide the Special Use Airspace Information Service (SUAIS).	EIELSON BIRCH BUFFALO YUKON 1, 2, and 3	Aviation Safety	This would increase situational awareness of all aviators operating in the Interior MOAs.
Continue the in-state toll free number (1-800-538-6647).	All MOAs	Recreation Subsistence Land Use	This would provide the public with a mechanism for obtaining information on Air Force aviation activities and MFE schedules, and conveying information and/or concerns to the Air Force (see Appendix O).
Notify Alaska press outlets of the annual MFE schedule for release in publications such as the <i>Milepost</i> , visitor and travel guides, and various newspapers.	All MOAs	Aviation Safety Recreation Subsistence Land Use	This would enable individuals to plan activities around the MFE schedule if they wished.
Continue operation of the Alaska Civil/Military Aviation Advisory Committee (ACMAAC).	All MOAs	Airspace Management Aviation Safety	This would provide for direct dialogue between airspace users to resolve potential impacts to aviation activities.
Establish a Resource Protection Council consisting of three inter-agency (federal, state, and Air Force) coordination teams: 1) Resource Protection/Mitigation, 2) Public Information, and 3) Research and Monitoring.	All MOAs	Biological Resources Recreation Subsistence Land Use	This would provide a forum for monitoring the efficacy of mitigation measures, providing information to the public, and identifying and filling data gaps.

Note: Unless otherwise indicated, mitigation would be year-round.

¹Under Alternative A—Modified, the CLEAR CREEK MOA would not be established.

²Under Alternative A—Modified, the floors of YUKON 5 MOA and FOX MOA would be 5,000 ft AGL year-round.

³Area of Critical Environmental Concern (ACEC).

2.8 Identification of the Preferred Alternative

The Preferred Alternative is Alternative A—Modified.

2.9 Identification of the Environmentally Preferable Alternative

The Environmentally Preferable Alternative is, by a small difference in anticipated impact, the No Action Alternative. Although Alternative A—Modified (the Preferred Alternative) has been adjusted considerably to alleviate many potential environmental impacts, compared to the No Action Alternative, Alternative A—Modified would still make more airspace available for routine training, permit more aircraft to participate in MFEs, allow more MFE sorties, lower the floors of four previously utilized TMOAs, and permit supersonic operations (down to 5,000 feet AGL or 12,000 feet MSL, whichever is higher) in four previously utilized TMOAs. However, compared to the Proposed Action, Alternative A—Modified would improve aviation safety by reducing civil-military aviation interactions; raise the floors of several MOAs to reduce potential impact on wildlife, recreation, subsistence, and other resources; modify the boundaries of several MOAs to eliminate overflight of some residential areas (e.g., the Salcha River and Harding Lake) and Conservation System Units (e.g., Lake Clark National Park and Preserve). Table 2-11 compares the No Action Alternative and Alternative A—Modified and illustrates, using quantifiable variables, the rationale for this conclusion.

Table 2-11 Comparison Between the No Action Alternative (the Environmentally Preferable Alternative) and Alternative A—Modified (the Preferred Alternative)

Comparative Element	No Action Alternative (NAA)	Alternative A—Modified (Preferred Alternative)	Difference (Δ)
<i>Total Area Affected (square miles)</i>			
Permanent MOAs	37,760	36,630	decreased 1,130 sq mi
Previously Utilized TMOAs	33,210	24,150	decreased 9,060 sq mi
Total Area Available for Routine Training	37,760	60,780	increased 23,020 sq mi
Total Area Available for MFE Training	70,970	60,780	decreased 10,190 sq mi
<i>Days Available for Routine Training</i>			
Permanent MOAs	240	240	same as NAA
Previously Utilized TMOAs	0	240	added 240 days
Days Available for MFE Training	60	60	same as NAA
Maximum MFE Aircraft	85	100	added 15 MFE aircraft
Maximum MFE Sorties per MFE Day	150	200	added 50 MFE sorties
<i>MOA Size</i>			
BIRCH (EIELSON A TMOA)	810	610	reduced 200 sq mi
FOX (FOX 1 TMOA)	7,460	6,550	reduced 910 sq mi
STONY A	6,070	5,400	reduced 670 sq mi
NAKNEK 2	4,100	3,640	reduced 460 sq mi
<i>MOA Floors</i>			
YUKON 1	Surface	100 feet AGL	raised 100 feet
YUKON 2	100 feet AGL	100 feet AGL	same as NAA
YUKON 3 (YUKON 3 TMOA)	3,000 feet AGL	100 feet AGL (3A) 2,000 feet AGL (3B)	lowered 2,900 feet lowered 1,000 feet
YUKON 4 (YUKON 3 TMOA)	3,000 feet AGL	100 feet AGL	lowered 2,900 feet
YUKON 5 (YUKON 4 TMOA)	2,000 feet AGL	5,000 feet AGL	raised 3,000 feet
BIRCH (EIELSON A TMOA)	100 feet AGL	500 feet AGL	raised 400 feet
BUFFALO (BUFLO TMOA)	1,000 feet AGL	300 feet AGL	lowered 700 feet
FOX (FOX 1 TMOA)	3,000 feet AGL	5,000 feet AGL	raised 2,000 feet
STONY B	3,000 feet AGL	100 feet AGL	lowered 2,900 feet
<i>Supersonic Operations to 5,000 feet AGL or 12,000 feet MSL, whichever is higher</i>			
YUKON 1	MFEs only ¹	Yes	added routine supersonic ²
YUKON 2	Yes ¹	Yes	same as NAA ²
YUKON 3 (YUKON 3 TMOA)	No	Yes	added supersonic
YUKON 4 (YUKON 3 TMOA)	No	Yes	added supersonic
YUKON 5 (YUKON 4 TMOA)	No	Yes	added supersonic
FOX (FOX 1 TMOA)	No	Yes	added supersonic
STONY B	Yes ¹	Yes	same as NAA

¹Supersonic operations would be authorized down to 5,000 feet AGL or 10,000 feet MSL, whichever is higher, under the No Action Alternative.

²With a higher minimum floor.

2.10 Operational Suitability of the Alternatives

Table 2-12 and Table 2-13 compare the operational utility of the No Action Alternative, the Proposed Action, and Alternative A—Modified (the Preferred Alternative) with the potential mitigation measures identified in section 2.7. The comparison was prepared by senior military aviators of the 3rd Wing, the 354th Fighter Wing, and Headquarters 11th Air Force. The alternatives were rated using the mandatory criteria identified through the Air Force alternative identification and evaluation process (see Volume III, Appendix N).

Table 2-12 Operational Utility of Selected Alternatives for Routine Training

Operational Readiness Factors	No Action Alternative	Proposed Action	Alternative A—Modified (with Mitigation)
ROUTINE TRAINING			
<i>Within Training Range</i>	Excellent Utility	Excellent Utility	Excellent Utility
<i>Accessible from both Main Bases</i>	No Utility	Excellent Utility	Excellent Utility
<i>MOA Linkage (Ranges/RAs)</i>	No Utility	Excellent Utility	Meets Minimum Core Requirements
<i>MOA Linkage (Aerial Refueling Tracks)</i>	Good Utility	Good Utility	Good Utility
<i>MOA Linkage to other MOAs</i>	Does Not Meet Core Readiness Requirements	Good Utility	Good Utility
<i>Lateral Dimensions</i>	Minimum Utility to meet Overall Readiness Requirements	Excellent Utility	Good Utility
<i>Vertical Dimensions</i>	Minimum Utility to meet Overall Readiness Requirements	Good Utility	Moderate Utility
<i>Supersonic Operations</i>	Meets Minimum Core Requirements	Good Utility	Moderate Utility
<i>Time Availability</i>	Excellent Utility	Excellent Utility	Good Utility
Integrative Criteria			
<i>Geographic Dispersion</i>	Moderate Utility	Outstanding Utility	Outstanding Utility
<i>Discrete MOAs</i>	Good Utility	Outstanding Utility	Excellent Utility
<i>ACMI/YMDS Linkage</i>	Good Utility	Outstanding Utility	Excellent Utility

Table 2-13 Operational Utility of Selected Alternatives for Major Flying Exercises

Operational Readiness Factors	No Action Alternative	Proposed Action	Alternative A—Modified (With Mitigation)
MAJOR FLYING EXERCISES			
<i>Within Training Range</i>	Excellent Utility	Excellent Utility	Excellent Utility
<i>MOA Linkage (Ranges/RAs)</i>	Moderate Utility	Excellent Utility	Meets Minimum Core Requirements
<i>MOA Linkage (Aerial Refueling Tracks)</i>	Good Utility	Good Utility	Good Utility
<i>Lateral Dimensions</i>	Excellent Utility	Excellent Utility	Good Utility
<i>Vertical Dimensions</i>	Minimum Utility to meet Overall Readiness Requirements	Good Utility	Moderate Utility
<i>Supersonic Operations</i>	Meets Minimum Core Requirements	Good Utility	Moderate Utility
<i>Time Availability</i>	Excellent Utility	Excellent Utility	Good Utility
Integrative Criteria			
<i>Geographic Dispersion</i>	Moderate Utility	Outstanding Utility	Outstanding Utility
<i>Discrete MOAs</i>	Good Utility	Outstanding Utility	Excellent Utility
<i>ACMI/YMDS Linkage</i>	Good Utility	Outstanding Utility	Excellent Utility

CHAPTER 3

AFFECTED ENVIRONMENT

3.1 Physical Considerations

Information on the climate and topography of the areas that would be affected by the Proposed Action or any of the alternatives is presented in this section. This general information assists in better understanding the alternatives. Where climate or topography play a direct role (e.g., in determining where aircraft operate, species are distributed, recreation occurs, etc.), more specific information is provided in the appropriate section. However, since neither climate nor topography would be impacted by any of the alternatives, physical considerations are not discussed in Chapter 4, Environmental Consequences.

3.1.1 Background

Four climatic zones are recognized in Alaska: maritime, transition, continental, and arctic. Most of the affected environment considered in this EIS is in the continental zone, although Elmendorf AFB and the SUSITNA MOA and portions of the STONY and NAKNEK MOAs are located in the transition zone (Selkregg 1976; Alaska Northwest Books 1991). The continental climatic zone covers Alaska from south of the central Brooks Range to the transition zone along the coastal margin, and is characterized by extreme temperature variations and low precipitation and humidity. Summers are short, extending from May 15 to September 30, and temperatures can reach 90°F in the Interior. Summer temperatures in the 30°F to 60°F range are more common in the western regions. Winters are long, extending from December 1 to mid-April. Winter temperatures average -10°F, although -60°F is not uncommon. Spring breakup occurs from April through the end of May. Rivers are navigable only about 5 months of the year. Snow-cover duration exceeds 200 days per year, and the snow depth averages 20 to 30 inches over most of the region (ADF&G 1986b). Precipitation is low as most of the air masses coming in from the Pacific lose their moisture over the mountains to the south. Surface winds are light, 10 to 15 miles per hour, although localized bands of strong winds (60 to 90 mph) may occur due to channeling through mountain valleys. Storms occur year-round, but are most frequent in late summer and early fall when the primary storm track penetrates the interior of the state. The transition climatic zone occurs as a band of varying width between the maritime and continental zones. Weather in this zone is transitional between maritime and continental climates. Average temperatures are lower than in the continental zone, and precipitation is higher. Surface winds are generally light, but there are numerous localized exceptions. July temperatures average 50°F to 60°F, and temperatures in January average 0°F. The highest level of storm activity occurs in the late summer and fall, with an average of 1.4 storms per month. Because of the high latitude, there is extreme variation between winter and summer daylight hours in both climatic zones.

The state's diverse terrain is organized into six broad physiographic regions, three of which occur in the affected environment: The Interior Region (Northern and Southern Interior Region MOAs), the Southcentral Region (Southcentral Region MOAs), and the Western Region (Western Region MOAs). The Interior region, located in the central part of the state between the Alaska Range to the south and the Brooks Range to the north, is a broad lowland created by the area's large rivers. The topography consists of low mountain ranges, rolling uplands, and alluvium-floored lowlands that decline westward from the Canadian border to the Bering and Chukchi seas. The Yukon River, the largest river in Alaska, flows through the region, as do the Tanana, Porcupine, Koyukuk, and several other large tributaries of the Yukon. South of the Yukon, the Kuskokwim River rises in the hills of the western Interior region. Elevations rarely exceed 6,000 feet.

The Southcentral region is a 650-mile arc between the Gulf of Alaska on the south and the Alaska Range to the north. The region is bounded on the east by the St. Elias and Chugach mountains, which are breached only by the Copper River Valley; the Aleutian Range rises along the western boundary of the region. Relief is extreme, with lowlands near sea level and mountains rising up to 10,000 to 20,320 feet. Major rivers in the region are the Susitna and Matanuska.

The Western region extends along the Bering Sea coast from the Arctic Circle south to where the Alaska Panhandle joins the mainland near Naknek on Bristol Bay. The predominant features of the region are the Yukon-Kuskokwim river delta, the Seward Peninsula, and Bristol Bay. Elevations rarely exceed 4,000 feet.

3.1.2 Avalanches

"Avalanches are common on steep, snow-covered mountains everywhere" (Perla and Martinelli 1975). The extremes of weather and severe topography found in Alaska and throughout the areas underneath the MOAs present an inherent, year-round risk of avalanches. Avalanches are a natural, but dangerous part of the Alaska outdoor environment and are capable of causing severe injury or death to persons or animals caught in them.

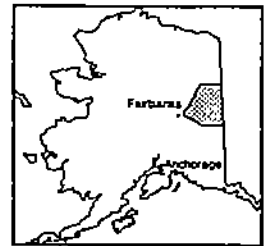
An avalanche can fall only where snow has collected on an inclined surface (LaChapelle 1985). The tendency of a slope to slide depends on numerous factors, including meteorological conditions, snowpack structure, and slope and angle of the terrain (LaChapelle 1985; Perla and Martinelli 1975). It is not possible to observe the many complex and subtle changes in snowpack that result in its failure and the avalanche release. Any outside trigger or force can result in slope failure and precipitate the release of an avalanche. Natural forces that can trigger an avalanche include a falling cornice, sluffing snow, stress change due to snow metamorphism, stress change due to weight of new snow, earth tremors, and snow falling from trees (Perla and Martinelli 1975). The glide of a ski, a mountaineer's weight, an explosive blast, and a sonic boom can precipitate avalanches (ibid).

A Colorado study (Lillard et al. 1965) demonstrated that sonic booms do not necessarily trigger avalanches. However, sonic booms from jet aircraft sometimes release avalanches on highly unstable slopes (Perla and Martinelli 1975). Therefore, it is conceivable that any increase or decrease in supersonic flight activities under any of the alternatives could potentially result in a proportional change in the number of avalanches released by sonic booms. However, the danger from avalanches presented to backcountry users cannot be altered merely by the presence (or absence) of a particular triggering event such as a sonic boom. Rather, the danger is a function of the backcountry user and his or her location in avalanche-prone terrain under certain meteorological conditions. The many causes of avalanches are complex. An avalanche may or may not occur in an avalanche-prone location with or without the benefit of the force of sonic booms.

In almost all cases of avalanche-related death or serious injury, the victims triggered the avalanche themselves (LaChapelle 1985; Perla and Martinelli 1975). In order for an accident to occur, the potential avalanche victim must first be in an area where an avalanche could occur, and then the greatest threat to that person is from his or her own activity. The best way to prevent or minimize the danger of avalanches is to acquire knowledge of the terrain and learn how to identify the safest routes in order to avoid dangerous slopes and release zones. Numerous books are available outlining avalanche hazard and safety, including the two referenced in this section. The opportunities to learn these skills are also offered in avalanche safety courses and workshops readily available to backcountry users throughout Alaska. Local ski and outdoor equipment stores and university recreation centers will have information about these types of workshops.

3.1.3 Northern Interior Region Climate and Topography

The Proposed YUKON MOAs (YUKON 1-6) and Stuart Creek air-to-ground weapons range (R-2205) are located in the continental climatic zone.



The northern portion of the MOA complex (YUKON 2, 4, and 5) overlies the Porcupine Plateau, an area characterized by low ridges with gentle slopes and summits 1,500 to 2,500 feet high with a few 3,500-foot peaks (Wahrhaftig 1965). Valley floors are broad and valley patterns irregular, with many imperceptible divides. The Black and Little Black rivers, which rise in the Ogilvie Mountains, flow below the northern portion of YUKON 5 MOA to the Yukon River. Scattered thaw lakes occur in lowlands and low passes.

The central part of the MOA complex (YUKON 1, 2, 3, 4, and 6) overlies the Yukon Flats Section. This area contains marshy, lake-dotted flats rising from 300 to 900 feet in elevation. Rolling silt- and gravel-covered terraces rise above the flats and slope gradually upward to elevations of about 1,500 feet. The region is drained by the Yukon River, and thaw lakes are abundant throughout the flats and common on the marginal terraces.

The southern portion of the MOA Complex (YUKON 1, 2, 3, and 4, and Stuart Creek range) overlies the Yukon-Tanana Upland. This area is characterized by rounded ridges with gentle side slopes and elevations ranging from 3,000 to 5,000 feet, although some domes are as high as 6,800 feet. In the YUKON 3 area, the ridges are very rugged. Most streams in this area drain to the Yukon River in narrow, V-shaped canyons, although the headwaters of the Fortymile and Ladue rivers are broad, alluvium-floored basins. Two small physiographic sections (localized areas defined by physical geography) located along the Canadian border between the Yukon-Tanana Upland and the Porcupine Plateau, also underlie the YUKON 3 and 4 MOAs. The Yukon River enters Alaska through the Tintina Valley, a narrow belt of open country with low, rounded ridges ranging in elevation from 1,000 to 2,500 feet. The northwestern part of the valley, around Circle Hot Springs and Birch Creek, is a lake-dotted plain that slopes gradually upward to the base of surrounding hills and is separated from the Yukon River by a flat-topped gravel ridge about 400 feet high and 3 to 4 miles wide. The Ogilvie Mountains to the north have sharp crests, precipitous slopes, and deep narrow valleys. The mountains rise to 5,000 feet, with local relief as high as 4,000 feet. Ridges are interconnected and there are few passes. These mountains are drained by the Kandik, Nation, and Tatonduk rivers, all tributaries of the Yukon River. Small thaw lakes and oxbow lakes occur along the Yukon River in the southern part of the mountains.

3.1.4 Southern Interior Region Climate and Topography

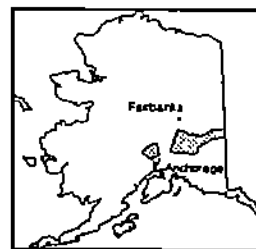
The Proposed Southern Interior Region MOAs (BUFFALO, CLEAR CREEK, EIELSON, FALCON, AND BIRCH), Eielson AFB, and the Oklahoma and Blair Lakes ranges (R-2202 and R-2211) are located in the continental climatic zone.



This region overlies the Yukon-Tanana Upland (see 3.1.3), the Tanana-Kuskokwim Lowland, and Northern Foothills. The Tanana-Kuskokwim Lowland is a broad depression north of the foothills of the Alaska Range (Wahrhaftig 1965). Rivers rising in the Alaska Range, most notably the Tanana and Delta rivers, flow north across the lowland at intervals of 5 to 20 miles. Thaw lakes and sinks are abundant in the lowlands. The Northern Foothills of the Alaska Range are flat-topped east-trending ridges 2,000 to 4,500 feet in elevation, 3 to 7 miles wide, and 5 to 20 miles long, and separated by rolling lowlands 700 to 1,500 feet high and 2 to 10 miles wide. Most streams rise in the Alaska Range and flow north across ridges in rugged V-shaped canyons and across the lowlands in broad terraced valleys. The entire section drains to the Tanana River.

3.1.5 Southcentral Region Climate and Topography

The Proposed SUSITNA MOA and Elmendorf AFB are located in the transitional climatic zone; the Proposed FOX and TANANA MOA areas are located in the continental climatic zone.



3.1.5.1 SUSITNA MOA

The northern portion of SUSITNA MOA overlies the Alaska Range from Ruth Glacier and Mount Barrille (7,650 feet) at the northeast edge almost to the Kichatna Mountains and Mount Dall (8,756 feet) in the west. This area is very rugged, with numerous peaks over 7,000 feet. Mount McKinley (Denali), the highest peak in North America at 20,320 feet, is located approximately 7.2 miles north of the MOA. The southern portion of the MOA overlies the drainages running south out of the Alaska Range and their neighboring floodplains and lowlands. Drainages include the Kichatna, Yentna, Kahiltna, and Chulitna rivers.

3.1.5.2 FOX MOA (FOX 1 TMOA)

The FOX MOA (FOX 1 TMOA) includes the central part of the Alaska Range in the north, the Clearwater Mountains in the center, the foothills of the Talkeetna Mountains in the southwest, and the Gulkana Upland and Copper River Lowland in the southeast. The central part of the Alaska Range contains ridges 6,000 to 9,000 feet high, surmounted by peaks over 9,500 feet in elevation, including Mount Deborah (12,329 feet), Mount Moffit (13,020 feet), and Mount Hayes (13,832 feet). The range rises abruptly from lower country on either side. This part of the Alaska Range is drained by north-flowing tributaries of the Tanana and Yukon rivers. There are a few lakes and many small ponds. The Clearwater Mountains consist of two or three steep, east-trending ridges rising to elevations of 3,000 to 3,500 feet. The entire section is tributary to the Susitna River. The central Talkeetna Mountains are a compact group of ridges 6,000 to 8,800 feet high. The Gulkana Upland consists of rounded, east-trending ridges separated by lowlands 2 to 10 miles wide. The ridge crest elevations are 3,500 to 5,500 feet. The east and southeast part of the upland drains to the Copper River; the western part drains to the Susitna River; and the north-central part drains, via the Delta River, to the Tanana and Yukon rivers. Many long narrow lakes occupy basins along the ridges. The western part of the Copper River Lowland, the Lake Louise Plateau, is a rolling upland with elevations of 2,200 to 3,500 feet. The northwestern part is drained by the Susitna River. Low passes lead to the headwaters of the Delta, Tok, and Matanuska rivers. Large lakes occupy the deep mountain basins.

3.1.5.3 TANANA MOA (FOX 2 TMOA)

The TANANA MOA covers portions of the Yukon-Tanana Upland (see 3.1.3), the Tanana-Kuskokwim Lowland (see 3.1.4), the Northern Foothills of the Alaska Range (see 3.1.4), and the Northway-Tanacross Lowland. The Northway-Tanacross Lowland consists of three small basins, separated by screens of low rolling hills. The entire lowland is drained by the Tanana River. There are seven named summits over 5,000 feet under the TANANA MOA, with higher peaks (between 8,000 and 9,000 feet) concentrated under the western part of the MOA in the central and eastern Alaska Range.

3.1.6 Western Region Climate and Topography

The Western Region MOAs are located almost entirely in the continental climatic zone. The eastern portions of the NAKNEK and STONY MOAs are located in the transition climatic zone.



3.1.6.1 NAKNEK 1 and 2 MOAs

The NAKNEK MOAs overlie the area just north of Bristol Bay, extending from the Wood-Tikchik Lakes in the west to the Alaska Range in the east. The northern part of the MOAs is situated over the rolling Nushagak Hills. Two major rivers flow beneath the MOAs: the Mulchatna River originates in the Alaska Range and the Nushagak River originates in the Nushagak Hills. Both rivers drain south into the lowlands south and west of the MOAs. The confluence of the Mulchatna and Nushagak rivers occurs just south of the MOAs; the Nushagak River then continues south into Bristol Bay at Dillingham. Elevations under the NAKNEK MOA complex range from about 1,500 feet in the southern portion of the complex to 4,000 feet at the eastern edge of NAKNEK 2.

3.1.6.2 STONY A and B MOAs and STONY C TMOA

The STONY MOAs overlie the mountain-enclosed upper Kuskokwim River Basin. In its upper reaches, the Kuskokwim River flows through a wide, forested floodplain, which is interlaced with lakes, sloughs, and oxbows and incised 50 to 100 feet into the Tanana-Kuskokwim lowland. To the west lie the Kuskokwim Mountains, a chain of rolling hills 2,000 to 4,000 feet high; east of the MOAs are the rugged mountain peaks of the Alaska Range. Numerous tributaries of the Kuskokwim River drain the Alaska Range, the Kuskokwim Mountains, and the Nushagak-Big River hills. Notable tributaries are the Windy, Swift, South, and North forks of the Kuskokwim River; and the Big, Stony, Hoholtna, and Holitna rivers. The Holitna lowland, ranging in elevation from 250 to 600 feet, occupies the southeastern portion of the upper Kuskokwim Basin and is bounded to the south by the Taylor Mountains-Nushagak Hills. At the western edge of the Holitna lowland, about halfway along its length, the Kuskokwim River cuts through the Kuskokwim Mountains in a gorge 100 to 400 feet deep, which lies within an older valley approximately 1,000 feet deep and 2 to 8 miles wide.

3.1.6.3 GALENA MOA

The GALENA MOA overlies the northern part of the Kuskokwim Mountains, between the Yukon River and the North Fork of the Kuskokwim River. The rivers under the MOA include the Sulatna, Susulatna, Nowitna, and Nixon Fork, and all drain north out of the hills to the north and west of 4,508-foot Von Frank Mountain. These rivers ultimately join the Nowitna River, and then the Yukon River.

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3.2 Airspace Management, Aircraft Operations, and Aviation Safety

3.2.1 Background

Airspace can be quantified as a finite resource having both vertical and horizontal bounds. One must also consider its transient use for aviation and the sometimes competing concurrent needs of military, commercial, and general aviation. Issues discussed in this section focus on:

- Special Use Airspace (SUA) in general and the MOAs in particular that are addressed as part of the actions assessed in this document, and
- the military training that occurs in the airspace under consideration.

The No Action Alternative, described in this section, provides the basis for comparison among alternatives in Chapter 4.

3.2.1.1 Airspace Management and Alaskan Military Airspace

The Federal Aviation Administration (FAA) is the sole agency charged with safely and effectively managing all airspace over the United States. Management of this airspace is via the National Airspace System (NAS) consisting of the common network of United States airspace; air navigation facilities, equipment and services; airports or landing areas; aeronautical charting and information services; rules, regulations, and procedures; technical information; and manpower. The principal aviation user groups are the commercial air carriers, general aviation, resource management agencies, and the military services. Each group has unique requirements and needs to operate under this NAS; all want the flexibility to operate safely with minimum constraints.

Airspace is required by the U.S. Department of Defense (DoD) to accomplish the operational, training, research and development, testing, and evaluation missions. Within the NAS, there are two general types of airspace where various military operations may be conducted, SUA and Airspace for Special Use. A detailed discussion of the National Airspace System can be found in Appendix D.

Because there is a need to segregate certain military flight activities that are incompatible with or potentially dangerous to civilian aircraft, the SUA program was instituted in 1961. In 1975, the FAA established the category of airspace known as Military Operations Areas (MOAs) to contain non-hazardous military flight training and to indicate to the public where these activities are conducted. In 1976, the Alaskan Air Command, in response to FAA requirements, created in Alaska the existing permanent MOA structure (Figure 3-1). Some minor modifications in MOA boundaries have occurred since that time, but for the most part, the existing permanent airspace structure has not changed in over 18 years. Figure 3-1 depicts the locations of the permanent MOAs with respect to Alaska communities and major physical features. Of the eight existing permanent MOAs, only two (SUSITNA and YUKON 2) are over areas that are accessible by road.

The restricted areas (RAs) R-2202, R-2205, and R-2211, encompassing the three air-to-ground weapons ranges (Oklahoma, Stuart Creek, and Blair Lakes, respectively), comprise another part of the SUA structure in Alaska. The lands where the air-to-ground weapons ranges (ranges) are located were withdrawn from the public domain in the 1940s. The RAs over the ranges were established in the late 1970s (during the same period the existing permanent MOAs were created) to protect the range operations. Figure 3-2 depicts the locations of the three RAs relative to the existing MOAs. These RAs are designed to contain "hazardous" military activities, such as live firing of weapons, and are the only overland areas in Alaska where such activities can take place.

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Figure 3-1
Existing Permanent
Military Operations Areas (MOAs)

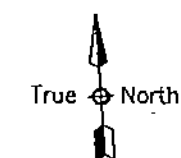
Legend:

— MOA Boundary

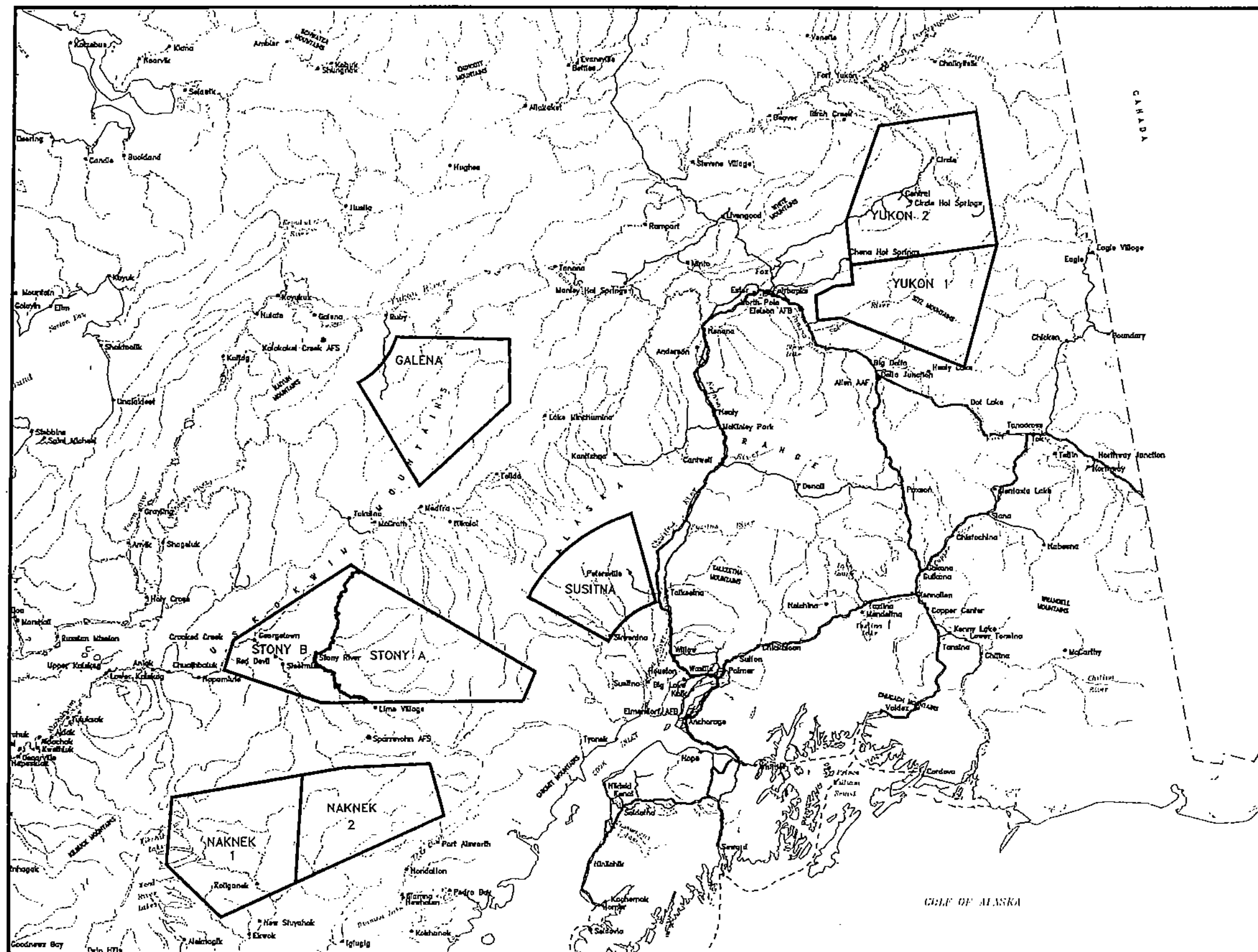
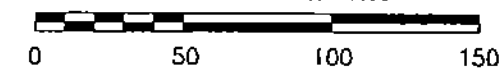
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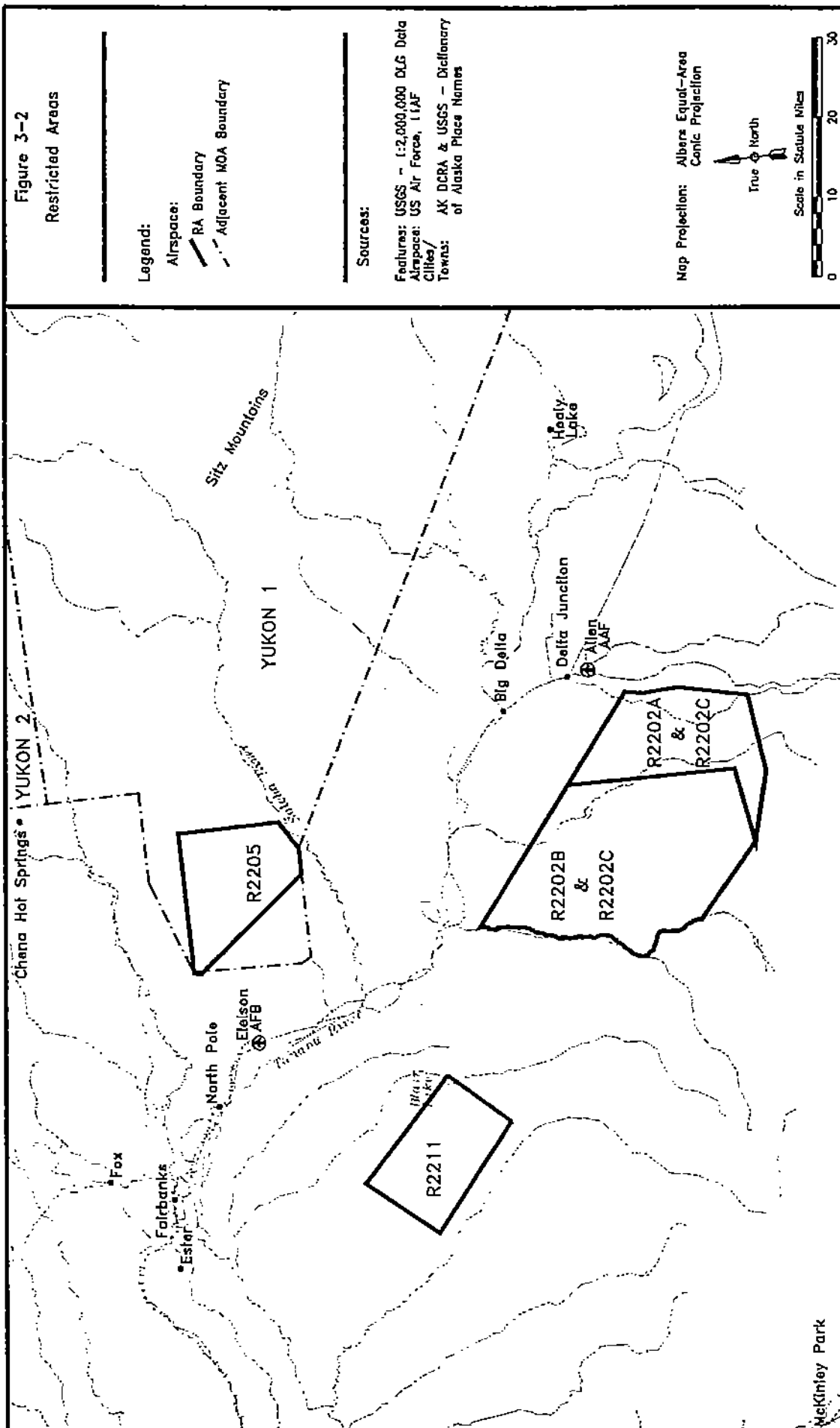
Features: USGS - 1:2,000,000 DLG Data
Airspace: US Air Force, 11AF
Cities/
Towns: AK DCRA & USGS - Dictionary
of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection



Scale in Statute Miles





The controlling agency for all air operations in Alaska MOAs is the FAA represented by Anchorage Air Route Traffic Control Center (ARTCC). Specifications for particular MOAs and other military airspace are outlined in a Letter of Agreement between Anchorage ARTCC and 11th Air Force (11 AF) describing Alaskan Military Airspace. This Letter of Agreement (amended March 28, 1994) graphically describes the MOAs along with other information, including the entry/exit gates to the MOAs; the altitudes (floors and ceilings) for the MOAs; the using (scheduling) agency; and the times of activation.

Air Force operations in the MOAs are scheduled through the appropriate Air Force using agencies defined in the Letter of Agreement for each MOA or MOA complex. The various units at both Eielson and Elmendorf AFBs are required to closely coordinate uses of the MOAs that are regularly accessible to aircraft of both units. For example, the F-15Es at Elmendorf AFB regularly use YUKON 1 MOA for air-to-air and low-altitude training. Following F-15E flight activity in the MOA (or higher altitude areas), the mission often is temporarily terminated after reaching the MOA border until aircrews can coordinate the transition to one of the air-to-ground weapons ranges (e.g., R-2205) and then return to base. The YUKON airspace and range activity for Elmendorf-based aircraft must be scheduled through the 354th Fighter Wing (354 FW) at Eielson AFB. Similarly, if an F-16C flight from Eielson needed to use the SUSITNA MOA for air-to-air training, that activity is scheduled through the 3rd Wing (3 WG) at Elmendorf AFB.

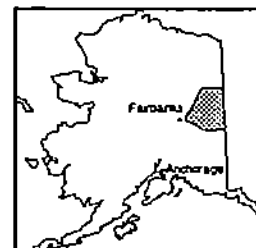
Once MOA/range activity is scheduled for a particular flying day, the Air Force using agency must contact Anchorage ARTCC and request that the MOA be activated for a particular period of time, consistent with the descriptions outlined in the Letter of Agreement. Individual flights proceeding to the MOAs from their departure bases most often follow predefined routings called STEREO ROUTES. These STEREO ROUTES are all coordinated between the individual Air Force wings (e.g., 354 FW) and the ARTCC (and published in the appropriate aircraft *Inflight Guides*). STEREO ROUTES are developed to provide the aircrews and air traffic control agencies the same standardized flight procedures each day for getting to and from various MOAs, ranges, or other military airspace. Once cleared in a MOA, all military flight operations, unless under positive Instrument Flight Rules (IFR) control or in Class G airspace, must be accomplished in visual meteorological conditions (VMC), observing specific cloud clearance and ground clearance requirements set forth in Air Force Instruction 11-206 (formerly AFR 60-16). Return flights from the MOAs would also follow STEREO ROUTING and usually terminate in some form of visual or instrument approach to the designated landing base or base of origin.

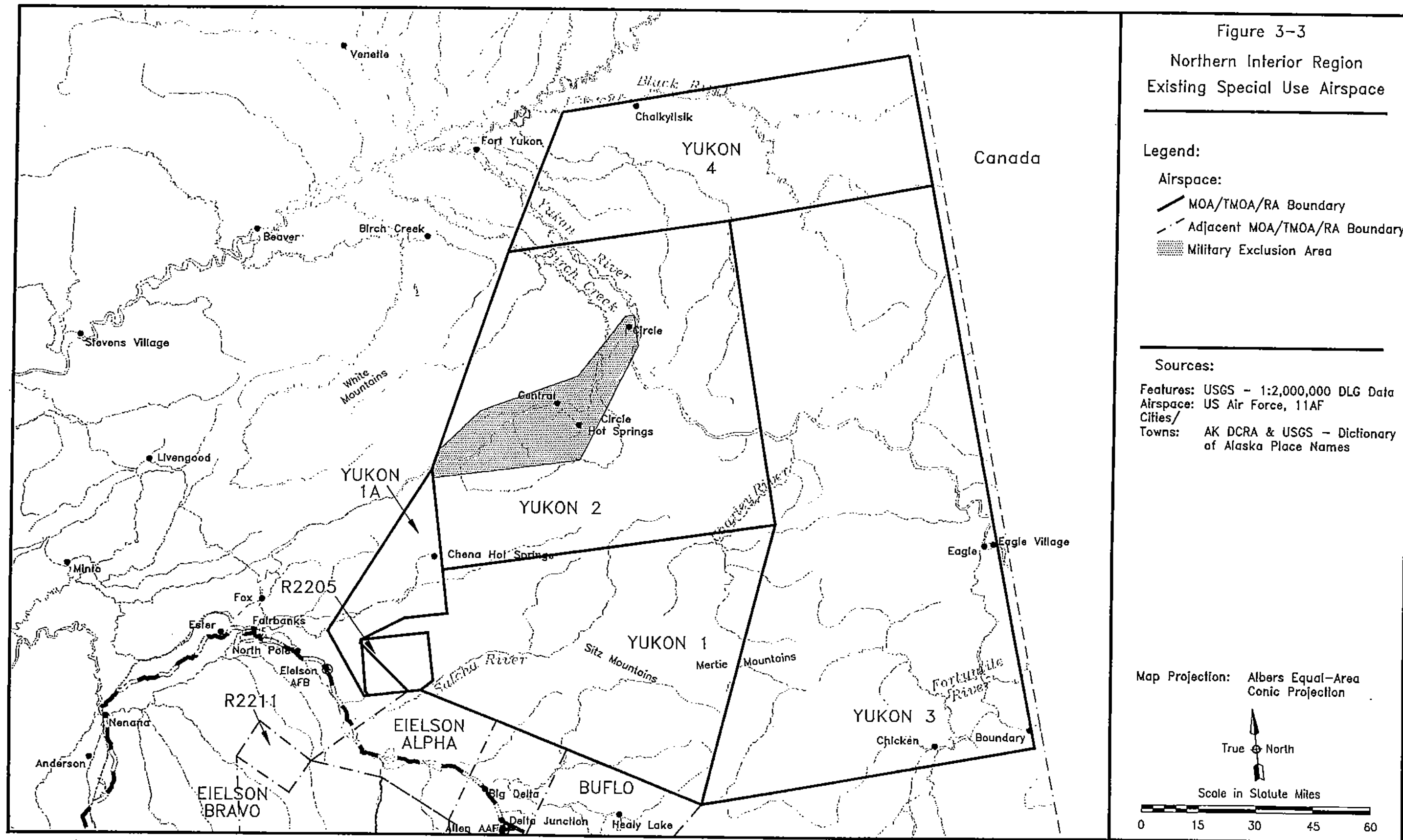
3.2.1.2 Aviation Safety

Issues addressed as a part of aviation safety concerns include the potential bird-aircraft strike hazards, aircraft mishap potential in the existing airspace, and the near miss/midair collision potential between military and civil aviation. These issues are applicable throughout all four regions addressed in this document and are presented at the end of this section following the discussions of airspace management and aircraft operations.

3.2.2 Northern Interior Region Airspace Management and Aircraft Operations

The Northern Interior Region encompasses the YUKON MOA complex (YUKON 1 and YUKON 2 MOAs; the YUKON 1A, YUKON 3, and YUKON 4 TMOAs; and R-2205 RA). Figure 3-3 displays the areas covered by the existing permanent MOAs and previously utilized Temporary MOAs (TMOAs) in the region. Table 2-2, Chapter 2, summarizes the approximate areas, altitude structure, and clearance for supersonic operations in the Northern Interior Region MOAs.



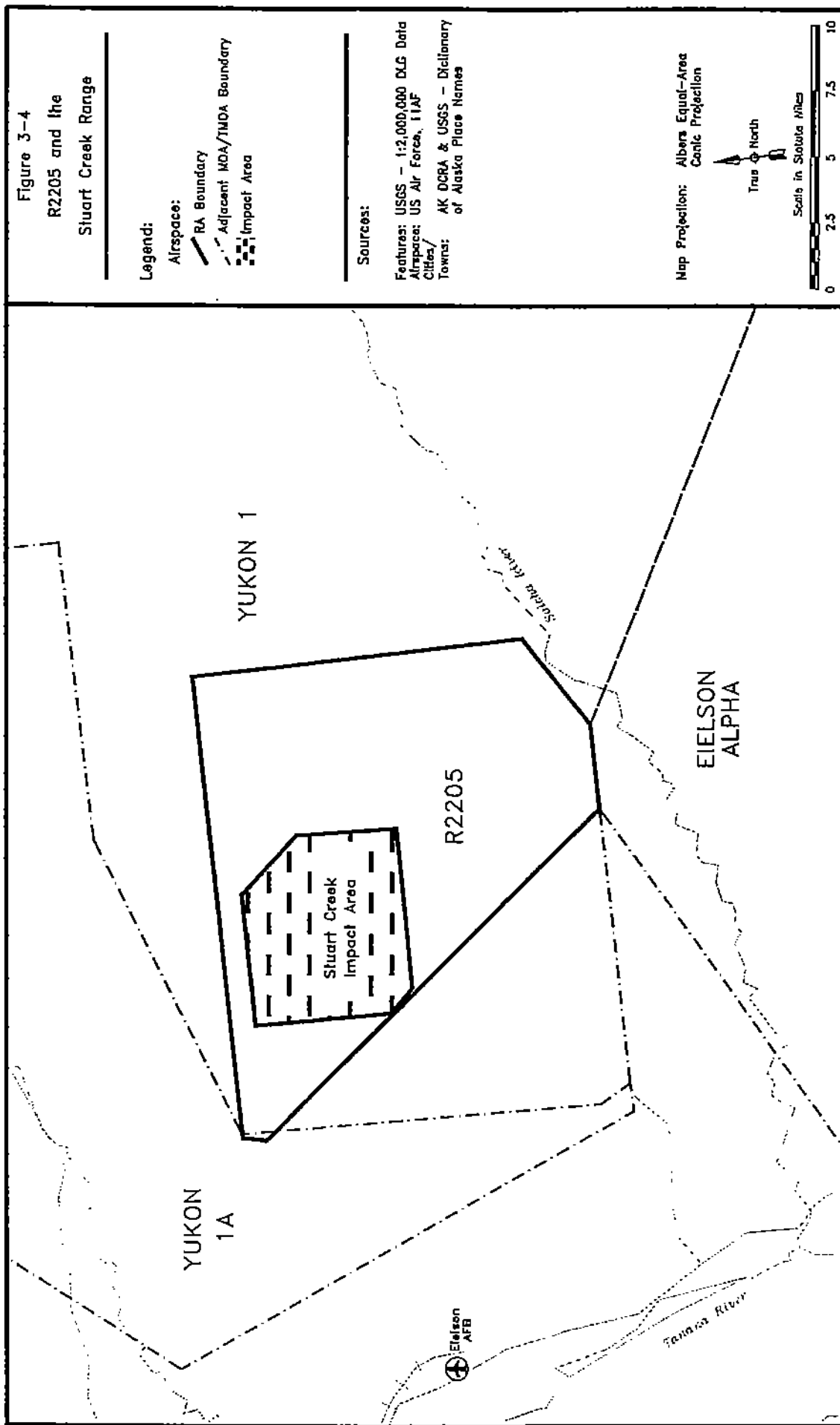


The scheduling agency for the YUKON MOAs and the Stuart Creek range (R-2205) is the 354 FW at Eielson AFB. STEREO ROUTING to and from the airspace has been established by the 354 FW. The Thunder North Departure proceeds from Eielson AFB to various entry gates on the western boundary of YUKON 2 MOA. This routing is available for routine training or for efficient handling of a large volume of traffic in a short period of time as in a major flying exercise (MFE). The Thunder South Departure provides similar routing to the southern entry gates in the YUKON 1 MOA. Return routing from the YUKON 1 and YUKON 2 MOAs follows similar STEREO ROUTES back to Eielson AFB for entry in the Eielson AFB traffic pattern.

YUKON 1 and YUKON 2 MOAs are the only MOAs in this complex available for routine training and joint/combined Air Force/Army training. These two MOAs can be scheduled individually or together. YUKON 1 and YUKON 2 MOAs are often subdivided into smaller parcels to allow more efficient, simultaneous use of the airspace by multiple users. Typical simultaneous usage could be a flight of four F-16Cs from Eielson AFB practicing low-altitude tactical navigation throughout the entire area of YUKON 1 and YUKON 2 but having a ceiling 5,000 feet AGL. A flight of four F-15Cs from Elmendorf could be using YUKON 1 and YUKON 2 above 6,000 feet AGL. The flight of F-15Cs could be cleared to use the MOA from a floor at least 1,000 feet higher than the ceiling of the F-16Cs' airspace, with a ceiling for F-15 operations either at the MOA ceiling or Air Traffic Control Assigned Airspace (ATCAA) above Flight Level (FL) 180 (approximately 18,000 feet MSL). All military aircraft operating in a MOA are responsible for maintaining safe separation between all other aircraft in the MOA (including other military participating aircraft or non-participating civilian aircraft transitioning the area). The Air Force term for this procedure is "See and Avoid" for non-participating aircraft.

Restricted Area R-2205 is located over the Stuart Creek range that is located within the Fort Wainwright maneuver area and controlled by the Army. Air Force use of the range is granted through an Interservice Support Agreement, with the priority for the use at the Army's discretion. The Stuart Creek range is the primary tactics/electronic countermeasures (EC) air-to-ground weapons range for the 11th Air Force. Procedures have been established to allow simultaneous use of the range by both the Army and Air Force. The Army area (called the "Lima" area) is located south of the Stuart Creek range and is used for unannounced artillery/mortar firings. The RA overlying the range serves as a buffer between military flight operations and non-military flight operations near the range. Clearance onto the range is obtained by radio contact with the Eielson Range Control. On the range, procedures for aircraft separation are the same as in the MOAs. Because R-2205 is almost entirely surrounded by the YUKON 1 MOA (see Figure 3-4), the common airspace cannot be active to different users. In other words, once a flight of aircraft are authorized to use R-2205, the portion of YUKON 1 that is coincident with R-2205 is withdrawn from use by other aircraft.

Scheduling of the YUKON MOAs must also take into account two other types of overlapping military airspace: the Low Altitude Tactical Navigation (LATN) area and the existing Military Training Routes (MTRs) that traverse the Northern Interior Region. The western two-thirds of the YUKON 1 and YUKON 2 MOAs is coincident with a LATN area used by C-130 aircraft from Elmendorf AFB to practice low-altitude navigation and air delivery procedures. Most C-130 operations generally avoid potential conflicts with the YUKON MOAs by either flying in the southern portion of the LATN or after the hours of normal operations in the YUKON MOAs. The LATN is cleared for slow speed (less than 250 knots indicated airspeed [KIAS]) and has been surveyed for operations down to 300 feet AGL. Current 11th Air Force restrictions prohibit C-130 operations below 500 feet AGL in the LATN. C-130 operations in the LATN include use of Station Keeping Equipment (SKE) routes, during which formations of up to three C-130s follow the same SKE route through the LATN, monitoring their position relative to each other in the formation (often separated by up to a mile) via electronic station keeping procedures. See Figure 3-5 for a depiction of the LATN relative to the YUKON MOAs.



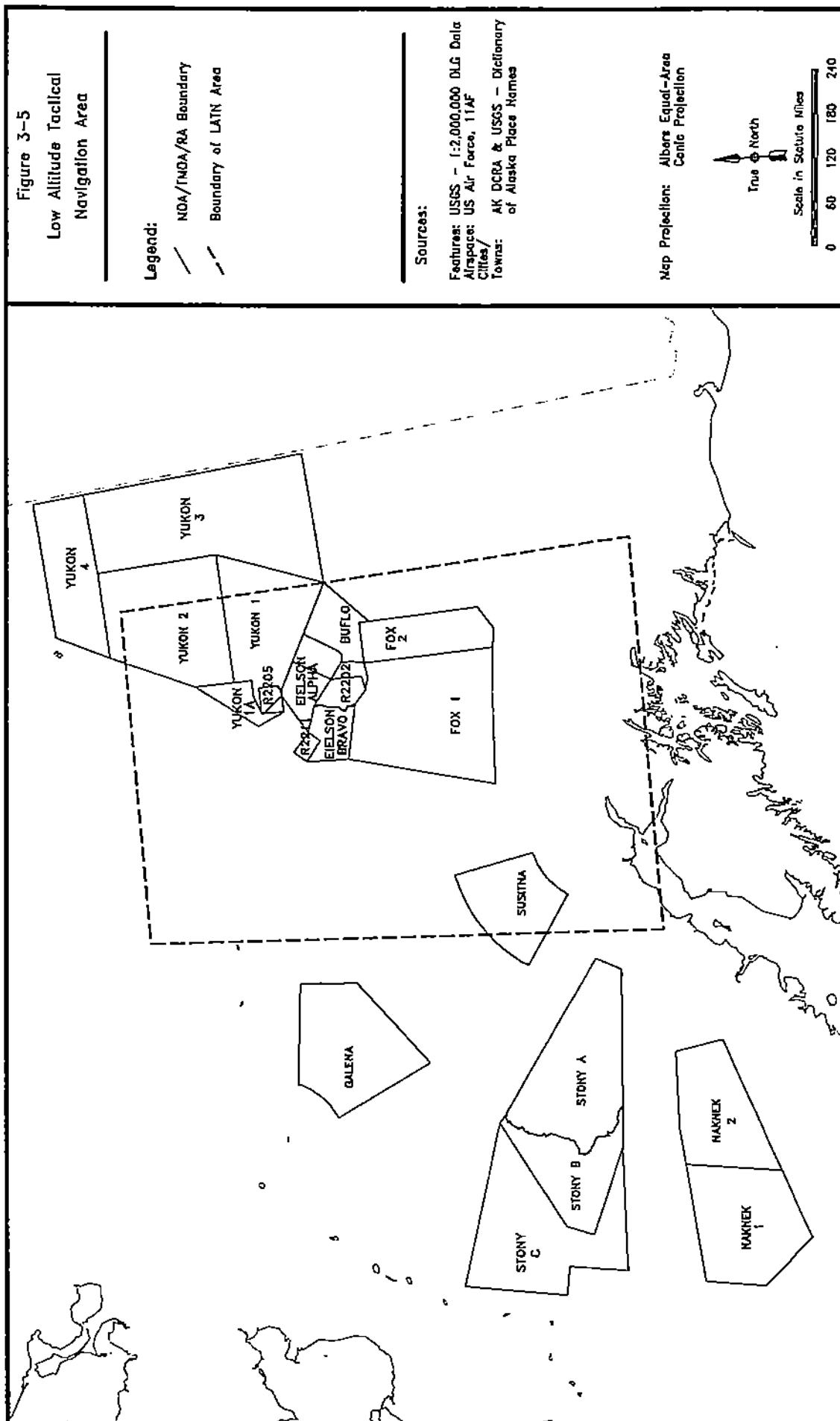


Figure 3-6 depicts the MTRs in the Northern Interior Region. Operations on these MTRs (935, 954, 1909, and 1928) are scheduled through the 354 FW at Eielson AFB. Special operating instructions for these routes require coordination with the YUKON 1 and YUKON 2 MOA operations and R-2205 operations.

As part of a continuing program to enhance the real-time awareness of both military and civilian pilots to flight operations in the area generally bounded by the towns of Circle, Fairbanks and Delta Junction, the Air Force has established a Special Use Airspace Information Service (SUAIS). During the published and Notice to Airmen (NOTAM) operating hours for R-2202, R-2205, and R-2211, pilots may contact the Eielson Range Control on frequency 125.3 megahertz (MHz) and obtain general information about operations of military aircraft in the vicinity and the status of the SUA in the region. Radio coverage currently exists in the three RAs, YUKON 1 and 2 MOAs, and YUKON 1A, BUFLO, EIELSON A, and EIELSON B TMOAs. The Air Force has expanded its radio coverage in the area and installed new radar equipment at Hill 3265 and Donnelly Dome that provides coverage of the western side of BUFLO TMOA up to Fairbanks. Figure 3-7 and Figure 3-8 depict the predicted low-altitude radar coverage for the radars located at Hill 3265 in YUKON 1 MOA and on Donnelly Dome, south of Delta Junction. Coverage at higher altitudes would be expanded over those shown in these figures for low-altitude coverage. Service provided to pilots includes general information regarding status of airspace and participating aircraft. Under this program, phraseology for the exchange of information is limited to general information that may help pilots improve their situational awareness of flight operations in the area. Service is limited to this basic information concerning the status of operations in the area and is not intended to provide air traffic control services, flight plan filing, or weather information. Along with the real-time information available from the system, it also provides another avenue for reporting known information on any aircraft-reported emergency or other hazard and could potentially be used as an aid to search and rescue activities if needed.

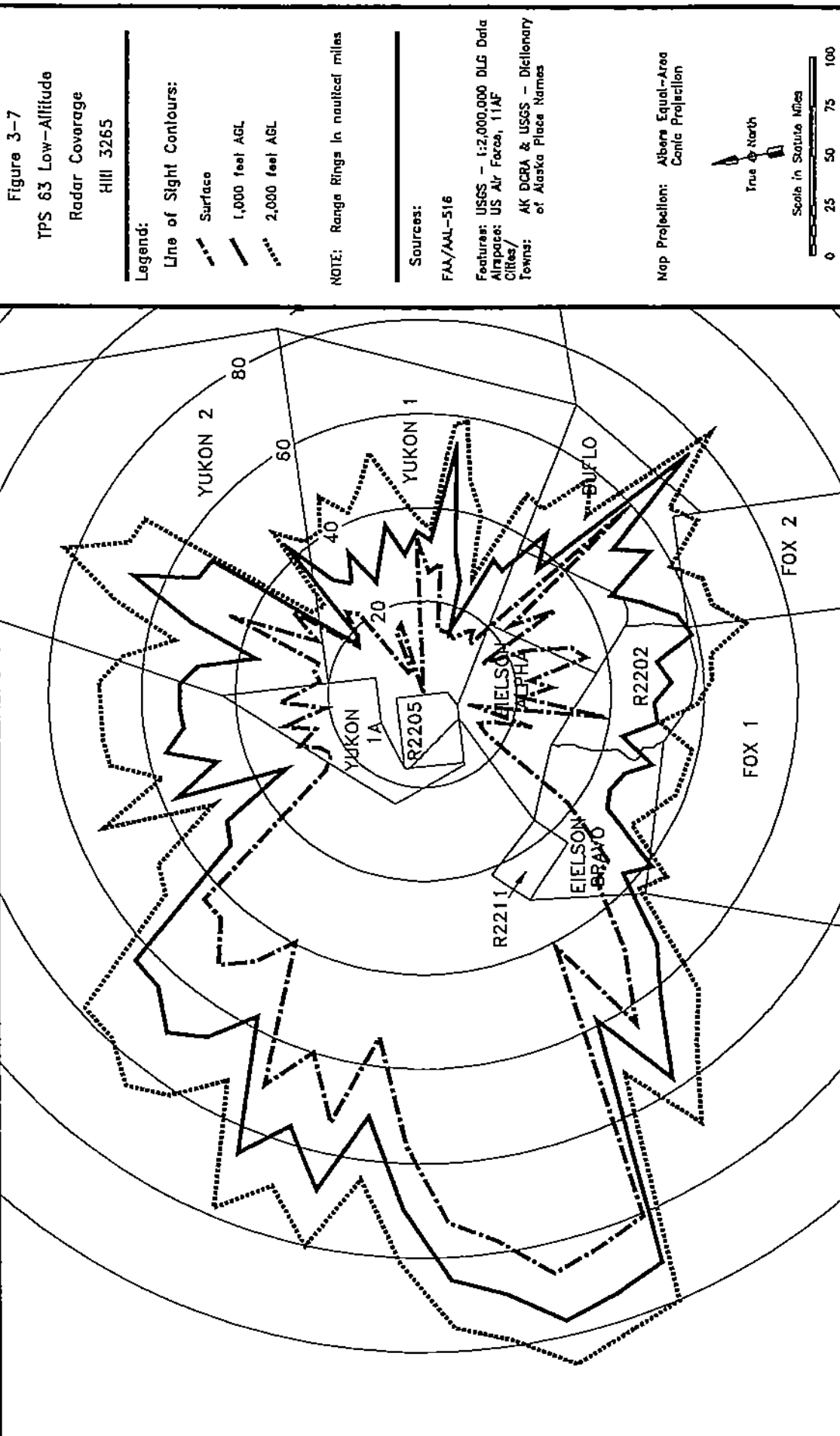
3.2.2.1 Northern Interior Region Routine and Joint/Combined Training

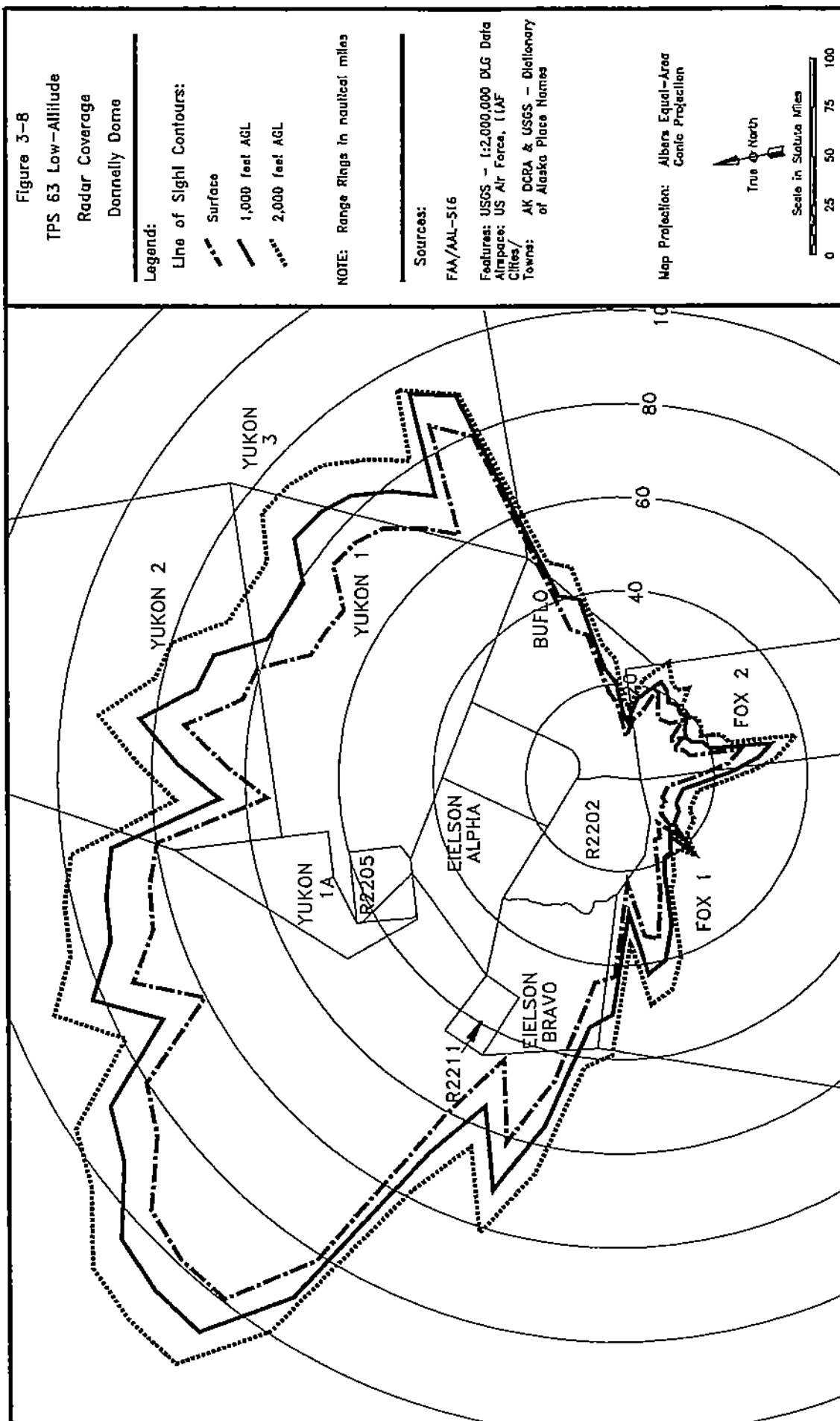
Military aircraft operations in the Northern Interior Region are characterized by two distinct levels of operations: routine operations and operations during MFEs. The area experiences less than 40 sorties per day of routine daily training activities in YUKON 1 and 2 MOAs. During an MFE, the region can expect to experience up to a four-fold increase in the level of daily activity.

The YUKON 1 and YUKON 2 MOAs are the most heavily used of the eight existing permanent MOAs in the state. They support approximately 44 percent of the annual total routine training operations conducted in the MOAs by Alaskan-based units. The proximity of the YUKON airspace to the Stuart Creek range (R-2205) and Oklahoma range (R-2202) makes it an invaluable training area. Table 2-7 presents the average daily usage of the YUKON MOAs/TMOAs, and Table 2-8 presents the average daily activity for the Stuart Creek and Oklahoma ranges.

Generally, routine operations in the YUKON 1 and 2 MOAs are air-to-air and air-to-ground missions associated with the Eielson-based F-16C/D and OA-10A, and the Elmendorf-based F-15C/D and F-15E aircraft. Additionally, Composite Force Training (CFT) is conducted routinely, integrating in limited numbers all types of tactical aircraft based in Alaska (see Appendix C for a description of aircraft types in Alaska).

Eielson-based aircraft account for approximately 77 percent of the routine daily use of the YUKON 1 and 2 MOAs. Approximately 25 percent of the F-16 operations are air-to-air missions, and 75 percent are air-to-ground missions. Air-to-air operations include familiarization (FAM), basic fighter maneuvering (BFM), and air combat tactics (ACT) as described in Appendix C. During low-altitude training, the vast majority of aircrews train at 500 feet AGL or higher. Only a few very experienced pilots are specifically qualified for flight below 500 feet AGL, and in those cases they may train between 300 feet AGL and 500 feet AGL. No flight training is currently authorized below 300 feet AGL. Those pilots authorized to train below 500 feet AGL would only do so over a small percentage of their total flight in a MOA with the majority of flight activity being at 500 feet AGL or above. Routes through the airspace are varied to provide opportunities to practice terrain-masking, precision navigation, and simulated target attack at speeds from 420 to 480 knots. Flights are most often concluded with





transition to one of the three air-to-ground weapons ranges in the vicinity of the YUKON 1 and 2 MOAs. OA-10As use the YUKON airspace mostly for low-altitude air-to-ground training. Tactics and procedures are similar to those practiced by the F-16s, except the maximum speeds achieved by the OA-10As are in the range of 350 knots.

The F-15Es from Elmendorf account for approximately 21 percent of the routine MOA usage, and practice both air-to-air and air-to-ground tactics. The F-15C/Ds from Elmendorf use the YUKON MOA complex only occasionally to practice air-to-air tactics and to participate in CFT scenarios. F-15C/Ds account for about 2 percent of the total YUKON 1 and 2 MOA use.

Routine supersonic operations can be conducted down to 5,000 feet AGL/10,000 feet MSL, whichever is higher, in the YUKON 2 MOA only. Review of the available logs of supersonic operations over the past year show no recorded supersonic events down to the 5,000 foot AGL level. Approximately 85 percent of the supersonic events occurred at or above FL 200 (20,000 feet MSL). The lowest recorded supersonic event occurred at 17,000 feet MSL, or approximately 10,000 feet AGL.

The use of the Stuart Creek range (R-2205) accounts for approximately 38 percent of the total annual routine range training operations. Both the F-16 and OA-10A units at Eielson AFB and the F-15E squadron at Elmendorf AFB use the range. The Stuart Creek range is classified as a tactical range, and both inert and live munitions are used.

The 354 FW at Eielson AFB is the primary user of the Stuart Creek range. Eielson-based aircraft operations account for approximately 82 percent of the total routine operations on the range, with the 3 WG at Elmendorf accounting for the remaining 18 percent. Large target arrays throughout the range area allow for multiple and varied aircraft attack routings, along with EC practice. Stuart Creek range is also used to accomplish combined F-16C and OA-10A Close Air Support (CAS) training as described in Appendix C. Routine operations in R-2205 occur below FL 200, and airspeeds on the range vary from 350 knots for the OA-10As up to 480 knots for the F-16Cs and F-15Es.

3.2.2.2 Northern Interior Region Major Flying Exercises

During an MFE, the YUKON 1A, YUKON 3, and YUKON 4 TMOAs are authorized, in addition to the YUKON 1 and 2 MOAs, to be activated for up to 60 days per year for conduct of MFEs. During an MFE, the airspace is usually activated by the NOTAM system for a 12-hour period from 6:00 a.m. to 6:00 p.m., but is normally used for a period of 2 to 3 hours in both the morning and afternoon, except for CAS exercises, which normally require a single 6-hour period. Only aircraft participating in the MFE are authorized to enter the TMOAs during the actual conduct of the MFEs. Routine training flights can be flown on MFE flying days but are restricted to use of the permanent MOAs provided they are de-conflicted from MFE use. Although these routine training flights could transition through some of the TMOAs enroute to an air-to-ground weapons range or permanent MOA, they are not permitted to schedule or delay in the TMOAs for practicing other flight activities.

During an MFE, flying in the YUKON MOAs/TMOAs accounts for approximately 93 percent of all MFE MOA operations. The YUKON 1 and 2 MOAs and YUKON 1A TMOA receive the heaviest use as they are centrally located, of substantial size, have low floors (100 feet AGL), and are the closest to the air-to-ground weapons ranges. YUKON 3 and 4 TMOAs are used primarily for force pre-attack or post-attack staging, some periphery air-to-air engagements, and account for approximately 41 percent of all MFE MOA operations. The typical scenario starts in the YUKON 3 and 4 TMOAs; proceeds into the YUKON 1, 2, and 1A area; and then back out to the YUKON 3 and 4 TMOAs. Other main avenues for aircraft proceeding into the YUKON MOAs are through the southern boundary from the FOX 1, FOX 2, BUFLO, EIELSON A, and EIELSON B TMOAs that make up parts of the Southern Interior and Southcentral Regions (discussed in sections 3.2.3 and 3.2.4,

respectively). The majority of the low-altitude flight and air-to-air engagements takes place in the YUKON 1 and YUKON 2 MOAs.

During an MFE, limited supersonic operations are also authorized in YUKON 1 MOA down to a floor of 5,000 feet AGL/10,000 feet MSL, whichever is higher. Past MFE operations in 1993 have not recorded any supersonic events in YUKON 1 MOA below FL 300 (30,000 feet MSL) and in YUKON 2 MOA below FL 180 (18,000 feet MSL).

Operations on the Stuart Creek range (R-2205) include about 50 percent of the air-to-ground attack aircraft flying during an MFE. Under the Proposed Action, approximately 50 percent of the operations on the range would consist of high-altitude, high-angle dive bombing activity, with the remaining 50 percent dedicated to low-altitude deliveries. The trend over the 1993 exercise year was toward more high-altitude deliveries as demonstrated during DESERT STORM in 1991.

3.2.2.3 Other DoD Aircraft Operations

3.2.2.3.1 Air Force MTR Operations

Operations on MTRs coincident with Northern Interior Region MOAs can average as high as 12 operations per day. They are predominantly flown by the F-16Cs (6 operations per day) from Eielson AFB, and F-15Es (6 operations per day) from Elmendorf AFB. Though they are traditionally designed for use at airspeeds above 250 knots, they may be used (and occasionally are) by aircraft such as the OA-10As at airspeeds below 250 knots.

3.2.2.3.2 Army Operations

The majority of annual Army helicopter flight operations occur from Fort Wainwright, located several miles northeast of Fairbanks (magnetic) or almost due east (true), and approximately 10 miles west of the western edge of YUKON 1A. Operations can be characterized as:

- Flights in the Yukon Training Area - 30 percent of total activity;
- Flights in the Tanana Flats Training Area - 30 percent of total activity;
- Transition flight between Forts Wainwright/Greely/Richardson - 20 percent of total activity; and
- Cross-country navigation training flights throughout the remainder of the state - 20 percent of total activity.

The majority of Army flying is between 50 feet AGL and 1,000 feet AGL (approximately 65 percent of the time) at airspeeds up to 140 knots (U.S. Army 1993). The only flight operations coincident with the Northern Interior Region are those into the Army's Yukon Training Area (approximately 30 percent of daily Army flight operations) covering the Stuart Creek range (R-2205) along with the southwestern portion of YUKON 1A TMOA.

3.2.2.3.3 Operations in the Low Altitude Tactical Navigation Area

The 517th Airlift Squadron (517 ALS), Elmendorf AFB, and the 176 Composite Group (176 CG), an Alaska Air National Guard unit stationed at Kulis Air Base, Anchorage International Airport, total approximately 18 C-130 sorties per week throughout the LATN area. Predominant operations are in the Susitna Valley, northwest of Elmendorf AFB (in the Southcentral Region). Operations typically consist of approximately 60 percent flying visual formations at 500 feet AGL, with 40 percent practicing instrument flying conditions between 1,000 feet and 5,000 feet AGL. Most operations in the Fairbanks area transition into and out of the area at approximately 5,000 feet AGL. Low-altitude training in the Fairbanks area occurs between 500 feet and 1,000 feet AGL through the various mountain passes. Nominal airspeeds vary from as low as 110 knots for air refueling HH-60Ds (helicopters) by the 176 CG to enroute speeds of 210 to 240 knots for 517 ALS operations along the SKE

routes. Operations along SKE 52A (in the Northern Interior Region) average less than two per week (estimate). OA-10 aircraft from Eielson AFB also use some of the same area encompassed by the LATN to practice low-altitude tactical navigation at airspeeds below 250 knots and outside of the areas of the YUKON 1 and 2 MOAs.

3.2.2.4 Civilian Aircraft Operations

Civilian aircraft flights consist of general aviation, state and federal agency operations (including firefighting operations), and air taxis/charter (FAA designated Part 135 operators) flights throughout the region. No current information on the frequency of civil aircraft operations throughout this region exists through the FAA or Alaska Department of Transportation. Up until the mid-1980s, information on aircraft operations at airports in and around the MOAs was maintained on FAA Form 5010. This record-keeping is no longer required, and hence no current definitive use data are available. As late as 1986, the estimated number of civilian light aircraft traversing the YUKON 1 and 2 MOAs was approximately 20,000 times each year (USAF 1986). It is expected that the flight operations have increased slightly since those estimates. The YUKON 1 MOA contains relatively uninhabited, mountainous terrain with very few places to land. The YUKON 2 MOA, characterized by both mountainous and flat terrain, is located over the communities of Central, Circle, and the resort area of Circle Hot Springs. Many of the flights to and from Fairbanks are air taxi service aircraft flying at altitudes below 2,500 feet AGL (estimate). Various federal airways parallel the western and southwestern borders of the YUKON 1 and 2 MOAs, with Victor Route V-481 (from Delta Junction to Fort Yukon) passing through the western third of the YUKON 1 and 2 MOAs. Information obtained during public scoping and through Air Force surveys also indicates that numerous other areas, predominantly in the southern two-thirds of the YUKON 3 TMOA, receive a large amount of Visual Flight Rules (VFR) civilian air traffic flying into various remote areas and along the rivers. No specific data exist on all the landing locations or on the extent of the activity into the area. Figure 3-9 depicts the federal airways in the vicinity of the MOAs/TMOAs of the Northern Interior Region, and Figure 3-10 depicts some of the uncharted flying routes and areas identified in the region.

Figure 3-10
Northern Interior Region
VFR Routes

Legend:

Airspace:

MOA/TMOA/RA Boundary

--- Adjacent NDA/TNOA/RA Boundary

Military Exclusion Area

VFR Flight Route

Sources:

Features: USGS - 1:2,000,000 DLG Data

Almazora; US Air Force, (IAF

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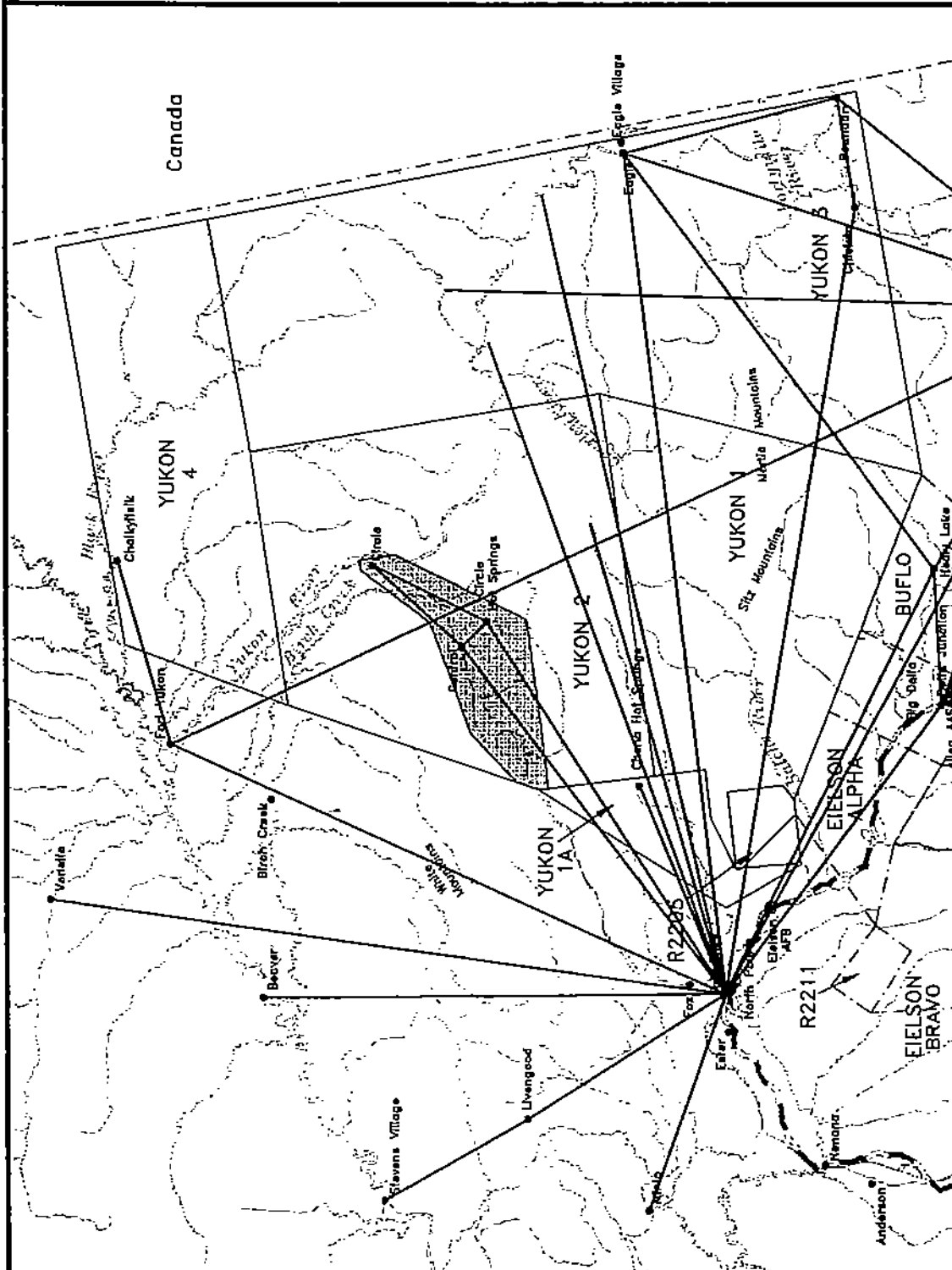
Towns: AK DCRA & USGS - Dictionary
of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection

True North

School in Statute Niles

Age Group	Percentage
18-24	55%
25-34	45%
35-44	35%
45-54	25%
55-64	15%
65-74	10%
75-84	5%
85+	2%



3.2.3 Southern Interior Region Airspace Management and Aircraft Operations



The Southern Interior Region includes the BUFLO, EIELSON A, and EIELSON B TMOAs; the Oklahoma (R-2202) and Blair Lakes (R-2211) ranges; Eielson AFB; and the airspace encompassing the proposed FALCON and CLEAR CREEK MOAs. Figure 3-11 displays the existing permanent MOAs and previously utilized TMOAs in the region. Table 2-3, Chapter 2, summarizes the approximate areas, altitude structure, and clearance for supersonic operations in the Southern Interior Region MOAs. All operations in the existing RAs and previously utilized TMOAs are restricted to subsonic airspeeds below FL 300.

The EIELSON A, EIELSON B, and BUFLO TMOAs are not available to the Air Force for routine daily training, but are activated only for MFEs. The RAs are available for both routine training and MFEs. The use of these areas is scheduled through the 354 FW at Eielson AFB. Flights to the RAs and subsequently the air-to-ground weapons ranges for routine training operations can be accomplished via STEREO ROUTING from Eielson or Elmendorf AFBs or via transition routes following exits from the permanent YUKON 1 and YUKON 2 MOAs in the Northern Interior Region.

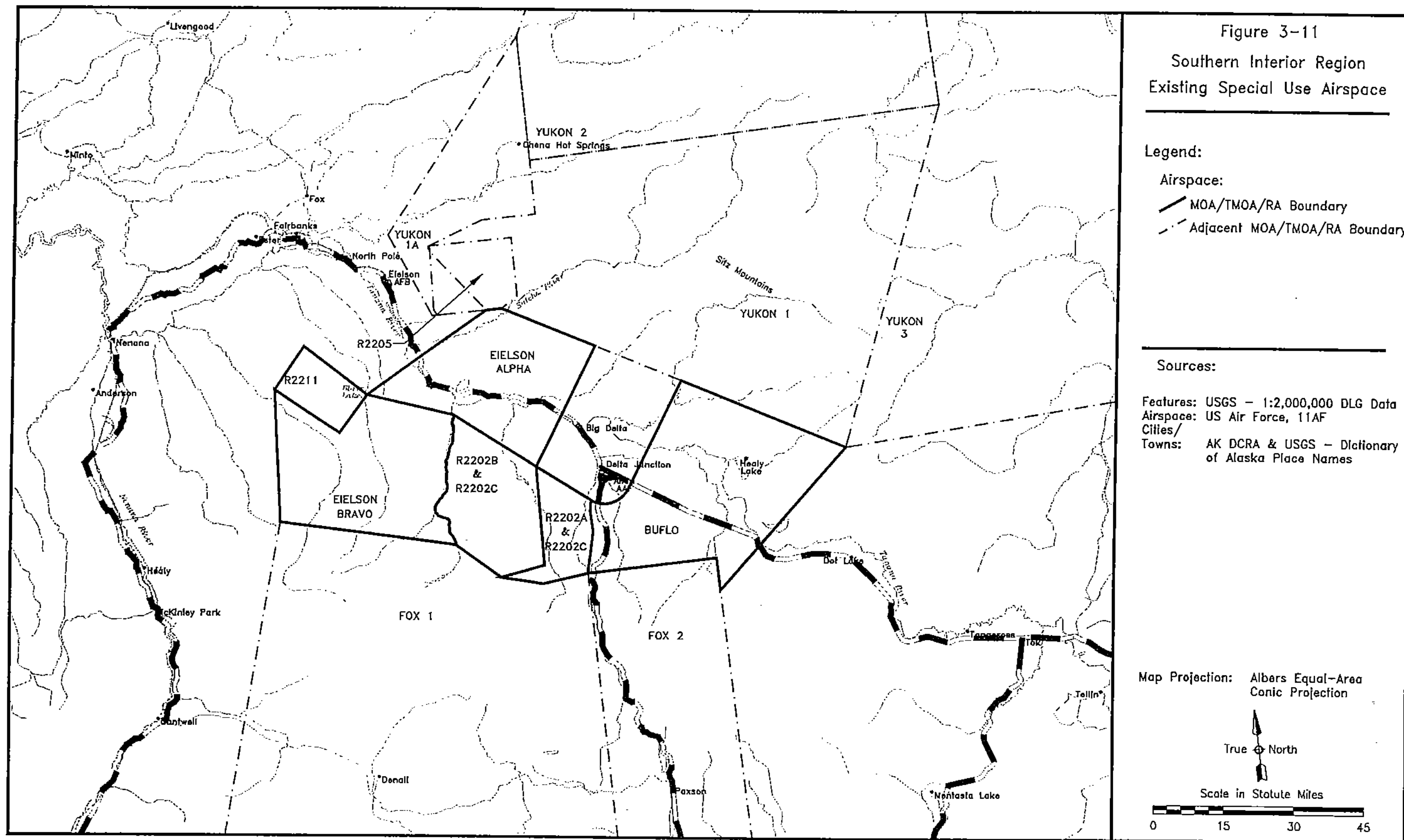
As described in section 3.2.2, the Air Force is providing a Special Use Airspace Information Service (SUAIS) through portions of this region. Figure 3-7 and Figure 3-8 display the coverage provided in this region, at different altitudes, from the two radars that make up the service. See section 3.2.2 for more information on the services provided and the hours of operation for the information services.

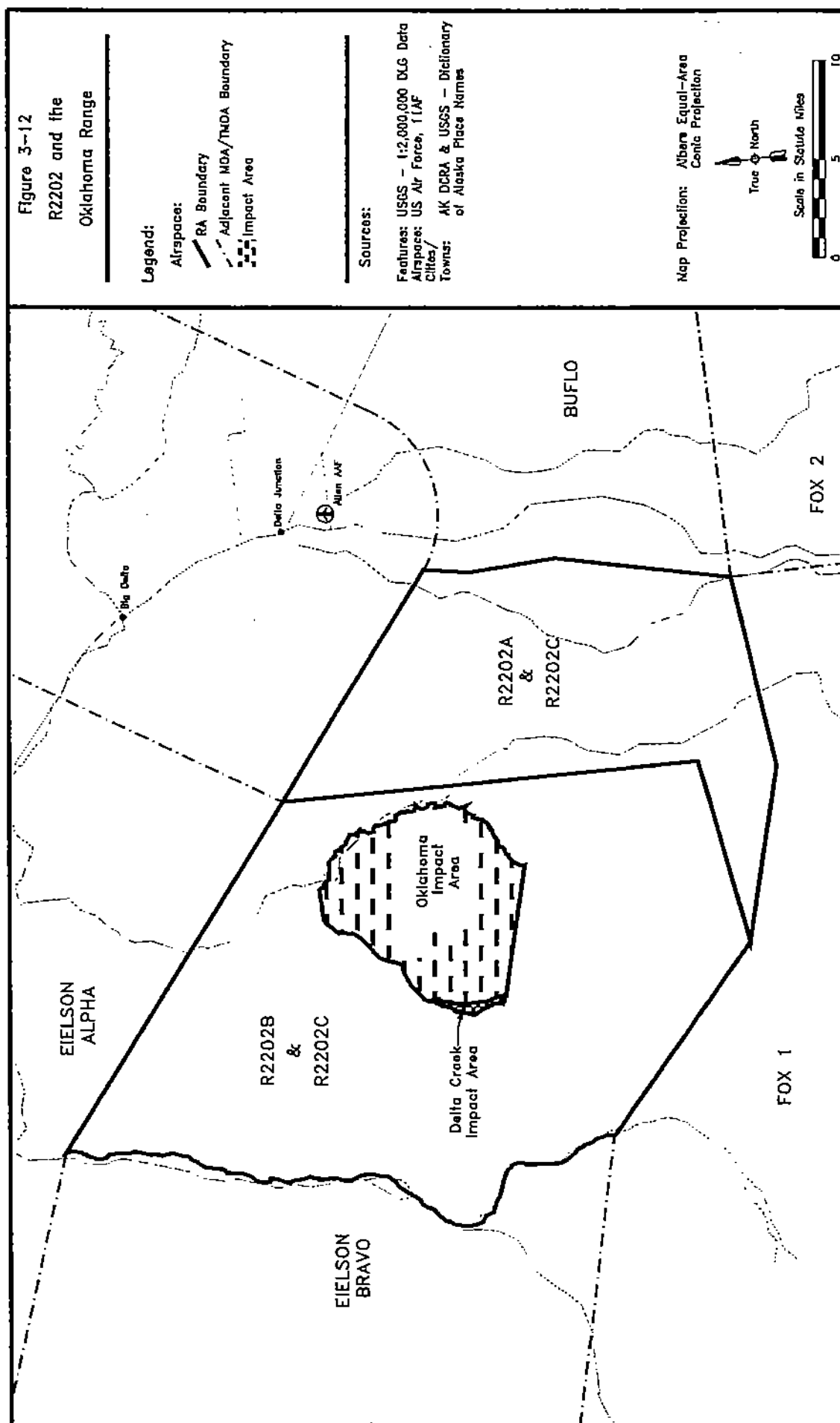
3.2.3.1 Southern Interior Region Routine and Joint/Combined Training

The only routine training accomplished in this region is the use of the Oklahoma (R-2202) and Blair Lakes (R-2211) air-to-ground weapons ranges. With no direct connection to other permanent MOAs, aircraft proceeding to one of the two ranges must follow VFR procedures or be under FAA control. The areas traversed enroute to the Oklahoma range are most often through the airspace covered by the BUFLO TMOA or the EIELSON A TMOA. FAA-controlled flights to the RAs use appropriate IFR altitudes enroute to and from the ranges. VFR aircraft proceeding to/from the ranges are not controlled by the FAA and operate in compliance with minimums specified in the Federal Aviation Regulations (FARs).

The Oklahoma range (R-2202) is an unmanned tactical range with several predesignated impact areas and numerous target types throughout the area (see Figure 3-12). Details of range operational procedures are outlined in Air Force Regulations (AFRs) and 11th Air Force supplements to those regulations. The range is cleared for both live and inert munitions in accordance with AFR 50-46/11 AF Suppl. 1. The RA R-2202 is located over land within the Fort Greely maneuver area and is controlled by the Army. Air Force use of the range is permitted through an Interservice Support Agreement. Air Force air-to-ground weapons range operations normally use R-2202B. Aircraft desiring the use of R-2202A and/or R-2202C must contact the Eielson Range Control at least 2 hours prior so that the airspace can be coordinated with Fort Greely Range Control (USAF 1992d). Operations on the Oklahoma range normally consist of OA-10As and F-16Cs from Eielson AFB as well as F-15Es from Elmendorf AFB either working the range separately or concurrently. In concurrent training, the OA-10As are normally actively controlling the F-16 operations by locating targets and directing target attacks on the range by the F-16s. This Forward Air Control (FAC)/CAS mission is further described in Appendix C.

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The Blair Lakes range (R-2211) is a manned training range. As with the other air-to-ground ranges, the Blair Lakes range is owned by the Army. However, use of the range by the Air Force is granted through a "sole use" Interservice Support Agreement. Hence, priority for use of the range is at Air Force discretion. Operations into R-2211 can occur after take-off from Eielson AFB with a direct STEREO ROUTING to the range, with an FAA-directed transition from the other surrounding airspace, or (less frequently) via a low-altitude entry from MTR 1900. The Blair Lakes range is manned by a range controller, offers several different simulated targets for attack, and has established "racetracks" for flights in R-2211 while on the range. These racetracks are similar to aircraft-closed traffic patterns around an airfield. Clearance onto the ranges is via the Eielson Range Control (or by the Range Officer at Blair Lakes range). Figure 3-13 depicts RA R-2211 and the Blair Lakes range.

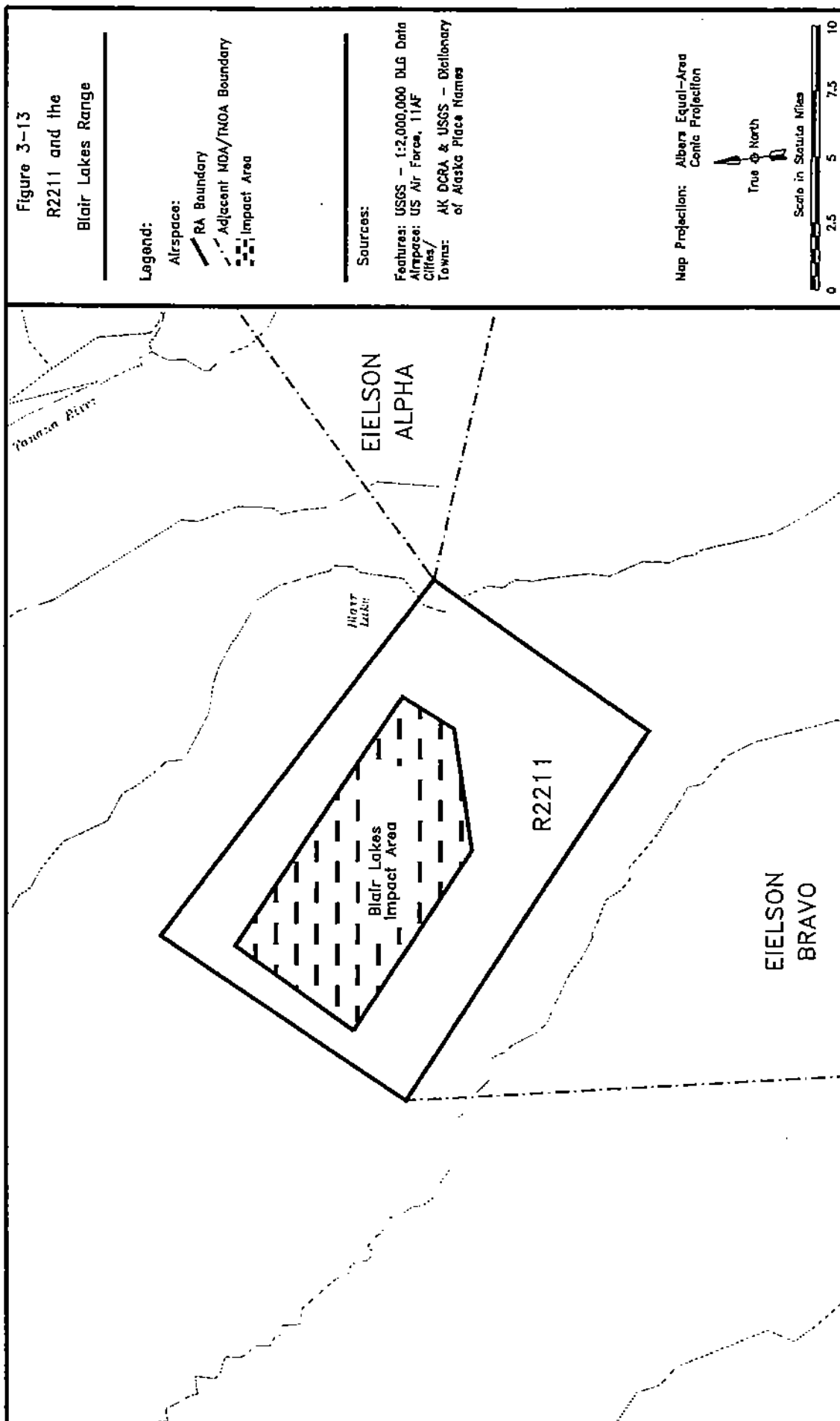
Control of aircraft operations on and around Eielson AFB is the sole responsibility of the Air Force-manned control tower on Eielson AFB. The base is surrounded by Class D and Class E Airspaces. These control areas extend from the surface up to 3,000 feet above the elevation of the airport. These areas are designed to handle only air traffic landings or take-offs from the designated airport within the area. Pilots must normally maintain two-way radio communication with the control tower while in the Class D and E Airspaces, including ground operations. Radar services are provided by short-range (approximately 30 miles) D-BRITE radar slaved to the same surveillance radar used by the FAA. Maximum range of the D-BRITE system is approximately 55 miles. Wide area radar coverage is provided by the FAA-manned Fairbanks Approach Control. Operations around the airfield consist of departures, arrivals, and multiple close-in and extended closed traffic patterns around the airfield. Preferred routing departures from and arrivals to Eielson AFB are flown along STEREO ROUTES as discussed earlier in this section.

As seen in Figure 3-5, the LATN area covers the entire Southern Interior Region. The RAs around the two ranges, when active, is excluded from the LATN airspace as is any actively controlled airspace surrounding Eielson AFB, such as the Class D and Class E Airspaces. SKE routes 53A, 54A, and 64A pass through both the EIELSON A and EIELSON B TMOAs, while SKE routes 56A and 64B both pass through the BUFLO TMOA airspace.

Figure 3-14 depicts the MTRs that overlie the airspace of the Southern Interior Region. Operations on MTRs 1900, 1926, 928, and 937 are all scheduled through the 354 FW at Eielson AFB. Special operating instructions for all these routes require coordination with the other permanent airspaces (R-2202 and R-2211) as well as coordination between the MTRs that have common route segments or intersections.

The use of the Oklahoma range (R-2202) and Blair Lakes range (R-2211) account for approximately 62 percent of the total annual routine range training operations. The Blair Lakes range is classified as a training range where only inert munitions may be expended. The Oklahoma range is classified as a tactical range where both inert and live munitions are approved for use on different portions of the range.

The 354 FW at Eielson AFB is the primary user of the RAs and the air-to-ground weapons ranges in the Southern Interior Region. Eielson-based aircraft operations account for approximately 74 percent of the total routine operations on these two ranges with the 3 WG at Elmendorf accounting for the remaining 26 percent. Within the RAs, operations on the Oklahoma range (R-2202) are quite different from those on the Blair Lakes range (R-2211). Oklahoma range operations are very dynamic with a broad target array throughout the impact area allowing for multiple and varied aircraft attack routings throughout the area. The Oklahoma range is also used to accomplish combined F-16C and OA-10A CAS training as described in Appendix C. Routine operations in R-2202 remain below 10,000 feet MSL, and airspeeds on the range vary from 350 knots for the OA-10As up to 480 knots for the F-16Cs and F-15Es. Operations on the Blair Lakes range are designed to train/score aircrews in accurate weapons delivery and are much less dynamic than those on the Oklahoma range. The targets located on the Blair Lakes range consist of a high angle strafe target coincident with a simulated nuclear target, two conventional bomb circle targets used for high angle dive deliveries, low angle strafing pits, a radar/Low-Altitude Navigation and Targeting Infrared for Night (LANTIRN) target, and a small assortment of tactical targets. Routing through the range follows predetermined racetracks that provide efficient flow for multiple aircraft



**Southern Interior Region
Military Training Routes**

Legend:

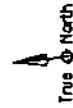
Alrspace:

- NOA/TMOA/RA Boundary
 - - - Adjacent NOA/TMOA/RA Boundary
 ■ Military Training Route

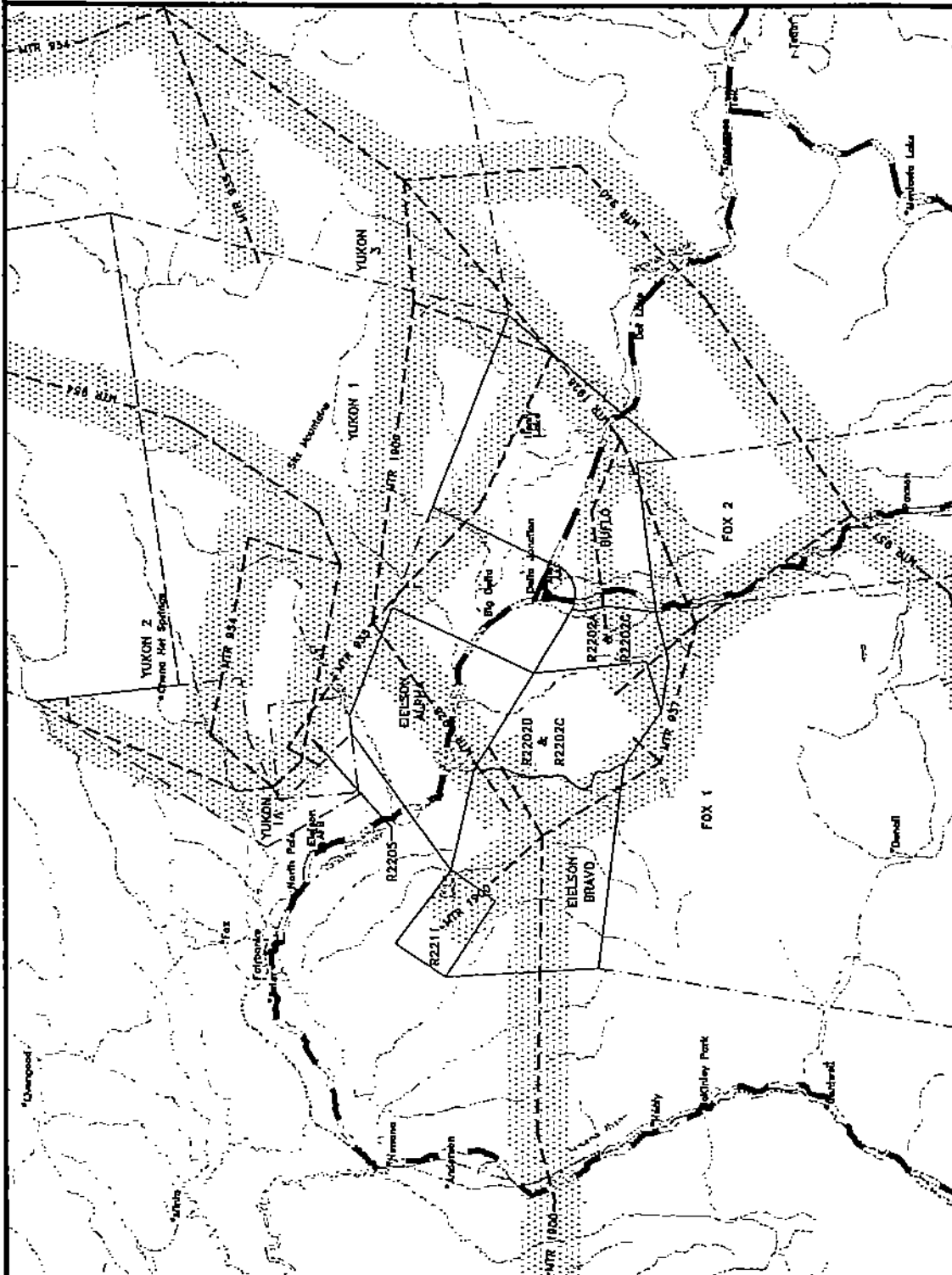
Sources:

Features: USGS - 1:2,000,000 DLG Data
 Airspace: US Air Force, 11AF
 Cities/
 Towns: AK DCRA & USGS - Dictionary
 of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection



Scale in Statute Miles



formations yet minimize the time between aircraft target attacks. Airspeeds in the range will vary from 325 KIAS for the OA-10As up to about 450 knots for the F-16Cs and F-15Es. Table 2-7, Chapter 2, presents the average daily usage by MOA/TMOA. Table 2-7 presents the estimated daily operations levels in the RAs.

The primary units assigned to the 354 FW at Eielson AFB are the 18th Fighter Squadron (18 FS) and the 355th Fighter Squadron (355 FS). The 168th Air Refueling Group (Alaska Air National Guard) is also stationed at Eielson AFB. The 18 FS flies LANTIRN-equipped F-16 C/Ds and trains for both air-to-air and air-to-ground roles. The 355 FS, flying the OA-10A aircraft, provides FAC or CAS for joint Army and Air Force contingencies in the Alaskan theater of operations and in support of the Air Force's tactical forces. Airfield operations at Eielson AFB directly supporting aircraft movements and maintenance activities include: aircraft departures or landing activities; aircraft taxi movements on the ground; operation of ancillary aircraft subsystems on the ground (including engine maintenance runs); and the operation of aircraft ground support equipment. Flight operations at the airfield include the assigned squadrons, transient aircraft, aircraft deployed to Eielson for routine training, and aircraft deployed to Eielson in support of an MFE.

During periods of routine training, operations at Eielson AFB average approximately 62 aircraft sorties per day, of which about 66 percent are directly attributed to the aircraft assigned at Eielson. Table 2-6 depicts the daily sorties flown from Eielson AFB during periods of normal routine training and during an MFE.

3.2.3.2 Southern Interior Region Major Flying Exercises

During an MFE, the TMOAs in this region are activated and are a vital part of the overall MFE mission scenario. At present, BUFLO, EIELSON A, and EIELSON B TMOAs are authorized to be activated for up to 60 days per year for conduct of an MFE. During an MFE, the airspace is usually activated by NOTAM for an 11-hour period from 7:00 a.m. to 6:00 p.m., but is normally used for 2 to 3 hours in the morning and 2 to 3 hours in the mid afternoon, except for Close Air Support exercises, which normally cover a single 6-hour period. Only aircraft participating in the MFE are authorized to enter the TMOAs during the actual conduct of the MFEs. Routine training flights that are not part of the MFE are not authorized to use any of the TMOAs during their training activities. Routine training flights being flown on MFE flying days are restricted to use of the permanent MOAs and RAs only, and can be flown before, between, or after the MFE operations. Although these routine training flights may transition through some of the TMOA airspace, they are not permitted to schedule or delay in the airspace for practicing other flight activities either enroute to or returning from the RAs.

Due to the increased operations levels during an MFE, arrivals back to Eielson AFB following an exercise flying period become quite involved. The 354 FW in concert with the FAA has developed procedures for controlling large numbers of arriving aircraft using less-than-required FAA minimum spacing requirements (when the aircraft are released from FAA control and handed over to Air Force control during the recoveries). Arriving fighter aircraft can expect a reduced runway separation of 4,000 feet when landing behind a similar aircraft under daytime conditions. This separation extends to 6,000 feet when operating behind a dissimilar aircraft or at night. These procedures are only used during VFR conditions and significantly reduce the time required to efficiently recover large numbers of aircraft at Eielson AFB.

During an MFE, the EIELSON A, EIELSON B, and BUFLO TMOAs provide the avenues for exercise aircraft to proceed to and from the Oklahoma range (R-2202). Without the TMOAs, the Oklahoma range is isolated from the exercise, and the only available tactical range is the Stuart Creek range (R-2205) in the Northern Interior Region. Strike and escort exercise aircraft use the EIELSON TMOAs for transitioning between YUKON 1 MOA and the Stuart Creek range to the north, and the Oklahoma range on the Fort Greely Military Reservation to the southeast. EIELSON A provides entry from the north into R-2202; EIELSON B provides entry into R-2202 from the west. During an MFE, a large number of air-to-ground attack aircraft, operating at lower altitudes, use the EIELSON TMOAs for ingress and egress to/from the range complexes. In addition to the air-to-ground fighters are some of the air-to-air forces, either protecting or actively attacking other air-to-ground forces. Most of these air-to-air engagements occur in the upper portions of the TMOA altitude blocks. The BUFLO TMOA is used

for transitioning between the YUKON 1 MOA and the Oklahoma range on the opposite side from the EIELSON TMOAs. It provides entry from the east into R-2202, and avoids the Delta Junction area by 5 nautical miles (NM). Most of the southern portion of the TMOA is situated over the northeastern portion of the Fort Greely Military Reservation.

Operations on the Oklahoma range (R-2202) include about 50 percent of the air-to-ground attack aircraft flying in the MFE. Unlike the routine daily restrictions of only having R-2202B available for training, the entire R-2202 complex (areas A, B, and C) is normally used during an MFE. Approximately 50 percent of the air operations consist of high-altitude, high-angle dive bombing activity, with the remaining 50 percent dedicated to low-altitude deliveries. The trend over the 1993 exercise year was toward more high-altitude deliveries as demonstrated during Desert Storm in 1991. During an MFE, the Blair Lakes range is not normally used by MFE participants. However, R-2211 is routinely used by the FAA as a holding area for aircraft during an MFE recovery into Eielson AFB.

Flight operations at Eielson AFB can increase by up to 130 percent during MFE flying days when units from the 354 FW are not participating in the exercise but continue to perform routine training. This training can continue to occur either before, between, or after MFE flying periods when the Eielson-based units are not participating in the exercise. If Eielson-based units are participating in the exercise, Eielson AFB operations can increase by approximately 70 to 106 percent over a routine training day, depending on which unit was participating. For example, if all F-16 daily sorties were flown in the MFE as air-to-surface fighter sorties, then the total daily sorties flown from Eielson would be approximately 105 for the day. Flying all OA-10A daily sorties in an MFE contributes a much smaller portion of total MFE sorties, and thus operations at Eielson would be expected to increase by a larger amount (approximately 106 percent). MFE operations at Eielson AFB can occur in several different ways. One MFE scenario that currently occurs is a launch of a large force over a short period of time followed by an approximate 2-hour lull in operations, and then the high volume recovery of those aircraft launched several hours earlier. This type of launch/recovery scenario occurs twice a day. Another scenario, the CAS exercise, involves nearly continuous launch and recovery operations during a period of up to 6 hours. Aircraft operating from Eielson come from various Pacific Air Forces (PACAF) units, Navy/Marine contingents, and even allied forces such as the British TORNADOs and the Canadian CF-18s. These MFE operations are possible for up to 60 days per year and are currently authorized for up to 10 MFE flying days at a time.

3.2.3.3 Other DoD Aircraft Operations

As with the Northern Interior Region, this area also includes routine MTR, LATN, and Army operations throughout the year.

3.2.3.3.1 Air Force MTR Operations

Operations on MTRs coincident with Southern Interior Region MOAs can average as many as six operations per day. They are predominantly flown by the F-16Cs from Eielson AFB and used only occasionally by F-15Es from Elmendorf AFB. Though they are traditionally designed for use at airspeeds above 250 knots, they may also be used (and occasionally are) by aircraft such as the OA-10As at airspeeds below 250 knots (USAF 1992a).

3.2.3.3.2 Army Operations

As discussed with the Northern Interior Region, the majority of annual Army helicopter flight operations occur from Fort Wainwright located several miles east-southeast of Fairbanks and approximately 10 miles west of the western edge of YUKON 1A TMOA. Operations affecting the Southern Interior Region are those flights in the Tanana Flats Training Area and the transition flights between Forts Wainwright/Greely/Richardson. These flights pass through the EIELSON A and BUFLO TMOAs on a regular basis, as well as utilizing the Army's Tanana Flats Training Area north of the Blair Lakes range (R-2211). The majority of Army flying is between 50 feet AGL and 1,000 feet AGL (approximately 65 percent of the time) at airspeeds up to 140 knots (U.S. Army 1993).

3.2.3.3.3 Operations in the LATN Area

LATN operations total approximately 18 sorties per week throughout the LATN area and are described in section 3.2.2.3.3. Operations along SKE routes within the region average less than four per week total.

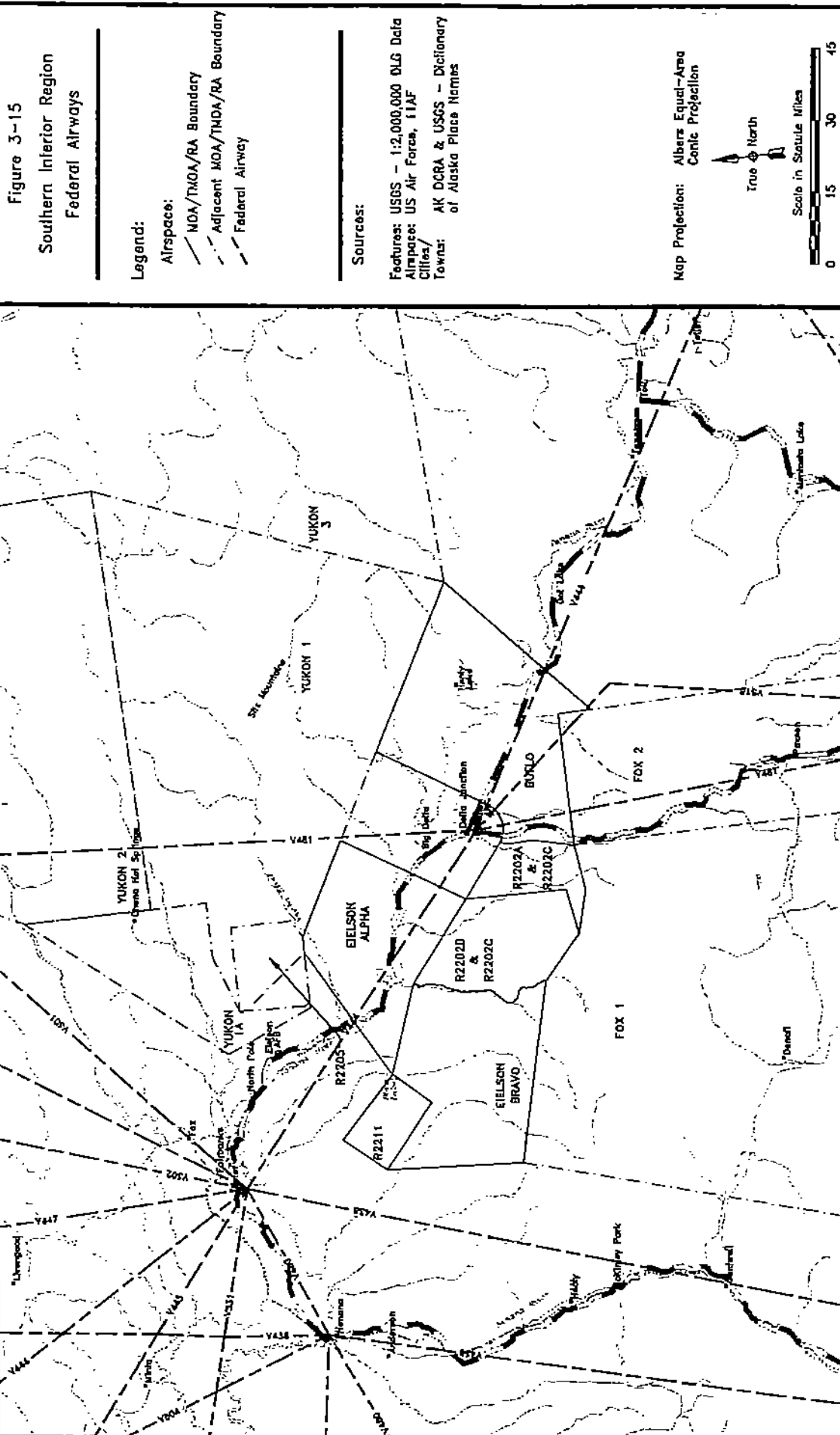
3.2.3.4 Civilian Aircraft Operations

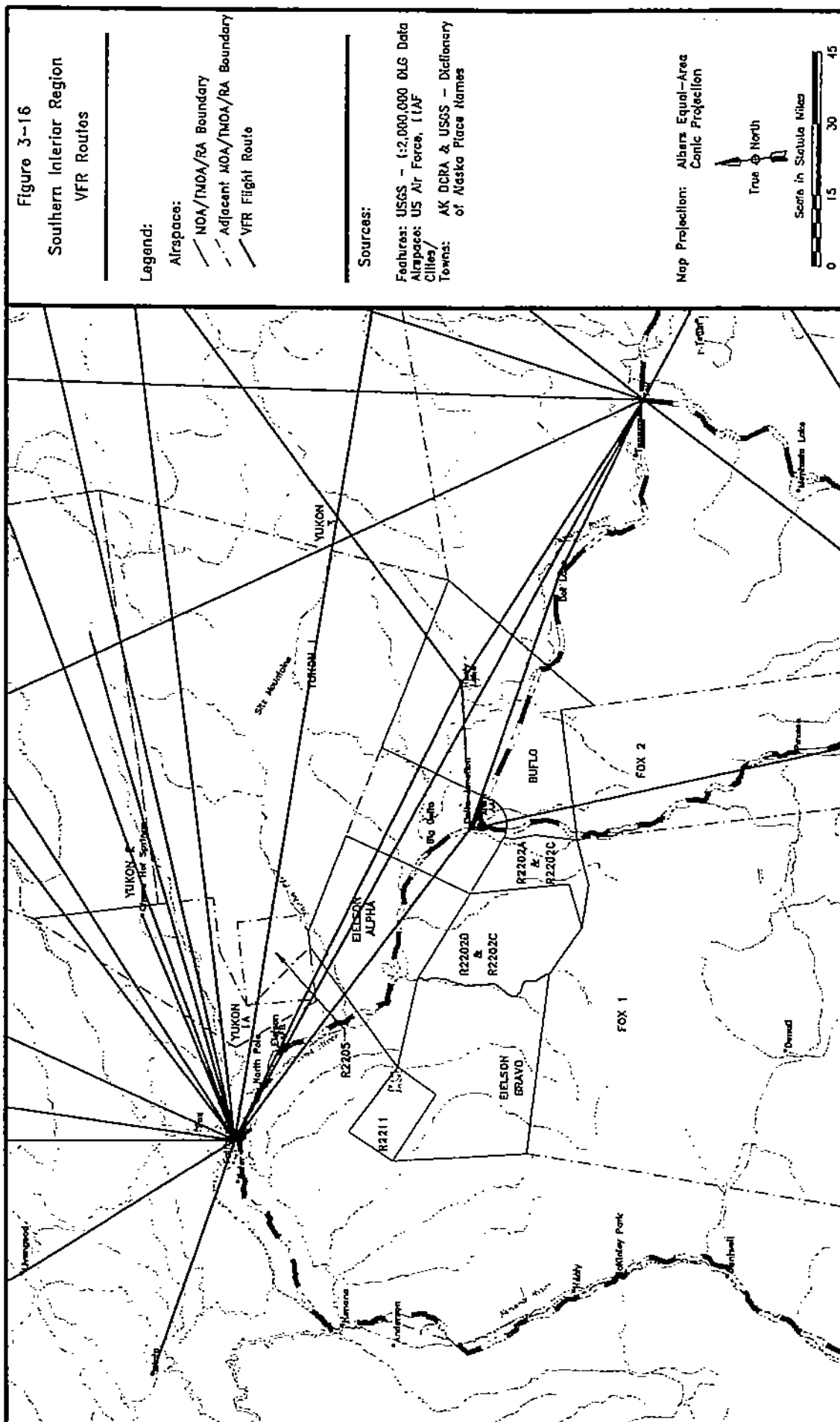
Civil aviation flights consist of general aviation, state and federal agency operations, air taxis, and air charter flights throughout the region. The EIELSON A TMOA lies approximately 25 NM northwest of the community of Delta Junction (population 652) and southeast of the Harding Lake State Recreation Area (SRA). The Alaska Highway crosses under the airspace complex, running east-west under EIELSON A TMOA, and at right angles to the normal flight path of military aircraft. The highway is a visual guide for civilian light aircraft travelling through the region. The ceiling of EIELSON A, at 4,000 feet MSL, allows civilian air traffic to cross over the TMOA without conflict; however, this is not a common practice since most civil traffic through the area is flying at altitudes of 2,500 feet AGL or lower. There are no known public use airports located within the boundaries of the EIELSON A TMOA. The largest airfield in the region is located at Fort Greely, southeast of the TMOA. There are no scheduled commercial airline flights to this airport. EIELSON B abuts EIELSON A to the southwest and covers a very sparsely inhabited area. Aircraft proceeding to/from the Delta Junction area to/from any of the numerous airfields located along the George Parks Highway to the west most likely transition through EIELSON A rather than through EIELSON B due to the existence of an RA (R-2202) east of EIELSON B.

The Alaska Highway crosses under the BUFLO TMOA at right angles to the normal flight path of military aircraft. The highway is a visual guide for civilian light aircraft travelling through the region. The 7,000 foot MSL ceiling allows civilian air traffic to cross over the TMOA without conflict, although the general aviation community routinely flies at altitudes of 2,500 feet AGL or below. There are no known public use airports located within the boundaries of the TMOA. The largest airfield in the region is located at Fort Greely, on the western edge of the TMOA. There are no scheduled commercial airline flights to this airport.

The Delta Junction Airport is located along the Richardson Highway, several miles north of the community of Delta Junction. Though not located within the boundaries of any of the TMOAs in the region, it is effectively surrounded by the TMOAs and RAs in the Southern Interior Region, and the YUKON 1 MOA in the Northern Interior Region.

The previously utilized TMOAs overlie several potentially busy VFR flight corridors and are under the existing federal airways V-444, V-481, and V-515. All three of these airways have floors at least 1,000 feet above the ceilings (where they cross) of BUFLO and EIELSON A TMOAs. The same corridor from Northway to Fairbanks designated along V-444 is also flown by civilian aviation at lower altitudes, VFR, along the Alaska Highway. Likewise the corridor south from Delta Junction to Gulkana/Glennallen along the Richardson Highway is also heavily used. Although no specific use numbers are available along these routes, the FAA has estimated that as many as 84,000 itinerant flights will depart Fairbanks in 1994 (for travel throughout the state) and as many as 19,000 itinerant flights will depart from the Gulkana area. Comments received during public scoping also highlighted the extensive civil air traffic along these corridors. Another corridor flown daily is along the trans-Alaska oil pipeline. Daily unscheduled (and unannounced) low-altitude helicopter flights occur along the length of the pipeline at altitudes usually below 500 feet AGL. The pipeline passes through the northeastern third of the area of the proposed CLEAR CREEK MOA and the previously utilized EIELSON A TMOA, and down along the western edge of the BUFLO TMOA. For security reasons, the flight times are not announced and the times change daily. Scoping inputs have highlighted that several close calls have occurred along these stretches of the pipeline between low-altitude military aircraft and the pipeline helicopter crews. Figure 3-15 depicts the federal airways in the vicinity of the Southern Interior Region and Figure 3-16 depicts some of the uncharted flying routes and areas identified in the region.





3.2.4 Southcentral Region Airspace Management and Aircraft Operations

The Southcentral Region includes the SUSITNA MOA and the FOX 1 and FOX 2 TMOAs; Elmendorf AFB; and the airspace covered by the TANANA MOA (Alternative B). Figure 3-17 displays the existing permanent MOAs and previously utilized TMOAs in the region. Table 2-4, Chapter 2, summarizes the approximate areas, altitude structure, and clearance for supersonic operations in the Southcentral Region MOAs. In Southcentral Region MOAs, supersonic operations below FL 300 are only permitted in the SUSITNA MOA.

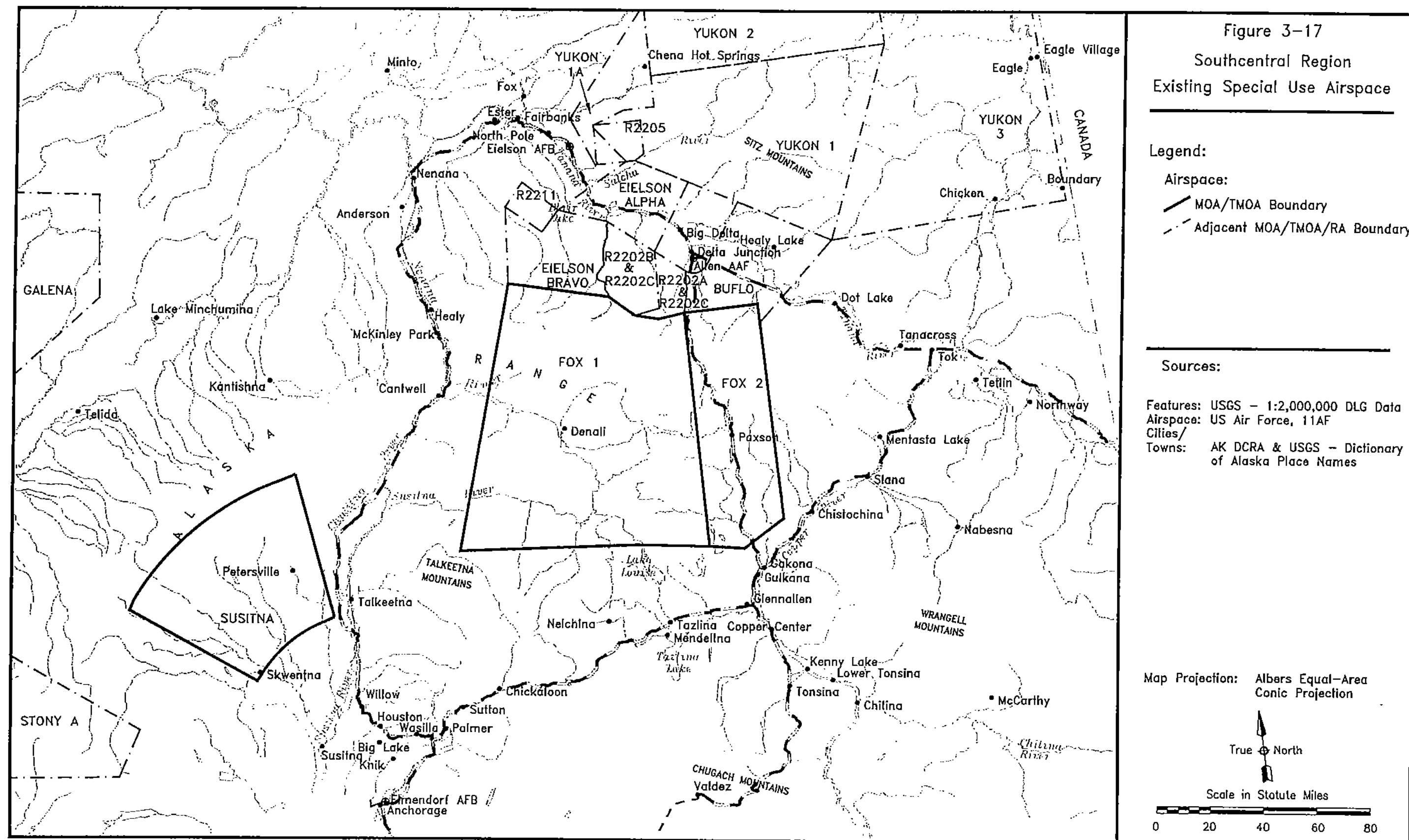


SUSITNA is the only MOA available for routine daily training in the Southcentral Region. It is not used for the conduct of MFEs. Scheduling of the SUSITNA MOA is through the 3 WG at Elmendorf AFB. Routing to and from the SUSITNA MOA generally involves aircraft from the 3 WG at Elmendorf AFB and follows STEREO ROUTING similar to that described earlier. The FOX 1 and FOX 2 TMOAs are only available for use by the Air Force during an MFE. Scheduling of the FOX TMOAs occurs along with other MFE TMOA activation through the 354 FW at Eielson AFB. No Air Force regularly scheduled routine training operations (routine or MFE) currently occur in the area of the TANANA MOA (Alternative B); however, the western area overlaps the existing C-130 LATN (see Figure 3-5) and may also be overflowed by OA-10As cruising at low-altitude, outside the MOAs and below 250 knots.

3.2.4.1 Southcentral Region Routine and Joint/Combined Training

The only Air Force training that can be accomplished on the SUSITNA MOA, with its high floor and varying terrain, is air-to-air training. Its location north of Elmendorf AFB makes it ideal for small formation (two ships) or single ship aircrew training in air-to-air tactics. It is also regularly used for F-15 aircraft maintenance functional check flights (FCFs) from Elmendorf AFB. However, its irregular shape and lack of significant ground features near the boundaries of the MOA reduce its ability to contain the more dynamic and complex extremes of air-to-air training. It is also within range (on the outer extremes) of F-16s from Eielson AFB, but again its size and shape make it unattractive for regular use by those aircraft when the YUKON MOAs are available. No routine training is accomplished in the FOX 1 or FOX 2 TMOAs.

Control of aircraft operations on and around Elmendorf AFB is the sole responsibility of the Air Force-manned control tower on the base. The airport is surrounded by its own irregularly shaped Class D Airspace extending approximately a 5 mile radius around the center of the airfield and about 5 miles off the west end Runway 23, along the extended centerline of the runway. The entire area is also within the Anchorage, Alaska Terminal Area (ATA) encompassing Elmendorf AFB, Anchorage International Airport, Merrill Field, and the Lake Hood Seaplane Base. This is an extremely congested area with these four high-volume airports within 12 miles of each other. The control area at Elmendorf AFB extends from the surface up to 3,000 feet above the elevation of the airport and is designed to handle only air traffic landing or taking off from the designated airport. Pilots must normally maintain two-way radio communications with the control tower while in the Class D Airspace, including ground operations. Radar services are provided by a surveillance radar slaved off the surveillance radar at Anchorage International Airport. Wide area radar coverage is provided by the FAA-manned Anchorage Approach Control. Operations around the airfield consist of departures, arrivals, and multiple close-in and extended closed traffic patterns around the airfield. Preferred routing departures from and arrivals to Elmendorf AFB are flown along STEREO ROUTES as discussed earlier for Eielson AFB. These routings are available to Alaska-based aircraft and transient/deployed exercise aircraft. Preferred routings for Elmendorf aircraft are departures on Runway 05 or Runway 33 with recoveries to Runway 05 or Runway 33. Arrivals on Runway 23 rarely occur.



As shown in Figure 3-5, the LATN area covers the Southcentral Region except for the western corner of SUSITNA MOA and extends under the western portion of TANANA MOA. Several SKE routes pass underneath the FOX 1 and FOX 2 TMOAs. Figure 3-18 depicts the MTRs that overlie the airspace of the Southcentral Region. Operations on MTRs 1900, 937, and 940 are all scheduled through the 354 WG at Eielson AFB. Special operating instructions for all these routes require coordination with the other permanent airspaces as well as coordination between the MTRs that have common route segments or intersections.

Use of SUSITNA MOA accounts for approximately 10 percent of the total annual routine MOA operations. The training in SUSITNA is predominately (about 95 percent) F-15 air-to-air operations flown from Elmendorf AFB. F-16 air-to-air operations make up about 5 percent of all SUSITNA operations. Table 2-7 presents the estimated daily operations levels in the MOA/TMOAs.

Supersonic operations as a part of routine training are approved at 5,000 feet AGL/10,000 feet MSL, whichever is higher, in the SUSITNA MOA. It is predicted that as a result of these routine supersonic operations, approximately 40-50 sonic booms could occur per year and that the majority of supersonic operations result in changes in peak overpressure (L_{pk}) as a result of a sonic boom of $L_{pk}=2.0$ or less. This change in peak overpressure (L_{pk}) from a sonic boom is roughly equivalent to an F-15C at Mach 1.2 and 30,000 feet AGL. See Appendix E for a *Summary of the Distribution of Cumulative Peak Overpressures* recorded from similar air combat training activities.

The primary flying units assigned to the 3 WG at Elmendorf AFB are the 19th, 54th, and 90th Fighter Squadrons (19 FS, 54 FS, and 90 FS), and the 517 ALS. The 19 FS and 54 FS fly F-15Cs and are dedicated to an air-to-air mission. The 90 FS flies LANTIRN-equipped F-15Es and trains for both air-to-air and air-to-ground roles. The 517 ALS flies C-130s supporting airlift operations throughout the state. Airfield operations at Elmendorf AFB directly supporting aircraft movements and maintenance activities include: aircraft departures or landing activities; aircraft taxi movements on the ground; operation of ancillary aircraft subsystems on the ground (including engine maintenance runs); and the operation of aircraft ground support equipment. Flight operations at the airfield include the assigned squadrons, transient aircraft, aircraft deployed to Elmendorf for routine training, and aircraft deployed to Elmendorf in support of an MFE.

During periods of routine training, operations at Elmendorf AFB average approximately 84 aircraft sorties per day, of which 80 percent are directly attributed to the aircraft assigned at Elmendorf. Table 2-6 depicts the daily sorties flown from Elmendorf AFB during periods of normal routine training and during an MFE.

3.2.4.2 Southcentral Region Major Flying Exercises

During an MFE, FOX 1 and FOX 2 TMOAs in the Southcentral Region are activated. The SUSITNA MOA is not used for MFE flying activities. At present, FOX 1 and FOX 2 TMOAs are authorized to be activated for up to 60 days per year for MFEs. During an MFE, the airspace is usually activated by NOTAM for a 12-hour period from 6:00 a.m. to 6:00 p.m., but is normally used for 2 to 3 hours in the morning and 2 to 3 hours in the mid afternoon, except for CAS exercises, which normally require a single 6-hour period. Only aircraft participating in the MFE are authorized to enter the MOAs during the actual conduct of the MFEs. Routine training flights that are not part of the MFE are not authorized to use any of the TMOAs during their training activities. Routine training flights flown on MFE flying days are restricted to use of the permanent airspace provided they are de-conflicted from MFE use. Although these routine training flights could transition through some of the TMOA airspace enroute to a range or permanent MOA, they are not permitted to schedule or delay in the TMOA airspace for practicing other flight activities.

The FOX TMOAs are normally used as the marshalling area for the opposing air-to-air forces during an MFE. Activities in the FOX TMOAs include pre- and post-strike defensive force air refueling; marshalling of aggressor forces before the coordinated air battle begins; and positioning of other electronic combat, command, and control forces. The TMOAs are also used for post-mission regrouping for flights prior to returning to base. During an MFE, air-to-air engagements could occur in the airspace complex.

Flight operations at Elmendorf AFB can increase by up to 90 percent during MFE flying days when units from the 3 WG are not participating in the exercise but continue to perform routine training. This training continues to occur either before, between, or after MFE flying periods when the Elmendorf-based units are not participating in the exercise. If Elmendorf-based units are participating in the exercise, Elmendorf AFB operations increase by approximately 68 percent over a routine training day. Operations of MFE aircraft require the launch of a large force over a short period of time followed by an approximate 2-hour lull in operations, and then the high volume recovery of those aircraft launched several hours earlier. Aircraft represented come from various PACAF units, Navy/Marine contingents, and even allied forces such as the British TORNADOs and the Canadian CF-18s. These MFE operations are permitted for up to 60 days per year, for up to 10 MFE flying days at a time.

3.2.4.3 Other DoD Aircraft Operations

3.2.4.3.1 Air Force MTR Operations

Operations on MTRs coincident with Southcentral Region MOAs can average as high as eight operations per day. Though they are traditionally designed for use at airspeeds above 250 knots, they may also be used by aircraft such as the OA-10As at airspeeds below 250 knots (USAF 1992a).

3.2.4.3.2 Army Operations

As discussed with the Northern Interior Region, the majority of annual Army helicopter flight operations occur from Fort Wainwright, located several miles east-southeast of Fairbanks and approximately 10 miles west of the western edge of YUKON 1A TMOA. Operations affecting the Southcentral Region are those transition flights between Forts Wainwright/Greely/Richardson. These flights pass under the FOX 1 and 2 TMOAs enroute to Fort Richardson. The majority of Army flying is between 50 feet AGL and 1,000 feet AGL (approximately 65 percent of the time) at airspeeds up to 140 knots (U.S. Army 1993).

3.2.4.3.3 Operations in the LATN Area

LATN operations in the state total approximately 18 sorties per week throughout the LATN area and are described in section 3.2.2.3.3. The Southcentral Region, predominantly the Susitna Valley northwest of Elmendorf AFB, is the primary training area in the LATN and accounts for at least 75 percent of C-130 LATN operations (estimate). Air National Guard C-130s based at Kulis Air National Guard Base in Anchorage also regularly fly in much of the same LATN airspace used by the active duty C-130s at Elmendorf AFB.

3.2.4.4 Civilian Aircraft Operations

The SUSITNA MOA is located near and over some of the most heavily used airspace in the state. Approximately 80 to 100 jet aircraft controlled by the FAA ARTCC fly daily air routes adjacent to the SUSITNA MOA (Bergt 1994). In addition, MOA airspace is used by civilian light aircraft that depart from Anchorage, communities along the Parks Highway, and other smaller airstrips and lakes underneath and around the MOA. However, because the floor of the MOA is so high (5,000 feet AGL minimum), only a small number of the annual flights in the area actually enter into the MOA. The eastern boundary of the MOA parallels the heavily used Anchorage-to-Fairbanks air traffic corridor. In the center of the MOA airspace, the large number of summer and fall recreational flights are well below the MOA floor. The pilots of civilian aircraft that travel through but do not land within the MOA tend to fly below the MOA floor for the views of the passing terrain and the scenic Alaska Range from these lower altitudes.

The FOX TMOAs lie in the northern portion of southcentral Alaska. They are bounded on the south by the Lake Louise Recreation Area and the Nelchina Public Use Area, and on the southeast by the Wrangell Mountains. The northern slopes of the Alaska Range are the northern boundary of the area. The Wrangell Mountains form the eastern boundary of the area. The western boundary is midway between the Parks Highway and Badman Mountain. Included in the boundaries of the TMOAs are the major drainages of the Susitna and Gulkana rivers south of the Alaska Range. Also underlying the western portion of the area is the Nelchina Public Use Area. The northern portion of the FOX TMOAs abuts the Fort Greely Military Reservation.

There are no communities having commercial air service located within the boundaries of the FOX TMOAs. The primary civilian VFR routing follows the Richardson Highway, which is the key topographic feature on the western edge of the FOX 2 TMOA. Most civilian traffic flies at altitudes near or below the 3,000 foot AGL floor of the FOX 1 TMOA and well below the 14,000 foot AGL floor of FOX 2 TMOA.

East of the FOX TMOAs to the Canadian border is another area of high non-DoD flight operations. The Alaska Highway forms a natural flyway from Tok to Delta Junction and on up to Fairbanks. It roughly parallels V-444 that follows the same course. All flights entering Alaska from Canada along the eastern border must either land at Tok or Eagle prior to proceeding. From comments during public scoping, it was noted that several air taxi operators in the Talkeetna area regularly transport hunters and fishermen into areas under the southern half of the FOX 1 TMOA. Figure 3-19 depicts the federal airways in the vicinity of the MOAs/TMOAs of the Southcentral Region, and Figure 3-20 depicts some of the uncharted flying routes and areas identified in the region.

The AATA surrounding the major operating locations in the Anchorage area contains the most heavily used airspace in the state. The FAA has forecasted (FAA 1993) that of the estimated 850,000 itinerant aircraft operations in the state in fiscal year (FY) 1993, approximately 393,000 (or over 46 percent) of those operations occur in the Anchorage area from the Anchorage International Airport, Merrill Field, and the Lake Hood Seaplane Base. Local general aviation contributes another 167,000 operations in this same area.

Figure 3-20
Southcentral Region
VFR Routes

Legend:

Airspace:

MOA/TMOA Boundary

Adjacent MOA/TMOA/RA Boundary

VFR Flight Route

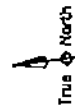
Sources:

Features: USGS - 1:2,000,000 D.G. Data

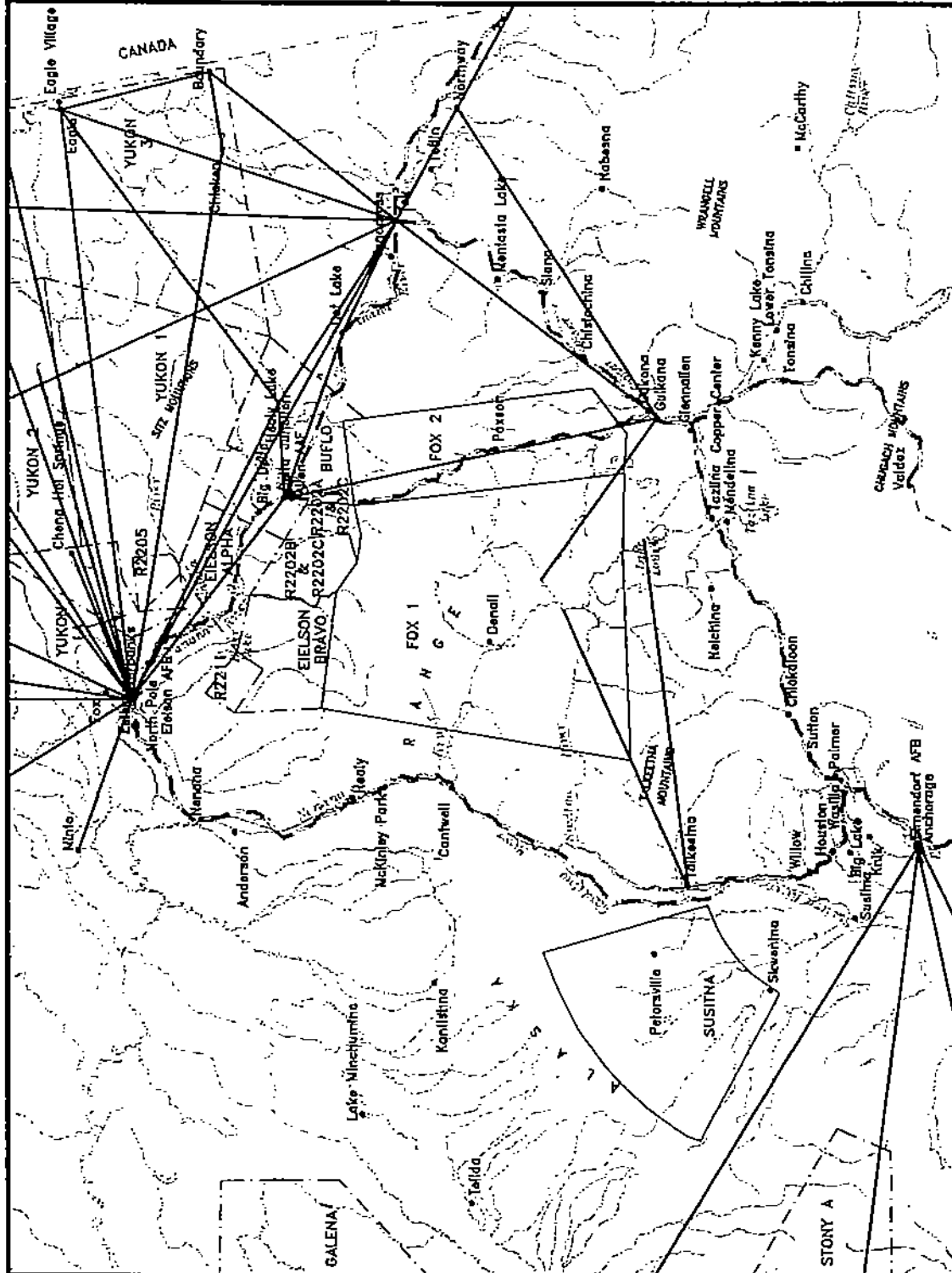
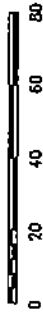
Airspace: US Air Force, 11AF

Cities/Towns: AK DCA & USGS - Dictionary of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection

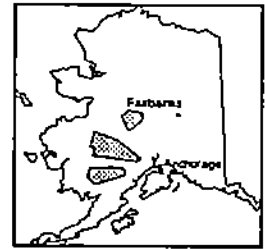


Scale in Statute Miles



3.2.5 Western Region Airspace Management and Aircraft Operations

The Western Region includes the area west of the SUSITNA MOA covered by the NAKNEK 1 and NAKNEK 2 MOAs, the STONY A and STONY B MOAs, the STONY C TMOA, and the GALENA MOA. Figure 3-21 displays the existing permanent MOAs and previously utilized TMOAs in the region. Table 2-5, Chapter 2, summarizes the approximate areas, altitude structure, and clearance for supersonic operations in the Western Region MOAs. In Western Region MOAs, supersonic operations below FL 300 are only permitted in the STONY A and STONY B MOAs.



The scheduling agency for all MOAs in the Western Region is the 3 WG at Elmendorf AFB. STEREO ROUTING to and from the airspace has been established by the 3 WG. This routing is available for routine daily training or for efficient handling of a larger volume of traffic for short periods of time, as in the use of the STONY MOA/TMOAs for a limited local air-to-air surge exercise.

3.2.5.1 Western Region Routine and Joint/Combined Training

The Western Region contains five of the eight existing permanent MOAs in the state, totalling approximately 63 percent of the existing permanent MOA airspace. All MOAs in the Western Region are available for routine training except the STONY C TMOA. The STONY A and STONY B MOAs are typically scheduled together, as are the NAKNEK 1 and NAKNEK 2 MOAs. GALENA MOA is rarely used for day-to-day training but is normally activated on a quarterly basis and used for about 5 days at a time when F-15Cs from Elmendorf practice reactivation of alert activities at the GALENA Air Force Station. GALENA MOA is normally inactive during other periods.

Scheduling of the MOAs in the region must also take into account the underlying MTRs that traverse through NAKNEK 1, NAKNEK 2, and STONY A MOAs. All of these MTRs are scheduled through and coordinated by the 3 WG. Figure 3-22 depicts the existing MTRs that overlie the Western Region.

The 3 WG, based at Elmendorf AFB, is the predominant user of the MOAs in the Western Region. Second only to the YUKON 1 and 2 MOAs, the STONY A and B MOAs account for approximately 33 percent of the total annual routine MOA operations in the state. Generally, operations in the region are associated with the F-15C/D air-to-air missions and the F-15E air-to-air and low-altitude tactical navigation missions. The Alaska Air Combat Maneuvering Information (ACMI) system, located in the western portion of the STONY A MOA, with coverage extending into the STONY B MOA, provides the key training feedback system that makes the STONY MOAs so critical to air-to-air training. The physical location of the Alaska ACMI on the terrain covers an area approximately 60 NM in diameter, with the western edge of that coverage area extending across the Kuskokwim River into the eastern portions of the STONY B MOA. The system can accurately track aircraft in this area down to an altitude of 500 feet AGL within this 60 mile area and at greater distances for higher altitude operations. The majority of air-to-air training in the STONY MOAs is accomplished within the vicinity of the ACMI. The STONY MOAs account for just under 72 percent of the MOA activity in the region, the NAKNEK MOAs are used over 27 percent of the time, and GALENA MOA provides less than 1 percent of the total activity.

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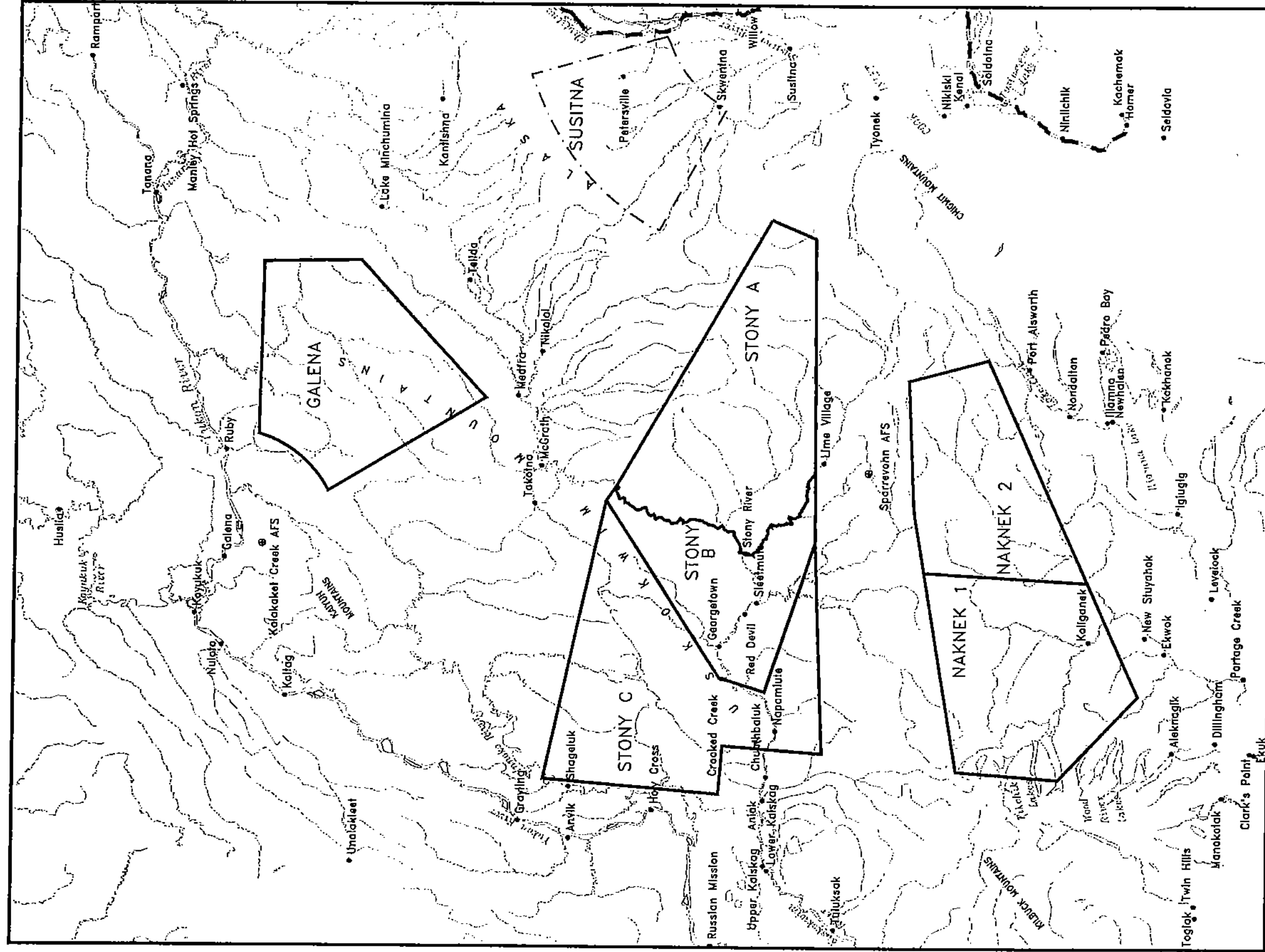


Figure 3-21

Western Region Existing Special Use Airspace

Legend:

Airspace:

— MOA/TMOA Boundary

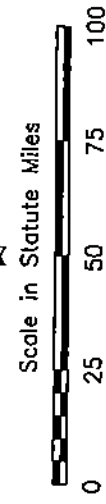
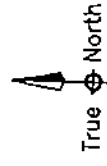
- - - Adjacent MOA Boundary

Sources:

Features: USGS - 1:2,000,000 DLG Data
Airspace: US Air Force, 11AF
Cities/
Towns:

AK DCRA & USGS - Dictionary
of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection



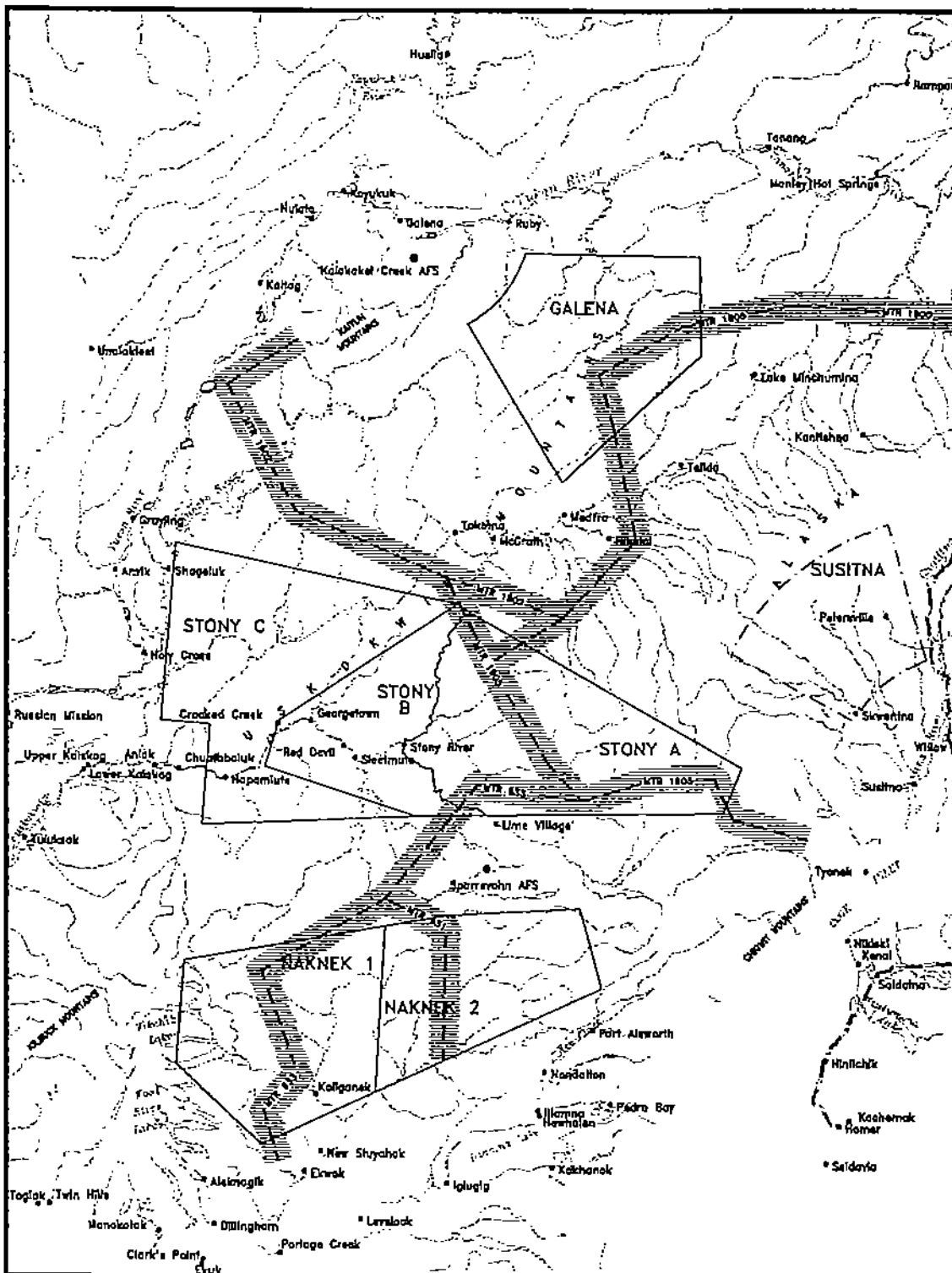


Figure 3-22
Western Region
Military Training Routes

Legend:

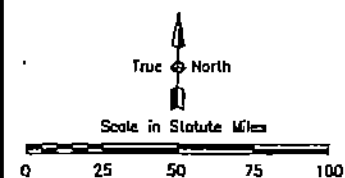
Airspace:

- MOA/TMOA Boundary
- - - Adjacent MOA Boundary
- == Military Training Route

Sources:

Features: USGS - 1:2,000,000 DLG Data
Airspace: US Air Force, 11AF
Cities/
Towns: AK DCRA & USGS - Dictionary
of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection



It is estimated that the F-15C/Ds conduct approximately 70 percent of their routine training between 10,000 feet MSL and 30,000 feet MSL. Another 15 percent of their training is conducted at altitudes below 10,000 feet MSL, and the remainder at altitudes from 30,000 feet MSL to 50,000 feet MSL. Seventy percent of the F-15C/D missions are flown between 300 and 450 knots, 15 percent at speeds of 200 to 300 knots, and 15 percent at speeds greater than 450 knots. The F-15C/Ds primarily fly four-ship formation missions in the STONY airspace. Over 60 percent of F-15C/D missions are flown in the STONY MOAs.

The F-15E air-to-air missions account for about 12 percent of the STONY MOA usage. For this training, the F-15Es employ the same altitude/airspeed schedule as the F-15C/Ds. F-15Es also use the STONY airspace for low-altitude attack training. Although there are no air-to-ground weapons ranges in the STONY MOAs, these MOAs are used to practice low-altitude flight operations and simulated low-altitude target attacks. Current F-15E low-altitude flight training operations are restricted to 500 feet AGL or higher. It is estimated that approximately 50 percent of F-15E operations occur between 500 feet and 1,500 feet AGL, with the balance above 1,500 feet AGL. Airspeeds during this training vary from 420 to 480 knots.

The F-16C/Ds from Eielson AFB account for less than 1 percent of the daily usage of the MOAs in the region, and use them only for air-to-air training.

Supersonic operations conducted as a part of routine training are approved down to 5,000 feet AGL/10,000 feet MSL, whichever is higher, in the STONY A and B MOAs. It is estimated that supersonic operations rarely occur below FL 200 (about 20,000 feet MSL).

Table 2-7 presents the estimated daily usage of the MOAs in the Western Region.

3.2.5.2 Western Region Major Flying Exercises

The STONY MOAs/TMOA are authorized for limited air-to-air surge exercises for up to 60 days per year. These exercises are most usually run by the 3 WG at Elmendorf AFB and are not part of the larger scale MFE activities being undertaken in the Northern Interior, Southern Interior, and Southcentral Regions. During these exercises, the airspace is usually opened for a 11-hour block from 7:00 a.m. to 6:00 p.m., but is most often used for 3 to 4 periods, each lasting 2 to 3 hours during the 11-hour window. The primary activity accomplished in the STONY MOAs/TMOA is air-to-air surge exercise training. Any routine training flights that are not part of these exercises are not authorized to use the STONY C TMOA during their training activities. Routine training flights flown on these exercise flying days are restricted to use of the permanent MOAs in the region and are flown before, between, or after the exercise operations. Levels of training operations are shown in Table 2-7.

3.2.5.3 Other DoD Aircraft Operations

3.2.5.3.1 Air Force MTR Operations

Operations on MTRs coincident with Western Region MOAs can average as high as 10 operations per day. They are predominantly flown by the F-15Es from Elmendorf AFB and rarely used by F-16Cs from Eielson AFB (USAF 1992a).

3.2.5.4 Civilian Aircraft Operations

Air taxi operators from southcentral and southwest Alaska traverse the STONY airspace. Destinations within the STONY MOAs are served primarily by the air taxis located at Bethel, McGrath, Aniak, Anvik, and Red Devil. The air taxis make stops in Red Devil, Sleetmute, and Stony River to pick up and deliver mail, supplies, and passengers throughout the year. Civilian air traffic through the STONY MOAs is somewhat seasonal (higher in the summer months). The STONY A MOA, which is relatively heavily used by military aircraft and has a floor of 100 feet AGL, is not located over any communities. Consequently, few light aircraft traverse STONY A. Commercial jet aircraft, controlled by the FAA ARTCC, use air routes adjacent to STONY A. The STONY B

MOA has a floor of 3,000 feet AGL and is located over the communities of Sleetmute, Red Devil, and Stony River, but not over popular recreation areas. Most of the civilian light aircraft travel below the floor of this MOA. It is estimated that about half of these flights depart from airports in McGrath, Aniak, or Bethel. Use of air routes adjacent to STONY B by FAA ARTCC-controlled aircraft is low, not more than two flights per day (estimate). It has been noted by the 3 WG Flying Safety Office (3 WG/SE) that during the summer months the areas along the Kuskokwim and Holitna Rivers—from Stony River, to Sleetmute, to Red Devil and from Sleetmute south to the border of the STONY B MOA—are an active civil air traffic corridor at 1,000 feet AGL and below. STONY C is bounded on the west by a visual route between Aniak and Anvik that sees very low daily use. A major airway link from McGrath to Bethel cuts through the center of the STONY C TMOA; however, the low number of military aircraft operations in the TMOA has not inhibited the air traffic in this area. The STONY C TMOA also encompasses four small airfields (at Shageluk, Flat, Decourcy Mountain Mine, and Crooked Creek), but reasonable access to these sites is not inhibited.

The NAKNEK MOAs are located away from major centers of population but contain some very popular summer and fall recreation attractions. The majority of civilian light aircraft flights into the MOAs each year occur between May and October. It is estimated that more than half of these flights depart from Dillingham, Aniak, Iliamna, or King Salmon. The others depart from smaller airstrips near the MOAs. Most of these aircraft fly below the MOA floors of 3,000 feet AGL and deposit their passengers at lodges or campsites along the upper Tikchik lake system or at smaller lakes northwest of Iliamna.

No communities or high-use recreational destinations underlie the GALENA MOA. The MOA is traversed by civilian light aircraft, most of which fly through the MOA airspace but do not land. Because the MOA floor extends down to 1,000 feet AGL, most of these aircraft fly through rather than under the airspace. It is estimated that about half of the flights that fly in/near the MOA depart either from McGrath or Galena. Civilian MOA traffic in the Galena MOA does not vary by season to the same extent as the other Alaskan MOAs. It is further estimated that up to eight commercial aircraft controlled by the FAA ARTCC fly air routes adjacent to the GALENA MOA on a daily basis.

Information obtained during public scoping also indicates that other areas, predominantly along the Kuskokwim River and to the west into the STONY B MOA, receive varying amounts of VFR civilian air traffic flying into various areas, settlements, and along the rivers. The VFR air route between McGrath and Dillingham also receives a measurable amount of traffic. No specific data exists on all the landing locations or on the extent of the activity into the area. Figure 3-23 depicts the federal airways in the vicinity of the MOAs and TMOA in the Western Region, and Figure 3-24 depicts some of the uncharted flying routes and areas identified in the region.

3.2.6 Aviation Safety

3.2.6.1 Bird Aircraft Strike Hazard

Detailed bird/aircraft strike hazard assessments for the existing permanent MOAs and RAs and previously utilized TMOAs are presented in Appendix H. This analysis was provided by the Air Force Bird Aircraft Strike Hazard (BASH) Team. The risk of a damaging bird strike is minimized by making recommendations to pilots and route planners based on the severity of the bird strike hazard at a particular time of day, month, and segment of a low-altitude route.

Bird strike hazards were evaluated for the SUA in the eastern and interior portions of Alaska. Bird habitat and survey data, collected by the U.S. Fish and Wildlife Service and the Alaska Department of Fish and Game, were used in combination with research data, historical bird strike statistics, trend analyses, and refuge bird population and migration chronology data to determine bird strike hazards for the proposed MOAs. Bird strike hazards in the existing airspace ranged from severe, during the migratory and breeding periods, to very low during the winter months. Much of the airspace encompasses the two largest migration corridors in Alaska, associated with the Yukon and Tanana riparian systems, as well as several minor flyways (Butler and Gill 1993; King 1993). The Tanana River corridor is used by millions of waterfowl, several hundred thousand sandhill cranes, thousands of gulls, and many hundreds of raptors on migration (April 15 to May 10 and August 20 to October 10). The corridor also provides nesting habitat for large numbers of waterfowl (June 10 to August 1) and raptors (May 1 to September 1). The Yukon River corridor is used by slightly fewer numbers of similar species composition (April 20 to May 15 and August 20 to October 1). See section 3.5 for maps depicting the flyways mentioned above. Virtually every major river in Alaska is used to some extent by migrating birds (refer to Figure 3-28). These rivers provide pathways through mountainous areas leading to the major migratory corridors.

Low-altitude bird strike data for Alaska were compiled from the Air Force BASH Team's Bird Strike Database for the years 1972 through March 1993. Thirty-one bird strikes (in Alaska) were reported in the low-altitude training areas and on the ranges during this period, accounting for more than \$50,000 in damage. Ninety-four percent of these strikes took place between April and October, due to migratory and breeding bird concentrations. Sixty-nine percent occurred between the surface and 500 feet AGL. The historical bird strike numbers and cost are low compared with low-altitude flight in the Lower 48 states.

Aircraft composition utilizing the existing airspace includes primarily the F-16C/D, OA-10A, F-15C/D, F-15E, and an assortment of other fighter aircraft (mostly during MFEs). The F-16, a single-engine, high speed fighter with both a low- and high-altitude mission, is considered to be the most vulnerable aircraft in the Air Force inventory to a serious bird strike mishap. Low-altitude training missions consist of low-altitude air-to-air training, low-altitude step down training, low-altitude tactical navigation training, and low-altitude surface attack training. Air-to-air training accounts for approximately 25 percent of all F-16 training missions; and of these missions, approximately 80 percent are flown at altitudes of 5,000 feet AGL or higher and approximately 20 percent are low-altitude air-to-air training down to no lower than 500 feet AGL. Air-to-ground training accounts for approximately 75 percent of all F-16 training activities. Except for a very few, very experienced pilots, low-altitude training is restricted to 500 feet AGL or higher. It is estimated that less than 5 percent of current flight training occurs below 500 feet AGL, that the majority of low-altitude training occurs between 500 and 1,500 feet AGL, and the balance occurs above 1,500 feet AGL. See Appendix C for a more detailed description of the training missions described above. Since 1989, seven F-16 aircraft worldwide have been completely destroyed due to bird aircraft collisions (Arrington 1993). Large and/or flocking species are of greatest concern to F-16 low-altitude flight operations. Birds representing the greatest hazard to military low-altitude aviation in Alaska include waterfowl, raptors, sandhill cranes, and flocks of gulls, shorebirds or passerines. It should be noted, however, that no Alaska F-16 has been lost to a bird strike, nor has an F-16 suffered any significant damage due to a bird strike as of June 1995.

Throughout the existing MOAs, waterfowl represent a significant hazard to low-altitude operations during the spring (April 15 to May 15) and fall (August 15 to October 10) migratory seasons, due to the enormous numbers of birds concentrating along the major corridors of the Tanana and Yukon rivers. Waterfowl most likely to be encountered include: Canada geese, greater white-fronted geese, snow geese, and a variety of ducks, swans, and loons. The weights of these birds range from 1.5 pounds for some species of ducks to 35 pounds for trumpeter swans. Ninety percent of all duck migration occurs at night at altitudes ranging from 500 to 10,000 feet AGL, but most commonly 1,500 to 5,000 feet AGL. Sixty percent of the population of geese and swans migrate at night from 500 to 10,000 feet AGL, but most commonly from 2,000 to 3,000 feet AGL. In stopover areas, these birds will make dawn/dusk feeding flights from the surface to 1,000 feet AGL for ducks and 300 to 800 feet AGL for geese. Once the birds reach the breeding ground, they spread out over the entire area, so there are no distinct flyways over the breeding areas. During breeding (June 10 to August 1) in wetland and lowland areas, 90 percent of waterfowl will be distributed from the surface to 200 feet AGL, while 10 percent will be between 200 and 500 feet AGL (Thompson 1993). Some species molt their flight feathers during breeding and lose the ability to fly until late summer (King 1993) (refer to Figure 3-28 for specific waterfowl use areas).

Raptors are the greatest hazard to aircraft during migratory and soaring foraging flights, as they tend to spend more time in the low-altitude environment than any of the other hazardous bird species. Nesting Alaskan raptors include bald eagles, golden eagles, red-tailed hawks, rough-legged hawks, northern goshawks, osprey, gyrfalcons, and peregrine falcons (refer to 3.5.2.3.3 for raptor distributions and population sizes). The weights of these raptors range from 1.4 pounds (peregrine falcon) to 11.5 pounds (golden eagle). Birds of prey are diurnal (daytime) migrants that will use thermal or ridge lift to reduce energy expenditure on migration. Migration altitudes are generally 500 to 5,000 feet AGL. Nearly 100 percent of migrant raptors will be airborne during the midday period, and with favorable weather approximately 95 percent will be distributed above 1,000 feet AGL. When nesting (May 1 to September 1), raptors will spend a smaller percentage of time in the air, but will make foraging flights generally from the surface to 2,000 feet AGL. Twenty to twenty-five percent of foraging breeding raptors will be airborne with a majority of foraging flights below 1,000 feet AGL (Thompson 1993). Approximately 50 percent of these airborne soaring raptors should be on foraging flights between the surface and 200 feet AGL. River systems provide excellent cliff nesting habitat for a variety of raptors and hold the highest density of breeding raptors in Alaska. These cliffs average between 50 and 190 feet in height, with some reaching heights over 350 feet along the Kuskokwim River (Mindell 1983).

Sandhill cranes are most hazardous to aircraft during the migratory periods (August 15 to October 15 and April 20 to May 12) due to their flocking, commonly from 1,000 to 3,000 feet AGL, but to altitudes of 7,000 to 8,000 feet AGL. Crane concentrations follow a corridor 19 to 25 miles in width along the major flyways of the Tanana and Yukon rivers (Kessel 1984). During migration, sandhill cranes will leave roosts between 5:00 a.m. and 8:00 a.m. These birds are primarily diurnal migrants, although they sometimes continue flight into the night. Sandhill cranes breed in lowland tundra marshes and will commonly make dawn/dusk feeding flights from the surface to 1,000 feet AGL.

Gulls and passerines may present a hazard to aircraft, especially during the migratory periods. Gulls are more abundant in coastal areas and around population centers and landfills, due to greater food availability. Some gulls, however, will breed on inland lakes and make dawn/dusk feeding flights from the surface to 1,500 feet AGL. Gull weights range from 1 to 3.5 pounds. Passerines migrate in flocks, usually at night, from the surface to 10,000 feet AGL, but most commonly from 500 to 2,500 feet AGL. Breeding passerines are dispersed and active only at low altitudes (below 200 feet AGL).

3.2.6.2 Aviation Safety

Midair collisions between military aircraft, small commercial aircraft, and/or private aircraft represents a concern to all aviators in Alaska, especially since nonmilitary aviation is part of the way of life in Alaska. For many communities in the state, aviation provides their only access beyond the immediate community. The siting of the existing permanent MOAs in the late 1970s was dictated by the location of the federal low-altitude airways, as shown on maps in the airspace descriptions for each region. The Air Force has also recognized that much of the civil flying in the state is "off airway" flying and that much of it regularly transits through the existing MOAs and previously utilized TMOAs. Through an aggressive public awareness program, the Air Force publicizes the times of extensive military operations (such as MFEs) and the types of operations associated with the F-16s and F-15Es. This program has fostered the safe, joint use of this airspace by the military and civil aviation communities. Safety records back to 1983 disclose no midair collisions between Air Force and civil aircraft. Also, Air Force records on near misses indicate that from January 1991 through June 1994, the only reported near misses occurred in the immediate vicinity of either the Eielson or Elmendorf AFB traffic patterns. No near misses have been officially recorded in any of the MOAs/TMOAs during routine or MFE operations. It should be noted, however, that during public scoping meetings, several civil operators stated that they had experienced occasional close calls with Air Force aircraft in the vicinity of the trans-Alaska oil pipeline (EIELSON A TMOA) and along the Richardson Highway between Eielson AFB and Delta Junction. The Special Use Airspace Information Service (SUAIS) provides coverage in the areas of the EIELSON A, B, and the western two-thirds of the BUFLO TMOAs where many civilian pilots transit along the Richardson Highway (see section 3.2.2).

Some of the TMOAs, especially those in the Southern Interior and Southcentral Regions, cross federal airways. Of those crossing the airways, they all provide some access (weather permitting) along the airway to nonmilitary aviation by virtue of their floor or ceiling. In the Southern Interior Region, BUFLO TMOA has a floor of 1,000 feet AGL and ceiling of 7,000 feet MSL, and provides two means to get into the Delta Junction area (the most probable route being under the BUFLO TMOA). The EIELSON A TMOA has a low floor of 100 feet AGL but has a ceiling of only 4,000 feet MSL. Aircraft needing to transit in this airspace could fly over the top of EIELSON A TMOA (but it is estimated by the FAA that this rarely occurs). FOX 2 TMOA in the Southcentral Region lies directly over V-481 and V-515 (airways connecting the Gulkana area with the Delta Junction area). FOX 2 TMOA has a floor of 14,000 feet AGL and does not restrict non-participating air traffic along these routes (either VFR or IFR).

3.2.6.3 Accident Potential

The Air Force defines three categories of aircraft mishaps: classes A, B, and C. Class A mishaps result in a loss of life, permanent total disability, a total cost of repair in excess of \$1 million, destruction of an aircraft, or damage to an aircraft beyond economical repair. Class B mishaps result in a total cost of repair between \$200,000 and \$1 million or result in permanent partial disability, but do not involve fatalities. Class C mishaps result in more than \$10,000 (but less than \$200,000) in total cost or a loss of worker productivity exceeding 8 hours. Class C mishaps represent the most common types of accidents, and generally involve minor damage and/or injuries and rarely affect property of the public.

Based on the past numbers of mishaps at all installations, the military services calculate the Class A mishap rate per aircraft based on 100,000 flying hours. These Air Force mishap reports focus on analyzing specific causes for an accident rather than the environment in which the aircraft was operating. Statistics show that 70 to 75 percent of all major accidents occur on or within 5 miles of a runway. The majority of these accidents involve a take-off or landing incident. The general category of Air Force flying activity with highest mishap rate other than take-offs and landings is high-performance maneuvering, such as that typically occurring in a MOA.

To estimate risk to individuals from Air Force flying activities, individual aircraft major mishap rates and projected flying hours can be used to predict the probability of an aircraft mishap. Table 3-1 provides predicted

and actual Class A mishaps occurring in Alaska for flying associated with routine training and MFEs. Regular F-16C operations in Alaska began in the summer of 1991 with the beddown of 24 F-16C aircraft at Eielson AFB; the two Class A mishaps shown occurred in 1993. Between January 1990 and August 1995, one F-15C Class A mishap occurred. The Air Force continues to focus on improving the safety consciousness of all pilots operating in Alaska airspace.

Table 3-1 Predicted and Actual Class A Mishaps for Aircraft Flying in Alaska

Aircraft Type	Annual Flying Hours in Alaska	Predicted Class A Mishaps per 100,000 Flying Hours ¹	Predicted Years Between Class A Mishaps in Alaska	Actual Class A Mishaps in Alaska Since 1983 ²
F-15C	16,498	1.90	3.2	8
F-14	540	5.88	31.5	0
F-18	2,160	2.08	22.3	0
F-4	270	3.12	118.7	0
F-15E	7,897	1.90	6.7	0
F-16	11,800	4.24	2.0	2
A/OA-10	6,815	3.35	4.4	1
A-6	270	0.00	N/A	0
A-7	270	0.00	N/A	0
F-111	270	2.18	169.9	0
F-5	135	0.00	N/A	0
B-52	270	3.11	119.1	0
B-1	135	3.31	223.8	0
C-130	4,402	0.34	66.8	0
C-141	135	0.49	1,511.7	0
Tornado	540	8.80	21.0	0

¹ 1994 Air Force Class A Mishap Rate (Air Force-wide).

² USAF 1993a.

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3.3 Noise

3.3.1 Background

Noise is one of the more important concerns associated with low-altitude subsonic and supersonic military aircraft operations. Of concern is the potential for physiological effects (hearing loss and nonauditory effects), behavioral effects (speech interference and performance impairment), and subjective effects (annoyance and "startle" from rapid onset noises). These issues are discussed further in Appendix F; however, a brief introduction to key terms and concepts is provided here.

Sound is measured as a force over a unit area and presented as a logarithmic ratio with the reference sound pressure near the threshold of hearing. The hearing threshold, or the point at which a person begins to hear sounds, starts at zero decibels (0 dB). A soft whisper at 15 feet equals 30 dB, a busy freeway at 50 feet is around 80 dB, a chain saw can reach 100 dB or more at operating distance, and 140 dB is generally thought to be the human threshold for pain.

The sound created by aircraft passing directly overhead or in the vicinity of humans, animals, or structures is determined using a variety of computer modeling techniques and acoustic measures (metrics). To understand how the potential effects of sound are analyzed, it is important first to understand the relationship between "sound" and "noise." Sound can be defined as an auditory sensation evoked by an oscillation (vibratory disturbance) in the pressure and density of a fluid (including air), or in the elastic strain in a solid, with frequency in the normal audible range of approximately 20 to 20,000 hertz (Hz). Noise can be defined simply as any unwanted sound; or, more specifically, as any sound that is undesirable because it interferes with speech and hearing, is intense enough to damage hearing, or is otherwise annoying (EPA 1976). In practice, the definitions of sound and noise are bound up in the subjective human perceptions of each.

The metrics used to describe and evaluate a sound environment include:

- Cumulative energy average levels (e.g., Equivalent Sound Level or L_{eq} ; yearly Day-Night Average A-Weighted Sound Level or DNL; Onset Rate Adjusted Monthly Day-Night Average A-weighted Sound Level or L_{dnmr} ; and L_{cda} , the C-weighted Day-Night Average Sound Level used to assess sonic boom impacts), which account for the temporal nature of sound events by averaging the total energy of multiple events over some prescribed period of time;
- Change of peak overpressure (symbolized Δp), in pounds per square foot (psf), used to assess the impulsive impact of sonic booms on humans and structures;
- One-Third Octave Band Sound Pressure Level (SPL);
- Single Event Maximum Sound Levels (L_{max}); and
- Sound Exposure Level (SEL), which reflects both maximum sound level and event duration.

L_{eq} and DNL, a 24-hour L_{eq} that includes a 10 dB penalty added to nighttime noise events, are the uniform descriptors of cumulative noise exposure that correlate with human annoyance. These cumulative metrics are the primary metrics employed to determine community (population) dose-response and annoyance of sound environment. The U.S. Environmental Protection Agency (EPA) recommends, and most federal agencies have adopted, the *Yearly Average DNL* as the basis for describing community noise exposure. With the exception of the SPL, these metrics typically employ an A-weighting network that de-emphasizes the low and high frequency portions of the sound spectrum, and provides a good approximation of the response of the average young, undamaged human ear. A-weighting correlates well with the average person's judgement of the relative loudness of a noise event (EPA 1974). Unless otherwise indicated, A-weighting should be assumed. Sound pressure levels and single event maximum sound levels like L_{max} can be used to characterize the sound environment when

assessing potential impacts of sound events on structures and animals. These metrics, along with single event energy dose levels like SELs, also provide supplemental information that can be used, on a case-by-case basis, to characterize specific sound events in the assessment of human effects such as activity interference and sleep disturbance or simply to answer the question "How loud is it?", and to determine appropriate mitigation measures (FICON 1992).

The DoD uses a variety of computer modeling techniques to evaluate the potential impacts of sound generated by its aircraft operations. DNL values around airfields are generated by the NOISEMAP computer program. Inputs to the program include information regarding flight tracks; altitude profiles; power settings; aircraft speeds; frequency of flight operations; and the location, duration, and power settings of ground run-up operations by type of aircraft. The results are then averaged over the median number of flying days, with some compensation for seasonal variations, and noise contours are drawn from points on the ground with equal DNL values. Contours are produced at 5 dB intervals beginning at DNL greater than or equal to 65 dB, the maximum level considered acceptable for unrestricted residential land use. Using NOISEMAP with a geographic information system and the 1990 U.S. Census database, the number of persons exposed to DNL greater than or equal to 65 dB can also be estimated. This assessment employs the land use compatibility guidelines supported by the FAA, EPA, U.S. Department of Housing and Urban Development (HUD), DoD, the American National Standards Institute (ANSI), and the Federal Interagency Committee on Urban Noise (FICUN). Specifically, DNL is used to describe the outdoor noise environment, and noise levels less than DNL 65 dB are considered compatible with *residential land uses*. NOISEMAP is used in this assessment to characterize the baseline and anticipated noise environments in the vicinity of Eielson and Elmendorf AFBs. The noise levels produced by aircraft operations at Eielson and Elmendorf AFBs are actually described in section 3.8 (Land Use).

When the potential for sleep disturbance is a factor due to aircraft operations between 10:00 p.m. and 7:00 a.m., NOISEMAP is used to compute SELs for aircraft operations around the airfields and combined with population data to estimate the number of people exposed to various SEL levels. These exposure estimates are then multiplied by the average percent expected to be awakened and summed to predict the total number of people expected to be awakened by aircraft noise events. The Air Force employs an interim measure based on laboratory and field work conducted in the late 1980s. Use of this metric was recommended by the Federal Interagency Committee on Noise (FICON 1992). Subsequently, the British Department of Transportation released the findings of a comprehensive field study (Ollerhead et al. 1992), which indicate a much lower response than predicted by the Air Force's interim metric. Predictions of the number of people expected to be awakened by aircraft noise events is presented using both procedures. More detailed information on both the Air Force interim metric and a description of the Ollerhead et al. findings is presented in Appendix F.

The Air Force also employs the L_{dnmr} metric to characterize sound exposure produced by subsonic, low-altitude flight operations in the MOAs. ROUTEMAP is the Air Force-approved model used to determine L_{dnmr} values along an MTR corridor. ROUTEMAP treats an individual flight track as a point source moving along a line, which, when time-averaged, becomes a line source. Algorithms used in ROUTEMAP are either the same as or closely resemble those used by NOISEMAP, with the difference being ROUTEMAP's adaptation for low-altitude, high-speed aircraft operations (Cook and Lucas 1993). MOAMAP is a noise model developed for predicting average sound levels due to aircraft operations in MOAs. MOAMAP uses a stochastic kinematic simulation of MOA operations to create a multidimensional probability density function (PDF). This PDF determines the likelihood that an aircraft will be found at a particular spot inside a predefined polygon (such as a MOA) inscribed on the surface of the earth. The model does not assume any particular map projection and is simply based on a rectangular grid. MOAMAP can generate several metrics, including L_{eq} , DNL and L_{dnmr} , using algorithms similar to ROUTEMAP's. The model can use the statistical methodology derived by Plotkin et al. (1989) at Holloman AFB to estimate L_{cch} values for sonic booms. The elliptical contours from this model are turned into a raster file by MOAMAP and referenced to a particular point. The OMEGA 14.6 computer program is used to determine $\frac{1}{3}$ octave band SPLs (for level flight) resulting from aircraft operations, while the OMEGA 10R program is used to determine L_{max} and SEL values. See Appendix F for a discussion of the MOAMAP, OMEGA 14.6, and OMEGA 10R programs. L_{max} and SEL values of representative aircraft at various altitudes are also presented in Appendix E.

Two noise metrics are used to describe the potential impacts of supersonic operations in a MOA. The C-weighted, Day-Night Average Sound Level (symbolized L_{dn}) is used to assess the temporal nature of sound events by averaging the total energy of multiple events over some prescribed period of time. L_{dn} values for supersonic operations are computed using the White Sands Missile Range (WSMR) model developed by Plotkin et al. (1989). This model was developed using data gathered over a 6-month period of air-to-air training activity at the WSMR. Some of the key information from the tests include:

- 4,600 Air Combat Maneuvering (ACM) sorties were flown, 72 percent of which were F-15s.
- Measured data showed that there were approximately 0.11 sonic booms recorded per sortie.
- Near the middle of the training airspace, the average sonic boom had a peak over-pressure of slightly under 1 psf.
- Approximately 0.5 sonic booms per day occurred in the center of the airspace, and decreased exponentially as one got further from the center.
- 99 percent of all sonic booms were below 4 psf, and none exceeded 7 psf.

From these measurements, Plotkin et al. (1989) developed what is known as the WSMR model for predicting potential sonic boom impacts from air combat operations. These predictions replace earlier work done at Navy Oceana in developing what has been known as the "Oceana Model." That model was based on a very limited number of 21 F-15 sorties, combined with a simplified carpet boom model. Predictions from the Oceana model appeared to be at least 10 dB too high when compared to the measured data gathered at WSMR. The WSMR methodology had been adopted for predicting the levels of sonic boom impacts being considered in this assessment (L_{dn} , number of booms per day, and the range of peak overpressures expected).

The single event noise associated with sonic booms is characterized by the change in peak overpressure (Δp) and is predicted by the BOOM 10C model. BOOM 10C calculates C-weighted sonic boom impacts for *steady state* supersonic flight using National Aeronautic and Space Agency (NASA) Carlson equations. BOOM 10C has been modified for altitudes below 10,000 feet using methods expressed in the Wyle Report 85-25. The program provides horizontal propagation distance, lateral propagation distance, slant distance, the change in peak sonic boom over-pressure, C-weighted SEL, and signal duration for up to 27 different aircraft that can be modeled. Due to the limitations of the model, these calculations represent the single event characteristics of a "carpet boom" below and behind the aircraft for which the calculations are made. Calculations were made for aircraft most likely to be involved in air-to-air training in the MOAs and are detailed in Appendix E. The tables in Appendix E show a range of peak overpressures (Δp) for sonic booms that propagate to the ground from a high of 14.8 psf for an F-15 E at Mach 1.05, in a 30 degree dive at 5,000 feet AGL (highly unlikely to physically occur), down to a low of 1.5 psf for an F-16 C at Mach 1.20, level flight at 30,000 feet AGL. Associated C-weighted SELs for individual booms range from 125.0 dB down to 105.1 dB. Some of these single event sonic booms could occur during maneuvering when the aircraft were not in a "wings level" attitude. In this case, the single event sonic boom change in peak overpressure would be approximately 2 to 3 times greater than calculated by the BOOM 10C model, but would be focused over a much smaller portion of the ground.

3.3.2 Noise Environment

Operations in SUA may result in overflight of areas ranging from suburban to undeveloped. In particular, operations in MOAs and on MTRs may result in overflight of public lands managed for a variety of agricultural, natural resource extraction and recreational uses, and may include areas designated or under consideration for management as wilderness areas. A methodology for assessing the combined impacts of multiple noise sources associated with Air Force operations must consider the varied noise environments within which these operations occur.

Although noise is commonly defined as unwanted or undesirable sound, its use in this study in conjunction with a descriptive term (i.e., urban, wilderness, residual, background, etc.) is non-evaluative and carries no implication

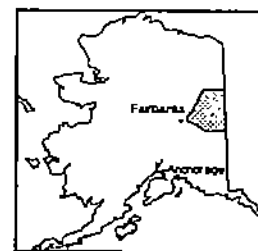
regarding the desirability or undesirability of the sound energy. In areas where the existing noise environment is dominated by a major noise source, such as aircraft noise in the vicinity of airports or motor vehicle noise in the vicinity of roadways, a variety of models are available to calculate both single event and long-term average sound levels.

In areas where no dominant noise source is present, the existing noise environment may be characterized primarily by local automotive traffic noise (EPA 1982). In such cases, population density may be used to calculate an estimated DNL. In general terms, urban noise environments are characterized by a moderate to high population density, with a corresponding level of transportation noise sources (including vehicle, railway, and aircraft traffic) in addition to other population-related noise. As population density decreases in the suburban and rural environments, transportation and other population-related noises decrease accordingly. However, this relationship is unlikely to hold true in areas with very sparse populations; for example, areas with 100 or less persons per square mile. Areas with no permanent human habitation would be characterized primarily by natural noise sources with relatively infrequent intrusions by man-made sources.

Frequently, assumptions are made that noise levels within urban, rural, and wilderness noise environments may be characterized as high, medium, and low, respectively. However, noise levels within any of these environments may vary significantly. For example, areas with low background noise levels exist in an urban environment (such as within large parks or large tracts of undeveloped land). In contrast, in uninhabited areas such as public lands, regions of moderate or even high noise may exist. For example, on public lands managed for agricultural or natural resource production, high noise levels may be associated with agricultural, mining, or logging activities. In recreational areas, high noise levels may be found at park entrances, parking lots, concessions, beaches and other recreational complexes, campgrounds, and locations where sightseeing aircraft and power boats operate. Even in wilderness areas, high noise levels may occur in the vicinity of rivers and waterfalls, or as a result of concentrations of animals.

3.3.3 Northern Interior Region

Operations in the MOAs are described in section 3.2. The Northern Interior Region supports two distinct levels (intensities) of operations during different months of the year. The lower intensity training can be generally characterized as routine training periods when no large-scale exercise activity is ongoing and the operations in the MOAs are confined to Alaska-based and deployed aircraft conducting routine training. More intense flying activities occur during MFE months when a maximum of 10 days per month are taken up with an MFE involving up to 150 aircraft sorties per day plus a reduced level of routine training activity, and the remainder of the month supports routine training activities. Noise exposure levels in the region for a routine training month and an MFE month are provided.



3.3.3.1 YUKON MOAs/TMOAs

Subsonic

The existing L_{dnmr} created by Air Force air operations in the YUKON 1 and 2 MOAs is less than 55 dB during a routine training month. The Air Force does not conduct routine training flight operations in YUKON 1A, YUKON 3, or YUKON 4 TMOAs. Noise levels in YUKON 1 MOA are approximately L_{dnmr} 5 dB greater than the maximum noise levels in YUKON 2 MOA. Aircraft noise levels are highest in the center two-thirds of the YUKON 1 MOA and on the western side near the Stuart Creek range (R-2205). In the YUKON 2 MOA, maximum noise levels occur south and east of the Steese Flight Avoidance Area (see Figure 3-3) and decrease by L_{dnmr} 5 to 7 dB to the north of the Flight Avoidance Area and near the northern MOA boundary.

During an MFE month, the L_{dnmr} in the YUKON Airspace Complex increases approximately L_{dnmr} 13 dB in YUKON 1 MOA and L_{dnmr} 8 dB in YUKON 2 MOA over routine operations noise levels; however, the average

noise levels remain below L_{dnmr} 55 dB. The cumulative noise levels in the YUKON 1A, YUKON 3, and YUKON 4 TMOAs are all less than L_{dnmr} 55 dB. The highest noise concentrations in YUKON 1 and YUKON 2 occur from just north of the central part of the boundary between YUKON 1 and YUKON 2 down through the middle of YUKON 1 and over to the eastern side of Stuart Creek range (R-2205). Aircraft noise levels throughout the remainder of YUKON 1 and 2 MOAs are generally L_{dnmr} 5 dB lower than the maximum values in the center, and are L_{dnmr} 10 to 15 dB lower near the outer boundaries. Aircraft noise levels in YUKON 1A TMOA are highest just north of Stuart Creek range (R-2205) and diminish rapidly through the remainder of the TMOA. The noise exposure levels in YUKON 3 and 4 TMOAs are about the same as those experienced on the outer edges of YUKON 1 and 2 MOAs. These lower noise levels are primarily due to the higher floors of these TMOAs compared to YUKON 1 and YUKON 2 MOAs.

Supersonic

In the YUKON 2 MOA, supersonic operations are permitted for routine training down to 5,000 feet AGL/10,000 feet MSL, whichever is higher. Supersonic events generally occur during air-to-air combat training such as FAM, BFM, ACT, and Dissimilar Air Combat Training (DACT) (see Appendix C for a description of Air Force operational missions and tactical flying training programs in Alaska). A typical air-to-air combat mission consists of entering the airspace, several engagements, then leaving the airspace to return to base. Participants in air-to-air combat training are generally divided into two forces, the defenders and the aggressors. After warming up with some basic aircraft maneuvering, the two sides usually proceed to setup points 30 to 60 miles apart. This setup distance is generally the distance at which combat aircraft begin to use their internal electronic systems to detect and track their opponents. As new, longer range air-to-air weaponry becomes available, these setup distances may increase. Once the flights have maneuvered to the setup points, often based on prominent visual references, the flights head towards each other and the attack phase begins. Missions practicing BFM may use a short setup distance and go directly into an engagement. Missions such as ACT and DACT may begin with defenders initiating an attack when they detect incoming aggressors. Often the training includes control from external sources such as a ground intercept controller or via Airborne Warning And Control Squadron (AWACS) control. Actions after leaving the setup points on these more demanding scenarios depend on tactics. Aggressors may proceed directly or via a circuitous route to some anticipated engagement areas. They may remain together as a large flight (four aircraft) or break up into smaller flights. From this initial maneuvering, the final engagements depend on the tactics being used by each participant.

One of the most important factors in any air-to-air engagement is "energy," which directly relates to an aircraft's maneuverability and the ability to employ weaponry with a tactical advantage. This energy level is usually attained by accelerating the aircraft to some airspeed that represents the best maneuvering capability for that particular aircraft. This acceleration usually takes place as the opposing forces close towards each other (inside of 20 miles). Maneuvering airspeed usually corresponds to a predetermined "indicated" airspeed, and at higher altitudes it could be supersonic. As the opposing forces get close enough to each other, the actual engagement begins. This "dogfight" can be characterized by tight maneuvering turns, climbs, and descents where each pilot attempts to gain an advantage over the adversary and maneuver the aircraft into a position where an air-to-air weapon could be employed. Speeds during these maneuvers are nearly always subsonic, except in momentary instances where a particular tactic such as a diving maneuver to gain energy, chase another aircraft, or to separate from another aircraft is employed. Air-to-air combat is such a fluid and dynamic process that it is impossible to predict what will occur, where it will occur, and what will be the outcome of any given engagement.

Following the "dogfight," participants disengage when one side gains the advantage or the fight reaches a stalemate. Each mission typically has some learning objectives, and when these are achieved the engagement is usually terminated and setup for the next event takes place. Training engagements are also terminated when airspace boundaries are approached (either laterally or horizontally) or if a hazardous situation is developing.

It is estimated that approximately 147 routine training sorties per month use the YUKON 2 MOA for air-to-air combat training and may engage in some supersonic activity. The majority of supersonic events occur along a

line from the northeast corner of YUKON 2 (east of the Steese Flight Avoidance Area) down to the central part of the southern boundary of the MOA. Occurrences in other parts of the YUKON 2 MOA are less likely due to MOA configuration and noise sensitive areas. Using the techniques developed in the WSMR model, it is estimated that the 147 monthly routine air-to-air training sorties in the YUKON 2 MOA produce a noise level of L_{cdn} 46.7 dB, and average approximately 3.5 sonic booms per month. This translates to about 1 sonic boom being heard on the ground every 7-8 days.

During an MFE, air-to-air training that could result in a supersonic occurrence is authorized in YUKON 1 and 2 MOAs down to 5,000 feet AGL/10,000 feet MSL, whichever is higher. The average number of monthly air-to-air sorties that occur as part of an MFE in the YUKON 1 or YUKON 2 MOAs is approximately 480. Additionally, aircraft operations on non-MFE days contribute another 132 air-to-air sorties to the YUKON 2 MOA. Most air-to-air engagements occur in two areas during an MFE. The first area is approximately 50 miles north and east of the northeastern corner of Stuart Creek range (R-2205). Engagements in this area generally run from south of the Steese Highway Flight Avoidance Area to the southcentral portion of the YUKON 1 MOA. The second engagement area lies generally north of the Steese Highway Flight Avoidance Area and eastward toward Circle and the eastern border of the MOA. Initial air-to-air engagements probably occur along the outermost ring as aggressors begin to penetrate the YUKON 2 MOA moving towards the weapons ranges. Follow-on engagements occur in the inner area as the aggressor forces push towards Stuart Creek range (R-2205) or Oklahoma range (R-2202), or are egressing from the ranges. It is estimated that the 612 air-to-air sorties that could occur during an MFE month produce a noise level of L_{cdn} 51.8 dB in YUKON 1 and L_{cdn} 52.8 dB in YUKON 2. It is further estimated that in the center of the area where supersonic operations are occurring an average of approximately 11.5 booms per month would be heard in YUKON 1 with an average of about 14.7 sonic booms per month in YUKON 2. Figure 3-25 depicts L_{cdn} contours for potential supersonic operations during an MFE month. The changes in peak overpressure and associated C-weighted SELs from these sonic booms would be as described in 3.3.1.

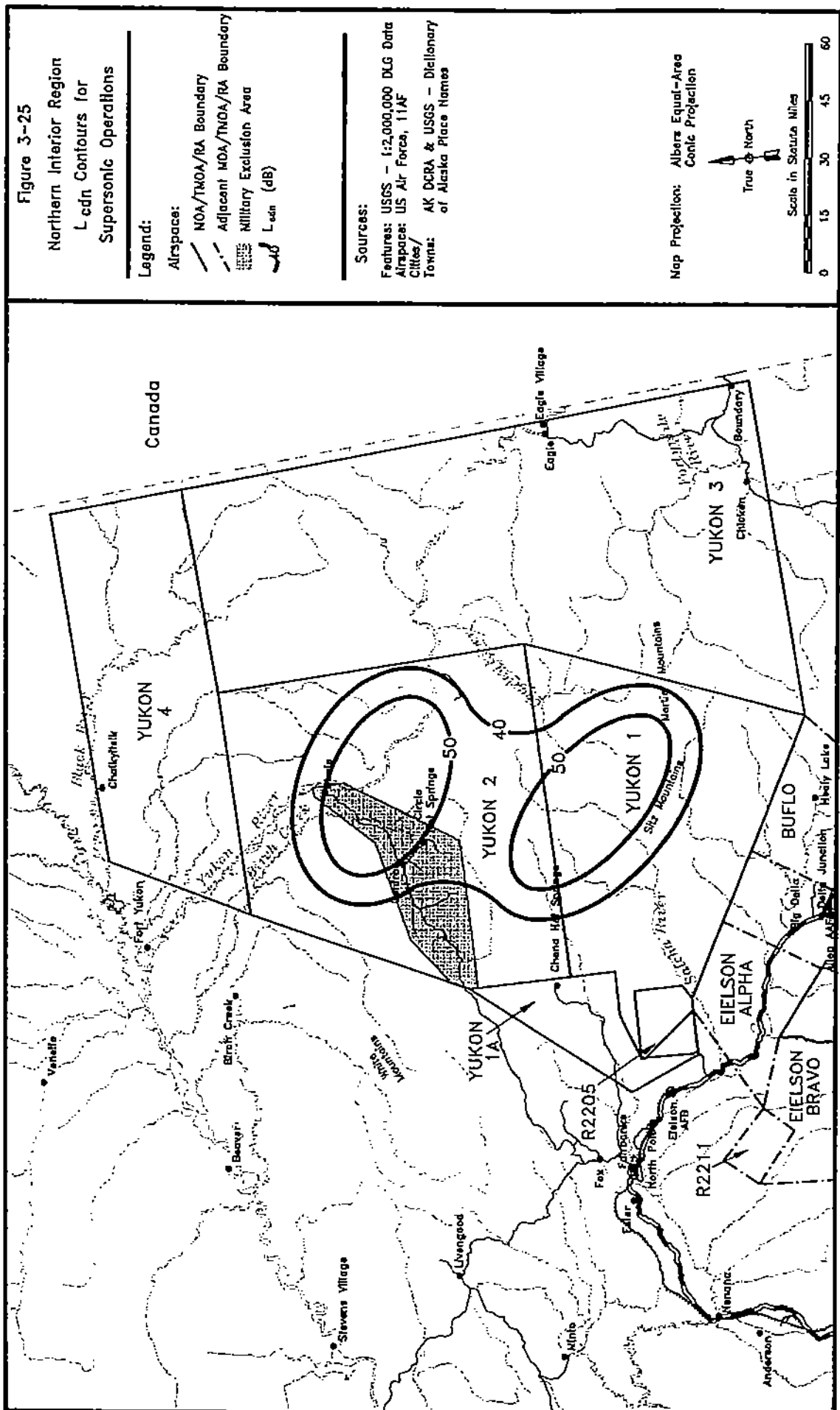
Supersonic operations below 30,000 feet MSL are not permitted in YUKON 1A, YUKON 3, or YUKON 4 TMOAs.

3.3.3.2 Stuart Creek Air-to-Ground Weapons Range (R-2205)

Subsonic

The NOISEMAP model was used to determine the noise impact of aircraft operations at subsonic airspeeds in the immediate target impact area. This methodology treats the range impact areas as miniature airfield runways around which multiple closed patterns (racetracks) are flown. These racetracks vary by aircraft types and weapons delivery profiles. Flight patterns of this nature very closely simulate airport traffic patterns, and for that reason the NOISEMAP model produces a more accurate representation of the sound levels in the vicinity of the impact areas. Conversely, the flights through the restricted areas, outside of the immediate vicinity of the impact areas, are more random and better represented by the MOAMAP model. The analysis indicated that for routine daily training operations, the maximum DNL is approximately 63 dB for the Stuart Creek range (R-2205). However, this level only occurs in the area immediately adjacent to the main target areas. Noise levels decrease to less than DNL 55 dB approximately 2 to 3 miles from the central target areas. The L_{dnmr} for the Stuart Creek range outside of the immediate vicinity of the impact area is less than 55 dB during routine training operations.

During an MFE, the noise level associated with aircraft operations increases to approximately DNL 65 dB for the Stuart Creek range (R-2205). Outside the immediate vicinity of the impact area and throughout the remainder of Stuart Creek range, the noise level is less than L_{dnmr} 55 dB.



3.3.3.3 Cumulative Noise in the Region

The environmental noise levels associated with the region are primarily affected by transportation or industrial noise and are closely related to population density and infrastructure. In the absence of significant noise sources such as interstate highways, major truck routes, railroads, airports, mining, logging, or agricultural activities, noise levels in rural and wilderness areas are typically in the range of DNL 35 to 50 dB. In addition to military aircraft operations in the MOAs, other military operations (low-altitude MTR training flights, C-130 LATN flights, and Army helicopter operations) contribute to DoD-generated noise throughout the area. Flight operations along MTRs 954 or 1909 (through YUKON 1 or YUKON 2) contribute up to a L_{dnmr} 3 dB increase in average noise levels during a month when an MFE is flown. Coincident operations in the C-130 LATN area overlapping these MTRs and the MOAs contribute less than an additional L_{dnmr} 0.1 dB increase over noise levels from MOA operations. Adding in occasional low-altitude helicopter operations in the western reaches of YUKON 1 and 2 MOAs also contributes less than a L_{dnmr} 0.1 dB increase. Non-DoD noise sources include propeller-driven aircraft operating throughout the area and low-altitude helicopter operations along the trans-Alaska oil pipeline. It is estimated that the low noise levels associated with civil aviation operations increase the total average noise by no more than L_{dnmr} 0.1-0.2 dB. Considering all of these noise sources, in the highest average noise area (western third of YUKON 1 MOA and in the YUKON 1A TMOA), the average noise levels in the region are still well below L_{dnmr} 55 dB.

In addition to the noise levels generated by subsonic aircraft operations, occasional sonic booms occur as a result of DoD flying activities in the YUKON 1 and 2 MOAs. These booms are similar to the noise generated by explosive devices such as those used in mining and road construction activities. In the western reaches of YUKON 1 MOA, these sonic booms would be similar to the noise of Army artillery firings into the Stuart Creek air-to-ground weapons range. Sonic booms occur occasionally as a result of air-to-air training activities (more often during MFEs), will be highly dispersed throughout YUKON 1 and 2 MOAs, and are generally expected to be in the 2 to 4 psf range (C-weighted SELs of approximately 107 to 114 dB).

3.3.4 Southern Interior Region

3.3.4.1 EIELSON A and EIELSON B TMOAs

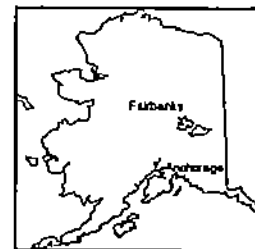
Subsonic

Routine training operations are not permitted in the EIELSON A and EIELSON B TMOAs. Noise impacts from routine Air Force training operations in the area are due to flights along MTRs 1900 and 1928 through the EIELSON B area and are less than L_{dnmr} 55 dB (USAF 1992a).

During an MFE, the L_{dnmr} in the EIELSON A and EIELSON B TMOAs is less than 55 dB. Highest noise levels occur in EIELSON A TMOA; noise levels in EIELSON B TMOA are approximately L_{dnmr} 5 dB less than in EIELSON A.

Supersonic

Supersonic operations below 30,000 feet MSL are not permitted in the EIELSON A and B TMOAs.



3.3.4.2 BUFLO TMOA

Subsonic

Routine training operations are not permitted in the BUFLO TMOA. Noise impacts from routine Air Force training operations in the area would be due to flights along MTRs 1926 and 935 through the northern/central portion of the BUFLO TMOA and are less than L_{dnmr} 55 dB (USAF 1992a).

During an MFE, the L_{dnmr} in the BUFLO TMOA is less than 55 dB and approximately L_{dnmr} 4 dB less than the EIELSON A TMOA.

Supersonic

Supersonic operations below 30,000 feet MSL are not permitted in the BUFLO TMOA.

3.3.4.3 Oklahoma (R-2202) and Blair Lakes (R-2211) Air-to-Ground Weapons Ranges

Subsonic

The NOISEMAP model was used to determine the noise impact of aircraft operations at subsonic airspeeds in the immediate vicinity of the target impact areas. This methodology treats the range impact areas as miniature airfield runways around which multiple closed patterns (racetracks) are flown. These racetracks vary by aircraft types and weapons delivery profiles. Flight patterns of this nature very closely simulate airport traffic patterns, and for that reason the NOISEMAP model produces a more accurate representation of the sound levels in the vicinity of the impact areas. Conversely, the flights through Oklahoma range (R-2202) outside of the immediate vicinity of the impact areas are more random and thus better represented by the MOAMAP model. Flight patterns through Blair Lakes range (R-2211) are much less random than Oklahoma range (R-2202) or Stuart Creek range (R-2205), and tend to concentrate the noise impacts directly under the flight paths similar to an MTR flight. The analysis indicates that for routine daily training operations, the maximum DNL is approximately 60 dB for the Oklahoma range area and approximately 71 dB for the Blair Lakes range. However, these levels only occur in the area immediately adjacent to the main target areas. Noise levels decrease to less than DNL 55 dB approximately 2 to 3 miles from the central target areas. The L_{dnmr} for Oklahoma range (R-2202) and Blair Lakes range (R-2211) is estimated to be less than 55 dB during routine training operations.

During an MFE, the noise level associated with aircraft operations is estimated to increase DNL 62 dB for the Oklahoma range (R-2202). Outside the immediate vicinity of the impact areas, the noise level remains less than L_{dnmr} 55 dB in the Oklahoma range and approximates those in the surrounding TMOAs (EIELSON A, EIELSON B, and BUFLO). Low-altitude MFE flight operations do not occur in Blair Lakes range (R-2211). Blair Lakes range is used as an aircraft orbit area for sequencing MFE aircraft back into the Eielson AFB traffic pattern. DNL levels in the Blair Lakes range are actually slightly less than for routine training operations as operations on the Blair Lakes range are reduced during MFEs.

3.3.4.4 Cumulative Noise in the Region

As discussed in section 3.3.3.3, the environmental noise levels associated with the region are primarily affected by transportation or industrial noise and are closely related to population density and infrastructure. Highest population concentrations in this region are located along the Richardson and Alaska Highways. In the absence of significant noise sources such as interstate highways, major truck routes, railroads, airports, mining, logging, or agricultural activities, noise levels in rural and wilderness areas are typically in the range of DNL 35 to 50 dB.

The temporary MOAs in this region are only activated up to 60 days per year during MFEs. Other routine military operations (low-altitude MTR training flights, C-130 and A/OA-10 LATN flights, plus Army helicopter operations) are the source of DoD-generated noise throughout the area. Flight operations along MTRs 928, 935, 937, 1900 or 1926 (through the same geographic areas as the EIELSON A, EIELSON B, and BUFLO TMOAs) contribute up to a L_{dnmr} 3 dB increase in average noise levels during a month when an MFE is flown. At other times, DoD flights along these MTRs are the dominant noise source in the region and are less than L_{dnmr} 55 dB. Coincident operations in the C-130 LATN area overlapping these MTRs and the MOAs contribute less than an additional L_{dnmr} 0.1 dB increase over noise levels from MOA operations and are the highest in areas near drop zones (DZs) such as Donnelly DZ in the western portion of the BUFLO TMOA. Adding in occasional low-altitude helicopter operations predominantly along the highways and in and out of R-2202 also contributes less than L_{dnmr} 0.1 dB increase. Non-DoD noise sources include propeller-driven aircraft operating throughout the area and coincident low-altitude helicopter operations along the trans-Alaska oil pipeline (under EIELSON A TMOA). It is estimated that the low noise levels associated with civil aviation operations increase the total average noise by no more than L_{dnmr} 0.1-0.2 dB. Considering all of these noise sources, in the highest average noise area (eastern half of EIELSON A, the eastern third of EIELSON B, and the western side of BUFLO TMOAs), the average noise levels in the region are still well below DNL 55 dB.

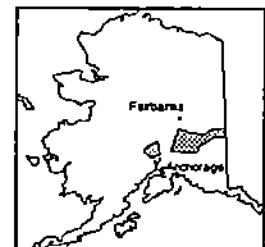
Supersonic operations below 30,000 feet MSL are not permitted in this region. It is possible that an occasional sonic boom could be heard on the ground due to high-altitude air training activities. These booms are similar to the noise generated by explosive devices such as those used in mining and road construction activities. In the western reaches of BUFLO TMOA, these sonic booms would be similar to the noise of Army artillery firings into the Oklahoma air-to-ground weapons range. Although sonic booms would not be expected to reach the ground in the vicinity of these TMOAs, if this were to occur, the intensity of the boom should be well below 2 psf (less than a C-weight SEL of approximately 107 dB).

3.3.5 Southcentral Region

3.3.5.1 FOX 1 and FOX 2 TMOAs

Subsonic

Routine training operations are not permitted in the FOX 1 and FOX 2 TMOAs. Noise from routine Air Force training operations in the area are due to flights along MTR 937 through the FOX 1 and 2 TMOAs, and is less than L_{dnmr} 55 dB (USAF 1992a).



During an MFE, the L_{dnmr} in the FOX TMOAs is below 55 dB. With the high floors in the FOX TMOAs and the lower number of MFE operations compared to the Northern and Southern Interior Regions, aircraft-generated noise levels are approximately L_{dnmr} 10 to 15 dB lower than in those regions.

Supersonic

Supersonic operations below 30,000 feet MSL are not permitted in the FOX TMOAs.

3.3.5.2 SUSITNA MOA

Subsonic

SUSITNA MOA is used as a routine training area for air-to-air operations. The L_{dnmr} in the MOA is below 55 dB.

Since SUSITNA is not used for MFE operations, the sound level in the MOA during an MFE month is the same as during a routine training month.

Supersonic

Supersonic operations are permitted in SUSITNA MOA down to 5,000 feet AGL/10,000 feet MSL, whichever is higher. As described in section 3.3.3.1, supersonic operations most often occur during air-to-air combat training. The relatively small size and the high terrain in the northwestern half of the SUSITNA MOA tend to concentrate air-to-air operations into the southern half of the MOA. An estimated 148 air-to-air sorties use the SUSITNA MOA in an average month. Using the same WSMR model described in section 3.3.1, the estimated maximum noise exposure due to supersonic air-to-air operations in the SUSITNA MOA is L_{dn} 46.7 dB with an average of 3.6 sonic booms per month. The range of changes in peak overpressures (Δp) are similar to those described in section 3.3.1.

3.3.5.3 Cumulative Noise in the Region

As discussed in section 3.3.3.3, the environmental noise levels associated with the region are primarily affected by transportation or industrial noise and are closely related to population density and infrastructure. Highest population concentrations in this region occur along the Richardson Highway south of Delta Junction, in the Glennallen area, and in the Talkeetna area. In the absence of significant noise sources such as interstate highways, major truck routes, railroads, airports, mining, logging, or agricultural activities, noise levels in rural and wilderness areas are typically in the range of DNL 35 to 50 dB. The temporary MOAs in this region (FOX 1 and FOX 2 TMOAs) are only activated up to 60 days per year during MFEs. Other routine military operations (operations in SUSITNA MOA, low-altitude MTR training flights, C-130 and A/OA-10 LATN flights, plus Army helicopter operations) are the source of DoD-generated noise throughout the area. Flight operations along MTRs 937, 940 and 1926 (through the same geographic areas as the FOX 1 and FOX 2 TMOAs) contribute up to a L_{dnmr} 10-12 dB increase in average noise levels during a month when an MFE is flown. At other times, DoD flights along these MTRs are the dominant noise source in the region and are less than L_{dnmr} 55 dB. Coincident operations in the C-130 LATN area overlapping these MTRs and the MOAs contributes an additional L_{dnmr} 2 dB increase over noise levels from TMOA operations. Adding in occasional low-altitude helicopter operations predominantly along the highways and in and out of R-2202 also contributes less than L_{dnmr} 1 dB increase. When compared to the Northern Interior and Southern Interior Regions, these other DoD noise sources have a higher impact on the Southcentral Region's average noise levels than do the limited, higher altitude operations in the FOX TMOAs. However, these other operations are confined along corridors (MTRs) or generally follow preplanned SKE routes used by C-130s. Non-DoD noise sources include propeller-driven aircraft operating throughout the area and coincident low-altitude helicopter operations along the trans-Alaska oil pipeline (under FOX 2 TMOA). It is estimated that the low noise levels associated with civil aviation operations increase the total average noise by no more than L_{dnmr} 0.1-0.2 dB. Considering all of these noise sources, in the highest average noise area (northern half of FOX 1 TMOA), the average noise levels in the region are still well below L_{dnmr} 55 dB.

Supersonic operations below 30,000 feet MSL are not permitted in the FOX TMOAs. Supersonic operations are authorized in the SUSITNA MOA at or above 5,000 feet AGL or 10,000 feet MSL, whichever is higher, and

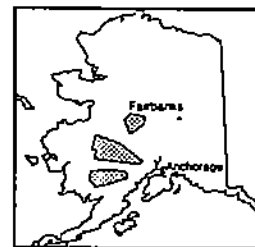
may result in a sonic boom occasionally being heard on the ground. These booms are similar to the noise generated by explosive devices such as those used in mining and road construction activities. Sonic booms occur occasionally as a result of air-to-air training activities, will be highly dispersed throughout SUSITNA MOA, and are generally expected to be in the 2 to 4 psf range (C-weighted SELs of approximately 107 to 114 dB).

3.3.6 Western Region

3.3.6.1 STONY MOAs/TMOA

Subsonic

The L_{dnmr} in the STONY A and STONY B MOAs is less than 55 dB during routine training operations. This noise level is concentrated in the central/west-central portion of the STONY A MOA over uninhabited areas. STONY B noise levels are approximately L_{dnmr} 3 dB below those in STONY A, mainly due to the high floor of 3,000 feet AGL in the STONY B MOA. The STONY C TMOA is not used for routine training.



Although not used for the MFEs, the STONY Airspace Complex is used for limited-scale, air-to-air exercises as described in section 3.2.5.2. During these short-duration, small-scale exercises, the L_{dnmr} in the STONY Airspace Complex remains below 55 dB, but increases approximately 2 dB over routine training operations.

Supersonic

Low-altitude (i.e., down to 5,000 feet AGL/10,000 feet MSL, whichever is higher) supersonic operations are currently approved in STONY A and B MOAs. As described in section 3.3.3.1, supersonic operations sometimes occur during air-to-air combat training. The STONY A and B MOAs, along with the ACMI system located in the western half of the STONY A MOA, comprise the prime air-to-air combat training area in Alaska. Often the training is accomplished with one flight of aircraft setting up on the western extreme of the ACMI coverage area (in eastern STONY B MOA) and the second flight using the eastern portion of the ACMI area to set up prior to engagement. From these setup areas, flights move to the engagements, generally in an east-to-west direction. It is estimated that approximately 501 air-to-air training sorties are flown in the STONY A and B MOAs on a monthly basis. Applying the same WSMR methodology as described in section 3.3.1, it is predicted that the 501 monthly air-to-air training operations in the STONY A and B MOAs generate a maximum noise level due to sonic booms of L_{dn} 52.0 dB and average approximately 12.0 sonic booms per month in the center of the area. Single event sonic boom levels would be the same as described in section 3.3.1, and tabulated in Appendix E.

During a limited air-to-air exercise, it is estimated that as many as 811 monthly air-to-air training sorties would use the STONY Airspace Complex. Under these exercise conditions, supersonic operations could be conducted down to 5,000 feet AGL/10,000 feet MSL, whichever is higher, in the permanent STONY A and B MOAs only. Supersonic operations in the STONY C TMOA are not authorized below 30,000 feet MSL. The maximum estimated noise exposure level due to supersonic operations in conjunction with air-to-air combat training is L_{dn} 54.1 dB in the STONY A and B MOAs, and the predicted number of booms per day could rise to an average of approximately 19.5. Figure 3-26 depicts the L_{dn} contours for potential supersonic operations during a month when routine training and a limited air-to-air surge exercise are occurring.

3.3.6.2 NAKNEK 1 and NAKNEK 2 MOAs

Subsonic

The NAKNEK 1 and 2 MOAs are used as a routine training area for air-to-air operations. The L_{dnmr} in the MOAs is below 55 dB, approximately 10 dB less than in the STONY MOAs.

Supersonic

Supersonic operations below 30,000 feet MSL are not permitted in the NAKNEK MOAs.

3.3.6.3 GALENA MOA

Subsonic

GALENA MOA is used only sparingly on an "as required" basis as an area for air-to-air operations. The L_{dnmr} in the MOA is below 55 dB, the lowest in the region.

Supersonic

Supersonic operations below 30,000 feet MSL are not permitted in the GALENA MOA.

3.3.6.4 Cumulative Noise in the Region

As discussed in section 3.3.3.3, the environmental noise levels associated with the region are primarily affected by transportation or industrial noise and are closely related to population density and infrastructure. No major ground transportation infrastructure links communities in the region. The largest villages are located under the STONY A and B MOAs along the Kuskokwim and Holitna River drainage. In the absence of significant noise sources such as interstate highways, major truck routes, railroads, airports, mining, logging, or agricultural activities, noise levels in rural and wilderness areas are typically in the range of DNL 35 to 50 dB. MOA operations occur predominantly in STONY A and B MOAs, with less activity in the NAKNEK 1 and NAKNEK 2 MOAs. Other routine military operations (low-altitude MTR training flights, and C-130 LATN flights on the very eastern edge of the region) contribute to the total DoD-generated noise throughout the region. Flight operations along MTRs 931, 933, and 1905 contribute up to a L_{dnmr} 5-7 dB increase in average noise levels during a month when a surge exercise is flown, particularly in the STONY A and B MOAs and STONY C TMOA. At other times, DoD flights along these MTRs are the dominant noise source in the area of the NAKNEK and GALENA MOAs. Coincident operations in the C-130 LATN area overlapping these MTRs and the MOAs contributes an additional L_{dnmr} 0.1-0.2 dB increase over noise levels from MOA operations. Non-DoD noise sources includes propeller-driven aircraft operating throughout the area. It is estimated that the low noise levels associated with civil aviation operations increase the total average noise by no more than L_{dnmr} 0.1-0.2 dB. Considering all of these noise sources, in the highest average noise area (western half of STONY A MOA), the average noise levels in the region are still well below L_{dnmr} 55 dB.

In addition to the noise levels generated by subsonic aircraft operations, occasional sonic booms occur as a result of DoD flying activities in the STONY A and B MOAs. These booms are similar to the noise generated by explosive devices such as those used in mining and road construction activities. Sonic booms occur occasionally as a result of air-to-air training activities (more often during limited surge exercises), will be highly dispersed throughout the MOAs, and are generally expected to be in the 2 to 4 psf range (C-weighted SELs of approximately 107 to 114 dB).

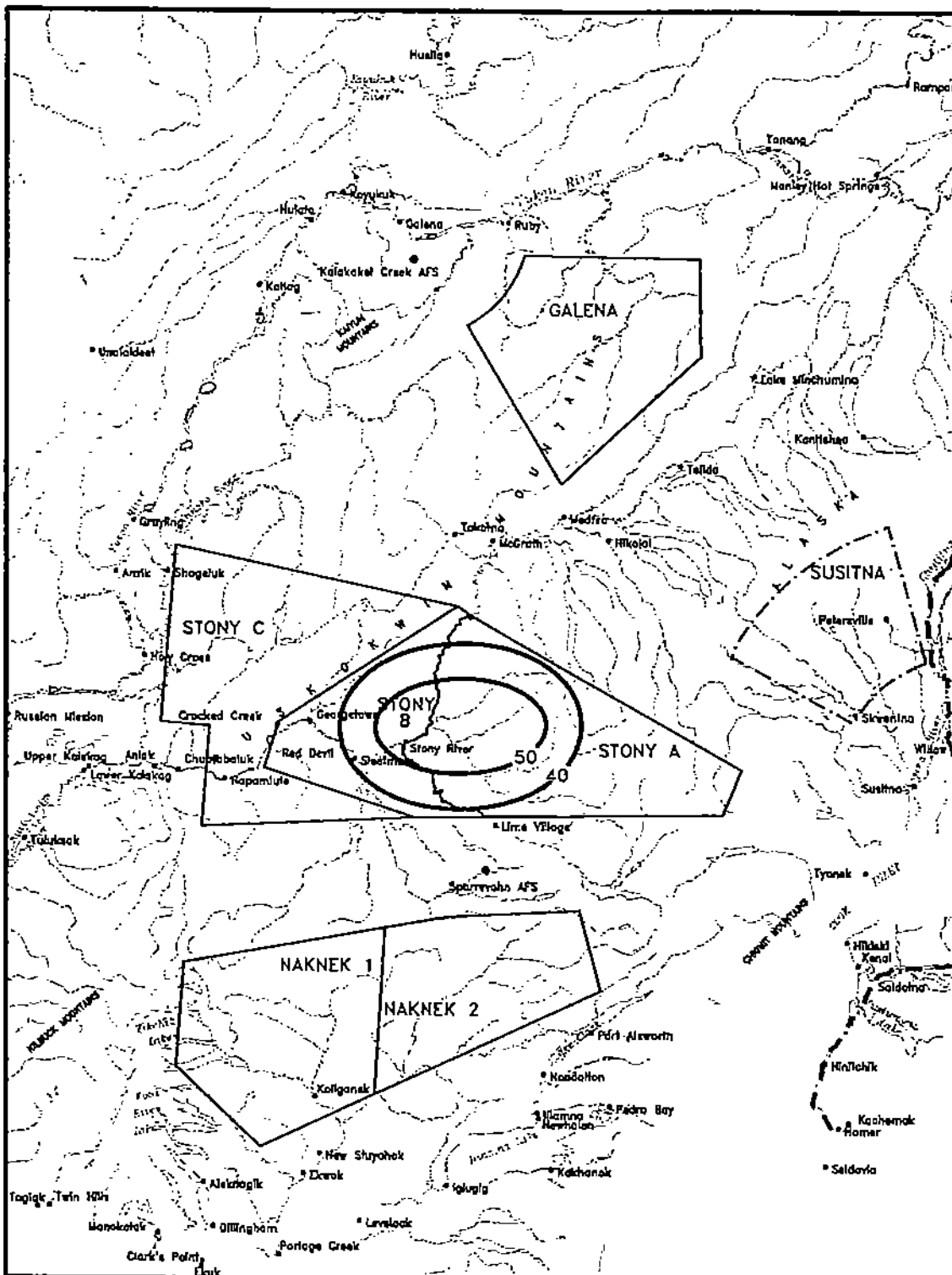


Figure 3-26
Western Region
Lcdn Contours for
Supersonic Operations

Legend:

Airspace:

- MQA/TMOA Boundary
- - - Adjacent MQA Boundary
- Lcdn (dB)

Sources:

Features: USGS - 1:2,000,000 DLG Data
Airspace: US Air Force, 11AF
Cities/
Towns: AK DCRA & USGS - Dictionary
of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection



Scale in Statute Miles

0 25 50 75 100

3.4 Chaff and Flares/Hazardous Operations

3.4.1 Background

Issues addressed in this section focus on the employment of chaff and flares, use of air-to-ground lasers, munitions use and handling, emergency response procedures for wildfire management, aircraft emergency fuel jettison procedures, and hazardous materials and wastes.

3.4.2 Chaff and Flares

3.4.2.1 Chaff

In 1989, the Strategic Air Command (SAC) released a publication entitled *Identifying and Evaluating the Effects of Dispensing Chaff from Military Aircraft* (USAF 1989). It documents the environmental effects of releasing chaff from aircraft, and is intended to be incorporated by reference in site-specific National Environmental Policy Act (NEPA) analyses to eliminate repetitive discussions of issues related to the use of chaff along MTRs and in MOAs. Over 100 reports were reviewed and analyzed, and the prevailing opinion was that chaff does not present a significant environmental impact. *Identifying and Evaluating the Effects of Dispensing Chaff from Military Aircraft* is herein incorporated by reference and relevant parts are summarized in this section.

Characteristics and Use

Chaff is composed primarily of silica (60 percent), with an aluminum surface (approximately 39 percent), and a coating of stearic acid. It consists of type-E glass monofilaments (fiberglass), called dipoles, each with a diameter of 0.001 to 0.003 inches (or about the thickness of fine human hair). Each fiber is coated with aluminum of 99 percent purity and has a second coating of stearic acid to prevent the fibers from sticking together. Chaff dipoles vary in length from 0.38 to 2 inches, so they can be effective against different frequencies of radar emissions. A standard "bundle" of training chaff is housed in a plastic, cardboard, or metal casing measuring 1 x 1 x 7 inches, and weighs approximately 4 ounces. Chaff bundles may contain between 500,000 and 3 million dipoles. The silica (SiO_2) in chaff contains no resin. Silica exists in nature in a pure state as quartz; is the main constituent of sand, sandstone, and diatomaceous earth; and comprises about 28 percent of the earth's crust. Aluminum is the third most abundant element in the earth's crust and is found in clays, mica, kaolin, and feldspar. It is highly resistant to corrosion and insoluble except in extremely acidic conditions. It occurs in the soil naturally in concentrations of 71,000 milligrams per kilogram (mg/kg). Varying amounts are found in the soil, air, water, and plant and animal tissue, including food products. The aluminum in chaff oxidizes to Al_2O_3 , a compound found in nature from which most aluminum is mined. The period of time over which oxidation occurs depends greatly upon environmental conditions and the size and shape of the original aluminum. Stearic acid, the third component of chaff, is an environmentally benign organic compound that biodegrades after several days of exposure to light and air, and has no impact on the environment.

Chaff is used by the military as a defensive mechanism to avoid detection by radar. Chaff is released from an aircraft in "bundles" from a dispenser and spreads in the air to form an "electronic smoke screen" that reflects radar signals. In the air, the initial burst from a bundle forms a sphere about 300 feet in diameter. This sphere shows up on radar screens as an electronic cloud. The aircraft is obscured by the cloud, which confuses enemy radar. The chaff casing is retained by the aircraft, and no packaging material is dispensed into the atmosphere. Chaff itself is not typically visible from the ground when dispersed in the air.

Chaff is employed in bursts, at a dispensing rate of 2 bundles per second for 2.9 seconds. Subsequent chaff bursts, if necessary, are usually spaced over a 2-minute period. Chaff dispensers can be programmed to produce spherical clouds approximately 300 to 600 feet in diameter at a density of one dipole per 3 to 7 cubic feet (ft^3). Optimal concentrations of the chaff cloud are one dipole per 5 ft^3 of airspace. Chaff dispensed in this manner is not likely to clump together even during adverse weather.

Chaff flutters through the air when released from the aircraft at an estimated fall of 50 feet per minute or less. Initial ambient concentrations are about 120 micrograms per cubic meter, but it dissipates quickly due to its light weight and the effects of wind and air currents. As a result, extremely wide dispersion patterns are produced, and it is not unusual for chaff dipoles, after medium-altitude release, to land 20 miles from the release point, with a concentration of two to three dipoles per 2,000 square feet (ft²). Occasionally, chaff bundles do not disperse completely, and small clumps may fall close to the originating point in higher concentrations. Factors affecting dispersion and deposition rates of chaff include aircraft speed and drop altitude, wind direction and velocity, humidity, and release quantities.

3.4.2.2 Flares

Characteristics and Use

Flares are small, intense heat sources ignited upon ejection from the aircraft. They are similar to highway safety flares or boating signal flares, but burn hotter and burn out very quickly. Fighter aircraft are capable of carrying and dispensing flares. The use of flares by aircrews is necessary to simulate realistic combat training conditions. Flares are of two types: illuminating and self-protection. Illuminating flares are not employed in the MOAs. Self-protection flares are devices ejected by the aircraft as a means of misleading the guidance systems of heat-sensitive or heat-seeking targeting systems. By providing a more intense heat source than the aircraft engine, the flares become the target rather than the aircraft. Under training scenarios, heat-seeking missile firing is simulated by electronic tones and the pilot releases flares to thwart the simulated attack.

Flares consist of an extruded pellet formed of a composite of magnesium and Teflon®. Standard flare components are an ignition device, a small plastic piston, the flare pellet wrapped in aluminum foil, and a plastic or aluminum end cap. When the aircrew activates a flare, an electrical firing mechanism simultaneously ignites and expels (through gas pressure) the flare from the aircraft. The flare begins burning immediately, reaching its highest temperature (1,000° F) by the time it passes the tail of the aircraft.

The flare pellet is designed to burn completely within approximately 4 to 5 seconds after dispensing. In this period, the combustible flare pellet is completely consumed so no burning material can contact the ground. The flare cartridge remains in the aircraft. The primary combustion product of flares is magnesium oxide (MgO), a mildly toxic substance. The threshold level of concern for MgO concentrations in air is 10 milligrams per cubic meter (mg/m³). Concentrations approaching that level would only occur near a burning flare. Given the short burn time of flares and rapid dispersion of MgO in the air, the health risk from MgO exposure is considered negligible. Flare ejection mechanism fragments, consisting of small (2 ounces) metal ignition devices and primer pins, may also survive as debris and fall to the surface.

Although there is a possibility that a flare could fall to the ground unignited, the Air Force has established an unofficial probability of 0.001 percent (or 1 in 100,000) for the potential of an unburned flare actually reaching the ground. Flares equipped with self-triggering ignition devices in which the igniter is released with the flare pellet contain safety mechanisms that prevent manual ignition by someone finding it on the ground. However, the safety mechanisms could be bypassed and the flare ignited, potentially causing injury. Flares with this ignition device were to be phased out by 1994 and, at any rate, are not currently used over non-DoD land. Flares equipped with an ignition device that remains with the flare dispenser on the aircraft are less hazardous if found on the ground. The flare requires a very hot flame (approximately 800° F) to ignite. This is the only model flare used over non-DoD land. Ingestion of unburned flares by livestock or wildlife is another environmental concern. However, in light of the extremely low probability of unburned flares reaching the ground, the likelihood of this occurring in any significant numbers is negligible.

3.4.2.3 Chaff and Flare Employment in Alaska

Current 11th Air Force policy dictates that "Chaff and flares will only be dispensed in restricted areas, permanent MOAs, and warning areas. Chaff and flare use in temporary MOAs or temporary exercise airspace is prohibited" (USAF 1993b). During MFEs, chaff can be used inside the *Fight's On Line* (see Figure 3-27) in YUKON 1 and YUKON 2 MOAs and on the Oklahoma and Stuart Creek ranges (R-2202 and R-2205). Use of chaff in these areas is carried out in accordance with the applicable regulations summarized below. Use of flares is currently prohibited by 11th Air Force policy during MFEs (USAF 1993b).

3.4.2.4 Operational Procedures for Chaff and Flare Employment

Air Force safety regulations (*AFR 127-100*) require safeguards on weapons systems and ordnance, including chaff and flares, that ensure against inadvertent releases. In addition, *AFR 55-79* outlines operational procedures that ensure against releases at improper altitudes or over inappropriate areas. Specific 11th Air Force directives for use of chaff and flares in Alaska include:

- Chaff/flare systems will not be armed unless in an approved area with an intent to dispense chaff and/or flares.
- Use of flares is authorized in permanent MOAs and restricted areas with the following restrictions:
 - Overland, from June 1 through September 30, flares may only be employed above 5,000 feet AGL.
 - Overland, from October 1 through May 31, minimum altitude for flare use in permanent MOAs is 2,000 feet AGL. Minimum altitude for flares in restricted areas is the most restrictive of Joint Regulation 55-79, as supplemented, or unit flying regulations.
- There is no restriction on flare employment when operating in over-water ranges.

Chaff Areas During an MFE

Airspace:

Adjacent MDA/TMDA/RA Boundary

Military Exclusion Area

Sources:

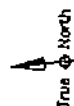
Features: USGS - 1:2,000,000 DLG Data

Almpaca: US Air Force, CIAF

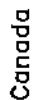
 $\text{C}_2\text{H}_5\text{O}_2/\text{C}_2\text{H}_5\text{O}_2$

AK DCRA & USGS - Dictionary
of Alaska Place Names

Map Projection: Albers Equal-Area Conic Projection



Scale in Statute Miles



3.4.3 Laser Use

Both the F-15E and the F-16C operate with LANTIRN during air-to-ground routine training and MFE missions. The LANTIRN system targeting pod has operational ("combat") and training mode lasers. The training mode laser is "eye-safe" and is approved for unrestricted use throughout all Alaskan airspace [AFR 50-46/11 AF Suppl. 1, 15 May 1992, para 6-1 b (11)].

3.4.3.1 Training Mode

Several redundant safety mechanisms ensure lasers are not operated in the "combat mode" unintentionally. The combat/training mode switch is in the system pod on the underside of the aircraft and can only be switched when the aircraft is on the ground and the access cover is removed. Normally, the mode is set by the ground crew and checked by the aircrew before flight. When the switch is set for "combat mode," the LANTIRN laser cannot be fired until: (1) the pilot has turned the targeting pod power on, (2) the aircraft is airborne, (3) the pilot or weapons system officer has armed the laser, and (4) the pilot has pulled the laser fire paddle switch. When the aircraft is powered and power is applied to the targeting pod, a signal in the cockpit indicates to the pilot whether the laser is in the training or combat mode. The laser fail-safe system also switches the system to the training mode whenever there is a fault in the mode selection mechanism. This fail-safe override ensures accidental operations in the combat mode will not occur due to mechanical failure. There is a theoretical hazard from the training mode laser, which operates at a wavelength to 1,540 nanometers. A laser in that frequency range could damage the eyes of a person looking directly into the beam through a 25 power magnification device at a distance of 100 feet for 10 seconds or more. These conditions could not realistically occur.

3.4.3.2 Combat Mode

In the combat mode, the LANTIRN laser operates at a wavelength of 1,064 nanometers. A high power beam of light at that wavelength can damage human eyes before the natural blink response can protect them. The LANTIRN laser operating in the "combat mode" is a hazard to eyes at a distance of several miles. Because of these hazards, the LANTIRN "combat mode" laser (or any other non eye-safe airborne laser) can only be used within the restricted areas and only when specifically approved by the Range Control Officer. All laser training and operations are scheduled in advance at the weekly Alaska Air Operations scheduling meeting. Requests must include the type of laser, target, attack heading, ordnance, altitude of designating aircraft, and altitude/distance from target. Laser footprints must not exceed the impact area boundaries [AFR 50-46/11 AF Suppl. 1, 15 May 1992, para 11-3 d.(2)]. Range personnel are required to wear protective glasses at appropriate times.

3.4.4 Munitions Use and Handling

Inert and live explosive munitions may be carried during training flights within the existing permanent and previously utilized temporary MOAs. During air-to-ground training, F-15Cs and F-15Es may carry gravity (free fall) bombs and ammunition for the 20 millimeter cannons; and OA-10As may carry bombs, rockets, and ammunition for the 30 millimeter cannon. Air-to-air training munitions simulate air-to-air missiles and, when authorized, 20 millimeter ammunition for air-to-air practice firings on towed targets. These practice firings only occur over the water southeast of Blying Sound, in Warning Area 612.

Air Force safety regulations require safeguards on weapons systems and ordnance to ensure against an inadvertent release. When carried, munitions are mounted on aircraft with mechanisms designed to preclude release without activating an electronic circuit.

In 1993 some 16,982 munitions (inert and live explosive bombs and forward firing rockets) and 122,973 rounds of ammunition were expended by 6,807 air-to-ground sorties on the three air-to-ground weapons ranges. The primary training munitions expended was BDU-33 (a 25-pound or less training bomb composed of ferrous metals and a small spotting charge equivalent to two shotgun shells). BDU-33 expenditures accounted for over 88 percent (15,006 of 16,982) of the total bombs delivered in 1993; live bombs expended accounted for nearly 6 percent of the total with the forward firing rockets being the balance. 11th Air Force Safety Office reports no known instance of an inadvertent (uncommanded) release of munitions in Alaska.

3.4.5 Emergency Response Procedures

3.4.5.1 Fire Management

One of the greatest hazards associated with the use of ordnance or flares, especially live ordnance, is the chance of a wildland fire being inadvertently started. To prevent this, 11th Air Force assesses potential fire conditions in its operations areas. The range agencies determine fire conditions at least every 24 hours (rating them Low, Moderate, High, or Extreme) and provides this information to the flying squadrons. Operational restrictions for the different conditions and munitions vary by range and are outlined in *AFR 50-46/11 AF Suppl. 1* and 11th Air Force Message: *Fire Index Restrictions on Weapons Delivery* (USAF 1993d).

The Alaska Fire Service (managed under the Bureau of Land Management [BLM]), in accordance with interservice support agreements, has assumed fire detection and suppression services for all range and forest wildland fires on Army lands. The Air Force has agreed to respond with firefighting capability, to the extent possible, in the event that the Alaska Fire Service is unable to respond due to other firefighting priorities. All aircrew fire or smoke observations are immediately reported to the Eielson Range Control. Eielson Range Control forwards the information to the appropriate Army Range Control, Eielson AFB Command Post, and the Eielson AFB Fire Department Communications Center. Eielson Range Control may request aircraft operating on a range to provide the location of the fire, relative size, and movement, if available. Air Force procedures restrict aircraft from flying below 5,000 feet AGL within 5 miles of an active ground fire. Recently completed agreements between 11th Air Force, the Alaska Fire Service, and the Alaska Department of Transportation establish similar procedures for fire reporting and avoidance for any ground fires outside of the ranges.

3.4.5.2 Aircraft Emergency Fuel Release Procedures

Occasionally an inflight emergency may dictate that an aircraft immediately reduce its inflight gross weight by jettisoning fuel in order to make an emergency landing. This reduction in weight is normally accomplished by flying with higher power settings/aerodynamic drag configurations in order to use fuel at an excessive rate. When the situation is of such a serious nature that prolonging aircraft flight to "burn down" fuel is not considered a viable alternative, then aircraft fuel jettison procedures are authorized. There are two fuel jettison areas in the vicinity of Eielson AFB: a North area located between 35 and 41 NM north of the airfield and a South area

located between 35 and 41 NM south/southeast of the base. Elmendorf AFB has one fuel jettison area located 22 NM southwest of the airfield and over Cook Inlet. The only Alaska-based aircraft capable of fuel jettison are the F-15s at Elmendorf AFB and the Alaska Air National Guard KC-135s at Eielson AFB. F-15s are required to jettison fuel at or above 5,000 feet AGL; KC-135s must jettison fuel at or above 25,000 feet MSL. Jettisoning at these altitudes or higher ensures fuel vaporization to preclude it reaching the ground in liquid form. When fuel is jettisoned, the aircrew records information such as time, location, magnetic heading, altitude, true airspeed, amount of fuel jettisoned, jettison rate, outside air temperature, and wind direction/velocity. This information is reported to the appropriate base environmental engineer, safety, legal, and operations personnel. There are currently no EPA regulations or restrictions concerning fuel jettisoning from either commercial or military aircraft.

3.4.5.3 Hazardous Materials and Wastes

The following hazardous materials are stored on-base at Eielson AFB: hydrazine, sulfuric acid, formaldehyde, and chlorine; other hazardous materials stored in bulk are motor oil, gas cylinders, and lye (USAF 1993e). At Elmendorf AFB, ammonia, sulfuric acid, and chlorine are stored; hydrazine is stored only when F-16 aircraft are present (USAF 1994a). Eielson and Elmendorf AFBs are classified as Large Quantity Generators of hazardous wastes under the Resource Conservation and Recovery Act (RCRA). All hazardous materials and wastes are handled in accordance with RCRA, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Emergency Planning and Community Right-to-Know Act (EPCRA), Air Force Occupational Safety and Health standards; and applicable state requirements. Both bases have pollution prevention programs in place, such as hazardous material pharmacies, to control ordering and use of hazardous materials to minimize the amount of hazardous materials used and, consequently, the amount of hazardous waste generated. Part of this pollution prevention effort is finding and using suitable substitutes for hazardous materials whenever possible.

The *Eielson AFB OPLAN 355-1: Disaster Preparedness* (USAF 1993e) and *3rd Wing OPLAN 355-1: Disaster Preparedness* (USAF 1993f) establish procedures for responding to flight, ground, and weapons mishaps for the 354 FW, 3 WG, and host bases (Eielson and Elmendorf AFBs). These plans contain procedures for preventing further loss of life and/or property damage, securing the accident site, and making the site safe for mishaps occurring on- and off-base and at remote locations. Actions outlined include providing emergency medical care, firefighting, and rescue support; securing the wreckage site; clearing ordnance; preserving perishable evidence; and notifying appropriate officials. The plans specify that, in the event of a release of a hazardous or toxic substance, a decontamination team will respond to the site and take actions that comply with applicable state and federal regulations (e.g., 18 AAC 75; 29 CFR 1910.129; 29 CFR 194; 40 CFR 300; 40 CFR 112; and 40 CFR 355). The plans establish specific procedures for incidents involving hazardous materials, including notification, response, containment, and recovery phases.

F-16s carry a small quantity of hydrazine in a sealed (6.6-gallon) container. Hydrazine is a toxic and flammable hazardous material that is unique to the operational requirements of the aircraft. Hydrazine (N_2H_4) is a clear, oily liquid with an ammonia-like odor (3 to 5 parts per million odor threshold) that autodecomposes at 550° F, has an open-cup flash point of 154° F, and is hygroscopic (readily absorbs moisture from the atmosphere). It is combustible in solution with water at concentrations of 40 percent or less, and its evaporation at any given temperature is slightly slower than that of water. The hydrazine used in F-16 aircraft is a mixture of 30 percent water and 70 percent hydrazine and is called H-70. The hydrazine is transported to the base in the canisters used on the aircraft. It is transported, stored, and handled in accordance with all appropriate federal, state, local, Air Force, and Eielson AFB regulations and guidelines. The canisters are installed on and removed from the F-16 aircraft by personnel who have been specially trained in the handling of this material.

The EPA classes hydrazine as a hazardous material because it is flammable and toxic to humans. Pathways of human exposure are ingestion, inhalation, and rapid absorption through the skin. Health effects from short-term exposure to high concentrations of hydrazine include burns; dizziness; nausea; and irritation of eyes, nose, throat,

and lungs. Exposure to very high concentrations can result in loss of consciousness and blindness. Long-term adverse health effects include liver and kidney damage. Hydrazine is also toxic to terrestrial and aquatic organisms at the parts per million level (Harrah 1982; Hudson 1982; and Kane and Williamson 1982).

Spill prevention and response plans for hydrazine include personnel training and organization of a hydrazine response team to ensure quick action in the event of accidental H-70 spills, suspected leaks, or F-16 emergency power unit (EPU) firings. All personnel who perform duties around the F-16 aircraft are thoroughly briefed on the properties and hazards of hydrazine. The procedures for hydrazine spill neutralization are based on the chemical reaction of H-70 with ordinary household bleach (5 percent sodium hypochlorite) or high-test hypochlorite (HTH) (granular calcium hypochlorite), which yields water, nitrogen, and harmless salts. Procedures for handling hydrazine and responding to spills or leaks are specified in *Technical Order (T.O.) 1F-16CG-2-49GS-00-1* (1992) and *Eielson AFB OPLAN 355-1* (USAF 1993e). The basic procedure is to mop up as much of the hydrazine as possible, neutralizing any remaining damp spots, and flush with water. In locations where floors and drainage systems have a holding sump, hydrazine may be immediately flushed into the holding sump with water for subsequent treatment and release. Because hydrazine is highly toxic to aquatic and terrestrial organisms, spills cannot be flushed directly into a storm or sanitary sewer drain. Where a holding sump is not available, general cleanup procedures involve containing the spill with polypropylene felt; diluting it with water (1:1 by volume) to reduce immediate fuming and fire hazards; mopping up as much of the product as possible with absorbent felt; neutralizing the surface area with bleach (for small spills less than 1 liter) or with a premixed HTH solution (for larger spills); and flushing the area with large amounts of water. Saturated (waste) felt would be placed in a container partially filled with water or 50 percent methanol/water solution, depending on the ambient temperature. Leaks would be handled by placing a bucket of water beneath the source, isolating and containing the leak, and neutralizing the waste solution. Spills on aircraft ramps would be absorbed with felt in accordance with procedures outlined above. Remaining damp areas would be neutralized with bleach and then flushed with water. Contaminated aircraft would be wiped with absorbent material, flushed with water, cleaned with detergent, then flushed again. Runoff would be collected and neutralized as outlined above. Response to an activated EPU would involve air sampling and surface wipes to test for hydrazine leakage.

Impacts on soils, surface water, and groundwater from accidents on base involving hydrazine would likely be of minor consequence. H-70 surface contamination would be diluted and neutralized to form harmless products. Its movement through natural soils composed of various fractions of sand, clay, and organic matter has been demonstrated to be slow and limited (Braun and Zirrolli 1983). It is expected that movement of hydrazine through these soils would be similarly limited due to absorption and chemical decomposition processes. Timely action by the trained hydrazine response team would be expected to preclude H-70 migration through soil to groundwater.

During normal hydrazine service and storage operations, potential effects on air quality and base personnel would be minimized by the provision of adequate ventilation and use of protective clothing and equipment. Mitigation during spill or leak response actions would adhere to proper procedures, including evacuating areas 100 feet upwind and farther downwind of the affected site, and use of self-contained breathing apparatus and other protective gear such as firemen's boots, rocket fuel handler's gloves, and hooded suits by response team members. Impacts on base personnel and the environment would be negligible due to specification and use of appropriate equipment and procedures for both normal conditions and accident response. Dissemination of information on hydrazine to the local emergency response agencies would also help to minimize hydrazine exposure during hazardous materials spill response.

The Air Force would most likely be the first responder to aircraft accidents occurring in remote areas, which constitute the majority of the areas underlying MOAs. Crashes of sufficient force to rupture the hydrazine containers on board the aircraft would probably result in a fire that would consume the hydrazine. The probability of the hydrazine not being completely consumed is remote. If not completely consumed, impacts to soil and groundwater would likely be minor as the movement of hydrazine through natural soils composed of various fractions of sand, clay, and organic matter has been shown to be slow and limited. Movement of

hydrazine through such soils would be limited due to absorption and chemical decomposition processes. If hydrazine were to reach a surface water body, there would be adverse effects on aquatic life, but the chances of such an occurrence are exceedingly small. In the case of any accident where a spill of hazardous materials occurs, the Air Force is ultimately responsible for cleanup. Once the accident investigation is completed, the Air Force would undertake site cleanup.

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3.5 Biological Resources

3.5.1 Background

Numerous ecosystems underlie the airspace, and their cumulative species diversity is great. The countless interactions involving these species and their physical environment are complicated. The information presented in this chapter is intended to provide the reader with sufficient background on the current status of potentially affected resources to understand the analysis of environmental consequences presented in Chapter 4. Therefore, information on biodiversity and protected species is presented as a broad overview to set the stage for Chapter 4. The information on specific species addressed in the analysis is more detailed, but it is not intended as a comprehensive presentation detailing all aspects of these species' biology and ecology. Rather, the information collected and presented here focuses on the species' life histories and current statuses, numbers, and distribution only to the extent necessary to: 1) identify life-cycle phases when these species might be vulnerable to adverse consequences associated with the proposed activities, and 2) establish where within the geographic scope of this analysis the species might occur during these critical life-cycle phases.

3.5.1.1 Issues and Species Addressed

Selection of issues and species was based on pertinent environmental regulations, on discussions with federal and state natural resource management agencies, and on public scoping. The issues identified were diverse but centered on biodiversity; protected species; terrestrial wildlife species important to subsistence, sport hunting, and wildlife viewing in areas that would be overflowed; and avian species living in overflowed areas as well as actually sharing the airspace. Consultation with the U.S. Fish and Wildlife Service (USFWS) indicated that the only federally listed species to be addressed in this analysis was the peregrine falcon.

The Alaska Department of Fish and Game (ADF&G), the USFWS, the National Park Service (NPS), and the BLM provided direction regarding which species were most appropriate for evaluation and analysis. Many public and private individuals and organizations provided input through the public scoping process. Terrestrial species addressed are caribou, moose, Dall sheep, brown bear, black bear, bison, wolf, and furbearers (lynx, beaver, river otter, marten, mink, and wolverine). Avian species or species groups addressed are peregrine falcon, bald eagle, golden eagle, gyrfalcon, rough-legged hawk, osprey, northern goshawk, waterfowl, and trumpeter swans.

3.5.1.2 Data Collection Methodology

For terrestrial species, the ADF&G Habitat Management Guides (1985, 1986a, 1986b) provided the point of departure. These documents provided the most comprehensive information available at the time of their publication on the status, numbers, and distribution of major Alaskan wildlife species. Caribou, moose, Dall sheep, brown bear, and bison are covered. Since some species, including black bear, wolves, and furbearers, are not covered and the information is somewhat dated, further investigation was required. This involved document review, particularly of the series of publications regularly produced by ADF&G under the Federal Aid in Wildlife Restoration program. It also involved bringing ADF&G, USFWS, NPS, and BLM headquarters- and field-based biologists into the process of updating the information provided in the 1986 Habitat Guides. Maps showing the species' normal and critical-season ranges from the 1986 guides and applicable overlapping MOAs were forwarded to these agencies and circulated among appropriate biologists. These biologists were then interviewed, the maps revised accordingly, and related discussions considered in this text.

For avian species, a literature search to obtain biological data and determine the availability of information on Alaska bird population dynamics and aircraft noise impacts was conducted by contacting experts in the scientific community and searching the following databases:

- Books in print
- National Technical Information Service (NTIS) (1964 to date)

- AGRICOLA (National Agriculture Library) (1970 to date)
- SCISEARCH (Institute for Scientific Information) (1974 to date)
- DTIC (Defense Technical Information Center)
- Life Science Collection (Cambridge Scientific Abstracts) (1978 to date)
- Biological Abstracts (BIOSIS, Zoological Record) (1969 to date)
- Zoological Abstracts (1978 to date)

Major search variables included population, migration, wintering, breeding, altitude, distribution, and aircraft noise disturbance for waterfowl (ducks, geese, and tundra and trumpeter swans), gulls, shorebirds, cranes, and raptors (peregrine falcons, bald eagles, golden eagles, gyrfalcons, ospreys, northern harriers, sharp-shinned hawks, northern goshawks, red-tailed hawks, rough-legged hawks, American kestrels, and merlins).

The following information on distributions in Alaska was obtained from the USFWS and ADF&G:

- Peregrine falcon, bald eagle, and other raptor nest site data (Schempf 1993; Ambrose 1993; Hughes 1993)
- Waterfowl breeding population survey data (Conant and Groves 1993b)
- Trumpeter and tundra swan survey data (Conant 1993)
- Waterfowl, raptor, and shorebird migratory and breeding concentration data (Butler and Gill 1993; King 1993)
- Waterfowl and raptor breeding and migrating distributions (ADF&G 1986b)

These data were digitized into the Geographical Analysis Support System (GRASS) geographical information system (GIS) to determine bird migration and breeding distributions and population sizes relative to the proposed Alaska MOAs.

While all reasonable efforts were made to compile information of comparable quantity and quality on each species addressed in this analysis, this was not always possible. The size of the potentially affected area, its biological diversity, the unique data-collection problems posed by many species, and the limited resources available to the agencies to maintain comprehensive and up-to-date data bases on all species resulted collectively in differences in the background information available on various species in different areas.

3.5.1.3 Organization of Section

Biological information generic to the areas potentially impacted by the Proposed Action and Alternatives is presented in the following "Overview" section. This includes information on biodiversity and protected species as well as profiles of specific species addressed. These profiles include statewide status, numbers and distribution, and a life-cycle overview focusing on the timing of critical phases.

The overview section is followed by a region-by-region description of the wildlife resources under the proposed military airspace, again emphasizing the timing and geographic location of critical phases. Under the heading of each region, discussion starts with a given species or group of species, then moves to specific MOAs or TMOAs. In cases where airspace units are contiguous within a region (e.g., the Northern and Southern Interior Regions), the most comprehensive information regarding a species is presented at the regional level. MOA-specific narratives, which follow, merely highlight key times and places for each species. In cases where MOAs themselves are divided into subunits (e.g., YUKON 1-6, STONY A-C, and NAKNEK 1-2 MOAs), most information is provided at the level of the MOA airspace complex, followed by brief summaries at the level of the subunit. Otherwise, where individual airspace units are discrete (e.g., SUSITNA and GALENA MOAs), all information is provided at the level of the specific unit. All figures and attachments referring to the regional distribution of wildlife are added at the end of each regional discussion.

It should be noted that this progression from larger to smaller categories of airspace is continued only as long as there is new information to present at the next, lower level. For example, there are no bison under current or proposed military airspace in the Western Region; this is stated under the heading of "Bison" at the region level, and the discussion stops there. On the other hand, each MOA in the Northern Interior Region overlies caribou habitat. While the major discussion of caribou is presented at the region level, the specifics of each MOA are spelled out under subsequent headings. This organization is intended to streamline the text and to facilitate cross referencing this section with the wildlife section of Chapter 4, where airspace configurations and use parameters vary according to alternative.

3.5.2 Overview

3.5.2.1 Biodiversity

The issue of biodiversity is considered because the airspace proposal could potentially affect 1) protected species, 2) use of sensitive habitats, such as wetlands, which may also be protected, and 3) protected areas such as parks and refuges. A number of federal and state management units underlie existing and proposed MOAs, as detailed in the Land Use section of this chapter (section 3.8). Most of these areas are managed from an ecosystem and community perspective with maintenance and improvement of biodiversity as clearly stated objectives.

West (1993) has defined biodiversity as "... a multifaceted phenomenon involving the variety of organisms present, the genetic differences among them, and the communities, ecosystems, and landscape patterns in which they occur." Indices of biodiversity are numerous (Colinvaux 1986), but measures for particular areas are often reduced to a straightforward measure of species richness. Ideally this would consist of a catalog of the total number of species in a defined area. However, this is rarely possible because sampling procedures tend to miss rare species, and a complete enumeration including microorganisms is extremely difficult at best. Despite its ecological shortcomings, species richness is the most easily obtained and perhaps the most useful index for comparison of biological diversity on a large scale (World Conservation and Monitoring Centre 1992). It is the main measure used in this analysis.

Gradients of species diversity exist in relation to latitude, elevation, and precipitation. At a global scale, overall species richness increases with decreasing latitude. This means that tropical regions generally have larger numbers of species than temperate regions, and species diversity in polar regions is less than in temperate. Alaska therefore has fewer species and is less diverse than the contiguous United States. Altitudinal gradients display decreasing diversity with increasing elevation. This trend would be observed at Denali National Park, and in the Brooks and Alaska ranges, for example. Precipitation gradients are much more complex due to seasonality, but the Boreal Forest (such as the Taiga near Fairbanks in central Alaska) can be expected to be much less diverse than the moister Coastal Forest (around Cook Inlet, for example).

The assemblages of organisms currently occurring in Alaska are less than 8,000 years old, having evolved during the warming period following the last ice age. Biodiversity was greater during the Pleistocene age than the current Holocene (Graham 1986), partly due to large extinctions taking place at the end of the Pleistocene.

The biome is the second largest ecological unit on earth, with the biosphere (the entire earth), being the largest. A biome is an area in which the vegetation formation is determined by the climate. It is necessary to understand the characteristics of biomes in order to understand their associated biodiversity. Alaska has four major biomes, namely Lowland and Upland Tundra, Boreal Forest or Taiga, and Coastal Forest. Each of these zones supports a mosaic of vegetation cover types at different levels of classification. The airspace addressed in this analysis overlies two biomes, Upland Tundra and Boreal Forest (Viereck et al. 1992), but pockets of Lowland Tundra (wet or moist tundra) also occur under the airspace.

The Boreal Forest forms an extensive vegetation zone between the Coastal Forest and the northern and western limits of forest growth. It is dominated by closed, open, and woodland evergreen forests of black and white

spruce, but has extensive areas of open and closed deciduous forests of paper birch, aspen, and balsam poplar, including sometimes extensive riparian areas dominated by cottonwoods and willows. Within this vegetation zone are mosaics of shrub and herbaceous types, including extensive areas of subarctic lowland sedge and sedge/moss bog meadows, as well as willow, sweetgale, and graminoid bogs. There are also expanses of closed and open shrublands of alder and willows in successional communities resulting from fire and alluvial deposition.

The Upland Tundra includes moist tundra, dry or alpine tundra, and shrub tundra. Over much of arctic and western Alaska, this biome is dominated by cottongrass tundra with areas of *Dryas* dwarf shrub tundra on exposed ridges and dry rocky sites. In mountainous areas above treeline, *Dryas* and ericaceous shrub tundra are the most widespread plant communities. In many areas in western Alaska, and in most areas near treeline in the Alaska and Brooks ranges, the zone includes extensive areas of shrubland, primarily low dwarf shrub birch.

Alaska has an estimated 1,700 to 1,800 plant species inclusive of varieties and depending on which taxonomist's flora is referenced (Lipkin 1994). The most recent vegetation classification scheme for Alaska cover types was developed by Viereck et al. (1992).

Alaska's species richness in terms of animals is presently estimated at 702 vertebrate species. Invertebrates have not been counted, but butterflies are estimated at 80 species. Alaska contains 112 species of mammals, 6 species of amphibians, and 3 reptiles (West and Michaelson 1994a, 1994b). There are 581 different species of fish in Alaska, as well as 442 confirmed and 38 unconfirmed bird species (Gibson 1994) ("unconfirmed" means that the birds have been sighted, but not verified by American Ornithological Union standards).

By definition, rare species are more vulnerable to extinction than common ones. Species with naturally limited ranges or those with systematically declining densities across wider ranges clearly require special attention. Similarly the loss of certain "keystone" species--species that provide important food, habitat, or other ecological values--will affect a large number of other species and can affect overall ecosystem structure and function. Such species are typically afforded formal protection, as outlined in the following section.

3.5.2.2 Protected Species

In regard to federally listed species protected under the Endangered Species Act of 1973 (ESA), Alaska has one endangered plant, the Aleutian shield fern (*Polystichum aleuticum*) and seventeen Category 2 candidate plant species, some of which may occur under the MOAs. Five federally listed threatened or endangered birds are present in Alaska, two of which may occur in the Boreal Forest and Upland Tundra biomes typical for the MOA regions, namely the American peregrine falcon (*Falco peregrinus anatum*), endangered; and the Eskimo curlew (*Numenius borealis*), endangered. Although the historic range of the Eskimo curlew includes Alaska, it has not been sighted since 1886 and no longer occurs in the state (USFWS 1994; Armstrong 1990). There is one threatened reptile, the green sea turtle (*Chelonia mydas*), and one endangered reptile, the leatherback sea turtle (*Dermochelys coriacea*), neither of which occur under the MOAs. There are eight endangered species of whales and one threatened sea lion, the Steller's sea lion (*Eumetopias jubatus*), none of which occur in the vicinity of the MOAs. There are nine federal Category 2 and one Category 1 candidate animal species in Alaska. Of these, only the North American lynx (*Felis lynx canadensis*) occurs under the MOAs (West and Michaelson 1994a).

The State of Alaska affords protection to five endangered species under state law, namely to three whale species (right whale, blue whale, and humpback whale) and two bird species (short-tailed albatross and Eskimo curlew). The American peregrine falcon, the Arctic peregrine falcon, and the Aleutian Canada goose have recently (October 12, 1993) been removed from Alaska's Endangered Species List (ADF&G 1993j). These three species now fall under the category of *Alaska Species of Special Concern*. The other species in this category are: spectacled eider, Steller's eider, Steller's sea lion, harbor seal, bowhead whale, beluga whale (Cook Inlet population), and the fall run of the Snake River chinook salmon. There are no state-listed threatened species.

Consultation with the USFWS indicated that the American peregrine falcon was the agency's only formal concern. The Biological Opinion and correspondence associated with it are included in Appendix I.

3.5.2.3 Profiles of Wildlife Addressed

3.5.2.3.1 Waterfowl

Areas of substantial benefit to waterfowl have been outlined in the ADF&G's Habitat Management Guide (ADF&G 1986b). The USFWS further defined waterfowl use areas and estimated populations and migration pathways for use in an Alaskan bird avoidance model (Butler and Gill 1993, and King 1993). Waterfowl breeding, staging, and migration areas are so extensive in Alaska that all the proposed MOAs could involve waterfowl to some extent (see Figure 3-28, following the discussion of the Northern Interior Region). The widespread late arrival of spring adversely affected waterfowl nesting habitat conditions in Alaska in 1992, and flooding in a few areas reduced production. However, extensive flooding should actually enhance waterfowl production in future years, as it has recharged many dry water basins (Conant and Groves 1992). The USFWS Waterfowl Breeding Population Survey was designed for ducks, but other species (geese, swans, and cranes) were also recorded. The total 1993 Alaska-Yukon duck population census was 4,095,100, down from the 4,279,700 1992 count (Conant and Groves 1992, 1993a).

3.5.2.3.2 Trumpeter Swan

Eighty percent of the world's trumpeter swan (*Cygnus buccinator*) population breeds in Alaska (Conant et al. 1991), where pristine habitat was severely depopulated until the 1950s (King 1980). For the past four decades, trumpeter swans have been steadily increasing and have tripled their range and population since 1975 (Conant et al. 1991). The reason for the earlier trumpeter decline is unclear. Although it seems unlikely that the net result of the changing land status and future development in Alaska will result in a severe impact on trumpeters, there is still reason for concern. In 1968, the Alaskan trumpeter population was located almost entirely on federal lands, and the habitat was relatively safe from encroachment. Since then, the human population within the swan range has increased significantly. The Alaska Native Claims Settlement Act of 1971 conveyed 39.5 million acres of public lands into private Native-owned corporations. Major portions of swan habitat now occur on private lands (King 1980). The USFWS recommends a combined program of complete censuses every 5 years and random sampling in interim years to obtain high quality data for swan management (Conant et al. 1991).

The fifth complete census (since 1968) of trumpeter swans on their Alaska breeding grounds was completed in 1990; the census was divided into eight units. The population of trumpeters has followed a logistic growth curve. Census totals, after hatching, were 2,847 in 1968; 4,170 in 1975; 7,696 in 1980; 9,459 in 1985; and 13,337 in 1990 (Conant et al. 1991). Although not a complete survey, swan observations from the 1993 waterfowl survey suggested a population of 9,200 adult and subadult trumpeter swans; the 1992 waterfowl survey suggested a population of 11,000 adult and subadult trumpeter swans (Conant and Groves 1992, 1993b).

The Alaska population of trumpeter swans is distributed along the coastal plain from Yakutat to Cook Inlet, in the forested interior valleys of the Copper, Susitna, and Yukon river drainages east of the tundra and south of the Arctic Circle (King 1980) (refer to Figure 3-29 following the Northern Interior Region discussion). Most of the 70,000 square miles of trumpeter habitat is located below 1,000 feet elevation. Swans do not normally nest above the 2,600-foot treeline.

3.5.2.3.3 Raptors

3.5.2.3.3.1 Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is a North American species that has declined in numbers over much of its range in the Lower 48 states. The northern race of bald eagle that breeds in Alaska is not considered

endangered under the ESA; however, all raptors are protected by federal and state laws, and bald eagles are further protected under the Bald Eagle Protection Act of 1940.

Bald eagle populations are large and stable along the relatively pristine Pacific Northwest Coast of North America. Bald eagles are abundant and widely distributed throughout most of Alaska (Brown and Amadon 1989). Large numbers nest and winter in coastal areas of southeastern Alaska, along the coasts of the Gulf of Alaska and Bristol Bay, and in the Aleutian Islands. Bald eagles also nest and sometimes winter in smaller numbers in interior Alaska, where they are most often associated with rivers and wetland areas of lakes and streams. Bald eagle productivity was found to be variable and generally declining in southeastern Alaska (Hansen et al. 1986). The population of bald eagles in Alaska was estimated at 7,500 pairs by Lincer et al. (1979). Schempf (1993) estimated a post-fledging population of 30,000 bald eagles statewide. The majority of the population occurs in the coastal areas: southeastern Alaska, 4,000 pairs (King et al. 1972); Prince William Sound region, 2,000 pairs (Isleib and Kessel 1973); and Cordova area, 2,500 pairs (Butler and Gill 1993). An aerial bald eagle survey of coastal British Columbia covered 10 percent of the coastline and estimated 11,000 adult eagles (Hodges et al. 1983). The USFWS has located 2,337 bald eagle nest sites in Alaska (Schempf 1993; Ambrose 1993) (see Figure 3-30 following the discussion of the Northern Interior Region). In interior Alaska, the numbers of nesting bald eagle populations within river drainages are relatively small compared with the coastal areas; however, they constitute an important portion of the Alaskan population: Tanana drainage, 73 pairs; Kuskokwim, 13 pairs; Susitna, 155 pairs; and Copper, 379 pairs (Schempf 1993; Ambrose 1993) (Figure 3-30).

Bald eagle food habits generally do not overlap with those of other raptors. Breeding bald eagle densities are likely influenced by differences in food abundance. Seabird colonies, waterfowl concentrations, large fish resources, and garbage dumps in some coastal areas provide a greater concentration and abundance of food than that found on the inland rivers. Eagle distribution is influenced by the availability of salmon carcasses. In the Chilkat Valley, in southeastern Alaska, the summer population of a few hundred eagles grew to over 3,000 during the height of the salmon runs in November, and then plummeted with the winter freeze (Hansen et al. 1983).

Bald eagle nests are easily located from the air, and the nesting habits of these birds make it practical to develop protection strategies for them (Roseneau et al. 1981).

3.5.2.3.3.2 Golden Eagle

The golden eagle (*Aquila chrysaetos*) is not considered to be endangered under the ESA; however, all raptors are protected by federal and state laws, and the golden eagle is further protected under the Bald Eagle Protection Act of 1940 (1964 amendment). No estimate is available on the golden eagle population in Alaska.

Golden eagles are widespread in mountainous areas of Alaska. Maximum local densities of golden eagles for southwestern Alaska are lower than densities of smaller raptors such as red-tailed hawk, rough-legged hawk, and peregrine falcon (Mindell 1983). Breeding pairs tend to be widely scattered, although higher densities occur in some areas of abundant prey. Golden eagles are generally considered a mountainous bird, usually building their nests on inaccessible cliffs and bluffs away from coasts or rivers. The USFWS has located 175 golden eagle nest sites in Alaska with the greatest concentrations occurring along the Brooks Range (Schempf 1993; Ambrose 1993) (Figure 3-30). Mindell (1983) found no golden eagle nests along the shores of seven rivers surveyed in the upper Kuskokwim River drainage. Golden eagles were more common in the lower Kuskokwim River area and west to the Yukon River where breeding pairs were found on nine of twelve rivers (Mindell 1983). USFWS surveys indicate concentrations occur along the lower Yukon, Tanana, and Porcupine rivers (Schempf 1993; Ambrose 1993). The majority of Alaskan-breeding golden eagles appears to be migratory (Gabrielson and Lincoln 1959), though the actual proportion of migrants to overwintering birds likely varies with the severity of winter weather.

Golden eagles forage over a wide territory around the nest site, preying on mammals. Snowshoe hares, arctic ground squirrels, and marmots are dietary staples (Gabrielson and Lincoln 1959; Ritchie and Curatolo 1982). When mammals are not available, birds and carrion can also be important (Brown and Amadon 1989).

3.5.2.3.3 Peregrine Falcon

In Alaska, three subspecies of the peregrine falcon occur: the American peregrine falcon, an endangered race, is found predominantly along the larger rivers in the forested interior; the Arctic peregrine falcon is found in the northern tundra region; and Peale's peregrine falcon (*F. p. pealei*), not threatened or endangered, occurs along the coastline of the Gulf of Alaska and southeastern Alaska. The American peregrine falcon is the race expected to nest under the MOAs, although the Arctic race migrates through the MOAs.

In 1979, the USFWS initiated a survey and banding program in interior and northern Alaska to monitor these populations and determine their migration routes and wintering areas. Peregrines occurring along the Colville and Sagavanirktok rivers in northern Alaska were selected as index populations for the Arctic peregrine, and peregrines located along the Upper Yukon and Tanana rivers in interior Alaska were chosen to represent populations for the American peregrine. The Lower Yukon and Porcupine rivers in interior Alaska were also selected because large numbers of falcons were known to breed there, and young could easily be banded. Human disturbance in all of these areas is minimal, with only occasional river traffic passing near the cliffs (Ambrose 1993; Cade et al. 1988). Generally, the populations in all areas have displayed the symptoms of decline and recovery. Numbers declined between the mid-1960s and the early 1970s as a result of DDT contamination, and reached or approached their pre-DDT population levels in the early 1980s. Peregrine index populations have surpassed the Peregrine Recovery Plan schedule (USFWS 1982) over most of North America. In one 3-year period (1986-88), the populations increased to numbers expected over a 5-year period, and populations have continued to expand over the past 3 years (Ambrose 1992). Biologically, some peregrine populations have overcome the need for endangered or threatened status. The administrative process for de-listing of the peregrine is planned in 1993 (Ambrose 1992). Section 4(g)(1) of the ESA requires the USFWS to monitor all species that recover to the point that they are removed from the threatened or endangered species list for a period of at least 5 years.

The total population size of peregrines nesting in Alaska is difficult to ascertain, and the division between American and Arctic peregrines is poorly understood, especially in parts of northwestern Alaska. Cade (1960) estimated between 600 and 1,200 breeding pairs of peregrines were present in Alaska. Approximately 125 to 150 American peregrine falcon pairs are counted each year in the forested interior out of an estimated total interior population of 250 to 300 pairs (Ambrose 1992). The USFWS has located 1,124 peregrine nest sites in Alaska (all three races) (Schempf 1993; Ambrose 1993) (Figure 3-32, following the Northern Interior Region discussion). In the MOAs being assessed for this document, peregrine nest site locations have been well surveyed by the USFWS and are expected to represent the entire population for consideration (Ambrose 1992).

Most peregrine nest sites occur along suitable nesting habitat of cliffs and bluffs that are accessible along river drainages. Availability of suitable habitat is variable among river drainages. Approximately 95 percent of the cliff sites suitable for nesting peregrines on the Kuskokwim River occur within a continuous segment 100 miles in length (Mindell 1983). This segment has a nesting density of one nest site per 16.5 miles of river length. This compares with one occupied site per 15.9 miles on the Middle Yukon River (111 miles long) and one site per 11 miles on the Lower Yukon (471 miles long) (Ambrose 1993). Bente and Wright (1993) located 23 peregrine nest sites on a 95-mile segment of the Sagavanirktok River in the central North Slope of Alaska and 25 nest sites on a 325-mile segment of the Tanana River. Peregrines are known to nest in upland rocky outcrops away from rivers, but the extent of such nesting is unknown.

The majority of prey species taken by the American and Arctic peregrines are birds. Although small mammals are also taken, they comprise only about 6 to 10 percent of the diet by number (Cade 1960). The preferred and most used hunting habitats depend on the relative abundance of vulnerable prey in the various habitats within the falcon's hunting range. Peregrines take most of their prey in the air and do most of their hunting either from high perches or from considerable soaring altitudes. Peregrines appear to hunt within relatively short distances from their nest sites if prey are abundant nearby.

3.5.2.3.3.4 Gyrfalcon

The gyrfalcon (*Falco rusticolus*) is not listed as endangered under the ESA; however, all raptors are protected by federal and state laws.

Cade (1960) estimated the total Alaskan population of gyrfalcons to be about 200 to 300 pairs; Cade (1982) believes there is a minimum of 300 pairs in Alaska with a more likely number being approximately 500 pairs. The USFWS has located 164 nest sites in Alaska (Schempf 1993, Ambrose 1993) (Figure 3-31).

Gyrfalcons are distributed throughout most of the tundra and alpine regions of Alaska. The largest concentrations are found in western and northern Alaska. Only small concentrations have been found in the areas assessed in this document, primarily along the Tanana and Nenana river drainages. Gyrfalcons are generally outnumbered by peregrines and rough-legged hawks in wooded river segments containing cliffs (Mindell 1983); however, this may only be accurate in western Alaska, where surveyed. Gyrfalcons are probably not as rare as the low number of nest sites suggest, since they inhabit mountainous terrain above timberline and coastal areas that are not easily surveyed.

Prey species identified from remains found in and around nests were predominantly rock or willow ptarmigan, followed by Arctic ground squirrel, snowshoe hare, spruce grouse, and voles (Mindell 1983).

3.5.2.3.3.5 Rough-legged Hawk

Rough-legged hawks (*Buteo lagopus*) are not listed as endangered under the ESA; however, all raptors are protected by federal and state laws. No estimates are available on the population size of rough-legged hawks in Alaska.

Rough-legged hawks are primarily associated with tundra and alpine habitats. They are limited in local density and distribution by the availability of cliff nesting sites. Nesting is widespread in Alaska; however, the densest nesting is in northern Alaska, especially the western Brooks Range, along and north of the Noatak River. The species also nests in the western coastal region and extend inland along the lower Yukon and Kuskokwim river drainages. The USFWS has located 328 rough-legged hawk nest sites in Alaska (Schempf 1993, Ambrose 1993) (Figure 3-31). The primary prey of the rough-legged hawk are voles, followed by birds, ground squirrels, and snowshoe hares.

3.5.2.3.3.6 Osprey

Osprey (*Pandion haliaetus*) are not considered to be endangered under the ESA; however, all raptors are protected by federal and state laws.

Osprey are widely but locally distributed throughout Alaska south of the Brooks Range (Gabrielson and Lincoln 1959). Osprey breed along Alaska's inland lakes and rivers and at low density along the southeast coast, but have colonized no other portion of Alaska's coastline (Poole 1989; Hughes 1986). Osprey forage exclusively on fish and prefer to hunt over shallow water containing abundant fish populations, where standing dead tree nest and perch sites are available (Poole 1989); however, Mindell (1983) found 5 of 10 nest sites to be in live white spruce in the lower Kuskokwim River drainage. The ADF&G has located 255 nesting sites in Alaska (Hughes 1993) (Figure 3-31). Schempf (1989) estimated the Alaskan osprey population at fewer than 200 pairs. ADF&G surveys indicate that two regions have more osprey than other areas: the lower Kuskokwim and Tanana river drainages. Forty osprey nests were located and checked for nesting activity during 1990 on the Tetlin Indian Reservation (34 nests), the Tetlin National Wildlife Refuge (NWR) (3 nests), and the Susitna Valley (3 nests) (Hughes and Wright 1990).

3.5.2.3.3.7 Northern Goshawk

The northern goshawk (*Accipiter gentilis*) is not listed as endangered under the ESA; however, it is listed as a Category 2 candidate species under the ESA. All raptors are protected by federal and state laws.

No estimates are available on the population size of northern goshawk in Alaska. Goshawks occur throughout the forested parts of Alaska, but typically in more open stands of larger trees (Clarke 1982). The USFWS has located 46 northern goshawk nest sites in Alaska (Schempf 1993; Ambrose 1993). Most nest sites have been located in the central to southeastern regions of the state, with the majority of nests found in the Fairbanks area extending southerly towards Anchorage. This small population number and its distribution is not considered indicative of goshawk distribution in Alaska, since no concerted effort has been made to find all nests in any area. Thirty active goshawk nests were studied in the early 1970s near Fairbanks (McGowan 1975).

3.5.2.3.3.8 Other Raptors

The raptors discussed above represent the species of greatest importance as indicated by various Alaskan agencies. Therefore, these will be the focus for impact assessment under the MOA airspace.

3.5.2.3.4 Caribou

Caribou (*Rangifer tarandus*) are distributed throughout most of Alaska, except on the southeast panhandle, along the Gulf of Alaska coastline from Southeast Alaska to the Alaska Peninsula, and on most offshore islands. Caribou do occur on the southern Alaska Peninsula. Caribou are a migratory species and generally form large herds. Alaskan caribou herds can range in size from several hundred to several hundred thousand animals. The general distribution and range of a particular herd varies, depending on animal numbers, weather, and availability of food. Despite this variation in distribution and range, caribou herds usually show site fidelity to certain areas, such as calving grounds. Caribou herds are thus commonly identified with reference to the geographical location of their traditional calving grounds (Skoog 1968). As an example, the traditional calving grounds of the Delta herd are located in the Delta River drainage, while the Macomb herd usually calves on the Macomb plateau. Caribou, however, are not territorial, and the ranges of different herds can overlap.

Caribou numbers are generally assessed by herd. In Alaska, ADF&G carries out surveys and publishes caribou herd-size estimates. Population trends vary among the different herds and over time. Some herds are experiencing rapid increases in population numbers, while others, such as the Mentasta herd, are declining. Fluctuations in caribou numbers have been attributed to factors such as overharvesting, predation by bears and wolves, unfavorable climatic conditions, and lack of food. In 1993, the statewide population of caribou was estimated at 950,000 animals (Peterson 1994).

Caribou are an important species for sport and subsistence hunters as well as for wildlife viewers and photographers. Caribou management goals and objectives may vary between different agencies and organizations involved in caribou management, with ADF&G generally advocating an increase in caribou numbers statewide. Caribou are one of the best studied and documented wildlife species in Alaska.

At the end of winter, bands of caribou aggregate in groups, and cows, often accompanied by yearlings, migrate to calving grounds. Some caribou herds exhibit high site fidelity to calving grounds, whereas other herds use different calving areas over time. Calving dates can vary slightly from one herd to another, but calving generally takes place between early May and mid-June. Cows usually give birth to one calf. The calves are able to follow their mothers and the herd within hours of birth. Calves are probably weaned between September and December (Miller 1987).

After calving, cows with their calves form large post-calving aggregations that move off the calving grounds to summer ranges. There they mix with bulls and other members of the herd (Miller 1987) and the herd eventually disperses into smaller bands (Bergerud 1978).

The post-calving period—particularly between early June and mid-July (Whitten 1994)—is another critical stage of the caribou life-cycle, as calf mortality is typically very high. Calf survival is influenced by factors such as birthweight, prevailing weather and winds after birth, and predation (Bergerud 1978). Where bear and wolves are abundant, calf mortality can reach 65 percent or more (ADF&G 1989a). Another cause of calf mortality is

separation of calves from their mothers (Bergerud 1978), particularly when a large herd is migrating, stampeding, or crossing rivers.

Caribou feed on lichen, mushrooms, grasses, sedges, twigs of willow or birches, and other plants. Very dry summers may lead to a higher than usual caribou mortality (Boertje 1993).

During the summer months, caribou are exposed to harassment by insects. Caribou react to the insect season by dispersal into small groups and moving to the edge of remaining snow fields on north facing slopes, or to windy areas. During the insect season, caribou exhibit changes in behavior as well, spending less time feeding and more time running around trying to evade insects (National Defense, Canada 1989).

In early fall, cows assemble into small groups and begin their fall migration to lower elevations. The females are later joined by male animals. When the rut begins, caribou bands can include up to several hundred animals (Bergerud 1978). In Alaskan herds, the rut takes place in late September and early October (McNay et al. 1993). In general, caribou do not have specific rutting areas, particularly since fall migration routes can vary from year to year. Males may lose as much as 25 percent of their body weight during the rut, and females can experience a similar weight loss during the winter season (Bergerud 1978). Caribou cows generally do not reach maturity until 2.5 or 3.5 years of age; pregnancy rates are high among mature females. The gestation period for caribou is approximately 7.5 to 8 months. Caribou bulls are polygamous. However, they do not gather harems but join existing bands of cows and young.

After fall migration and once rutting is completed, caribou disperse in small groups into winter-use areas, with bulls separating from cows and calves. In winter, caribou primarily eat lichen, but also feed on other vegetation such as shrubs and trees (Miller 1987). In winter, caribou prefer low-elevation areas with shallow snow depths, where they may dig with their hooves for green plants. Winter is also a critical period for caribou of all age groups, as mortality may be high during hard winters and late springs (Boertje 1993).

3.5.2.3.5 Moose

The Alaska race of moose (*Alces alces gigas*) are distributed throughout Alaska, except for the southeastern panhandle, the southwestern Alaska Peninsula, most offshore islands, and glaciated areas. Moose are generally found along major drainages, and below 4,500 feet elevation. They prefer spruce forests, swamps, and aspen and willow thickets. Several factors, such as elevation, snow depth, range condition, and fire influence moose distribution and the size of their seasonal ranges.

Moose are relatively well studied ungulates, although their solitary nature, varied habits, and habitat preferences make collecting reliable data on numbers and movements difficult. Moose population figures and/or densities are assessed by the ADF&G and reported for different Game Management Units (GMUs) (see Appendix M for location of GMUs in relation to the MOAs). In 1993, the state-wide moose population was estimated at 144,000 to 166,000 animals (Peterson 1994).

Like caribou, moose are important for sport and subsistence hunting as well as for game viewing and photography. ADF&G management goals are generally to maintain and increase the moose population, particularly in the vicinity of more densely populated areas such as Fairbanks and Anchorage, where numerous town dwellers hunt moose for home consumption (Taylor 1994).

Movements and migration patterns of moose are quite variable; some groups of animals migrate from one range to another during the course of the year, while others are more or less resident within the same area throughout the seasons (ADF&G 1986a). Some moose, such as cows using calving grounds in the Tanana Flats, have been observed to migrate up to 50 miles from winter ranges to calving areas (Whitten 1994). In general, moose move to higher elevations in spring and summer in search of food. However, aquatic vegetation in lowlands ponds and lakes provides important feeding opportunities as well during summer.

Cows are solitary during the calving period. As the birth of a new calf approaches, the pregnant cow will drive her yearlings away. After a gestation period of about 8 months, moose cows give birth to one or two young from late May to early June. Cows prefer to calve in spruce forests or shrubby areas that offer protection for newborn calves. Cows suckle their calves until fall, but the calves start eating plants when only a few days old (Schmidt and Gilbert 1978). Calves stay with their mother during the first year. Moose are solitary in summer, except for cows with young. They consume grasses, sedges, aquatic and semiaquatic plants, and browse.

The rutting season is from late September to early November, when male and female moose concentrate in rutting areas. Female moose reproduce each year, occasionally beginning to breed as early as 1.5 years of age. However, females reach their maximal reproductive potential between 4 and 12 years of age (Schmidt and Gilbert 1978). Male moose reach sexual maturity at the same age as females, but older bulls will prevent younger bulls from breeding until they are 5 to 6 years old (Banfield 1974).

After the rut, moose generally move to lower elevations for the winter, occasionally forming small herds. They search for food in areas where snow depth is not prohibitive. During the winter, moose browse on deciduous shrubs, small trees, and sometimes on tree bark (USAF 1992). Winter is critical, as both young and adult animals are typically faced with energy deficits resulting from high energy requirements coupled with low dietary intake. As a consequence, mortality of both young and mature moose may be high during severe winters.

Moose mortality, especially calf mortality, is heavily influenced by bear and wolf predation. In areas where predators are numerous and the moose population density is low, calf mortality (for calves younger than 5 months) was reported to exceed 85 percent (ADF&G 1990b). In the Charley, Fortymile, and Ladue river drainages, post-calving population mortality through predation was estimated at 29 percent, with each of the two predators taking about equal numbers of moose (ADF&G 1993a).

Human-induced mortality includes hunting for subsistence and sport. Indirectly, humans add to moose mortality along highways and railroads, where moose are often killed by traffic.

3.5.2.3.6 Dall Sheep

Dall sheep (*Ovis dalli dalli*) occur primarily in alpine habitat above 2,500 feet elevation. Dall sheep habitat includes the Brooks Range, the Alaska Range, the Talkeetna and Chulitna-Watana Mountains, the Wrangell Mountains, the Chugach Mountains, the Kenai Mountains, and the Tanana/Yukon Uplands. They prefer rugged, open territory that affords them the opportunity to see and escape from predators. Dall sheep population numbers are estimated by the ADF&G on a mountain-range basis, or within special management units. The present statewide Dall sheep population has been estimated at 60,000 to 80,000 (Peterson 1994).

Dall rams are highly valued by sport hunters. Ram horns grow into full curls in older animals, and are sought-after hunting trophies. Dall sheep populations are managed primarily for trophy hunting, but Dall sheep are also important for subsistence hunting and for wildlife viewing and photography.

Dall sheep occupy winter and summer areas, and are very site-loyal. Lambing generally takes place from mid-May to early June on winter ranges in steep, rocky areas that offer protection from predators (Heimer 1993). After a gestation period of about 5.5 months, ewes typically drop one lamb; twinning is rare (Bowyer and Leslie, Jr. 1992).

At the onset of snowmelt, sheep move from the winter ranges to mineral licks, and then on to their summer ranges. This movement generally takes place at the end of May and during June, but the dates can vary from year to year, depending on the weather and the amount of snow accumulated during winter (Heimer 1994a). Mineral licks seem to provide sheep with important dietary supplements such as magnesium and calcium. Licks are most intensively used during the month of June, when sheep move from winter to summer ranges. Rams, later ewes without lambs, and finally ewes with lambs will gather around the licks in large numbers. According

to Heimer up to 200 to 300 sheep may congregate around a lick. If disturbed, the sheep are likely to disperse and will not return to the lick for several days.

Summer habitat extends over entire mountain blocks down to about 2,500 feet elevation. The location of Dall sheep summer range can vary depending on winter snow accumulation and the onset of snowmelt (ADF&G 1986a). Dall sheep feed primarily on grasses, sedges, and various forbs. On the summer ranges, rams generally separate from ewes and lambs, and occupy higher-altitude habitats (USAF 1992).

In October, Dall sheep move to winter ranges, where they breed from late November to mid-December (USAF 1992). Most female sheep are sexually mature by 30 months of age, but lamb:ewe ratios in interior Alaska indicate that females may not reproduce every year (Bowyer and Leslie, Jr. 1992). Male Dall sheep may reach sexual maturity by 18 months, but dominant rams will prevent young males from breeding until they are about 5 to 7 years of age. Dominant rams mate with several ewes.

Under the proposed airspace, Dall sheep occupy two different kinds of habitat. Prime Dall sheep habitat is located in rugged mountainous areas like the northern slopes of the Alaska Range. Here sheep are found on winter ranges where winds constantly remove the snow cover and expose vegetation even during the winter months, and other areas where snow accumulation is generally low. Winter ranges in this type of habitat are normally small.

Dall sheep habitat in the Tanana/Yukon Uplands is of lesser quality. The Tanana Uplands may receive more snow than the Alaska Range. Because of the topography of the region, there are hardly any areas where winds regularly remove the snow cover (Heimer 1994a). As a consequence, Dall sheep in the Tanana uplands cannot rely on vegetation found on wind-swept ridges, but have to search for food in areas where there is less snow accumulation. For this reason, Dall sheep in the Tanana/Yukon Uplands generally use larger winter ranges compared to sheep in prime habitat, such as in the Alaska Range.

In prime habitat, Dall sheep winter range is typically at higher elevations than summer range, whereas in the Tanana/Yukon hills summer and winter ranges may overlap (ADF&G 1986a).

Dall sheep populations are affected by severe winters with heavy snowfall, which makes foraging difficult. Mortality is high among lambs and can reach 40 to 50 percent during the first winter (Nichols 1978). Sheep numbers are further reduced by predators, particularly wolves. Brown bear, coyote, and golden eagle occasionally prey on sheep as well.

3.5.2.3.7 Brown Bear

Brown bear (*Ursus arctos*) are distributed throughout most of Alaska, with the exception of remote islands, glaciated areas, and high elevations. Formerly, taxonomists listed brown bear and grizzly bear as different species (*U. a. middendorfi* and *U. a. horribilis*, respectively). All "brown" and "grizzly" bears are now classified as the same species, namely *Ursus arctos* (ADF&G 1989b). In popular usage, "brown bear" refers to bears found in coastal areas, whereas bears in interior Alaska are called "grizzly bear." In this document "brown bear" will be used in the general sense, referring to all members of the species *Ursus arctos*.

Population densities are assessed by the ADF&G within GMUs. The current brown bear population in Alaska has been estimated at 32,000 to 43,000 (Peterson 1994).

Although brown bear are a relatively well-studied species, detailed surveys are costly, and population estimates are often extrapolated from census results collected in a limited area or from harvest data. Brown bear have been recognized as major predators, particularly on moose and caribou. However, ADF&G does not propose a rigorous predator control program for brown bear. Brown bear have a relatively low productivity, and predator control programs could result in a long-lasting setback for the species, particularly because present population

numbers are not known accurately. However, ADF&G has relaxed hunting restrictions on brown bear in areas where caribou or moose management goals are hindered by extensive predation by brown bear. Relaxed hunting restrictions have resulted in reduced brown bear numbers, particularly on the northern slopes of the Alaska Range and in the Tanana Uplands, around the Fortymile River.

Brown bear are solitary except during the mating season and along fishing streams where they tolerate other bears. Brown bear range to near and above treeline. The average home-range size has been estimated at 400 square miles for adult males and 90 square miles for adult females (ADF&G 1991b). In general, brown bear move within their home ranges in search of food. Bears may move beyond their home ranges where seasonal food sources are abundant year after year, for example along salmon streams, or where caribou herds use specific calving areas with great regularity, such as the calving grounds of the Porcupine herd (Reynolds 1993).

The ADF&G habitat maps (ADF&G 1985, 1986a) indicate several special use habitats for brown bear, such as denning concentration areas, or areas where bears concentrate around mammalian food sources. According to Reynolds (1993), these special use areas indicate primarily where people observed bears engaging in certain activities such as denning or feeding on moose or caribou calves. It is likely, however, that bears concentrate as well in other areas that are less accessible to human observation and that are thus not indicated on the ADF&G habitat maps. Furthermore, the locations of particular concentration areas may change from year to year, depending on local abundance of seasonal foods. For these reasons, information on special use areas shown in the ADF&G habitat maps (ADF&G 1985, 1986a) has been considered incomplete, except for salmon streams.

Brown bear normally emerge from their winter den sites in April or May, depending on weather and the amount of snow cover in the denning area. Bears typically move from den sites to south-facing slopes where snow melts early or to lower-elevation areas in search of food.

During the summer, brown bear may move to higher altitudes or to salmon streams. Brown bear are omnivorous, feeding primarily on vegetation such as newly sprouted plants, buds, roots, leaves, berries, and nuts; but they also eat mammals, especially rodents, like the arctic ground squirrel (*Spermophilus parryii*). Bears consume moose and caribou, particularly during the spring ungulate calving season. Other important food sources are carrion and, where available, salmon. In fall, berries typically become an important part of brown bear diet.

Adult brown bear do not have natural enemies. However, they are hunted for sport.

Brown bear generally return to higher elevations for denning. Greater snow accumulation at higher elevations helps to better insulate the den against low winter temperatures. Brown bear prepare for winter by digging a den into the ground. They generally begin denning from September to mid-October. In years with abundant food supply, however, brown bear—particularly males—may delay entering the den until as late as December. Brown bear do not truly hibernate, but spend winter in a state of torpor. They may wake up occasionally during winter.

Bears are polygamous and mate in June and early July. Female brown bear do not reach maturity until they are at least 4.5 years old (Craighead et al. 1969). Females exhibit delayed implantation, meaning the fetus does not begin to develop until the female enters her winter den. Sows give birth between January and March to litters of one to four cubs (two on average). Cubs are generally weaned before moving into their first winter den (Jonkel 1978). Sows and cubs form a family group that travels and dens together until after the cubs' second or third winter, at which time the juveniles are chased off by the female before she mates again. As a result of this prolonged mother-offspring bond, sows breed only every 3 to 4 years, and possibly even less often. These long intervals between breeding periods, as well as the age when brown bear become sexually mature, account for the low reproductive potential of the species.

The survival rate of the cubs is high as long as they remain with their mothers. Once alone, bear cub mortality increases, mainly because juveniles are attacked by adult males (Jonkel 1978).

3.5.2.3.8 Black Bear

Black bear (*Ursus americanus*) inhabit much of continental Alaska, except the region north of the Brooks Range and the extreme western part of the state. The total black bear population in Alaska has been estimated at 100,000 to 200,000 (Peterson 1994).

Average home-range size varies by age and sex. In the Tanana Flats, adult females were found to occupy a home range of approximately 23 square miles, while the average range of adult males has been estimated at 230 square miles (ADF&G 1993b). Black bear occupy habitat primarily below treeline. Black bear move within their home ranges in search of seasonal food sources. They are solitary, except during mating and around abundant food sources.

Few black bear surveys have been carried out, but it appears that black bear in the interior of Alaska have lower reproductive rates than in southern areas of the state. ADF&G management objectives are mainly to keep black bear harvests at levels that do not deplete the population. Black bear are hunted for sport and subsistence, and when they pose a real or perceived threat to human life or property.

After emerging from their dens in spring, black bear normally move to areas with early vegetation growth. Black bear mate from June to early July. Where food conditions are favorable, females may be sexually mature at 3 years of age.

Black bears are omnivorous, consuming primarily vegetation such as newly sprouted plants, buds, roots, leaves, and nuts. They also eat mammals, especially rodents, and may prey on moose or caribou calves. Where available, black bear eat carrion and scavenge in garbage dumps. In regions with salmon runs, fish constitute an important part of the black bear diet. In fall, berry patches become important feeding areas.

Black bears move to their dens in September or October, except in years of abundant food supplies, when bears may delay denning. Unlike brown bear, black bear do not dig their dens but use caves, hollow logs, or hollows under spruce and fir trees as their wintering spots. Black bear are not true hibernators, but spend the winter months in a state of torpor. Black bear generally do not leave their dens during winter.

As is true for other bear species, implantation of the blastocyst (fertilized egg) is delayed until the female enters the winter den. Black bear cubs are born in the den between January and early February in litters of one to five (usually twins or triplets). Adult females form family groups with their offspring; cubs stay with their mother until after their second winter. Sows usually have young every 2 years. In exceptional cases, such as during periods of food abundance or when all of the previous litter was lost, sows may breed the following spring. Cub mortality is low as long as the young animals stay with their mothers. Mortality increases for sub-adults leaving the family group. Brown bear are natural enemies of black bear.

3.5.2.3.9 Bison

Bison (*Bison bison*) were introduced to Alaska in 1928. The main herd in Alaska is the Delta herd near Delta Junction. Other herds are located near Farewell, Chitina, and Nabesna.

The only bison herd under the proposed airspace is the Delta herd near Delta Junction. The Delta herd is not truly free-ranging; during the growing season, the herd is managed so as not to enter agricultural lands and farms, in particular the fields of the Delta Agricultural Project. However, the Delta bison do migrate between summer and winter ranges.

The ADF&G estimates bison populations by herd. The Delta herd comprised 482 animals in 1992 (ADF&G 1993f). The total bison population in Alaska was surveyed at 811 animals in June 1993. ADF&G management

objectives are to keep bison populations healthy and at present numbers, and to provide viewing and sport hunting opportunities.

Calving occurs on the summer range. After a gestation period of 9.5 months, one calf is born from late May to mid-June. Cows normally do not calve every year (Meagher 1978). Calves are weaned when 7 to 8 months old. Calf mortality is highest during the first year of life; up to 50 percent of bison calves die before reaching 3 years of age.

In late July and August, bison herds migrate to fall ranges. Herds are typically lead by a mature dominant cow. Bison bulls are usually solitary except during the breeding season (Meagher 1978). The rut begins in mid to late July, and is over in late August or early September. Although some bison, male and female, are sexually mature at 1 or 2 years of age, most reach reproductive age at 3 to 4 years. Cows remain productive until about 12 years of age (USAF 1992). Most bulls breed only when they are seven or more years old. Bison bulls are polygamous but do not acquire harems. Instead, they form temporary pairs (Meagher 1978).

During and after the rut, bison herds migrate to winter range. Bison are predominantly grazers, feeding on grasses, forbs, legumes, willows, and sedges. Bison remove snow with their hooves and head to expose buried forage. However, when snow becomes very deep, or where it is compacted or crusted, young and adult bison may die from starvation (USAF 1992).

Predation by wolf and bear are not common. However, bison may be subject to diseases such as tuberculosis, brucellosis, and anthrax, especially where they come in contact with infected livestock. Although these diseases do not necessarily result in the death of infected bison, they can influence reproductive rates (Meagher 1978).

3.5.2.3.10 Wolf

Wolves (*Canis lupus*) are distributed throughout mainland Alaska and occur in open tundra and forests. Their habitat is characterized less by a specific vegetation type than by the availability and abundance of prey. Wolves are a highly social species, primarily living and hunting in packs of 2 to 15 adults. Packs consist mainly of family members and relatives. Packs are organized in clear hierarchical order, with a male wolf most often assuming the position of dominance (alpha male) (Mech 1974). Hunting takes place primarily between dusk and dawn. Packs may occupy home ranges as large as 5,000 square miles. The ADF&G estimates wolf populations and densities by GMUs. The total wolf population in the state in 1993 has been estimated at 5,900 to 7,200 wolves (Peterson 1994).

Wolves travel extensively within their home ranges, and packs may follow the seasonal movements of their primary prey species, caribou and moose (Banfield 1974). Small animals such as rodents, fish, and birds also contribute to their diet. Wolves remain active throughout the year.

Female wolves reach sexual maturity around 2 years of age, while males are not mature before they reach the age of 3. Mating takes place from late February to mid-March, and pairs normally mate for life (Banfield 1974). After a gestation period of 60 to 63 days, 5 to 14 (7 on average) whelps are born. The reproductive rates of wolves seem to be directly proportional to the availability of prey, particularly of large ungulates (ADF&G 1990b). Females give birth in an enlarged den. After about 2 months, the mother generally transfers the cubs to a summer den, possibly for sanitary reasons or to be closer to better hunting opportunities (Banfield 1974). Young wolves are weaned at about 2 months of age. All animals of the pack are involved in the care of the pups, and this period of pup raising seems to be critical. When disturbed, wolves may change the location of the dens (Taylor 1994).

Wolves may die in large numbers when exposed to diseases such as rabies, distemper, or sarcoptic mange. In years when prey is scarce, wolves can be subject to starvation, and interpack strife and cannibalism have been observed (ADF&G 1991d).

Although wolves are not preyed upon by other animals, wolf populations are affected by human activities. Wolves are trapped or hunted for their furs. Moreover, wolf populations have been significantly affected by federal and state wolf control programs involving lethal methods such as poisoning, trapping, killing pups at dens, and aerial shooting (ADF&G 1991d). In Alaska, poisoning as a method of wolf control was abandoned in the 1950s (Taylor 1994). The primary purpose of these wolf control programs has been to reduce the extent of predation on moose and caribou. However, wolf reduction programs have proven to have rather ephemeral effects; a reduction in wolf numbers increases the food resources available to surviving wolves, and, in turn, increases reproductive rates (Boertje and Stephenson 1992).

ADF&G management recommendations have advocated that wolf control programs, as well as maximum opportunities for the public to harvest wolves by reinstating land-and-shoot taking, be implemented in areas (GMUs) that are important for local and non-local hunting of caribou and moose (ADF&G 1991d). As of this writing, however, the only intensive wolf control program is carried out in GMU 20A south of Fairbanks (Taylor 1994; see Appendix M for location of GMU).

Lethal wolf control programs have generated considerable controversy. As a result, the ADF&G has investigated other non-lethal methods of reducing predation on moose and caribou, such as diversionary feeding of wolves and brown bears (ADF&G 1993h).

3.5.2.3.11 Furbearers

A variety of furbearers are distributed throughout Alaska. Lynx, beaver, river otter, marten, mink, and wolverine were included in this analysis because of their economic importance for trappers and hunters. Except for wolverine, the furbearers described in this section are mainly nocturnal or crepuscular. Most are carnivores with relatively small home ranges, varying from a few acres to several square miles.

Furbearers are generally nonmigratory, but during the breeding season males of some species, such as river otter, may travel extensively in search of a female. Low prey availability often forces furbearers to abandon their territory to search for new food sources. Furbearers primarily prey upon small animals such as rodents and other small mammals, fish, and birds. Exceptions to this are wolverines, which feed as well on carrion, and beavers, which are herbivores. Some of the furbearers go through pronounced cycles of population growth and decline, emulating similar population trends exhibited by their main prey base. For example, snowshoe hares are the primary prey of lynx, and the snowshoe hare cycles have been recognized as the driving force for the lynx cycle.

Most furbearers are difficult to study because of their secretive habits, and furbearer population dynamics are thus not well understood (ADF&G 1993g). ADF&G has initiated lynx and wolverine population surveys in some regions of Alaska. For other furbearing species, no population numbers or densities are known. Instead, ADF&G compiles records of trapping harvests, and conducts trapper surveys to estimate the relative abundance of different furbearers. The completeness and reliability of these data are limited.

Trapping records and the results of the trapper surveys are summarized for different GMUs or regions. However, trapper harvest reports collected for a particular area are not necessarily an accurate measure of furbearer population sizes and densities. Trapping activities are influenced by different factors, such as fur prices, accessibility of trapping areas, and weather conditions.

3.5.2.3.11.1 Lynx

Lynx (*Felis lynx*) are distributed throughout continental Alaska. The preferred habitat of lynx is dictated by snowshoe hare habitat preference. Snowshoe hare thrive in successional habitats where willows and other preferred forage plants abound. However, lynx will occasionally hunt in open tundra, particularly when food is scarce (Banfield 1974). Lynx home-range size varies depending on sex, age, population density, and prey density, with estimates of 4 to over 90 square miles (Tumilson 1987).

Lynx are solitary animals, except during the breeding season. Lynx mate in March and early April, and litters of two to four kittens are born in May and early June (ADF&G 1989c). Mothers may remain with the kittens through their first winter. Lynx are active throughout the year and do not hibernate.

The primary prey of lynx is the snowshoe hare, but lynx also prey on birds such as ptarmigan, grouse, and ducks, small rodents, caribou and moose carrion, and sometimes on caribou calves and sheep. Lynx populations fluctuate in response to the abundance of snowshoe hare, with the periodicity of local snowshoe hare population cycles being 9 to 10 years. Periods of low snowshoe hare populations are followed by a decline of the lynx population, either through reduced lynx reproduction, or because lynx migrate to areas where hares are abundant. Low lynx densities thus are not necessarily a sign of over-harvesting or other exogenous impacts on the lynx population, but may be caused by the natural fluctuation in prey availability. However, if lynx harvests remain high even during low population levels, population recovery may remain depressed. For this reason, restrictions on trapping at low lynx densities have been instituted in some areas.

Lynx have few natural enemies; wolves may prey on lynx, particularly when encountered in open habitat where lynx cannot escape by climbing a tree. Human disturbance to lynx habitat, including hunting and trapping, are the primary factors affecting lynx abundance.

3.5.2.3.11.2 Beaver

Beaver (*Castor canadensis*) are distributed throughout most of Alaska, particularly the interior region south of the Brooks Range. They live in slow-flowing streams, lakes, and marshes in forested regions, but also inhabit muskeg, tundra, and alpine meadows (Banfield 1974). They build dams on streams to create ponds, and build lodges in ponds or dig dens into river banks. Beaver live in family groups in a common lodge or den. Beaver do not hibernate. Beaver mate in January or February, and one to six kits are born in late April to June (ADF&G 1989d).

Beaver are herbivorous, feeding primarily on aspen, willow, and birch (bark, leaves, twigs, buds), and on aquatic plants. Beaver populations are likely dependent on the availability of their preferred plants, and they abandon their lodges and emigrate to new suitable areas once the food supply is exhausted. Such relocations are generally necessary only after several generations of beaver have inhabited the same lodge and overutilized the surrounding area. Beaver are preyed upon by bears, wolves, coyotes, wolverines, and lynx (Banfield 1974), and are trapped for their valuable pelts.

3.5.2.3.11.3 River Otter

The river otter (*Lutra canadensis*) is distributed throughout continental Alaska, mainly south of the Brooks Range. They live along streams, lakes, and marshes, but also travel overland between bodies of water (ADF&G 1989e). Otters occur primarily in wooded areas, but can also be found north of the treeline. River otters are crepuscular, but may also be active during daylight hours if not disturbed. They do not hibernate during winter.

River otters mate in spring, usually in May. River otters have delayed implantation, and two to three pups (on average) are born the next year, between late January and June (ADF&G 1989e).

River otters primarily prey upon fish, but small mammals, amphibians, ground- and burrow-nesting birds and their eggs, and terrestrial invertebrates, such as insects, also comprise a portion of the diet. If fish availability decreases, population numbers and densities of river otters may be affected. River otters have few natural enemies except humans (ADF&G 1989e).

3.5.2.3.11.4 Marten

Marten (*Martes americana*) are distributed throughout most of Alaska, except north of the Brooks Range and in the southwestern portion of the state, including Kodiak Island, the Kuskokwim Delta, and the Alaska Peninsula. Marten are indigenous to some islands, and have been introduced to others (ADF&G 1991c). Marten prefer climax coniferous forests and avoid logged areas (Banfield 1974). They are solitary except during the mating season. Marten are primarily nocturnal and are active during winter.

Transient martens travel extensively (ADF&G 1992b). Males occupy home ranges that are two to three times the size of females' home ranges (Clark et al. 1987). Home-range sizes may vary, depending on factors such as population density, food abundance, or body size. Home ranges of male martens have been estimated between 1 and 8 square miles.

Marten mate in July and August. Because of delayed implantation of the fertilized eggs, young are born in April or early May the next year. Litters of three young are usual (ADF&G 1989f).

Marten diet varies according to food availability. Various species of rodents, particularly red-backed and meadow voles, provide the bulk of marten nutrition. Depending on the season, marten also eat birds and their eggs, fruits, berries, and insects (Strickland et al. 1987).

Enemies of marten include lynx, coyote, great horned owl, and golden eagle. Marten populations are impacted by the removal of suitable habitat through logging, increased human access, and intensive trapping (ADF&G 1991c). Although marten are opportunistic feeders, populations appear to decline in response to population declines in prey species such as small mammals. When food is scarce, marten may become more vulnerable to trapping, probably as a result of increased movement related to searching for prey.

3.5.2.3.11.5 Mink

Mink (*Mustela vison*) are distributed throughout Alaska, except north of the Brooks Range. Mink typically inhabit areas along rivers, creeks, lakes, marshes, and tidal flats. Home-range size varies from 20 acres to 3 square miles depending on the sex of the animal (Banfield 1974). Mink are solitary, except during the mating season. They are primarily crepuscular and nocturnal, and remain active during the winter.

Mink breed from March to April, depending on the latitude (ADF&G 1989g); young are born in June in litters of four to ten kits.

Mink are carnivores and feed on a variety of animals, such as small mammals, fish, birds, insects, amphibians, and reptiles (Linscombe et al. 1987). Predators of the mink include great horned owl, coyote, red fox, wolf, and black bear. Mink are trapped for their fur.

3.5.2.3.11.6 Wolverine

Wolverines (*Gulo gulo*) are distributed throughout continental Alaska, inhabiting forests and tundra. They have extensive home ranges comprising several hundred square miles, resulting in a very low population density. Wolverine are solitary, except during the mating season and when females are with their young. They are active throughout the day and do not hibernate.

Wolverines may be sexually mature as yearlings. Breeding occurs in summer, and females have delayed implantation. Young are born from January to April in litters of 3.5 on average (Wilson 1987).

Wolverines are omnivorous and feed on rodents and other mammals, birds, eggs, roots, and berries. Carrion such as moose and caribou killed by wolves plays an important role in wolverine diet (Wilson 1987). In rare cases, wolverines have been observed to attack and kill caribou (Banfield 1974). They are trapped for their fur.

3.5.2.4 Management and Regulatory Environment of Species Addressed

In addition to their physical and biological environments, all of the species addressed exist in a management and regulatory framework. Wildlife plays a vital role in the economy of Alaska, helping provide for the subsistence and recreation of residents and visitors alike. In the case of migratory species, this importance extends beyond the state's boundaries. These roles are reflected in the plans and activities of the agencies charged with their management. Management objectives vary according to the species, agency, and geographic area in question.

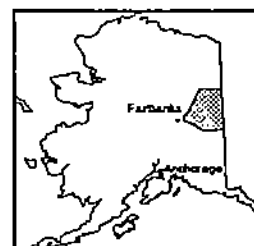
ADF&G is largely responsible for consumptive use of wildlife, emphasizing species valued by subsistence and sport hunters and trappers in their management planning. The USFWS contributes to this function when migratory species are concerned. The management objectives of the USFWS, NPS, BLM, and Alaska Department of Natural Resources (ADNR) generally prioritize the full spectrum of species present in the areas under their administration, giving higher priority to preservation and nonconsumptive use. However, hunting is a management tool they typically employ to help meet these management objectives. In regard to protected species, the USFWS has primary responsibility for implementation of the ESA, but all agencies are bound by the act's stipulations. The state has complementary regulations regarding management of rare, threatened, and endangered species as well as other nongame species.

These management and regulatory aspects are complex. Detailing them is beyond the scope of this analysis, but they may warrant consideration on a case-by-case basis. The sections of this EIS dealing with subsistence and recreational hunting provide more detailed information on the management and regulation of these activities.

3.5.3 Northern Interior Region

3.5.3.1 Waterfowl

General waterfowl information is provided in section 3.5.2.3.1. Waterfowl breeding and spring and fall population distribution estimates are based on USFWS surveys (Butler and Gill 1993; King 1993). Butler and Gill (1993) and King (1993) provided migration population and pathway estimates primarily for bird-aircraft strike hazard impact modeling; sufficient data are not available to accurately verify these estimates. Trumpeter swans were censused by the USFWS in 1990 (refer to 3.5.2.3.2).



Part of the waterfowl spring concentration area WC-1 overlaps with the southern portion of the Northern Interior Region. The area supports approximately 50,000 cranes, 10,000 Canada geese, 20,000 greater white-fronted geese, 20,000 ducks, and 2,000 swans in the spring (April 15 to May 10) and 20,000 cranes, 5,000 Canada geese, 10,000 greater white-fronted geese, 10,000 ducks, and 1,000 swans in the fall (August 20 to October 10) (see Figure 3-28 and Attachment A).

Waterfowl spring concentration area WC-3 is located along the Yukon River, immediately west of the northwestern boundary of the region. It supports 5,000 Canada geese in the spring (April 30 to May 5) (see Figure 3-28 and Attachment A).

Part of the waterfowl summer breeding concentration area W-3 is located within the northwestern portion of the Northern Interior Region. It supports 1,500,000 ducks, 3,000 cranes, 5,000 Canada geese, 2,000 greater white-fronted geese, and 200 swans from June 10 to August 1 (see Figure 3-28 and Attachment A).

Waterfowl summer breeding concentration area W-2 is located 25 miles west of the southwestern corner of the Northern Interior Region. It supports 200,000 ducks, 5,000 cranes, 5,000 Canada geese, 5,000 greater white-fronted geese, and 3,000 swans from June 10 to August 1 (see Figure 3-28 and Attachment A).

3.5.3.1.1 YUKON 1 MOA and Stuart Creek Air-to-Ground Weapons Range (R-2205)

Ducks and geese occur seasonally under the southwestern portion of the YUKON 1 MOA and R-2205 along the Salcha River. The waterfowl spring concentration area WC-1 is located under the southcentral portion of the MOA and extends to the south to the Healy Lake area. The waterfowl summer breeding concentration area W-2 is located 25 miles west of the MOA (see Figure 3-28).

No trumpeter swans were counted under the YUKON 1 MOA or R-2205 during the 1990 USFWS census. However, 3,880 trumpeters were counted in the Lower Tanana census unit located west of the MOA, and 525

trumpeters were counted in the Upper Tanana census unit (Conant et al. 1991) south of the MOA along the Tanana River drainage (see Figure 3-29).

3.5.3.1.2 YUKON 2 MOA

Ducks and geese occur seasonally under the northern half of the MOA, with a more sparse distribution occurring under the southern portion of the MOA, generally associated with the Yukon River drainage. The northwestern portion of the MOA is located over a waterfowl summer breeding concentration area (Area W-3), which extends to the north and west of the MOA. The waterfowl spring concentration area WC-3 is located 10 miles northwest of the MOA along the Yukon River (see Figure 3-28).

The trumpeter swan population under the YUKON 2 MOA is generally associated with the Yukon River drainage. Twelve trumpeters were counted under the YUKON 2 MOA during the 1990 USFWS census; however, 152 trumpeters were counted in the Yukon Flats census unit (Conant et al. 1991), which encompasses most of YUKON 2 MOA (see Figure 3-29).

3.5.3.1.3 YUKON 3 MOA

Ducks and geese occur seasonally under the extreme northeastern and southwestern portions of the YUKON 3 MOA. No major waterfowl concentrations occur under the MOA.

Two trumpeter swans were counted under the YUKON 3 MOA during the 1990 USFWS census; however, the MOA is situated between the Yukon Flats census unit, where 152 trumpeters were counted, and the Upper Tanana census unit, where 525 trumpeters were counted (Conant et al. 1991) (see Figure 3-29).

3.5.3.1.4 YUKON 4 MOA

Waterfowl populations occur seasonally under much of the YUKON 4 MOA, especially the northwestern portion and southward to the Yukon River. The major waterfowl summer breeding area W-3 extends north and west of the MOA (see Figure 3-28).

The trumpeter swan population under the YUKON 4 MOA is generally associated with the Yukon and Black river drainages. Two trumpeters were counted under the YUKON 4 MOA during the 1990 USFWS census; however, 152 trumpeters were counted in the Yukon Flats census unit (Conant et al. 1991), which encompasses most of YUKON 4 MOA (see Figure 3-29).

3.5.3.1.5 YUKON 5 MOA

Waterfowl populations occur seasonally under most of the YUKON 5 MOA, especially in the western portion. The western one-third of the MOA is located over the waterfowl summer breeding area W-3, which extends west of the MOA (see Figure 3-28). The waterfowl spring concentration area WC-3 borders the western MOA boundary and extends to the west (see Figure 3-28).

Under the western to northern portions of the YUKON 5 MOA, within the Yukon Flats NWR, specific areas of concern for the refuge are: (1) high density waterfowl fall staging and breeding around Tiinkdhul, Marten, Big Timber, Jokoei, Ohtig, and Mardow lakes; and (2) high density waterfowl breeding along the Black, Little Black, Sucker, and Grass river drainages.

The trumpeter swan population under the YUKON 5 MOA is generally associated with the Yukon and Black river drainages. Two trumpeters were counted under the YUKON 5 MOA during the 1990 USFWS census; however, 152 trumpeters were counted in the Yukon Flats census unit (Conant et al. 1991), which encompasses most of YUKON 5 MOA (see Figure 3-29).

3.5.3.1.6 YUKON 6 MOA

Duck and geese populations occur seasonally under the YUKON 6 MOA, being generally associated with the Tanana River drainage. The waterfowl summer breeding concentration area W-2 is located 15 miles southwest of the MOA (see Figure 3-28).

Under the southwestern to southern portions of the YUKON 6 MOA, within the Yukon Flats NWR, specific areas of concern are: (1) high density waterfowl fall staging and breeding around Tiinkdhul, Marten, Big Timber, Jokoei, and Ohtig lakes; and (2) high density waterfowl breeding along the Black River drainage (Bertram 1993).

No trumpeter swans were counted under the YUKON 6 MOA during the 1990 USFWS census; however, 3,880 trumpeters were counted in the Lower Tanana census unit located west of the MOA, and 525 trumpeters were counted in the Upper Tanana census unit (Conant et al. 1991) located south of the MOA along the Tanana River drainage.

3.5.3.2 Raptors

General raptor information is provided in section 3.5.2.3.3. Raptor nest site data are based on USFWS and ADF&G surveys (Schempf 1993; Ambrose 1993; Hughes 1993), and do not represent the entire nesting population. Raptor breeding population distribution estimates are based on USFWS surveys (Butler and Gill 1993; King 1993). These breeding distributions are not indicative of raptor distribution throughout Alaska, since no concerted effort has been made to find all nesting areas. Raptors occur throughout the forested parts of Alaska; most surveyed areas are along accessible river systems and coastal areas. Butler (1993) and King (1993) provided migration population and pathway estimates primarily for bird-aircraft strike hazard impact modeling; sufficient data are not available to accurately verify these estimates. Refer to Figure 3-28 and Attachment A, Figure 3-30, Figure 3-31, and Figure 3-32 for all raptor distributions addressed below.

There is one raptor breeding concentration area (R-3) located under the Northern Interior Region, along the Yukon River. Another raptor breeding concentration area (R-4) is located along the Tanana River, below the southern boundary of the region (see Figure 3-28 and Attachment A).

3.5.3.2.1 YUKON 1 MOA and Stuart Creek Air-to-Ground Weapons Range (R-2205)

An estimated 500 raptors nest from May 1 to September 1 along a 200-mile Tanana River segment (area R-4), which extends under the southern portion of the YUKON 1 MOA and R-2205. A number of resident raptors begin to nest before May 1 (e.g., goshawks, owls).

Ten peregrine falcon nest sites have been located under the YUKON 1 MOA, but no nests have been located under R-2205. All are along the Yukon River drainage below the northeastern corner of the MOA. One golden eagle and four bald eagle nest sites have been located under the YUKON 1 MOA along the Yukon River drainage below the northeastern corner of the MOA. Two gyrfalcon nest sites have been found along the Yukon River drainage under the northeastern corner of the MOA. One northern goshawk nest site has been located under the northwestern corner of the YUKON 1 MOA.

3.5.3.2.2 YUKON 2 MOA

An estimated 200 raptors nest along a 120-mile Yukon River segment (area R-3), which extends under the YUKON 2 MOA.

Forty-two peregrine falcon nest sites have been located under the YUKON 2 MOA. The most dense nesting occurs along the Yukon River, and all but four nests are located under the eastern half of the MOA. Five bald eagle nest sites have been located under the YUKON 2 MOA along the Yukon River, four of which are located

within the eastern half of the MOA. Five golden eagle nest sites have been located under the YUKON 2 MOA, four below the western half of the MOA. One gyrfalcon nest site has been found under the southeastern portion of the YUKON 2 MOA along the northeast boundary of the YUKON 1 MOA. Three northern goshawk nest sites have been located under the YUKON 2 MOA; one below the southwest corner of the MOA and two below the west-central region. One rough-legged hawk nest site has been located under the southcentral portion of the MOA.

3.5.3.2.3 YUKON 3 MOA

An estimated 200 raptors nest from May 1 to September 1 along a 110-mile Yukon River segment (area R-3), which extends under the northeastern portion of the YUKON 3 MOA. A number of resident raptors begin to nest before May 1 (e.g., goshawks, owls).

Fifty-one peregrine falcon nest sites have been located under the YUKON 3 MOA, with a concentration along the Yukon River under the northeastern portion of the MOA. This area supports one of the highest peregrine nesting densities in Alaska and is included in the USFWS index population. Thirteen bald eagle and two golden eagle nest sites have been located in the northeastern portion of the YUKON 3 MOA along the Yukon River. One northern goshawk nest site has been located under the extreme northeastern portion of the MOA.

3.5.3.2.4 YUKON 4 MOA

An estimated 200 raptors nest from May 1 to September 1 along a 110-mile segment of the Yukon River (area R-3), which extends under the YUKON 4 MOA. A number of resident raptors begin to nest before May 1 (e.g., goshawks, owls).

Fifty peregrine falcon nest sites have been located under the southern half of the YUKON 4 MOA along the Yukon River. This area supports one of the highest peregrine nesting densities in Alaska and is included as part of the USFWS index population. Three bald eagle and three golden eagle nest sites have been located along the Yukon River under the southern half of the MOA.

3.5.3.2.5 YUKON 5 MOA

Six peregrine falcon nest sites have been located along the Black River under the MOA. No peregrine nests have been found under the southern half and western half of the MOA. The USFWS has surveyed no bald eagle nest sites along the Black River; however, bald eagle nests have been observed (Ritchie 1984). The Yukon River valley supports dense raptor nesting. A 110-mile segment of river to the south of the MOA supports approximately 200 breeding raptors (area R-3).

3.5.3.2.6 YUKON 6 MOA

An estimated 500 raptors nest from May 1 to September 1 along a 200-mile segment of the Tanana River (area R-4), which extends under the southern portion of YUKON 6 MOA. A number of resident raptors begin to nest before May 1 (e.g., goshawks, owls).

No peregrine nest sites have been found under the YUKON 6 MOA; however, two nest sites have been located within 5 miles of the southwestern boundary under FALCON MOA. One bald eagle nest site has been located under the southern portion of the MOA. Two northern goshawk nest sites have been located under the YUKON 6 MOA; one along the eastern MOA boundary and one along the southern boundary. One rough-legged hawk nest site has been located under the extreme western corner of the MOA.

3.5.3.3 Bird Migration

Major migration flyways (refer to Figure 3-28, Major Migration Routes 1 and 2) extend through the Northern Interior Region, along the Tanana and Yukon river valleys. Major Migration Route 2 passes through the northern portion of the region, extending across YUKON 2 and 4 MOAs, the southwestern portion of YUKON 5 MOA, and the northeastern portion of YUKON 3 MOA. Major Migration Route 1 passes through the southern portion of the region, extending through the southern portions of YUKON 1 and 6 MOAs and Stuart Creek range (R-2205). Flyway 2 is followed by 2 million waterfowl and 12,000 raptors in the spring (April 10 to May 20), and 5 million waterfowl and 23,000 raptors in the fall (August 1 to October 10). Flyway 1 is followed by 2 million waterfowl and 25,000 raptors in the spring, and 9 million waterfowl and 48,000 raptors in the fall. Although these flyways are fairly well defined, since they are associated with river systems, many birds will begin to disperse throughout the migration pathway as breeding grounds are reached. Therefore, the entire Northern Interior Region may be covered to some extent by migrant birds.

3.5.3.4 Caribou

The Northern Interior Region provides habitat for the Porcupine, Fortymile, and White Mountains caribou herds (Figure 3-33). In certain years, caribou of the Mentasta and the Nelchina herds winter in the southeastern portion of the region. Detailed information on the Mentasta herd can be found under section 3.5.5.4.4, and for the Nelchina herd under section 3.5.5.4.2.

The *Fortymile herd* (Figure 3-33) is the most abundant herd in the Northern Interior Region, but historically has experienced large fluctuations in numbers. In the 1920s, the Fortymile herd was estimated to have over 500,000 animals, but the herd declined to a historic low of about 4,000 head in the mid-1970s (ADF&G 1986a). Predation by wolves and brown bears, and over-harvest and harsh winters may have been the causes for this steep decline in caribou numbers.

Since the mid-1970s, the herd has grown steadily to about 20,000 animals in 1988. In June 1992, the herd size was estimated at about 22,000 caribou (ADF&G 1993i). However, the growth rate of the population has slowed since 1988, mainly due to harsh winter conditions and increased predation. ADF&G plans to allow the herd to grow to 50,000 to 60,000 animals by the year 2000 (ADF&G 1992a).

The general distribution of the Fortymile herd has varied considerably over the years, probably as a result of fluctuating herd size. In the 1920s, the herd's range reached beyond the confluence of the Yukon and the Porcupine rivers in the north, and as far south as Copper Center in the Copper River Valley. At present, the herd's range stretches roughly between the south bank of the Yukon River to the north and the Tanana River to the south, and as far as the White Mountains to the west and into the Canadian Yukon Territory to the east (ADF&G 1985).

The location of the Fortymile herd's calving grounds has been highly variable over time as well. Until 1963, calving took place in the White Mountains (BLM 1990a). Later the herd's primary calving area was between Circle, Chena Hot Springs, and Twin Mountain. From 1978 to 1983, the herd calved in the southern tributaries of the Seventymile River and the upper Charley River drainages. In 1984, however, calving shifted closer to the upper Birch Creek drainage (ADF&G 1986a). The herd has concentrated around the Charley River drainage during calving in recent years (USAF 1992) and along the eastern slopes of Mount Harper and in the upper Middle Fork drainage in 1990 (ADF&G 1992a). According to Townsend (USAF 1992), the typical calving period for the Fortymile herd is between May 15 and June 1.

Post-calving and summer use areas of the Fortymile herd have been variable as well. When the herd was very large in the 1920s and 30s, it summered in Canada (McNay et al. 1993). In recent years, the herd has summered from Mount Harper north and east to Glacier Mountain, and west to the upper Salcha River. In some years, the

summer range extends east to the Taylor Highway (ADF&G 1992a). However, the Fortymile and White Mountain herds may mix during summer and fall along the Steese Highway.

During fall migration, all or a portion of the Fortymile herd may aggregate in late September to early October and cross the Taylor Highway into the Yukon Territory. Most of the caribou return to Alaska in November, although part of the herd, especially bulls, may remain in Canada until April (McNay et al. 1993).

Winter use areas of the Fortymile herd have varied over time. In 1989 about 25 percent of the animals wintered in the Tanana-Fortymile divide, while the remainder of the herd moved northwest to the Birch Creek area (ADF&G 1992a). In some years, significant numbers of animals winter in the Ladue River drainage or in the Dennison Fork south of the proposed Northern Interior Region airspace. In 1982, the Fortymile herd wintered along the Yukon River, as did caribou from the Porcupine herd migrating south of the Yukon River (ADF&G 1986a).

The *Porcupine herd* is the second largest of the Alaskan caribou herds. The herd numbered 160,000 animals in 1992, which represents a decline from the 1989 estimate of 178,000 (ADF&F 1993d). The Porcupine herd migrates between Alaska and the Yukon and Northwest Territories of Canada. Calving areas of the Porcupine herd are located on the north slope of the Brooks Range. No calving areas are located within the Northern Interior Region airspace. The post-calving areas are also located in the Brooks Range, but in mid-August the animals move south toward the Porcupine River.

The winter use areas of the Porcupine herd extend from the Porcupine River east into the Yukon Territory, namely to the Ogilvie Mountains and to the headwaters of the Tatonduk River. About 1 in every 10 years, the herd extends its winter range from Canada into the headwaters of the Black and Little Black rivers in Alaska (see Figure 3-33). In the winter 1992/93, about 75,000 animals moved into the Black and Little Black river drainages (Whitten 1993). As mentioned previously, animals of the Porcupine herd may even winter as far south as the upper Yukon River along with wintering caribou from the Fortymile herd.

The *White Mountains herd* consists of about 1,000 head (USAF 1992), which inhabit the area of the White Mountains northwest of the Steese Highway year-round (Figure 3-33). The range of the herd occurs within the White Mountains National Recreation Area managed by the BLM.

Since the Fortymile herd previously had winter and calving areas in this region, it is probable that the White Mountains herd is a remnant of the Fortymile herd. However, the White Mountains herd has established its own calving grounds in the White Mountains west of the Steese Highway, and consequently is regarded as separate from the Fortymile herd. The White Mountains herd calves in the White Mountains around Mount Prindle, Rocky Mountain, and in the headwaters of Victoria Creek. Typically, calving takes place in May.

Summer use areas of the White Mountains herd are located on the high ridges of the White Mountains and headwaters of Beaver and Preacher creeks. The ranges of the White Mountains and Fortymile herds may overlap during summer and fall along the Steese Highway. Fall migration takes place from late September to early October, as caribou travel in a western and northern direction to the Victoria Creek headwaters (BLM 1990a). The winter range of the White Mountains herd includes Victoria Creek and the headwaters of Hess Creek and Tolovana River.

3.5.3.4.1 YUKON 1 MOA

The entire YUKON 1 MOA, except its western end, overlaps the general distribution of the Fortymile herd. In recent years, the herd's calving activities have been concentrated on the eastern slope of Mount Harper, just east of the YUKON 1 MOA. Post-calving ranges have included areas under the eastern portion of YUKON 1, including the upper Salcha River drainage.

3.5.3.4.2 YUKON 2 MOA

The Porcupine herd infrequently uses areas under the northern portion of the YUKON 2 MOA during summer, or as part of its winter range.

Part of the range of the Fortymile herd is located under the southern half the YUKON 2 MOA. Calving, summer, and winter use have to be expected under this MOA. In the past, important calving grounds have been located in the area of Circle, Chena Hot Springs, and Twin Mountain, and in the upper Birch Creek drainage, all located under the southern portion of YUKON 2 MOA. However, as previously described, the Fortymile herd does not exhibit high site fidelity to particular calving grounds or winter use areas. Hence, it is not possible to predict herd location under this MOA during critical times (i.e., calving, post-calving, winter).

Animals of the White Mountains herd are expected to occur along the Steese Highway under the YUKON 2 MOA, especially during summer and fall. However, no calving areas of the White Mountains herd are below YUKON 2 MOA.

3.5.3.4.3 YUKON 3 MOA

The YUKON 3 MOA, especially the northern and western parts, overlies very important calving grounds for the Fortymile herd, in recent years. Calving has taken place in the Charley River drainage, as well as along the eastern slopes of Mount Harper and in the upper Middle Fork drainage. In past years, post-calving and summer use areas have extended from Mount Harper north and east to Glacier Mountain and west to the upper Salcha River. In some years, the summer range extends east beyond the Taylor Highway. In late summer, all or part of the Fortymile herd aggregates and crosses the Taylor Highway during its fall migration into Canada. This movement takes place in late September and early October. In November caribou return to Alaska. The entire YUKON 3 MOA overlaps potential winter use area for the Fortymile herd.

In some years, caribou of the Nelchina herd (see section 3.5.5.4.2) and the Mentasta herd (see section 3.5.5.4.4) winter as well under the YUKON 3 MOA.

3.5.3.4.4 YUKON 4 MOA

Portions of the Porcupine herd have been observed to winter under the northern portion of the YUKON 4 MOA about once every 10 years. The caribou migrate from the Yukon Territory to the Black and Little Black river drainages during early and mid-winter, before moving back into Canada. However, in 1982 animals of the Porcupine herd were observed south of the Yukon River with wintering animals of the Fortymile herd.

The southwestern portion of YUKON 4 MOA overlies areas used by the Fortymile herd during calving and post-calving, such as the upper drainage of the Charley River and the southern drainage of the Seventymile River. The area south of the Yukon River is also used as winter range. During the winter 1993/94, the Fortymile herd was sighted in the Charley and Fortymile river drainages (Valkenburg 1994). Since the movements of the Fortymile herd are highly variable, it is not possible to predict if the herd will use these calving and winter use areas in any given year in the future.

3.5.3.4.5 YUKON 5 MOA

Portions of the Porcupine herd may move into areas under the YUKON 5 MOA, especially in late summer on the way from post-calving areas to winter use areas, and during some winters when part of the herd migrates from the Yukon Territory into the Black River and Little Black River drainages. Although the range of the Fortymile herd extended as far as the Porcupine River in the 1920s, the herd presently does not use areas under YUKON 5 MOA. The range of the White Mountains herd does not extend under YUKON 5 MOA. No calving or post-calving areas are located under this MOA.

3.5.3.4.6 YUKON 6 MOA

The range of the Porcupine herd does not extend as far south as this MOA. Historically, the Fortymile herd has utilized the area under the northern half of the YUKON 6 MOA as a calving ground. The area under the northern half of YUKON 6 MOA must be considered a potential general and winter use area for this herd, even though it has not been used in the past few years. Animals of the White Mountains herd may move under the northern end of the YUKON 6 MOA during summer and fall.

3.5.3.4.7 Stuart Creek Air-to-Ground Weapons Range (R-2205)

Restricted Area R-2205 is located in the southwest corner of YUKON 1 MOA and covers the Yukon Maneuver Area. The Stuart Creek range is located in the north-central portion of the Yukon Maneuver Area. No caribou have been reported within the Yukon Maneuver Area (BLM and DoD 1994).

3.5.3.5 Moose

Moose are distributed throughout the Northern Interior Region (Figure 3-34), and calving, rutting, and winter concentration areas have been identified under most of the MOAs in this region. Moose population densities vary within the region. In the northern and western portions of the region, moose densities have been described as low (0.1 to 0.3 moose/square mile), although higher concentrations have been observed in some areas. Moose population densities in this portion of the Northern Interior Region have been historically low. At present, moose populations are stable or slightly increasing. ADF&G management goals call for increased moose numbers in this region (ADF&G 1993a).

Moose were numerous in the eastern portion of the Northern Interior Region following an intensive federal predator control program carried out between the early 1950s and the early 1960s. However, the moose population declined rapidly thereafter to about one-fifth of its previous size. Predation by bears and wolves has been identified as the primary factor in the decline, but severe winters and heavy human harvests have equally played an important role in moose population dynamics. Since 1976, the moose population has remained at low densities of 0.2 to 0.4 moose/square mile. ADF&G management goals recommend increasing the moose population in the eastern portion of the region (ADF&G 1993a).

In the southwestern portion of the Northern Interior Region, moose population densities are considerably higher, particularly in the Chena and Salcha river drainages, which contain prime moose habitat. In these drainages, densities of 1.3 to 1.9 moose/square mile have been observed, and moose numbers are still increasing. A wolf control program was carried out in the area between 1984 and 1986, and may have contributed to the increase in moose numbers. Outside of the Chena and Salcha river drainages, however, moose densities are at about half of those reported in prime moose habitat, that is at about 0.7 to 1 moose/square mile (ADF&G 1991e).

In the southeastern part of the Northern Interior Region, the moose population density has been described as low, reaching only 0.3 to 0.5 moose/square mile (ADF&G 1991e). Moose populations increase slowly in this area, and predation by wolves and bears may be a main factor causing reduced moose calf survival rates (ADF&G 1993a).

3.5.3.5.1 YUKON 1 MOA

Under the YUKON 1 MOA, moose calving primarily occurs in the South Fork of the Chena River and in the Salcha River drainage, both located under the western portion of this MOA. Moose calving concentration areas have also been identified in the Shaw Creek drainage, whose headwaters reach under the southern portion of YUKON 1 MOA. During the rutting season, moose concentrate in the South Fork of the Chena River and along the Salcha River, particularly its north fork. Moose winter range covers a large portion under the YUKON 1 MOA. During winter, moose converge to the Chena, Salcha, and Goodpaster river drainages.

3.5.3.5.2 YUKON 2 MOA

No specific calving concentration areas have been identified under the YUKON 2 MOA. Rutting activity is concentrated in the upper Birch Creek, south of Circle Hot Springs. Winter concentration areas are distributed throughout the YUKON 2 MOA. Moose winter along the Yukon River, Preacher Creek, Birch Creek, Steese Highway, south of the Crazy Mountains, and along the East Fork of the Chena River.

3.5.3.5.3 YUKON 3 MOA

Calving, rutting, and winter concentration areas are located under the northern portion of this MOA along the Seventymile and Yukon rivers, and under the southern portion around Mount Veta.

3.5.3.5.4 YUKON 4 MOA

Moose calving areas are concentrated under the southern portion of the proposed YUKON 4 MOA, particularly in the triangle between the Yukon, lower Charley, and Seventymile rivers. Some calving has been reported in the lower reaches of the Kandic and Nation rivers, also located under the southern portion of the MOA. Rutting areas under the YUKON 4 MOA coincide with calving areas. In winter, moose concentrate in the Black River drainage, whose upstream portion reaches under the northern part of the YUKON 4 MOA. Other winter concentration areas are located along the Yukon, Kandik, and Nation rivers, and in the area between lower Charley, Yukon, and Seventymile rivers. Small winter concentration areas have been observed between the Little Black River and the Kandik River, and between the Kandik and the National rivers.

3.5.3.5.5 YUKON 5 MOA

Moose calving is concentrated in the Porcupine, Black, and Yukon river flats, located under the western portion of the YUKON 5 MOA. Rutting concentration areas under this MOA are identical to calving concentration areas. Moose use large tracts under the YUKON 5 MOA during winter, particularly the flats between the Porcupine and Yukon rivers, as well as areas along the Black River and its tributaries. Winter concentration areas are thus found under the western and northern portions of YUKON 5 MOA, and under much of the eastern half of the MOA, along drainages.

3.5.3.5.6 YUKON 6 MOA

The YUKON 6 MOA overlaps part of an important moose calving area, which extends from the Tanana to the Minto flats and includes the Salcha and Chena river drainages. Moose calving grounds typically cover at least half of the area under the YUKON 6 MOA and are particularly concentrated under the central portion of this MOA. Locations of moose rutting grounds are similar to the calving concentration areas mentioned above. Moose winter range occurs under most of the YUKON 6 MOA, except for its northern tip.

3.5.3.5.7 Stuart Creek Air-to-Ground Weapons Range (R-2205)

Moose are present in low densities of around 0.1 moose/square mile (BLM and DoD 1994). A portion of Restricted Area R-2205 overlies moose calving and rutting concentration areas along the South Fork of the Chena River, which is located at the northeastern edge of the Stuart Creek range. The area under R-2205, including the Stuart Creek range, is used by moose mainly during winter (USAF 1993). Most moose leave the area in spring and return in early fall (BLM and DoD 1994).

3.5.3.6 Dall Sheep

In the Northern Interior Region, Dall sheep occur in the alpine areas of Glacier Mountain and in the headwaters of the Charley River, as well as in a continuous area south of Birch Creek, around Twin Mountain and including the upper Chena River and Salcha River drainages (Heimer 1994b) (Figure 3-35). Dall sheep are also found west

of the Northern Interior Region, namely in the White Mountains (ADF&G 1986a). North of the Yukon River, some sheep may winter in the lower stretches of the Tatonduk River. These animals are part of a larger population of Dall sheep that inhabit the Ogilvie Mountains (Canada) and remain mostly in the Yukon Territory east of the proposed Northern Interior Region (Whitten 1993).

The hills and mountains in the Northern Interior Region are not as high as other mountain ranges in Alaska. They generally lack the steep, rocky outcrops that provide Dall sheep with escape habitat. Sheep in this region are therefore more prone to predation than other sheep populations in Alaska. This situation is exacerbated by the encroachment of spruce on existing sheep range in the Northern Interior Region. Spruce reduces the size of suitable range and increases vulnerability to predation because sheep are forced to traverse spruce growth in order to reach water or to move from one grazing area to another.

Sheep in the Northern Interior Region use larger ranges than other sheep populations in Alaska and can depend less on wind-swept ridges during winter (see section 3.5.2.3.6). As a consequence, only one winter concentration area has been identified in the Northern Interior Region (Figure 3-35). This winter range is located around West Point.

Dall sheep typically lamb on or in close proximity to their winter range. Lambing is thus expected in the vicinity of West Point. Lambing has been observed as well in the upper Charley River drainage and in the upper reaches of the Seventymile River (Figure 3-35). But lambing is also expected to occur in other portions of the region.

Two mineral licks have been identified in the Northern Interior Region, namely at Big Windy hot springs and on Puzzle Gulch, in the western portion of the region (Heimer 1994b) (Figure 3-35).

ADF&G assesses Dall sheep populations on a regional basis. It is estimated that about 350 sheep occur in the Tanana Hills region, which is only half the number specified in ADF&G management goals for the year 2000 (ADF&G 1992d).

According to Heimer (1993), Dall sheep populations in the Interior of Alaska have declined since 1986 because of a series of hard winters and late springs. Lamb recruitment has been very low and has been aggravated by predation in areas with increased wolf populations. Strict fire control, which allowed spruce to encroach on sheep habitat, may have been partly responsible for the population decline (BLM 1990b). In contrast to the Dall sheep population in the Tanana Hills, sheep numbers recovered in the White Mountains from a low of 132 animals in 1982 to between 250 and 300 head in 1989.

3.5.3.6.1 YUKON 1 MOA

Sheep occur in the upper Salcha River drainage and the West Point area under the northern portion of the YUKON 1 MOA, as well as extensive areas between the Charley River drainage in the northeast and Mount Harper in the southeast. No specific winter ranges have been identified under this MOA, but sheep may winter throughout their general range, depending on snow depth and availability of food. Known lambing areas are located in the upper Charley River drainage under the northeastern portion of this MOA, but lambing is expected to occur under other portions of the MOA as well.

3.5.3.6.2 YUKON 2 MOA

Dall sheep occur under the southern portion of the YUKON 2 MOA, namely around West Point, the headwaters of the Salcha River, the headwaters of the East Fork of the Chena River, in the Twin Peak area, and in the upper reaches of the Charley River. The only identified winter use area is located around West Point. However, sheep also use other areas during the winter months depending on the availability of forage. Lambing usually occurs on or close to the winter range. Sheep have been observed to lamb in the upper Charley River drainage, under the southeastern corner of the YUKON 2 MOA, but lambing has to be expected on the other sheep ranges under

the southern part of the MOA as well. Both mineral licks identified in the Northern Interior Region are located under the southern portion of YUKON 2 MOA.

3.5.3.6.3 YUKON 3 MOA

Dall sheep occur in the upper Charley River drainage, on Glacier Mountain, and on Mount Eldridge under the northern portion of the MOA. Sheep range also extends from Glacier Mountain south to Mount Harper under the western portion of the airspace. No specific winter range has been identified under this MOA, but sheep may winter throughout their range. Lambing has been observed under the northwestern corner of the YUKON 3 MOA and is expected to occur under other portions of the MOA as well.

3.5.3.6.4 YUKON 4 MOA

Suitable Dall sheep habitat is located in the Charley River headwaters under the southwestern corner of YUKON 4 MOA, and along the eastern border of this MOA. No particular winter use areas have been identified under this MOA. However, as mentioned earlier, sheep distribution is not limited to specific locations during winter in this region, but is determined by snow depth and the availability of food. Lambing areas have been identified along the headwaters of the Charley and Seventymile rivers, but lambing would be expected in other areas as well.

3.5.3.6.5 YUKON 5 and 6 MOAs

Dall sheep do not occur under the YUKON 5 or 6 MOAs.

3.5.3.6.6 Stuart Creek Air-to-Ground Weapons Range (R-2205)

There are no Dall sheep under Restricted Area R-2205 and on the Stuart Creek range.

3.5.3.7 Brown Bear

Brown bear are distributed throughout the Northern Interior Region, extending their range to near and above treeline. Although salmon migrate up several rivers in the region (e.g., Yukon River), there apparently are no significant salmon spawning streams under the proposed or existing airspace that would provide significant fishing opportunities for bears. Berry-producing plants are widespread throughout the Northern Interior Region, and bears normally use these areas in the fall. Brown bear are responsible for a considerable portion of moose and caribou calf mortality, particularly in the eastern part of the Northern Interior Region.

Brown bear population density estimates for the southern portion of the Northern Interior Region are 13.1 bears 2 years or older/1,000 square miles (ADF&G 1991b). In the southern portion of the region, the brown bear population is probably stable or slightly increasing.

In the southeastern portion of the Northern Interior Region (mainly under YUKON 3 MOA), brown bear densities have declined as a consequence of heavy hunting pressure and liberalized hunting regulations. Brown bear density in this part of the region has dropped to 6.9 bears 2 years or older/1,000 square miles (ADF&G 1991b).

Bear habitat quality is lower in the remainder of the Northern Interior Region, and density estimates of 10 bears 2 years or older/1,000 square miles for the whole of the Northern Interior Region are probably liberal. The number of brown bears in the Northern Interior Region thus probably does not exceed 300 bears 2 years or older.

3.5.3.8 Black Bear

Black bear are distributed throughout the Northern Interior Region. In general, black bear prefer forested habitat. Black bear may seasonally concentrate in berry-producing areas near treeline on high domes in the Northern Interior Region.

Black bear densities seem to be relatively low in the interior of Alaska compared to other areas of the state, possibly because of lower reproductive rates and sub-optimal habitat (ADF&G 1993e). Adult black bear density has been estimated at 12 to 18 animals/100 square miles for the Tanana Flats, located southwest of the Northern Interior Region (ADF&G 1993b). Population surveys have not been conducted in the areas pertaining to the Northern Interior Region. Assuming that the above density figures are valid for the region, 3,000 to 4,500 adult black bear would occur in the whole Northern Interior Region.

3.5.3.9 Bison

No bison occur in the Northern Interior Region.

3.5.3.10 Wolf

Wolves are distributed throughout the Northern Interior Region. In the northernmost portion of the region, wolf population densities have been estimated as low but stable (ADF&G 1991d). In the southern half of the Northern Interior Region, where there is a greater abundance of large ungulate prey such as moose and caribou, wolf densities are higher.

3.5.3.10.1 YUKON 1 MOA

Wolf control programs were carried out at different times and in different areas under this MOA, primarily as a management tool to increase the moose population. At present, wolf population densities are assumed to be similar to densities under neighboring MOAs, that is between 14 and 24 wolves/1,000 square miles, and are probably increasing.

3.5.3.10.2 YUKON 2 MOA

The ADF&G has not conducted wolf population surveys for the entire area under the YUKON 2 MOA, but wolf population densities are assumed to be similar to those estimated in neighboring areas, namely 9.6 to 11.8 wolves/1,000 square miles.

3.5.3.10.3 YUKON 3 MOA

Wolf population densities and dynamics are similar to those described for the YUKON 4 MOA south of the Yukon River.

3.5.3.10.4 YUKON 4 MOA

The area under the northern portion of this MOA is believed to support a low wolf population density of about 9.6 to 11.8 wolves/1,000 square miles. The ADF&G associates these low densities with the limited availability of large ungulate prey (ADF&G 1991d).

South of the Yukon River, wolf numbers have fluctuated widely in response to changes in both moose and caribou abundance, and to federal and state wolf control programs (ADF&G 1991d). The last wolf control program was carried out from 1981 to 1983. Moose and caribou populations increased in the years following wolf control. However, in the fall of 1986, wolves were more numerous than before the control program was implemented,

possibly as a result of the increased availability of caribou and moose. In 1989, the fall wolf population density was estimated at 18.6 wolves/1,000 square miles.

3.5.3.10.5 YUKON 5 MOA

Wolf densities under this MOA have been stable and are estimated to be low at 9.6 to 11.8 wolves/1,000 square miles (ADF&G 1991d). These low densities are probably a function of a limited prey base, since moose densities are low and caribou are only seasonally abundant. Wolf packs and litters are generally small, and pups seem to have low survival rates, all of which may be linked to the scarcity of prey in the area. Currently, reported wolf harvests are moderate under this MOA. Snowmobiles and aircraft are the means of transportation most widely used by wolf trappers and hunters (ADF&G 1992f).

3.5.3.10.6 YUKON 6 MOA

A wolf control program was last carried out in the area under the YUKON 6 MOA during the winter of 1985-86. In 1990, the fall wolf densities under this MOA were estimated at 25.6 wolves/1,000 square miles (ADF&G 1992f).

3.5.3.10.7 Stuart Creek Air-to-Ground Weapons Range (R-2205)

Wolf densities under the Restricted Area and on the Stuart Creek range are assumed to be comparable to those occurring in neighboring locations, namely between 14 and 24 wolves/1,000 square miles. A wolf was observed denning within the impact area in summer of 1993 (Boertje 1993).

3.5.3.11 Furbearers

Information for this section has been extracted mainly from the ADF&G Survey-Inventory Management Report (ADF&G 1993g). As of this writing, this Report is the most up-to-date source available for summary furbearer statistics. However, a characteristic of many furbearing species is that they may experience abrupt or cyclical changes in their population numbers, either locally or regionally, due to the abundance or scarcity of their main prey. Current conditions may therefore have changed since the compiling of this Report. Also, as explained in section 3.5.2.3.11, data on furbearers are gathered from harvest reports and trapper surveys, and are thus strongly influenced by trapping efforts.

ADF&G furbearer data are compiled for large regions. The information gained from such summaries is necessarily very general and may not accurately reflect furbearer populations in a specific area within these regions. Since furbearer information is so general, it will be given at the regional level only, and not at the MOA level.

In the northern portion of the Northern Interior Region, lynx, beaver, and marten are abundant, particularly on the Yukon Flats. Wolverines populations are stable but low. Beaver activity fluctuates from year to year, but numbers seem to be generally stable or increasing in the area. Mink and weasels are moderately abundant, whereas river otters are scarce.

In the western portion of the Northern Interior Region, lynx are reported to be common, and their numbers are probably increasing, particularly in the lower Tanana basin. Wolverine are considered scarce, and their population probably decreased between 1989 and 1991. According to harvest records and trapper surveys, beaver and otter are common. Weasels and marten are common, but densities seem to be decreasing.

In the eastern portion of the Northern Interior Region, lynx populations experienced a low between 1985 and 1988 but recovered until 1990. A low number of kittens in the 1991 harvest indicates that the lynx population may not sustain recent growth rates. Wolverine were abundant in the 1960s, concomitant with high ungulate and

wolf densities. However, populations have declined over the years, in concert with declining caribou and moose numbers, and are currently at low levels. Beaver are abundant in suitable habitat, while marten populations have been declining since a population peak in 1987. Few river otter have been sighted in this portion of the Northern Interior Region. In contrast, mink are considered common.

In the southcentral portion of the Northern Interior Region, lynx have been scarce for several years. The lynx population seems to be slightly increasing, probably because snowshoe hare populations have been increasing. The 1991 wolverine population appears to be low, but stable. Beaver are common in this part of the region, while marten numbers are low but stable. Few river otter or mink have been sighted in this area.

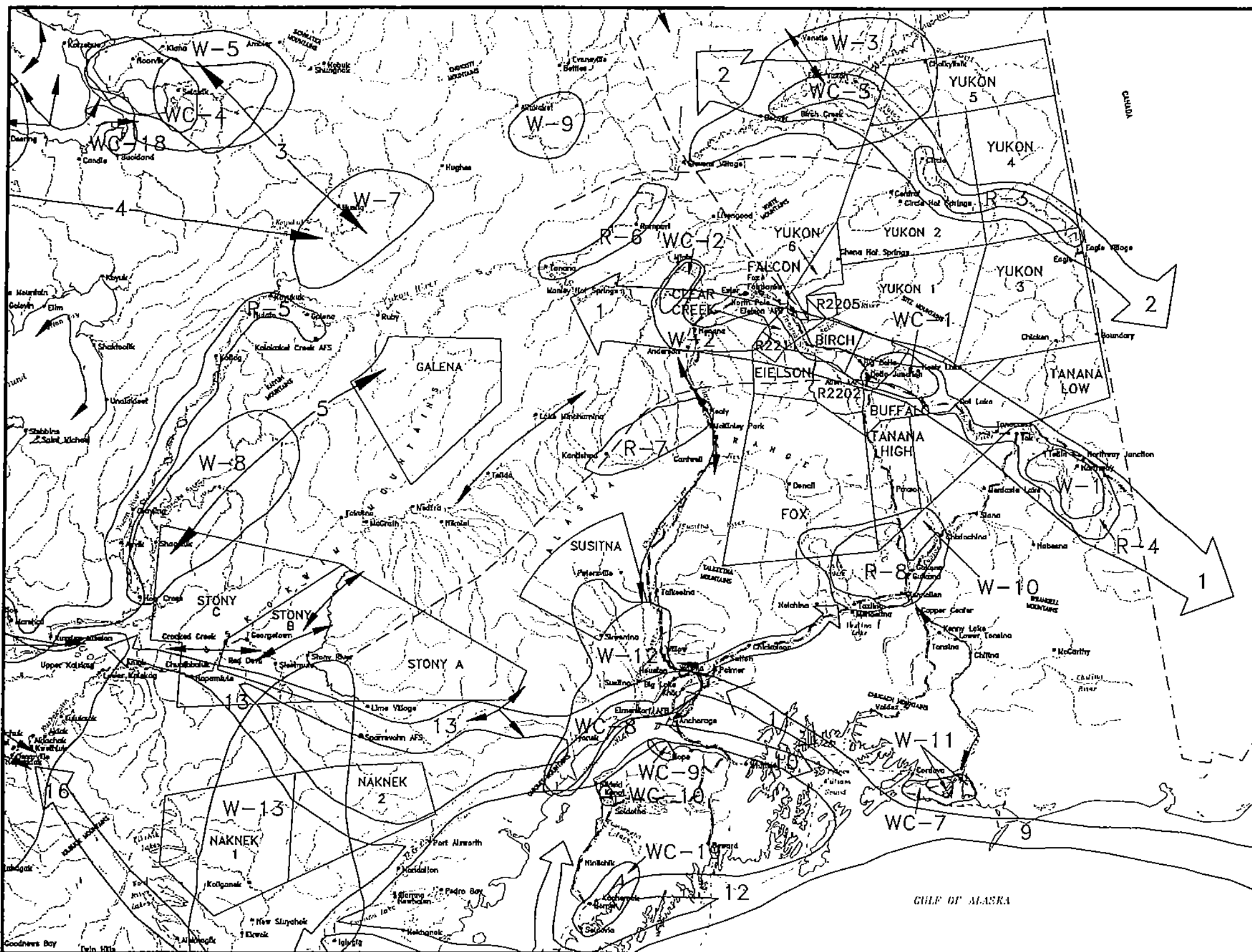


Figure 3-28

Known Waterfowl, Raptor, and Shorebird Migratory/Breeding Concentrations

Legend:

- MOA/RA Boundary
- WC-(n) Waterfowl Concentration Area
- W-(n) Waterfowl Breeding Area
- R-(n) Raptor Breeding Area
- ➡ Major Migration Route
- ➡ Minor Migration Route

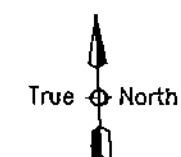
NOTE: Refer to legend immediately following for detailed information.

Sources:

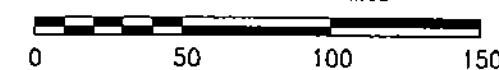
- W. Butler, USFWS, 1993
- R. Gill, USFWS, 1993
- R. King, USFWS, 1993

Features: USGS - 1:2,000,000 DLG Data
 Airspace: US Air Force, 11AF
 Cities/
 Towns: AK DCRA & USGS - Dictionary of Alaska Place Names

Map Projection: Albers Equal-Area
 Conic Projection



Scale in Statute Miles



Attachment A to Figure 3-28

Waterfowl and Raptor Migration Routes

AREA	SPECIES	SPRING Number	Inclusive dates	FALL Number	Inclusive dates
1	Cranes	200,000	15 Apr-10 May	300,000	20 Aug-10 Oct
	Geese				
	Canada	50,000		80,000	
	White-fronted	70,000		100,000	
	Ducks	1,500,000		8,000,000	
	Swans	15,000		20,000	
	Gulls	± 10,000		± 15,000	
	Bald Eagle	1,500	10 Apr-20 May	2,250	1 Aug-1 Oct
	Golden Eagle	1,000		1,500	
	Peregrine Falcon	1,000		2,000	
	Kestrel/Merlin	4,000		8,000	
	Red-tailed Hawk/ Rough-legged Hawk	4,000		8,000	
	Sharp-shinned Hawk	5,000		10,000	
	Northern Harriers	5,000		10,000	
	Short-eared Owl	3,000		6,000	
2	Cranes	20,000	20 Apr-15 May	30,000	20 Aug-1 Oct
	Geese				
	Canada	10,000		15,000	
	White-fronted	15,000		20,000	
	Ducks	1,500,000		5,000,000	
	Swans	2,000		3,000	
	Bald Eagle	500	10 Apr-20 May	750	1 Aug-1 Oct
	Golden Eagle	500		750	
	Peregrine Falcon	500		1,000	
	Kestrel/Merlin	2,000		4,000	
	Red-tailed Hawk/ Rough-legged Hawk	2,000		4,000	
	Sharp-shinned Hawk	2,000		4,000	
	Northern Harriers	2,000		4,000	
	Short-eared Owl	2,000		4,000	
3	Cranes	20,000	1 May-20 May	30,000	20 Aug-30 Sep
	Geese				
	Canada	10,000		15,000	
	White-fronted	15,000		20,000	
	Ducks	500,000		2,000,000	
4	Swans	2,000		4,000	
	Cranes	3,000	10 May-30 May	5,000	15 Aug-15 Sep
	Geese				
	Canada	5,000		8,000	
	White-fronted	2,000		4,000	
	Ducks	500,000		3,000,000	
	Swans	5,000		6,000	

5	Cranes	20,000	5 May-20 May	40,000	15 Aug-10 Sep
	Geese				
	Canada	20,000		30,000	
	White-fronted	20,000		30,000	
	Ducks	500,000		3,000,000	
	Swans	2,000		5,000	
6	Sead Ducks	150,000	15 May-1 Jun	300,000	1 Jul-10 Aug
7	Snow Geese	125,000	25 Aug-20 Sep		
	Golden Eagle	500	20 Apr-20 May	750	1 Aug-1 Oct
	Peregrine Falcon	500		1,000	
	Kestrel/Merlin	1,000		2,000	
	Red-tailed Hawk/ Rough-legged Hawk	2,000		4,000	
	Short-eared Owl	2,000		4,000	
8	Geese				
	White-fronted	100,000	20 May-15 Jun	150,000	15 Aug-15 Sep
	Brant	25,000	10 Jun-25 Jun	40,000	
	Canada	15,000	10 Jun-25 Jun	15,000	
	Ducks	1,000,000	20 May-15 Jun	2,000,000	
	Swans	10,000	20 May-15 Jun	15,000	
	Loons	10,000	20 May-15 Jun	15,000	
9	Cranes	30,000	1 Apr-15 May	30,000	1 Aug-1 Nov
	Geese				
	Canada	250,000		70,000	
	White-fronted	25,000			
	Snow	60,000			
	Brant	5,000			
	Ducks	2,000,000		3,000,000	
	Swans	50,000		60,000	
	Gulls	200,000			
	Shorebirds	1,000,000	few	10,000	several
10	Cranes	15,000	1 Apr-15 May	17,000	1 Aug-1 Nov
	Geese				
	Canada	125,000		35,000	
	White-fronted	10,000		12,000	
	Snow	30,000		35,000	
	Ducks	750,000		1,000,000	
	Swans	30,000		35,000	
	Gulls	50,000		60,000	
	Shorebirds	10,000	several		
11	Cranes	15,000	1 Apr-15 May	17,000	1 Aug-1 Nov
	Geese				
	Canada	125,000		35,000	
	White-fronted	10,000		12,000	
	Snow	30,000		35,000	
	Ducks	750,000		1,000,000	
	Gulls	50,000		60,000	

			1 Apr-15 May		1 Aug-1 Nov
12	Geese				
	Canada				
	White-fronted	5,000		5,000	
	Brant	1,000		1,000	
	Ducks	500,000		600,000	
	Gulls	100,000			
13	Ducks	250,000	1 Apr-15 May	300,000	1 Aug-1 Nov
	Gulls	75,000		90,000	
14	Cranes	5,000	1 Apr-15 May	7,000	1 Aug-1 Nov
	Geese				
	Canada	125,000		35,000	
	White-fronted	10,000		12,000	
	Snow	30,000			
	Ducks	600,000		650,000	
	Swans	25,000		30,000	
15	Cranes	5,000	1 Apr-15 May	17,000	1 Aug-1 Nov
	Geese				
	Canada	125,000		35,000	
	White-fronted	10,000		12,000	
	Snow	30,000			
	Ducks	600,000		1,000,000	
	Swans	25,000		30,000	
16	Geese		1 Apr-15 May		1 Aug-1 Nov
	White-fronted	200,000		230,000	
17	Geese		1 Apr-15 May		1 Aug-1 Nov
	Canada	200,000			
	Brant	100,000		120,000	
	Emperor	75,000			
	Ducks	500,000		700,000	
	Swans	10,000		15,000	
	Gulls	100,000			
	Shorebirds			100,000	several
18	Shorebirds	100,000	1 Apr-15 May	100,000	1 Aug-1 Nov
		several		several	

Shorebird and Passerine Migration Routes

Shorebirds and passerines follow the same general migration routes used by waterfowl; although passerines may migrate over a broader front than waterfowl.

Waterfowl Concentration Areas

AREA	SPECIES	SPRING Number	Inclusive dates	FALL Number	Inclusive dates
WC-1	Delta Junction		15 Apr-10 May		20 Aug-10 Oct
	Cranes	50,000		20,000	
	Geese				
	Canada	10,000		5,000	
	White-fronted	20,000		10,000	
	Ducks	20,000		10,000	
	Swans	2,000		1,000	

WC-2 Lake Minchumina-Minto Flats					
	Cranes	10,000	20 Apr-10 May	5,000	15 Aug-10 Oct
	Geese				
	Canada	5,000			
	White-fronted	10,000			
	Ducks	200,000		300,000	
	Swans	3,000		6,000	
WC-3	Canada Geese	5,000	30 Apr-5 May		
WC-4	Geese				
	White-fronted	10,000	15 May-15 Jun		
	Ducks	20,000		10,000	20 Aug-10 Sep
	Swans	1,000		2,000	
WC-5	Snow Geese			125,000	25 Aug-20 Sep
WC-6	Geese				
	Brant			20,000	10 Jul-10 Aug
	Canada			15,000	
	White-fronted			3,000	
WC-7	Copper River Delta		1 Mar-15 May		1 Aug-15 Nov
	Geese				
	Canada	30,000		40,000	
	Ducks	100,000		150,000	
	Gulls	50,000		50,000	
	Bald Eagle	2,500			
	Shorebirds	1,000,000	few	< 1 million	
WC-8	West Side Cook Inlet		20 Mar-15 May		1 Aug-1 Nov
	Cranes	5,000		7,500	
	Geese				
	Canada	100,000		50,000	
	White-fronted	10,000		10,000	
	Snow	40,000			
	Ducks	200,000		250,000	
	Swans	15,000		20,000	
	Shorebirds	10,000	few	1,000	several
WC-9	Chickaloon		20 Mar-15 May		1 Aug-1 Nov
	Cranes	500		500	
	Geese				
	Canada	5,000		15,000	
	White-fronted	500		1,500	
	Snow	3,000			
	Ducks	10,000		15,000	
	Shorebirds	1,000	few	1,000	few
WC-10	Kenai Flats		20 Mar-15 May		1 Aug-1 Nov
	Cranes	500		500	
	Geese				
	Snow	15,000			
	Ducks	10,000		15,000	
	Shorebirds	1,000	few	1,000	few

WC-11	Izembek Lagoon		10 Apr-10 May		1 Sep-30 Nov
	Geese				
	Brant	120,000		120,000	
	Emperor	6,000		6,000	
	Ducks	40,000		40,000	
	Shorebirds	1,000	few	10,000	several
WC-12	Nelson Lagoon		10 Apr-10 May		1 Sep-30 Nov
	Geese				
	Emperor	20,000		35,000	
	Ducks	40,000		40,000	
	Shorebirds	1,000	few	1,000	few
WC-13	Seal Island/Port Haiden		10 Apr-10 May		1 Sep-30 Nov
	Geese				
	Canada	5,000		5,000	
	Emperor	20,000		35,000	
	Ducks	30,000		30,000	
	Shorebirds	1,000	few	100,000	few
WC-14	Cinder Lagoon		10 Apr-10 May		1 Sep-30 Nov
	Geese				
	Emperor	10,000		12,000	
	Ducks	5,000		5,000	
	Shorebirds	1,000	few	10,000	several
WC-15	Ugashik Bay		10 Apr-10 May		1 Sep-30 Nov
	Geese				
	Emperor	15,000		2,000	
	Ducks	5,000		7,000	
	Shorebirds	1,000	few	10,000	few
WC-16	Egegik		10 Apr-10 May		1 Sep-30 Nov
	Geese				
	Emperor	1,000		1,000	
	Ducks	5,000		5,000	
	Shorebirds	1,000	few	10,000	few
WC-17	Chagvan Bay		10 Apr-10 May		1 Sep-30 Nov
	Geese				
	Brant	4,000		4,000	
	Emperor	2,000		2,000	
	Ducks	5,000		5,000	
	Shorebirds	1,000	few	1,000	several
WC-18	Buckland		10 Apr-10 May		1 Sep-30 Nov
	Geese				
	Canada	3,000		6,000	
	White-fronted	2,000		5,000	
	Snow	5,000			
	Ducks	10,000		15,000	
WC-19	Kachemak Bay				
	Ducks	10,000		7,000	
	Shorebirds	100,000	several	10,000	few
WC-20	Coastal Yukon Delta				
	Ducks	100,000		300,000	
	Shorebirds	10,000	several	100,000	several

Waterfowl Breeding Areas

(10 Jun-1 Aug)			(15 May-15 Aug)		
AREA	SPECIES	NUMBER	AREA	SPECIES	NUMBER
W-1	Ducks	200,000	W-9	Cranes	500
W-2	Cranes	5,000		Geese	
	Geese			White-fronted	1,000
	Canada	5,000		Ducks	100,000
	White-fronted	5,000		Swans	100
	Ducks	200,000	W-10	Gulkana	
	Swans	3,000		Ducks	10,000
W-3	Cranes	3,000		Swans	2,000
	Geese		W-11	CRD	
	Canada	5,000		Geese	
	White-fronted	2,000		Canada	10,000
	Ducks	1,500,000		Ducks	15,000
	Swans	200		Swans	6,000
W-4	Geese			Gulls	20,000
	Canada	20,000	W-12	Cook Inlet	
	White-fronted	100,000		Geese	
	Brant	20,000		Canada	5,000
	Ducks	1,000,000		White-fronted	1,000
	Swans	10,000		Ducks	20,000
W-5	Cranes	4,000		Swans	1,500
	Geese		W-13	Mulchatna	
	Canada	20,000		Cranes	5,000
	White-fronted	5,000		Geese	
	Ducks	600,000		Canada	10,000
	Swans	3,000		White-fronted	15,000
W-6	Cranes	3,000		Ducks	50,000
	Geese		W-14	Yukon Delta	
	Canada	5,000		Cranes	30,000
	White-fronted	2,000		Geese	
	Emperor	1,000		Canada	200,000
	Brant	2,000		White-fronted	100,000
	Ducks	200,000		Brant	60,000
	Swans	2,000		Ducks	1,500,000
W-7	Cranes	1,000		Swans	60,000
	Geese			Shorebirds	10,000
	Canada	1,000			
	White-fronted	5,000			
	Ducks	200,000			
	Swans	1,000			
W-8	Cranes	2,000			
	Geese				
	Canada	3,000			
	White-fronted	10,000			
	Ducks	200,000			
	Swans	500			

Raptor Breeding Areas (1 May-1 Sep)**AREA NUMBER OF RAPTORS**

R-1	700
R-2	200
R-3	200
R-4	500
R-5	600
R-6	200
R-7	500
R-8	500

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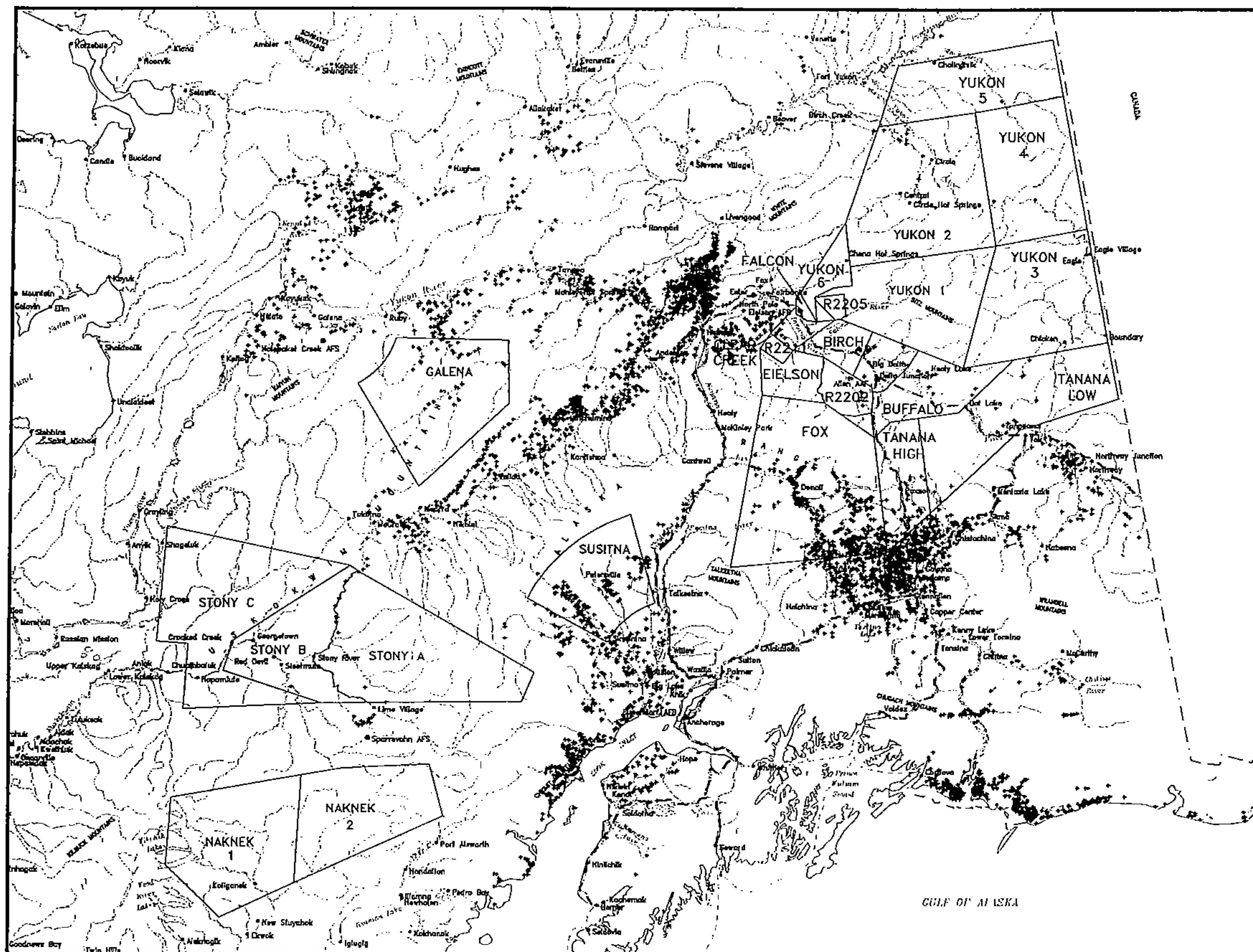


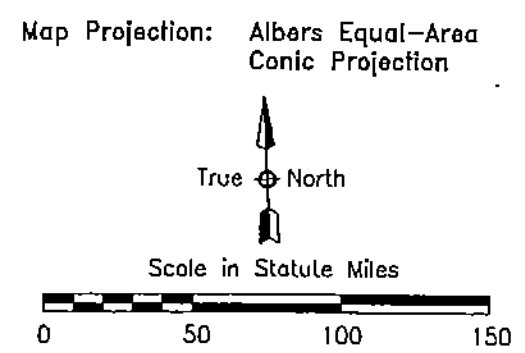
Figure 3-29
Known
Trumpeter Swan Nest Sites

- Legend:
- MOA/RA Boundary
 - Trumpeter Swan Nest Sites

Sources:

Bruce Conant, USFWS, 1993

Features: USGS - 1:2,000,000 DLG Data
 Airspace: US Air Force, 11AF
 Cities/
 Towns: AK DCRA & USGS - Dictionary
 of Alaska Place Names



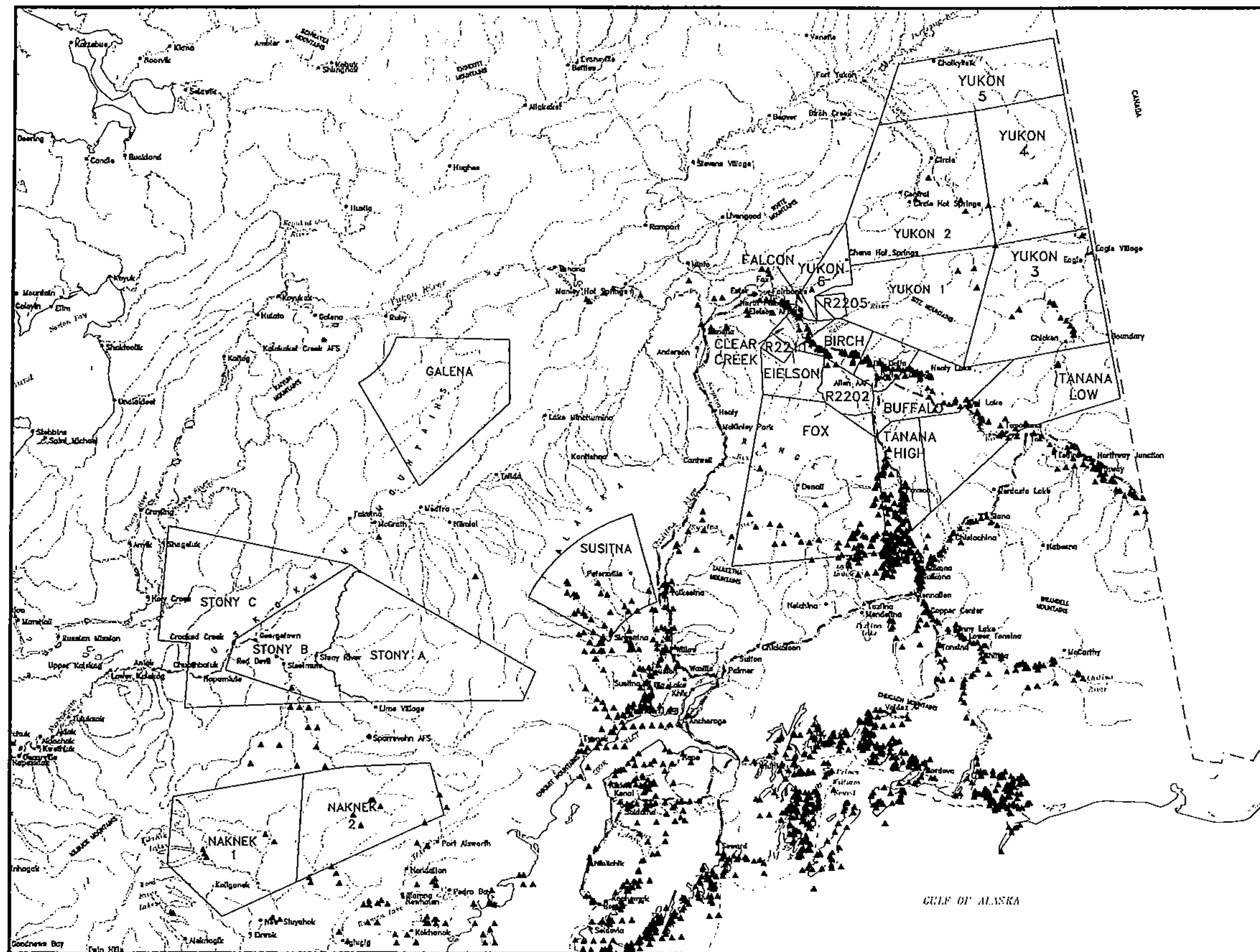


Figure 3-30
Known
Bald Eagle Nest Sites

Legend:

- MOA/RA Boundary
- ▲ Bald Eagle Nest Sites

Sources:

R. E. Ambrose, USFWS, 1993
P. F. Schempf, USFWS, 1993

Features: USGS - 1:2,000,000 DLG Data
Airspace: US Air Force, 11AF
Cities/
Towns: AK DCRA & USGS - Dictionary
of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection



Scale in Statute Miles



Figure 3-31
Known Nest Sites of
Golden Eagles and
Other Raptors

Legend:

- MOA/RA Boundary
- ▲ Golden Eagle Nest Sites
- ✚ Goshawk Nest Sites
- ✚ Gyrfalcon Nest Sites
- ✚ Osprey Nest Sites
- ✚ Rough-Legged Hawk Nest Sites

Sources:

R. E. Ambrose, USFWS, 1993
P. F. Schempf, USFWS, 1993
J. Hughes, ADF&G, 1993

Features: USGS - 1:2,000,000 DLG Data
Airspace: US Air Force, 11AF
Cities/
Towns: AK DCRA & USGS - Dictionary
of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection



Scale in Statute Miles

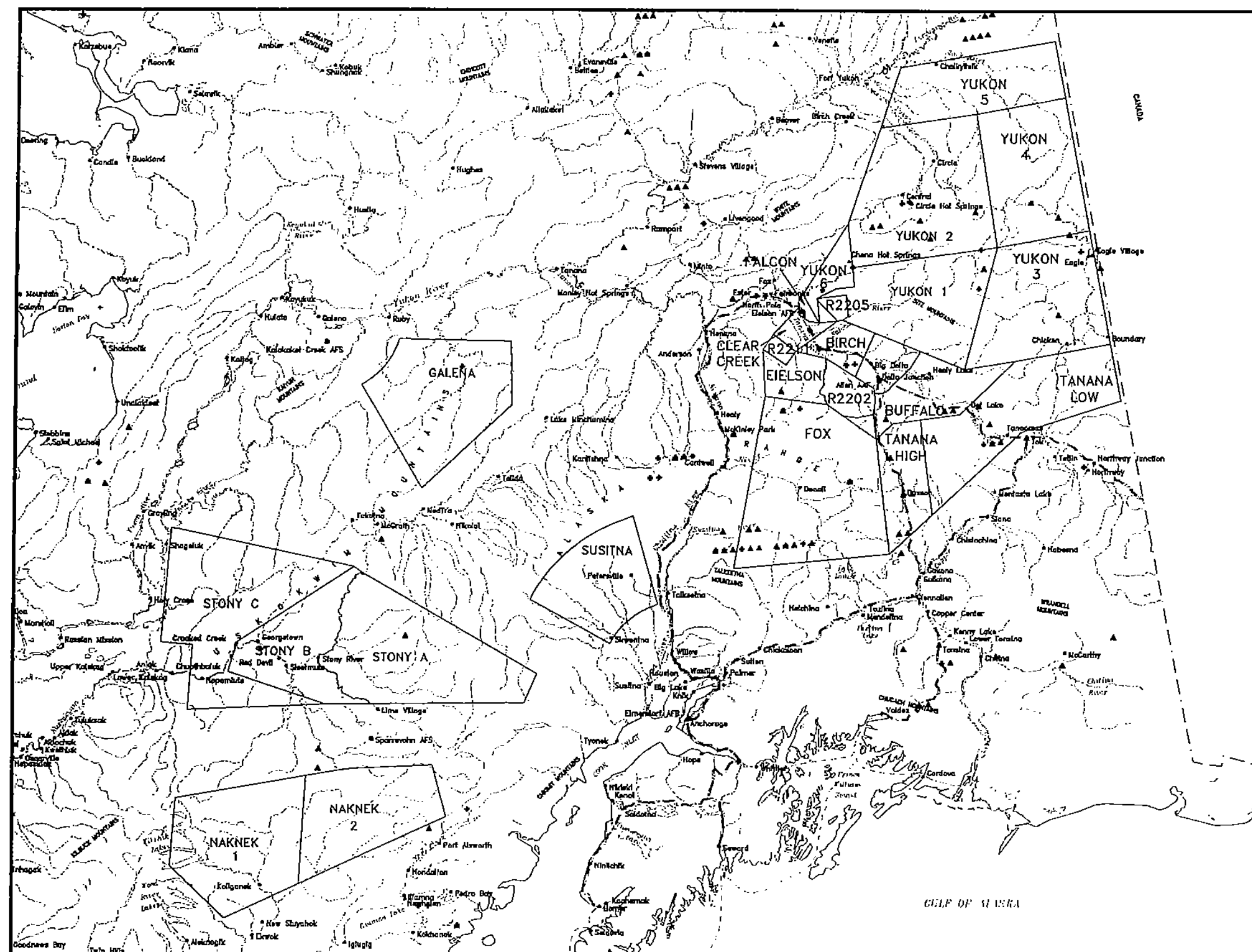
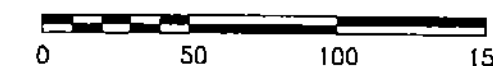


Figure 3-32
Known
Peregrine Falcon Nest Sites

Legend:

- MOA/RA Boundary
- + Peregrine Falcon Nest Sites

Sources:

R. E. Ambrose, USFWS, 1993
P. F. Schempf, USFWS, 1993

Features: USGS - 1:2,000,000 DLG Data
Airspace: US Air Force, 11AF
Cities/
Towns: AK DCRA & USGS - Dictionary
of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection



Scale in Statute Miles

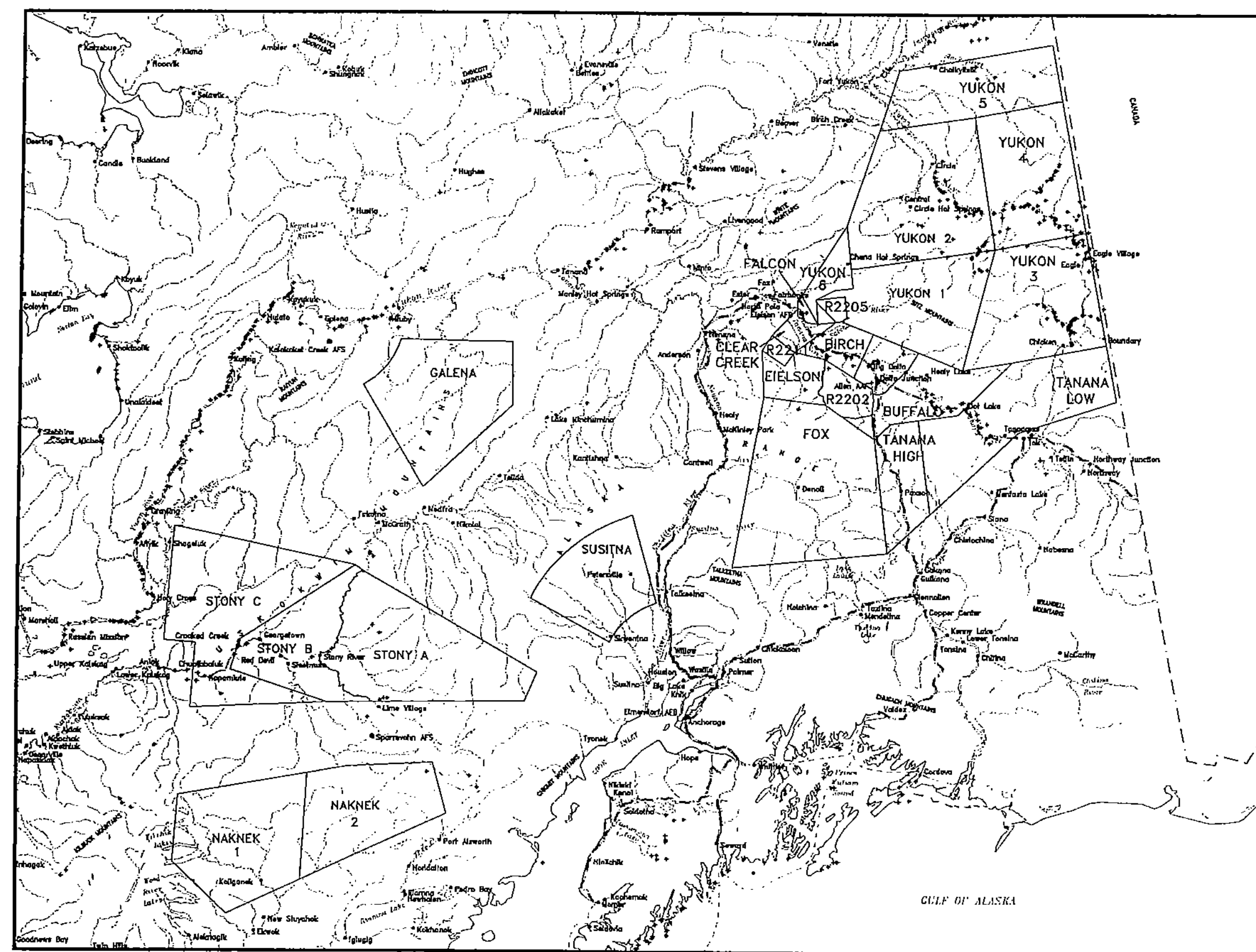
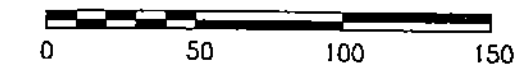


Figure 3-33
Northern Interior Region
Caribou

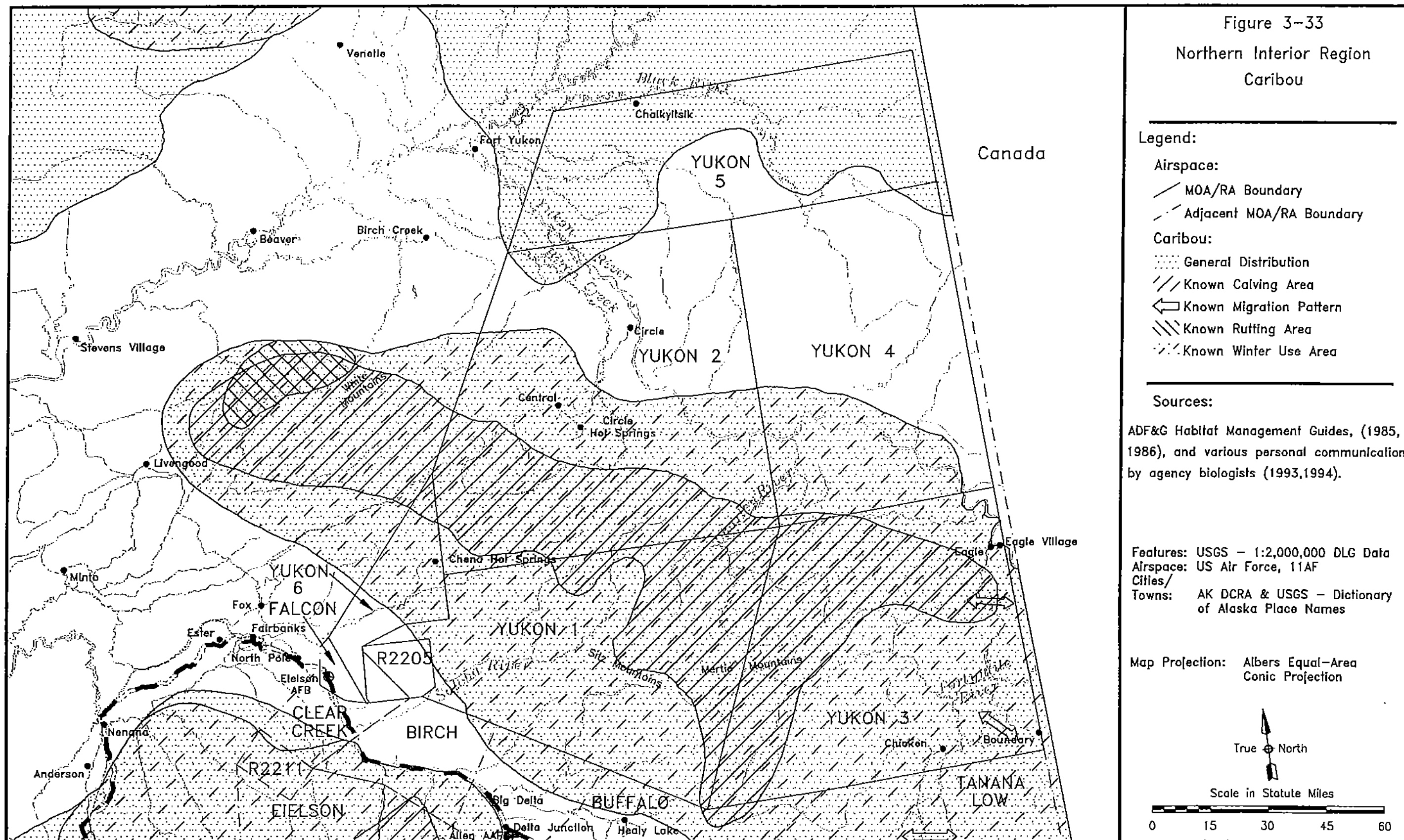


Figure 3-34
Northern Interior Region
Moose

Legend:

Airspace:

- MOA/RA Boundary
- - - Adjacent MOA/RA Boundary

Moose:

- General Distribution
- Known Calving Concn. Area
- Known Rutting Concn. Area
- Known Winter Concn. Area

Sources:

ADF&G Habitat Management Guides, (1985, 1986), and various personal communications by agency biologists (1993,1994).

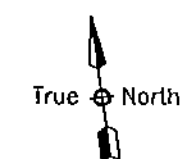
Features: USGS - 1:2,000,000 DLG Data

Airspace: US Air Force, 11AF

Cities/

Towns: AK DCRA & USGS - Dictionary of Alaska Place Names

Map Projection: Albers Equal-Area Conic Projection



Scale in Statute Miles

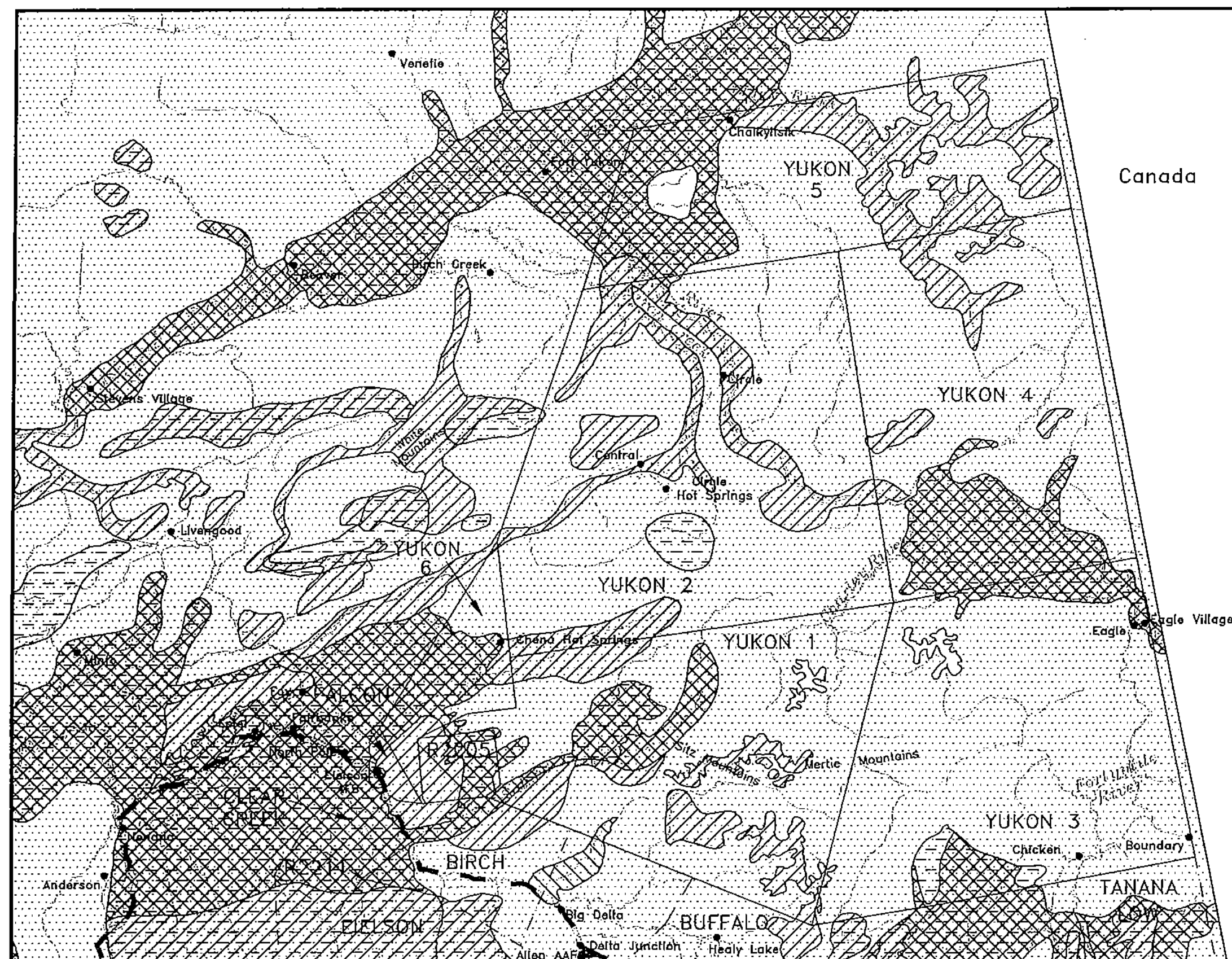
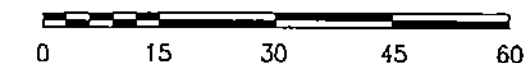


Figure 3-35
Northern Interior Region
Dall Sheep

Legend:

Airspace:

- MOA/RA Boundary
- - - Adjacent MOA/RA Boundary

Dall Sheep:

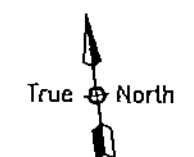
- General Distribution
- //// Known Lambing Area
- ⊕ Known Mineral Lick
- //// Known Winter Use Area

Sources:

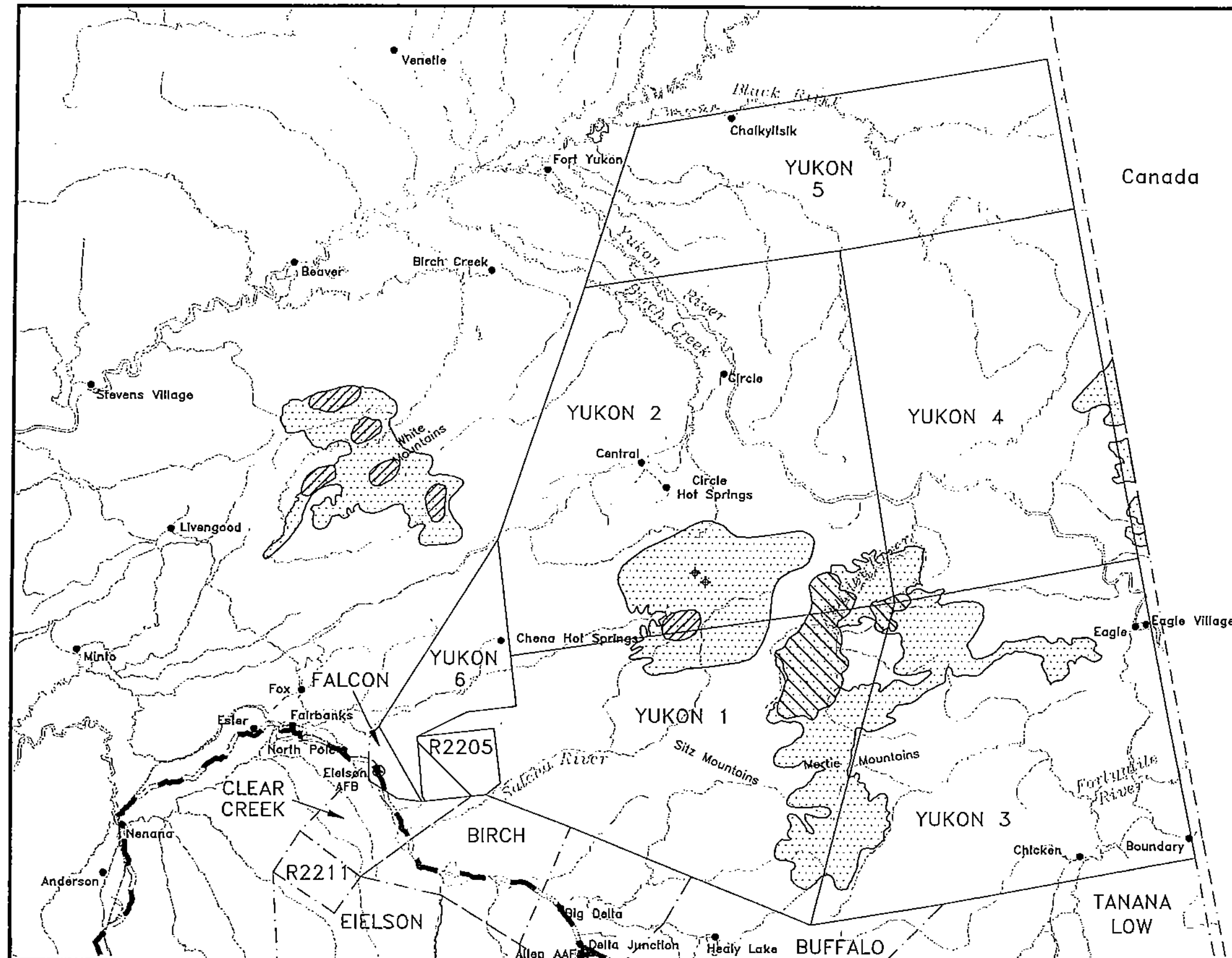
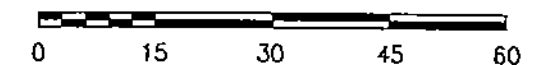
ADF&G Habitat Management Guides, (1985, 1986), and various personal communications by agency biologists (1993,1994).

Features: USGS - 1:2,000,000 DLG Data
Airspace: US Air Force, 11AF
Cities/
Towns: AK DCRA & USGS - Dictionary of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection

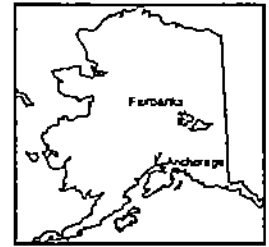


Scale in Statute Miles



3.5.4 Southern Interior Region

3.5.4.1 Waterfowl



General waterfowl information is provided in section 3.5.2.3.1. Waterfowl breeding and spring and fall population distribution estimates are based on USFWS surveys (Butler and Gill 1993; King 1993). Butler and Gill (1993) and King (1993) provided migration population and pathway estimates primarily for bird-aircraft strike hazard impact modeling; sufficient data are not available to accurately verify these estimates. Trumpeter swans were censused by the USFWS in 1990 (see section 3.5.2.3.2). Refer to Figure 3-28 (and Attachment A) and Figure 3-29 for all waterfowl distributions addressed below.

The waterfowl concentration area WC-1 is located in the eastern portion of the Southern Interior Region. It supports a total of 50,000 cranes, 20,000 greater white-fronted geese, 10,000 Canada geese, 20,000 ducks, and 2,000 swans during the spring (April 15 to May 10) and 20,000 cranes, 10,000 greater white-fronted geese, 5,000 Canada geese, 10,000 ducks, and 1,000 swans during the fall (August 20 to October 10) (Figure 3-28 and Attachment A).

The waterfowl concentration area WC-2 is located west of the region, in the Lake Minchumina-Minto Flats area. It supports 200,000 ducks, 10,000 cranes, 10,000 greater white-fronted geese, 5,000 Canada geese, and 3,000 swans during the spring and 300,000 ducks, 6,000 swans, and 5,000 cranes during the fall (Figure 3-28 and Attachment A).

Part of the waterfowl summer breeding concentration area W-2 overlaps with the western portion of the region. This area supports approximately 200,000 ducks, 5,000 cranes, 5,000 Canada geese, 5,000 greater white-fronted geese, and 3,000 swans from June 10 to August 1 (Figure 3-28 and Attachment A).

The waterfowl summer breeding concentration areas W-1 is located about 35 miles southeast of the eastern boundary of the region. It supports approximately 200,000 cranes. Waterfowl summer breeding concentration area W-10 is located south of the region and supports 10,000 ducks and 2,000 swans (Figure 3-28 and Attachment A).

Large numbers of crane have been counted within the Southern Interior Region. Kessel (1984) describes several major crane roost sites, with the largest crane numbers in a single roost at a given time being 5,000 on the gravel bars of the Delta River.

3.5.4.1.1 FALCON MOA and Eielson AFB

Ducks and geese occur seasonally throughout the area under the FALCON MOA, being generally associated with the Tanana River drainage. The waterfowl summer breeding concentration area W-2 is located 15 miles southwest of the MOA.

The Eielson AFB lakes, ponds, and marshes attract migrating, nesting, and resident waterfowl. Surveys indicate that more than 30,000 Canada geese stop over on the Eielson AFB from August 1 to October 6. Eielson AFB has over 600 acres of mowed grass that is attractive to fall migrant and resident geese for foraging (USAF 1989).

No trumpeter swans were counted under the FALCON MOA during the 1990 USFWS census. However, 3,880 trumpeters were counted in the Lower Tanana census unit located west of the MOA, and 525 trumpeters were counted in the Upper Tanana census unit (Conant et al. 1991) south of the MOA along the Tanana River drainage.

3.5.4.1.2 CLEAR CREEK MOA

Ducks and geese occur seasonally throughout the area under the proposed CLEAR CREEK MOA, generally associated with the Tanana River drainage. Part of the waterfowl summer breeding concentration area W-2 is located under the western portion of the MOA.

No trumpeter swans were counted under the CLEAR CREEK MOA during the 1990 USFWS census. However, 3,880 trumpeters were counted in the Lower Tanana census unit located west of the MOA, and 525 trumpeters were counted in the Upper Tanana census unit (Conant et al. 1991) south and east of the MOA along the Tanana River drainage.

3.5.4.1.3 BIRCH MOA

Ducks and geese occur seasonally throughout area under the BIRCH MOA, being generally associated with the Tanana River drainage. The waterfowl summer breeding concentration area W-2 is located 10 miles west of the MOA. The waterfowl concentration area WC-1 is located 5 miles east of the BIRCH MOA. There are several large crane roost sites in the area (Kessel 1984).

No trumpeter swans were counted in the BIRCH MOA during the 1990 USFWS census. However, the BIRCH MOA is located within the Upper Tanana census unit where 525 trumpeters were counted, just north of the Gulkana census unit where 3,921 trumpeters were counted, and just east of the Lower Tanana census unit where 3,880 trumpeters were counted (Conant et al. 1991).

3.5.4.1.4 EIELSON MOA and Blair Lakes Air-to-Ground Weapons Range (R-2211)

Ducks and geese occur seasonally under the northern half of the EIELSON MOA and all of R-2211, generally associated with the Tanana River drainage. The waterfowl summer breeding concentration area W-2 is located adjacent to the northwestern MOA boundary and within the western one-third of R-2211. The waterfowl concentration area WC-1 is located 25 miles east of the MOA. There are large crane roost sites in the area (Kessel 1984). Another waterfowl concentration area (WC-2, in the Lake Minchumina-Minto Flats area), is located 30 miles northeast of the MOA.

No trumpeter swans were counted under the EIELSON MOA or R-2211 during the 1990 USFWS census. However, the EIELSON MOA is located over the Upper Tanana census unit where 525 trumpeters were counted, just north of the Gulkana census unit where 3,921 trumpeters were counted, and just east of the Lower Tanana census unit where 3,880 trumpeters were counted (Conant et al. 1991).

3.5.4.1.5 BUFFALO MOA and Oklahoma Air-to-Ground Weapons Range (R-2202)

Ducks and geese occur seasonally under the northern half of the BUFFALO MOA and R-2202, being generally associated with the Tanana River drainage. The waterfowl concentration area WC-1 is located in the northern portion of the BUFFALO MOA and is adjacent to the northeastern portion of R-2202. There are large crane roost sites in the area (Kessel 1984).

The waterfowl summer breeding concentration area W-2 is located 40 miles north-northwest of the MOA. Two other waterfowl summer concentration areas (W-1, W-10) are located 35 miles southeast and 35 miles south, respectively, of the MOA.

Six trumpeter swans were counted under the MOA and none within R-2202 during the 1990 USFWS census. The MOA is located under the Upper Tanana census unit where 525 trumpeter swans were counted and just north of the Gulkana census unit where 3,921 trumpeter swans were counted (Conant et al. 1991).

3.5.4.2 Raptors

General raptor information is provided in section 3.5.2.3.3. Raptor nest site data are based on USFWS and ADF&G surveys (Schempf 1993; Ambrose 1993; Hughes 1993), and do not represent the entire nesting population. Raptor breeding population distribution estimates are based on USFWS surveys (Butler and Gill 1993; King 1993). These breeding distributions are not considered indicative of raptor distribution throughout Alaska since no concerted effort has been made to find all nesting areas. Raptors occur throughout the forested parts of Alaska; most surveyed areas are along accessible river systems and coastal areas. Butler (1993) and King (1993) provided migration population and pathway estimates primarily for bird-aircraft strike hazard impact modeling; however, sufficient data are not available to accurately verify these estimates. Refer to Figure 3-28 (and Attachment A), Figure 3-30, Figure 3-31, and Figure 3-32 for all raptor distributions addressed below.

The Southern Interior Region overlaps one raptor breeding area (R-4), which extends along the Tanana River corridor (Figure 3-28 and Attachment A).

3.5.4.2.1 FALCON MOA and Eielson AFB

An estimated 500 raptors nest from May 1 to September 1 along a 200-mile Tanana River segment (Area R-4), which extends under the southern portion of the FALCON MOA. A number of resident raptors begin to nest before May 1 (e.g., goshawks, owls).

Two peregrine nest sites have been located under the FALCON MOA, one along the river segment about 3 miles from Eielson AFB. No peregrine nest sites have been located on Eielson, but peregrines have been observed using the base as a migrant stopover (USAF 1989). No bald eagle nest sites have been located under the FALCON MOA; however, dense nesting occurs along the Tanana River drainage near the south and west MOA boundaries. One northern goshawk nest site has been located under the FALCON MOA along the western boundary. The northern goshawk has been reported as a year-round resident of Eielson AFB (USAF 1993).

3.5.4.2.2 CLEAR CREEK MOA

An estimated 500 raptors nest from May 1 to September 1 along a 200-mile Tanana River segment (Area R-4), which extends under CLEAR CREEK MOA. A number of resident raptors begin to nest before May 1 (e.g., goshawks, owls).

One peregrine nest site has been located under the eastern MOA boundary, and two additional nests are located within 5 miles of the eastern boundary under the BIRCH MOA. Nine bald eagle nest sites have been located under CLEAR CREEK MOA. Dense bald eagle nesting occurs in this region along the Tanana River drainage—about one nest per 2 miles of river. Two northern goshawk nest sites have been located within the northern and eastern portions of the MOA, along the Tanana River drainage.

3.5.4.2.3 BIRCH MOA

An estimated 500 raptors nest from May 1 to September 1 along a 200-mile Tanana River segment (Area R-4), which extends under BIRCH MOA. A number of resident raptors begin to nest before May 1 (e.g., goshawks, owls).

Twelve peregrine nest sites have been located under BIRCH MOA; three near the western boundary along the Salcha River, and the remaining across the MOA along the Tanana River drainage. Twenty bald eagle nest sites have been located under the BIRCH MOA. Dense bald eagle nesting occurs in this region along the Tanana River drainage under the southern half of the MOA—about one nest per 2 miles of river. Three northern goshawk nest sites have been located under the southern portion of the MOA, along the Tanana River drainage. One osprey nest site has been located along the southeastern MOA boundary.

3.5.4.2.4 EIELSON MOA and Blair Lakes Air-to-Ground Weapons Range (R-2211)

An estimated 500 raptors nest from May 1 to September 1 along a 200-mile Tanana River segment (Area R-4), which extends under the northern portion of EIELSON MOA and R-2211. A number of resident raptors begin to nest before May 1 (e.g., goshawks, owls).

One peregrine nest site has been located under the southeast portion of the MOA, and no peregrine nests have been located under R-2211; however, there is a concentration of peregrine nest sites within 20 miles of the north-northeast MOA boundary along the Tanana River drainage. No bald eagle nest sites have been located under the EIELSON MOA or R-2211; however, there is a concentration of bald eagle nests within 10 miles of the north-northeastern MOA boundary along the Tanana River drainage. One golden eagle nest site has been located under the southwestern portion of the MOA. No gyrfalcons have been found under the EIELSON MOA; however, two nests have been located within 10 miles of the southern MOA boundary, under FOX MOA.

3.5.4.2.5 BUFFALO MOA and Oklahoma Air-to-Ground Weapons Range (R-2202)

An estimated 500 raptors nest from May 1 to September 1 along a 200-mile Tanana River segment extending under BUFFALO MOA and R-2202 (Area R-4), and another 500 nest 35 miles to the south along the Copper River drainage. A number of resident raptors begin to nest before May 1 (e.g., goshawks, owls).

Twenty-two peregrine nest sites have been located throughout the area under the central portion of BUFFALO MOA, and one nest site has been located under R-2202, along the Tanana River drainage. Thirty-three bald eagle nest sites have been located throughout the area under the central portion of the MOA and two under R-2202, along the Tanana River drainage. Nesting concentrations of one nest per 2 river miles extend easterly and westerly along the Tanana River. Three golden eagles have been located under the BUFFALO MOA; two under the southeastern portion and one under the southwestern portion of the MOA. Four osprey nest sites have been located under the south and eastern portion of the MOA on Healy Lake; these may not be occupied each year. No northern goshawk nest sites have been located under the BUFFALO MOA or R-2202; however, three goshawk nest sites have been located within 5 miles of the northern boundary of R-2202B along the Tanana River drainage.

3.5.4.3 Bird Migration

A major migration flyway (Major Migration Route 1, see Figure 3-28) extends through the Southern Interior Region, along the Tanana River Valley. Major Migration Route 1 passes through the BUFFALO, CLEAR CREEK, EIELSON, FALCON, and BIRCH MOAs, Eielson AFB, and the Oklahoma (R-2202) and Blair Lakes (R-2211) Ranges. Major Migration Route 1 is followed by 2 million waterfowl and 25,000 raptors in the spring (April 10 to May 20) and 9 million waterfowl and 48,000 raptors in the fall (August 1 to October 10). Although the flyway is fairly well defined, since it is associated with a river system, many birds will begin to disperse throughout the migration pathway as breeding grounds are reached. Therefore, the entire Southern Interior Region may be covered to some extent by migrant birds.

A radar study at Eielson AFB indicated that large numbers of passerines, some swans, geese, ducks, raptors, and cranes passed over Eielson in the fall and spring (Cooper 1992). In the Tok area, southeast of the Southern Interior Region and within the Major Migration Route 1 corridor, Cooper et al. (1991) studied migration using radar. Spring migration was characterized by three peak movements: (1) dabbling ducks, geese, and swans in the last week of April; (2) sandhill cranes, early to mid-May; and (3) diving ducks, passerines, and shorebirds, mid to late May. Fall migration was also characterized by three peak movements: (1) greater white-fronted geese and passerines, late August; (2) sandhill cranes and some geese, ducks, raptors, and passerines, mid-September; and (3) swans and ducks, late September to mid-October.

3.5.4.4 Caribou

The Southern Interior Region contains habitat primarily for the Delta-Yanert and Macomb herds, and includes some of the Fortymile herd's calving and winter grounds (Figure 3-36). For details on the Fortymile herd, see section 3.5.3.4.

The *Delta-Yanert herd* (Figure 3-36) occurs in the southwestern portion of the Southern Interior Region. Delta and Yanert herds were considered separate until 1987, when the range of the expanding Delta herd began to overlap with that of the Yanert herd.

The Delta-Yanert herd size has fluctuated extensively during the past 20 years. In 1973, the herd was estimated at 2,300 animals. In 1989, the herd reached 10,700 head, which was the largest population ever recorded (ADF&G 1992a). In 1993, the Delta-Yanert herd was estimated to consist of about 3,700 to 4,000 head (ADF&G 1993d). This represents more than a 60 percent decline from the 1989 peak population. Severe winters were probably the main cause for increased adult and calf mortality (ADF&G 1992a). As of 1992, hunting of the Delta-Yanert herd has been closed in order to allow recovery of the herd to its previous population level of about 10,000 caribou.

The range of the Delta-Yanert herd has expanded with increased population size. Winter use areas of the Delta-Yanert herd are virtually identical to the general distribution of the herd. Caribou from this herd have been reported west of the Tanana River to the Tatlanika River and beyond. To the north, the herd's range stretches as far as the Tanana Flats (in the winter of 1992-93, caribou of the Delta-Yanert herd even wintered around and north of Fairbanks [Boertje 1993]). In summer, the range of the Delta-Yanert herd may extend as far south as the southern slopes of the Alaska Range.

Calving grounds used by the Delta-Yanert herd have changed over time. The Delta herd used a traditional calving area in the Upper Delta Creek until 1979, but has since shifted its calving grounds to areas between the Delta River and Dry Creek, and farther along the eastern foothills of the Alaska Range. The Yanert herd calved between the upper Yanert River and the upper Wood River until 1987. Since then, however, the calving areas of the Delta and the Yanert herds have overlapped, and calving may take place between the Delta River and Yanert River drainage (ADF&G 1992a). The peak calving date of the Delta-Yanert herd is between mid-May and end of May depending on the year (ADF&G 1992c).

The movements of the Delta-Yanert herd have varied over time. In the past few years during post-calving, cows and calves have concentrated in the upper Wood River drainage and along the Wood River/Yanert River divide. This aggregation takes place between late June and early July. In late August/September, caribou were observed to move across the Wood River to the Gold King Benches and further westward. After congregating for the rut in October, the herd dispersed into their wintering grounds along the western foothills, in the Gold King Benches, and on the Tanana Flats. Depending on the snow depth, caribou wintering in the Tanana Flats may move toward the foothills during winter. In the winter of 1990-91, portions of the Delta-Yanert herd wintered in the Yanert River drainage.

The summer and fall range of the Delta-Yanert herd may overlap with the range of the Nelchina herd to the south, the Denali herd along the Toklat drainage in the west, and possibly the Macomb herd in the east (USAF 1992).

The *Macomb herd* (Figure 3-36) occupies a small range located east of the Delta River of approximately 1,400 square miles. The herd's range is located on and around the Macomb Plateau. The Macomb herd is small; the herd remained relatively unknown until 1972, when its population was estimated at roughly 350 to 400 animals. A reassessment in 1975 indicated that the herd consisted of 800 animals, but the higher population figure was probably a result of better knowledge of the herd and not due to actual herd growth. A population estimate from

1988 indicated that the herd size had remained stable. The population has remained stable ever since, even though the management goal of ADF&G is to allow the herd to grow to 1,000 animals.

Harsh winters and predators are believed to be responsible for the herd size remaining static (ADF&G 1992a). Wintering and calving grounds of the Macomb herd are located on and around the Macomb Plateau. The Macomb Plateau seems to be heavily grazed and has a poor coverage of lichen. More lichen is available in the lower-lying forested areas surrounding the Macomb Plateau and in the southern Granite Mountains to the west. Both areas are extensively used by caribou (ADF&G 1986a; ADF&G 1992a).

The core calving area of the Macomb herd is located on the Macomb Plateau between Johnson River and Berry Creek. The peak of calving occurs around May 24 (ADF&G 1992c). No caribou have been observed east of the Robertson River or west of Jarvis Creek in spring.

The summer range of the Macomb herd extends from the Delta River in the west, along the foothills of the Alaska Range, nearly as far as the Tok River in the east. As previously mentioned, the ranges of Macomb and Delta-Yanert herds may overlap to a certain extent, particularly during summer and fall.

The winter range of the Fortymile herd reaches into the northern part of the Southern Interior Region. In recent years, the Fortymile herd used a calving area around Mount Harper, but this calving ground is just north of the Southern Interior Region.

3.5.4.4.1 FALCON MOA

The FALCON MOA does not overlie the normal range of any caribou herd.

3.5.4.4.2 Eielson AFB

Caribou are not normally present on Eielson AFB.

3.5.4.4.3 CLEAR CREEK MOA

The southwestern portion of the CLEAR CREEK MOA overlies the general distribution of the Delta-Yanert caribou herd. Winter use by the Delta-Yanert herd has been documented for the southern portion of the MOA.

3.5.4.4.4 Blair Lakes Air-to-Ground Weapons Range (R-2211)

Blair Lakes range (R-2211) overlies the general distribution and wintering grounds of the Delta-Yanert caribou herd.

3.5.4.4.5 BIRCH MOA

The general distribution and wintering grounds of the Fortymile herd are located under the northeastern corner of BIRCH MOA. The portion of this MOA south of the Tanana River is considered general distribution and wintering grounds of the Delta-Yanert herd. Part of the Delta-Yanert herd's calving grounds occur in a small area in the extreme south of the area under the MOA.

3.5.4.4.6 EIELSON MOA

The entire EIELSON MOA overlies the general distribution and winter range of the Delta-Yanert herd. Calving areas have been identified in the southeastern and southern portion of the area under the MOA.

3.5.4.4.7 Oklahoma Air-to-Ground Weapons Range (R-2202)

Restricted Area (R-2202) overlaps most of the Fort Greely Military Reserve. The Oklahoma range is located within Fort Greely. Caribou from the Delta-Yanert herd use much of Fort Greely during the course of the year. A traditional calving ground is located in the southern part of the Oklahoma range, but it has not been used since the mid-1980s. In 1991, caribou were observed in this area during the pre-calving period, but most of the animals moved westward out of the impact area for calving. The U.S. Army and State of Alaska have a *Cooperative Agreement for the Protection of Unique or Sensitive Areas* (1986), which has identified areas just south of the Oklahoma range as sensitive during the caribou calving and post-calving period of May 15 through 31 (USAF 1993).

3.5.4.4.8 BUFFALO MOA

The northern portion of the BUFFALO MOA overlaps part of the wintering and calving grounds of the Fortymile herd. In recent years, the Fortymile herd has used the area around Mount Harper, which is just outside the BUFFALO MOA, as its major calving area. The BUFFALO MOA also overlaps the year-round range of the Macomb caribou herd. Winter use areas, calving areas, and summer range are located in the southern half of the area under the MOA.

For the BUFLO TMOA (No Action Alternative), the situation described above differs as follows: The overlap of the BUFLO TMOA with the general distribution of the Macomb herd is less extensive. Only small portions of the calving and winter use areas of the Macomb herd occur in the southernmost portion of the area under the TMOA. The herd may use southern-southwestern portions under the TMOA as summer range.

3.5.4.5 Moose

Moose are distributed throughout the Southern Interior Region, except for elevations above 4,000 to 4,500 feet (Figure 3-37). In the northeastern portion of the Southern Interior Region, moose concentrate mainly in the Chena and Salcha river drainages. Moose population densities in this prime habitat have been estimated at between 1.3 to 1.89 moose/square mile, and populations are increasing (ADF&G 1991e). However, growth rates vary within the northeastern portion of the Southern Interior Region, possibly because of wolf reduction programs carried out at different times. ADF&G management goals set for this area have probably been met (ADF&G 1993a).

Moose populations in the Tanana Flats and in the Alaska Range foothills increased in the 1950s and reached high densities exceeding 3 moose/square mile in the early 1960s. Toward the late 1960s, moose populations began to decline and reached a low in the mid-1970s. At present, the moose population is growing at about 12 percent per year in the Tanana Flats and the Alaska Range foothills, and the population density has reached approximately 2.2 moose/square mile, or about 8,800 adult animals for this portion of the Southern Interior Region. The ADF&G management goal is a moose population of 10,000 adult animals (ADF&G 1993a).

Many moose remain resident in the Salcha and Chena river drainages throughout the year. Other moose originating from the northern slopes of the Alaska Range, from the Tanana hills, and from north of Fairbanks move into the Tanana Flats to the south of Fairbanks for calving, and remain in the flats throughout the summer (Whitten 1994) before returning to their rutting and winter location in fall. Migration to and from the calving areas in the Tanana Flats is associated with the largest numbers of moose road kill.

In the southeastern part of the Southern Interior Region, moose population densities are high and stable south of the Alaska Highway, but are low and stable or declining north of the Alaska Highway (ADF&G 1993a).

3.5.4.5.1 FALCON MOA

The entire FALCON MOA overlies what is considered moose winter concentration area. Calving and rutting activities are concentrated in the northern and western portions of the MOA.

3.5.4.5.2 Eielson AFB

Eielson AFB is located within moose habitat but does not contain any special concentration areas. Moose are present on the base primarily in late fall, winter, and in early spring. Eielson AFB is in the migratory path of moose moving between the Tanana Flats and the Chena River drainage (USAF 1989). Major movements take place between April 1 and May 25, in August and September, and to some extent in October.

The aircraft runways on base are not fenced, but removal of shrubs and planting of grass have made the vicinity of the runways unattractive for moose (USAF 1989). A 7.5 mile-long fence along the Richardson Highway has been provided with openings so that migratory movements are not obstructed.

Moose population densities on Eielson AFB are not known. Since 1987, part of the base has been open to bow hunting.

3.5.4.5.3 CLEAR CREEK MOA

The entire CLEAR CREEK MOA overlies important moose habitat in the Tanana Flats. Winter, calving, and rutting concentrations have been observed in the MOA, and the moose population density is high, even during summer. Significant numbers of moose move from the surrounding hills to the Tanana Flats in April and remain there throughout the summer, before returning to the hills from August until late October (ADF&G 1993a). Some moose reside in the Tanana Flats throughout the year.

3.5.4.5.4 Blair Lakes Air-to-Ground Weapons Range (R-2211)

The Blair Lakes range is south of the CLEAR CREEK MOA; information provided for the CLEAR CREEK MOA is valid for this area as well.

3.5.4.5.5 BIRCH MOA

The entire BIRCH MOA overlies moose habitat. The north-northwestern portion of the MOA overlaps the Salcha River drainage, which is important year-round moose habitat and includes wintering, calving, and rutting areas. Part of the Shaw Creek drainage is an important moose calving area and is located under the eastern part of the MOA. The southern portion of the MOA overlaps winter use and rutting areas in the Tanana Flats south of Fairbanks.

3.5.4.5.6 EIELSON MOA

The EIELSON MOA overlaps the Tanana Flats, thereby covering important winter use and rutting areas. As described for CLEAR CREEK MOA, moose are likely to move to the Tanana Flats for calving and remain in the area during the summer as well.

3.5.4.5.7 Oklahoma Air-to-Ground Weapons Range (R-2202)

Moose inhabit the entire area under Restricted Area R-2202 throughout the year, with an average density of about 0.75 moose/square mile (USAF 1993). Moose do not appear to be common on the Oklahoma range, primarily because most of the impact area provides poor moose habitat. Part of the southern portion of the impact area is considered a fall concentration area for moose, while the northeastern margin is utilized during spring and summer. However, no calving areas are located under R-2202.

3.5.4.5.8 BUFFALO MOA

The eastern portion of the BUFFALO MOA overlies part of extensive winter use, calving, and rutting areas located between the Tanana River and Mount Veta. Other winter use areas are located under the western and southern portions of the airspace.

The BUFLO TMOA (No Action Alternative) does not overlie calving or rutting concentration areas. Winter concentration areas under this TMOA are less extensive than under the BUFFALO MOA. They are located mainly under the northeastern portion of the MOA, along the Delta River in the west, and on the southern boundary of the airspace.

3.5.4.6 Dall Sheep

In the Southern Interior Region, Dall sheep occur on the northern slopes of the Eastern Alaska Range (Figure 3-38). Sheep populations are estimated by the ADF&G within different regions or mountain ranges. The Southern Interior Region Dall sheep population falls within the Eastern Alaska Range unit and comprises portions of the Delta Controlled Use Area and the Tok Management Area. In 1991, the sheep population in the Eastern Alaska Range was estimated at 2,000 to 4,000. This represents a decrease in sheep numbers compared to previous years, when the sheep population was estimated to be comprised of approximately 5,000 animals. The decline in sheep numbers has been attributed to several severe winters (particularly since 1986) and predation, mainly by wolf (ADF&G 1992d). The stated management goal of the ADF&G is to maintain a minimum of 5,000 Dall sheep in the Eastern Alaska Range.

The Delta Controlled Use Area east of the Delta River is managed to provide the opportunity to hunt full-curl rams under aesthetically pleasing conditions. In 1986, Dall sheep were estimated to number 1,500 in this area (ADF&G 1986a), which is below the ADF&G management goal of 1,800 animals (ADF&G 1992d).

The Tok Management Area is also managed for trophy Dall sheep rams. Although no population surveys have been carried out in recent years, the Dall sheep population is assumed to be stable at about 2,000 animals (ADF&G 1990a).

Several mineral licks have been identified in the Southern Interior Region along the northern slopes of the Alaska Range (Figure 3-38).

3.5.4.6.1 EIELSON MOA

The southern portion of EIELSON MOA overlaps Dall sheep habitat located on the northern slopes of the Alaska Range. Particular winter ranges or lambing areas have not been identified under EIELSON MOA; nevertheless, winter use and lambing have to be expected on Dall sheep ranges under EIELSON MOA. Five mineral licks have been identified in the southern portion of the area under the MOA, namely between the Wood River and the Tatlanika Creek, and in the Dry Creek drainage.

3.5.4.6.2 Oklahoma Air-to-Ground Weapons Range (R-2202)

Dall sheep occur under the extreme southern portion of Restricted Area R-2202, and a winter use and lambing area has been identified within the perimeter. No Dall sheep, however, are present in the Oklahoma range. There are no known mineral licks under R-2202.

3.5.4.6.3 BUFFALO MOA

Dall sheep occur under the southern portion of the BUFFALO MOA, along the northern slopes of the Alaska Range. The sheep range under the southwestern portion of the MOA falls into the Delta Controlled Use Area.

No particular winter ranges and lambing areas are known under this MOA, but both winter use and lambing have to be expected under the MOA. Five mineral licks have been identified between Delta River and Gerstle River.

BUFLO TMOA (No Action Alternative) overlaps with less Dall sheep range than BUFFALO MOA. All Dall sheep range is located in the southern portion of the area under the BUFLO TMOA. One identified mineral lick falls under the perimeter of the BUFLO TMOA.

3.5.4.7 Brown Bear

Brown bear are distributed throughout the Southern Interior Region, and their range generally extends to near and above treeline. Brown bear densities are low in low-elevation, spruce-dominated or mixed forests, and are moderate in foothills and mountainous terrain near or above treeline (ADF&G 1991b). Brown bear do not concentrate along salmon runs in the Southern Interior Region, since the runs occur mainly in the lowland rivers away from the foothill and mountain habitat preferred by brown bear.

In the Southern Interior Region, brown bear population densities have been estimated at 13.1 bears 2 years or older/1,000 square miles, with population densities varying between 10.7 bears 2 years or older/1,000 square miles in the northern portion of the region and 31.2 bears 2 years or older/1,000 square miles on the northern slopes of the Alaska Range in the southern portion of the region (ADF&G 1991b).

Brown bear populations along the Alaska Range have come under increased hunting pressure and have declined. As a consequence, ADF&G management objectives are to prevent further decline of brown bear population along the Alaska Range while maintaining current brown bear densities in the remainder of the Southern Interior Region (ADF&G 1993c).

Given the general distribution of brown bear in the Southern Interior Region, all of the proposed and existing MOAs and ranges include brown bear habitat.

3.5.4.8 Black Bear

Black bear are distributed throughout the Southern Interior Region in areas below treeline. Black bear density on the Tanana Flats around Fairbanks is estimated at 12 to 18 bears (excluding cubs of the year)/100 square miles (ADF&G 1993b). Since bear density estimates are not available for other parts of the Southern Interior Region, this estimate has been used by ADF&G biologists for areas throughout the region.

A density of 12 to 18 bears/100 square miles is rather low compared with other black bear habitat in Alaska, but black bear in the Alaska Interior occupy less optimal habitat and show lower reproductive rates than bears in other regions of the state. In addition, black bear are exposed to increasing hunting pressure around Fairbanks. ADF&G thus plans to monitor black bear populations more closely in the region (ADF&G 1993b). Given the general distribution of black bear in the Southern Interior Region, all of the proposed and existing MOAs and ranges include black bear habitat.

3.5.4.9 Bison

The Delta Junction bison herd is the only bison herd occurring in the Southern Interior Region (Figure 3-39). In the post-calving season of 1992, the herd consisted of 482 animals (ADF&G 1993f). The herd grew at a rate of 20 percent in the first 10 years after its introduction to Alaska. The population growth rate has since decreased, and current reproduction and mortality (resulting from natural causes and from sport hunting) are at par, keeping the herd size stable.

The bison herd uses the Delta River bottom from Black Rapids to the confluence of the Delta and Tanana rivers as their summer range, as well as portions of Fort Greely under Restricted Area R-2202. Calving grounds are

located within summer range north of Donnelly. Calving takes place from late May to mid June. In July or August, the bison move to the Delta Junction Bison Range southeast of Delta Junction and south of the Alaska Highway. The herd is actively managed so that bison do not cross the highway and disperse into fields associated with the Delta Agricultural Project or other farms until the harvest is completed in September. Bison winter range includes the Delta Junction Bison Range and extends north of the Alaska Highway to the Tanana River.

In the Southern Interior Region, bison occur only under the BUFFALO MOA and under R-2202.

3.5.4.9.1 BUFFALO MOA

The western portion of the BUFFALO MOA overlaps part of the Delta bison herd's summer range and calving grounds. The fall and winter ranges of the Delta bison herd are located east of Delta Junction and are located primarily under the BUFFALO MOA.

In the BUFLO TMOA (No Action Alternative), there is less overlap of summer range and calving grounds. The extent of fall and winter range within the BUFLO TMOA is similar to the area covered in the BUFFALO MOA.

3.5.4.9.2 Oklahoma Air-to-Ground Weapons Range (R-2202)

The Delta bison herd uses the eastern portion under R-2202 as part of its summer range. Calving takes place on summer range under the southeastern corner of R-2202. Bison do not move as far west as the impact area on the Oklahoma range.

3.5.4.10 Wolf

Wolves are present throughout the Southern Interior Region, with the exception of glaciated areas of the Alaska Range. Currently, the only wolf control program being implemented in Alaska is located in GMU 20A (Taylor 1994; see Appendix M for location of GMU). A large portion of the Southern Interior Region falls under this GMU, namely EIELSON MOA, R-2211 and R-2202, and the areas under CLEAR CREEK and BIRCH MOAs west of the Tanana River.

3.5.4.10.1 FALCON MOA

In 1990, the fall wolf densities under this MOA were estimated at 24 wolves/1,000 square miles (ADF&G 1992f). Wolf control was last carried out in this MOA during the winter of 1985-86.

3.5.4.10.2 Eielson AFB

According to the Eielson AFB Natural Resource Manager, wolves may pass through, but are not resident on, Eielson AFB (von Rueden 1994).

3.5.4.10.3 CLEAR CREEK MOA

Wolf surveys carried out in 1990 and 1991 estimated fall densities between 24 wolves/1,000 square miles and 41 wolves/1,000 square miles (ADF&G 1992f). A wolf control program is presently active under part of the MOA.

3.5.4.10.4 Blair Lakes Air-to-Ground Weapons Range (R-2211)

The Blair Lakes range is assumed to support similar wolf densities as the neighboring area under the CLEAR CREEK MOA, or about 24 to 41 wolves/1,000 square miles. The impact area is also included in the current wolf control program.

3.5.4.10.5 BIRCH MOA

The wolf population density under this MOA is probably around 18 to 24 wolves/1,000 square miles. The southern and western portion of the area under the airspace is included in the current wolf control program.

3.5.4.10.6 EIELSON MOA

In fall 1991 the wolf population under this MOA was estimated at 41 wolves/1,000 square miles (ADF&G 1992f). The EIELSON MOA is included in the only wolf control program presently active in Alaska.

3.5.4.10.7 Oklahoma Air-to-Ground Weapons Range (R-2202)

Wolf densities within Fort Greely and the Oklahoma range are assumed to be similar to densities under the EIELSON MOA.

3.5.4.10.8 BUFFALO MOA

Wolf population surveys for the area under this MOA are incomplete, but wolf densities are expected to be in the order of 18 to 24 wolves/1,000 square miles (based on extrapolated density estimates from other areas). This information is also applicable to the BUFLO TMOA (No Action Alternative).

3.5.4.11 Furbearers

Information on furbearers in this region was extracted from ADF&G data (1993g). As mentioned in section 3.5.3.11, furbearer data are collected within large regions, and the methods used to assess furbearer abundance are not very reliable. The discussion of furbearers will thus be restricted to the regional level only.

Lynx appear to be common in the Southern Interior Region, and their numbers are probably increasing in the western portion of the region. They appear to be more scarce to the east. Wolverine are scarce over the whole region. In contrast, beaver are fairly common, with stable populations throughout favorable habitat in the region. Marten and river otter are more common in the western than in the eastern portion of the Southern Interior Region.

Figure 3-36
Southern Interior Region
Caribou

Legend:

Airspace:

- MOA/RA Boundary
- - - Adjacent MOA/RA Boundary

Caribou:

- ... General Distribution
- /// Known Calving Area
- ← Known Migration Pattern
- - - Known Summer Concentration Area
- ▨ Known Winter Use Area

Sources:

ADF&G Habitat Management Guides, (1985, 1986), and various personal communications by agency biologists (1993,1994).

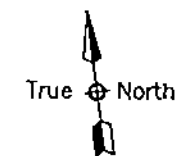
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Airspace: US Air Force, 11AF

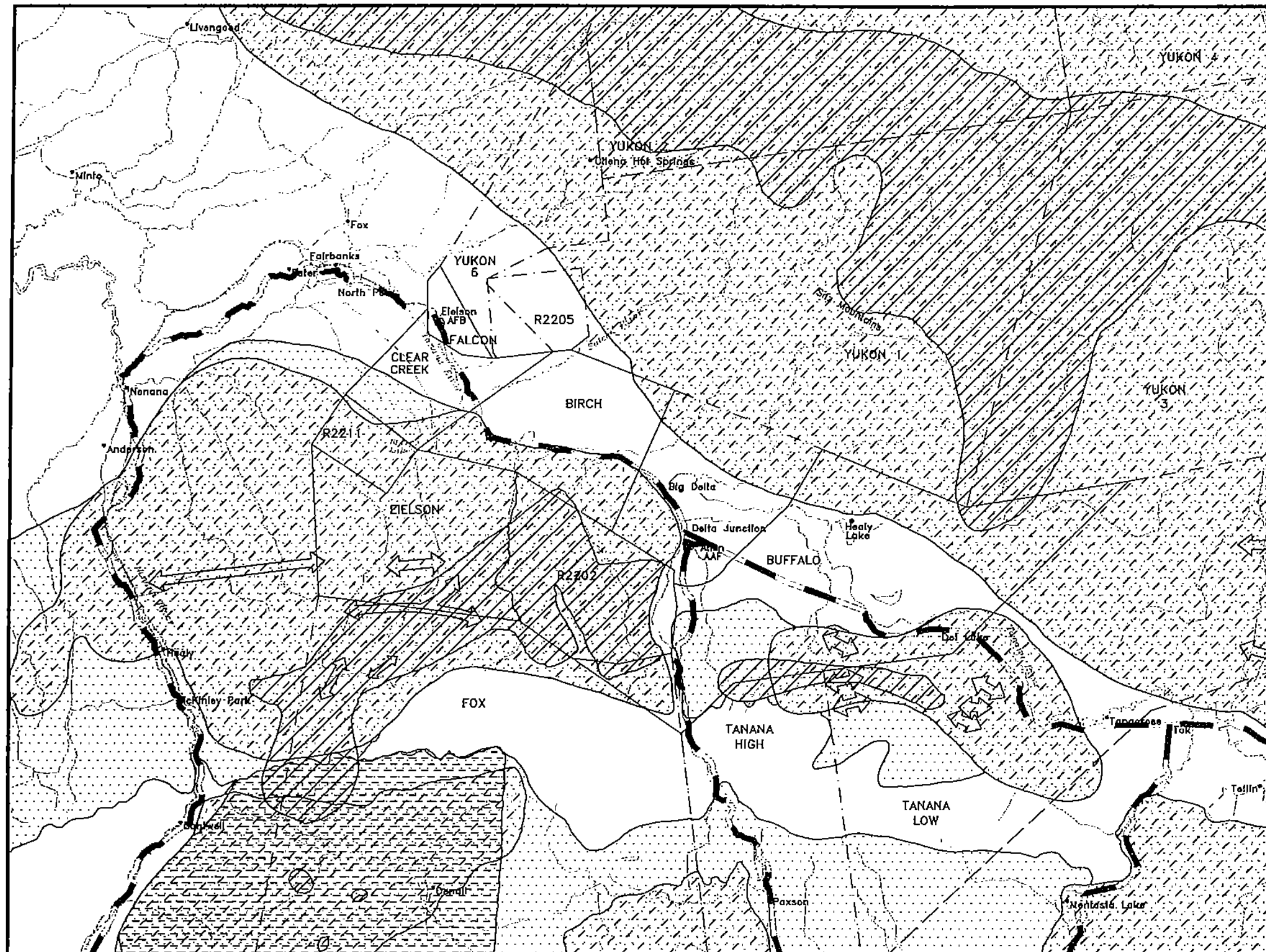
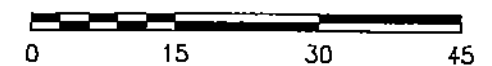
Cities/

Towns: AK DCRA & USGS - Dictionary of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection



Scale in Statute Miles



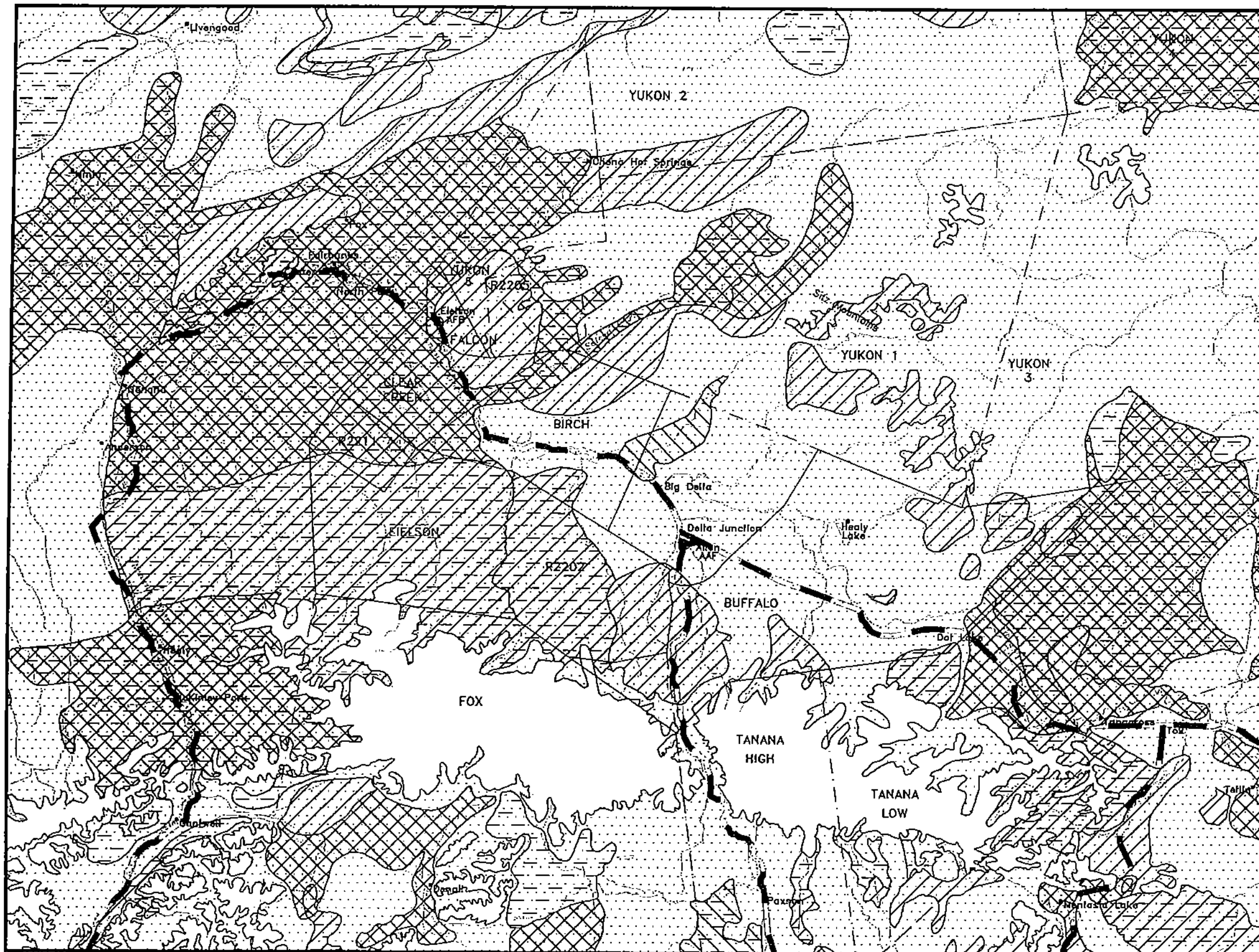


Figure 3-37
Southern Interior Region
Moose

Legend:

Airspace:

- MOA/RA Boundary
- - - Adjacent MOA/RA Boundary

Moose:

- ... General Distribution
- \\ Known Calving Concn. Area
- - - Known Rutting Concn. Area
- /// Known Winter Concn. Area

Sources:

ADF&G Habitat Management Guides, (1985, 1986), and various personal communications by agency biologists (1993,1994).

Features: USGS - 1:2,000,000 DLG Data

Airspace: US Air Force, 11AF

Cities/

Towns: AK DCRA & USGS - Dictionary of Alaska Place Names

Map Projection: Albers Equal-Area Conic Projection



Scale in Statute Miles



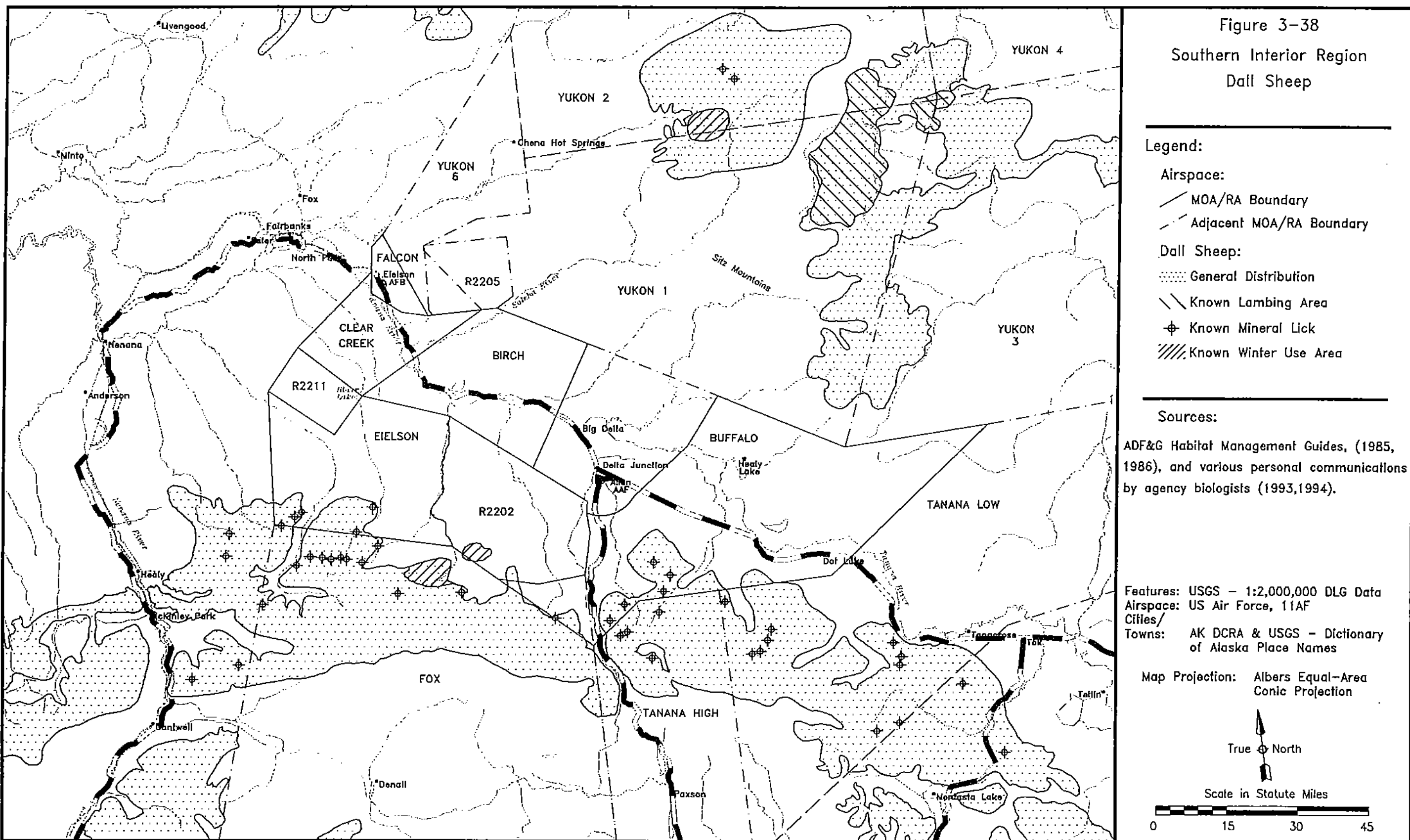


Figure 3-39
Southern Interior Region
Bison

Legend:

Airspace:

- MOA/RA Boundary
- - - Adjacent MOA/RA Boundary

Bison:

- ▨ Calving Area
- ▨ Delta Junction Bison Range
- ▨ Summer Use Area
- ▨ Winter Use Area

Sources:

Steve Dubois, ADF&G, 1993

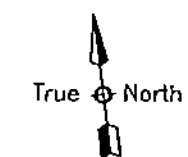
Features: USGS - 1:2,000,000 DLG Data

Airspace: US Air Force, 11AF

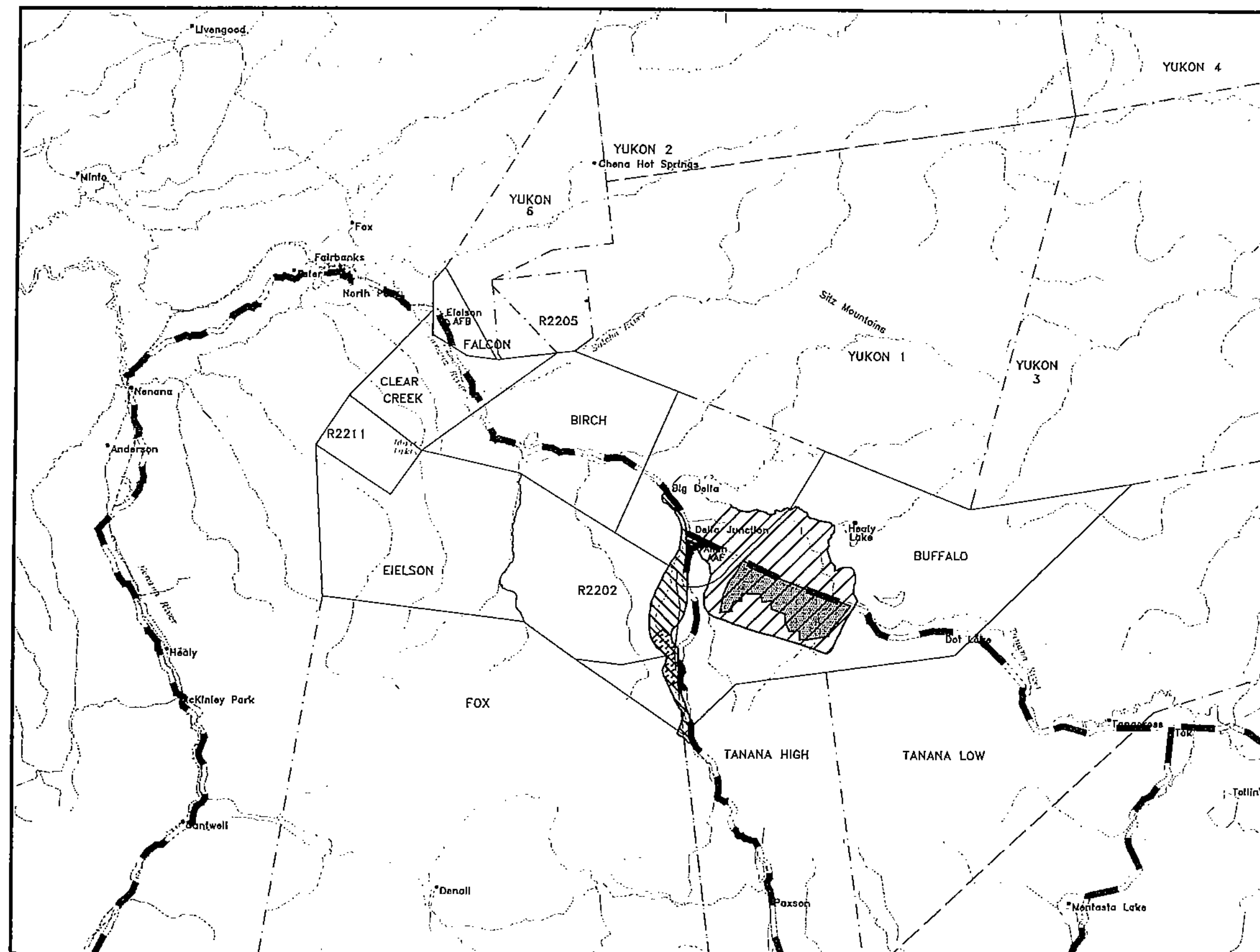
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Towns: AK DCRA & USGS - Dictionary of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection



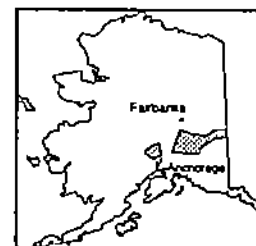
Scale in Statute Miles



3.5.5 Southcentral Region

3.5.5.1 Waterfowl

General waterfowl information is provided in section 3.5.2.3.1. Waterfowl breeding and spring and fall population distribution estimates are based on USFWS surveys (Butler and Gill 1993; King 1993). Butler and Gill (1993) and King (1993) provided migration population and pathway estimates primarily for bird-aircraft strike hazard impact modeling; sufficient data are not available to accurately verify these estimates. Trumpeter swans were censused by the USFWS in 1990 (see section 3.5.2.3.2).



Because the airspace of the Southcentral Region is not contiguous, a discussion of waterfowl at the regional level will be omitted. Instead, all information will be presented at the MOA level only.

3.5.5.1.1 SUSITNA MOA

The Cook Inlet waterfowl summer breeding population (area W-12, see Figure 3-28) extends into the southern half of the area under the MOA. From May 15 to August 15, the area supports a population of 5,000 Canada geese, 1,000 greater white-fronted geese, 20,000 ducks, and 1,500 swans (Attachment A). In the fall and spring, waterfowl concentrate in the southeastern to central portion of the area under the MOA.

The trumpeter swan population is generally distributed throughout the southern two-thirds of the area under the MOA, and is associated with the Susitna River drainage. The USFWS counted 113 trumpeters under the MOA during the 1990 breeding population census; however, a total of 1,661 trumpeters (Conant et al. 1991) were counted within the Cook Inlet census unit, which includes the area under the SUSITNA MOA. Trumpeter nesting and brood-rearing concentration areas are located under the western portion of the MOA. Dispersed nesting and brood-rearing occurs in the area under the southwest corner of the MOA, and extensive concentration and dispersed nesting and brood-rearing extends 100 miles south of the SUSITNA MOA. Three molting concentration areas are located under the western, central, and eastern portions of the MOA.

3.5.5.1.2 FOX MOA (includes FOX 1 TMOA)

Ducks and geese occur seasonally under the central to southeast portions of the FOX MOA and are generally associated with the Susitna River drainage. The area under the southeast portion of the MOA includes two BLM-designated Areas of Critical Environmental Concern (ACEC): West Fork Gulkana River and 50 Mile (BLM 1993).

The Gulkana waterfowl breeding concentration area (W-10) is located in the Lake Louise/Copper River drainage area and extends into the area under the southeast portion of the FOX MOA. It supports 10,000 ducks and 2,000 swans from May 15 to August 15 (Figure 3-28 and Attachment A). A large waterfowl concentration area (the Delta Junction area WC-1) is located 20 miles northeast of the MOA. It supports a total of 50,000 cranes, 20,000 greater white-fronted geese, 10,000 Canada geese, 20,000 ducks, and 2,000 swans during the spring (April 15 to May 10) and 20,000 cranes, 10,000 greater white-fronted geese, 5,000 Canada geese, 10,000 ducks, and 1,000 swans during the fall (August 20 to October 10) (Figure 3-28 and Attachment A).

Kessel (1984) describes several major crane roost sites in the area; the largest crane number in a single roost at a given time was 5,000 on the gravel bars of the Delta River. The waterfowl summer breeding concentration area W-2 is located 20 miles northwest of the MOA and supports 200,000 ducks, 5,000 cranes, 5,000 Canada geese, 5,000 greater white-fronted geese, and 3,000 swans from June 10 to August 1 (Figure 3-28 and Attachment A).

Under the FOX MOA, 548 trumpeter swans were counted during the 1990 USFWS census. FOX MOA is located partially over the Upper Tanana census unit where 403 trumpeters were counted, and partially over the Gulkana census unit where 3,921 trumpeters were counted (Conant et al. 1991). The trumpeter swan population is distributed throughout the central area under the FOX MOA and is generally associated with the Susitna and Tanana river drainages. The nesting concentration of trumpeter swans north of Lake Louise is probably the largest in North America (Carson 1994). Trumpeter nesting and brood-rearing concentration areas are located under the central and southeast portions of the MOA and extend about 50 miles south to southeast of the MOA to Tazlina Lake and the Copper River drainage. Trumpeter molting concentration areas are located under the central-southeast portions of the MOA and extend to the south and southeast from the MOA.

There are 412 trumpeter swan nests under FOX 1 TMOA (No Action Alternative).

3.5.5.1.3 FOX 2 TMOA

Populations of ducks and geese are distributed under the central to southwest portions of the FOX 2 TMOA and are generally associated with the Gulkana and Copper River drainages. The MOA overlies part of the West Fork Gulkana River ACEC, in the southern portion of the MOA, and part of the Mud Lake ACEC (of less waterfowl significance) in the central portion of the MOA (BLM 1993). The Gulkana nesting concentration area W-10 is located in the Lake Louise/Copper River drainage area. It supports 10,000 ducks and 2,000 swans from May 15 to August 15 (Figure 3-28 and Attachment A). The waterfowl concentration area near Delta Junction (WC-1) is 15 miles north of FOX 2 TMOA along the Tanana River. It supports a total of 50,000 cranes, 20,000 greater white-fronted geese, 10,000 Canada geese, 20,000 ducks, and 2,000 swans during the spring (April 15 to May 10) and 20,000 cranes, 10,000 greater white-fronted geese, 5,000 Canada geese, 10,000 ducks, and 1,000 swans during the fall (August 20 to October 10) (Figure 3-28 and Attachment A). Kessel (1984) described several major crane roost sites in the area, with the largest crane numbers on the gravel bars of the Delta River.

During the 1990 USFWS census, 190 trumpeter swans were counted under the FOX 2 TMOA, mostly within the West Fork Gulkana River area. FOX 2 TMOA overlies the Upper Tanana census unit where 525 trumpeters were counted, and is just northwest of the Gulkana census unit where 3,921 trumpeters were counted (Conant et al. 1991).

3.5.5.1.4 TANANA MOA

Ducks and geese occur seasonally under the TANANA MOA, being generally associated with the Tanana and Copper river drainages. The TANANA MOA overlies part of the West Fork Gulkana River ACEC, in the southwestern portion of the MOA, and part of the Mud Lake ACEC (of less waterfowl significance) in the central portion of the MOA (BLM 1993).

The Gulkana waterfowl summer breeding concentration area (W-10) is located under the southwestern portion of the MOA, in the Lake Louise/Copper River drainage area. It supports 10,000 ducks and 2,000 swans from May 15 to August 15 (Figure 3-28 and Attachment A).

Another waterfowl summer breeding concentration area (W-1) is located 20 miles to the southeast of the central portion of the MOA, and supports 200,000 ducks from June 10 to August 1 (Figure 3-28). The Delta Junction waterfowl concentration area WC-1 is located 20 miles northwest of the MOA along the Tanana River, and supports a total of 50,000 cranes, 20,000 greater white-fronted geese, 10,000 Canada geese, 20,000 ducks, and 2,000 swans during the spring (April 15 to May 10) and 20,000 cranes, 10,000 greater white-fronted geese, 5,000 Canada geese, 10,000 ducks, and 1,000 swans during the fall (August 20 to October 10) (Figure 3-28 and Attachment A). According to Kessel (1984), there are several major crane roost sites in the area.

During the 1990 USFWS census, 68 trumpeter swans were counted under the TANANA MOA, mostly within the West Fork Gulkana River area. TANANA MOA overlies the Upper Tanana census unit where 525 trumpeter

swans were counted and just northwest of the Gulkana census unit where 3,921 trumpeters were counted (Conant et al. 1991).

3.5.5.1.5 Elmendorf AFB

The waterfowl concentration area (W-12) extends from immediately west of Elmendorf AFB along the Cook Inlet in a northern direction, including the Susitna River drainage. In summer (May 15 to Aug 15) the waterfowl breeding population comprises 5,000 Canada geese, 1,000 greater white-fronted geese, 20,000 ducks, and 1,500 swans. In fall and spring, waterfowl concentrate within 5 miles of Elmendorf and along the northwest portion of Cook Inlet. From August 1 to November 1, these concentrations include 200,000 ducks, 100,000 Canada geese, 40,000 snow geese, 15,000 swans, 10,000 greater white-fronted geese, and 5,000 sandhill cranes. From March 20 to May 15, these concentrations include 250,000 ducks, 50,000 Canada geese, 20,000 swans, 10,000 greater white-fronted geese, and 7,500 swans (Figure 3-28 and Attachment A). The Tule subspecies of greater white-fronted goose (*Anser albifrons elgasi*) nests in the upper Cook Inlet, near the mouth of the Susitna River, and along the western side of the inlet. This subspecies has been identified by the State of Alaska as being of special concern in environmental documents.

The Chickaloon waterfowl concentration area (WC-9) is located 20 miles to the southwest of Elmendorf AFB along the southeast portion of Cook Inlet and supports 10,000 ducks, 5,000 Canada geese, 3,000 snow geese, 500 greater white-fronted geese, and 500 sandhill cranes during the spring, and 15,000 ducks, 15,000 Canada geese, 1,500 greater white-fronted geese, and 500 cranes during the fall (Figure 3-28 and Attachment A).

3.5.5.2 Raptors

General raptor information is provided in section 3.5.2.3.3. Raptor nest site data are based on USFWS and ADF&G surveys (Schempf 1993; Ambrose 1993; Hughes 1993), and do not represent the entire nesting population. Raptor breeding population distribution estimates are based on USFWS surveys (Butler and Gill 1993; King 1993). These breeding distributions are not considered indicative of raptor distribution throughout Alaska, since no concerted effort has been made to find all nesting areas. Raptors occur throughout the forested parts of Alaska; most surveyed areas are along accessible river systems and coastal areas. Butler and Gill (1993) and King (1993) provided migration population and pathway estimates primarily for bird-aircraft strike hazard impact modeling; sufficient data are not available to accurately verify these estimates.

The MOAs of the Southcentral Region do not form a contiguous airspace. For this reason, the information on raptors is not summarized at the regional level, but is presented for each MOA separately.

3.5.5.2.1 SUSITNA MOA

The raptor breeding area (R-7) is located 25 miles north of the SUSITNA MOA. It supports 500 raptors in the summer. In fall and spring, these raptors migrate along the Nenana River through the western portion of the MOA (Figure 3-28 and Attachment A).

No peregrine falcon nest sites have been located under the SUSITNA MOA (Figure 3-32). Twenty-five bald eagle nest sites, including one multiple site, have been under within the southern half of the MOA. Additionally, numerous bald eagle nests are located directly to the south and southeast of the MOA along the Susitna River drainage (Figure 3-30). No osprey nests have been located under the SUSITNA MOA; however, three osprey nests have been found within 10 miles of the southeast MOA boundary (Figure 3-31).

3.5.5.2.2 FOX MOA

An estimated 500 raptors nest from May 1 to September 1 under the southeastern portion of the MOA region near Lake Louise and the Copper River (raptor breeding concentration area R-8). Another raptor breeding concentration area with 500 raptors is located in the Tanana River drainage 15 miles west-northwest of FOX

MOA (raptor breeding concentration area R-7). Raptor breeding concentration area R-4 is located 15 miles north of the MOA (Figure 3-28 and Attachment A). A number of resident raptors begin to nest before May 1 (e.g., goshawks, owls).

One peregrine nest site has been located within 10 miles of the northern MOA boundary (Figure 3-32). Fifty bald eagle nest sites (65 under FOX 1 TMOA) have been located mostly under the southern and eastern portions of the MOA. Dense nesting concentrations occur especially to the east and southeast extending from the MOA, in the Copper River drainage and Lake Louise areas (Figure 3-30). Ten golden eagle nest sites have been located under the FOX MOA, five of which were found under the southwest to south-central portion of the MOA (Figure 3-31). Five gyrfalcon nest sites have been located under the FOX MOA; two under the extreme northern portion and three under the eastern to southern portion (Figure 3-31). Two northern goshawk nest sites have been located under the southeast portion of the MOA (Figure 3-31).

3.5.5.2.3 FOX 2 TMOA

An estimated 500 raptors nest along a 200-mile segment of the Tanana River. This raptor breeding concentration area (R-4) extends 15 miles from the northern boundary of FOX 2 TMOA (Area R-4). Another 500 raptors nest in raptor breeding concentration area R-8, which is located within the extreme southwestern portion of FOX 2 TMOA (Lake Louise area and along the Copper River drainage) (Figure 3-28 and Attachment A). Nesting generally takes place between May 1 and September 1, but a number of resident raptors begin to nest before May 1 (e.g., goshawks, owls).

No peregrine nest sites have been found under the FOX 2 TMOA (Figure 3-32). One hundred twenty-seven bald eagle nest sites are concentrated under the western and southern portions of FOX 2 TMOA; the concentration area extends 30 miles south and southwest from the MOA. Two bald eagle nest sites are active in the Mud Lake ACEC (Figure 3-30). Seven golden eagle nest sites have been located under the western and southern portions of the MOA (Figure 3-31). Two gyrfalcon nest sites have been located under the southwestern portion of the MOA, including one in the Mud Lake ACEC (Figure 3-31).

3.5.5.2.4 TANANA MOA

An estimated 500 raptors nest from May 1 to September 1 along a 200-mile Tanana River segment extending under the TANANA MOA (raptor breeding concentration area R-4), and another 500 nest under the extreme southwestern portion of the TANANA MOA in the Lake Louise area and along the Copper River drainage (raptor breeding concentration area R-8) (Figure 3-28 and Attachment A). A number of resident raptors begin to nest before May 1 (e.g., goshawks, owls).

Thirteen peregrine nest sites are located under the central portion of the TANANA MOA, along the Tanana River drainage (Figure 3-32). One hundred twelve bald eagle nest sites have been located under the TANANA MOA; 18 under the central portion of the MOA along the Tanana River drainage, and 94 nest sites concentrated under the western and southwestern portions. Nesting concentrations of one nest per 2 river miles extend easterly and westerly along the Tanana River. Two bald eagle nest sites are active in the Mud Lake ACEC (Figure 3-30). Eight golden eagle nest sites have been located under the TANANA MOA: four under the central portion along the Tanana River drainage and four under the western to southwestern portion of the MOA (Figure 3-31). Two gyrfalcon nest sites have been located under the southwestern portion of the MOA, including one in the Mud Lake ACEC (Figure 3-31). No osprey nest sites have been located under the TANANA MOA; however, osprey concentrations have been found just northwest and southeast of the MOA along the Tanana River drainage (Figure 3-31). Two northern goshawk nest sites have been located under the central portion of the TANANA MOA (Figure 3-31).

3.5.5.2.5 Elmendorf AFB

Extensive bald eagle nesting has been located within 5 to 50 miles (and extending north and south) east of Elmendorf AFB, generally associated with Cook Inlet and the Susitna River drainage (Figure 3-30).

3.5.5.3 Bird Migration

A major migration flyway (Major Migration Route 1) extends through the Southcentral Region along the Tanana River valley. A minor flyway follows the Susitna, Chulitna, and Nenana rivers from the Cook Inlet area to the northwestern portion of the Southcentral Region. This minor flyway extends along the eastern boundary of SUSITNA MOA. The Major Migration Route 1 passes through the central portion of TANANA MOA and the northern portions of FOX MOA and FOX 2 TMOA, and is followed by 2 million waterfowl and 25,000 raptors in the spring (April 10 to May 20) and 9 million waterfowl and 48,000 raptors in the fall (August 1 to October 10) (Figure 3-28). Although these flyways are fairly well defined, since they are associated with river systems, many birds will begin to disperse throughout the migration pathways as breeding grounds are reached. Therefore, migrants should tend to be dispersed throughout the Southern Interior Region.

Elmendorf AFB, located on the Cook Inlet, should be affected by different migration populations than the northern portion of the Southcentral Region. A major migratory flyway extends along the northern Gulf of Alaska and divides in the fall at Prince William Sound (Area 9). From the Sound, the northern pathway (Area 11) distributes approximately 1 million waterfowl immediately to the north of Elmendorf toward Cook Inlet and the Susitna River drainage in the spring (April 1 to May 15). In the fall (August 1 to November 1), approximately 1,200,000 waterfowl return from western breeding areas passing generally immediately to the south of Elmendorf AFB (Area 10) (Figure 3-28).

3.5.5.4 Caribou

The airspace of the Southcentral Region is not contiguous. For this reason, caribou will be discussed for each MOA separately, and the discussion at the regional level will be omitted.

3.5.5.4.1 SUSITNA MOA

Caribou are generally absent from the area under the SUSITNA MOA, except for some small groups in the vicinity of Rainy Pass at the extreme northwest corner of the MOA (Pegau 1984) (Figure 3-40). The *Rainy Pass* herd numbers 500 to 1,000 animals (Valkenburg 1991) and ranges between the areas under the STONY and SUSITNA MOAs, mostly along the south fork of the Kuskokwim and Happy river drainages, which are outside the SUSITNA MOA boundaries. Small numbers of caribou from the *Denali* herd may occasionally move into areas under this MOA.

3.5.5.4.2 FOX MOA

Caribou are distributed throughout the area under the FOX MOA, with the exception of the highest elevations of the Alaska Range (Figure 3-40). The FOX MOA overlies the ranges of two caribou herds, namely the Delta-Yanert herd in the north and the Nelchina herd in the central and southern portions. For details on the Delta-Yanert herd, refer to section 3.5.4.4.

The Delta-Yanert herd occupies the northern slopes of the Alaska Range, located in the northern portion of the Southcentral Region. The ranges of the Delta-Yanert and the Nelchina herds occasionally overlap along the Nenana and Chulitna rivers, particularly during summer and fall.

In June 1992, the *Nelchina herd* was estimated at about 47,000 animals (ADF&G 1993d), but its size has fluctuated widely in the past. In 1948, the population was estimated at 4,500 to 5,500 head. The herd steadily increased to over 70,000 animals in 1962. However, the population declined dramatically between 1967 and 1972 to less than 8,000 animals. Since then, the herd has increased to its present size. These extreme historic fluctuations have been attributed to several factors, such as deteriorating range conditions, varying levels of predation by wolf and bear, increased hunting activity, increased winter calf mortality, or emigration of portions of the herd to other range (ADF&G 1985). The ADF&G management goal for the Nelchina herd is to maintain the population at 30,000 adult animals, which is approximately the present size of the herd (ADF&G 1993d).

The range of the Nelchina caribou herd has varied considerably over time, possibly in relation to herd size. However, the calving grounds of the herd have remained more or less constant. Calving takes place in the eastern Talkeetna Mountains, and in the Kosina Creek, Goose Creek, Black River, and Oshetna River drainages between 2,700 and 4,200 feet elevation.

In early April, caribou gather on their winter ranges and migrate to calving grounds. Calving occurs from mid-May to early June. Cows and calves move to adjacent post-calving areas or disperse to summer ranges in the northern and eastern Talkeetna Mountains. In September to October, the caribou migrate to their wintering grounds. The rut takes place during fall migration and has been observed mainly around the Lake Louise Flats, the northeastern Talkeetna Mountains, and to some extent in the Alphabet Hills.

Migration routes and winter use areas can vary from one year to another. Winter use areas include the Lake Louise Flats, the Gakona and Chistochina drainages, and the upper Copper, Tok, and Mentasta river drainages (ADF&G 1985). In the winter of 1992-93, part of the Nelchina herd was located around Denali Highway between Cantwell and Paxson. About 50 percent of the herd moved northeast to the Tok area. Of these caribou, about 8,000 to 10,000 crossed the Alaska Highway and wintered in the Ladue drainage and in the Yukon Territory (Tobey 1994). Some animals ventured as far north as American Summit (Gardner 1994). During the winter of 1993-94, as many as 30,000 caribou of the Nelchina herd had moved north of the Alaska Highway, but not further than Mount Fairplay.

East of FOX MOA, the winter range of the Nelchina herd may overlap with some of the wintering areas used by the Mentasta herd and with winter range of the Fortymile herd, particularly north of Tok (for the Mentasta herd, refer to section 3.5.5.4.4; for the Fortymile herd, see section 3.5.3.4).

3.5.5.4.3 FOX 2 TMOA

Most of the area under the FOX 2 TMOA is considered caribou habitat, except for the glaciated areas of the Alaska Range (Figure 3-40). Three different caribou herds use areas under the FOX 2 TMOA, namely the Macomb, Nelchina, and Mentasta herds. More detailed information on the Macomb herd can be found in section 3.5.4.4. The Nelchina herd is described in section 3.5.5.4.2, and the Mentasta herd in section 3.5.5.4.4.

The Macomb herd occupies areas under the northern portion of the TMOA. Calving is expected to occur under the northern portion of the TMOA. The peak calving date for the Macomb herd is around the end of May (ADF&G 1992c). The Macomb herd winter range extends under the northeastern portion of the FOX 2 TMOA.

Calving and post-calving grounds, as well as summer ranges of the Nelchina herd are located west of the FOX 2 TMOA, but some rutting usually occurs around the Lake Louise Flats, which are located under the southernmost portion of the FOX 2 TMOA. Winter use areas of the Nelchina herd vary from year to year and can extend under much of the central and southern portions of the FOX 2 TMOA.

The calving and post-calving grounds, as well as the summer ranges of the Mentasta herd are located southeast of FOX 2 TMOA. In winter, the majority of the Mentasta herd generally moves north and east, avoiding the area under the FOX 2 TMOA. However, part of the herd may move to winter ranges to the west and south.

In 1993, for example, about 25 percent of the herd wintered in the vicinity of Glennallen (Jenkins 1994). Depending on the year, varying numbers of Mentasta caribou may occur under the southern portion of the FOX 2 TMOA, where they may mix with wintering animals of the Nelchina herd.

3.5.5.4.4 TANANA MOA

Extensive areas within the TANANA MOA are used by four caribou herds, namely the Fortymile, Macomb, Mentasta, and Nelchina herds (Figure 3-40). For a detailed description of the Fortymile herd, refer to section 3.5.3.4. The Nelchina herd is described in section 3.5.5.4.2 and the Macomb herd in section 3.5.4.4.

No calving areas of the Fortymile herd have been identified under the TANANA MOA. However, the Fortymile herd is known for exhibiting very low site fidelity to calving grounds, and has used calving areas to the north and to the west of the TANANA MOA in the past. In 1990, caribou of the Fortymile herd calved along the eastern slopes of Mount Harper and in the upper Middle Fork drainage located northwest of the TANANA MOA (ADF&G 1992a). Given the high variation in calving site selection, it is possible that the Fortymile herd may use calving grounds under the TANANA MOA in the future.

Post-calving and summer use areas of the Fortymile herd are variable as well. In some years, the summer range extends east to the Taylor Highway (ADF&G 1992a), and thus may occupy areas under the northern portion of the TANANA MOA.

Winter use areas of the Fortymile herd have also varied over the years. In some years, significant numbers of animals winter in the Dennison Fork drainage, located under the northern portion of the TANANA MOA, or in the Ladue River drainage, which is barely outside the area covered by the MOA.

Information on the Macomb herd is compiled in section 3.5.4.4. The herd has calving areas located on and around the Macomb plateau, and some calving may take place under the westernmost portion of the MOA. The peak calving date for the Macomb herd is around the end of May (ADF&G 1992c). Seasonal migrations are along the Macomb plateau. Winter use areas extend as far east as the Tok River drainage and include the area under the central portion of the TANANA MOA.

The *Mentasta herd* primarily occupies the Upper Copper River and the Wrangell Mountains areas. It spends most of the year within the Wrangell-St. Elias National Park and Preserve. The Mentasta herd may be a remnant of the Fortymile herd, whose range extended into the Copper River Basin in the 1920s when the herd was very large (ADF&G 1985). The Mentasta herd consisted of about 2,300 animals between 1973 and 1982, and was considered to be stable during that period. In 1987, the Mentasta herd was estimated to contain 3,000 caribou prior to calving, but the following years brought a sharp decline. In 1989, 2,600 animals were counted in spring before calving (ADF&G 1991f). In 1991, the post-rut population included 1,973 animals, with only 0.02 percent calves. Wet and cold weather in the spring of 1991 may have contributed to low calf survival (ADF&G 1992e). In 1992, the post-rut count identified 1,426 animals, 4 percent of which were calves (ADF&G 1993d). The 1993 post-rut survey revealed a further decline in caribou numbers to 972 animals, with only 25 calves (i.e., 2.6 percent of post-rut population) (Jenkins 1994). The ADF&G management goal of maintaining 2,500 adult animals has been jeopardized by the rapid decline of caribou numbers over the last few years.

Predation appears to be the principal cause of high calf mortality. Jenkins (1994) reported that of 39 radio-collared calves, only one survived until the post-rut count, while 17 were lost to wolf predation, 12 to bears, 1 to wolverine, and 8 died of unidentified causes. Despite the extent of predation, the NPS does not advocate a predator control program within the range of the Mentasta herd at the present time. Sport hunting on the Mentasta herd was closed in 1990, and subsistence hunting has been suspended since 1992.

The Mentasta herd has shown high fidelity to its traditional calving grounds, located in Drop Creek and Boulder Creek. Calving typically takes place between mid-May and mid-June, with 50 percent of the calves being born

by May 25 (ADF&G 1991f). Post-calving areas are located from the Nadina River north and east to the Upper Copper River (Jenkins 1994). Summer range is generally situated along Mount Sanford and Mount Drum (ADF&G 1992e).

In early October, segments of the Mentasta herd may migrate northeast to the upper Nabesna River and farther east into the Snag and Beaver creek drainages. A variable number of caribou may cross the Alaska Highway into Canadian territory or into the Tanana uplands. In the winter of 1992, caribou of the Mentasta herd were observed as far north as Chicken (ADF&G 1993d), entering traditional winter range of the Fortymile herd. In 1993, 75 percent of the Mentasta herd crossed the Alaska Highway (Jenkins 1994), with many animals wintering in the Ladue River and Gardiner Creek drainages, which are located just outside of the TANANA MOA. Currently (as of winter 1994), most of the Mentasta herd has moved north, but has largely remained south of the Alaska Highway. When moving north, Mentasta caribou often encounter wintering animals from the Nelchina herd. However, herd interchanges are considered rare (ADF&G 1991f). Part of the Mentasta herd may also move west and south during winter. In 1993, about 25 percent of the herd wintered in Glenallen (Jenkins 1994).

While the Mentasta herd typically inhabits areas outside the perimeter of the area under the TANANA MOA during most of the year, some overlap between the TANANA MOA and the herd range may occur during the winter months under both the northern and southern portions of the MOA.

The Nelchina herd is described in detail in section 3.5.5.4.2. While calving and summer use areas of the Nelchina herd are located outside the TANANA MOA, part of the rutting activity around the Lake Louise Flats may fall under the southernmost tip of the MOA. In certain winters, the herd may use the entire area under the TANANA MOA.

3.5.5.4.5 Elmendorf AFB

No caribou occur on Elmendorf AFB and surrounding areas.

3.5.5.5 Moose

The airspace of the Southcentral Region is not contiguous. For this reason, moose will be discussed for each MOA separately and the discussion at the regional level is omitted.

3.5.5.5.1 SUSITNA MOA

Moose are widely distributed and abundant under the SUSITNA MOA at elevations below 4,000 feet (Figure 3-41), although they are far less widespread during winter months. Moose are less common above 1,500 feet or in extensive black spruce-Labrador tea bogs, which provide little food and cover. In winter, moose are most abundant near riparian zones and on south-facing, open birch-cottonwood forests. Major wintering areas include the Kahiltna and Yentna river valleys (Figure 3-41). In high snow years, moose in this area suffer high mortality due to difficulty in travel to find browse. The estimated mortality in high snow years can be as high as 25 to 30 percent of cows, 95 to 99 percent of calves, and 70 to 80 percent of bulls (ADF&G 1993a). No moose calving concentration areas have been identified to date under the MOA, although calving concentration areas are located immediately to the south and southeast. Fall moose densities under the MOA are estimated at 1.8 moose/square mile (ADF&G 1993a). Important rutting areas include the Dutch Hills, upper Kahiltna River valley, Yenlo Hills, and the Yentna River valley (Figure 3-41).

3.5.5.5.2 FOX MOA

Moose are distributed throughout the area under the FOX MOA, except in areas above 4,000 to 4,500 feet elevation, such as the higher areas of the Alaska Range, and the Chulitna-Watana and Talkeetna mountains (Figure 3-41).

The moose population located under the northern portion of the FOX MOA (i.e., along the northern foothills of the Alaska Range) has increased at a rate of 12 percent per annum during the last few years, and has reached a high density of about 2.8 moose/square mile. The increase in this moose population coincides with a sharp decrease in the Delta caribou herd population (ADF&G 1993a). ADF&G management objectives are to maintain the current moose population size under this portion of the FOX MOA.

Moose populations south of the Alaska Range, excluding the western Talkeetna Mountains, have been abundant in the past, reaching their peak in the mid-1960s. Large harvests, severe winters, and increased predation led to a population decline until the mid-1970s. Moose populations then recovered and increased until 1988. Subsequent adverse winter conditions and increased predation by wolves and brown bears contributed to the reduction of the moose population by 20 to 30 percent. In 1991, average population densities within the southern portion of the FOX MOA were still high at 1.9 moose/square mile, with the highest concentrations occurring in the Alphabet Hills, the eastern Talkeetna Mountains, and in the upper Susitna River drainage. The area south of the Alaska Range contributes significantly to the statewide moose harvest; ADF&G plans to manage this population to increase moose numbers to 1988 levels (ADF&G 1993a).

Extensive calving areas are located on both sides of the Parks Highway around the town of McKinley Park. The eastern portion of these calving grounds occurs under the northwestern portion of the FOX MOA. Other calving areas are located in the upper Nenana and Susitna river drainages and southwest of Paxson, underlying the central and southern portions of the FOX MOA. Calving typically occurs in late May and early June.

Moose rutting has been observed under the FOX MOA in subalpine habitat along the northern and western foothills of the Alaska Range, on the upper McLaren and Susitna Rivers, southwest of Paxson, and along the Talkeetna Mountains. During winter, moose concentrate at the lower elevations under the FOX MOA, primarily utilizing areas without excessive snow cover. Important winter concentration areas under FOX MOA are located in the Susitna drainage, in the Lake Louise Flats, and along the Gulkana River (Figure 3-41). Other important moose winter concentration areas are located in the Copper, Gakona, and Chistochina river drainages, to the east and south of the MOA.

3.5.5.5.3 FOX 2 TMOA

Moose are distributed throughout the area under the FOX 2 TMOA at elevations below 4,500 feet (Figure 3-41). Moose are thus found under the northernmost portions of the FOX 2 TMOA, that is on the northern slopes of the Alaska Range, and under the central and southern portions of the FOX 2 TMOA on the southern slopes of the Alaska Range.

Moose on the northern slopes of the Alaska range remain mostly resident in the area and seldom move north of the Tanana River (ADF&G 1993a). Except for a winter concentration area along the upper Gerstle River, no other special use areas have been identified under this portion of the FOX 2 TMOA (Figure 3-41). Population densities for moose north of the Alaska range underwent fluctuations over time. In the mid-1960s to early 1970s, the moose population fell so low that the hunt was closed. The population decline was mainly due to inclement weather, but hunting and predation exacerbated the situation. Wolf control programs carried out within the area and to the west of FOX 2 TMOA, as well as hunting restrictions, have allowed the moose population to recover. The present population density is estimated to be medium to high, probably around 3 moose/square mile. Since this an important moose hunting area, ADF&G management objectives aim at increasing moose numbers north of the Alaska Range.

Similarly, moose numbers have fluctuated on the southern slopes of the Alaska Range. Low populations in the 1900s increased and peaked in 1965. Weather and over-harvesting, as well as predation, led to a rapid decline. The moose population recovered from 1975 onward, but experienced another significant decline from 1988 to 1991, when winter conditions caused extensive calf mortality and reduced the population by about 30 percent.

At present, moose population densities in suitable areas under the FOX 2 TMOA have been estimated at 1.6 to 1.9 moose/square mile (ADF&G 1993a). ADF&G management objectives aim at maintaining the moose population at its present level south of the Alaska Range.

Moose concentration areas within the southern portion of the FOX 2 TMOA include calving areas from the Denali Highway south, including the Gulkana and Gakona river drainages, as well as the Lake Louise Flats. Rutting concentrations have been observed in subalpine habitats, such as the headwaters of the Gulkana and the Gakona rivers. During winter, when snow depth is increasing, moose descend to lower-elevation areas south of Paxson. Winter concentration areas are in the Lake Louise Flats, the Gulkana, Gakona, and Chistochina river drainages, and in the Copper River basin (Figure 3-41).

3.5.5.5.4 TANANA MOA

Moose are distributed throughout the entire area under the TANANA MOA, except for areas above 4,000 to 4,500 feet elevation (Figure 3-41). Such higher-elevation areas are mainly along the Alaska Range, which crosses the central and western portions of the area under the TANANA MOA.

Under the northern part of this MOA, moose population densities have fluctuated. Studies (ADF&G 1993a) have concluded that declines in the moose population were primarily caused by predation and were not a result of unfavorable climatic conditions, nutrition, human harvest, or diseases affecting moose. Wolf control programs were carried out in the area between the 1950s and early 1960s, and between 1981 and 1983. The area is also under liberalized regulations for brown bear hunting, which has reduced bear predation on moose.

At present, the moose population located under the northern segment of the TANANA MOA is growing slightly and has reached a density of 0.3 to 0.5 moose/square mile. However, the ADF&G plans to increase moose concentrations to 0.7 to 0.9 moose/square mile in this area. Given the high incidence of predation as a mortality factor (wolves and bears may kill up to 30 percent of the post-calving population) (ADF&G 1993a), the ADF&G does not consider this a realistic objective without reintroducing predator control programs. The northern portion under the TANANA MOA is very popular with local and non-local moose hunters, particularly because it has easy access for motor vehicles from the Alaska and Taylor Highways.

The central portion under the TANANA MOA contains an apparently stable moose density of about 2 moose/square mile (ADF&G 1993a); this density is below that specified in ADF&G management goals. The moose population has fluctuated under this portion of the MOA as well, but the severe decline in the mid-1960s and 1970s was attributed primarily to hard winter conditions, with predation having less of an impact on moose than under the northern part of the MOA. However, predation under the central portion of the MOA might have been less significant than in other areas because of predator controls carried out in neighboring units (ADF&G 1993a). Moose under the central portion of the TANANA MOA remain more or less resident throughout the year. The area is popular with hunters, particularly because of easy access from the Alaska Highway.

Under the southern and southwestern portions of the TANANA MOA, moose populations were low in the early 1900s, but increased substantially between the 1940s and the mid-1960s. Since then, moose numbers have fluctuated due to large hunting harvests, severe winters, and predation (ADF&G 1993a). Currently, moose densities are estimated at about 1.4 moose/square mile, despite a population loss of about 30 percent between 1987 and 1991 when hard winters adversely impacted moose calf survival. The present moose population is below ADF&G management objectives. ADF&G plans to impose temporary hunting restrictions and introduce wolf control measures in order to stimulate moose population growth in this very popular hunting area.

Moose calving areas under the northern portion of the TANANA MOA include the south slopes of Mount Veta, the Mosquito Flats, the West Fork of the Fortymile River west of the Taylor Highway, and the Dennison Fork east of the Taylor Highway. Calving under the central portion of the MOA is concentrated along both sides of

the Tanana River. Calving activity is also expected in the Gulkana River drainage and surrounding areas, located under the southern and southwestern portions of the TANANA MOA.

Under the northern portion of the MOA, rutting areas overlap with the calving grounds described above. Under the central portion of the MOA, rutting takes place on the northern foothills of the Alaska Range. Moose under the southern part of the MOA concentrate on the southern and southwestern slopes of the Alaska Range and in the Middle Fork drainage of the Gulkana River during the rut.

Winter use areas are primarily concentrated around Mount Veta, the Mosquito Flats, the West Fork of the Fortymile River, and around the Dennison Fork and Prindle Volcano under the northern portion of the TANANA MOA. Under the central portion of the MOA, moose principally winter in the Tanana River valley but also occur in the upper reaches of the Tok River drainage. In the southern and southwestern portions of the MOA, moose primarily winter in the flats south of Paxson.

3.5.5.5 Elmendorf AFB

Moose were not common around Anchorage before 1940, but moved into the area as a result of development activities linked with Anchorage and Fort Richardson, which eliminated much of the old growth forests and allowed brushy vegetation to take hold (ADF&G 1993a). Elmendorf AFB extends over 13,130 acres and most of the area, including the runways, is not fenced (Richmond 1994a). As a former part of Fort Richardson, Elmendorf AFB contains favorable moose habitat. The moose population in Fort Richardson and Elmendorf AFB combined was estimated at about 600 animals in 1990/91. Although population figures were considered stable during the 1980s, moose numbers might decline in the future as a result of vegetation succession and because of increased urban development.

Moose are year-long residents in the Anchorage area (Richmond 1994a) and can be expected to seasonally move up and down the mountain slopes in search of feed. The low elevation of Elmendorf AFB makes it a likely winter use area for moose. Both calving and rutting activities are likely on and around Elmendorf AFB.

Elmendorf AFB is open for a limited number of bow hunters (15 permits per year) (Richmond 1994a).

3.5.5.6 Dall sheep

The airspace of the Southcentral Region is not contiguous. For this reason, Dall sheep will be discussed for each MOA separately, while a description at the regional level is omitted.

3.5.5.6.1 SUSITNA MOA

A primary factor in Dall sheep distribution is the requirement for windblown slopes with little snow cover within their range to allow for winter foraging. Under normal environmental conditions in interior Alaska, recruitment and mortality are roughly balanced and sheep populations are stable (Heimer 1988). The Alaska Range, which runs northeast-southwest in this area, divides the drainages of the Kuskokwim and Susitna rivers. Dall sheep are found primarily on the northern and western side of the Alaska Range because the eastern side (area of SUSITNA MOA) receives too much snow from moisture-laden air moving north from the Gulf of Alaska. Because of this, the density of Dall sheep under the SUSITNA MOA is low. Dall sheep are limited to areas of discontinuous habitat and generally inhabit only south-facing slopes. Three small areas under the SUSITNA MOA area of the Alaska Range are classified as Dall sheep habitat (Figure 3-42). Most productive Dall sheep hunting in this area occurs within the Skwentna River drainage to the west of the SUSITNA MOA, although some sheep are also taken from the Yentna River area. No mineral licks have been identified under the SUSITNA MOA.

3.5.5.6.2 FOX MOA

Dall sheep occupy a large portion of the area under the northern part of the FOX MOA, namely the northern slope of the Alaska Range, and the Chulitna-Watana and Talkeetna mountains (Figure 3-42). In 1991, the population in the Eastern Alaska Range was estimated at 2,000 to 4,000 sheep. This represented a decrease from previous years when approximately 5,000 animals were estimated. This decline has been attributed to several severe winters and predation by wolves (ADF&G 1992d). The ADF&G plans to maintain a minimum of 5,000 Dall sheep in the Eastern Alaska Range. The Dall sheep population inhabiting the Talkeetna and Chulitna-Watana mountains has been estimated at 1,500 to 2,500. The population is assumed to be stable or slightly increasing (ADF&G 1990a). The ADF&G management objective is to maintain hunter harvests at present levels.

There are only a few known winter ranges under the FOX MOA, namely in the northern part of the Alaska Range and north of the upper Susitna River (Figure 3-42). However, it is likely that there are other winter use areas throughout the general Dall sheep range. In general, Dall sheep lamb on their winter range in habitat where they can escape from predators (Heimer 1993). Most lambing occurs from May 15 to June 15.

Fourteen mineral licks have been located under the FOX MOA. Twelve of them are located along the northern slopes of the Alaska Range, under the northern portion of the MOA. Under this portion of the MOA, the licks are concentrated between the upper Wood River, the Delta Creek drainage, and the West Fork of the Little Delta. Two licks have been identified in the Watana Mountains north of the Susitna River (Figure 3-42).

3.5.5.6.3 FOX 2 TMOA

Dall sheep habitat is found under the northern portion of the FOX 2 TMOA on the northern slopes of the Alaska Range (Figure 3-42). Sheep primarily occur in the Delta Controlled Use Area. This Controlled Use Area east of the Delta River is managed for "aesthetically pleasing" hunts for full-curl rams. Hunting permits are allocated by lottery. In 1986, Dall sheep were estimated to number 1,500 in the Delta Controlled Use Area (ADF&G 1986a). ADF&G management goals for this area are to allow the sheep population to increase to 1,800 animals in order to maintain a certain harvest level of full-curl rams (ADF&G 1992d).

No specific winter ranges and lambing areas have been identified under the FOX 2 TMOA airspace, and the location of winter range and lambing areas probably varies from year to year. Dall sheep generally lamb on winter ranges. Most lambing occurs from May 15 to June 15.

Eight mineral licks have been located under the FOX 2 TMOA (Figure 3-42).

3.5.5.6.4 TANANA MOA

Dall sheep habitat is found under the central portion of the TANANA MOA on the northern slopes of the Alaska Range (Figure 3-42). Sheep numbers are assessed by the ADF&G within different regions or mountain ranges. The sheep under the TANANA MOA primarily belong to the Delta Controlled Use Area (see section 3.5.5.6.3) and the Tok Management Area, and are included in the counts for these two areas.

The Tok Management Area is managed to produce trophy Dall sheep rams. No population surveys have been carried out in recent years, but the sheep population is estimated at about 2,000 animals. Based on the reported harvests of legal rams, the Dall sheep population is assumed to be more or less stable (ADF&G 1990a).

Fourteen mineral licks have been identified under TANANA MOA. Except for these mineral licks, no particular use areas have been identified under the TANANA MOA, and winter use and lambing are expected along the entire portion of the Alaska Range under the TANANA MOA (Figure 3-42). Bands of sheep will choose their winter range according to the availability of food, and range locations may change from one year to the next. The same is true for lambing areas, which are generally on or close to the winter range.

3.5.5.6.5 Elmendorf AFB

No Dall sheep occur on Elmendorf AFB.

3.5.5.7 Brown Bear

The airspace of the Southcentral Region is not contiguous. For this reason, brown bear will be discussed for each MOA separately, while a description at the regional level is omitted.

3.5.5.7.1 SUSITNA MOA

The zone under the SUSITNA MOA includes six areas having known brown bear concentrations along fish streams (primarily during the summer and fall salmon runs) and five suspected denning areas. Brown bear density in southcentral Alaska has been estimated at one bear/13.5 square miles (Miller and Ballard 1982). The highest densities are in the foothills of the Alaska Range (Faro 1990). Harvest data suggest that brown bear populations in areas accessible to hunters may have declined over the last 5 years, particularly in GMU 16B, which includes the area under the SUSITNA MOA (see Appendix M for location of GMU). Brown bear are distributed throughout the area underlying the SUSITNA MOA and are described as abundant in the general area (one bear/14 square miles [Miller et al. 1987]).

3.5.5.7.2 FOX MOA

Brown bear are distributed throughout the area under the FOX MOA. Their general habitat extends to near and above treeline, but excludes very high altitudes in the Alaska Range and the Talkeetna Mountains. Brown bear densities on the northern slopes of the Alaska Range, located within the northern portion of the FOX MOA, have been described as moderate and estimated at 31.2 bears 2 years or older/1,000 square miles (ADF&G 1991b). It is believed that increasing hunting activities may have caused a population decline during recent years. ADF&G management goals in this area are to reduce the harvest rates in the near future in order to allow the brown bear population to recover or stabilize.

The brown bear population occurring on the southern side of the Alaska Range, in the Nelchina Basin, has been considered high and was probably still increasing in the mid- to late 1970s. However, high hunting harvests during the 1980s stopped the population increase. Currently, the bear population in the Nelchina Basin is estimated at 1,200 animals or more, resulting in a population density of approximately 18.2 bears 2 years or older/1,000 square miles (ADF&G 1991b). The ADF&G management goal is to maintain the brown bear population at present size.

Brown bear have been observed to concentrate along the Middle Fork of the Gulkana River during the salmon runs. Brown bear are important predators of moose south of the Alaska Range (ADF&G 1991b).

3.5.5.7.3 FOX 2 TMOA

Brown bear are distributed throughout the area under the FOX 2 TMOA, except for glaciated areas along the Alaska Range. Brown bear concentrations are low in low-elevation, spruce-dominated or mixed forests, and are moderate in foothills and mountainous terrain near or above treeline (ADF&G 1991b).

Brown bear population densities under the FOX 2 TMOA have been estimated at about 32 bears 2 years or older/1,000 square miles on the northern slopes of the Alaska Range (ADF&G 1991b). Brown bear populations under this portion of the TMOA may have suffered from high hunting harvests in previous years.

Brown bear populations south of the Alaska Range, that is under the central and southern sectors of the FOX 2 TMOA, have been exposed to heavy hunting pressure as well, which has resulted in a decline in bear numbers

compared to pre-1980 levels. The current population density has been estimated at 18.2 bears 2 years or older/1,000 square miles. The ADF&G management objective is to maintain the brown bear population at its present level (ADF&G 1991b).

Brown bear concentrations have been observed along the Middle Fork of the Gulkana River during the salmon runs. Brown bear are known to contribute significantly to moose and caribou mortality.

3.5.5.7.4 TANANA MOA

Brown bear are present throughout the area under the TANANA MOA, except in glaciated regions of the Alaska Range. Brown bear populations in the region have been influenced by wildlife management, which has sought to increase moose densities through measures such as predator control programs and minimal restrictions on brown bear hunting. Brown bear concentrations have been observed along the Middle Fork of the Gulkana River during the salmon runs.

Under the northern portion of the MOA, brown bear populations were decimated concomitantly with a federal wolf control program (carried out before statehood) using poison (ADF&G 1991b). The brown bear population has since recovered and increased to 41 bears/1,000 square miles by the mid-1980s. At this density, they were considered to contribute to the decline of moose in the area.

Moose management objectives led to a liberalization of the brown bear hunt. As a result, the brown bear population has probably decreased since the mid-1980s, particularly in human-accessible areas and regions popular with moose hunters, where brown bear are incidentally taken. Bear populations have thus been reduced along the Taylor Highway and around Mount Veta. Where moose hunting pressure is low, as in the Ladue River drainage or around Prindle Volcano, brown bear densities are believed to be at mid-1980s levels (ADF&G 1991b).

Under the central portion of the TANANA MOA, brown bear densities are probably between 27 and 34 bears 2 years or older/1,000 square miles (ADF&G 1991b). While brown bear densities north of the Tanana River are believed to be increasing slightly, the bear population south of the Tanana River and on the northern slopes of the Alaska Range is experiencing heavy hunting pressure and may be declining as evidenced by reduced harvests (ADF&G 1991b).

Under the southern portion of the TANANA MOA, brown bear populations were considered to be high and increasing until heavy hunting pressure began in the 1970s. Bear numbers declined, particularly in easily accessible areas. At present, the density of brown bears is roughly estimated at about 36 bears 2 years or older/1,000 square miles (ADF&G 1991b).

3.5.5.7.5 Elmendorf AFB

Although Anchorage and surrounding areas, including Elmendorf AFB, are potential brown bear habitat, brown bear distribution and abundance is thought to be affected by the urban, agricultural, and other development in the area (ADF&G 1991b). Brown bear have been sighted on Elmendorf AFB (Richmond 1994b), but no density estimates are available for the area.

3.5.5.8 Black Bear

The airspace of the Southcentral Region is not contiguous. For this reason, black bear will be discussed for each MOA separately, while a description at the regional level is omitted.

3.5.5.8.1 SUSITNA MOA

Black bear are distributed throughout the area underlying the SUSITNA MOA below 5,000 feet. Black bear are known to concentrate along salmon streams under the MOA in spring and fall, and in alpine berry patches during late summer and early fall. Black bear are abundant in the Susitna River drainage, and the density is estimated at one bear/4.2 square miles (Miller 1985). No population trends are currently known for black bear in this area.

3.5.5.8.2 FOX MOA

Black bear population densities within the area under the FOX MOA vary, from low under the northern portion of the MOA where habitat is unsuitable, to high in the Nelchina Basin where the estimated density is greater than 200 bears/1,000 square miles (ADF&G 1993b). Although more accurate black bear population surveys are pending, the ADF&G plans to maintain the black bear population at its current level in the region.

3.5.5.8.3 FOX 2 TMOA

Black bear population densities within the area under the FOX 2 TMOA vary, from low in the northern portion of the TMOA, where habitat is unsuitable (areas in the Alaska Range above treeline), to high at lower elevations south of the Alaska Range. Black bear densities under the southern portion of the FOX 2 TMOA have been estimated at or above 200 bears/1,000 square miles (ADF&G 1993b). The ADF&G plans to maintain black bear populations at present levels.

3.5.5.8.4 TANANA MOA

Black bear are distributed throughout the area under the TANANA MOA, except in heavily populated areas and treeless alpine habitat (ADF&G 1993b). Although population surveys have not been conducted, black bear seem to be abundant in most of the region. Black bear populations under the northern portion of this MOA seem to have been higher in the 1960s and early 1970s, possibly benefitting from a decline in the brown bear population that resulted when poison was used for wolf control.

3.5.5.8.5 Elmendorf AFB

Black bear have been sighted on Elmendorf AFB (Richmond 1994b). However, ADF&G reports that the lowland areas associated with the communities of Anchorage-Eagle River exclude most black bears (ADF&G 1993b), and black bear densities on Elmendorf AFB are thus probably low. Black bear densities are expected to be high, however, east of Elmendorf AFB (ADF&G 1993b).

3.5.5.9 Bison

The airspace of the Southcentral Region is not contiguous. For this reason, bison will be discussed for each MOA separately, while a description at the regional level is omitted.

3.5.5.9.1 SUSITNA MOA

Bison are not known to occur under the SUSITNA MOA (ADF&G 1993f).

3.5.5.9.2 FOX MOA

The Delta bison herd ranges along the western bank of the Delta River from early spring through July or August. The southern portion of this summer range, including the southern half of the calving area, is located under the northeastern corner of the FOX MOA (Figure 3-43). Calving generally takes place from late May to mid-June. In late August, the herd moves out of the area under FOX MOA and onto its fall and winter ranges, which are located south and east of Delta Junction. For more information on the Delta bison herd, refer to section 3.5.4.9.

3.5.5.9.3 FOX 2 TMOA

The Delta bison herd ranges along the western bank of the Delta River from early spring through July or August. The southern portion of this summer range, including a portion of the calving area, is located under the northwestern corner of the FOX 2 TMOA (Figure 3-43). Calving generally takes place from late May to mid-June. From summer range, the herd moves onto its fall and winter ranges located south and east of Delta Junction. For more information on the Delta bison herd, refer to section 3.5.4.9.

3.5.5.9.4 TANANA MOA

The northeastern corner of the TANANA MOA overlaps the southernmost portion of the Delta bison herd summer range (Figure 3-43). Calving takes place within the summer range from late May to mid June; however, generally, no calving is expected under this MOA. Fall and winter ranges of the bison herd are located outside the TANANA MOA boundaries. For more information on the Delta bison herd, refer to section 3.5.4.9.

3.5.5.9.5 Elmendorf AFB

No bison occur on Elmendorf AFB.

3.5.5.10 Wolf

The airspace of the Southcentral Region is not contiguous. For this reason, wolf data will be presented for each MOA separately, while a description at the regional level is omitted.

3.5.5.10.1 SUSITNA MOA

Despite an abundance of prey, particularly moose, wolf populations under the SUSITNA MOA are probably near a historical low, with average wolf densities probably below 3 to 4 wolves/1,000 square miles (ADF&G 1991d). The decline of the wolf population in this area is probably attributable to over-harvesting for more than a decade. Over-harvesting has been facilitated by aircraft use for trapping and hunting. The present wolf population is below that specified in ADF&G management objectives.

3.5.5.10.2 FOX MOA

Under the northern portion of the FOX MOA, the wolf population density has been estimated at 41 wolves/1,000 square miles (fall estimate 1991 [ADF&G 1992f]), and wolf control is presently carried out in the area.

South of the Alaska Range, wolf populations were very low from the late 1900s to the early 1930s because of low prey density. Wolf numbers rose once the prey base, particularly moose and caribou, increased. However, a predator control program carried out between 1948 and 1953 decimated the wolf population in the Nelchina Basin to the point that only about 12 wolves remained (ADF&G 1991d). After statehood in 1959, the wolf hunt was closed for 5 years, and thereafter harvesting was limited. In 1990, wolf densities under the southern portion of FOX MOA were expected to have reached 22.5 wolves/1,000 square miles, representing an increase of 48 to 63 percent since 1985. However, "Same Day Airborne" (SDA) was reintroduced as a legal hunting method that same year. SDA wolf hunting is considered an effective method of wolf control (ADF&G 1991d). Wolf takes have been highest in easily accessible areas. One of the identified goals of ADF&G wolf management in this area is to avoid over-harvesting in popular wolf-hunt tracts.

3.5.5.10.3 FOX 2 TMOA

The history of wolf control and present wolf population densities are comparable to the FOX MOA.

3.5.5.10.4 TANANA MOA

Wolf populations under the northern portion of the TANANA MOA have fluctuated widely, both because of wolf control programs carried out at different times and changes in prey abundance (ADF&G 1991d). The last wolf control program was carried out in the winter of 1981-82. Present wolf densities under the northern portion of the TANANA MOA have been estimated at 41.7 wolves/1,000 square miles; populations are believed to be increasing.

Detailed wolf surveys under the central portion of the TANANA MOA have not yet been carried out, but wolves have been identified as a major predator on caribou and moose, and wolf numbers are probably increasing (ADF&G 1991d). The last wolf reduction program in this area dates back to 1979.

Under the southern portion of this MOA, wolf populations have undergone wide fluctuations, but are presently at a density of about 22.5 wolves/1,000 square miles (ADF&G 1991d).

3.5.5.10.5 Elmendorf AFB

No systematic wolf surveys have been implemented around Elmendorf AFB, but harvest and sighting records indicate that the wolf population is low (ADF&G 1991d).

3.5.5.11 Furbearers

The airspace of the Southcentral Region is not contiguous. For this reason, furbearer data will be presented for each MOA separately, while a description at the regional level is omitted.

3.5.5.11.1 SUSITNA MOA

Under the SUSITNA MOA, low lynx and wolverine densities have been recorded for the past two decades. An emergency closure was imposed on lynx trapping between 1987 and 1990 to avoid further population declines. Beaver are abundant in suitable habitat, while the marten population appears to be declining, possibly because of over-harvesting. River otter are present in the area, but no abundance estimates are available.

3.5.5.11.2 FOX MOA and FOX 2 TMOA

Data on furbearers are summarized for large areas. Since FOX MOA and FOX 2 TMOA mainly overlies the same report area, furbearer information is presented here for both airspaces.

ADF&G has monitored lynx populations under FOX MOA and FOX 2 TMOA since 1988. Lynx numbers are considered moderate but have probably increased since 1988-89, after several years of low population density. Wolverines seem to be abundant only in remote and mountainous regions. A wolverine population density survey yielded an estimate of 4.5 wolverines/1,000 square miles in favorable habitat. In less mountainous terrain, wolverines are considered to be much scarcer than the above density estimate suggests. Beaver are numerous, and populations are probably stable under the FOX MOA and the FOX 2 TMOA. The marten population peaked around 1988 but has since decreased. Numbers now seem to be low but stable. Otter and mink have both been labelled "scarce to common" under FOX MOA and FOX 2 TMOA.

3.5.5.11.3 TANANA MOA

Under the TANANA MOA, both lynx and wolverine populations are evidently low. Beaver are common in suitable habitat. Marten experienced a population increase until 1987-88 but are probably decreasing at present. River otter are scarce under the northern portion of the TANANA MOA, and are moderately common under the southern portion. Mink are probably more common under the northern portion of the MOA than under the south.

3.5.5.11.4 Elmendorf AFB

A variety of furbearers have been observed on Elmendorf AFB, including lynx, wolverine, beaver, marten, and river otter. The presence of mink has not been confirmed. No population densities and trends are known for these species.

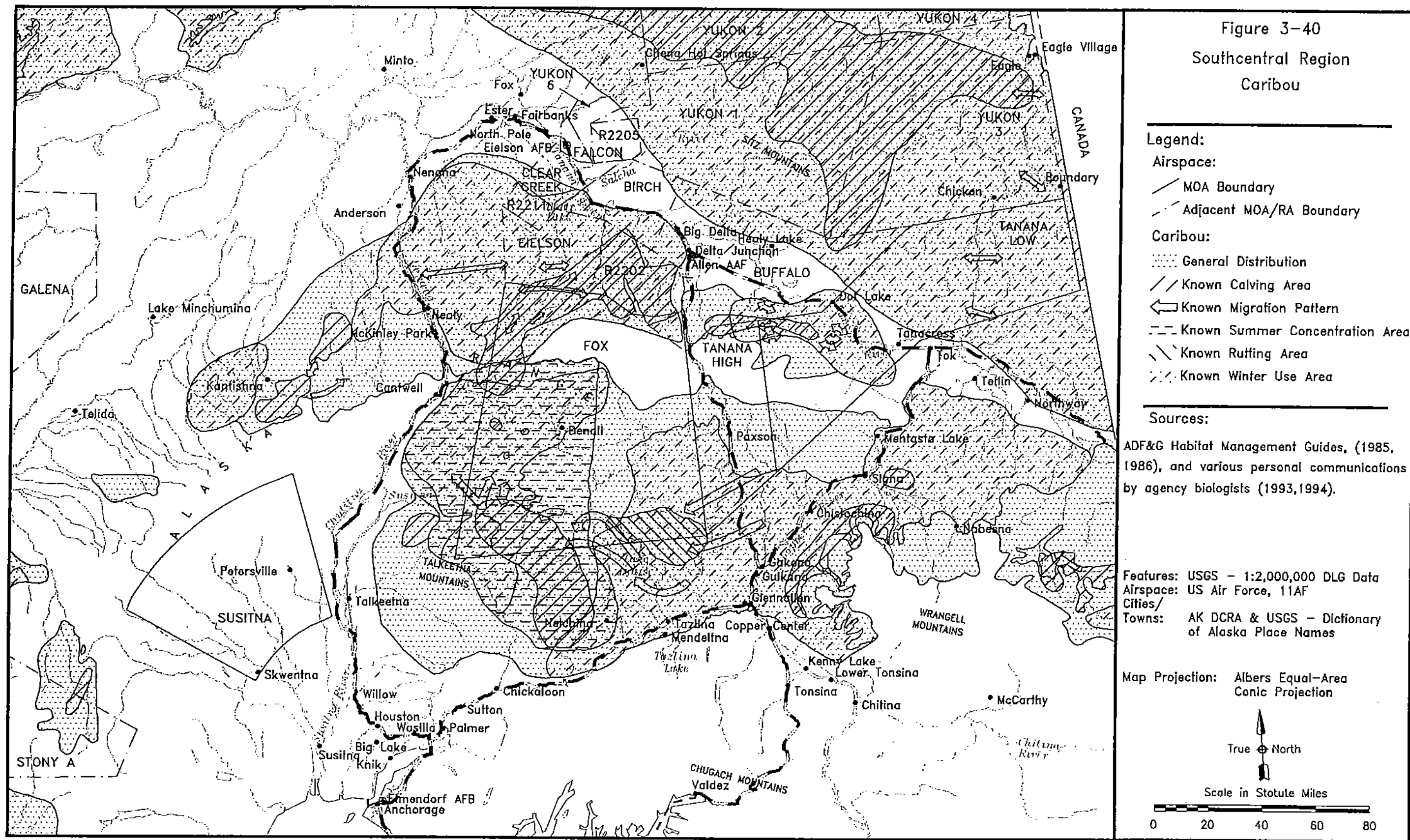


Figure 3-40
Southcentral Region
Caribou

- Legend:**
- Airspace:**
- MOA Boundary
 - Adjacent MOA/RA Boundary
- Caribou:**
- General Distribution
 - Known Calving Area
 - Known Migration Pattern
 - Known Summer Concentration Area
 - Known Rutting Area
 - Known Winter Use Area

Sources:

ADF&G Habitat Management Guides, (1985, 1986), and various personal communications by agency biologists (1993,1994).

Features: USGS - 1:2,000,000 DLG Data
Airspace: US Air Force, 11AF
Cities/Towns: AK DCRA & USGS - Dictionary of Alaska Place Names

Map Projection: Albers Equal-Area Conic Projection



Scale in Statute Miles

0 20 40 60 80

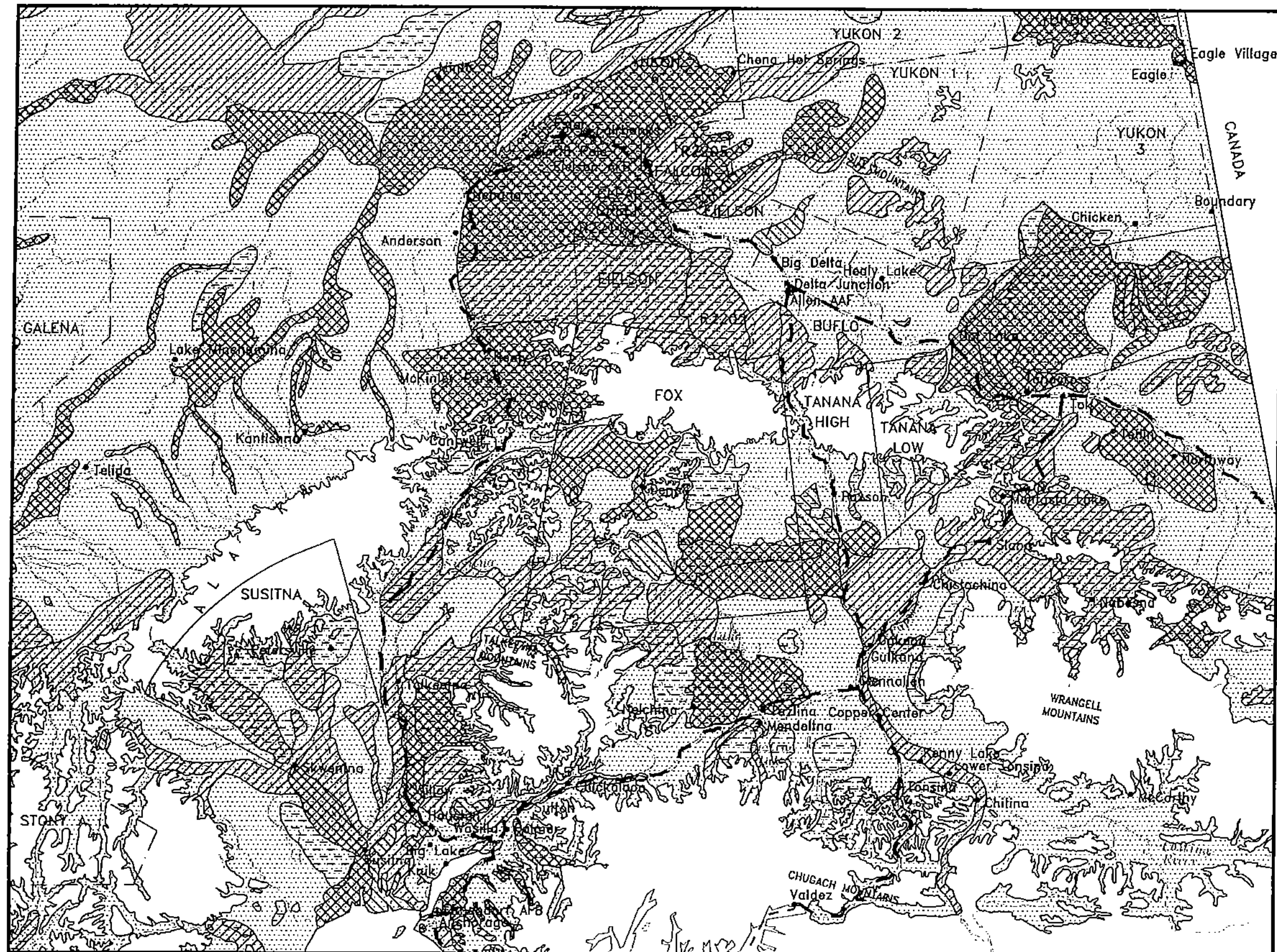


Figure 3-41
Southcentral Region
Moose

Legend:

Airspace:

- MOA Boundary
- - - Adjacent MOA/RA Boundary

Moose:

- General Distribution
- \\ Known Calving Concn. Area
- - - Known Rutting Concn. Area
- /// Known Winter Concn. Area

Sources:

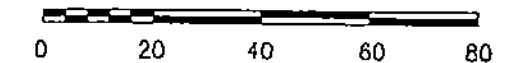
ADF&G Habitat Management Guides, (1985, 1986), and various personal communications by agency biologists (1993,1994).

Features: USGS - 1:2,000,000 DLG Data
Airspace: US Air Force, 11AF
Cities/
Towns: AK DCRA & USGS - Dictionary of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection



Scale in Statute Miles



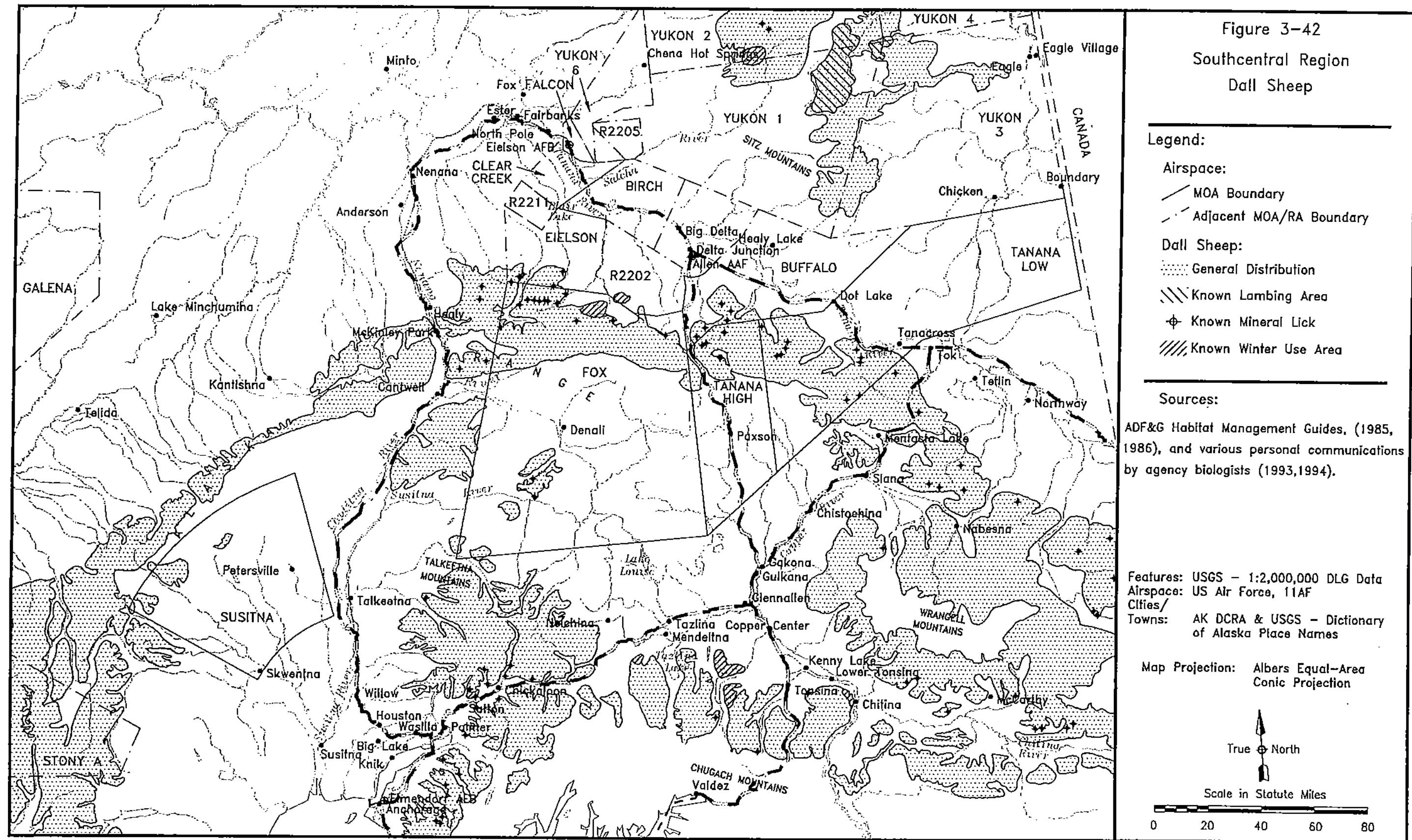


Figure 3-43

Southcentral Region Bison

Legend:

Airspace:

- MOA Boundary
- Adjacent MOA/RA Boundary

Bison:

- Calving Area
- Delta Junction Bison Range
- Summer Use Area
- Winter Use Area

Sources:

Steve Dubois, ADF&G, 1993
 Features: USGS - 1:2,000,000 DLG Data
 Airspace: US Air Force, 1:1AF
 Cities/
 Towns: AK DCRA & USGS - Dictionary of Alaska Place Names

Map Projection: Albers Equal-Area
 Conic Projection

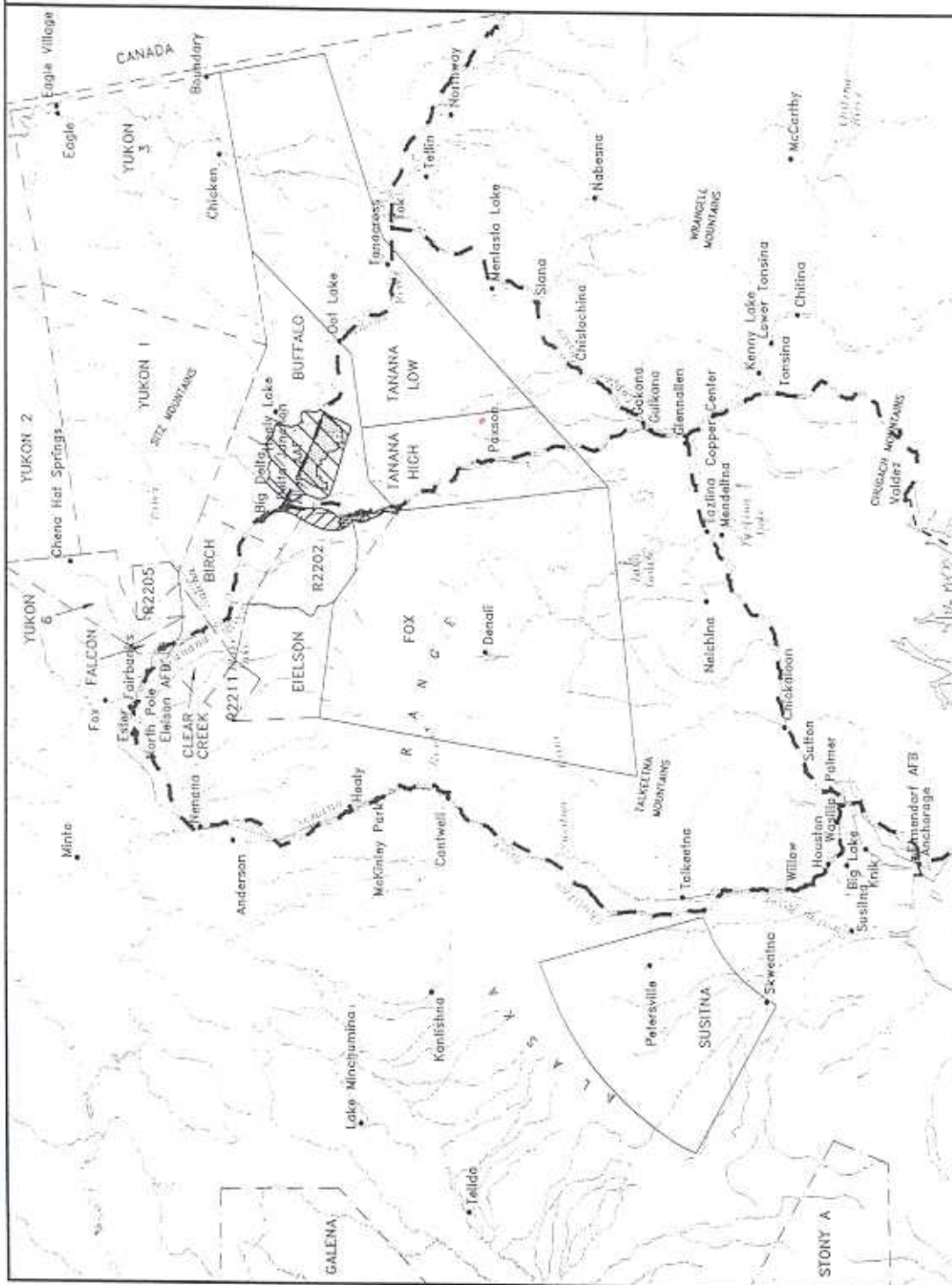
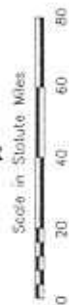


Figure 3-43

Southcentral Region Bison

Legend:

Airspace:

- MOA Boundary
- Adjacent MOA/RA Boundary

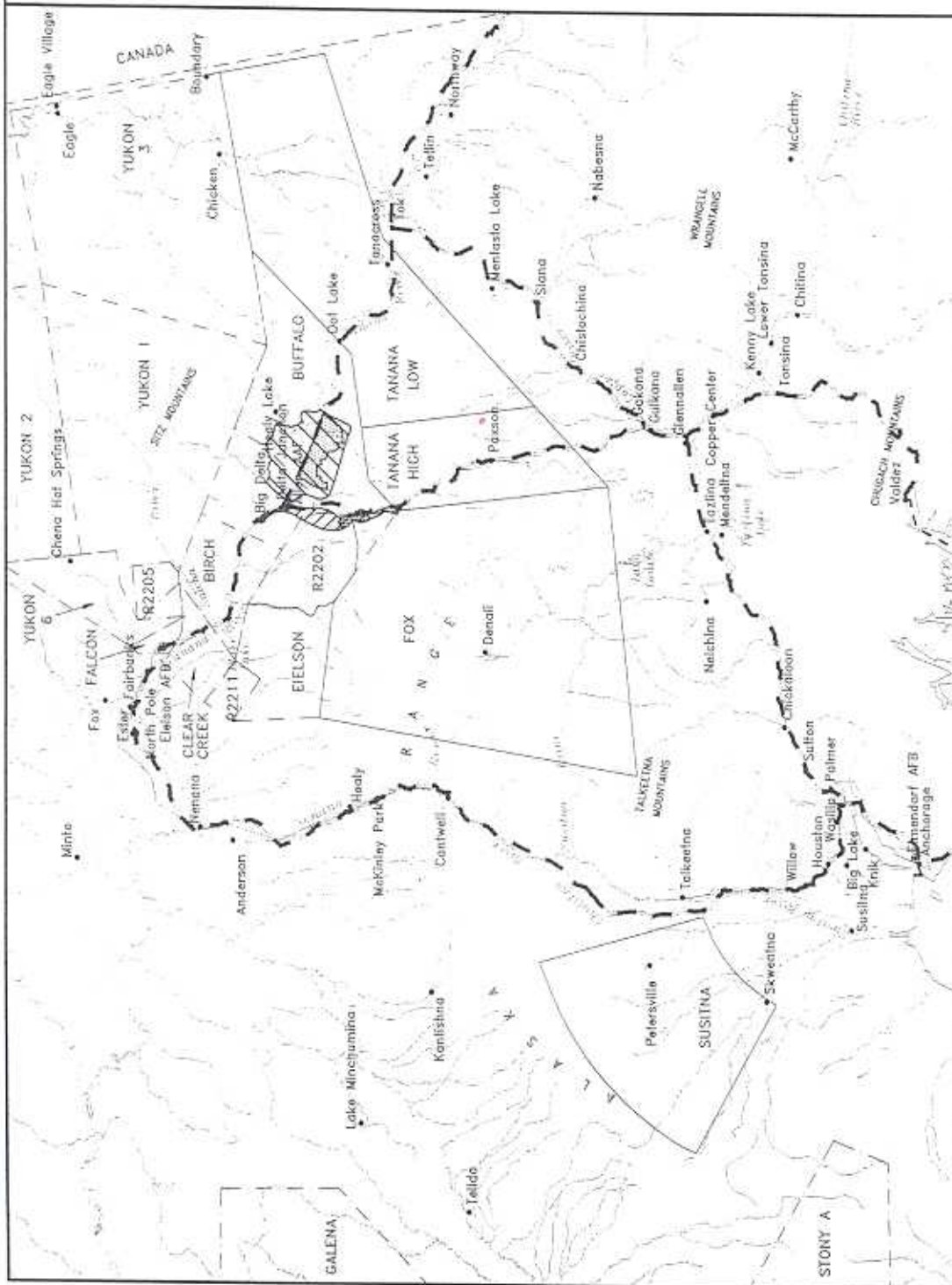
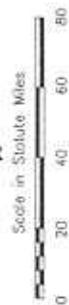
Bison:

- Calving Area
- Delta Junction Bison Range
- Summer Use Area
- Winter Use Area

Sources:

Steve Dubois, ADF&G, 1993
 Features: USGS - 1:2,000,000 DLG Data
 Airspace: US Air Force, 11AF
 Cities/
 Towns: AK DCRA & USGS - Dictionary of Alaska Place Names

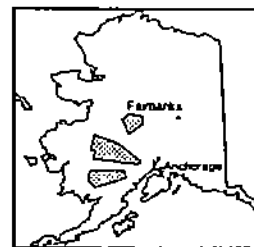
Map Projection: Albers Equal-Area
 Conic Projection



3.5.6 Western Region

3.5.6.1 Waterfowl

General waterfowl information is provided in section 3.5.2.3.1. Waterfowl breeding and spring and fall population distribution estimates are based on USFWS surveys (Butler and Gill 1993; King 1993). Butler and Gill (1993) and King (1993) provided migration population and pathway estimates primarily for bird-aircraft strike hazard impact modeling; sufficient data are not available to accurately verify these estimates. Trumpeter swans were censused by the USFWS in 1990 (refer to section 3.5.2.3.2).



Since the airspace in the Western Region is not contiguous, the information on waterfowl will be presented for each MOA separately, and the discussion at the regional level will be omitted.

3.5.6.1.1 GALENA MOA

Ducks and geese occur seasonally under a large portion of the MOA, generally along the Yukon River drainage. No major waterfowl concentration occurs under GALENA MOA (Figure 3-28).

The trumpeter swan population under the GALENA MOA is associated with the Yukon River drainage. Thirty-five trumpeters were counted under the GALENA MOA during the 1990 USFWS census; however, 3,880 trumpeters were counted in the Lower Tanana census unit (Conant et al. 1991), which encompasses most of the area under the GALENA MOA.

3.5.6.1.2 STONY A MOA

Ducks and geese occur seasonally throughout the western and central portions of the area under the MOA along the Kuskokwim River drainage. STONY A is located over the northern portion of the Mulchatna waterfowl summer breeding area (W-13), which extends south to the coast. From May 15 to August 15, this area supports an estimated 50,000 ducks, 10,000 Canada geese, 15,000 greater white-fronted geese, and 5,000 cranes (Figure 3-28 and Attachment A).

The trumpeter swan population under the STONY A MOA is generally associated with the Kuskokwim River drainage. Five trumpeters were counted under the STONY A MOA during the 1990 USFWS census; however, 781 trumpeters were counted in the Kuskokwim census unit (Conant et al. 1991), which encompasses most of the area under the STONY A MOA.

3.5.6.1.3 STONY B MOA

Ducks and geese occur seasonally throughout the southeastern portion of the area under the STONY B MOA. The MOA extends over the northern portion of the Mulchatna waterfowl summer breeding area (W-13). As described above (see section 3.5.6.1.2), the area supports an estimated 80,000 waterfowl from May 15 to August 15 (Figure 3-28 and Attachment A).

No trumpeter swans were counted in the area under the STONY C MOA during the 1990 USFWS census; however, 781 trumpeters were counted in the Kuskokwim census unit (Conant et al. 1991), which is located immediately to the east of the MOA. The Lower Tanana census unit extends to the western portion of the area under the MOA along the Yukon River; however, few trumpeters are counted within this southern portion of the census unit.

3.5.6.1.4 STONY C TMOA

Ducks and geese occur seasonally under the western half of the MOA. The greatest waterfowl concentrations occur along the Yukon and Innoko river drainages to the northwest of the TMOA. A waterfowl breeding area (W-8) extends under the western third of the TMOA and supports 200,000 ducks, 10,000 greater white-fronted geese, 3,000 Canada geese, 500 swans, and 2,000 sandhill cranes from June 10 to August 1 (Figure 3-28 and Attachment A).

No trumpeter swans were counted under the STONY C TMOA during the 1990 USFWS census; however, 781 trumpeters were counted in the Kuskokwim census unit (Conant et al. 1991), which is located immediately to the east of the TMOA. The Lower Tanana census unit extends to the western portion of the area under the TMOA along the Yukon River; however, few trumpeters were counted within this southern portion of the census unit.

3.5.6.1.5 NAKNEK 1 MOA

Ducks and geese occur seasonally under the NAKNEK 1 MOA along the Tikchik lakes and river drainages areas. The NAKNEK 1 MOA is located over the central portion of the Mulchatna waterfowl summer breeding area (W-13), which extends north to the STONY MOAs and south to the coast. The Mulchatna waterfowl summer breeding area supports an estimated 80,000 waterfowl, including 50,000 ducks, 10,000 Canada geese, 15,000 greater white-fronted geese, and 5,000 cranes from May 15 to August 15 (Figure 3-28 and Attachment A).

3.5.6.1.6 NAKNEK 2 MOA

Ducks and geese occur seasonally throughout the western half of the area under the NAKNEK 2 MOA. The western half of this MOA is located over the central portion of the Mulchatna waterfowl summer breeding area (W-13). This area is described in section 3.5.6.1.5 and depicted in Figure 3-28.

No trumpeter swans were counted under the NAKNEK 2 MOA during the 1990 USFWS census; however, a sensitive habitat area for trumpeters has been designated on the east-central boundary of NAKNEK 2 MOA (Bennett 1993).

A tundra swan breeding population occurs under the southern to southwestern two-thirds of the MOA.

3.5.6.2 Raptors

General raptor information is provided in section 3.5.2.3.3. Raptor nest site data are based on USFWS and ADF&G surveys (Schempf 1993; Ambrose 1993; Hughes 1993), and do not represent the entire nesting population. Raptor breeding population distribution estimates are based on USFWS surveys (Butler and Gill 1993; King 1993). These breeding distributions are not indicative of raptor distribution throughout Alaska, since no concerted effort has been made to find all nesting areas. Raptors occur throughout the forested parts of Alaska; most surveyed areas are along accessible river systems and coastal areas. Butler and Gill (1993) and King (1993) provided migration population and pathway estimates primarily for bird-aircraft strike hazard impact modeling; sufficient data are not available to accurately verify these estimates.

Because the airspace of the Western Region is not contiguous, raptor information will not be summarized at the regional level, but presented for each MOA separately.

3.5.6.2.1 GALENA MOA

No peregrine falcon nests have been located under the MOA; however, a concentration of peregrine nests are located within 10 to 25 miles to the northwest of GALENA MOA on the Yukon River (Figure 3-32). One northern goshawk nest site has been identified under the northeast portion of the MOA (Figure 3-31).

3.5.6.2.2 STONY A MOA

Seven peregrine falcon nest sites have been located within the western one-third of the area under the MOA off the Kuskokwim River drainage. These include two nests on the common central boundary between STONY A and STONY B (Figure 3-32). One golden eagle nest site has been located under the central region of the MOA (Figure 3-31). Three osprey nest sites have been located under the western one-third of the MOA (Figure 3-31). One rough-legged hawk nest has been found under the southwestern portion of the MOA (Figure 3-31).

3.5.6.2.3 STONY B MOA

Ten peregrine nest sites have been located under the MOA along the Kuskokwim River (Figure 3-32). One bald eagle nest has been located near the south boundary of STONY B within the Kuskokwim River drainage. Eleven more bald eagle nests have been located within 50 miles south of STONY B and north of the NAKNEK MOAs (Figure 3-30). No golden eagle nest sites have been located under the STONY B MOA. One nest was found within 50 miles south of STONY B and north of the NAKNEK MOAs (Figure 3-31). Five rough-legged hawk nests have been found along the Kuskokwim River under the western portion of the MOA (Figure 3-31). Two osprey nests have been located under the north and southcentral portions of the MOA; however, STONY B lies within some of Alaska's most productive osprey habitat. Twelve additional osprey nests have been found extending from 8 miles south of STONY B to the NAKNEK MOAs (Figure 3-31).

3.5.6.2.4 STONY C TMOA

Six peregrine nest sites have been located within the southern portion of the area under the TMOA along the Kuskokwim River. Dense peregrine nesting occurs along the Yukon River immediately to the west and northwest from the TMOA. Additionally, three peregrine nests have been located on the southeastern boundary, shared with the STONY B MOA (Figure 3-32). No bald eagle nests have been located under STONY C TMOA; however, four nest sites have been found near the extreme southeastern boundary along the Kuskokwim River drainage (Figure 3-30). Three rough-legged hawk nests have been found along the Kuskokwim River under the southern portion of the TMOA (Figure 3-31).

3.5.6.2.5 NAKNEK 1 MOA

No peregrine falcon nest sites have been located under NAKNEK 1 MOA (Figure 3-32). Five bald eagle nest sites have been located under NAKNEK 1 MOA: three concentrated about 20 miles from the west-central MOA boundary (in the Tikchik Lakes region) and two sites within 20 miles of the east-central boundary (Figure 3-30). One rough-legged hawk nest site has been located under the west-central portion of the MOA (Figure 3-31). No osprey nests have been found within NAKNEK 1 MOA; however, 12 osprey nest sites have been located northeast of NAKNEK 1, extending from 8 miles north of NAKNEK 1 to the STONY B MOA (Figure 3-31).

3.5.6.2.6 NAKNEK 2 MOA

One peregrine nest site has been located under the northeast corner of the MOA (Figure 3-32). Five bald eagle nest sites have been located within a 10-mile radius under the center of the MOA. Seven additional nest sites are scattered along or within 5 miles of the southern and eastern MOA boundaries (Figure 3-30). No golden eagles have been located under the NAKNEK 2 MOA; however, one nest site has been found within under 5 miles of the southeast MOA boundary (Figure 3-31). Nine osprey nest sites have been located within the eastern half of the MOA. Osprey nests have also been found within 5 miles of the southern MOA boundary extending southerly to Lake Clark and Iliamna Lake, and within 2 miles of the northern MOA boundary extending northerly to the STONY B MOA (Figure 3-31). One rough-legged hawk nest site has been located along the eastern MOA boundary (Figure 3-31).

3.5.6.3 Bird Migration

Migration pathways are associated with river systems, but are generally well dispersed throughout the Western Region. The Western Region MOAs are influenced by several migrant flyways, which are discussed below.

Major Migration Route 13 extends along the Kuskokwim drainage along the southern portions of the STONY MOA complex, through central NAKNEK 2 MOA, and across the northeastern portion of NAKNEK 1 MOA. This flyway is followed by an estimated 250,000 waterfowl and 75,000 gulls in the spring (April 1 to May 15) and 300,000 waterfowl and 90,000 gulls in the fall (August 1 to November 1) (Figure 3-28 and Attachment A).

Migration Route 5 (along the Innoko River drainage) migrants may disperse into western portions of STONY C and GALENA MOAs. This flyway is followed by 500,000 ducks, 20,000 Canada geese, 20,000 greater white-fronted geese, 20,000 cranes, and 2,000 swans in the spring (May 5 to May 20) and 3 million ducks, 30,000 Canada geese, 30,000 greater white-fronted geese, 40,000 cranes, and 5,000 swans in the fall (August 15 to September 10) (Figure 3-28 and Attachment A).

Great numbers of migrants from Yukon River (Migration Route 2) and Tanana River (Migration Route 1) drainages may disperse into interior Alaska, and pass through or stop over in the area under the GALENA MOA. Migration Route 16, to the south and west (less than 20 miles) of the NAKNEK 1 MOA boundary, is followed by 200,000 migrating greater white-fronted geese in the spring (April 1 to May 15), and 230,000 greater white-fronted geese in the fall (August 1 to November 1) (Figure 3-28 and Attachment A).

Minor flyways, following tributaries throughout the region between Migration Route 13 and Migration Route 1, disperse birds into the areas underlying the STONY MOA complex and GALENA MOA (Figure 3-28 and Attachment A).

3.5.6.4 Caribou

The airspace of the Western Region is not contiguous. For this reason, caribou will be discussed for each MOA separately, and the discussion at the regional level omitted.

3.5.6.4.1 GALENA

The southwestern portion of the area underlying the GALENA MOA overlaps the range of part of the Beaver Mountain/Sunshine Mountain caribou herds (Figure 3-44).

The caribou found in the northern part of the Kuskokwim Mountains were until recently referred to collectively as the Kuskokwim Mountain herd. However, these caribou are now recognized as two herds, namely the *Beaver Mountain herd* and the *Sunshine Mountain herd*. These two herds may frequently interbreed and interchange. The 1992 population estimates were 865 for the Beaver Mountain herd and 823 for the Sunshine Mountain herd (ADF&G 1992a). The majority of both herds calve on the northwest slopes of the Sunshine Mountains and winter between the Nixon Fork and Susulatna rivers. The herds summer in the upper Susulatna and Nowitna river drainages. There has been little caribou hunting north of the Kuskokwim River since 1976, when the winter hunting season was closed in response to a decline in the Beaver Mountain herd. Previously, this herd numbered about 3,000 (Skoog 1963; Hemming 1970).

About 1,200 animals were in the area under the GALENA MOA during a July 1993 photocensus (Seavoy 1993). Caribou use alpine regions of the Page, Kaladi, and Von Frank mountain areas for calving.

3.5.6.4.2 STONY MOA Complex

About 4,700 to 5,700 caribou are year-round residents in the area underlying the STONY MOA complex. Portions of the Beaver Mountain/Sunshine Mountain, Mulchatna, Rainy Pass, and Big River herds use the area under the STONY MOA complex.

Aerial surveys of the *Mulchatna herd* were first conducted in 1949 when the population was estimated at 1,000 caribou (ADF&G 1992a); the population increased to 5,000 in 1965 (Skoog 1968). In 1966 and again in 1972, relatively small migrations across the Kvichak River were recorded, but no major movements of this herd were observed until recently. An estimated 6,030 caribou were observed on a survey in June 1973, but it was not until June 1974 that a major effort was made to census this herd accurately. A total of 13,079 caribou were counted at that time, providing for an October 1974 estimate of 14,231 caribou. Photocensusing was used to monitor the herd as the population declined through the 1970s; seasons and bag limits for hunters were reduced continuously through that decade. Since 1981, the Mulchatna herd has increased at an annual rate of approximately 17 percent. This increase is attributed to a succession of mild winters from the late 1970s to 1988, low predation rates, and an estimated annual harvest rate by hunters of less than 5 percent of the population since 1976. The herd numbered 18,600 in 1981, 42,900 in 1985 (Taylor 1985a), and 82,000 in 1990 (ADF&G 1992a).

The Mulchatna herd currently shows high productivity and continues to increase in number, with a 1993 population estimate of 130,000 animals (Van Daele 1993). Concurrent with this population growth, the Mulchatna herd has expanded into "new" ranges north and west in summer and fall, and to the south and east during the winter months. The increase in numbers has resulted in an increase in both subsistence and sport hunting in these areas. Mulchatna caribou are receiving increased hunting pressure, in particular along the Hoholitna River drainage. Most of the Mulchatna herd is migratory, using areas from the western slopes of the Alaska Range to the Wood-Tikchik Lakes along the Kuskokwim, Mulchatna, Nushagak, and Stony rivers.

The *Rainy Pass herd* is probably the least studied and least understood herd in the state. Major questions remain about herd size (1990 estimate is 500 to 1,000 [Valkenburg 1991]), discreteness, and the interactions/relationship with the Mulchatna herd. The Rainy Pass herd is harvested by sheep and moose hunters on "combination" hunts.

The *Big River herd* consists of about 2,500 animals (Seavoy 1993). The Big River herd is taken primarily by hunters who fly into the area for moose and bison, and are on a "combination" hunt. The Big River herd and its interaction with the Farewell herd to the east is still poorly understood.

The George River area is used by the Beaver Mountain and Sunshine Mountain herds (see section 3.5.6.4.1 and Figure 3-44). The area under the southern portion of the STONY MOA complex is used as a winter range by the Mulchatna herd. The area under the extreme eastern portion of the complex is used by the Rainy Pass herd. The foothills of the Revelation Mountains and the Lyman Hills under the eastern part of the MOA complex are used by the Big River herd year-round. The Big River herd uses a calving area located between the north and middle forks of the Big River, while the Rainy Pass herd calves in an area along the south fork of the Kuskokwim River near Ptarmigan Valley. There is also a concentration of about 20,000 caribou near Lime Village, which may be a separate herd or a part of the Mulchatna herd (Denton 1993).

Although no specific data has been collected on natural mortality rates or factors, wolf predation is probably high in the STONY MOA complex. The low proportion of calves and the early calving dates suggest that the Beaver Mountain herd is highly productive but has high calf mortality. The Sunshine Mountain herd may also suffer from high calf mortality.

3.5.6.4.2.1 STONY A MOA

The area underlying the southern portion of the STONY A MOA is used as a winter range by the Mulchatna herd (see section 3.5.6.4.2 and Figure 3-44), while the extreme eastern portion under the MOA is used by the Rainy Pass herd (see section 3.5.6.4.2). The foothills of the Revelation Mountains and the Lyman Hills under the

northeast part of STONY A are used by the Big River herd (see section 3.5.6.4.2) year-round. The Big River herd uses a calving area located between the north and middle forks of the Big River, while the Rainy Pass herd calves in an area along the south fork of the Kuskokwim River near Ptarmigan Valley. There is also a concentration of caribou near Lime Village, which is just south of the MOA.

3.5.6.4.2.2 STONY B MOA

The George River area under STONY B is used by the Beaver Mountain and Sunshine Mountain herds (refer to section 3.5.6.4.1 and Figure 3-44). The area underlying the southern portion of the MOA is used as winter range by the Mulchatna herd (see section 3.5.6.4.2). This herd is rapidly expanding and moving into new areas, particularly new areas north of the Kuskokwim River. There is also a concentration of caribou near Lime Village, which is just south of the MOA.

3.5.6.4.2.3 STONY C TMOA

The George River area under the STONY C TMOA is used by the Beaver Mountain and Sunshine Mountain herds (see section 3.5.6.4.1 and Figure 3-44). The area underlying the southern portion of the TMOA is used as a winter range by the Mulchatna herd (see section 3.5.6.4.2). This herd is rapidly expanding and moving into new areas, particularly around the Russian Mountains to the north of the Kuskokwim River (Van Daele 1993).

3.5.6.4.3 NAKNEK MOA Complex

The NAKNEK MOA complex overlies large portions of the winter, summer, and calving ranges of the Mulchatna caribou herd (see section 3.5.6.4.2 and Figure 3-44). The area underlying the central portion of the MOA complex (approximately 60 to 70 percent of the MOAs total) is used by the Mulchatna herd in winter.

3.5.6.4.3.1 NAKNEK 1 MOA

A Mulchatna herd calving area extends east of Koliganek on the west side of the Mulchatna River. Large portions of the herd summer in the Nushagak Hills under the central and northern part of the MOA. A large portion of the area under the MOA is used as winter range by the Mulchatna herd (Figure 3-44).

3.5.6.4.3.2 NAKNEK 2 MOA

Major calving areas within NAKNEK 2 include the Bonanza Hills and the Chilikadrotna, Little Mulchatna, Mosquito, and Koksetna river drainages. Another calving area is located under the southwestern portion of the MOA, west of the Mulchatna River (Figure 3-44). The Mulchatna herd uses the area under the northwestern portion of NAKNEK 2 MOA as summer range, and the entire area under the western half of the MOA during winter. The Mulchatna River valley is a major migration corridor for the herd in spring and fall (Figure 3-44).

3.5.6.5 Moose

The airspace of the Western Region is not contiguous. For this reason, moose will be discussed for each MOA separately, and the discussion at the regional level omitted.

3.5.6.5.1 GALENA MOA

Moose are generally distributed under the GALENA MOA, with high densities in the Nowitna and Sulatna river drainages (2 to 4 moose/square mile). Moose densities away from the rivers drop to moderate levels (0.2 to 0.9 moose/square mile; ADF&G 1993a). Major calving and wintering areas are found along the Nowitna, Susulatna, Sulukna, and Nixon Fork Rivers, as well as in the Von Frank Mountains (Figure 3-45). Riparian habitats in these areas contain extensive willow (*Salix pulchra* and *S. alaxensis*) stands, which are the preferred browse species for moose. Most cow moose spend summer months around open grass and brush meadows on the floodplains, away from the rivers. In October, they move to riparian areas of the rivers where they remain until early May. Some cow moose winter in the hills north and south of the Nowitna River. Surveys indicate populations of moose in this area have increased since 1988. Predation is a major population factor for moose in this area, with black bears killing an estimated 38 percent of all calves (ADF&G 1993a).

3.5.6.5.2 STONY MOA Complex

Moose were generally unknown to most early residents of the Kuskokwim River drainage until the early 1900s. During the 1920s and 1930s, the moose population gradually expanded throughout the area. Moose are now distributed throughout the area underlying the STONY MOA complex, with the exception of the higher elevations under the eastern portion of STONY A (Figure 3-45). Moose populations in the area are probably as high as they have ever been. The major factors influencing moose abundance in the area are predation, hunting, and weather. Moose densities have not been determined for the MOAs; although above-average hunter harvests in the region (ADF&G 1991a), especially along the river bottoms, suggest a moderate to high density in those areas. In 1990, the moose harvest in GMU 19, the unit under the MOAs, was a reported 7,789 animals (or 4 percent) out of an estimated statewide population of 175,000 animals (ADF&G 1991a; see Appendix M for location of GMU).

Moose numbers in GMU 19 are estimated to be stable or slightly increasing. Moose in the area around Lime Village have an estimated density of 0.73 moose/square mile. Moose density in prime habitat, such as along rivers, may reach 1.39 moose/square mile; in poor areas, it may be as low as 0.39 moose/square mile (ADF&G 1993a). Most moose under the STONY MOA complex are taken by subsistence hunters.

3.5.6.5.2.1 STONY A MOA

Important wintering and rutting areas for moose include the Stony, Swift, and Kuskokwim river valleys and the western slopes of the Revelation Mountains. Calving occurs along the Kuskokwim River (Figure 3-45). Moose do not occur at higher elevations under the eastern portion of the MOA.

3.5.6.5.2.2 STONY B MOA

Important wintering areas for moose include the Hoholtna, Stony, and Kuskokwim river valleys (Figure 3-45). Some moose winter to the west of the STONY B MOA around Aniak (under STONY C), but move back under the STONY B MOA in summer. Other important wintering areas occur to the west of the Kuskokwim River around Granite Mountain, under the northern part of the MOA. Important calving and rutting areas occur along the Kuskokwim River (Figure 3-45).

3.5.6.5.2.3 STONY C TMOA

Moose densities are high along the lowlands to the east of the Yukon River under the western portion of STONY C TMOA. Although there is an extensive rutting concentration area in the western portion of the TMOA, few calving and winter concentration areas are located in this part of the TMOA (Figure 3-45).

Moose use the area around Aniak and Kalskag on the Kuskokwim River west of the TMOA as a wintering range. In the spring, these moose move east into other areas of the STONY MOA complex. Moose also occur year-round in the northeast part of the TMOA north of the Kuskokwim River (Figure 3-45).

3.5.6.5.3 NAKNEK MOA Complex

Moose are widely distributed along river drainages under the NAKNEK MOA complex at densities of 0.7 to 1.3 moose/square mile (Taylor 1985b) (Figure 3-45). Moose populations in the area have increased substantially over the last decade, both in numbers and range. This increase is attributed to moderate snowfalls in several successive winters, low predation rates by wolves, decreased human harvest of cow moose, and better control over subsistence hunting by residents. The increase in alternative big game, such as the Mulchatna caribou herd, has also taken pressure off moose from local hunters; however, non-resident moose harvests are increasing due to the popularity of "combination" moose/caribou hunts. The population is stable but still below ADF&G management objectives.

3.5.6.5.3.1 NAKNEK 1 MOA

Moose are common year-round along the Nushagak River and all of its major tributaries. They also occur throughout the Tikchik Lakes area on the western edge of the MOA. The Nushagak River valley is an important wintering and calving area (Figure 3-45).

3.5.6.5.3.2 NAKNEK 2 MOA

Moose are common along the Nushagak and Mulchatna rivers and all of their major tributaries. The Mulchatna and Nushagak river valleys are important wintering and calving areas (Figure 3-45).

3.5.6.6 Dall Sheep

The airspace of the Western Region is not contiguous. For this reason, Dall sheep will be discussed for each MOA separately, and the discussion at the regional level omitted.

Dall sheep are not known to occur under the NAKNEK MOA complex, GALENA MOA, STONY B MOA, or STONY C TMOA (Heimer 1989) (Figure 3-46).

3.5.6.6.1 STONY A MOA

A primary factor in Dall sheep distribution is the requirement for windblown slopes with little snow cover within their range to allow for winter foraging. Under normal environmental conditions in interior Alaska, recruitment and mortality are roughly balanced and sheep populations are stable (Heimer 1988). The Alaska Range, which runs northeast-southwest in this area, divides the drainages of the Kuskokwim and Susitna rivers. Dall sheep are found primarily on the western side (area of the STONY MOA complex) of this range because the eastern side of the range receives too much snow. As a result, the density of Dall sheep under the eastern part of STONY A is the highest in the STONY MOA complex, as well as in the general region (Figure 3-46). This sheep population is referred to as the Alaska Range west of Denali population.

Dall sheep are abundant on the western side of the Alaska Range, which includes the area under the eastern part of STONY A, with the exception of the very high peaks and river valleys (Figure 3-46). The 1989 population estimates for the entire area on the western side of the Alaska Range indicate a population of approximately 4,000 Dall sheep in GMUs 9, 16, 17, and 19 (Whitman 1989; see Appendix M for location of GMUs).

The STONY MOA includes part of this population. The 1990 sheep harvest on the western side of the Alaska Range was 141 animals, corresponding to about 83 percent of the 1988 Alaska Range sheep harvest (ADF&G 1990a).

3.5.6.7 Brown Bear

The airspace of the Western Region is not contiguous. For this reason, brown bear will be discussed for each MOA separately, and the discussion at the regional level omitted.

3.5.6.7.1 GALENA MOA

Brown bear are distributed throughout the area underlying the GALENA MOA at moderate densities, with highest numbers in the more mountainous areas. Populations have been stable or slowly increasing with low annual harvests of usually less than 10 bears per year (ADF&G 1991b). The MOA overlies one known brown bear concentration area associated with a mammalian food source (caribou calving grounds) located around the Nowitna River drainage under the southwest portion of the MOA.

3.5.6.7.2 STONY MOA Complex

Brown bear are distributed throughout the area underlying the STONY MOA complex, but are concentrated mainly in the Alaska Range and Lime Hills. No specific population data have been collected on brown bear under the STONY MOA complex, but densities are described as low to moderate.

The foothills and valleys of the Alaska Range and the Lime Hills, under the eastern part of STONY A MOA, generally support greater numbers of brown bear than do the low-lying wet and moist tundra habitats to the west. Density of bears under STONY A MOA is fairly high with about 25 to 50 bears/50 square miles (ADF&G 1991b).

The area under STONY B MOA has the lowest density of brown bear under the STONY MOA complex with about one bear/75 square miles (ADF&G 1991b). This MOA is dominated by the drainages of the Stony, Kuskokwim, and Holitna Rivers and contains little of the upland tundra habitat preferred by brown bear.

STONY C TMOA has a density of brown bear of about one bear/50 square miles (ADF&G 1991b). The Kuskokwim Mountains in the eastern portion of the MOA contain more upland tundra habitat of the type preferred by this species.

3.5.6.7.3 NAKNEK MOA Complex

Brown bear are common under the NAKNEK MOA complex. The MOA complex overlies 19 streams where brown bear concentrate in summer and fall. Brown bear are seasonally abundant along salmon spawning areas in tributaries to the Nushagak and Mulchatna rivers, along Klutuspak Creek and the King Salmon River, and around the Wood River Lakes. Bears also occur near post-calving aggregations of caribou throughout the Mulchatna herd range (refer to section 3.5.6.4.2). Four important denning areas have been identified in the Nushagak Hills.

The brown bear occurring in the vicinity of the area under the NAKNEK MOA complex are generally smaller in size, and population density is lower than on the Alaska Peninsula; therefore, there has never been significant hunting pressure on this population. Bear harvest (as with moose) has increased with hunting pressure on the Mulchatna herd as the caribou quadrupled during the 1980s (Van Daele 1993). This increase in bear harvest is attributed to bears being killed incidentally or during "combination" hunts. Many local residents have a low tolerance for bears near villages and fishing sites, and bears are commonly killed when they frequent these areas. The bears in the Nushagak and Mulchatna river drainages receive the greatest harvest pressure in the area. This portion of the bear population has probably been decreasing for the past several years. Miller et al. (1987) estimated brown bear density at 2.79 bears/100 square miles under the NAKNEK MOA complex.

Under NAKNEK 1 MOA, the low-lying areas around the Nushagak River and Tikchik Lakes offer prime brown bear habitat, particularly because of the abundance of fish. Several salmon streams are located within NAKNEK 2 MOA.

3.5.6.8 Black Bears

The airspace of the Western Region is not contiguous. For this reason, black bear will be discussed for each MOA separately, and the discussion at the regional level omitted.

3.5.6.8.1 GALENA MOA

Black bear are widely distributed and very abundant under the GALENA MOA (Osborne 1985). Black bear are generally most abundant within or near large woodlands areas below 3,500 feet. Limited movements to salmon streams and alpine berry patches occur in the summer and early fall.

3.5.6.8.2 STONY MOA Complex

Black bear occur in low to moderate numbers under the STONY MOA complex. The black bear densities tend to be higher in the low-lying wet and moist tundra habitats near rivers and streams where there are willow thickets and other riparian vegetation. Limited movements to salmon streams and alpine berry patches occur in the summer and early fall.

The drainages of the Stony, Swift, Kuskokwim, and Big rivers, as well as their tributaries, offer prime black bear habitat under the STONY A MOA. Under the STONY B MOA, the drainages of the Stony, Holitna, and Kuskokwim rivers, as well as their tributaries, offer prime black bear habitat. The drainage of the Kuskokwim River, the eastern tributaries of the Innoko River, and the lowlands to the east of the Yukon River offer prime black bear habitat, some of which occurs under the STONY C TMOA.

3.5.6.8.3 NAKNEK MOA Complex

No information is presently available on population densities within this area. Black bears occur mainly in forested areas east of the Wood River and the Wood River Lakes. Black bears are subject to increasing hunting pressure as more hunters come into the area to harvest caribou from the expanding Mulchatna herd.

Highest population densities under NAKNEK 1 MOA appear to be in the upper Nushagak River drainage and near the Tikchik Lakes (ADF&G 1993b). Highest population densities under NAKNEK 2 MOA appear to be in the upper Mulchatna and Nushagak river drainages in the Nushagak Hills (ADF&G 1993b).

3.5.6.9 Bison

No bison occur in the Western Region.

3.5.6.10 Wolf

The airspace of the Western Region is not contiguous. For this reason, wolves will be discussed for each MOA separately, and the discussion at the regional level omitted.

3.5.6.10.1 GALENA MOA

Wolf surveys have not been completed within the entire area under the GALENA MOA, but observations seem to indicate that wolf populations are increasing, despite high harvest numbers. Population densities are probably around 15 to 16 wolves/1,000 square miles. Wolf prey species in the area, such as moose, are abundant and increasing (ADF&G 1991d).

3.5.6.10.2 STONY MOA Complex

Wolves are distributed throughout the area underlying the STONY MOA complex. No detailed wolf studies have been conducted in the area, and the wolf population seems to be increasing despite significant wolf harvests. Wolf population densities are probably around 15 to 16 wolves/1,000 square miles (ADF&G 1991d).

3.5.6.10.3 NAKNEK MOA Complex

Available information about wolves is scarce for this area, and research and management data concerning the abundance of wolf populations are not available (ADF&G 1991d). The wolf population was probably highest between 1974 and 1977, but declined sharply until the early 1980s. Two rabies epidemics were reported in 1981 and 1989. At present, the wolf population under the NAKNEK MOA complex seems to be healthy and increasing, concurrent with increasing prey availability from the rapidly expanding Mulchatna herd. Wolf

densities are highest in the Nushagak Hills, particularly in the King Salmon River and Mosquito Creek drainages. Access to wolf harvesting is mainly by airplane.

3.5.6.11 Furbearers

The airspace of the Western Region is not contiguous. For this reason, furbearers will be discussed for each MOA separately, and the discussion at the regional level omitted.

3.5.6.11.1 GALENA MOA

During the mid-1980s, lynx reached the low point of their 10-year population cycle and have since increased. They are currently considered abundant, though the harvest has been declining because of falling pelt prices (ADF&G 1993g). The wolverine population is apparently stable. Beaver and river otter are common throughout suitable habitat in the area, and their populations seem to be increasing. Marten appear to be moderately abundant under the GALENA MOA. The mink harvest has been very low, probably because of low pelt prices.

3.5.6.11.2 STONY MOA Complex

Lynx have traditionally been scarce under the STONY MOA complex. Some drainages, however, such as those in the foothills of the Alaska Range, have snowshoe hare populations that could support modest lynx populations (ADF&G 1993g). Wolverine are distributed throughout the area at low to moderate densities. The wolverine population is apparently stable or increasing. Beaver populations are very high throughout the area, but few beavers are being harvested because of depressed pelt prices. High trapping harvests led to a decline of the marten population during the 1980s. In 1989, the trapping season was shortened by emergency order, but since then marten harvests have increased, indicating that marten populations are probably recovering. River otter populations have been estimated to be moderate and stable. Because of low fur prices, river otter have not been intensively trapped in the area. Mink populations are under little trapping pressure because pelt prices are low. At present, the mink population seems to be slightly increasing.

3.5.6.11.3 NAKNEK MOA Complex

Lynx numbers under the NAKNEK MOA complex are low to moderate even during peaks in the lynx population cycle. The lynx population under the NAKNEK MOA complex was probably at a low between 1989 and 1992 (ADF&G 1993g). Wolverines occur throughout the entire area under the NAKNEK MOA complex, and observations and trapper reports indicate that their population is stable or increasing. Beaver are abundant in all of the major drainages. Currently, beaver populations are stable or increasing; however, beaver have been overharvested in the past, and season closures were necessary to allow the beaver population to recover. Marten were uncommon in the region before 1970, but there is evidence that they are becoming more widespread. River otters are common under the NAKNEK MOA complex, and their numbers are probably increasing. Mink are present in most riparian areas of the region, but population densities and trends are not known.

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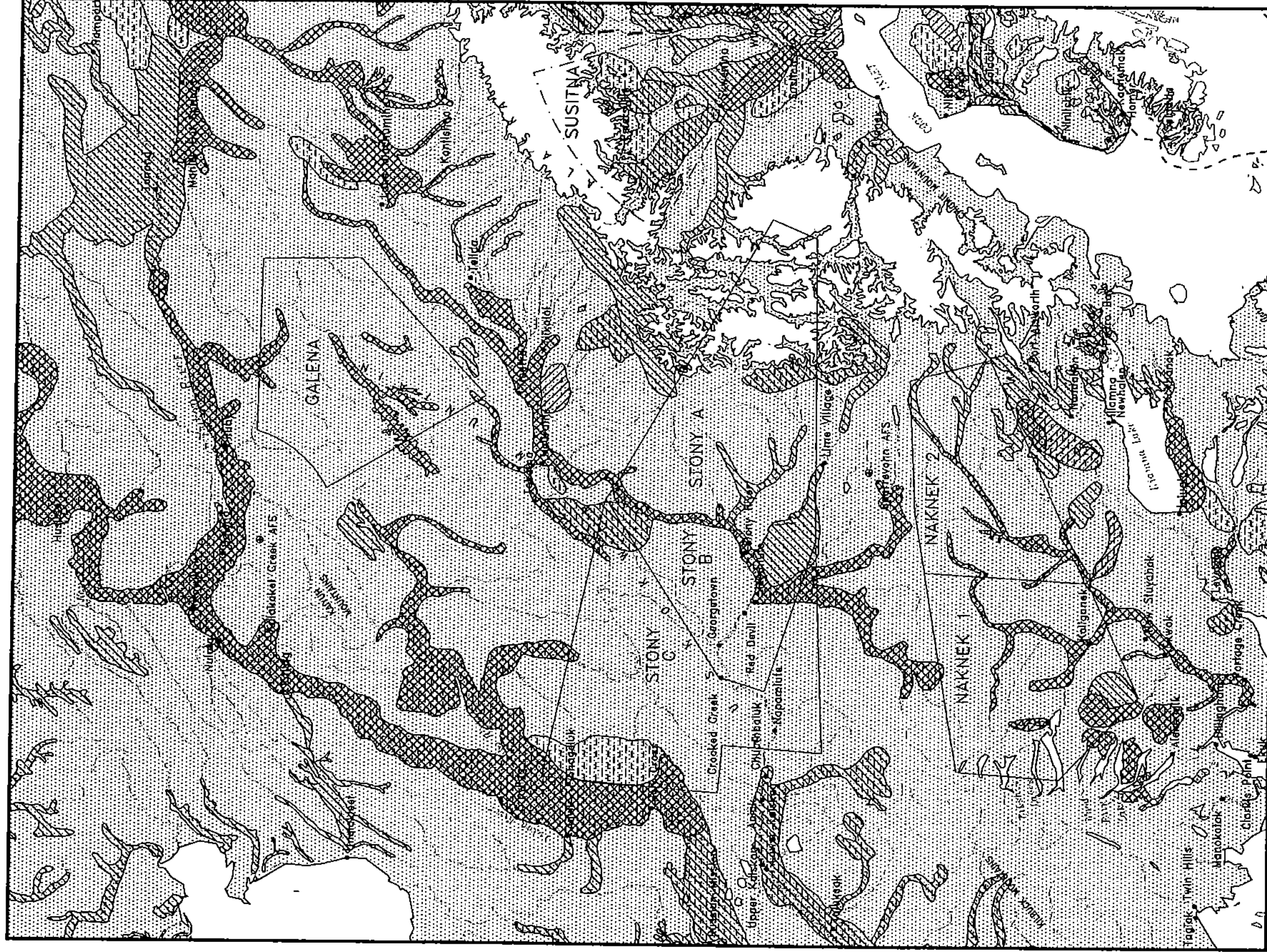


Figure 3-45

Western Region Moose

Legend:

Airspace:

- MOA Boundary
- Adjacent MOA Boundary

Moose:

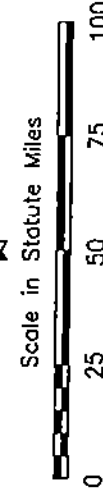
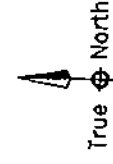
- General Distribution
- Known Calving Concen. Area
- Known Rutting Concen. Area
- Known Winter Concen. Area

Sources:

ADF&G Habitat Management Guides, (1985, 1986), and various personal communications by agency biologists (1993,1994).

Features: USGS - 1:2,000,000 DLG Data
Airspace: US Air Force, 11AF
Cities/
Towns: AK DCRA & USGS - Dictionary of Alaska Place Names

Map Projection: Albers Equal-Area Conic Projection



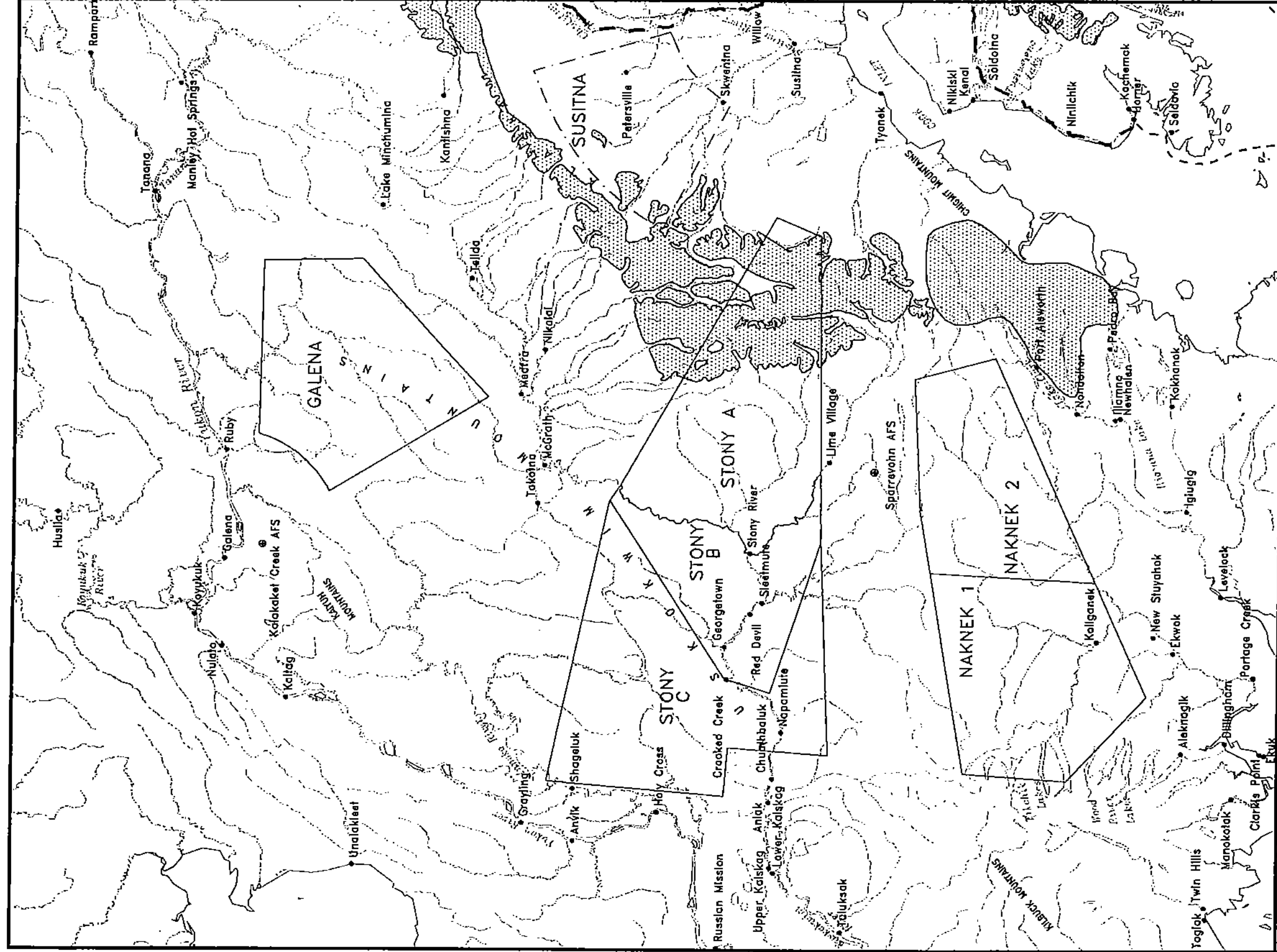


Figure 3-46
Western Region
Dall Sheep

Legend:

Airspace:

MOA Boundary

Adjacent MOA Boundary

Dall Sheep:

General Distribution

Known Mineral Lick

Known Winter Use Area

Sources:

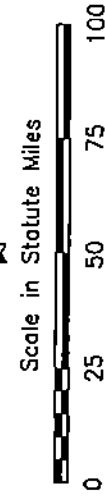
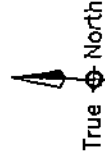
ADF&G Habitat Management Guides, (1985, 1986), and various personal communications by agency biologists (1993,1994).

Features: USGS - 1:2,000,000 DLG Data

Airspace: US Air Force, 11AF

Towns: AK DCRA & USGS - Dictionary of Alaska Place Names

Map Projection: Albers Equal-Area
Conic Projection



3.6 Recreation

3.6.1 Background

A 1992 survey by the Alaska Division of Parks and Outdoor Recreation found that approximately 95 percent of the state's population considered outdoor recreation either somewhat important or very important to their lifestyles (ADNR 1992). Statewide, the recreation activities with the highest participation rates were:

- Driving for pleasure/sightseeing (81 percent),
- Picnicking (76 percent),
- Sportfishing (72 percent),
- Hiking (66 percent),
- Bicycling (64 percent),
- Walking (61 percent),
- Berry picking (53 percent), and
- Wildlife viewing (49 percent).

The tourism industry also plays a vital role in Alaska's economy. In 1993, 1,049,819 visitors spent an estimated \$1 billion in the state (Woodring 1994b). Tourism is the second largest industry employer in the state and creates the third-largest economic impact (Woodring 1994b). However, while wilderness-based commercial recreation ("ecotourism") is a growing segment of the tourism industry (Alaska Wilderness Recreation & Tourism Association 1994), the majority of out-of-state visitors seek recreation opportunities along the highway system and railbelt, and in more developed or managed areas.

Of the questionnaires received during scoping, approximately 72 percent of the respondents ranked the issue of recreation as "Very Important." Public and agency comments pertaining to recreation centered on the following issues:

- Potential effects on recreation resources and experiences,
- Potential socioeconomic effects on commercial recreation,
- Potential effects on the safety [aviation] of recreation users and providers, and
- Potential effects on access [aviation] to recreation resources.

The first two concerns derive from the potential for the sound and/or sight of military aircraft to affect recreation; it is these issues that are addressed in the sections on Recreation in this EIS. The last two issues are dealt with in the sections on Airspace Management, Aircraft Operations, and Aviation Safety (see sections 3.2 and 4.2).

3.6.1.1 General Methods and Assumptions

When considering opportunities for outdoor recreation, people make choices about the activities they engage in, the kinds of recreation experiences they seek, and the settings in which they recreate. The concept of a Recreation Opportunity Spectrum is used by outdoor recreation managers and policy-makers to make decisions about the allocation and management of recreation resources (Harrison et al. 1980). The basic assumption underlying the Recreation Opportunity Spectrum is that quality outdoor recreation experiences are best assured by providing the public with a diverse set of outdoor recreation opportunity settings (Clark and Stankey 1979). A recreation opportunity setting is defined as "the combination of physical, biological, social, and managerial conditions that give value to a place" (ibid.). Different combinations of these conditions offer varied opportunities for recreation. The value or quality of a recreation opportunity setting is a function of the perceived ability of that setting to provide the activities and experiences an individual seeks. The quality of a setting, then, is not based on the presence or absence of some specific factor, but on the extent to which a given setting satisfies the

desires of a particular recreationist. This judgement varies from individual to individual, and for each individual is situation- or context-specific.

The Recreation Opportunity Spectrum focuses on specific observable and measurable features of the recreation opportunity setting. Although designed for use by recreation planners, it is a logical method for determining the nature of recreation opportunity settings in the Region of Influence and, subsequently, assessing how the Proposed Action and Alternatives would alter specific recreation opportunity settings, and thus potentially affect outdoor recreation resources and experiences. The Recreation Opportunity Spectrum characterizes outdoor recreation opportunity settings as either modern, semi-modern, semi-primitive, or primitive (Clark and Stankey 1979). These settings are not exclusive, but occur along a continuum. They are further defined by the six factors outlined in Table 3-2.

The Recreation Opportunity Spectrum framework was used by Harrison et al. (1980) to develop a typology of appropriate human-related sounds in recreation areas (see Table 3-3). It is based on the premise that noise is simply sound that has reached an unacceptable level, duration, and/or quality in a particular recreation opportunity setting. The appropriateness of a sound depends on an individual's expectations for a particular setting. Two assumptions were made: 1) that most people prefer a relatively quiet environment, regardless of the recreation opportunity they seek; and 2) that people expect recreation opportunity settings towards the "modern" end of the spectrum to exhibit a greater variety of human-related sounds than settings at the "primitive" end. It is important to note that the typology can be used to determine the acceptability of sounds only in terms of specific situations or recreation opportunities; there are no absolute standards or thresholds (Harrison et al. 1980).

For the purposes of this EIS, recreation is defined as consumptive and non-consumptive leisure pursuits that occur outdoors. Outdoor recreation includes, but is not limited to, activities such as camping, water sports, river floating, power-boating, mountain climbing, photography, sightseeing, hiking, cross-country skiing, snowshoeing, dog mushing, snowmachining, wildlife watching, sport hunting, and sportfishing. This section describes the outdoor recreation resources and activities that occur in the four regions in the Region of Influence. Recreation resources considered are primarily those areas that are owned, managed, or otherwise officially recognized by federal, state, or borough government, including wilderness areas (designated and de facto) used for recreation.

Recreation resources located in urban areas, including Elmendorf and Eielson AFBs, are not described, nor are indoor recreation facilities or activities. The Alaska Department of Labor defines "urban" as a place of 2,500 persons or more (ADL 1991). The only community with a population greater than 2,500 that would be located beneath a MOA is Eielson AFB (1990 population estimated at 5,251). Thus, by definition, the only "urban" area located beneath proposed or existing MOAs is Eielson AFB itself. The base cantonment area has a bowling center; recreation, sports and fitness, and youth centers; and arts and crafts, wood craft, and auto craft shops. Outdoor recreational facilities include three tennis courts, five ballfields, a one-half mile track, and six athletic fields.

Table 3-2 Factors Defining Outdoor Recreation Opportunity Settings (Clark and Stankey 1979)

Management Factors	Modern	Semi-modern	Semi-primitive	Primitive
1. Access				
a. Difficulty	very easy	moderately difficult	difficult	very difficult
b. Access system				
(1) roads	freeways	2-lane, paved	single-lane, paved	gravel or dirt
(2) trails		high standard	low standard	cross country
c. Means of conveyance		motorized	nonmotorized	
	vehicles on established roads	vehicles on informal roads	vehicles off roads	horne
				foot
2. Non-recreational resource uses	compatible on a large scale	depends on nature and extent	incompatible	
3. On-site Management (modification):				
a. Extent	very extensive	moderate extent	isolated locations	no development
b. Apparentness	obvious changes	primarily natural appearing	no changes	
c. Complexity	very complex	somewhat complex	not complex	
d. Facilities	many comforts, conveniences	some comforts, conveniences	minimum comforts, conveniences	safety and site protection
				no facilities
4. Social interaction	frequent interparty contacts	occasional interparty contacts	infrequent interparty contacts	no interparty contacts
5. Acceptability of visitor impacts				
a. Degree of impact	high degree	moderate degree	low degree	none
b. Prevalence of impacts	prevalent, broad areas	prevalent, small areas	uncommon	none
6. Acceptable regimentation	strict regimentation	moderate regimentation	minimum regimentation	none

Table 3-3 Typology of Appropriateness for Human-Related Sounds in Recreation Areas

Recreation Opportunity Setting	Appropriate (Acceptable) Human-Related Sounds
Modern Opportunities	The sounds here are "noisy" relative to the full range of recreation opportunities. A variety of both mechanical and non-mechanical sounds is acceptable at levels close to that found in urban residential environments. Sounds may be of long duration, occur frequently, and occasionally be heard late at night. Sounds that reach well beyond the source are acceptable.
Semi-Modern Opportunities	The sounds here may have the same sources as in modern opportunity areas, but the loudness, repetitiveness, and duration are noticeably less. Sounds are occasionally evident beyond the general area of their source.
Semi-Primitive Opportunities	The sounds here are primarily natural. Human-related sounds may occur, but less often than in the semi-modern category, last for a shorter period of time, and are infrequently heard at night. Sounds are normally confined to the general area of their source.
Primitive Opportunities	The sounds here are generally not human-related, but are primarily natural background sounds (such as wind or water). In the most primitive areas, both mechanical and unnatural, non-mechanical sounds are inappropriate. Sounds do not extend beyond the immediate area of their source.

Source: Harrison et al. 1980.

3.6.1.2 Application of Methods and Assumptions in this EIS

For each of the four regions in the Region of Influence, information describing identified recreation areas is presented in tabular form with supporting text (see sections 3.6.2 through 3.6.5). The tables provide each recreation area's name and managing agency, total area, overlying airspace (existing/proposed), actual portion of the area located beneath airspace (existing/proposed), visitor use levels (where available), and any existing Flight Avoidance Area(s) (see Appendix B for maps depicting these areas). The primary recreation resources in the four regions are mapped in conjunction with the existing and proposed airspace. A non-quantitative analysis was then conducted to assign each recreation area to one of the following outdoor recreation opportunity settings outlined in Table 3-3.

- Modern opportunities include urban parks, jet boat areas, and off-road vehicle use sites (i.e., areas where noise is an accepted component of the recreational use).
- Semi-modern opportunities include small, rural parks or campgrounds along main highways where noise is expected from traffic and other recreationists.
- Semi-primitive opportunities include fishing lakes and streams, and developed campgrounds in more remote locations.
- Primitive opportunities logically encompass all wilderness, designated or otherwise, and primitive campgrounds or other recreation areas located in very remote areas.

Next, each recreation area is assigned a sensitivity ranking of high, medium, or low. This subjective sensitivity ranking is based on three factors: 1) the degree to which noise resulting from any aircraft overflights (military or non-military) would be considered inconsistent with the recreation opportunity setting of the area based on the typology developed by Harrison et al. (1980); 2) visitor use levels (if known)—comparatively high visitor use levels connote greater sensitivity; and 3) the percentage of the recreation area located beneath proposed airspace (may vary between Alternatives)—the higher the percentage, the greater the sensitivity. The rankings are assigned using the following guidelines:

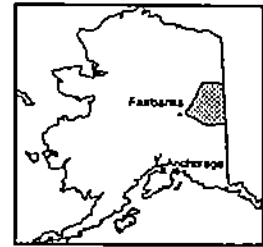
- High Sensitivity: Primitive Recreation Opportunity Setting (ROS); high visitor use levels compared to similar resources in the region; 50 percent or more of area under MOA.
- Medium Sensitivity: 1) Primitive ROS; low visitor use levels compared to similar resources in the region; 20 to 49 percent of area under MOA; or 2) Semi-primitive ROS; high visitor use levels compared to similar resources in the region; 50 percent or more of area under MOA.
- Low Sensitivity: 1) Primitive ROS; low visitor use levels compared to similar resources in the region; less than 20 percent of area under MOA; 2) Semi-primitive ROS; low visitor use levels compared to similar resources in the region; less than 50 percent of area under MOA; or 3) Semi-modern or modern ROS, regardless of visitor use levels or percent of area under MOA.

It is important to note that overflights by military aircraft using the existing permanent and previously utilized temporary MOAs occur now over many of the recreation areas identified, and that much of this airspace has been used for military aircraft training since the 1970s. The types and numbers of aircraft using the MOAs have evolved over time, as has the manner in which the airspace is used (i.e., air-to-air training at higher altitudes vs. air-to-ground training at low altitudes).

In section 3.6.6, sport hunting activities in the four regions are characterized using 1991/1992 species harvest data. Harvest data for selected species, by Game Management Unit (GMU), is presented. The number of animals harvested is also converted to a percentage of the total reported statewide harvest for each species assessed. This information will be used to judge, albeit somewhat subjectively, the levels of sport hunting activity occurring in the regions, which is suggestive of the relative importance of the GMUs underlying the MOAs in each region to sport hunting efforts. Finally, in section 3.6.7, commercial recreation is examined. Important commercial recreation resources and activities are identified and assigned a subjective, assumption-based sensitivity to impact ranking.

3.6.2 Northern Interior Region

The Northern Interior Region contains the existing permanent YUKON 1 and 2 MOAs, and the previously utilized YUKON 3, 4, and 1A TMOAs (proposed for conversion to permanent MOAs as YUKON 3, 4, 5, and 6). The existing recreation environment described in this section is described by proposed MOAs; the existing airspace will be noted in parentheses where it differs in name from the given proposed MOA.



3.6.2.1 Federal and State Designated Recreation Resource Areas

Portions of five federally designated units are located beneath the Northern Interior Region MOAs (Figure 3-47): 1) the Steese National Conservation Area, including the Pinnell Mountain National Recreation Trail; 2) the Yukon-Charley Rivers National Preserve, including the Charley National Wild River; 3) the Yukon Flats National Wildlife Refuge; 4) the Birch Creek National Wild River; and 5) the Fortymile National Wild, Scenic, and Recreational River. In addition, two BLM sites are located in this region: 1) the Eagle Campground, and 2) the Fort Egbert National Historic Site, both located in the community of Eagle. The Chena River State Recreation Area and a very small portion of the Tanana Valley State Forest are also located beneath Northern Interior Region airspace, specifically the YUKON 6 MOA (YUKON 1A TMOA).

Steese National Conservation Area

The Steese National Conservation Area is managed by the BLM. Approximately 70 percent of the conservation area is under the YUKON 2 MOA. Located about 1 hour's drive northeast of Fairbanks and bisected by the Steese Highway, it is used for year-round recreation activities. Part of the Pinnell Mountain National Recreation Trail, a 27-mile trail with two emergency shelters, is located under the western portion of the MOA. Peak summer recreational use occurs between May and September, peak winter use is between February and April. Other than unimproved miner's roads, no public roads penetrate the conservation area, but access is available from a number of points along the Steese Highway. The area is popular for hiking and primitive camping, fishing and hunting, river floating, snowmachining, and cross-country skiing. There were an estimated 8,350 visitors in 1993. Mineral exploration and development is permitted, and there are numerous mining claims throughout the conservation area.

The Steese Highway Flight Avoidance Area (G), which goes from the surface to 2,000 feet above ground level (AGL) and is in effect year-round, overlies the segment of the Pinnell Mountain National Recreation Trail that is under the MOA and a very small segment of the southern unit of the conservation area. This analysis categorized the Steese National Conservation Area in its entirety as a primitive recreation opportunity setting. The Pinnell Mountain National Recreation Trail, because of its proximity to the highway, was categorized as semi-primitive.

Yukon-Charley Rivers National Preserve

The Yukon-Charley Rivers National Preserve and the Charley National Wild River are managed by the National Park Service (NPS). Forty-three percent of the Preserve is located under the YUKON 1 and 2 MOAs, 54 percent is located under the YUKON 3 and 4 MOAs (YUKON 3 TMOA). The Charley National Wild River is also located under the proposed (and existing) MOAs: approximately 50 percent under the YUKON 1 and 2 MOAs, and 50 percent under the YUKON 3 and 4 MOAs (YUKON 3 TMOA). "Wild" rivers are "vestiges of primitive America," generally inaccessible by roads (Palmer 1993). At 251 river miles, including its tributaries, the Charley is one of the longest rivers in the National Wild and Scenic Rivers System designated from source to mouth (ibid.). Floating the Yukon River is the primary recreational activity in the Preserve, with an average trip length of 5 to 7 days. The Yukon River between Eagle and Circle is a popular 154-mile, 5- to 10-day float trip. Portions of the Kandik and Nation rivers are also within the Preserve, and are floated as a part of remote, fly-in

trips. Limited floating occurs on the Charley River. Other types of recreational use (e.g., hiking) are low as most of the Preserve is "geographically and economically inaccessible" (Dick 1993). Concentrated areas of recreational use are along the major tributaries of the Yukon River: the Nation and Kandik rivers, and the first 5 to 10 miles of the Charley River. Cabins that visitors can use are concentrated along the Yukon River, with the Coal Creek/Slaven Cabin area receiving the highest visitor use. Other relatively high use cabins (private cabins that can be used by the public) are located at Glenn Creek, the mouth of the Kandik River, Nation Bluff, and the mouth of the Charley River. Approximately 90 percent of the annual recreational use on the Preserve occurs between June and August, with highest visitor use in June (Dick 1993). Limited winter use takes place, primarily from the communities of Circle and Central. Total visitor use in 1989 was 2,900, with 477 overnight backcountry stays. In 1993 there were 3,800 visits, with 2,362 backcountry stays (NPS 1989; NPS 1993a).

There are Flight Avoidance Areas over portions of the Charley, Kandik, and Yukon rivers (17). These Flight Avoidance Areas extend 2 miles either side of the rivers, go from the surface to 2,000 feet AGL, and are in effect from April 15 to August 31. These Flight Avoidance Areas appear to encompass the higher-use cabins located at Coal Creek, Glenn Creek, the mouth of the Kandik River, Nation Bluff, and the mouth of the Charley River. There is also a Flight Avoidance Area over the Ben Creek landing strip (H), located in the vicinity of Coal Creek and the Slaven Cabin on the Yukon River. It extends in a 3-mile radius around the landing strip, goes from the surface to 1,500 feet AGL, and is in effect year-round. This analysis categorized the Yukon-Charley Rivers National Preserve and the Charley National Wild River as primitive recreation opportunity settings.

Yukon-Flats National Wildlife Refuge

The Yukon Flats National Wildlife Refuge (NWR) is managed by the U.S. Fish and Wildlife Service (USFWS). Approximately 6 percent of the refuge is located beneath the YUKON 2 MOA, 2 percent beneath the YUKON 4 MOA (YUKON 3 TMOA), and 13 percent beneath the YUKON 5 MOA (YUKON 4 TMOA). The refuge is a remote and roadless area; access is limited to boats along the Yukon River and its tributaries, and by small aircraft. There are no recreational facilities or developed resources for visitors. The primary recreation activities are river floating and sport hunting (USFWS 1987c). Birch Creek and the Yukon River, located under the northwestern corner of the YUKON 2 MOA and southwestern corner of the YUKON 5 MOA (YUKON 4 TMOA), are popular float destinations. There are no floating destinations in the portion of the refuge located beneath the YUKON 4 MOA (YUKON 3 TMOA). Some recreational floating occurs on the Yukon River between Circle and Fort Yukon and on the Black River between the Salmon Fork and Chalkyitsik, located beneath the YUKON 5 MOA (YUKON 4 TMOA). Although some hunting and fishing occurs along the Black River, located beneath the YUKON 4 and 5 MOAs (YUKON 3 and 4 TMOAs), it is more likely to be subsistence than sport hunting. Recreational use of the entire refuge was estimated at less than 1,000 visitors per year in 1987. Summer use occurs between late May and September.

There are no Flight Avoidance Areas over the Yukon Flats NWR. This analysis categorized the refuge as a primitive recreation opportunity setting.

Birch Creek National Wild River

The Birch Creek National Wild River is managed by the BLM. Its upper reaches (approximately 80 river miles) lie within the Steese National Conservation Area. The entire designated portion of the river is approximately 126 miles long, all of which are located beneath the YUKON 2 MOA. The river is a principal recreation resource, with road access at two points separating an undisturbed river segment. River segments designated as "wild" are vestiges of "primitive America" and generally not accessible by road (Palmer 1993). Although wilderness in most respects, the river is often extremely muddy due to placer gold mining activities in its headwaters and tributaries (Palmer 1993). Boaters can put in at Twelvemile Creek, Mile 94.5 of the Steese Highway, and float to a take-out point on the highway between the communities of Central and Circle. Boating use in 1993 was estimated at 50 users. Other popular summer activities along the river include hiking, camping, sport hunting and fishing,

recreational mining, and off-road vehicle use. Popular winter activities include cross-country skiing and snowmachining. Peak summer use occurs between May and July.

The Steese Highway Flight Avoidance Area (G), which goes from the surface to 2,000 feet AGL and is in effect year-round, overlies approximately 15 miles of the Birch Creek National Wild River. This analysis categorized the Birch Creek National Wild River as a semi-primitive recreation opportunity setting due to its proximity to the highway, ease of accessibility, and non-recreation resource uses (i.e., mining).

Fortymile National Wild, Scenic, and Recreational River

The Fortymile National Wild, Scenic, and Recreational River is managed by the BLM. It is the largest designated network of a river and its tributaries in the National Wild and Scenic Rivers System (Palmer 1993). Approximately 87 percent of the designated portion of the river is located under the YUKON 3 MOA (YUKON 3 TMOA). The main segments of the Fortymile network are designated as follows:

- The main stem of the Fortymile is designated "scenic" and its tributary designations include wild, scenic, and recreational; there are several access points along the Taylor Highway.
- The Middle Fork of the Fortymile and its tributary, Joseph Creek, are designated "wild," and are inaccessible by road.
- The North Fork is designated "wild," while its tributary, Hutchison Creek, is designated "scenic"; the North Fork system is inaccessible by road.
- The South Fork and most of its tributaries are designated "scenic," and are accessible from several points along the Taylor Highway.

River segments designated as "wild" are intended to offer visitors a "chance to experience solitude in a primitive setting" (Buckle 1994). Segments designated "scenic" are mostly primitive, with largely undeveloped shorelines; while "recreational" segments are road accessible and may be more developed (Palmer 1993). The South Fork or the main stem of the river downstream from Chicken to the Canadian border is the most heavily used segment of the river (Buckle 1994). The most commonly used "wild" segments of the Fortymile network are the Middle Fork from Joseph to the confluence with the North Fork, the North Fork from its confluence with the Middle Fork to its confluence with the South Fork, and the Mosquito Fork (of the South Fork) from Kechumstuk to the mouth (Buckle 1994). Power-boating also takes place on the navigable segments of the river network, including the South Fork, portions of the North Fork, and the Fortymile main stem. Boating use in 1993 was estimated at 200 visitors. Sport hunting and fishing are also popular in the river drainage; caribou has historically been the most sought after species, followed by moose, bear, and sheep (BLM 1988b). Total visitor use in 1993 was estimated at 38,110, 30,000 of which was non-off-road vehicle motorized travel.

The BLM also operates the 60-acre Walker Fork Campground at mile 82 of the Taylor Highway. The campground is located under the southeast corner of the YUKON 3 MOA (YUKON 3 TMOA). It has 20 campsites and is popular for camping, fishing, and recreational gold panning. It is open from May through September. The Walker Fork portion of the Fortymile River is designated "scenic."

There are no Flight Avoidance Areas over the Fortymile National Wild, Scenic, and Recreational River. This analysis categorized the Fortymile National Wild, Scenic, and Recreational River as a primitive recreation opportunity setting.

Eagle Campground and Fort Egbert Historic Site

The 80-acre Eagle Campground is located at mile 160 of the Taylor Highway, in the community of Eagle. The campground has 16 campsites and is open from May through September. Fort Egbert National Historic Site is also located in Eagle, at mile 161 of the Taylor Highway. The fort was built by the U.S. Army in 1899. The BLM has restored five buildings on the 22-acre site, and the Eagle Historical Society conducts daily tours of the

historic buildings throughout the summer. Both sites are managed by the BLM. They are located under the extreme northeastern edge of the YUKON 4 MOA (YUKON 3 TMOA).

The Eagle Flight Avoidance Area (M), which extends in a 3-mile radius around the community, goes from the surface to 1,500 feet AGL, and is in effect year-round. This analysis categorized the Eagle Campground and Fort Egbert National Historic Site as semi-modern recreation opportunity settings due to their proximity to Eagle and their predominant activities.

Chena River State Recreation Area

The Chena River State Recreation Area (SRA) is managed by the Alaska Division of Parks and Outdoor Recreation. An estimated 15 percent of the unit is located beneath the YUKON 1 MOA and 85 percent beneath the YUKON 6 MOA (YUKON 1A TMOA). The SRA is approximately 30 miles east of Fairbanks and easily accessible from the Chena Hot Springs Road, making it a popular year-round use area. Attractions include boating the Chena River; hiking the 35 miles of marked trails, including the Granite Tors Trail; fishing and hunting; horseback riding; off-road vehicle use; rock-climbing; and camping at one of two state campgrounds (Rosehip and Tors Trail) in the area. It is also used in the winter for snowmachining, dog mushing, and cross-country skiing. Total visitor use in 1993 was 203,030 and in 1992, 143,540.

The Chena Recreation Area Flight Avoidance Area (2) overlies most of the SRA, including the Rosehip and Tors Trail campgrounds. This Flight Avoidance Area goes from the surface to 1,500 feet AGL and is in effect from May 1 to September 30. This analysis categorized the Chena River SRA in its entirety as a semi-primitive recreation opportunity setting due to its proximity to the highway and relative ease of accessibility. The Rosehip and Tors Trail campgrounds were categorized as semi-modern recreation opportunity settings.

Tanana Valley State Forest

The Tanana Valley State Forest is managed by the Alaska Division of Forestry. Less than 1 percent of the forest is located under the extreme western edge of the YUKON 6 MOA (YUKON 1A TMOA). While the predominant use of these lands is forestry, recreational use also occurs. Primary activities include sport hunting, hiking, off-road vehicle use, snowmachining, dog mushing, and cross-country skiing. Specific visitor use data were not available.

The Pleasant Valley Subdivision Flight Avoidance Area (1) overlies a small portion of the forest under the airspace. This Flight Avoidance Area goes from the surface to 3,000 feet AGL and is in effect year-round. This analysis categorized this part of the Tanana Valley State Forest as a semi-modern recreation opportunity setting due to its proximity to the highway and relative ease of accessibility.

3.6.2.2 Undesignated Recreation Resource Areas

Federal Lands

Recreation activities occur on BLM-administered lands scattered throughout the area under the Northern Interior Region MOAs (see Figure 3-53 in section 3.8.2). Primary activities include sport hunting and fishing, hiking and camping, river floating, recreational mining, and off-road vehicle use. No use figures are available, but difficulty of access may keep use relatively low. Recreational use would also tend to be concentrated near the urban areas of Fairbanks and Delta Junction and along the highway corridors. The Taylor Highway under the YUKON 3 MOA (YUKON 3 TMOA) is not maintained during the winter, and winter recreation activities are most likely limited to snowmachining and cross-country skiing by the few year-round residents.

Some recreation activities also occur on the Fort Wainwright Military Reservation under the YUKON 1 MOA and YUKON 6 MOA (YUKON 1A TMOA). However, recreation activities are secondary uses of these lands,

are subject to permission from the U.S. Army, and are precluded in certain areas. Primary activities include sport hunting and fishing, off-road vehicle use, and snowmachining and cross-country skiing in the winter.

No attempt was made to categorize specific tracts of undesignated federal lands. Depending on proximity to communities, highways, or other development, these lands would range from semi-modern to primitive recreation opportunity settings.

State Lands

Recreational use of general state lands occurs throughout the Northern Interior Region. Of the state lands and waters under the YUKON 1 MOA, the Salcha River probably receives the highest recreational use due to its proximity to Fairbanks and navigability upriver of the Richardson Highway. During the summer months, the river is used for boating, fishing, and access to recreation cabins along the river. During the fall, boat access for moose and waterfowl hunting occurs. The area is used by snowmachiners in the winter when snow cover permits. Because of difficulty of access, recreational use of general state lands under the YUKON 2 MOA is concentrated along the Steese Highway, secondary roads, and creeks and rivers. Popular summer activities include hiking, camping, boating, sport hunting and fishing, recreational mining, and off-road vehicle use. Popular winter activities include cross-country skiing and snowmachining. Recreational use of general state lands under the YUKON 3 and 4 MOAs (YUKON 3 TMOA) is concentrated along the Taylor Highway and its secondary roads, and creeks and rivers. Popular summer activities include hiking, camping, boating, sport hunting and fishing, recreational mining, and off-road vehicle use. Small blocks of undesignated state lands under the YUKON 3, 4, and 5 MOAs (YUKON 3 and 4 TMOAs) have been selected under statehood entitlement. Sport hunting and fishing probably occur on these lands, but difficulty of access limits use. Several parcels of general state lands located under the YUKON 6 MOA (YUKON 1A TMOA) are used for recreation activities similar to those occurring in the Chena River State Recreation Area, but use levels are probably lower due to limited access.

The Salcha River Area Two Flight Avoidance Area (5) begins about 22 miles upstream from the Alaska Highway and extends roughly another 21 miles further up the Salcha River, goes from the surface to 1,000 feet AGL, and is in effect year-round. No attempt was made to categorize specific tracts of undesignated state lands. Depending on proximity to communities, highways, or other development, these lands would range from semi-modern to primitive recreation setting.

Private Lands

Private recreation cabins are located throughout area under the MOAs, but are more likely to be located along roads and waterways due to access considerations. Approximately 100 cabins are located along the entire length of the Salcha River. The Circle Hot Springs Resort is a major private recreation facility, which underlies the YUKON 2 MOA. Located south of Central in Circle Hot Springs, the resort caters to day and overnight use year-round. The primary private recreation facility under the YUKON 6 MOA (YUKON 1A TMOA) is the Chena Hot Springs Resort, located at the end of the Chena Hot Springs Road. The resort is open year-round and offers swimming in the hot springs, lodging, meals, RV support, fishing, and cross-country skiing and dog sled rides in the winter. Hiking, off road-vehicle use, snowmachining, dog mushing, and cross-country skiing are common recreational activities. The 1,000-mile Yukon Quest International Sled Dog Race takes place each February between Fairbanks and Whitehorse, Yukon Territory, Canada. Portions of the trail underlie the YUKON 6 MOA (YUKON 1A TMOA), YUKON 2 MOA, and YUKON 3 and 4 MOAs (YUKON 3 TMOA). The race is run in alternating directions each year, and takes between 11 and 14 days to complete.

The following Flight Avoidance Areas cover portions of private lands underneath Northern Interior Region MOAs: 1) The Circle Hot Springs Airport Flight Avoidance Area (K), which overlies the community of Circle Hot Springs, including the Circle Hot Springs Resort, goes from the surface to 1,500 feet AGL, and is in effect year-round; 2) the Circle City Airport Flight Avoidance Area (J), which extends in a 3-mile radius around the

airport at Circle, goes from the surface to 1,500 feet AGL, and is in effect year-round; 3) the Central Airport Flight Avoidance Area (I), which extends in a 3-mile radius around the airport at Central, goes from the surface to 1,500 feet AGL, and is in effect year-round; 4) the Chena Hot Springs Resort Flight Avoidance Area (3), which overlies the community of Chena Hot Springs, including the Chena Hot Springs Resort, goes from the surface to 1,500 feet AGL, and is in effect year-round; 5) the Towns of Central and Circle Hot Springs Flight Avoidance Area (31), which overlies these communities, goes from the surface to 6,000 feet AGL, and is in effect year-round; 6) the Town of Circle City Flight Avoidance Area (30), which extends in a 2-mile radius around the community of Circle, goes from the surface to 6,000 feet AGL, and is in effect year-round; and 7) the Steese Highway Flight Avoidance Area (G), which overlies the Steese Highway, goes from the surface to 2,000 feet AGL, and is in effect year-round.

No attempt was made to categorize private recreation facilities. Depending on proximity to communities, highways, or other development, these facilities would typically be considered semi-modern to semi-primitive settings, but may provide access to and depend on primitive recreation opportunities.

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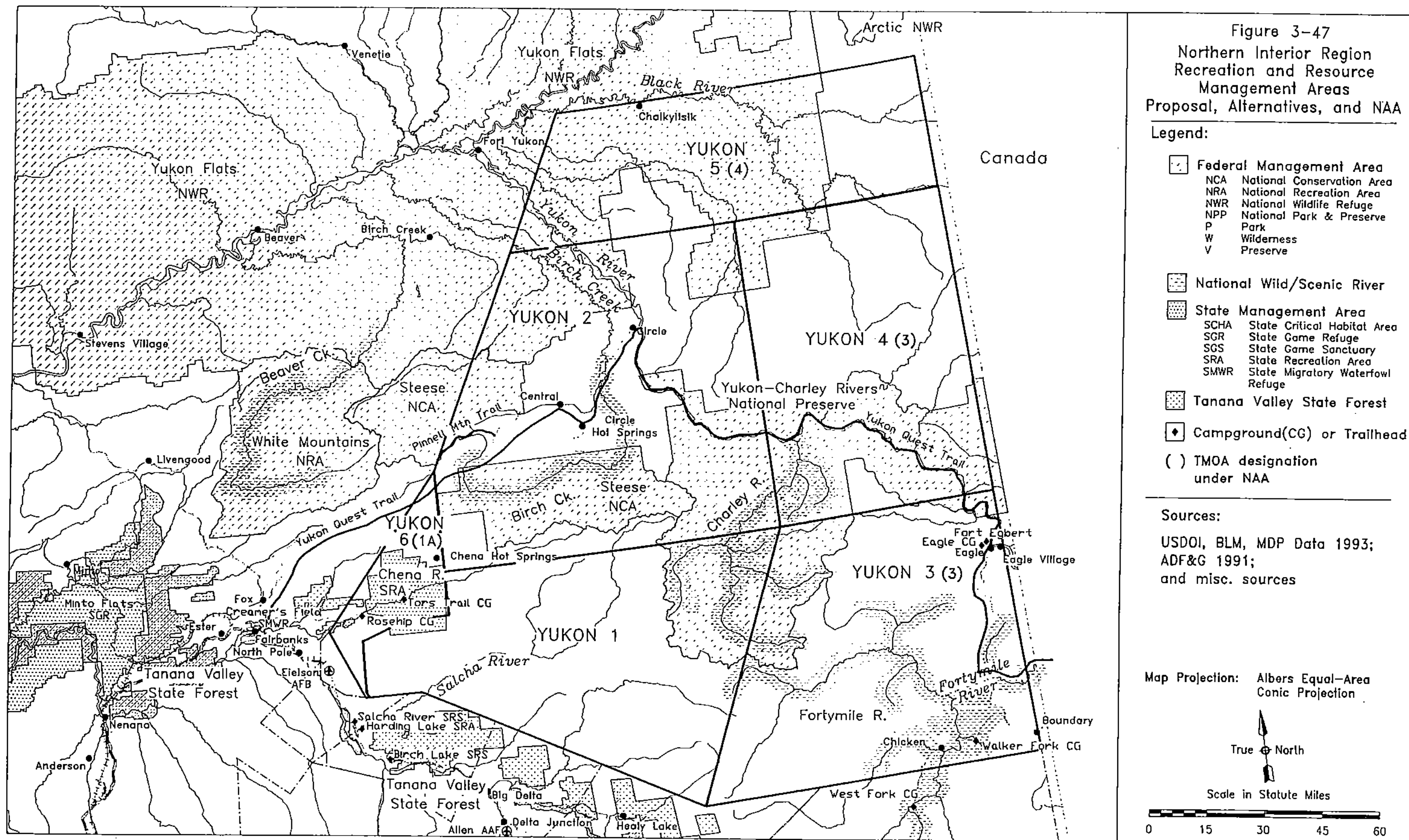


Table 3-4 Major Recreation Resources Located Beneath Existing and Proposed MOAs in the Northern Interior Region

Recreation Resource	Total Area ^{1,2}	Airspace ³	Area Beneath Airspace ^{1,3,4}	Visitor Use ⁵	Flight Avoidance Area ⁶	Recreation Opportunity Category ⁷				Sensitivity Ranking ⁸
						M	S-M	S-P	P	
U.S. Department of Interior, Bureau of Land Management, Steese-White Mountains District										
Steese National Conservation Area	1,220	YUKON 2	851 (70%)	8,350	Some (G)				X	High
Pinnell Mountain National Recreation Trail	27 TM	YUKON 2	27 TM	not avail.	Yes (G)			X		Medium
Fort Egbert National Historic Site	22 acres	YUKON 3 (YUKON 3)	22 acres	4,300 (1992)	Yes (M)		X			Low
Eagle Campground	8 acres	YUKON 3 (YUKON 3)	8 acres	not avail.	Yes (M)		X			Low
Walker Fork Campground	6 acres	YUKON 3 (YUKON 3)	6 acres	not avail.	No			X		Medium
Birch Creek National Wild River	126 RM	YUKON 2	126 RM	50 boating	Some (G)			X		Medium
Fortymile National Wild, Scenic, and Recreational River (includes Denison, Champion, Franklin, Napoleon, O'Brien, Uhler, Wade, Middle Fork, Joseph, North Fork, Hutchison, South Fork, Mosquito, and Walker forks)	396 RM	YUKON 3 (YUKON 3)	342 RM (87%)	200 boating; 38,110 total	No				X	High

Recreation Resource	Total Area ^{1,2}	Airspace ³	Area Beneath Airspace ^{1,2,4}	Visitor Use ⁵	Flight Avoidance Area ⁶	Recreation Opportunity Category ⁷				Sensitivity Ranking ⁸
						M	S-M	S-P	P	
U.S. Department of Interior, National Park Service										
Yukon-Charley Rivers National Preserve	2,527	YUKON 1,2 YUKON 3,4 (YUKON 3)	1,090 (43%)	3,800	Some (17)				X	High
			1,376 (54%)							
			1,376 (54%)							
Charley National Wild River	251 RM	YUKON 1,2 YUKON 3,4 (YUKON 3)	125 RM (50%)	not avail.	Some (17)				X	High
			126 RM (50%)							
			126 RM (50%)							
U.S. Department of Interior, Fish and Wildlife Service										
Yukon Flats National Wildlife Refuge	8,630	YUKON 2 YUKON 4 (YUKON 3) YUKON 5 (YUKON 4)	506 (6%)	1,000 (1987)	No				X	Low
			117 (2%)							
			1,137 (13%)							

Recreation Resource	Total Area ^{1,2}	Airspace ³	Area Beneath Airspace ^{1,2,4}	Visitor Use ⁵	Flight Avoidance Area ⁶	Recreation Opportunity Category ⁷				Sensitivity Ranking ⁸
						M	S-M	S-P	P	
Alaska Department of Natural Resources, Division of Parks and Outdoor Recreation										
Chena River State Recreation Area	254	YUKON 1 YUKON 6 (YUKON 1A)	37 (15%) 217 (85%)	203,030	Some (2)			X		Medium
Tors Trail and Rosehip Campgrounds	not avail.	YUKON 6 (YUKON 1A)	(100%)	not avail.	Yes (2)		X			Low
Alaska Department of Natural Resources, Division of Forestry										
Tanana Valley State Forest	1,810	YUKON 6 (YUKON 1A)	(< 1%)	not avail.	Some (1)		X			Low

¹Sources: BLM 1993c; Alaska Northwest Books 1991; Simmerman 1991; various unit plans; data not available for all areas.

²Area figures are given in acres x 1,000 unless otherwise indicated, and rounded to the nearest whole number; M = road miles; RM = river miles; and TM = trail miles.

³Airspace in parentheses indicates previously utilized Temporary MOA.

⁴Figures in parentheses indicate percentage of recreation area located beneath airspace, rounded up to the nearest whole number; assume 100 percent unless otherwise indicated.

⁵Visitor use data not available for all areas; 1993 data presented unless otherwise indicated; data presented is for the entire resource area or unit unless otherwise indicated; visitor use data do not indicate number of people exposed to overflights because: 1) not all areas are completely located beneath the airspace, and 2) not all visitors would be exposed to overflights.

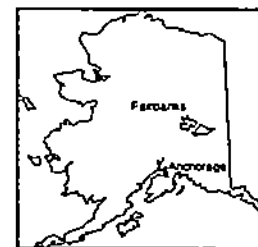
⁶Alpha/numeric code in parentheses refers to list of Flight Avoidance Areas in Appendix B.

⁷Recreation Opportunity categories: M = Modern; S-M = Semi-Modern; S-P = Semi-Primitive; and P = Primitive.

⁸Sensitivity ranking is based on three factors: 1) the degree to which noise resulting from any aircraft overflights (military or non-military) would be considered inconsistent with the recreation opportunity setting of the area (see section 3.6.1.2); 2) visitor use levels (if known)—comparatively high visitor use levels connote greater sensitivity; and 3) the percentage of the recreation area located beneath proposed airspace (may vary between Alternatives)—the higher the percentage, the greater the sensitivity.

3.6.3 Southern Interior Region

The Southern Interior Region contains the previously utilized EIELSON A and B, and BUFLO TMOAs (proposed for conversion to permanent MOAs as BIRCH, EIELSON, and BUFFALO MOAs, respectively). This region also contains the proposed permanent FALCON and CLEAR CREEK MOAs. The existing recreation environment described in this section is described by proposed MOAs; the existing airspace will be noted in parentheses where it differs in name from the given proposed MOA.



3.6.3.1 Federal and State Designated Recreation Resource Areas

There are no federally designated units located beneath the Southern Interior Region MOAs. Four units of the Alaska Division of Parks and Outdoor Recreation are located wholly in the region: 1) the Salcha River State Recreation Site, 2) the Harding Lake State Recreation Area, 3) the Birch Lake State Recreation Site, and 4) the Donnelly Creek State Recreation Site. Portions of the Tanana Valley State Forest are also located in this region. In addition, several private recreation facilities are found in the region.

Salcha River State Recreation Site

The Salcha River State Recreation Site (SRS) is located off the Richardson (Alaska) Highway under the proposed CLEAR CREEK MOA, about 40 miles south of Fairbanks. There are 95 campsites, 3 boat launches, and picnic facilities. Primary summer activities include camping, picnicking, boating, and sportfishing. A winter trail for snowmachine use extends up the Salcha River from the SRS. Total visitor use in 1993 was 45,820.

The Salcha River Area One Flight Avoidance Area (4) overlies this SRS and extends east roughly 22 miles up the Salcha River from the highway. It goes from the surface to 1,500 feet AGL and is in effect year-round. A second Flight Avoidance Area, the Salcha River Area Two (5), extends approximately another 21 miles further up the Salcha River, goes from the surface to 1,000 feet AGL, and is in effect year-round. This analysis categorized the Salcha River SRS as a semi-modern recreation opportunity setting due to its proximity to the highway and primary uses.

Harding Lake State Recreation Area

The Harding Lake SRA is located beneath the proposed BIRCH MOA (EIELSON A TMOA). The SRA is located off the Richardson (Alaska) Highway at mile 321.4, about 42 miles south of Fairbanks. There are 125 campsites, 3 boat launches, 35 picnic sites, a trail, and ball fields. Primary summer activities are picnicking, boating, and sportfishing; winter activities include ice fishing, ice skating, cross-country skiing, and snowmachining. In 1993, total visitor use was 78,520.

The Harding Lake Flight Avoidance Area (11) extends in a 2-mile radius around this SRA, goes from the surface to 1,000 feet AGL, and is in effect year-round. This analysis categorized the Harding Lake SRA as a semi-modern recreation opportunity setting due to its proximity to the highway and primary uses.

Birch Lake State Recreation Site

The Birch Lake SRS is also located entirely beneath the proposed BIRCH MOA (EIELSON A TMOA). It is 58 miles south of Fairbanks at mile 305.5 of the Richardson (Alaska) Highway. It offers 10 campsites, a large parking lot and unimproved boat launch, and is a popular fishing area. Total visitor use in 1993 was 25,550.

The Birch Lake State Recreation Site Flight Avoidance Area (10) extends in a 1-mile radius around the SRS, goes from the surface to 2,000 feet AGL, and is in effect from May 15 to September 30. This analysis categorized

the Birch Lake SRS as a semi-modern recreation opportunity setting due to its proximity to the highway and primary uses.

Donnelly Creek State Recreation Site

The Donnelly Creek SRS is located beneath the proposed BUFFALO MOA (FOX 2 TMOA). It is 126 miles south of Fairbanks at mile 238 of the Richardson (Alaska) Highway, and has 12 campsites, 6 picnic sites, and a trail. It is primarily a camping facility and does not support other specific recreation activities in the immediate vicinity. There were 18,270 visitors to the SRS in 1993.

The Donnelly Creek State Recreation Site Flight Avoidance Area (24) extends in a 1-mile radius around the SRS, goes from the surface to 2,000 feet AGL, and is in effect from May 15 to September 30. This analysis categorized the Donnelly Creek SRS as a semi-modern recreation opportunity setting due to its proximity to the highway and primary uses.

Tanana Valley State Forest

The Tanana Valley State Forest is managed by the Alaska Division of Forestry. Approximately 12 percent of the forest is located beneath the proposed BIRCH MOA (EIELSON A TMOA) and 13 percent beneath the BUFFALO MOA (BUFLO TMOA). While the predominant use of these lands is forestry, recreational use also occurs. Primary activities include sport hunting, hiking, off-road vehicle use, snowmachining, dog mushing, and cross-country skiing. Specific visitor use data were not available.

The following Flight Avoidance Areas cover portions of the Tanana Valley State Forest, although none were established specifically for that purpose: 1) The Clear Creek Cabins Flight Avoidance Area (8), which extends in a 1-mile radius around a group of cabins located south of the Richardson (Alaska) Highway and the Tanana River, goes from the surface to 1,500 feet AGL, and is in effect year-round; 2) the Healy Lake/Village Flight Avoidance Area (22), which extends in a 3-mile radius around the community of Healy Lake and the lake itself, goes from the surface to 6,000 feet MSL, and is in effect year-round; 3) the Lake George Flight Avoidance Area (28), which extends in a 2-mile radius around Lake George and a portion of Moosehead Lake, goes from the surface to 1,500 feet AGL, and is in effect year-round; and 4) the Shaw Creek Youth Camp Flight Avoidance Area (29), which extends in a 1-mile radius around the Shaw Creek area on the Richardson (Alaska) Highway, goes from the surface to 1,500 feet AGL, and is in effect year-round. This analysis categorized the Tanana Valley State Forest as providing semi-modern to semi-primitive recreation opportunity settings, depending on proximity to the highway and primary uses.

3.6.3.2 Undesignated Recreation Resource Areas

Federal Lands

Recreation activities occur on BLM-administered lands located under the northcentral portion of the BUFFALO MOA (northeast corner of the BUFLO TMOA) (see Figure 3-54 and Figure 3-55 in section 3.8.3). These lands are open to the public for recreation, but are not road-accessible. They may be used for sport hunting, recreational mining, and snowmachining. Some recreation activities also occur on the Fort Wainwright and Fort Greely Military Reservations, portions of which are located under Southern Interior Region MOAs. However, recreation activities are secondary uses of these lands, subject to permission from the U.S. Army, and are precluded in certain areas. Primary activities include sport hunting and fishing and off-road vehicle use in the summer, and snowmachining and cross-country skiing in the winter. The Blair Lakes are used for fly-in recreation hunting and fishing.

No attempt was made to categorize specific tracts of undesignated federal lands. Depending on proximity to communities, highways, or other development, these lands would range from semi-modern to primitive recreation opportunity settings.

State Lands

Recreational use of general state lands occurs throughout the Southern Interior Region. Of the state lands under the BIRCH MOA (EIELSON A TMOA), the Salcha River probably receives the highest recreational use due to its proximity to Fairbanks and navigability upriver of the Richardson Highway. During the summer months, the river is used for boating, fishing, and access to recreation cabins along the river. During the fall, the river provides boat access for moose and waterfowl hunting. The area is used by snowmachiners in the winter when snow cover permits.

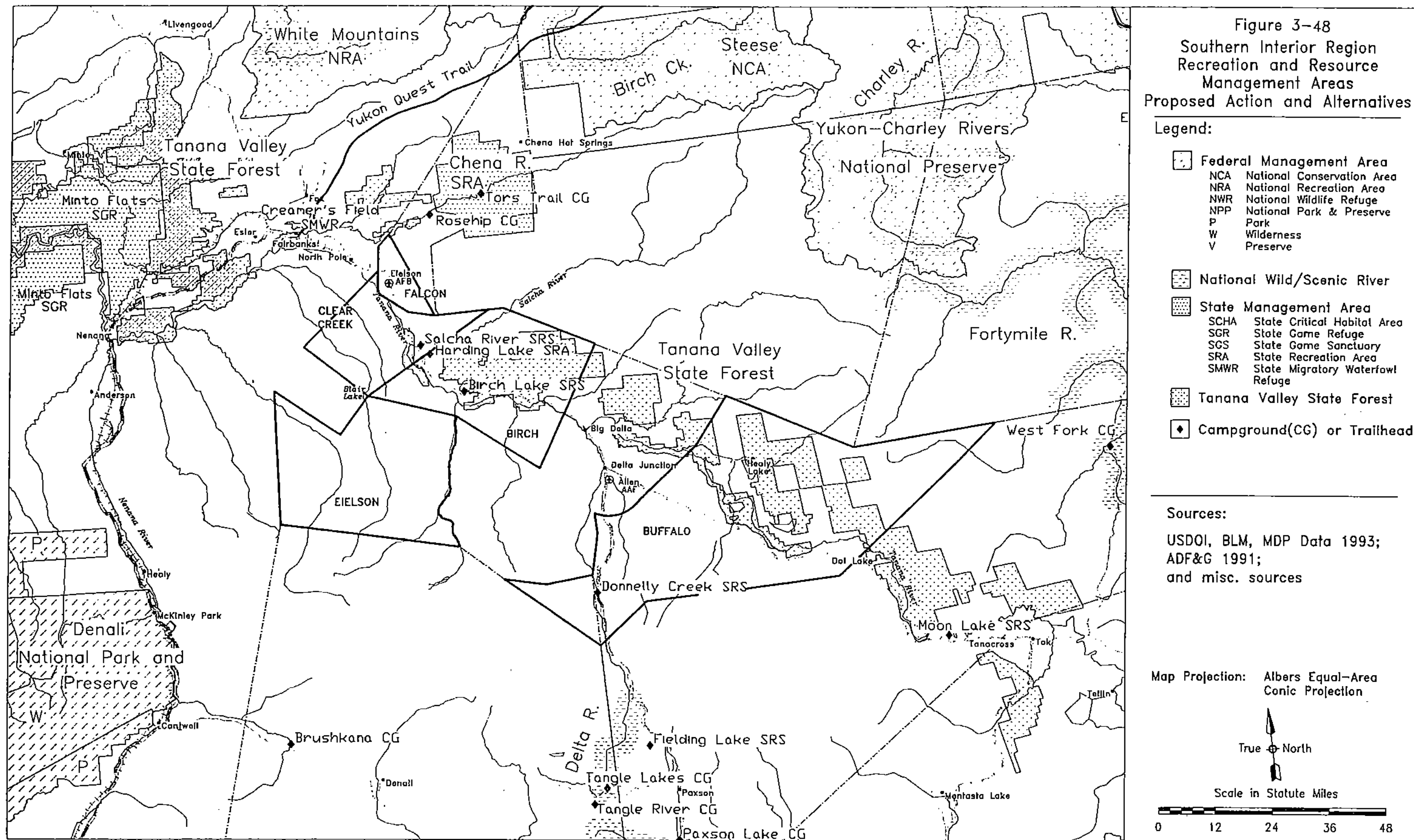
Other general state lands located under the BIRCH MOA (EIELSON A TMOA), north of the Salcha River SRS, are open to recreation. There is a moderate level of recreation activity on the general state lands underlying the EIELSON MOA (EIELSON B TMOA). Primary activities include sport hunting and fishing, off-road vehicle use, snowmachining, and cross-country skiing (ADNR 1991a).

On general state lands under the BUFFALO MOA (BUFLO TMOA), some recreational boating occurs on the Delta River during the summer months. A small series of lakes (Bolio Lake, Last Lake, Coal Mine #5 Lake, Brodie Lake, and Pauls Pond) are also popular for fishing during the summer months (Alaska Northwest Books 1992, pg. 155, 523). Along the Richardson (Alaska) Highway, Lake George, Big and Little Donna lakes, Craig Lake, and Lisa Lake are also fished (ibid.). The Tanana Basin Area Plan assigns a primary Recreation Use management classification to state lands along the highway west of Dot Lake; commercial recreational uses are also allowed on some of these lands.

No attempt was made to categorize specific tracts of undesignated state lands. Depending on proximity to communities, highways, or other development, these lands would range from semi-modern to primitive recreation opportunity settings.

Private Lands

A number of lodges are located along the Richardson (Alaska) Highway in this region. In general, these lodges provide semi-modern recreation opportunities in their immediate vicinity, but some also offer access to semi-primitive recreation opportunities further away from the highway corridor.



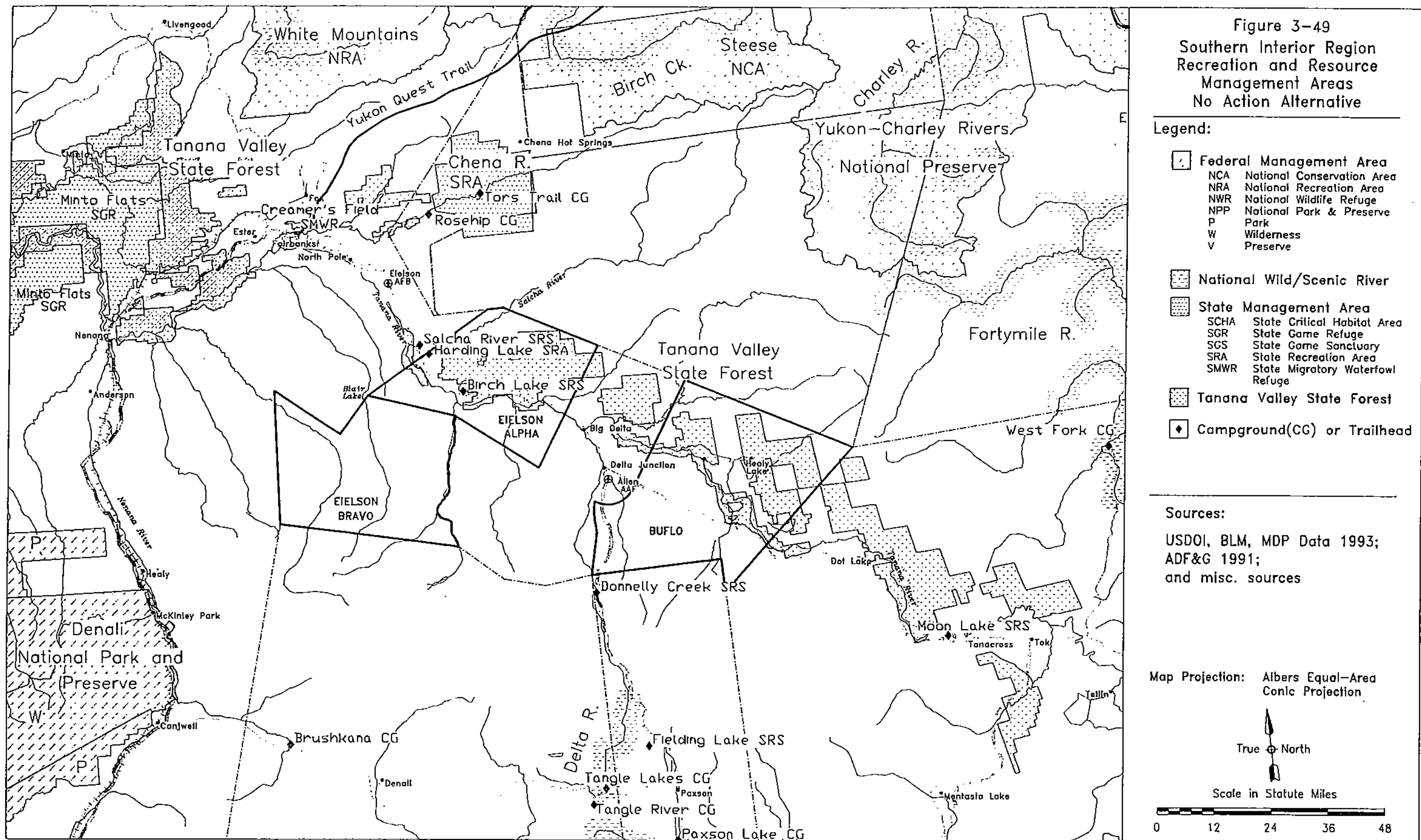


Table 3-5 Major Recreation Resources Located Beneath Existing and Proposed MOAs in the Southern Interior Region

Recreation Resource	Total Area ^{1,2}	Airspace ³	Area Beneath Airspace ^{1,2,4}	Visitor Use ⁵	Flight Avoidance Area ⁶	Recreation Opportunity Category ⁷				Sensitivity Ranking ⁸
						M	S-M	S-P	P	
Alaska Department of Natural Resources, Division of Forestry										
Tanana Valley State Forest	1,810	CLEAR CREEK BIRCH (EIELSON A) BUFFALO (BUFLO)	(<1%) 217 (12%) 308 (17%) 235 (13%)	not avail.	Some (8, 22, 28, 29)		X	X		Low
Alaska Department of Natural Resources, Division of Parks and Outdoor Recreation										
Salcha River SRS	61 acres	CLEAR CREEK	61 acres	45,820	Yes (4)		X			Low
Harding Lake SRA	169 acres	BIRCH (EIELSON A)	169 acres	78,520	Yes (11)		X			Low
Birch Lake SRS	191 acres	BIRCH (EIELSON A)	191 acres	25,550	Yes (10)		X			Low
Donnelly Creek SRS	42 acres	BUFFALO (FOX 2)	42 acres	18,270	Yes (24)		X			Low

¹Sources: BLM 1993c; Alaska Northwest Books 1991; Simmerman 1991; various unit plans; data not available for all areas.

²Area figures are given in acres x 1,000 unless otherwise indicated, and rounded to the nearest whole number; M = road miles; RM = river miles; and TM = trail miles.

³Airspace in parentheses indicates previously utilized Temporary MOA.

⁴Figures in parentheses indicate percentage of recreation area located beneath airspace, rounded up to the nearest whole number; assume 100 percent unless otherwise indicated.

⁵Visitor use data not available for all areas; 1993 data presented unless otherwise indicated; data presented is for the entire resource area or unit unless otherwise indicated; visitor use data do not indicate number of people exposed to overflights because: 1) not all areas are completely located beneath the airspace; and 2) not all visitors would be exposed to overflights.

⁶Alpha/numeric code in parentheses refers to list of Flight Avoidance Areas in Appendix B.

⁷Recreation Opportunity categories: M = Modern; S-M = Semi-modern; S-P = Semi-primitive; and P = Primitive.

⁸Sensitivity ranking is based on three factors: 1) the degree to which noise resulting from any aircraft overflights (military or non-military) would be considered inconsistent with the recreation opportunity setting of the area (see section 3.6.1.2); 2) visitor use levels (if known)—comparatively high visitor use levels connote greater sensitivity; and 3) the percentage of the recreation area located beneath proposed airspace (may vary between Alternatives)—the higher the percentage, the greater the sensitivity.

3.6.4 Southcentral Region

The Southcentral Region contains the existing permanent SUSITNA MOA and the previously utilized FOX 1 and 2 TMOAs. The FOX 1 TMOA and the proposed permanent FOX MOA cover essentially the same land area. There is some overlap between the FOX 2 TMOA and the proposed permanent TANANA MOA (Alternative B); however, the area that would be covered by the TANANA MOA extends substantially further east and north than the FOX 2 TMOA. The existing recreation environment described in this section is described by proposed MOAs; the existing airspace will be noted in parentheses where it differs in name from the given proposed MOA.



3.6.4.1 SUSITNA MOA

3.6.4.1.1 Federal and State Designated Recreation Resource Areas

SUSITNA MOA overlies portions of Denali National Park and Preserve (NPP), the Iditarod National Historic Trail, Denali State Park, and the Deshka and Lake Creek State Recreation Rivers.

Denali National Park and Preserve

Denali NPP is managed by the NPS. The northern half of the SUSITNA MOA overlies the southern portion of Denali NPP. Sixteen percent of the unit is located under the MOA, including portions designated park and preserve, but no designated wilderness. The park contains resources of international importance (e.g., the highest mountain on the North American continent and the largest continuously protected ecosystem in the world), and it has been designated a biosphere reserve under the Man and the Biosphere program of the United Nations (NPS 1986). The park lies between Alaska's two major population centers, Anchorage and Fairbanks, and is accessible by road (private automobile or tour bus), railroad, and airplane, although most visitors arrive by automobile (NPS 1988).

Use of the park is highly seasonal, with nearly 80 percent of the annual recreational use occurring from June through August, and 98 to 99 percent between May and September. The predominant recreation activities in the area underlying the SUSITNA MOA are mountain climbing and access to climbing base camps (Nemeth 1993). The climbing season begins in March, peaks in May-June, and then tapers off, although sightseeing flights continue into September (Purdum 1993; Nemeth 1993). Air taxi operators serve the park from bases in Anchorage, Fairbanks, Talkeetna, and other communities near the park. The area is also used for backpacking in the summer, hunting in the spring and fall, and dog mushing in the winter. Use rates are low, however, with an average of one to twelve backcountry use permits issued for the southern portion of the park each year (Nemeth 1993).

The Denali Park Road and associated facilities (e.g., campgrounds, visitor center, etc.) are approximately 31 miles north of the SUSITNA MOA's northern boundary. Almost all visitor activities are confined to this 88.5-mile road corridor and the park entrance on the George Parks Highway (NPS 1988). In 1988, about 94 percent of all visitor use occurred along the park road corridor (ibid.). The primary attractions of the park are viewing Mount McKinley and the park's wildlife; other activities include day hiking, backcountry hiking and backpacking, mountain climbing, hunting and fishing, cross-country skiing, and dog mushing. Total visitor use in 1989 was 1,586,900; in 1993 it was 1,395,500. In 1989 there were 34,113 overnight backcountry stays; in 1993, there were 33,010 (NPS 1989; NPS 1993a).

The Denali Park Road Flight Avoidance Area (16) follows the park road from the entrance to the community of Kantishna (approximately 91 miles), extends 5 miles on either side of the road, goes from the surface to 2,000 feet AGL, and is in effect from May 15 to September 15. Note that this part of the Denali NPP is not actually underneath the SUSITNA MOA. This analysis categorized the portion of Denali NPP located beneath the

SUSITNA MOA as a primitive recreation opportunity setting. Other parts of the park, particularly the portions along the park road, were categorized as semi-modern to semi-primitive depending on their proximity to the road and the George Parks Highway, level of development, and types of activities.

Iditarod National Historic Trail

The Iditarod National Historic Trail (NHT), which is actually a network of approximately 2,264 miles of trails, is administered by the BLM. Approximately 6 miles (less than 1 percent) of the trail crosses under the southern corner of the SUSITNA MOA, through the community of Skwentna. Most recreational use is by local residents, and occurs in the winter when the tundra and rivers are frozen and travel is easier (BLM 1986a). The Iditarod Trail Sled Dog Race, which takes place in March, uses this segment of the trail, and there is a checkpoint in Skwentna (Iditarod Trail Committee 1994; Alaska Northwest Books 1991). Visitor use estimates for the trail were not available; although recreational snowmachine use of the trail between Rainy Pass and Skwentna is known to be on the rise (Schlapfer 1993).

There are no Flight Avoidance Areas over this segment of the Iditarod NHT. However, *FAR* § 91.119 and *AFR* 60-16 require a minimum operating altitude of 1,000 feet AGL over all towns and settlements, and a minimum avoidance distance of 500 feet for structures in less populous areas. This analysis categorized the segment of the Iditarod NHT located beneath the SUSITNA MOA as a semi-primitive recreation opportunity setting.

Denali State Park

Denali State Park (SP) is managed by the Alaska Division of Parks and Outdoor Recreation. Approximately 8 percent of the park underlies the SUSITNA MOA. It is 100 air miles north of Anchorage and is bisected by the George Parks Highway. Although one of the most accessible parks in the entire state, it is essentially wilderness except for the roadside facilities (Simmerman 1991).

There are no developed recreation facilities in the portion of the park underlying SUSITNA MOA. The eastern edge of the MOA is about 8 miles west of the Denali Viewpoint South (mile 135.2 of the George Parks Highway) and the Troublesome Creek Trailheads and Campground (mile 137.5 of the George Parks Highway). The trail along Curry and Kesugi ridges is also east of the MOA's eastern boundary. The Division intends for the area underlying the MOA to remain relatively undeveloped in order to provide users with opportunities for high value, natural experiences, and to act as a buffer between recreational development areas closer to the highway and wilderness areas. The park is used primarily for camping, picnicking, swimming, day hiking, backpacking, fishing, viewing Mount McKinley, river floating on the Chulitna River, cross-country skiing, sport hunting, and trapping. In fiscal year 1993, 465,054 visits were made to Denali SP—329,568 by Alaska residents and 135,486 by non-residents.

There are no Flight Avoidance Areas over the Denali SP. This analysis categorized the portion of the park located beneath the SUSITNA MOA as a primitive recreation opportunity setting. Other parts of the park, particularly the portions along the George Parks Highway, were categorized as semi-modern to semi-primitive depending on their proximity to the highway, level of development, and types of activities.

State Recreation Rivers

In 1988, the Alaska legislature passed the Recreation Rivers Act designating six rivers in the Susitna Basin planning area as State Recreation Rivers. Portions of two of these rivers, the Deshka and Lake Creek, are located beneath the SUSITNA MOA. State Recreation Rivers are managed by the Alaska Division of Land.

Deshka State Recreation River

The Deshka River is formed by the confluence of Kroto and Moose creeks, which flow southward about 58 and 52 miles, respectively, from their sources in the Peters Hills. The Deshka River then flows another 29.5 miles to its confluence with the Susitna River. Approximately 28 to 29 river miles (or 33 percent) of the Moose and Kroto creeks underlie the southeastern corner of the SUSITNA MOA. The popularity of this river system, which receives 23 percent of the total recreation river use in the Susitna Basin, stems from its proximity to Anchorage and its king and silver salmon and rainbow trout fisheries (Alaska DNR 1991). Moose and Kroto creeks are accessible by automobile from the Petersville Road, a spur road off the George Parks Highway about 100 miles north of Anchorage; the mouth of the Deshka River is accessible from the Deshka Landing, a boat launch on the Susitna River also reached via the George Parks Highway. The remainder of the river system is accessible only by air or boat. In addition to fishing, other major recreation activities are river floating and power-boating and, in winter, ice fishing for burbot, snowmachining, and dog mushing on the rivers and adjacent trails. Moose, black bear, and brown bear are hunted along the river; the drainage is one of the most important moose harvest areas in the Susitna Basin (ibid.). The portion of Kroto Creek underlying the MOA is "seldom visited by users because the shallow, rocky channel is only marginally navigable even by float craft" (ibid.). The summer use season on Moose Creek runs from mid-May through Labor Day weekend. Peak use occurs from mid-June to the first week of July, which corresponds to the king salmon spawning run. There is a second, smaller peak from late July to early August during the silver salmon spawning run. Rafting is the primary form of floating (ibid.). Power boats are not used on upper Moose Creek due to shallow water levels. Recreation users rarely leave the stream banks (ibid.). Growth of recreational use on the Deshka State Recreation River appears to be leveling off in comparison with other Susitna Basin rivers (ibid.). There were 37,778 person-days on the Deshka State Recreation River in 1989.

There are no Flight Avoidance Areas over the portion of the Deshka State Recreation River that underlies the SUSITNA MOA. There is a Flight Avoidance Area over the mouth of Kroto Creek (34). It extends in a 1-mile radius around the mouth of the creek, goes from the surface to 1,500 feet AGL, and is in effect from May 1 to October 1. This analysis categorized the portion of the Deshka State Recreation River located beneath the SUSITNA MOA as a primitive recreation opportunity setting. The lower segment of the river near the confluence with the Susitna River (outside the MOA) was categorized as semi-primitive due to higher use levels and boat congestion.

Lake Creek State Recreation River

Lake Creek is located in the northwestern portion of the Susitna Basin, in the center of the SUSITNA MOA. It heads in Chelatna Lake, and approximately 64 river miles are designated as a recreation river. Of the designated portion of the river, about 51.5 miles (or 80 percent) are beneath the MOA. Lake Creek is accessible only by air or boat. Major float plane landing sites are Chelatna Lake, Bulchitna Lake, and in the Yentna River at the mouth of the creek. Wheel planes land at a private airstrip at Chelatna Lake Lodge, on a strip at the creek mouth, and on a gravel bar island around river mile 39. Chelatna Lake is about 100 air miles northwest of Anchorage, and the mouth of the creek is about 60 air miles northwest of the city. Like the Deshka River system, the primary attraction is the fishery. Lake Creek receives about 12 percent of the total recreation river use in the Susitna Basin, compared to 23 percent on the Deshka River and 36 percent on the Little Susitna River (Alaska DNR 1991). However, the scenic qualities of Lake Creek are "... perhaps the highest of all the Recreation Rivers," with many good views of the Alaska Range (ibid.). The summer use season runs from mid-May through Labor Day weekend. Peak use occurs from mid-June to mid-July, which corresponds to the king salmon spawning run. There is a second, smaller peak in August during the silver salmon spawning run (ibid.). In addition to fishing, other major recreation activities are river floating and power-boating and, in winter, cross-country skiing, dog mushing, snowmachining, off-road vehicle use, and ice fishing (ibid.). Recreation users rarely leave the stream banks (ADNR 1991). Rafting is the primary form of floating; power boats are used on the lower portion of the creek, mostly congregating at the creek mouth outside the MOA (ADNR 1991). Power-boating is an integral part of recreation on Chelatna Lake itself (ADNR 1991), and there are a number of lodges

and cabins located on the shores of Chelatna Lake (ADNR 1991). Moose, black bear, and brown bear are the principal sport hunting species (ADNR 1991). Recreational use has been stable or slowly increasing, and weekend use is not appreciably higher than weekday use (ADNR 1991). There were 14,500 person-days on the Lake Creek State Recreation River in 1989.

There are no Flight Avoidance Areas over the portion of the Lake Creek State Recreation River that underlies the SUSITNA MOA. There is a Flight Avoidance Area over the mouth of Lake Creek (33). It extends in a 1-mile radius around the mouth of the creek, goes from the surface to 1,500 feet AGL, and is in effect from May 1 to October 1. This analysis categorized the portion of the Lake Creek State Recreation River located beneath the SUSITNA MOA as a primitive recreation opportunity setting. The lower segment of the river near the confluence with the Yentna River (outside the MOA) was categorized as semi-primitive due to higher use levels and boat congestion.

3.6.4.1.2 Undesignated Recreation Resource Areas

Federal, State, and Private Lands

There are two tracts of undesignated BLM-administered lands underlying the SUSITNA MOA; the remainder of the undesignated lands under the MOA are state-owned (see Figure 3-57 and Figure 3-58 in section 3.8.4). Many of these lands support extensive and varied recreation activities, largely determined by seasonal access. Most recreational use is concentrated along roads, trails, rivers, and around lakes. In the summer, recreational use radiates out from the highway system, fly-in points, and boat access points. Summer recreation activities include picnicking, tent and RV camping, hiking, river floating, power-boating, driving for pleasure, berry picking, and flightseeing. Winter recreation activities tend to be more dispersed as frozen ground and water make more areas accessible, and include cross-country skiing, dog mushing, snowmachining, and snowshoeing. The region is heavily used by local and state residents as well as nonresident tourists (ADNR 1984; ADNR 1989). There are numerous lodges and cabins located on the lakes and rivers beneath the SUSITNA MOA. Most are accessible only by boat or aircraft, with the exception of a few lodges in the Skwentna area under the extreme southern corner of the MOA and a roadhouse on the Petersville Road.

There are no Flight Avoidance Areas in the SUSITNA MOA. No attempt was made to categorize specific tracts of undesignated federal or state lands or private lands. Depending on proximity to the highway and other roads, these lands would range from semi-modern to primitive recreation opportunity settings. The majority, however, would probably be considered semi-primitive to primitive.

3.6.4.2 FOX MOA (FOX 1 TMOA)

3.6.4.2.1 Federal and State Designated Recreation Resource Areas

The FOX MOA (FOX 1 TMOA) overlies portions of the Gulkana National Wild River; the Delta National Wild, Scenic, and Recreational River; numerous recreation resources in the BLM's Glennallen District; and the Nelchina Public Use Area.

Gulkana and Delta National Wild and Scenic Rivers

Both the Gulkana National Wild River and the Delta National Wild, Scenic, and Recreational River are administered by the BLM. Approximately 15 river miles (or 47 percent) of the Middle Fork and 32 river miles (or 24 percent) of the West Fork of the designated portion of the Gulkana are located under the eastern edge of the FOX MOA (FOX 1 TMOA), south of the Denali Highway. An estimated 30 river miles (or 48 percent) of the designated portion of the Delta River are also located under the eastern part of the FOX MOA (FOX 1 TMOA), but north of the Denali Highway. These are extremely popular recreation rivers, due largely to their central location and road-accessibility. Scenery along the Gulkana River is "subdued but wild," and fishing for salmon, rainbow trout, and grayling is good (BLM 1988a). The most popular float trip is a 3- to 5-day trip on

the main stem of the river from Paxson Lake to Sourdough, which is entirely outside the FOX MOA (FOX 1 TMOA). Ninety-nine percent of the float trips occur along this segment of the river, and there were an estimated 4,799 recreation users on this segment of the river in 1993 (Kajdan 1993). Visitor use on this segment of the river has increased approximately 35 percent since 1990. The West and Middle forks of the Gulkana receive comparatively little recreational use, but these river segments provide excellent opportunities for extended wilderness travel not available on the main stem of the river. The most popular trip on the Delta River is the 35-mile segment from Tangle Lakes, on the Denali Highway, north to the Richardson Highway. There were an estimated 658 recreation users on the Delta River in 1993, a decline of roughly 23 percent since 1990 (Kajdan 1993). Most fishing is for grayling, with some lake trout fishing in late winter and early spring. The peak use season on both rivers is from June 15 to September 20 (Kajdan 1993).

The Gulkana National Wild River Flight Avoidance Area (36) extends 5 miles either side of the main stem of the Gulkana River from the outlet of Paxson Lake south to the community of Sourdough. It goes from the surface to 5,000 feet MSL and is in effect from June 27 to July 11. The Delta National Wild and Scenic River Flight Avoidance Area (19) extends 5 miles either side of the river from the Denali Highway and Round Tangle Lake north almost to Darling Creek. It goes from the surface to 5,000 feet MSL and is in effect from June 27 to July 11. This analysis categorized the rivers as primitive recreation opportunity settings.

BLM Glennallen District Recreational Resources

The BLM manages an Archaeological District, three campgrounds, numerous trails, interpretive sites, and other facilities in the area underlying the FOX MOA (FOX 1 TMOA). Between 70 and 85 percent of the use of these recreation resources is concentrated at the eastern edge of the MOA, roughly paralleling the Richardson Highway and the Delta and Gulkana rivers, and along the Denali Highway (Kajdan 1993). Recreation activities include camping and hiking, sightseeing and wildlife watching, picnicking and berry picking, big-game hunting (guided and unguided), fishing, river floating, off-road vehicle travel, and bicycle touring. The Tangle Lakes National Register Archaeological District (mile 15 of the Denali Highway) contains over 400 archaeological sites, and evidence of human occupation in the area for at least 10,000 years. In addition, it offers opportunities for hiking, camping, boating, fishing, and hunting. There are 10 trails in the district, all beginning from the Denali Highway. The trails are open to off-road-vehicle use from May 16 to October 15; winter use is unrestricted. Specific visitor use data for this area was unavailable. The Tangle Lakes Campground (mile 21.5 of the Denali Highway) has 27 campsites, a picnic area, and a boat launch; the Tangle River Campground (mile 21.7 of the Denali Highway) offers 7 campsites and a boat launch; and the Brushkana Campground (mile 104 of the Denali Highway) has 17 campsites. In 1993, some 21,000 visitors used the Tangle Lakes Campground, an estimated 10,800 used the Tangle River Campground, and approximately 20,734 used the Brushkana Campground. Use of BLM campgrounds on the Denali Highway has increased over the past 5 years, with the Brushkana and Tangle River campgrounds experiencing a 50 percent increase and the Tangle Lakes Campground experiencing an increase of almost 100 percent (Kajdan 1993). The BLM has also proposed establishing two Areas of Critical Environmental Concern (ACECs) in the FOX MOA (FOX 1 TMOA) area: The 50 Mile ACEC and the West Fork Gulkana River ACEC. The 50 Mile ACEC would be adjacent to the Denali Highway, and part of the justification for establishing it is that it would provide roadside opportunities for wildlife watching. The West Fork Gulkana River ACEC would not be road accessible.

The Delta National Wild and Scenic River Flight Avoidance Area (19) covers the Tangle Lakes National Register Archaeological District, the Tangle Lakes Campground, and other facilities and trails in the area. It goes from the surface to 5,000 feet MSL and is in effect from June 27 to July 11. This analysis categorized the Tangle Lakes National Register Archaeological District (NRAD), the Brushkana Campground, and the 50 Mile ACEC as semi-primitive recreation opportunity settings; the Tangle Lakes Campground and the Tangle River Campground were categorized as semi-modern to semi-primitive; the West Fork Gulkana River was categorized as a primitive recreation opportunity setting; and the other recreation facilities and resources were categorized as semi-primitive to primitive recreation opportunity settings depending on proximity to the Denali Highway and levels and types of use.

Nelchina Public Use Area

The Nelchina Public Use Area is managed by the Alaska Division of Land. Some 284,000 acres (or roughly 17 percent) of the Nelchina Public Use Area are located beneath the southern edge of the FOX MOA (FOX 1 TMOA). This area is an important state recreation resource, providing opportunities for hunting, fishing, mining, and other forms of nonconsumptive recreation such as hiking, backpacking, snowmachining, cross-country skiing, and wildlife watching. The area is managed by the state for multiple use. Most access to the area is along an extensive off-road vehicle and foot trail system, which starts from the Glenn Highway (about 50 miles south of the southern boundary of the MOA). Float and ski planes also provide access to more remote parts of the area. Visitor use data for this area were unavailable.

The Caribou Calving Area Flight Avoidance Area (26), a rectangle roughly 10.8 miles wide and 36 miles long, extends from the northern foothills of the Talkeetna Mountains north to the Susitna River valley. It goes from the surface to 1,000 feet AGL and is in effect from May 1 to June 30. It was established for a low-altitude Military Training Route (MTR), and is shaped to extend 5 miles on either side of the MTR's center line. There are no other Flight Avoidance Areas over the Nelchina Public Use Area. This analysis categorized the Nelchina Public Use Area as a primitive recreation opportunity setting.

3.6.4.2.2 Undesignated Recreation Resource Areas

Federal, State, and Private Lands

About 92 miles (or 68 percent) of the Denali Highway, which is maintained by the Alaska Department of Transportation (ADOT), are located beneath the FOX MOA (FOX 1 TMOA). The highway is generally open from mid-May to sometime in October, and is paved for the first 21 miles west of Paxson. There are dozens of turnouts and informal campsites along the highway, and these are heavily used by hunters in the fall (Alaska Northwest Books 1992). The highway is popular for wildlife watching and its panoramic views of the Alaska Range and the Susitna River valley. Recreational travel on the Denali Highway itself has increased dramatically in recent years, with an estimated 21,444 visitors in 7,190 groups in 1993 (Kajdan 1993).

The Delta National Wild and Scenic River Flight Avoidance Area (36) is adjacent to the Denali Highway on the north side, extending 5 miles either side of the river. It goes from the surface to 5,000 feet MSL and is in effect from June 27 to July 11. There are no other Flight Avoidance Areas on the Denali Highway. This analysis categorized the Denali Highway as a semi-modern recreation opportunity setting.

Recreation activities occur on the extensive tracts of BLM-administered lands located throughout the area under the MOA (see Figure 3-57 and Figure 3-58 in section 3.8.4). The BLM manages most of these lands as either semi-primitive with an emphasis on recreation in a predominantly natural setting or as "extensive" areas where little or no management emphasis or restrictions are placed on recreational uses (Kajdan 1993). Much of the BLM land under the MOA is open to off-road vehicle use either at all times or on a limited basis.

General state lands underlying the FOX MOA (FOX 1 TMOA) support a wide array of recreational activities, including hunting and fishing, hiking, camping, skiing, mountain climbing, and snowmachining. The majority of these lands are located under the northern edge of the MOA, although smaller tracts are found elsewhere. Sport hunting for moose, Dall sheep, bear, and caribou is particularly heavy in the Talkeetna Mountains Subregion located under the southern part of the MOA. The majority of the Nelchina caribou herd's range is located in this subregion.

There are five lodges and/or recreation outfitters located on the segment of the Denali Highway under the FOX MOA (FOX 1 TMOA). There are also lodges and recreation cabins on the lakes and rivers throughout the area under the MOA, which are only accessible by boat or aircraft. The Lake Louise, Lake Susitna, and Tyone Lake area, located at the extreme southeastern edge and predominantly outside the MOA, supports extensive

recreational use, particularly during the summer, holidays, and hunting seasons. Clarence and Watana lakes, located under the southwestern corner of the MOA, are also used for recreation throughout the year, but especially during the summer.

The Sheep Lambing Flight Avoidance Area (6) covers much of the mountainous region under the northwest corner of the FOX MOA (FOX 1 TMOA), including Mount Deborah (elevation 12,339) and the Yannert Glacier, Hess Mountain (elevation 11,940), Mount Geist (elevation 10,720), and Mount Hayes (13,832), as well as much of the Wood River drainage underlying the MOA. The Flight Avoidance Area goes from the surface to 1,500 feet AGL and is in effect from May 1 to June 30. The Wood River Lodge Flight Avoidance Area (7) extends in a 3-mile radius around the Wood River Lodge, which is located in the northwestern corner of the MOA at a bend in the river. It goes from the surface to 1,500 feet AGL and is in effect year-round. No attempt was made to categorize specific tracts of undesignated federal or state lands or private recreation facilities. Depending on proximity to highways, communities, or other development, these lands would range from semi-modern to primitive recreation opportunity settings.

Approximately 130 miles of the upper Susitna River, a large river that heads at Susitna Glacier in the Alaska Range, would underlie the proposed FOX MOA. The mountains of the Alaska Range provide a striking backdrop. Wildlife that may be observed include moose, bear, caribou, wolf, and beaver. The best boat launching access is at the Susitna River bridge on the Denali Highway at Milepost 79.5 from Paxson. From this point, the river is rated Class III for 55 miles.¹ Approximately 30 miles downriver from the bridge, the Maclaren River joins from the east; then after 10 more miles, the Tyone River also comes in from the east. The Tyone River connects Lake Louise and the Susitna River. The slow, meandering Tyone can be used as a connecting waterway to leave the Susitna Valley for the extensive Lake Louise plains. A small outboard motor or a canoe speeds an otherwise slow upriver paddle; it takes about a day to get to Tyone Lake with a motor. Below the Tyone River confluence, the Susitna has several huge oxbow bends and approximately 20 miles of swift water and rapids rated Class II. After this stretch, the river slows for the next 70 miles, rated Class I to II. This tame stretch ends at Devils Canyon, which is not usually attempted. Pick-up may be made by floatplane at Log Creek, or it is possible to portage 5 miles to Stephan Lake for a prearranged pick-up by floatplane. Both pick-up points are outside the FOX MOA boundary. The Maclaren River heads at Maclaren Glacier in the Clearwater Mountains, under the northeastern FOX MOA, and flows southwest 55 miles to the Susitna River, from the high tundra country into the forests of the Lake Louise basin. The usual access point is at the end of a state road that leaves the Denali Highway at Milepost 43.3 from Paxson. The Maclaren is rated Class II and III and is rocky with many shallow rapids. Wildlife that may be seen along the way include bear, moose, and caribou. The Tyone River heads at Tyone Lake, at the extreme southern edge of the FOX MOA, and flows northwest 30 miles to the Susitna River. The flat-water river flows slowly and meanders. This route is suitable for riverboats and canoes with small motors, as well as for kayaks and paddled canoes. The river can be run upstream from the Susitna by strong paddlers. This is considered a good trip for less experienced paddlers who are experienced in the wilderness. Access is by floatplane to Lake Louise or via the 19.3-mile-long Lake Louise Road, which leaves the Glenn Highway at Milepost 159.8 from Anchorage. Exit is by floatplane from the Susitna River. Lake Louise and Susitna Lake have excellent fishing for grayling, lake trout, and lingcod.

3.6.4.3 TANANA MOA (FOX 2 TMOA)

3.6.4.3.1 Federal and State Designated Recreation Resource Areas

The TANANA MOA (FOX 2 TMOA) overlies portions of the Gulkana National Wild River; the Delta National Wild, Scenic, and Recreational River; recreation resources located in the BLM's Glennallen District; the Fielding Lake State Recreation Site; and the Denali Highway. Although not located under existing airspace, the portion

¹Rivers are rated according to how difficult they are to run. Class I is easy; Class II is medium; Class III is difficult; Class IV is very difficult; Class V is extremely difficult; and Class VI is extraordinarily difficult (nearly impossible).

of the Southcentral Region that would include the TANANA MOA contains the Fortymile National Wild, Scenic, and Recreational River; Moon Lake State Recreation Site; and portions of the Tanana Valley State Forest.

Gulkana and Delta National Wild and Scenic Rivers

See section 3.6.4.2.1 for a more detailed description of the rivers. The most popular float trip on the Gulkana River is the 3- to 5-day trip on the main stem of the river from Paxson Lake to Sourdough, which supports about 99 percent of the visitor use of the river system. There were an estimated 4,799 recreation users in 1993, an increase of approximately 35 percent over 1990 (Kajdan 1993). About 45 river miles (or 96 percent) of this part of the river underlies the FOX 2 TMOA. About 17 river miles (or 53 percent) of the Middle Fork and 36 river miles (or 27 percent) of the West Fork are under the airspace. These segments receive very little recreational use, but provide opportunities for extended wilderness travel not available on the main stem of the river. The most popular trip on the Delta River is the 35-mile segment from Tangle Lakes, on the Denali Highway, north to the Richardson Highway. There were an estimated 658 recreation users on the Delta River in 1993, a decline of roughly 23 percent since 1990 (Kajdan 1993). Some 32 river miles (or 52 percent) underlie the TANANA MOA (FOX 2 TMOA). The peak use season on both rivers is from June 15 to September 20 (Kajdan 1993).

The Gulkana National Wild River Flight Avoidance Area (36) extends 5 miles either side of the main stem of the Gulkana River from the outlet of Paxson Lake south to the community of Sourdough. It goes from the surface to 5,000 feet MSL and is in effect from June 27 to July 11. The Delta National Wild and Scenic River Flight Avoidance Area (19) extends 5 miles either side of the river from the Denali Highway and Round Tangle Lake north almost to Darling Creek. It goes from the surface to 5,000 feet MSL and is in effect from June 27 to July 11. This analysis categorized the rivers as primitive recreation opportunity settings.

Fortymile National Wild, Scenic, and Recreational River

See section 3.6.2.2 for a more detailed description of this river system. Three tributaries of the South Fork of the Fortymile River are located in the Southcentral Region: The West Fork of the Dennison Fork, 13 designated river miles; the Dennison Fork, 19 designated river miles; and the Logging Cabin Creek Fork, 17 designated river miles. These tributaries are accessible from several points along the Taylor Highway, but are not the most heavily used segments in the Fortymile system (Buckle 1994). Total boating use of the Fortymile was estimated at 200 visitors in 1993; while total visitor use was estimated at 38,110, 30,000 of which was non-off-road vehicle motorized travel. Sport hunting and fishing are also popular in the river drainage; caribou has historically been the most sought after species, followed by moose, bear, and sheep (BLM 1988b). The BLM also operates the 20-acre West Fork Campground at mile 48.5 of the Taylor Highway. The campground has 25 campsites, is popular for camping and fishing, and is open from May through September.

There are no Flight Avoidance Areas over the Fortymile National Wild, Scenic, and Recreational River. This analysis categorized the Fortymile National Wild, Scenic, and Recreational River as a primitive recreation opportunity setting. The West Fork Campground was categorized as semi-primitive due to its proximity to the highway and use levels.

BLM Glennallen District Recreational Resources

The BLM manages the Paxson Lake Campground, located at mile 175 of the Richardson Highway. This 90-acre campground is located under the western portion of the TANANA MOA (FOX 2 TMOA). It has 40 campsites and a boat launch, and is open from June through October. It is a popular fishing destination and is the put-in for trips on the main stem of the Gulkana River. There were approximately 14,526 visitors in 1993. The BLM has proposed establishing the Mud Lake ACEC, which would be under the western portion of the TANANA MOA (FOX 2 TMOA). The ACEC would be adjacent to the Denali Highway, and part of the justification for establishing it is that it would provide roadside opportunities for wildlife watching. The BLM also manages some 12 trails and an estimated 88 miles of trail under the western portion of the TANANA MOA (FOX 2 TMOA).

Visitor use information for these trails was not available. The 150-acre Sourdough Campground, mile 147 of the Richardson Highway, is located beneath the previously utilized FOX 2 TMOA, but not under any of the proposed MOAs. Expanded and scheduled to re-open in the summer of 1994, it will have 42 campsites and boat launching facilities, and will be open from May through October. There were an estimated 20,000 visitors to the campground in 1993.

The Delta National Wild and Scenic River Flight Avoidance Area (19) extends 5 miles either side of the river from the Denali Highway north almost to Darling Creek, and encompasses some of the BLM's recreational resources in this area. It goes from the surface to 5,000 feet MSL and is in effect from June 27 to July 11. This analysis categorized the Paxson Lake and Sourdough Campgrounds as semi-modern recreation opportunity settings due to proximity to the Richardson Highway and high use levels. The BLM-managed trails were categorized as semi-primitive to primitive, again depending on proximity to the highway and dominant uses. The Mud Lake ACEC would be categorized as a semi-primitive recreation opportunity setting due to its proximity to the Denali and Richardson highways.

Fielding Lake and Moon Lake State Recreation Sites

The 600-acre Fielding Lake SRS, at mile 200 of the Richardson Highway, has 7 campsites, a boat launch and access to fishing; total visitor use in 1993 was 8,300. The 22-acre Moon Lake SRS, at mile 1,332 of the Alaska Highway, has 15 campsites and a boat launch; total visitor use in 1993 was 54,240.

The Fielding Lake SRS Flight Avoidance Area (23) extends in a 1-mile radius around this SRS, goes from the surface to 2,000 feet AGL, and is in effect from May 15 to September 30. In addition, the Delta National Wild and Scenic River Flight Avoidance Area (19) extends west from the Fielding Lake SRS for about 10 miles, goes from the surface to 5,000 feet MSL, and is in effect from June 27 to July 11. There is no Flight Avoidance Area over the Moon Lake SRS. These units were categorized as semi-modern recreation opportunity settings due to proximity to the highway and levels of visitor use.

Tanana Valley State Forest

Although the primary use of these lands is forestry, recreational uses include sport hunting, hiking, off-road vehicle use, snowmachining, dog mushing, and cross-country skiing. The part of the forest located in the Southcentral Region is important for developed and dispersed recreation because of easy access and its location near the junction of the Alaska and Glenn highways. The Tanana River in this area is used for fishing, camping, and boating. However, specific visitor use numbers were not available.

There is no Flight Avoidance Area over the Tanana Valley State Forest in this area. This portion of the forest was categorized as semi-modern to semi-primitive recreation opportunity settings, depending on proximity to the highway and other development and predominant uses.

3.6.4.3.2 Undesignated Recreation Resource Areas

Federal, State, and Private Lands

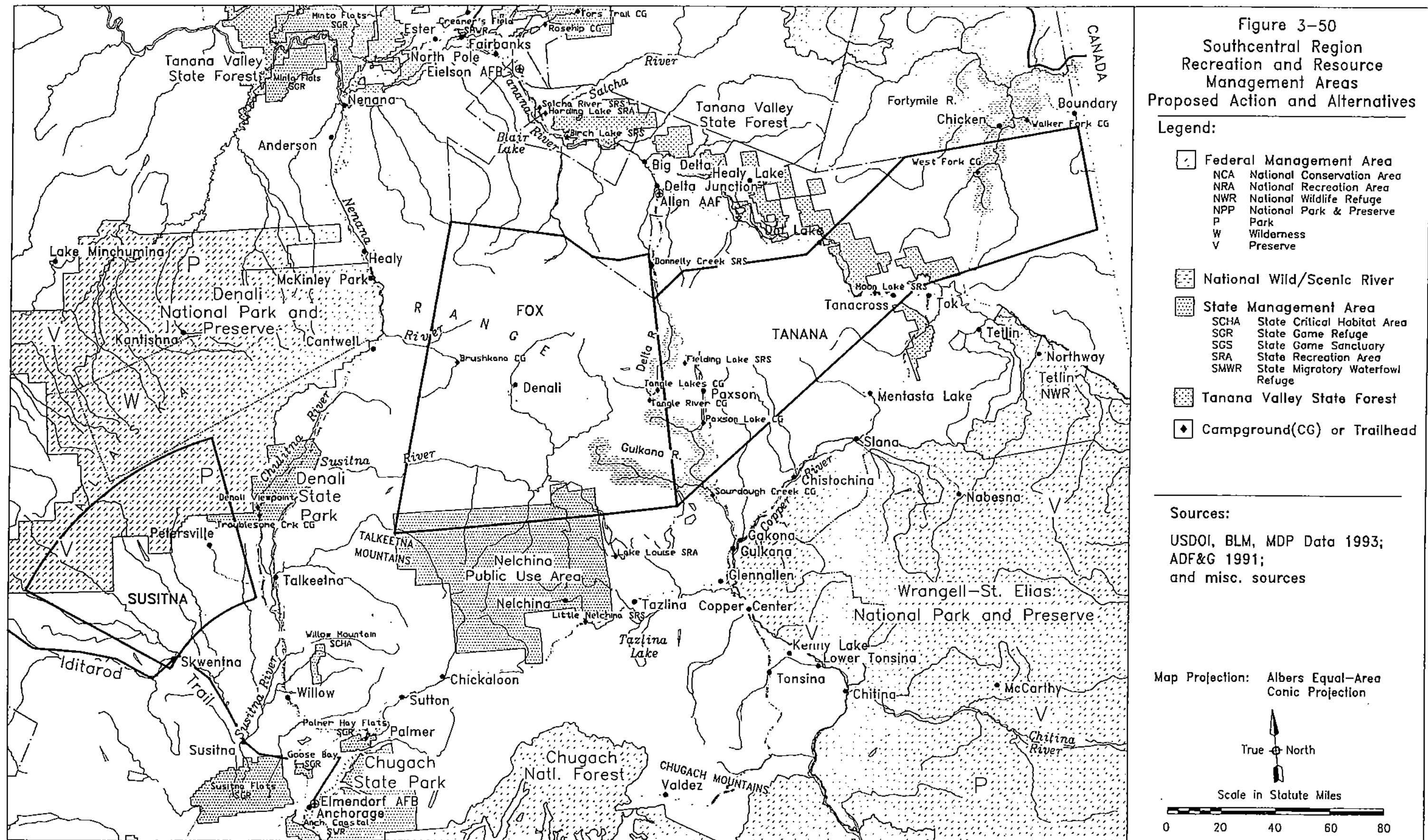
See section 3.6.4.2.2 for a detailed description of recreational resources and activities along the Denali Highway.

Recreation activities also occur on BLM-administered lands located at the western edge of the TANANA MOA (FOX 2 TMOA) and on BLM lands in other areas in the region (see Figure 3-57 and Figure 3-58 in section 3.8.4). General state lands underlying the western portion of TANANA MOA (FOX 2 TMOA) and throughout the region support a variety of recreational activities, including hunting and fishing, hiking, camping, skiing, mountain climbing, and snowmachining. There are two lodges on the Richardson Highway under the western edge of the TANANA MOA (FOX 2 TMOA): 1) Paxson Roadhouse at the junction of the Denali and Richardson

highways, and 2) Meier's Lake Roadhouse at mile 170 of the Richardson Highway. Dot Lake Lodge is located at mile 1,361 of the Alaska Highway. Some private recreation facilities are located under the southern edge of the FOX 2 TMOA—just outside the southwestern corner of proposed TANANA MOA—, in and around the community of Sourdough. Private recreation cabins and lodges are also probably scattered throughout the TMOA area, but are most likely to be situated along roads and rivers for ease of access.

The Sheep Lambing Area Flight Avoidance Area (27), a rectangle roughly 12 miles wide and 34 miles long, extends eastward from Mount Gakona and the Gakona Glacier over the West Fork of the Robertson River. It goes from the surface to 1,000 feet AGL and is in effect from May 1 to June 30. It was established for a low-altitude MTR, and is shaped to extend 5 miles on either side of the MTR's center line. The Gulkana National Wild River Flight Avoidance Area (36) extends 5 miles either side of the main stem of the Gulkana River from the outlet of Paxson Lake south to the community of Sourdough. It goes from the surface to 5,000 feet MSL and is in effect from June 27 to July 11. The Delta National Wild and Scenic River Flight Avoidance Area (19) extends 5 miles either side of the river from the Denali Highway and Round Tangle Lake north almost to Darling Creek. It goes from the surface to 5,000 feet MSL and is in effect from June 27 to July 11. No attempt was made to categorize specific tracts of undesignated federal or state lands or private recreation facilities. Depending on proximity to communities, highways, or other development, these areas would range from semi-modern to primitive recreation opportunity settings.

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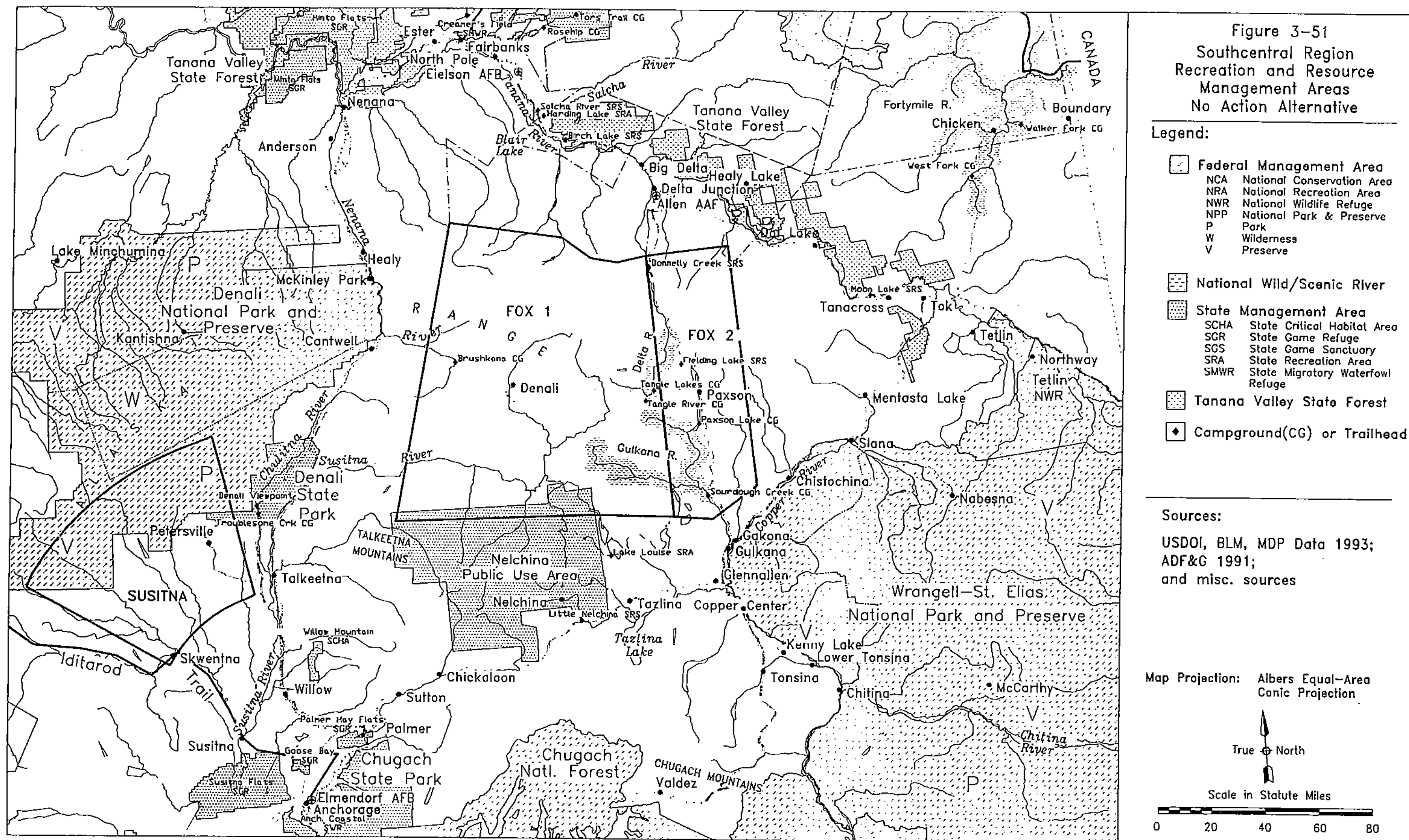


Table 3-6 Major Recreation Resources Located Beneath Existing and Proposed MOAs in the Southcentral Region

Recreation Resource	Total Area ^{1,2}	Airspace ³	Area Beneath Airspace ^{1,2,4}	Visitor Use ⁵	Flight Avoidance Area ⁶	Recreation Opportunity Category ⁷				Sensitivity Ranking ⁸
						M	S-M	S-P	P	
U.S. Department of Interior, Bureau of Land Management, Glennallen District										
Tangle Lakes Campground	60 acres	FOX (FOX 1)	60 acres	21,000	Yes (19)		X	X		Medium
Tangle River Campground	3 acres	FOX (FOX 1)	3 acres	10,800	No		X	X		Medium
Brushkana Campground	20 acres	FOX (FOX 1)	20 acres	20,734	No			X		Medium
Tangle Lakes National Register Archaeological District	≈ 460	FOX (FOX 1)	≈ 460	not avail.	Yes (19)			X		Medium
Proposed 50 Mile Area of Critical Environmental Concern	7	FOX (FOX 1)	7	not avail.	No			X		Medium
Proposed West Fork Gulkana River Area of Critical Environmental Concern	381	FOX (FOX 1)	381	not avail.	No				X	High
23 Trails, Trailheads along the Denali Highway	227.5 TM	FOX (FOX 1)	227.5 TM	not avail.	Some (19)			X	X	Medium to High
Denali Highway	135.5 M	FOX (FOX 1) TANANA (FOX 2)	92 M (68%) 19 M (14%)	21,444 (7,190 groups)	No		X			Low
Gulkana National Wild River (main stem)	47 RM	TANANA (FOX 2) FOX (FOX 1)	45 RM (96%) 47 RM	4,799	Yes (36)				X	High
Middle Fork	32 RM	TANANA (FOX 2) FOX (FOX 1)	15 RM (47%) 17 RM (53%)	not avail.	Yes (36)				X	High
West Fork	133 RM	FOX (FOX 1) TANANA (FOX 2)	73 RM (55%) 56 RM (42%) 60 RM (45%)	not avail.	Yes (36)				X	High

Recreation Resource	Total Area ^{1,2}	Airspace ³	Area Beneath Airspace ^{12,4}	Visitor Use ⁵	Flight Avoidance Area ⁶	Recreation Opportunity Category ⁷				Sensitivity Ranking ⁸
						M	S-M	S-P	P	
Delta National Wild, Scenic, and Recreational River	62 RM	FOX (FOX 1) TANANA (FOX 2)	30 RM (48%) 32 RM (52%)	658	Yes (19) N. of Hwy.				X	High
Paxson Lake Campground	90 acres	TANANA (FOX 2)	90 acres	14,526	No		X			Low
Sourdough Campground	150 acres	(FOX 2)	150 acres	20,000	Yes (36)		X			Low
Proposed Mud Lake Area of Critical Environmental Concern	9.2	TANANA (FOX 2)	9.2	not avail.	No			X		Medium
12 Trails, Trailheads along the Richardson Hwy.	88 TM	TANANA (FOX 2)	88 TM	not avail.	Some (19)			X	X	Medium to High
<i>U.S. Department of Interior, Bureau of Land Management, Anchorage District</i>										
Iditarod National Historic Trail	2,264 TM	SUSITNA	(<1%)	not avail.	No			X	X	Low
<i>U.S. Department of Interior, Bureau of Land Management, Steese/White Mountains District</i>										
Fortymile National Wild, Scenic, and Recreational River	13 RM 19 RM 17 RM	TANANA TANANA TANANA	13 RM 14 RM (74%) 17 RM	200 boating 38,110 total	No				X X X	High
West Fork Campground	20 acres	TANANA	20 acres	not avail.	No			X		Medium
<i>U.S. Department of Interior, National Park Service</i>										
Denali National Park and Preserve	6,028	SUSITNA	957 (16%)	1395000	Yes (16) Over Park Road	X		X	X	Low

Recreation Resource	Total Area ^{1,2}	Airspace ³	Area Beneath Airspace ^{1,4}	Visitor Use ⁵	Flight Avoidance Area ⁶	Recreation Opportunity Category ⁷				Sensitivity Ranking ⁸
						M	S-M	S-P	P	
Alaska Department of Natural Resources, Division of Parks and Outdoor Recreation										
Denali State Park	324	SUSITNA	24 (8%)	465,054	No		X	X	X	Low
Fielding Lake State Recreation Site	600 acres	TANANA	600 acres	8,300	Yes (23)		X			Low
Moon Lake State Recreation Site	22 acres	TANANA	22 acres	54,240	No		X			Low
Alaska Department of Natural Resources, Division of Land										
Deshka State Recreation River	87 RM	SUSITNA	29 RM (33%)	37,778 person-days (1989)	No			X	X	Medium
Lake Creek State Recreation River	64 RM	SUSITNA	51.5 RM (81%)	14,500 person-days (1989)	No			X	X	High
Nelchina Public Use Area	2,350	FOX (FOX 1)	391 (17%) 276 (12%)	not avail.	Some (26)				X	Low

Recreation Resource	Total Area ¹²	Airspace ³	Area Beneath Airspace ^{12,14}	Visitor Use ⁵	Flight Avoidance Area ⁶	Recreation Opportunity Category ⁷				Sensitivity Ranking ⁸
						M	S-M	S-P	P	
Alaska Department of Natural Resources, Division of Forestry										
Tanana Valley State Forest	1,810	TANANA	284 (16%)	not avail.	No	X	X			Low

¹Sources: BLM 1993c; Alaska Northwest Books 1991; Simmerman 1991; various unit plans; data not available for all areas.

²Area figures are given in acres x 1,000 unless otherwise indicated, and rounded to the nearest whole number; M = road miles; RM = river miles; and TM = trail miles.

³Airspace in parentheses indicates previously utilized Temporary MOA.

⁴Figures in parentheses indicate percentage of recreation area located beneath airspace, rounded up to the nearest whole number; assume 100 percent unless otherwise indicated.

⁵Visitor use data not available for all areas; 1993 data presented unless otherwise indicated; data presented is for the entire resource area or unit unless otherwise indicated; visitor use data do not indicate number of people exposed to overflights because: 1) not all areas are completely located beneath the airspace; and 2) not all visitors would be exposed to overflights.

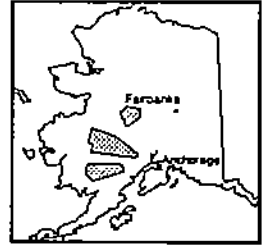
⁶Alpha/numeric code in parentheses refers to list of Flight Avoidance Areas in Appendix B.

⁷Recreation Opportunity categories: M = Modern; S-M = Semi-modern; S-P = Semi-primitive; and P = Primitive.

⁸Sensitivity ranking is based on three factors: 1) the degree to which noise resulting from any aircraft overflights (military or non-military) would be considered inconsistent with the recreation opportunity setting of the area (see section 3.6.1.2); 2) visitor use levels (if known)—comparatively high visitor use levels connote greater sensitivity; and 3) the percentage of the recreation area located beneath proposed airspace (may vary between Alternatives)—the higher the percentage, the greater the sensitivity.

3.6.5 Western Region

The Western Region contains the NAKNEK 1 and 2 MOAs, STONY A and B MOAs, STONY C TMOA, and GALENA MOA.



3.6.5.1 NAKNEK 1 and 2 MOAs

3.6.5.1.1 Federal and State Designated Recreation Resource Areas

The NAKNEK MOAs overlies portions of Lake Clark NPP, the Mulchatna National Wild River, and Wood-Tikchik State Park SP.

Lake Clark National Park and Preserve

Lake Clark NPP is managed by the NPS. The eastern edge of NAKNEK 2 MOA overlies approximately 3 percent of Lake Clark NPP. Located about 150 miles southwest of Anchorage, Lake Clark NPP is accessible by air from Anchorage, Homer, Iliamna, Kenai, or Port Alsworth. There are no roads to or within this area. Use of the park is highly seasonal, with most use occurring May through August. Total visitor use in 1989 was 21,700 with 363 overnight backcountry stays; in 1993 there 12,200 visitors and 2,369 overnight backcountry stays (NPS 1989; NPS 1993a). Total park visitation during the summer is approximately 1,500 to 2,300 visits per month; an estimated 100 visits occur during the fall hunting season (Roberts 1993). The primary recreation activities are backpacking, river floating, and fishing. Wildlife watching and photography are also popular. Sport hunting is permitted in the Preserve, but not in the Park. Fairly high summer fishing use levels occur at the Caribou Lakes, located at the headwaters of the Koksetna River under the southeast corner of NAKNEK 2 MOA. This area is also used during the fall for hunting, with access provided by air taxi.

There are no Flight Avoidance Areas over the Lake Clark NPP. This analysis categorized the portion of Lake Clark NPP located beneath the NAKNEK 2 MOA as a primitive recreation opportunity setting.

Mulchatna and Chilikadrotna National Wild Rivers

Twenty-four miles of the Mulchatna River are designated as a National Wild River and administered by the NPS. The NAKNEK 2 MOA overlies the last 3 of these river miles, or 13 percent of the designated portion of the river. The 11-mile segment of the Chilikadrotna River designated as a National Wild River is located east and entirely outside the boundaries of NAKNEK 2 MOA. However, both rivers flow west/southwest underneath the MOA. Recreational use centers around fishing, hunting, and river floating. Access is by airplane only. Most recreational use occurs from June to September. Visitor use estimates were not available, but the number of floaters has increased in recent years, particularly on the Chilikadrotna River (Roberts 1993).

There are no Flight Avoidance Areas over the designated Mulchatna or Chilikadrotna National Wild Rivers. This analysis categorized both rivers, designated and undesignated, as primitive recreation opportunity settings.

Wood-Tikchik State Park

NAKNEK 1 MOA overlies approximately 58 percent of Wood-Tikchik SP. The park, which was established in 1978, is the largest state park in the United States. It attracts hikers and backpackers, kayakers, lake boaters, river floaters, cross-country skiers, fishermen, and hunters. Floating and fishing are by far the most popular activities in the park. There is no road access to the area; access is by air taxi from Dillingham or chartered boat from Aleknagik. Visitor use data for the park were unavailable (Panarese 1993). The Tikchik Lodge Airport Flight Avoidance Area (B) (under the western portion of NAKNEK 1 MOA) extends in a 3-mile radius around the Tikchik Lodge airport from the surface to 1,500 feet AGL and is in effect year-round. This analysis categorized the portion of Wood-Tikchik SP located beneath the NAKNEK 1 MOA as a mostly primitive

recreation opportunity setting with semi-primitive settings around the high-use lodge areas where activities are concentrated.

3.6.5.1.2 Undesignated Recreation Resource Areas

Federal, State, and Private Lands

There are two small areas of BLM-administered lands along the southern boundary of NAKNEK 1 MOA, and one small area along the southern boundary of NAKNEK 2 MOA. However, most of the area under the NAKNEK MOAs is undesignated, state-owned land. Recreational use is most intensive along the Mulchatna, Chilikadrotna, Koktuli, Nuyakuk, King Salmon, Stuyahok, and Mosquito rivers (ADNR 1984) and centers around fishing, hunting, and recreational boating. Access to the area is primarily by powerboat or floatplane. Most recreational use occurs from June to September. The number of floaters has increased in recent years, particularly on the Chilikadrotna River (Roberts 1993). There are numerous private cabins, lodges, and camps underneath the NAKNEK MOAs, located predominantly along the lakes and rivers that provide boat and aircraft access.

The Mulchatna River Fishing Lodge Flight Avoidance Area (20) extends in a 1-mile radius around the lodge. Located in the approximate center of the NAKNEK 2 MOA, it goes from the surface to 1,500 feet AGL and is in effect from May 1 to September 30. The New Koliganek Airport Flight Avoidance Area (1) extends in a 3-mile radius around the airport, goes from the surface to 1,500 feet AGL, and is in effect year-round. No attempt was made to categorize federal or state undesignated lands or private lands underneath the NAKNEK MOAs. Depending on proximity to communities, these lands would range from semi-primitive to primitive recreation opportunity settings.

3.6.5.2 STONY A and B MOAs and STONY C TMOA

3.6.5.2.1 Federal and State Designated Recreation Resource Areas

The STONY MOAs overlie portions of Lake Clark NPP, the Iditarod NHT, and the Innoko NWR. There are no formally designated state recreation resource units under the STONY MOAs.

Lake Clark National Park and Preserve

The southeastern corner of the STONY A MOA overlies approximately 2 percent of Lake Clark NPP. Most of the area under the MOA is designated wilderness (Roberts 1993; NPS 1984). Almost all of this area is mountainous and glacier-covered, with little recreational use (Roberts 1993). See section 3.6.5.1.1 for more information on the recreational use characteristics of Lake Clark NPP.

There are no Flight Avoidance Areas over the portion of Lake Clark NPP located beneath the STONY A MOA. This analysis categorized the portion of the Lake Clark NPP located below the STONY A MOA as a primitive recreation opportunity setting.

Innoko National Wildlife Refuge

The northwestern corner of STONY C TMOA overlies approximately 2 percent of the Innoko NWR. This portion of the refuge is designated wilderness. Recreation appears to be a very small part of the use of the refuge; total recreational use was estimated at 500 visitor use days in 1987 (USFWS 1987a). Moose hunting trips comprise most of the recreational use of the refuge. Recreational hunting occurs primarily along the Innoko River, above the confluence with Magitchlie Creek, and along the Dishna River. Both of these areas are outside the STONY C TMOA. Sportfishing levels are low and expected to remain so due to the high costs of transportation to and from the area. The slow-moving, meandering rivers do not attract river recreationists, and the low relief and vast wetlands discourage cross-country hiking and camping. It is anticipated that recreational

use will continue to focus on moose hunting with incidental waterfowl and fish harvest, and will occur primarily during the fall moose and waterfowl hunting seasons (USFWS 1987a).

There are no Flight Avoidance Areas over the Innoko NWR. This analysis categorized the portion of the refuge located beneath the STONY C TMOA as a primitive recreation opportunity setting.

Iditarod National Historic Trail

Approximately 2 percent of the Iditarod NHT is located underneath the northern portion of STONY C TMOA. The Iditarod NHT was designated in 1978 and consists of a network of approximately 2,264 miles of trails. It is managed by the BLM under a comprehensive management plan (BLM 1989b). See section 3.6.5.3.1 for a more detailed description of the Iditarod NHT recreational use characteristics.

There are no Flight Avoidance Areas located over this segment of the Iditarod NHT. This analysis categorized the portion of the trail underneath the STONY C TMOA as a primitive recreation opportunity setting.

3.6.5.2.2 Undesignated Recreation Resource Areas

Federal, State, and Private Lands

The region underlying the STONY MOAs is predominantly a mix of undesignated federal and state lands. Undesignated federal lands under the STONY MOAs are managed by the BLM. Most of these lands are state- or Native-selected (Vernimen 1993). Recreational use is concentrated under the STONY A MOA, between the Kuskokwim River and the Alaska Range. Hunting, fishing, and river floating are the primary recreational activities. Most use takes place during the fall hunting season, from early August to mid-October, along major river drainages. The George River, under the STONY C TMOA, has high potential for recreational use (BLM 1982a). Big-game commercial guiding on state lands is relatively high along the western slopes of the Alaska Range, particularly under STONY A MOA. This region has the highest concentration of commercial guide use in the Kuskokwim Area (ADNR 1988a). There is no road access to this area. Private recreation cabins are located throughout the area underneath the STONY MOAs, and are likely to be located predominantly along waterways that provide access. Large areas of private land exist along the Kuskokwim River, particularly underneath the STONY B MOA and STONY C TMOA.

There are Flight Avoidance Areas over the following communities: Crooked Creek Airport (D), Red Devil Airport (E), Sleetmute (F), and Stony River (C). All extend in a 3-mile radius around the airport, go from the surface to 1,500 feet AGL, and are in effect year-round. No attempt was made to categorize specific tracts of federal or state undesignated lands or private lands. Depending on proximity to communities or other development, these lands would range from semi-primitive to primitive recreation settings.

3.6.5.3 GALENA MOA

3.6.5.3.1 Federal and State Recreation Resource Areas

The GALENA MOA overlies portions of the Nowitna NWR, the Nowitna National Wild River, and the Iditarod NHT. There are no formally designated state recreation resource units under the GALENA MOA.

Nowitna National Wildlife Refuge

The northern and central portions of the GALENA MOA overlie approximately 30 percent of the Nowitna NWR. The dominant feature of the refuge is the Nowitna River, a popular hunting area for Ruby residents and Fairbanks hunters travelling the Yukon River (ADCRA 1987). This river is further described below. Moose and bear hunting, trapping, and fishing are recreation opportunities available on the refuge. There is no road access to

the area; access is by boat or air service from Galena or Fairbanks. No visitor use statistics were available at the time of this writing.

There are no Flight Avoidance Areas over the portion of the Nowitna NWR under the GALENA MOA. This analysis categorized this portion of the refuge as a primitive recreation opportunity setting.

Nowitna National Wild River

The Nowitna National Wild River flows 225 miles from the southern boundary of the Nowitna NWR to the confluence with the Yukon River. Approximately 63 percent of the designated segment underlies the GALENA MOA. The river is floated by rafters, kayakers, and canoers. Access is by airplane to put-ins in the vicinity of Clearwater and Meadow creeks, and from take-outs at the confluence with the Yukon River or from Ruby. Air taxis operate from the communities of Galena and Tanana. The Nowitna is the second longest river in the National Wild and Scenic Rivers System. Sportfishing for trophy size sheefish is a popular recreation activity on the river (USFWS 1987b). Agate hunting along gravel bars on the upper portion of the river is also popular. Most recreational use takes place from June to September. No visitor use statistics were available.

There are no Flight Avoidance Areas over the Nowitna National Wild River. This analysis categorized the Nowitna River as a primitive recreation opportunity setting.

Iditarod National Historic Trail

The Iditarod NHT was designated in 1978 and is managed by the BLM. It consists of a network of approximately 2,264 miles of trails. Two segments of the Iditarod NHT underlie the northwestern corner of GALENA MOA and run roughly parallel from the Hunch Mountain area north to Placerville and Poorman, where they converge, and then on to Sulatna Crossing and Long. These segments comprise approximately 2 percent of the trail. Recreational use along these segments is low. Most use is by local residents, is concentrated around villages, and occurs in the winter when the tundra and rivers are frozen and easier to travel across (BLM 1986a; BLM 1988c). Due to extreme weather conditions and lack of support facilities away from communities, the Iditarod NHT attracts few non-local recreationists (BLM 1986a). During the fall, some big game hunting is based out of the Yukon River villages. In even-numbered years, the Iditarod Trail Sled Dog Race, which takes place in March, follows a northern route from Ophir to Kaltag that uses the trail segments underlying the MOA (Iditarod Trail Committee 1994; Alaska Northwest Books 1991). During the race, mushers, tourists, and support personnel also use the trail segments.

There are no Flight Avoidance Areas over these trail segments. This analysis categorized those portions of the trail as primitive recreation opportunity settings.

3.6.5.3.2 Undesignated Recreation Resource Areas

Federal, State, and Private Lands

Undesignated federal lands under the GALENA MOA are managed by the BLM as part of the Kuskokwim Subunit, but most of these lands are state-selected (Vernimen 1993; BLM 1986b). Much of this area has outstanding dispersed recreation potential, particularly for hunting and fishing in primitive settings (BLM 1986b). The majority of recreational users are local residents. The predominant opportunities are sport fishing, big game hunting, and river floating, primarily on the Titna River and the North Fork (BLM 1986b). General state lands occur under the western portion of GALENA MOA. Recreational use of these lands is similar to the uses occurring in other areas underneath this MOA. Private recreation cabins are probably located underneath the GALENA MOA, and are likely to be located predominantly along waterways that provide access.

There are no Flight Avoidance Areas under the GALENA MOA. No attempt to categorize undesignated federal or state lands or private lands has been made. However, most of the area would fall in the primitive recreation opportunity setting.

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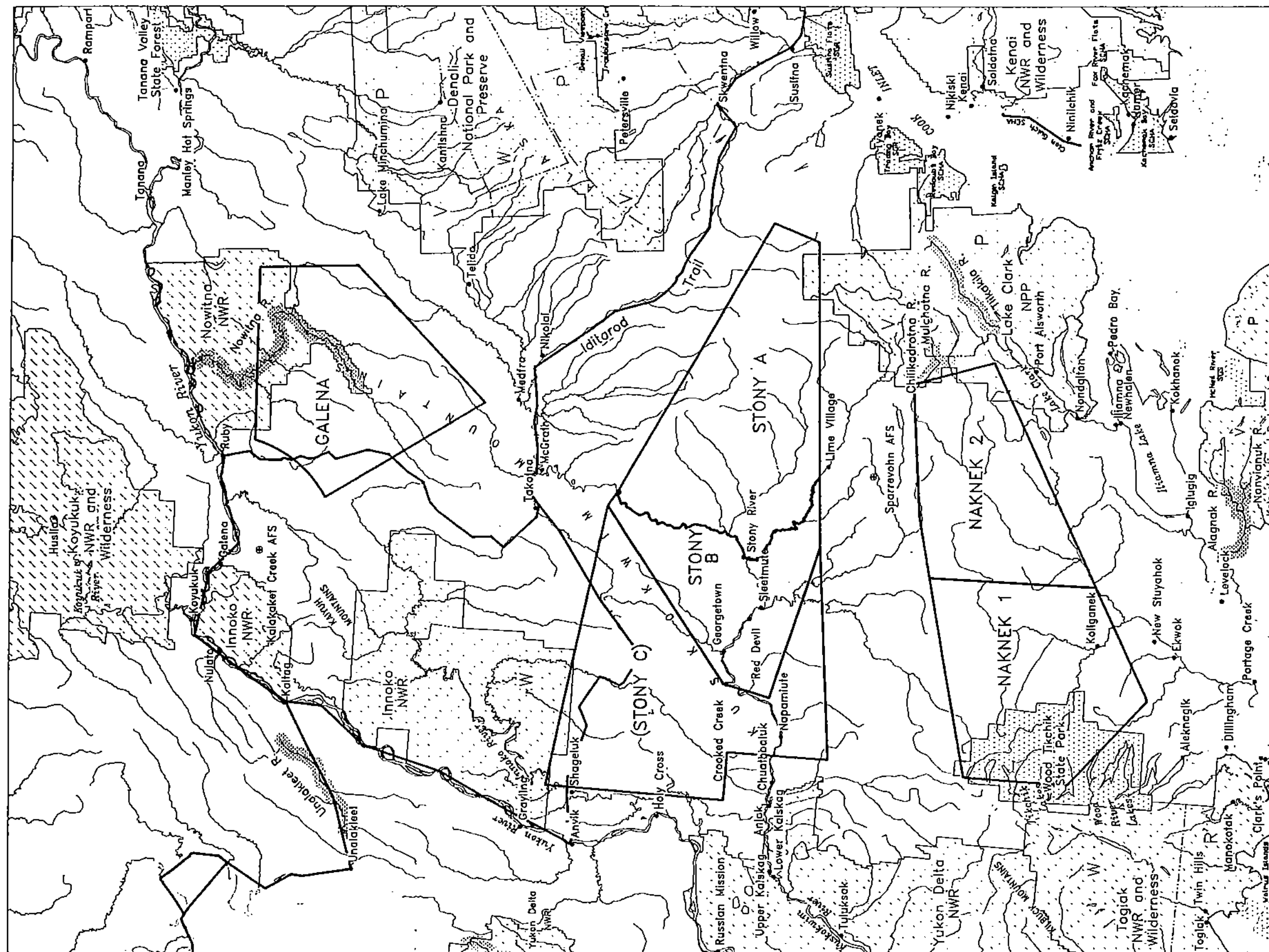


Figure 3-52
Western Region
Recreation and Resource
Management Areas
Proposal, Alternatives, and NAA

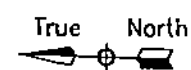
Legend:

- Federal Management Area
 - NCA National Conservation Area
 - NRA National Recreation Area
 - NWR National Wildlife Refuge
 - NPP National Park & Preserve
 - P Park
 - W Wilderness
 - V Preserve
- National Wild/Scenic River
- State Management Area
 - SCHA State Critical Habitat Area
 - SGR State Game Refuge
 - SGS State Game Sanctuary
 - SRA State Recreation Area
 - SMWR State Migratory Waterfowl Refuge
- Tanana Valley State Forest
- Campground(CG) or Trailhead
- () TMOA designation under NAA

Sources:

USDOI, BLM, MDP Data 1993;
ADF&G 1991;
and misc. sources

Map Projection: Albers Equal-Area
Conic Projection



Scale in Statute Miles

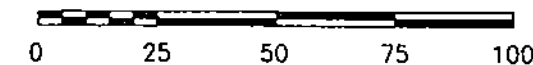


Table 3-7 Major Recreation Resources Located Beneath Existing and Proposed Military Operations Areas in the Western Region

Recreation Resource	Total Area ^{1,2}	Airspace ³	Area Beneath Airspace ^{1,2,4}	Visitor Use ⁵	Flight Avoidance Area ⁶	Recreation Opportunity Category ⁷				Sensitivity Ranking ⁸
						M	S-M	S-P	P	
U.S. Department of Interior, National Park Service										
Lake Clark National Park and Preserve	3,655	NAKNEK 2 STONY A	102 (3%) 69 (2%)	12,200	No				X	Low Low
Mulchatna National Wild River	24 RM	NAKNEK 2	3 RM (13%)	not avail.	No				X	Low
U.S. Department of Interior, Bureau of Land Management, Anchorage District										
Iditarod National Historic Trail	2,264 TM	GALENA (STONY C)	45 TM (2%) 107 TM (5%)	not avail.	No				X	Low Low
U.S. Department of Interior, Fish and Wildlife Service										
Innoko National Wildlife Refuge	3,850	(STONY C)	69 (2%)	500 (1987)	No				X	Low
Nowitna National Wildlife Refuge	1,560	GALENA	475 (31%)	not avail.	No				X	Medium
Nowitna National Wild River	225 RM	GALENA	141 RM (63%)	not avail.	No				X	Medium to High

Recreation Resource	Total Area ^{1,2}	Airspace ³	Area Beneath Airspace ^{1,2,4}	Visitor Use ⁵	Flight Avoidance Area ⁶	Recreation Opportunity Category ⁷				Sensitivity Ranking ⁸
						M	S-M	S-P	P	
Alaska Department of Natural Resources, Division of Parks and Outdoor Recreation										
Wood-Tikchik State Park	1,428	NAKNEK 1	830 (58%)	not avail.	Yes (B)		X	X		High

¹Sources: BLM 1993c; Alaska Northwest Books 1991; Simmerman 1991; various unit plans; data not available for all areas.

²Area figures are given in acres x 1,000 unless otherwise indicated, and rounded to the nearest whole number; M = road miles; RM = river miles; and TM = trail miles.

³Airspace in parentheses indicates previously utilized Temporary MOA.

⁴Figures in parentheses indicate percentage of recreation area located beneath airspace, rounded up to the nearest whole number; assume 100 percent unless otherwise indicated.

⁵Visitor use data not available for all areas; 1993 data presented unless otherwise indicated; data presented is for the entire resource area or unit unless otherwise indicated; visitor use data do not indicate number of people exposed to overflights because: 1) not all areas are completely located beneath the airspace; and 2) not all visitors would be exposed to overflights.

⁶Alpha/numeric code in parentheses refers to list of Flight Avoidance Areas in Appendix B.

⁷Recreation Opportunity categories: M = Modern; S-M = Semi-modern; S-P = Semi-primitive; and P = Primitive.

⁸Sensitivity ranking is based on three factors: 1) the degree to which noise resulting from any aircraft overflights (military or non-military) would be considered inconsistent with the recreation opportunity setting of the area (see section 3.6.1.2); 2) visitor use levels (if known)—comparatively high visitor use levels connote greater sensitivity; and 3) the percentage of the recreation area located beneath proposed airspace (may vary between Alternatives)—the higher the percentage, the greater the sensitivity.

3.6.6 Sport Hunting

Sport hunting is an activity that is highly valued in Alaska. Although it is difficult to estimate its scope, the number of hunting licenses sold gives an indication of its popularity. In 1991/1992, 87,402 resident hunting licenses and an additional 10,806 combination fishing, hunting, and trapping licenses were sold, entitling a total of 98,208 Alaskans to hunt within the state; 10,282 nonresident hunting licenses were also sold (ADF&G, Division of Wildlife Conservation 1993). Sport hunting is not only important as a recreational activity, but is the basis of an important industry. Commercial hunting guides, air taxi operators, hunting lodge owners, sporting goods suppliers, and a variety of service industries benefit from the expenditures made by sport hunters in Alaska.

The ADF&G administers the state's GMUs and oversees the harvest of game species in them. In Appendix M, the GMUs and subunits underlying the MOAs in each of the four regions are identified, along with the reported harvest levels for black bear, brown bear, bison, caribou, moose, Dall sheep, wolves, and wolverine. To indicate the relative importance of each GMU or subunit on a statewide basis, the number of animals harvested in 1991/1992 is also given as a percentage of the statewide harvest. This information, including the percentage of statewide harvest, is summarized in the following sections and presented in tabular form in Table 3-8. All percentages are approximate and have been rounded to the nearest whole number.

3.6.6.1 Northern Interior Region MOAs

The Northern Interior Region MOAs overlie portions of GMUs 20B, 20D, 20E, 25B, 25C, and 25D. Caribou harvest in this region is comparatively low at 7 percent of the total statewide harvest; moose harvest is 12 percent; Dall sheep harvest is 4 percent; black bear harvest is 8 percent; and brown bear harvest is an estimated 2 percent of the statewide total. Eleven percent of the wolves and 10 percent of the wolverine harvested statewide were taken from the GMUs underlying these MOAs.

3.6.6.2 Southern Interior Region MOAs

The Southern Interior Region MOAs overlie portions of GMUs 20A, 20B, and 20D. Fifteen percent of the statewide moose harvest and 9 percent of the statewide caribou harvest occur in GMUs underlying this region; and 11 percent of the Dall sheep harvested were taken in this region's GMUs. Nine percent of the black bear harvest also takes place in this region, but brown bear harvest is low at 2 percent. Seventy-two percent of the bison harvested in the state were taken from GMU 20D, in an area underlying the BUFFALO MOA (BUFFLO TMOA). Twelve percent of the wolves and 6 percent of the wolverine harvested statewide came from GMUs underlying this region.

3.6.6.3 Southcentral Region MOAs

The GMUs underlying the Southcentral Region, including the proposed TANANA MOA, accounted for 43 percent of the statewide caribou harvest (33 percent from the Nelchina Herd alone), 40 percent of the Dall sheep harvest, 25 percent of the moose harvest, 15 percent of the black bear harvest, and 13 percent of the brown bear harvest. Twenty-one percent of the wolves and 18 percent of the wolverine successfully hunted or trapped in the state were also taken from these GMUs.

3.6.6.3.1 SUSITNA MOA

The SUSITNA MOA overlies portions of GMUs 16A and 16B. Nine percent of the black bear harvested in the state were taken from these GMUs and 5 percent of the brown bear harvest. Other harvest levels for the species assessed were comparatively low.

3.6.6.3.2 FOX MOA (FOX 1 TMOA)

The FOX 1 TMOA overlies portions of GMUs 13A, 13B, 13E, and 20A. Thirty-seven percent of the caribou harvested statewide were taken from these GMUs (33 percent from the Nelchina Herd). Thirteen percent of the moose and 12 percent of the Dall sheep were also harvested in these GMUs, along with 6 percent of the brown bear and 4 percent of the black bear.

3.6.6.3.3 TANANA MOA (FOX 2 TMOA)

The proposed TANANA MOA (FOX 2 TMOA) overlies portions of GMUs 12, 13B, 13C, 20D, and 20E. Forty percent of the caribou harvested in the state were taken in these GMUs, again 33 percent from the Nelchina Herd, whose range underlies both the FOX and TANANA MOAs (FOX 1 and FOX 2 TMOAs). Twenty-seven percent of the Dall sheep were harvested in these GMUs, and 9 percent of the moose. Black and brown bear harvests were comparatively low, both at 3 percent. Again, 72 percent of the bison harvested in the state were taken from GMU 20D, which underlies the western portion of the TANANA MOA (FOX 2 TMOA), although only a small portion of the bison range actually occurs under this airspace.

3.6.6.4 Western Region MOAs

The GMUs underlying the Western Region accounted for 39 percent of the statewide caribou harvest (22 percent from the Mulchatna Herd alone), 22 percent of the moose harvest, 12 percent of the brown bear harvest, 9 percent of the Dall sheep harvest, and 8 percent of the black bear harvest. Eighteen percent of the wolves and 28 percent of the wolverine successfully hunted or trapped in the state were also taken from these GMUs.

3.6.6.4.1 NAKNEK 1 and 2 MOAs

The NAKNEK 1 and 2 MOAs overlie portions of GMUs 9B, 17B, and 17C. Twenty-two percent of the caribou harvested statewide were taken in these MOAs. Other harvest levels are comparatively low.

3.6.6.4.2 STONY A and B MOAs and STONY C TMOA

The STONY A and B MOAs and STONY C TMOA overlie portions of GMUs 19A, 19B, 19C, 19D, 16B, and 21A. Twenty-eight percent of the bison harvested statewide were taken from GMU 19C, which underlies this airspace. However, the bison range is near Farewell, north of the STONY A MOA. Although counted because they were harvested in a GMU underlying the STONY MOAs, it is unlikely that harvested bison were taken in areas actually underlying the MOAs. Twenty-four percent of the caribou, 12 percent of the moose, 9 percent of the Dall sheep, 7 percent of the black bear, and 6 percent of the brown bear harvested in the state were taken from the GMUs underlying the STONY MOAs.

3.6.6.4.3 GALENA MOA

The GALENA MOA overlies portions of GMUs 21A, 21B, and 21D. Fifteen percent of the caribou harvested statewide were taken from these GMUs and 7 percent of the moose harvest. Other harvest levels were comparatively low.

Table 3-8 Species Harvest Data Summary

Total Animals Reported Harvested in GMUs Underlying the Proposed and Alternative Action MOAs ¹											
Species	Northern Interior Region ^{1,2}	Southern Interior Region ^{1,3}	Southeastern Region ^{1,3}				Western Region ^{1,4}			All Regions ^{1,5}	
			SUSITNA	FOX 1 TMOA (FOX)	FOX 2 TMOA (TANANA)	Region Total	NAKNEK 1/2	STONY A/B and C TMOA	GALENA		Region Total
Black Bear	122 (8%)	144 (9%)	150 (9%)	63 (4%)	46 (3%)	255 (15%)	2 (<1%)	120 (7%)	5 (<1%)	127 (8%)	378 (22%)
Brown Bear	23 (2%)	27 (2%)	68 (5%)	78 (6%)	37 (3%)	176 (11%)	76 (5%)	87 (6%)	1 (<1%)	164 (12%)	293 (21%)
Bison ⁶	0 (0%)	93 (72%)	0 (0%)	0 (0%)	93 (72%)	93 (72%)	0 (0%)	36 (28%)	0 (0%)	36 (28%)	129 (100%)
Caribou	618 (7%)	816 (9%)	67 (<1%)	3,258 (37%)	3,477 (40%)	3,846 (43%)	1,936 (22%)	2,115 (24%)	1,362 (15%)	3,467 (39%)	7,369 (83%)
			Note: Includes GMUs under both FOX 1/2 TMOAs (FOX and TANANA MOAs)								
Moose	849 (12%)	1,019 (15%)	400 (6%)	904 (13%)	656 (9%)	1,739 (25%)	314 (4%)	869 (12%)	505 (7%)	1,351 (22%)	3,642 (32%)
Dall Sheep	63 (4%)	164 (11%)	15 (1%)	177 (12%)	394 (27%)	582 (40%)	2 (<1%)	133 (9%)	0 (0%)	135 (9%)	707 (49%)
Wolf ⁹	125 (11%)	134 (12%)	5 (<1%)	160 (14%)	99 (9%)	238 (21%)	64 (6%)	105 (9%)	46 (4%)	208 (18%)	338 (46%)
Wolverine ⁹	57 (10%)	35 (6%)	21 (4%)	36 (6%)	52 (9%)	108 (18%)	70 (12%)	87 (14%)	21 (4%)	164 (28%)	289 (49%)

Source: Alaska Department of Fish and Game 1993c. *Alaska Wildlife Harvest Summary: 1991-1992*.

¹A GMU may not be completely located beneath a MOA; all animals reported harvested in a GMU may not have been taken in the area underlying the MOA. There is also considerable overlap between regions, particularly between the Northern Interior and Southern Interior Regions, and between the Southern Interior and Southcentral Regions. Thus, several GMUs are counted in more than one MOA or region, resulting in some overstatement of the regional harvest levels.

²Figure in parentheses is percentage of statewide harvest, rounded to the nearest whole number.

³Figures include GMUs located under the YUKON 4 and 5 MOAs, which would not be established under Alternative B.

⁴Figures include GMUs located under the CLEAR CREEK MOA, which would not be established under Alternative A.

⁵Figures include GMUs located under the TANANA MOA, which would only be established under Alternative B.

⁶Figures include GMUs located under the STONY C TMOA, which would only be established under the No Action Alternative.

⁷Totals and percentages may be less than sum of regional and/or MOA totals and percentages as a GMU may be counted in more than one region.

⁸Bison are harvested only in GMUs 19C and 20D, 19C underlies the STONY MOAs in the Western Region and the bison range in 20D underlies the BUFFALO MOA (BUFLO TMOA) and FOX 2 TMOA in the Southern Interior and Southcentral Regions.

⁹Harvested by hunting or trapping.

3.6.7 Commercial Recreation

According to the Alaska Department of Commerce and Economic Development (ADCED), there was substantial growth in total in-state expenditures by visitors to Alaska between summer 1989 and 1993—an estimated 26 percent increase in per person per trip expenditures (ADCED 1993a). Overall, visitors to Alaska spent an average of \$83.00 per person per night and \$728.00 per person per trip in 1993. The Southcentral region was the major beneficiary of total visitor spending (\$251 million) and had the second highest per-person per-trip expenditure (\$451.00). The Interior/Northern region received \$79 million in total visitor expenditures, considerably more than in summer 1989, and averaged \$261 per-person per-trip expenditures (70 percent of which was spent in Fairbanks). The Denali/McKinley region received \$40 million in total visitor expenditures, again considerably more than in summer 1989, and averaged \$163.00 per person per trip. The Southwest region received \$24 million in total visitor expenditures, but had the highest per-person per-trip average expenditure at \$839.00. Although Alaska's largest communities (Anchorage, Fairbanks, Juneau, Ketchikan, Skagway, Kenai/Soldotna, Sitka, Homer, and Seward) attracted two-thirds of the total in-state expenditures, more visitor dollars are finding their way into smaller communities and more remote locations. Wilderness locations in the Southwest and Southcentral areas captured significant shares of visitor expenditures, receiving \$9.9 million and \$6.7 million, respectively; while Tok received \$7.5 million, Glennallen \$4.3 million, other Southcentral communities some \$12.2 million, other Interior communities some \$7.8 million, and other Southwest communities \$2.0 million.

Summer visitors in 1993 spent more on tours and recreation services (\$175 million) than any other expenditure category (*ibid.*). This figure includes expenditures for day tours, overnight tours, guide services, sports, and entertainment. An estimated 1.4 percent of this (\$2.5 million) was spent on guide services—\$0.9 million in the Southcentral region, \$1.0 million in the Southwest region, and \$0.6 million in the Southeast region. No expenditures for guide services were recorded in the Interior/Norther region in the summer of 1993. As in past years, most of the tours purchased (95 percent) fell into the day tour category. Some 2.9 percent of the total tours purchased were for three or more nights. Of these longer tours, 27 percent were stays at fishing lodges and 21 percent were excursions for wilderness fishing or adventure tours.

ADCED also found that visitor satisfaction was rated very highly, although overall trip ratings declined somewhat between summer 1989 and summer 1993 (ADCED 1993b). The department speculated that the relationship between the rapidly growing visitor volume and a slower growing infrastructure (e.g., roads, facilities, etc.) could provide one explanation for the decline. Another possible explanation is the changing expectations of visitors as the State has succeeded in drawing visitors from a larger pool. A third factor may be the different attitudes, values, and perceptions of the post-war baby-boomers who are beginning to emerge as the prime target age group for Alaska visitors. The department also examined visitor satisfaction on a regional level for specific activities. These findings are summarized Table 3-9 (Visitor Satisfaction by Region).

Table 3-9 Visitor Satisfaction Ratings by Region

All Visitors - Summer 1993				
Activity	Southcentral	Interior/North	Southwest	Denali/McKinley
Canoeing/Kayaking	6.2	6.0	5.7	4.9
Rafting	6.2	6.0	7.0	6.3
Hiking	6.0	5.8	6.3	6.2
Fishing (Freshwater)	5.4	5.4	6.5	4.8
Wildlife Viewing	5.9	5.5	6.6	5.7
Bird Watching	5.7	5.6	6.3	5.3
Hunting	6.6	6.5	7.0	6.9
Dogsledding	4.0	5.5	-	4.6
Camping	5.5	5.4	5.3	5.3

Note: 1 = Poor and 7 = Excellent on a scale of 1 to 7.

Source: ADCED 1993b.

Within the context of this EIS, there are several factors that determine the commercial recreational activities and providers that could potentially be affected and the magnitude of impact anticipated, such as:

- The types and numbers of commercial recreation providers operating under proposed MOAs,
- The types of recreation activities and/or services provided,
- The location and nature of the attractions or use areas,
- The seasons, peak periods, and volumes of commercial recreation activities occurring,
- The methods employed to access use areas, particularly reliance on small aircraft, and
- The relative cost of commercial recreation activities.

Eight general types of commercial recreation activities occur in the Region of Influence:

- Lodges (hunting, fishing, and wilderness experience): The use of these facilities is relatively steady from June through September, although hunting and fishing depend on seasonal openings and distribution of fish species.
- Hunting Guides (moose, caribou, brown bear, black bear, and Dall sheep): Alaska sport hunting regulations concentrate these activities from mid-August through mid-October; hunting guides may rely on road, boat, or small aircraft access depending on the location of base camps and use areas.
- Fishing Guides: Fishing guides operate from June through September, although use of an area depends on the availability of target species; fishing guides may rely on road, boat, or small aircraft access depending on the location of base camps and use areas; activities are focused on rivers and lakes.
- Rafting/Boating Wilderness Outfitters: Outfitter activity is likely to be concentrated on specific rivers selected for characteristics such as scenic values, level of difficulty, and/or ease of access; use may be affected by water levels, with more activity during higher water levels in the first half of the season; outfitters may rely on road, boat, or small aircraft access depending on the location of base camps and use areas.

- **Hiking/Horseback Wilderness Outfitters:** Outfitters operate from June through September; horseback activity is more common where there are trails and road access; hiking can occur off the road systems or use small aircraft to access remote locations.
- **Flightseeing Excursions:** Air taxis provide these services predominantly from June through September; excursions usually involve a 1- to 4-hour trip from the airport or floatplane base of operations.
- **Air Taxis (drop-off/pick-up):** This activity consists of air charter by various types of private recreational users for a drop-off and/or pick-up; air taxis typically operate from June through September, but the timing and location depends on the recreation activities of the client.
- **Tour Bus and Tour Boat Excursion Operators:** Excursions occur from June through September; tour buses are concentrated along highways such as the Alaska and Richardson highways, although use of the Taylor and Denali highways is increasing; tour boat excursions currently concentrate on the Yukon River between the Canadian border and either Eagle or Circle.

Information regarding the locations of major commercial recreation attractions, types of commercial recreation activities, use levels, and seasons of operation (including peak periods by activity) is presented in Table 3-10. It forms the basis for a subjective sensitivity ranking, also presented in Table 3-10. Table 3-11 presents the Guide Use Areas and number of guides and other commercial recreation providers operating in the Region of Influence.

Table 3-10 Commercial Recreation Resources and Activities Located Beneath Existing and Proposed MOAs in the Region of Influence

Commercial Recreation Attraction	MOA	Major Use Area Under MOA	Activity	Operator Type ¹	Use/Intensity ²	Current Overflight ³	Sensitivity Ranking ⁴
<i>Northern Interior Region MOAs</i>							
Yukon-Charley Rivers National Preserve; Charley National Wild River	YUKON 1	No	Flightseeing Boating Hiking	Air Taxi Guide Guide	L1 L2 L1	RT/MFE	Low Low Low
	YUKON 2	No	Flightseeing Boating Hiking	Air Taxi Guide Guide	L1 M2 L1	RT/MFE	Low Medium Low
	YUKON 3	No	Flightseeing Boating Tour Boats Hiking	Air Taxi Guide Excursion Co. Guide	L1 M2 M1 L1	MFE	Low Medium Medium Low
	YUKON 4	Yes	Flightseeing Boating Tour Boats Hiking	Air Taxi Guide Excursion Co. Guide	L1 M2 M1 L1	MFE	Low Medium Medium Low
Steese National Conservation Area	YUKON 2	Yes	Hiking Flightseeing	Guide Air Taxi	M1 M1	RT/MFE	Medium Medium
Birch Creek National Wild River	YUKON 2	Yes	Boating	Guide	H2	RT/MFE	High
Yukon Flats National Wildlife Refuge	YUKON 2	No	Hunting	Guide	L3	RT/MFE	Low
	YUKON 4	No	Hunting	Guide	L3	MFE	Low
	YUKON 5	No	Hunting	Guide	L3	MFE	Low
Fortymile National Wild, Scenic, and Recreational River; Taylor Highway	YUKON 3	Yes	Boating Flightseeing/ Drop-off Tour Buses Hunting	Guide Air Taxi Excursion Co. Guide	H2 M1 M1 H3	MFE	High Medium Low High

Commercial Recreation Attraction	MOA	Major Use Area Under MOA	Activity	Operator Type	Use/Intensity ²	Current Overflight ³	Sensitivity Ranking
Chena River State Recreation Area; Chena Hot Springs	YUKON 6	Yes	Hiking Horse Riding Lodge	Guide Guide Owner	H1 H1 H1	MFE	Medium Medium Medium
<i>Southern Interior Region MOAs</i>							
Blair Lakes	CLEAR CREEK	Yes	Hunting Fishing	Air Taxi Air Taxi	M3 M2	RT/MFE	Low Low
Alaska Range - Northern Foothills	EIELSON	No	Hunting Fishing	Air Taxi, Guide Air Taxi, Guide	M3 M2	MFE	Low Low
Harding Lake State Recreation Area	BIRCH	Yes	Air Taxi Base	Air Taxi	H1	MFE	Medium
<i>Southcentral Region MOAs</i>							
Fortymile National Wild, Scenic, and Recreational River; Taylor Highway	TANANA	Yes	Boating Flightseeing/ Drop-off Tour Buses Hunting	Guide Air Taxi Excursion Co. Guide	H2 M1 M1 H3	None	High Medium Low High
Delta National Wild River; Gulkana National Wild River; Richardson Highway	FOX (FOX 1/2 TMOAs)	Yes Yes No	Boating Boating Tour Buses	Guide Guide Excursion Co.	H2 H2 M1	MFE	High High Low
Denali Highway; McClaren and Susitna rivers; Nelchina Public Use Area	FOX (FOX 1 TMOA)	Yes Yes No	Tour Buses Hunting Hunting Hunting	Excursion Co., Guide, Air Taxi Guide, Air Taxi Guide	M1 H3 M3 M3	MFE	Medium High Medium Medium
Denali National Park and Preserve; Deshka and Lake Creek State Recreation rivers	SUSITNA	No Yes	Flightseeing Fishing, Hunting, Boating, Lodges	Air Taxi Guide, Air Taxi Guide, Air Taxi Guide, Air Taxi Owner	H1 H2 H3 H1 M1	RT	Medium Medium Medium Medium Medium

Commercial Recreation Attraction	MOA	Major Use Area Under MOA	Activity	Operator Type ¹	Use/Intensity ²	Current Overflight ³	Sensitivity Ranking ⁴
Western Region MOAs							
Wood-Tikchik State Park	NAKNEK 1	Yes	Lodges Hunting Fishing Boating	Owner Guide, Air Taxi Guide, Air Taxi Guide, Air Taxi	H1 H3 H1 H1	RT	Medium Medium Medium Medium
Nushagak and Mulchatna rivers	NAKNEK 2	Yes	Lodges Hunting Fishing Boating	Owner Guide, Air Taxi Guide, Air Taxi Guide, Air Taxi	H1 H1 H1 H1	RT	Medium Medium Medium Medium
Lake Clark National Park and Preserve	NAKNEK 2 STONY A	No No	Hiking Hiking	Guide, Air Taxi Guide, Air Taxi	L1 L1	RT	Low Low
Stony, Holitna, and Kuskokwim rivers	STONY A/B	No	Boating Fishing Hunting	Guide, Air Taxi Guide, Air Taxi Guide, Air Taxi	M2 M2 M3	RT	Medium Medium Medium
Western Alaska Range - Uplands	STONY A	No	Hunting Fishing	Guide, Air Taxi Guide, Air Taxi	M3 M2	RT	Medium Medium
Nowitna National Wildlife Refuge; Nowitna National Wild River	GALENA	No Yes	Hunting Fishing Boating Fishing	Guide, Air Taxi Guide, Air Taxi	L3 L2 L2 L2	RT	Low Low

¹Operator types include guides (fishing, hunting, boating, other outfitters), air taxis for flightseeing and recreational use drop-off/pick-up, lodge owners, and excursion companies (bus and boat tours).

²All use assumes May through September season; use levels include high (H), medium (M), and low (L); seasonal variation is indicated by number code: 1 means relatively steady use throughout the season, 2 means higher early to mid-summer use levels based on higher water or presence of sport fish species, and 3 means specific moose, caribou, or Dall sheep hunting season.

³RT means routine training aircraft activities, MFE means Major Flying Exercise aircraft activities.

⁴All factors are evaluated to develop a subjective assumption-based sensitivity ranking of High, Medium, or Low.

Table 3-11 Commercial Recreation Providers Operating Beneath Existing and Proposed MOAs in the Region of Influence

MOA	Guide Use Areas (GMU-Use Area)	Master Guide-Outfitters ¹	Guide-Outfitters ²	Wilderness Recreation and Tourism Businesses ³
Northern Interior Region				
YUKON 1	20-06, 20-10, 20-11	0	6	18
YUKON 2	20-06, 20-11			
YUKON 3	20-11, 20-12			
YUKON 4	20-11			
YUKON 6	20-06			
Southern Interior Region				
EIELSON	20-03, 20-05, 20-07	0	5	13
BIRCH	20-06, 20-07, 20-10			
FALCON	20-06			
CLEAR CREEK	20-05, 20-06			
BUFFALO	20-08, 20-09, 20-10, 20-11			
Southeastern Region				
FOX	13-01, 13-02, 13-03, 20-04, 20-08	1	45	75 (66 % Denali NPP)
SUSITNA	16-02*, 16-03, 16-04, 16-05	1	11	
TANANA	12-01, 13-04, 20-08, 20-09, 20-10, 20-11, 20-12	1	15	

MOA	Guide Use Areas (GMU Use Area)	Master Guide-Outfitters ¹	Guide-Outfitters ²	Wilderness Recreation and Tourism Businesses ³
<i>Western Region</i>				
GALENA	21-01, 21-04	0	5 [†]	20 (50% Wood-Tikchik SP)
STONY A	19-04, 19-05, 19-06, 19-07, 19-08*, 19-10	2	52	
STONY B	19-01, 19-02, 19-03, 19-04			
STONY C TMOA	19-01, 19-02, 19-03, 19-04*, 21-01	0	26	
NAKNEK 1	17-02, 17-03, 17-04, 17-05, 19-03, 19-04			
NAKNEK 2	09-01, 17-01, 17-02, 17-03, 19-04	1	74 [‡]	

Notes: It is probable that some businesses are counted more than once; GMU = Game Management Unit; NPP = National Park and Preserve; and SP = State Park.

¹Registered master guide-outfitters have worked as registered guide-outfitters for at least 12 out of the last 15 years and been favorably recommended by past clients.

²Registered guide-outfitters have served a 3-year apprenticeship as an assistant guide, completed oral and written exams, and demonstrated a knowledge of first aid and CPR.

³Includes wilderness guides (hiking, river trips, kayaking, sailing, wildlife watching, photography, mountaineering, dog sledding, etc.), lodges, equipment rentals, and charter and flightseeing services.

*Very little of GUA underlies the MOA.

[†]Includes 4 counted in STONY C TMOA as well.

[‡]Includes 17 counted in STONY B MOA/C TMOA as well.

Sources: ADCED 1994b; ADF&G 1992; AWRTA 1995; AWRTA 1994; NPS 1993b.

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3.7 Subsistence

3.7.1 Background

Of the questionnaires received during scoping, approximately 50 percent of the respondents ranked the issue of subsistence as "Very Important" (30 percent ranked subsistence as "Somewhat Important"). Public and agency comments pertaining to subsistence centered on the following issues: 1) identify significant subsistence use areas; and 2) identify impacts on subsistence users and resources. This section describes subsistence use and identifies significant use resources and use areas in the region underneath the existing and proposed MOAs. Chapter 4, section 4.7, identifies the potential impacts to these use areas, users, and resources.

On December 2, 1980, Congress passed the Alaska National Interest Lands Conservation Act (ANILCA), which recognized the importance of subsistence use of fish, wildlife, and other consumptive resources. Title VIII of ANILCA provides for the continued opportunity for customary and traditional uses of fish and wildlife resources on public lands by residents of rural Alaska. The State of Alaska was allowed to continue managing fish and wildlife on federal public lands for subsistence purposes if the State had a subsistence law that was consistent with Sections 803, 804, and 805(d) of ANILCA. Section 803 of ANILCA defines subsistence uses as follows:

As used in this Act, the term 'subsistence uses' means the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; and for customary trade.

In anticipation of the passage of ANILCA, the State passed a subsistence law in 1978, which the Secretary of the Interior subsequently found to be consistent with ANILCA. In 1984, a suit was filed in state court challenging the constitutionality of the Alaska law (specifically, its granting of a subsistence priority based solely on residency). In December of 1989, the Alaska Supreme Court found the rural preference provision of the State's subsistence law to be unconstitutional under Section 258 of the Alaska State Constitution (*McDowell v. Alaska*, 1989). As a result of the 1989 McDowell court decision, all Alaska residents qualify as subsistence users. There is no rural preference for subsistence use on state lands. Alaska residents may harvest resources on state (and some local and private) lands in accordance with Alaska State Hunting Regulations, which govern recreational, subsistence, and commercial uses of Alaska's wildlife. On federal public lands, however, subsistence harvest is only permitted: 1) by residents of rural communities determined to have customary and traditional use of the resource, or 2) where no determination has been made, by all rural Alaska residents (residents of certain non-rural communities are specifically excluded). Residents of the following communities do not qualify as rural Alaska residents:

- Adak
- Municipality of Anchorage
- Fairbanks North Star Borough
- Homer area (including Homer, Anchor Point, Kachemak City, and Fritz Creek)
- Juneau area (including Juneau, West Juneau, and Douglas)
- Kenai area (including Kenai, Soldotna, Sterling, Nikiski, Salamatof, Kalifornsky, Kasilof, and Clam Gulch)
- Ketchikan area (including Ketchikan City, Clover Pass, North Tongass Highway, Ketchikan East, Mountain Point, Herring Cove, Saxman East, and parts of Pennock Island)
- Seward area (including Seward and Moose Pass)
- Valdez
- Wasilla area (including Palmer, Wasilla, Big Lake, Houston, and Bodenbug Butte)

Many small communities in Alaska are wholly or largely dependent on subsistence use of renewable resources. Approximately 50 percent of the food for three-quarters of the Alaska Native families in the state's smaller communities (average population in these communities is approximately 65) is acquired through subsistence activities (FSB 1992). Subsistence use can be the principal means of support for families whose members do not participate in a wage-oriented economy. Subsistence may contribute indirectly to income when used to replace household food purchases and may also contribute economic self-sufficiency when people sell meat, furs, or artifacts fashioned from the plants and animals used for subsistence (Nelson 1986). Subsistence activities may also informally transmit a culture from generation to generation (*ibid.*).

The social organization of rural Alaska includes kinship networks that organize much of the community's subsistence production, distribution, and consumption levels; informally derived systems of respect and authority; strong extended families—although not always living in the same household—and stratification between families focused on success at subsistence endeavors; and access to subsistence technology (FSB 1992).

3.7.2 Information Common to All Regions

Scoping meetings were held in the following communities to inform residents of the Proposed and Alternative Actions and solicit input: Anchorage, Arctic Village, Chalkyitsik, Circle Hot Springs, Delta Junction, Eagle, Fairbanks, Fort Yukon, Glennallen, Lime Village, McGrath, Sleetmute, Talkeetna, Tok, and Venetie. Communities with subsistence resources or use areas likely to be located under the MOAs are identified in each region (following). The following communities were included in the analysis of potential subsistence impacts: Circle, Central, Eagle City, Eagle Village, Chicken, Chalkyitsik, Fort Yukon, Birch Creek, Venetie, Arctic Village, Delta Junction, Healy Lake, Dot Lake, Skwentna, Talkeetna, Trapper Creek, Upper Petersville Road, Paxson, Gakona, Gulkana, Tanacross, Tok, Chistochina, Koliganek, Lime Village, Napamiute, Red Devil, Sleetmute, Stony River Village, Chuathbaluk, Lake Minchumina, McGrath, Nikolai, Ruby, Takotna, Telida. Subsistence activities and characteristics were determined using ADF&G Technical Reports (see Appendix J), Community Data Base Profiles (ADCRA 1991), ADF&G Regional Habitat Guides (ADF&G 1985, 1986); Alaska Department of Labor statistics (ADL 1991); and management plans from state and federal agencies (see Land Use, section 3.8). For each community identified, the following characteristics are described to the extent that data was available: location and setting; population characteristics; estimated subsistence participation of population; employment; general patterns of subsistence use, including seasonal round; and harvest totals. This information has been included in this EIS in Appendix J and is summarized relevant to the Proposed Action and Alternatives in the following sections.

A great deal of variation exists between individuals and among communities. An emphasis on Alaska Native culture has been made here because of the central role subsistence plays in that culture as well as the lesser understanding and knowledge the public and decision-makers have about it. The emphasis on Alaska Native culture is not meant to downplay the importance of subsistence to rural non-Native residents.

Because existing data is not uniform and because there is no standard methodology to assess such impacts, it is difficult to quantify the nature of aircraft overflights and associated noise impacts on subsistence. In order to make meaningful assessment of the impact of aircraft overflights on subsistence resources, this EIS has ranked the communities (described in Appendix J) according to their present sensitivity to any potential impacts to their subsistence resources or activities. This ranking has been developed using "factors" that are compared to develop

a subjective, assumption-based sensitivity to impact criteria. Communities are ranked as having high sensitivity, medium sensitivity, or low sensitivity. This criteria is based on the following factors:

- 1) Is the majority of a community's subsistence use area (predominant use area) under a given MOA (i.e., is it within the area that would be affected by noise from aircraft overflights)? The assumption is that the more subsistence use area under a MOA(s), the greater potential impacts could be.¹
- 2) Is the community predominantly Alaska Native? Alaska Native communities are likely to have higher sensitivity to any impact due to reduced employment opportunities and increased economic importance of harvest, and due to kinship and other forms of sharing and economic/social dependence that increase impact; this also considers social/cultural effects due to potential disruption to subsistence.
- 3) An economic factor evaluates a community's potential sensitivity to harvest disruption based on availability of employment opportunities to offset disruption and the cost of food replacement.

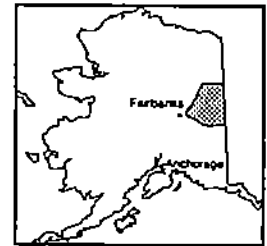
These factors and subsequent sensitivity rankings are presented in Table 3-12 through Table 3-15 for each region. Each table also summarizes information presented in Appendix J regarding primary species of importance for each community, season(s) of primary importance for acquisition of that species, and the status of that species as presented in the biological resources section 3.5.

Finally, subsistence use of fish resources is not addressed in this EIS. There are no foreseen or conceivable impacts resulting from aircraft overflights that would adversely affect fish resources in the state.

3.7.3 Northern Interior Region

This section summarizes the patterns of subsistence use of resources in the areas underneath the Northern Interior Region MOAs. Specific MOAs are identified where they are relevant to the discussion.

The principal species harvested in the Northern Interior Region are moose, caribou, brown bear, black bear, Dall sheep, fish, waterfowl, and small game (FSB 1992). However, moose were determined the most important subsistence species in the Northern Interior Region (Appendix J). In addition to moose, Fort Yukon area residents also rely heavily on waterfowl, and Arctic Village area residents also rely heavily on caribou. (Subsistence harvest of Dot Lake and Healy Lake is addressed in section 3.7.4 as part of the Southern Interior Region).



The dominant seasonal round beginning in winter consists of trapping furbearers and hunting moose and caribou, accessed by snowmachine and on foot (winter); caribou and waterfowl hunting and movement to fish camps (spring); activities centered around fish camps with gillnet or fish wheels for salmon harvest (summer); and moose and caribou hunting accessed by boat until freezeup (fall) (FSB 1992). The fall moose hunt in August and September is one of the single most important activities of the year as it is the most critical time for residents to obtain a large supply of moose meat to see them through the winter. Moose hunting may continue through fall and winter, as late as March in some locations.

¹As an initial visual aid for identifying probable majority use areas, 30-mile radiuses were drawn around each community located beneath or near a MOA. The 30-mile figure was based on information in the literature (including mapped subsistence use areas), consultation with agencies and subsistence users, and federal and state criteria for determining customary and traditional use—all of which suggest that subsistence users do not harvest resources outside their traditional harvesting areas, which for practical purposes are usually as near as possible to their residence. While subsistence users may travel long distances to harvest certain resources, the average distance travelled, given available time and transportation methods, was estimated to be 30 miles. However, the primary means for determining a community's majority use area was the information obtained from ADF&G Division of Subsistence technical papers and Regional Habitat Guides; the ADCRA Community Database; ADL population and demographic reports; management plans from state and federal agencies; and the communities themselves (see Appendix J).

Schroeder et al. (1987) reported that the amount of hunting effort in Interior Alaska is highly variable among parties, and gave for example the Stevens Village hunters who spent a total of from 1 to 21 days hunting moose in 1984/1985. Boats are commonly used for fall moose hunts along major rivers, sloughs, and nearby lakes (Sumida and Alexander 1985). In the winter, snowmachines are commonly used to access moose hunting areas, and the stalking and tracking of moose is done on foot with snowshoes. Moose are also taken opportunistically in conjunction with winter trapping activities. Upper Tanana River communities concentrated their caribou hunting efforts along the Taylor Highway during the fall and winter (Haynes et al. 1984). Small game hunting, including waterfowl, is often carried out in conjunction with other hunting, fishing and gathering activities or conducted in areas within walking distance of communities (Schroeder et al. 1987).

Six communities were determined to have or be likely to have the majority of their subsistence use areas under the proposed or existing Northern Interior Region MOAs (see Table 3-12). Specifically, Central and Circle subsistence harvest occurs predominantly in an area that would be located under the (proposed and existing) YUKON 2 MOA; use is concentrated along the Steese Highway corridor. Eagle City, Eagle Village, and Chicken residents conduct subsistence activities primarily in an area the majority of which is under the proposed YUKON 3 MOA (previously utilized YUKON 3 TMOA); hunting is concentrated along the Taylor Highway corridor (FSB 1992). Eagle City hunts moose primarily along the Yukon River and its tributaries. Chalkyitsik is likely to participate in subsistence in the area under the proposed YUKON 5 MOA (previously utilized YUKON 4 TMOA); use is concentrated along the Black River and Salmon Fork drainages. The majority of subsistence use areas of the communities of Fort Yukon, Birch Creek, Venetie, and Arctic Village are not located underneath proposed or existing MOAs.

Table 3-12 presents the factors (outlined in section 3.7.2) used to rank these communities according to their sensitivity to impacts on subsistence activities and resources. Circle and Eagle Village are considered in this analysis to have high sensitivity to impacts. Central, Eagle City, Chicken, and Chalkyitsik are considered to have medium sensitivity. Fort Yukon, Birch Creek, Venetie, and Arctic Village are considered to have low sensitivity, primarily because their area of subsistence harvest is predominantly outside of the area underneath the proposed MOAs.

Table 3-12 Northern Interior Region¹

Community	Majority of Use Area under MOA ²	Native ³	Economic Factor ⁴	Rank ⁵	Species of Primary Importance	Status of Species ⁶	Seasonal Use/Species
Central	YUKON 2	≈2%	M	M	moose	Moose populations: North and West (YUKON 2 & 5) part of region: low densities, but stable or slightly increasing. Eastern (YUKON 3 & 4): stable, but low density. Southwest (YUKON 1): high density, stable. Southeast (YUKON 3): low density, increasing slowly.	Sep/moose, caribou Dec-Feb/caribou Nov-Mar/furbearer
Circle	YUKON 2	≈86%	H	H	moose		late Aug/moose
Eagle City	YUKON 3	≈3%	M	M	moose		Aug-Sep/moose
Eagle Village	YUKON 3	≈80%	H	H	moose		Aug-Sep/moose
Chicken	YUKON 3 TANANA	≈3%	M	M	info. not avail.		late Aug-mid Sep/moose early Aug-end Sep, Dec 1-Feb 28/caribou
Chalkyitsik	YUKON 5	≈92%	H	M	moose		fall, along Black River and Salmon Fork/moose
Fort Yukon	--	≈85%	H	L	moose, waterfowl		Sep/moose spring, late Aug-Sep/waterfowl
Birch Creek	--	≈90%	H	L	moose		late summer, early fall/moose
Venetie	--	≈94%	H	L	moose		fall/moose
Arctic Village	--	≈94%	H	L	moose, caribou		fall/moose mid-Aug through winter/caribou

¹ See Appendix J for detailed descriptions of communities' subsistence characteristics summarized here.

² If no MOA is indicated, majority of use area appears to be outside MOA.

³ Percentage of community that is Alaska Native, based on 1990 population census. Native communities are likely to have higher significance of impact due to increased employment opportunities and increased economic importance of harvest, due to kinship and other forms of sharing and economic/social dependence that increase impact, and due to the social/cultural effects of disruption to subsistence (see section 3.7.2).

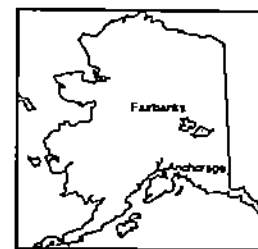
⁴ Economic factor evaluates sensitivity to adverse harvest disruption based on availability of employment opportunities to offset disruption and food replacement on a high sensitivity (H), medium sensitivity (M), and low sensitivity (L) basis (see section 3.7.2).

⁵ All factors are compared to develop a subjective, assumption-based high sensitivity (H), medium sensitivity (M) and low sensitivity (L) ranking.

⁶ Source: Biological resources section 3.5.3.5.

3.7.4 Southern Interior Region

The communities of Delta Junction, Healy Lake, and Dot Lake are located under the proposed Southern Interior Region MOAs. The majority of Healy Lake subsistence harvest is likely to occur under the YUKON 1 and proposed BUFFALO MOAs (existing YUKON 1 MOA and previously utilized BUFLO TMOA). The majority of Dot Lake subsistence harvest is likely to occur under the proposed BUFFALO and TANANA MOAs. Because Dot Lake is located directly underneath the boundary of BUFFALO and TANANA MOAs, it is assumed that approximately 50 percent of the community's subsistence area would be under BUFFALO MOA and 50 percent under TANANA MOA. However, the majority of the subsistence use area of Dot Lake does not occur under the previously utilized BUFLO TMOA (No Action Alternative).



While residents of the community of Delta Junction may participate in subsistence hunting, the community has been ranked as having low sensitivity since Fort Greely, Alyeska Pipeline, and agriculture provide existing employment opportunities in this predominantly non-Native community. Delta Junction subsistence use will not be described further in this section.

Dominant seasonal round and general subsistence use patterns are assumed to be similar to those described in the Northern Interior Region section (see section 3.7.3). Species harvested for subsistence in the Southern Interior Region include moose, caribou, brown bear, black bear, Dall sheep, fish, waterfowl, and small game. Moose were determined to be the most important subsistence species for Healy Lake; moose and caribou for Dot Lake. There are no data available describing the general patterns of subsistence use for Healy Lake. It is assumed that the seasonal patterns of Healy Lake hunters are comparable to those of Dot Lake and Tanacross (for Tanacross, see Southcentral Region section 3.7.5). Both communities hunt moose primarily in September and occasionally throughout the year. Caribou are hunted primarily in August/September and December through February. Dot Lake residents hunt caribou by permit in the vicinity of the Macomb Plateau, accessing hunting areas by foot in the fall or by snowmachine in the winter (Martin 1983). Upper Tanana River communities concentrated their caribou hunting efforts along the Taylor Highway during the fall and winter (Haynes et al. 1984 in Schroeder et al. 1987).

Table 3-13 presents the factors that have been used to rank these communities according to their sensitivity to impacts on subsistence activities and resources. This analysis has ranked Healy Lake and Dot Lake communities as having high sensitivity to impacts on subsistence.

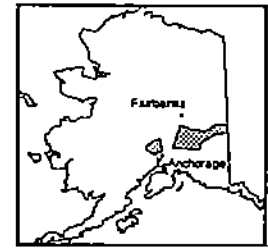
Table 3-13 Southern Interior Region¹

Community	Majority of Use Area under MOA ²	Native ³	Economic Factor ⁴	Rank ⁵	Species of Primary Importance	Status of Species ⁶	Seasonal Use/Species
Delta Junction		≈ 3%	L	L	not avail.	Moose populations: Salscha and Chena R. increasing. NE part of region, variable, but ADF&G management goals probably incl. Increasing in Tanana Flats and AK Range foothills. SE portion: high and stable south of Alaska Highway; <i>low and stable or declining north of Alaska highway.</i>	not avail.
Healy Lake	BUFFALO YUKON 1	≈ 85%	H	H	moose	Caribou herds: Fortymille: slowly increasing. Chisana: increasing (FSB 1992). Mentasta: declining. Subsistence hunt currently suspended. Nelchina: stable-slightly increasing. Macomb: stable.	Sep/moose
Dot Lake	BUFFALO TANANA	≈ 58%	H	H	moose caribou		Sep/moose. Aug-Sep, Dec-Feb/caribou.
	(NAA) ⁷			M ⁷			

¹ See Appendix J for detailed descriptions of communities' subsistence characteristics summarized here.² If no MOA is indicated, majority of use area appears to be outside MOA.³ Percentage of community that is Alaska Native, based on 1990 population census. Native communities are likely to have higher significance of impact due to reduced employment opportunities and increased economic importance of harvest, due to kinship and other forms of sharing and economic/social dependence that increase impact, and due to the social/cultural effects of disruption to subsistence (see section 3.7.2).⁴ Economic factor evaluates sensitivity to adverse harvest disruption based on availability of employment opportunities to offset disruption and food replacement on a high sensitivity (H), medium sensitivity (M), and low sensitivity (L) basis (see section 3.7.2).⁵ All factors are compared to develop a subjective, assumption-based high sensitivity (H), medium sensitivity (M) and low sensitivity (L) ranking.⁶ Source: Biological resources section 3.5.4.5 (unless otherwise noted).⁷ Under the No Action Alternative (NAA), majority of subsistence use area for Dot Lake would not be located under MOAs/TMOAs.

3.7.5 Southcentral Region

Twelve communities whose subsistence activities could potentially be affected by the Proposed Action or Alternative Actions in the Southcentral Region were identified for impact analysis. These communities are Tanacross, Tok, Gakona, Gulkana, Chistochina, Paxson, Skwentna, Talkeetna, Trapper Creek, Upper Petersville Road, Mentasta Lake, and the Nabesna Road area. (See discussion under Southern Interior Region for the community of Dot Lake.) This section describes the subsistence use patterns for these communities and ranks them according to their sensitivity, as detailed previously in section 3.7.2. Factors and sensitivity ranking for this region are given in Table 3-14.



The principal species harvested for subsistence in the southcentral region are moose, salmon, caribou, brown and black bear, waterfowl, furbearers, Dall sheep, and small game. The dominant seasonal round beginning in winter consists of hunting caribou, moose, and bear, and trapping furbearers (winter); trading between interior and coastal communities, harvesting hare and muskrat, freshwater fishing, and salmon fishing (spring); dipnetting for salmon (summer); and hunting caribou, moose, sheep, and goat (fall) (FSB 1992). The species of primary importance varied among communities within the region. In general, moose and salmon are the species of primary importance for residents of the Copper River Basin area (east of the Richardson Highway) (Schroeder et al. 1987); moose and caribou were determined to be the most important subsistence species for other communities in the region.

No data were available describing exact use areas. However, all of the communities in this region (see below) are located along existing roadways, with the exception of Skwentna. Use areas are likely to be concentrated along roadways and river drainages that provide access.

Of the 12 communities, four (Tanacross, Tok, Paxson, and Upper Petersville Road area) were determined to have or be likely to have the majority of their subsistence use areas located underneath the proposed or existing MOAs.

The majority of subsistence use areas for the communities of Tanacross and Tok would be located under the proposed TANANA MOA. The majority of the Paxson subsistence area would be located under the proposed FOX and TANANA MOAs. Tanacross subsistence use is concentrated north along the Taylor Highway, south along the Glenn Highway, and east/west along the Alaska Highway. Moose and caribou are the species of primary importance for Tanacross, a predominantly Native community. The critical subsistence hunting season for Tanacross is mid-August through September. Tanacross has been given a high sensitivity ranking. No subsistence use pattern data have been collected for Tok or Paxson. However, Tok area and seasonal use patterns are assumed to be similar to those of Tanacross and the Northern Interior Region (see section 3.7.3); moose are likely to be the most important subsistence harvest species. Paxson use is likely to be concentrated along the Denali and Richardson Highways, and along area river drainages. Moose, caribou, and Dall sheep are the most important species for Paxson area residents. Paxson and Tok are representative of more urbanized, predominantly non-Native populations connected by road networks and having a high level of participation in a capital economy. Wild resource use is secondary to the area economies. Subsistence harvest activities for these areas are likely to be valued as recreational pursuits (Schroeder et al. 1987). For these reasons, Tok and Paxson have been ranked as having low sensitivity to subsistence impacts.

Although it appears that the majority of the subsistence use area for Skwentna is not likely to be located under the SUSITNA MOA, a primary use area is located under the southwestern portion of the MOA along the West and East Forks of the Yentna River and along the Kichatna River. Based on its economic importance and the importance of the use area under the MOA, Skwentna has been ranked as having medium sensitivity.

The majority of the subsistence use area for the Upper Petersville Road community is also located under the SUSITNA MOA. No data were available for this community; however, based on nearby communities' use

patterns, moose are probably the most important subsistence species, and use is likely to be concentrated along area roads and drainages that provide access. The primary hunting season is likely to follow the sport hunting regulations and seasons, mid-August through September. Based on economic importance and amount of subsistence area likely to be located under the MOA, the Upper Petersville Road has been ranked as having medium sensitivity.

The majority of the subsistence use areas of the Copper River Basin communities of Gakona, Gulkana, Chistochina, Mentasta Lake, and the Nabesna Road and Talkeetna and Trapper Creek areas are *not* located underneath the proposed or existing MOAs. The Copper River Basin communities rely heavily on salmon, a species that the Proposed Action or Alternative Actions would not affect. Talkeetna, located on the railbelt and road system, is not recognized in this analysis as a subsistence-based community. Subsistence harvest activities are, rather, valued as recreational pursuits (Schroeder et al. 1987). Based on these considerations, these communities have been given a low sensitivity ranking.

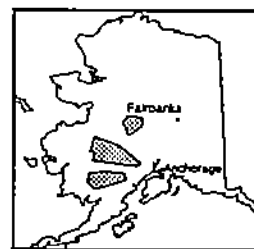
Table 3-14 Southcentral Region¹

Community	Majority of Use Area under MOA ²	Native ³	Economic Factor ⁴	Rank ⁵	Species of Primary Importance	Status of Species ⁶	Seasonal Use/Species
Tanacross	TANANA	≈ 94%	H	H	moose, caribou	Moose: Populations increasing in northern FOX, high density; southern MOA, moose pop. declining, though numbers abundant. FOX 2 TMOA/TANANA: abundant, but recent decline (due to severe winter). Northern TANANA: increasing slightly, abundant. Central TANANA: stable. Southern TANANA: recent decline; hunting restrictions currently foreseeable.	mid-Aug through Sep/moose, caribou
Tok	TANANA	≈ 13%	L	L			
Gulkana [*]		0%	L	L	moose, salmon		mid-Aug-Sep
Gulkana [*]		≈ 59%	M	L	moose, salmon		late Aug-Sep/moose, caribou; Jan-Feb/caribou
Chistochina [*]		≈ 62%	M	L	moose, salmon		mid-Aug-Sep/moose, caribou
Mentasta Lake [*]		≈ 73%	not avail.	M	moose, salmon		
Nabesna Road area [*]			not avail.		moose, salmon	Caribou: Delta herd, sharp decline (northern FOX). Nelchina herd increasing (central, south FOX, TANANA). Mentasta herd declining (southeastern TANANA); sport and subsistence hunt currently suspended. 40-mile herd slowly increasing (TANANA). Mocomb herd stable (TANANA).	
Paxson	TANANA (FOX 1 & 2 TMOAs)	0%	L	L	moose, caribou, Dall sheep		≈ sport hunt season, mid- Aug-Sep
Skwentna		≈ 1%	M	M	moose, black bear, waterfowl		≈ sport hunt season, mid- Aug-Sep
Talkeetna		≈ 2%	L	L	moose		
Trapper Creek		≈ 6%	M	L	moose		≈ sport hunt season, mid- Aug-Sep
Upper Petersville Road	SUSITNA	not avail.	M	M	not avail.		≈ sport hunt season, mid- Aug-Sep

¹ See Appendix J for detailed descriptions of communities' subsistence characteristics summarized here.² If no MOA is indicated, majority of use area appears to be outside MOA. Previously utilized TMOAs (No Action Alternative), where different from listed MOAs, are indicated in parentheses.³ Percentage of community that is Alaska Native, based on 1990 population census. Native communities are likely to have higher significance of impact due to reduced employment opportunities and increased economic importance of harvest, due to kinship and other forms of sharing and economic/social dependence that increase impact, and due to the social/cultural effects of disruption to subsistence (see section 3.7.2).⁴ Economic factor evaluates sensitivity to adverse harvest disruption based on availability of employment opportunities to offset disruption and food replacement on a high sensitivity (H), medium sensitivity (M), and low sensitivity (L) basis (see section 3.7.2).⁵ All factors are compared to develop a subjective, assumption-based high sensitivity (H), medium sensitivity (M) and low sensitivity (L) ranking.⁶ Source: Biological resources sections 3.5.3.4, 3.5.4.4, 3.5.5.4, and 3.5.5.5.^{*} Communities in the Copper River Basin area likely to rely heavily on salmon resources (Schroeder et al. 1987).

3.7.6 Western Region

Koliganek was determined to have the majority of its subsistence use area under the NAKNEK MOA complex, predominantly under NAKNEK 1. Subsistence patterns of communities in this area (such as Koliganek) reflect patterns typical of the southwest part of Alaska. According to the Federal Subsistence Board (FSB 1992), the principal species harvested in this region are, primarily, salmon, caribou, waterfowl, and freshwater fish. Moose, marine mammals, deer, brown bear, and Dall sheep are among the more secondarily harvested species. The dominant seasonal round beginning in winter consists of hunting moose and caribou, trapping, and freshwater fishing (winter); hunting marine mammals, freshwater fishing, and salmon fishing (spring); salmon fishing (summer); and hunting caribou, moose, waterfowl, and marine mammals (fall) (FSB 1992).



Koliganek subsistence activities rely heavily on moose and caribou. The fall hunt, September through mid-October, is the primary harvest season for these species for this community. The harvest activity area can be extensive; in the fall, most traffic is confined to rivers and lakes. The Nushagak and Nuyakuk drainages are traditional areas used by Koliganek hunters. Under the methodology used for this analysis, Koliganek has been ranked as having high sensitivity. No other primary subsistence use areas have been identified under the NAKNEK MOAs. The Mulchatna caribou herd is presently increasing. The moose population under NAKNEK is generally stable, but below ADF&G management objectives.

For the communities whose subsistence areas occur under the proposed or existing STONY or GALENA MOAs, subsistence patterns generally follow those of the Northern Interior Region, outlined in section 3.7.3. However, fish and waterfowl are probably more important to this area than in the Northern Interior.

The STONY MOAs overlies the majority of subsistence use areas for several communities located predominantly along the Kuskokwim River. Majority use areas occur under the MOAs as follows: Lime Village (STONY A), Stony River (STONY A, B), Sleetmute (STONY B), Red Devil (STONY B MOA and STONY C TMOA), Chuathbaluk (STONY C TMOA), and Napamiute (STONY C TMOA). These communities are located along the Kuskokwim River with the exception of Lime Village, which is located just south of the STONY MOA complex along the Stony River. Moose and waterfowl are the species of primary importance to these communities; moose harvest during the mid-August through September fall hunt is critical. Critical waterfowl harvest occurs in the spring (April-May). Moose populations under the STONY MOA complex are currently stable to increasing. Subsistence use in the STONY MOA area is extensive and concentrated along the major drainages, including the Stony, Swift, and Kuskokwim rivers and their tributaries. These communities have been ranked as having high sensitivity.

No communities were identified as having the majority of subsistence use area under GALENA MOA. Ruby, Lake Minchumina, Telida, Nikolai, Takotna, and McGrath probably use some of the area under the MOA for subsistence activities. Use patterns generally follow those for the Northern Interior Region; moose and waterfowl are species of primary importance; the fall hunt is the most critical hunting period. Use is concentrated along major river drainages. Because the majority of use area for these communities would not occur under the GALENA MOA, these communities have been ranked as having low sensitivity.

Table 3-15 Western Region¹

Community	Majority of Use Area under MOA ²	Native ³	Economic Factor ⁴	Rank ⁵	Species of Primary Importance	Status of Species ⁶	Seasonal Use/Species
Koliganek	NAKNEK I	≈96%	H	H	moose, caribou	Caribou: NAKNEK: Mulchatna herd increasing population, high productivity, increase in range areas, increased hunting pressure, particularly in Hoholinn drainage.	Sep to mid-Oct/moose, caribou
Lime Village	STONY A	≈95%	H	H	moose, waterfowl		mid-Aug-Sep/moose, waterfowl
Napamiute	STONY C TMOA	100%	H	H	moose, waterfowl		mid-Aug-Sep/moose, waterfowl
Chuathbaluk	STONY C TMOA	≈90%	data not avail.	H	data not avail.	Waterfowl: no major concentrations under GALENA. Concentrations along Kuskokwim, Yukon, and Innoko R. drainages. Above average productivity expected; but most-recent duck census is down.	data not available
Red Devil	STONY B, C TMOA	≈51%	M	H	moose, waterfowl		mid-Aug-Sep/moose, waterfowl
Sleetmute	STONY B	≈87%	H	H	moose, waterfowl	Moose: GALENA: High densities in Nowitna, Sulatna drainages; moderate densities elsewhere under MOA. Population increasing. STONY: density unknown, estimated moderate to high. Population stable, slightly increasing. NAKNEK: population stable but below management objectives.	fall hunt/moose, waterfowl Apr-May/waterfowl
Stony River	STONY A,B	≈88%	H	H	moose		mid-Aug-Sep/moose
Lake Minchumina	—	≈19%	M	L	moose		—
McGrath	—	≈47%	L	L	moose, waterfowl		fall/moose, waterfowl
Nikolai	—	≈89%	M	L	moose, waterfowl		fall, winter/moose
Ruby	—	≈74%	M	L	moose		—
Takotna	—	≈45%	M	L	moose		—
Telida	—	≈91%	H	L	moose		fall and throughout winter

¹ See Appendix J for detailed descriptions of communities' subsistence characteristics summarized here.² If no MOA is indicated, majority of use area appears to be outside MOA.³ Percentage of community that is Alaska Native, based on 1990 population census. Native communities are likely to have higher significance of impact due to reduced employment opportunities and increased economic importance of harvest, due to kinship and other forms of sharing and economic/social dependence that increase impact, and due to the social/cultural effects of disruption to subsistence (see section 3.7.2).⁴ Economic factor evaluates sensitivity to adverse harvest disruption based on availability of employment opportunities to offset disruption and food replacement on a high sensitivity (H), medium sensitivity (M), and low sensitivity (L) basis (see section 3.7.2).⁵ All factors are compared to develop a subjective, assumption-based high sensitivity (H), medium sensitivity (M), and low sensitivity (L) ranking.⁶ Source: Biological resources sections 3.5.6.1.1, 3.5.6.1.2, 3.5.2.3.1, 3.5.6.4.2, 3.5.6.5.

3.8 Land Use

3.8.1 Introduction

This section describes ownership, uses, management considerations, and aesthetics/quality of life characteristics of lands located under the proposed MOAs. Refer to sections 3.6 and 3.7 for a description of recreation and subsistence land uses in the Region of Influence.

Characteristics Generic to Lands in Alaska

The lands located beneath the MOAs are owned and managed by a mix of federal, state, municipal, Alaska Native, and private entities. In many areas, ownership is unresolved due to selections of federal lands by the State of Alaska under statehood entitlement and by Alaska Native corporations under the provisions of the *Alaska Native Claims Settlement Act of 1971* (ANCSA). ANCSA resulted in the formation of Alaska Native village and regional corporations, which were entitled to select predetermined acreage of land from the federal government. In general, village corporations own surface rights to lands in the immediate vicinity of the village, and regional corporations own the subsurface estate of village-owned lands (with some surface lands). In addition to ANCSA-selections, parcels of land up to 160 acres may be owned by Alaska Natives under the Native Allotment Act of 1906. Native Allotments are under the trusteeship of the Bureau of Indian Affairs (BIA). The Bureau of Land Management (BLM) manages "intermanagement" lands, or undesignated federal lands that are state- or Alaska Native-selected, until conveyance is completed (Vernimmen 1993).

Lands in the vicinity of the Proposed Action MOAs support a variety of urban-, remote residential-, military-, commercial/industrial-, recreational-, subsistence-, and transportation-related uses. Physical and environmental characteristics of these lands can contribute to an aesthetic quality, which is reflected in use of specific areas for recreational, remote residential, and traditional Native purposes.

There are basically two types of state lands that are administered by the Alaska Department of Natural Resources (ADNR). General state lands are lands whose use, classification, and disposal is guided by area plans. Area plans set out goals, objectives, and guidelines by which the state directs its land management. Not all of the general state lands, however, have an established plan. The second type of state land classification includes those lands in designated resource management areas, such as state parks, forests, refuges, public use areas, etc.

Data Collection Methods Employed and Assumptions Made

To determine land status, the MOAs were overlaid onto land status maps published by ADNR (1991a; 1994). Maps of the townships underlying the MOAs were also plotted, and applicable resource management plans or area plans were consulted to determine what land uses and management guidelines were underneath the MOAs. The level of detail for the land status analysis was limited to township unless a land resource item was specifically noted in a plan, by an agency, or in an agency management document.

The amount of land (acres) underlying each MOA was approximated by mapping land status at the township level using a computerized geographic information system. From this database, the approximate percent of lands by status underneath the MOAs was calculated. Because private lands other than Native corporation lands are seldom in contiguous amounts greater than a township, they were not calculated or shown in the tables. However, the presence of private land is discussed in the text for each MOA.

The following characteristics are described for each of the MOAs: land status, land use, land management, and aesthetics/quality of life characteristics.

3.8.2 Northern Interior Region

The lands underneath the Northern Interior Region MOAs are a mix of designated and undesignated state and federal lands, Native village and Native regional corporation lands, municipal, and other private lands. Table 3-16 shows the approximate percent of land status of the lands underlying the Region MOAs. Level of detail is to the township. Figure 3-53 shows land status under the Northern Interior Region MOAs.

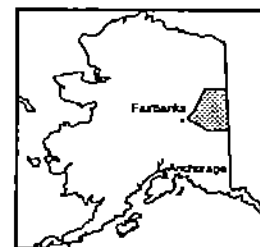


Table 3-16 Northern Interior Region Land Status (by percent of land total underneath MOA)¹

Northern Interior MOAs	State Lands	Federal Lands	Native Corporation Lands	Military Lands
YUKON 1	2.2% ²	16.4%	1.4%	6.2%
	53.8% ³	20.0%		
YUKON 2	0%	49.6%	9.4%	0%
	28.7%	12.3%		
YUKON 3	0%	10.1%	9.4%	0%
	29.3%	51.2%		
YUKON 4	0%	34.2%	21.1%	0%
	0.8%	43.9%		
YUKON 5	0%	54.7%	11.5%	0%
	9.1%	24.6%		
YUKON 6	45.9%	0%	0%	11.8%
	42.1%	0.3%		

¹Figures may not equal 100 percent due to rounding.

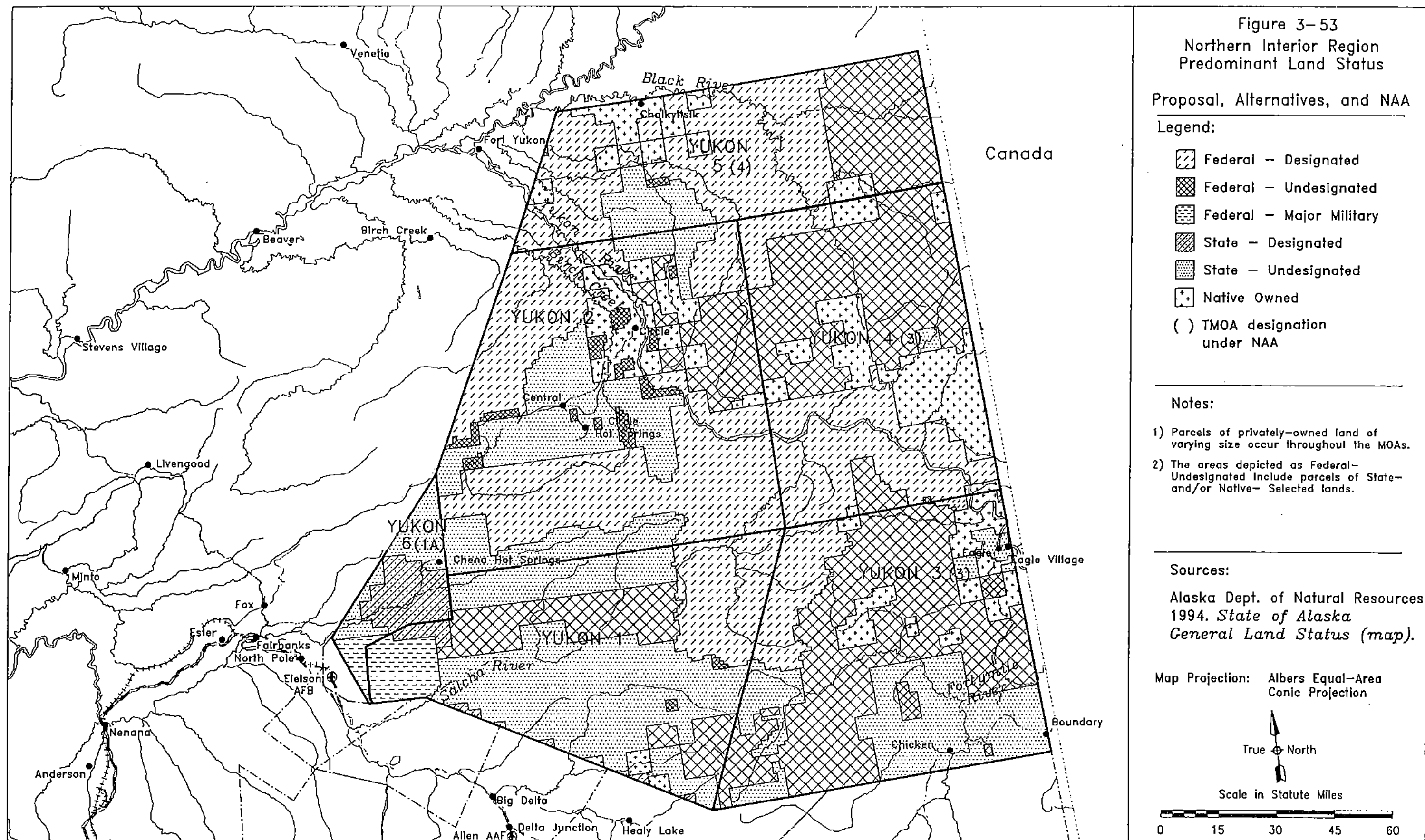
²Top figure is designated lands (e.g., parks, refuges, recreation rivers, etc.).

³Bottom figure is undesignated or general management land.

3.8.2.1 YUKON 1 MOA

Land Status

Approximately 43 percent of the 4,558 square miles of lands beneath the MOA are administered by the federal government. The majority of federal lands are: the Fort Wainwright Military Reserve and Yukon Maneuver Area military withdrawals; the Yukon-Charley Rivers National Preserve, administered by the National Park Service (NPS), which underlies the northeastern portion of the MOA; and BLM-administered lands located in the eastern center of the MOA. Some federal lands around the military reserves have been selected by Alaska Native groups and the State of Alaska, but have not been conveyed. In addition to these lands, a portion of the designated Charley National Wild River is located beneath this MOA, managed by the NPS.



State lands account for 56 percent of the lands beneath the MOA. They are located throughout the area under the YUKON 1 MOA, and include lands specifically designated for parks, transportation and public facilities, and general lands managed by the ADNR.

Two forms of Native lands occur under the area of the Proposed Action and account for 6.2 percent of the lands beneath the MOA. Village corporation lands under the YUKON 1 MOA are located along the southern border and are owned by the Healy Lake village corporation. Doyon Ltd. is the regional Native corporation in the Northern Interior Region; they own the subsurface estate of the Healy Lake village corporation lands.

Private lands under this MOA are small, contiguous parcels concentrated beneath the western portion of the MOA on either side of the Richardson Highway, and more scattered parcels are located along the Salcha River and other river valleys. Certain small parcels of state lands have been leased or otherwise assigned to private individuals, such as mining claims, and are concentrated along the river valleys.

Land Use

Land use under the YUKON 1 MOA is a combination of low-density residential, commercial, military training, remote residential, recreation, and subsistence activities (see sections 3.6 and 3.7). Low-density residential, commercial areas are located along the Richardson Highway under the extreme western portion of the MOA. Military training activities occur on the ground within the Fort Wainwright Military Reserve and Yukon Maneuver Area, and in the airspace of the existing permanent YUKON 1 MOA. The majority of the area is not accessible by road, and most of the existing road access is on military withdrawals and closed to the general public. Remote/recreation/residential uses are limited to the valley of the Chena River, Salcha River, and other rivers.

Land Management

Lands under the YUKON 1 MOA are subject to several forms of land management. Federal lands under the jurisdiction of Fort Wainwright and Eielson AFB are managed following the management and base comprehensive plans for these areas. Yukon-Charley Rivers National Preserve lands and the Charley National Wild River are managed by the NPS under the guidelines of a comprehensive conservation plan, environmental impact statement, and wilderness review (NPS 1985).

State lands beneath the YUKON 1 MOA are managed by the ADNR under the guidelines of the *Tanana Basin Area Plan for State Lands* (TBAP) (ADNR 1991c). Lands subject to the TBAP are located in the management units listed in Table 3-17. There are two special designated areas of state lands underneath the MOA: the Chena River State Recreation Area (SRA) and Tanana Valley State Forest. There is a management plan for the Tanana Valley State Forest.

The northern portion of the MOA falls within the boundaries of the Fairbanks North Star Borough (FNSB). The Borough Comprehensive Plan provides a foundation for zoning and other land use regulations, was significantly revised in 1984, and was last amended in 1990. Within the Comprehensive Plan, the areas under this MOA are designated for a variety of military, open space, natural reserve area, and rural settlement land uses. The Borough also has a Borough-wide zoning ordinance, which was significantly revised in 1988. The YUKON 1 MOA overlies two types of zoning districts: the General Use 1 and Rural Agriculture Districts. The General Use 1 applies to the majority of lands underneath the MOA, and is the Borough's most common and least restrictive district. The Rural Agricultural District (with 5-, 10-, 20-, and 40-acre lot size categories) applies to many lands within the Chena River valley. It is intended primarily for large-lot rural, residential, and agricultural uses. Permission for use and management of Native lands are set by Doyon Ltd., the regional corporation.

Table 3-17 Land Use Designation Summary: YUKON 1 MOA

Management Unit	Primary Surface Use
1R - Salcha-Goodpaster Uplands	wildlife habitat, forestry
1S - Salcha River Corridor	public recreation, wildlife habitat
1T - Upper Chena River Highlands	wildlife habitat
1U - Steese to Chena Hot Springs	public recreation, wildlife habitat, forestry, settlement
1V - Middle Fork of the Chena	wildlife habitat
1W - Little Chena	agriculture, wildlife habitat, forestry, high value resource management
1X - Johnson Road	agriculture, settlement, wildlife habitat
1Y - Salchaket River	forestry, public recreation, wildlife habitat
1Z - Harding/Birch Lake	agriculture, settlement, public recreation, forestry
1ZA - Salcha Forest	public recreation, wildlife habitat, forestry

Source: ADNR 1991c.

Aesthetics/Quality of Life Characteristics

There are no incorporated communities under the YUKON 1 MOA. However, remote residential and recreation uses and activities are concentrated along the Salcha River. Public and written comments received during scoping indicate over 100 remote residences or parcels along the river, and people who use this area value its remote rural setting. Access to this area is limited to boat and snowmachine, which creates occasional man-made noise. The area lies under the permanent YUKON 1 MOA and experiences occasional aircraft noise.

The western portion of the MOA overlies Eielson AFB and Fort Wainwright. These areas have been used for military activities for more than three decades, and there are indications of this use in the landscape. The central portion of the MOA consists of rolling hills, with little development except placer mining in some creek valleys. The area is remote, seldom visited, and access is extremely limited, except during the winter months.

There are no designated wilderness areas under the MOA. However, the northeastern portion of the MOA overlies part of the Yukon-Charley Rivers National Preserve and the Charley National Wild River. This area is remote, with access limited to small planes. Recreation visitors to the area value the remote, undeveloped setting (NPS 1985); most use takes place along the rivers.

3.8.2.2 YUKON 2 MOA

Land Status

Approximately 62 percent of the 6,252 square miles of lands beneath the YUKON 2 MOA is administered by the federal government. The majority of federal lands are located in three designated areas: the Steese National Conservation Area and related lands along the Steese Highway under the jurisdiction of the BLM; the Yukon Flats Wildlife refuge, under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS), located in the northern portion of the MOA; and part of the Yukon-Charley Rivers National Preserve, administered by the NPS, located beneath the southeastern portion of the MOA. The remainder of the federal lands fall under the jurisdiction of the BLM, and are located in the eastern portion of the MOA. Some federal lands have been

selected by the State of Alaska around the Steese Highway, but have not been conveyed. In addition to these lands, portions of several designated National Wild and Scenic Rivers are located underneath this MOA. These include Birch Creek National Wild River (managed by the BLM) and the Charley National Wild River (managed by the NPS). Beaver Creek National Wild River (managed by the BLM and the USFWS) is located just to the east of the YUKON 2 MOA.

State lands are located in the southern and central portions of the MOA. These include a portion of the designated Chena River SRA and general undesignated lands along the Steese Highway. A small portion of these lands have been selected from the federal government but not yet conveyed.

The extreme southern portion of the MOA is within the boundary of the FNSB. A small parcel of Borough land is located just north of Chena River SRA. There are no other incorporated municipalities under the MOA, and no other municipal lands.

Native lands are located in the vicinity of the community of Circle on the Yukon River. Non-native private lands are located in the vicinity of the communities of Central and Circle Hot Springs.

Land Use

Land use beneath the YUKON 2 MOA is a combination of rural and remote residential, commercial, military training, mining, subsistence, and recreation activities. Rural community residential/commercial areas are located along the Steese Highway in the central portion of the MOA, near the communities of Central, Circle Hot Springs, and Circle. Remote residential use occurs along the Steese Highway and some of the rivers under the MOA. Military training activities occur in the airspace of the existing permanent YUKON 2 MOA. Placer mining occurs along several of the streams underneath the MOA and is primarily a summer activity. The majority of the area is not accessible by road, and most of the existing road access is along the Steese Highway. Recreation uses occur in the Steese National Conservation Area, the Chena River SRA, and along the creeks and rivers under the MOA.

Land Management

Lands under the YUKON 2 MOA are subject to several forms of land management. Each of the designated federal land management units has a management plan. The BLM manages the Steese National Conservation Area using the guidelines of the Resource Management Plan and Final EIS (BLM 1984). Additional guidance is provided by the Master Habitat Management Plan (BLM 1983b) and the Recreation Activity Management Plan (BLM 1983c). The BLM prepared a River Management Plan for the Birch Creek National Wild River in 1983 (BLM 1983d), and an EIS for placer mining in Birch Creek (BLM 1988a). The Yukon Flats National Wildlife Refuge is managed by the USFWS under the guidelines of a Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review (USFWS 1987b). Yukon-Charley Rivers National Preserve lands and the Charley National Wild River are managed by the NPS under the guidelines of a Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review (NPS 1985).

State lands under the YUKON 2 MOA are managed by the ADNIR. The southern block of lands are managed under the guidelines of the TBAP (ADNIR 1991c). Lands subject to the TBAP are located in the management units listed in Table 3-18. The Chena River SRA is the one designated area of state lands under the MOA.

The southern portion of the MOA falls within the boundaries of the FNSB. The Borough Comprehensive Plan provides a foundation for zoning and other land use regulations, was significantly revised in 1984, and was last amended in 1990. Within the Comprehensive Plan, the areas underneath this MOA are designated for a variety of military, open space, natural reserve area, and rural settlement land uses. The Borough also has a Borough-wide zoning ordinance, which was significantly revised in 1988. The YUKON 2 MOA overlies two types of zoning districts: the General Use 1 and Rural Agriculture Districts. The General Use 1 applies to the majority

of lands underneath the MOA, and is the Borough's most common and least restrictive district. The Rural Agricultural District (with 5-, 10-, 20-, and 40-acre lot size categories) applies to many lands within the Chena River Valley.

Permission for use and management of Native lands are set by village corporation (Circle Village Corporation) and regional corporation (Doyon Ltd.) policies.

Table 3-18 Land Use Designation Summary: YUKON 2 MOA

Management Unit	Primary Surface Use
1S - Salcha River Corridor	public recreation, wildlife habitat
1T - Upper Chena River Highlands	wildlife habitat
1U - Steese to Chena Hot Springs	public recreation, wildlife habitat, forestry, settlement
1V - Middle Fork of the Chena	wildlife habitat

Source: ADNR 1991c.

Aesthetics/Quality of Life Characteristics

There are no incorporated communities under the YUKON 2 MOA; there are three rural communities: Circle, Circle Hot Springs, and Central. Remote residences are also located along the Steese Highway and its side roads. Many residents chose to live in this area because of its remote, rural nature.

The western and central portions of the area under the MOA have a concentration of recreational uses and activities, due in part to the scenic quality of the White Mountains and rivers, and to relative accessibility from the Steese Highway. The designations of the Steese National Conservation Area, the Birch Creek National Wild River, and the Yukon-Charley Rivers National Preserve are based in part on these values. However, development activities have historically and are presently occurring on lands underlying the MOA, including placer mining in many of the rivers and creeks. In addition, the area under the YUKON 2 MOA experiences occasional aircraft noise.

The area under the eastern portion of the MOA consists of rolling hills, with little development—except placer mining in some creek valleys—and tourism. There are no designated wilderness areas under the MOA.

3.8.2.3 YUKON 3 MOA

Land Status

Approximately 61 percent of the 5,000 square miles of lands beneath the MOA are administered by the federal government. The majority of federal lands are located in two areas: the Yukon-Charley Rivers National Preserve, administered by the NPS, underlying the northwestern portion of the MOA; and federal lands under the jurisdiction of the BLM located in the central portion of the MOA. Some federal lands have been selected by the State of Alaska along and west of the Taylor Highway, but have not been conveyed. In addition to these lands, the designated Fortymile National Wild, Scenic, and Recreational River is located entirely beneath this MOA. This river is managed by the BLM.

State lands are located under the southeastern and southwestern portions of the MOA. These consist of general undesignated lands. Some federal lands have been selected by the State of Alaska along and west of the Taylor Highway, but have not been conveyed.

Eagle is the only incorporated community located underneath the MOA, and is incorporated as a second class city. Some small parcels of city-owned land are located in the immediate vicinity of Eagle.

Native-owned lands are located in the vicinity of the community of Eagle Village in the northeast corner of the MOA. A second block is located in the center of the MOA along the Fortymile River. Non-Native private lands are located in the vicinity of the communities of Chicken and Eagle.

Land Use

Land use under the YUKON 3 MOA is a combination of rural/remote residential, commercial, military training, mining, subsistence, and recreation activities. Rural community residential/commercial areas are located along the Taylor Highway under the central portion of the MOA, near the communities of Chicken and Eagle. Remote residential use occurs along the Taylor Highway and some of the rivers under the MOA. Military training activities occur in the airspace of the previously utilized YUKON 3 TMOA. Placer mining occurs along several of the streams underneath the MOA and is primarily a summer activity. The majority of the area is not accessible by road, and most of the existing road access is along the Taylor Highway. Recreational uses occur along the Taylor Highway, the Fortymile River corridor, and other streams in the area.

Land Management

Lands under the YUKON 3 MOA are subject to several forms of land management. Each of the designated federal land management units has a management plan. The BLM manages the Fortymile National Wild, Scenic, and Recreational River. Yukon-Charley Rivers National Preserve lands and the Charley National Wild River are managed by the NPS under the guidelines of a Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review (NPS 1985).

State lands beneath the YUKON 3 MOA are managed by the ADNR. Three townships in the extreme southeastern block of lands are managed under the guidelines of the TBAP (ADNR 1991c). Lands subject to the TBAP are located in the management units listed in Table 3-19. There are no designated areas of state lands beneath the MOA.

There are no municipal land management plans or regulations applying to municipal lands under the MOA.

Permission for use and management of Native lands are set by village corporation (Eagle Village Corporation) and regional corporation (Doyon Ltd.) policies.

Aesthetics/Quality of Life Characteristics

The incorporated community of Eagle and three rural communities, Chicken, Eagle Village, and Boundary, occur under the YUKON 3 MOA. Remote residences are also located along the Taylor Highway and its side roads. Many residents chose to live in this area because of its remote, rural nature.

The MOA has a concentration of recreational uses and activities, due in part to the scenic quality of the Fortymile National Wild, Scenic, and Recreational River, and to relative accessibility from the Taylor Highway. The designations of the Fortymile National Wild, Scenic, and Recreational River and the Yukon-Charley Rivers National Preserve are based in part on these values. However, development activities have historically and are presently occurring on lands beneath the MOA, including placer mining in many of the rivers and creeks. There are no designated wilderness areas under the MOA. In addition, the area lies under the YUKON 3 TMOA and experiences occasional aircraft noise.

3.8.2.4 YUKON 4 MOA

Land Status

Approximately 78 percent of the 4,445 square miles of lands beneath the MOA are administered by the federal government. The majority of federal lands are located in three designated areas: the Steese National Conservation Area and related lands along the Steese Highway, under the jurisdiction of the BLM; the Yukon Flats Wildlife refuge, under the jurisdiction of the USFWS, located under the northern portion of the MOA; and part of the Yukon-Charley Rivers National Preserve, administered by the NPS, located beneath the southeastern portion of the MOA. The remainder of the federal lands fall under the jurisdiction of the BLM and are located under the eastern portion of the MOA. Some federal lands have been selected by the State of Alaska around the Steese Highway, but have not been conveyed. In addition to these lands, portions of several designated National Wild and Scenic Rivers are located underneath this MOA. These include Birch Creek National Wild River (managed by the BLM) and the Charley National Wild River (managed by the NPS).

State lands are located under the southern and central portions of the MOA. These include a portion of the designated Chena River SRA and general undesignated lands along the Steese Highway. Some of these undesignated lands have been selected from the federal government by the state and/or Alaska Native corporations, but not yet conveyed.

The extreme southern portion of the MOA is within the boundary of the FNSB. A small parcel of Borough land is located just north of Chena River SRA. There are no other incorporated municipalities under the MOA and no other municipal lands.

Native lands are located in the vicinity of the community of Circle on the Yukon River. Non-Native private lands are located in the vicinity of the communities of Central and Circle Hot Springs.

Land Use

This is a remote, sparsely populated area. Land use under the YUKON 4 MOA is a combination of rural/remote residential, military training, mining, subsistence, and recreation activities. Remote residential use occurs along some of the rivers under the MOA. Military training activities occur in the airspace of the previously utilized YUKON 3 TMOA. Placer mining occurs along several of the streams underneath the MOA, and is primarily a summer activity. The area is not accessible by road. Recreation uses occur along the Yukon River corridor, the Charley National Wild River, and other streams in the area.

Land Management

Lands under the YUKON 4 MOA are subject to several forms of land management. Each of the designated federal land management units has a management plan. The Yukon-Charley Rivers National Preserve lands and the Charley National Wild River are managed by the NPS under the guidelines of a Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review (NPS 1985). Yukon Flats National Wildlife Refuge lands are managed by the USFWS under the guidelines of a Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review (USFWS 1987b). BLM lands are not subject to a specific Management Framework Plan.

State lands beneath the YUKON 4 MOA are managed by the ADNRR. An area plan has not been completed for this area of state lands. There are no designated state lands underneath the MOA. There are no municipal land management plans or regulations applying to municipal lands located beneath the MOA. Permission for use and management of Native lands are set by regional corporation (Doyon Ltd.) policies.

Aesthetics/Quality of Life Characteristics

There are no incorporated communities under the YUKON 4 MOA. Remote residences are located along some of the river corridors. Many residents chose to live in this area because of its remote, rural nature.

The MOA has a concentration of summer recreational uses and activities, due in part to the scenic quality of the Yukon and Charley rivers. The designations of the Yukon-Charley Rivers National Preserve are based in part on these values. However, development activities have historically and are presently occurring on lands underlying the MOA, including placer mining in some of the rivers and creeks. There are no designated wilderness areas beneath the MOA. In addition, the area lies under the previously utilized YUKON 3 TMOA and experiences occasional aircraft noise.

3.8.2.5 YUKON 5 MOA

Land Status

Approximately 79 percent of the 3,568 square miles of lands beneath the YUKON 5 MOA are administered by the federal government. Roughly half of the YUKON 5 MOA overlies lands of the Yukon Flats Wildlife Refuge under the jurisdiction of the USFWS. These lands are located under the western and central portions of the MOA. This is a remote area not accessible by road; access is limited to boats along the Yukon River and its tributaries, and by small planes. The BLM manages a block of lands under the eastern portion of the MOA. Some of these lands have been selected under statehood entitlement, but have not been conveyed.

There are no designated state management unit lands under this MOA. However, there is a small block of state lands under the southcentral portion of the MOA.

There are no incorporated municipalities under the MOA, although Chalkyitsik, an unincorporated community, is located just under the northern boundary of the MOA. There are no municipal lands under this MOA.

Several townships of Native land are located in the vicinity of the community of Chalkyitsik, under the northern portion of the MOA. Two additional blocks of Native lands are located in the lower eastern corner of the MOA.

Land Use

This is a remote, sparsely populated area. Land use under the YUKON 5 MOA is a combination of rural and remote residential, military training, mining, subsistence, and recreation activities. Land use around Chalkyitsik focuses on subsistence, commercial fishing, trapping, and other traditional activities. Remote residential use occurs along some of the rivers under the MOA. Military training activities occur in the airspace of the previously utilized YUKON 3 TMOA. Placer mining may occur along some of the streams underneath the MOA and is primarily a summer activity. The area is not accessible by road. Low levels of recreational uses occur along the rivers in the Yukon Flats National Wildlife Refuge.

Land Management

Yukon Flats National Wildlife Refuge lands are managed by the USFWS under the guidelines of a Comprehensive Conservation Plan/Environmental Impact Statement/Wilderness Review (USFWS 1987b). BLM lands are not subject to a specific Management Framework Plan.

State lands underlying the YUKON 5 MOA are managed by the ADNR. An area plan has not been completed for this area of state lands. There are no designated state lands under the MOA.

There are no municipal land management plans or regulations applying to municipal lands located underneath the MOA.

Permission for use and management of Native lands are set by village corporation (Chalkyitsik Village Corporation) and regional corporation (Doyon Ltd.) policies.

Aesthetics/Quality of Life Characteristics

The rural, unincorporated community of Chalkyitsik is located under the YUKON 5 MOA. Some remote residences may also be located along some of the rivers. These residents most likely chose to live in this area because of its remote, rural nature. Visitation to the area other than by residents is low, even during the summer.

There are no designated wilderness areas underlying the MOA. In addition, the area lies under the previously utilized YUKON 4 TMOA and experiences occasional aircraft noise.

3.8.2.6 YUKON 6 MOA

Land Status

Approximately 12 percent of the 696 square miles of lands beneath the MOA are administered by the federal government. The Fort Wainwright Military reservation is the only designated federal area under this proposed permanent MOA. There are no undesignated federal lands under the YUKON 6 MOA.

A major portion of the Chena River SRA is located under the YUKON 6 MOA. Approximately 26 miles east of Fairbanks off the Steese Highway along the Chena River Road, this SRA is a popular year-round use area. A small portion of the Tanana Valley State Forest Lands are also located under the MOA. There are several parcels of general state lands in the area.

The MOA is within the boundary of the FNSB. A small parcel of Borough land is located just east of Chena River SRA and north of the Chena Hot Springs Road. There are no other incorporated municipalities under the MOA and no other municipal lands.

There are several parcels of private land under this MOA, including the Chena Hot Springs resort, located along and at the end of the Chena Hot Springs Road.

Land Use

Land use under the YUKON 6 MOA is a combination of rural residential, commercial, agricultural, military training, mining, subsistence, and recreation activities. Rural community residential, commercial, and agricultural use areas are located along the Chena Hot Springs Road under the central portion of the MOA. Military training activities occur in the airspace of the previously utilized YUKON 1A TMOA. Placer mining occurs along streams under the upper corner of the MOA and is primarily a summer activity. The majority of the area is not accessible by road, and most of the existing road access is along the Chena Hot Springs Road and Steese Highway. Recreation uses occur in the Steese National Conservation Area, the Chena River SRA, along the Chena Hot Springs Road, and along the creeks and rivers under the MOA.

Land Management

Federal lands under the jurisdiction of Fort Wainwright and Eielson AFB are managed following the management and base comprehensive plans for these areas.

State lands located beneath the YUKON 6 MOA are managed by the ADNR under the guidelines of the TBAP (ADNR 1991c). Lands subject to the TBAP are located in the management units listed in Table 3-19. There are two designated areas of state lands under the MOA: the Chena River SRA and the Tanana Valley State Forest. There is a management plan for the Tanana Valley State Forest (ADNR 1988b).

The MOA falls within the boundaries of the FNSB. The Borough Comprehensive Plan provides a foundation for zoning and other land use regulations, was significantly revised in 1984, and was last amended in 1990. Within the Comprehensive Plan, the areas underlying this MOA are designated for a variety of military, open space, natural reserve area, and rural settlement land uses. The Borough also has a Borough-wide zoning ordinance, which was significantly revised in 1988. The YUKON 6 MOA overlies two types of zoning districts: the General Use 1 and Rural Agriculture Districts. The General Use 1 applies to the majority of lands underneath the MOA, and is the Borough's most common and least restrictive district. The Rural Agricultural District (with 5-, 10-, 20-, and 40-acre lot size categories) applies to many lands within the Chena River valley. It is intended primarily for large lot rural residential and agricultural uses.

Table 3-19 Land Use Designation Summary: YUKON 6 MOA

Management Unit	Primary Surface Use
1U - Steese to Chena Hot Springs	public recreation, wildlife habitat, forestry, settlement
1W - Little Chena	agriculture, wildlife habitat, forestry, high value resource management

Source: ADNR 1991c.

Aesthetics/Quality of Life Characteristics

There are no incorporated communities under this MOA; there are rural residences located along the Chena Hot Springs Road and its side roads. Many residents chose to live in this area because of its remote, rural nature.

The central portion of the MOA has a concentration of recreational uses and activities, due in part to the scenic quality of the Chena River valley and to relative accessibility from the Chena River Road. The designations of the Chena River SRA and Steese National Conservation Area are based in part on these values. However, development activities have historically and are presently occurring on lands underlying the MOA, including rural development and placer mining in some of the rivers and creeks. In addition, the area lies under the previously utilized YUKON 1A TMOA and experiences occasional aircraft noise.

3.8.3 Southern Interior Region

The lands underneath the Southern Interior Region MOAs are a mix of designated and undesignated state and federal lands, Native village and Native regional corporation lands, municipal lands, and other private lands. Table 3-20 shows the approximate percent of land status of the lands underlying the MOAs. Level of detail is to the township. Figure 3-54 and Figure 3-55 show land status under the Southern Interior Region MOAs.

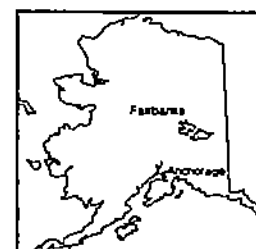


Table 3-20 Southern Interior Region Land Status (by percent of land total underneath MOA)¹

Southern Interior MOAs	State Lands	Federal Lands	Native Corporation Lands	Military Lands
BUFFALO	29.4% ²	0%	16.8%	5.3%
	39.7% ³	8.8%		
EIELSON	0%	0%	0%	1.8%
	98.2%	0%		
BIRCH	41.3%	0%	0%	2.4%
	56.3%	0%		
CLEAR CREEK	0%	0%	0%	67.3%
	32.5%	0%		
FALCON	0%	0%	0%	60.2%
	39.8%	0%		

¹Figures may not equal 100 percent due to rounding.

²Top figure is designated lands (e.g., parks, refuges, recreation rivers).

³Bottom figure is undesignated or general management land.

3.8.3.1 BUFFALO MOA

Land Status

Approximately 9 percent of the 2,188 square miles of lands beneath the MOA are administered by the federal government. Two portions of the Fort Greely Military Reservation are located under this MOA, in the vicinity of the Richardson Highway just south of the Alaska Highway. There are two townships of general BLM lands under the northeast corner of the MOA that are located in the general Fortymile management area, and two townships under the southwest corner of the MOA. These lands are not road accessible.

There are three designated areas of state land under this MOA. The Donnelly Creek State Recreation Site (SRS) is located 126 miles south of Fairbanks on the Richardson Highway. The Delta Bison Range was legislatively designated east of the Richardson Highway and just south of the Alaska Highway. A portion of the Tanana Valley State Forest Lands are also located under this MOA. Approximately one-third of the lands under this MOA are general state lands.

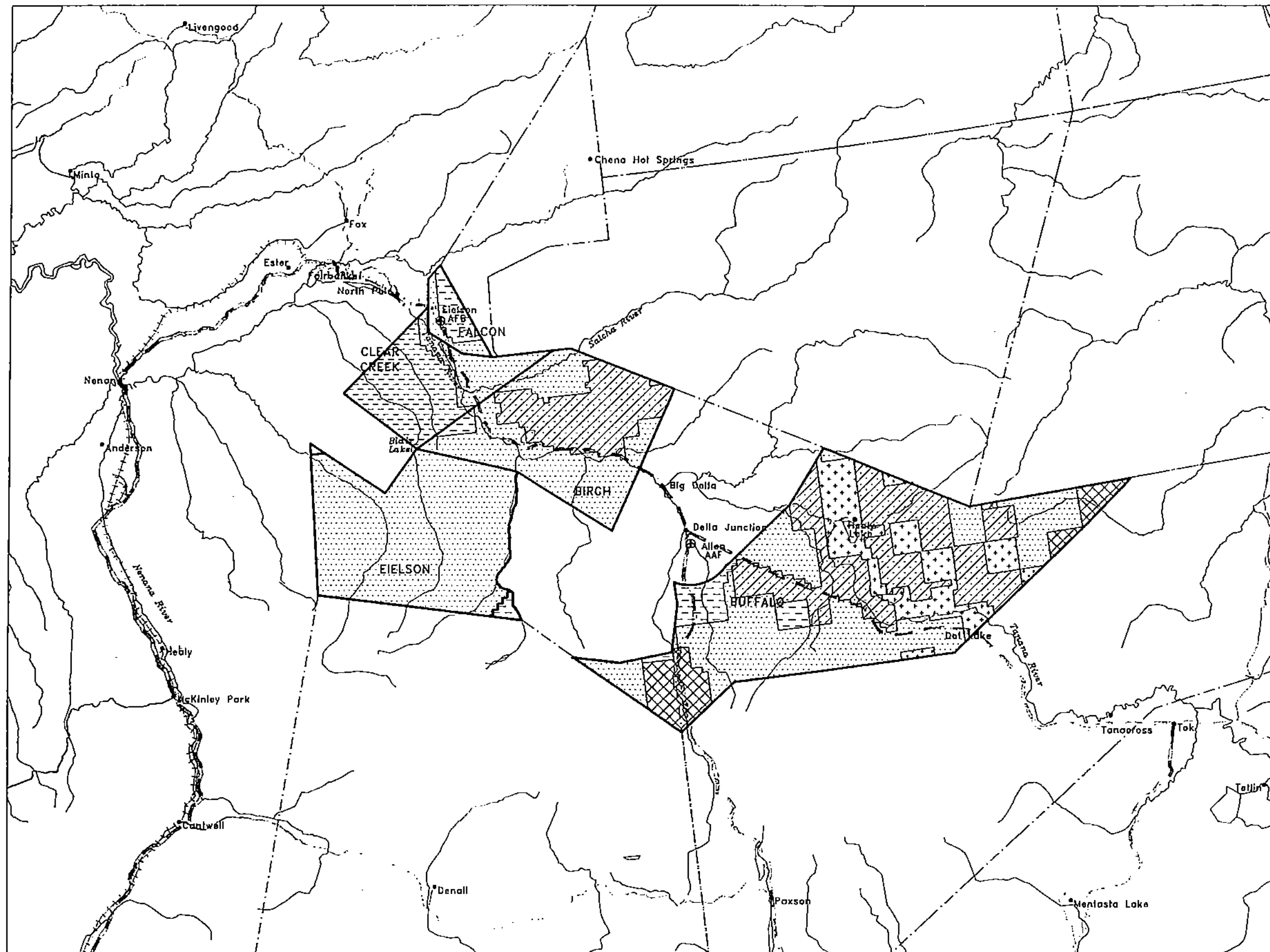


Figure 3-54
Southern Interior Region
Predominant Land Status

Proposed Action and Alternatives

Legend:

-  Federal - Designated
-  Federal - Undesignated
-  Federal - Major Military
-  State - Designated
-  State - Undesignated
-  Native Owned

Notes:

- 1) Parcels of privately-owned land of varying size occur throughout the MOAs.
- 2) The areas depicted as Federal-Undesignated include parcels of State- and/or Native- Selected lands.

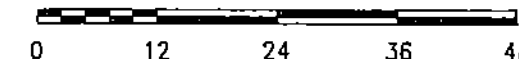
Sources:

Alaska Dept. of Natural Resources
1994. *State of Alaska
General Land Status (map).*

Map Projection: Albers Equal-Area
Conic Projection

True North

Scale in Statute Miles



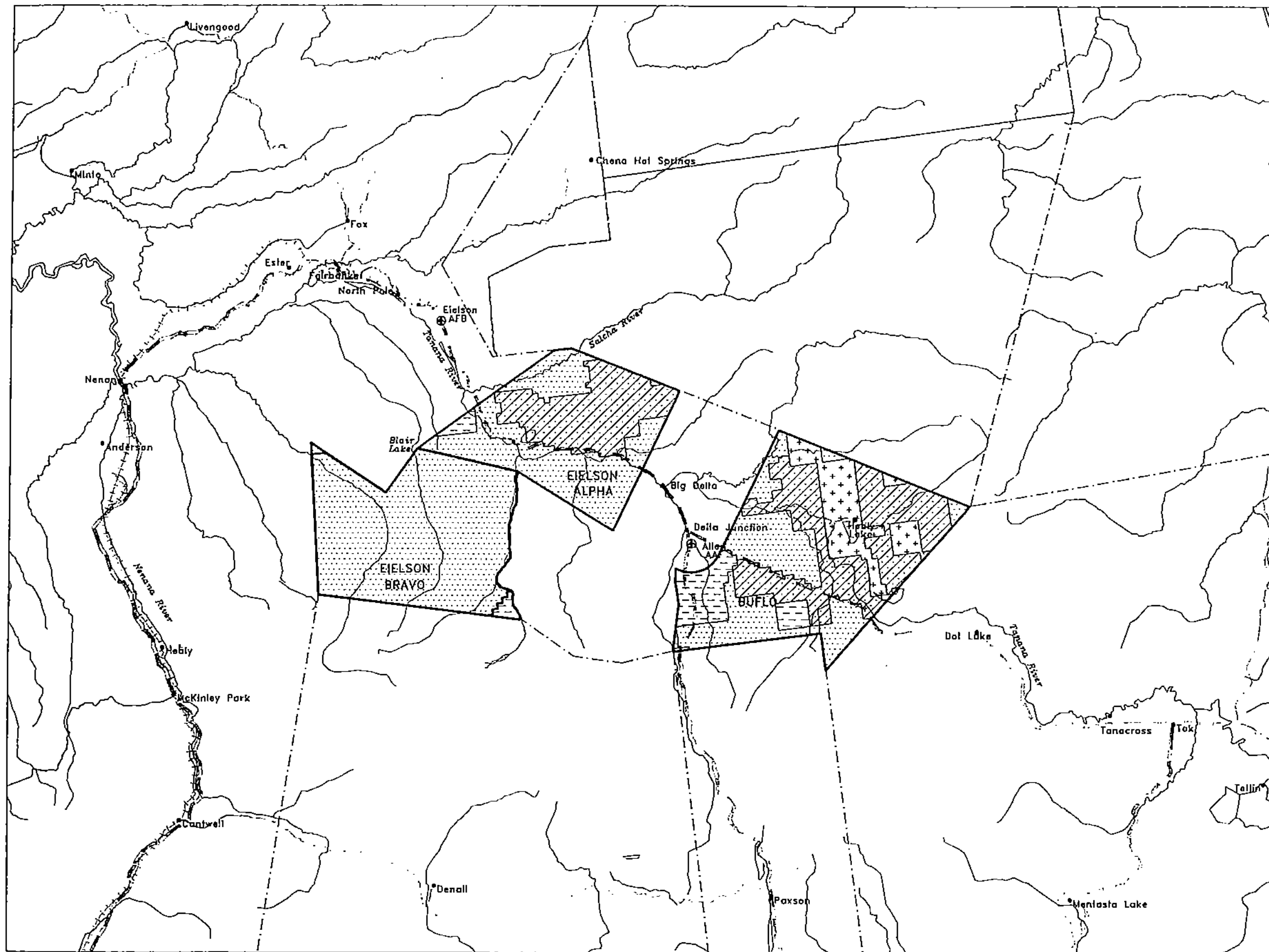


Figure 3-55
Southern Interior Region
Predominant Land Status

No Action Alternative

Legend:

- Federal - Designated
- Federal - Undesignated
- Federal - Major Military
- State - Designated
- State - Undesignated
- Native Owned

Notes:

- 1) Parcels of privately-owned land of varying size occur throughout the MOAs.
- 2) The areas depicted as Federal-Undesignated include parcels of State- and/or Native- Selected lands.

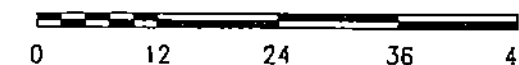
Sources:

Alaska Dept. of Natural Resources
1994. *State of Alaska
General Land Status (map).*

Map Projection: Albers Equal-Area
Conic Projection



Scale in Statute Miles



The unincorporated community of Healy Lake is located underneath this MOA. There are no incorporated communities or municipal lands located under the MOA.

Several townships of Native land are located in the vicinity of the community of Healy Lake, under the northern portion of the MOA. Other areas of Native-owned lands are located under the eastern half of the MOA, north of the Alaska Highway.

Private lands are located along the north and south sides of the Alaska Highway, east of its junction with the Richardson Highway.

Land Use

Land use under the BUFFALO MOA is a combination of rural residential, commercial, agricultural, military training, subsistence, and recreation activities. Rural residential, commercial, and agricultural use areas are located along the Alaska Highway under the central portion of the MOA. Community/residential uses occur at Healy Lake, which is not road accessible. Military training activities occur in the airspace of the previously utilized BUFLO TMOA and on the ground in the Fort Greely Military Reservation. Much of the area is not accessible by road, and most of the existing road access is along the Alaska and Richardson Highways. Recreational uses occur in the Donnelly Creek SRS and in areas off the two highways.

Land Management

Federal lands under the jurisdiction of Fort Greely Military Reservation are managed following the management and base comprehensive plans for these areas. The BLM manages the Fortymile River drainage basin lands.

State lands beneath the BUFFALO MOA are managed by the ADNR under the guidelines of the TBAP, Delta-Salcha and East Alaska Range Subregions. Lands subject to the TBAP are located in the management units listed in Table 3-21. There are three designated areas of state lands beneath the MOA: the Donnelly Creek SRS, the Delta Bison Range, and Tanana Valley State Forest. There are management plans for both the Bison Range and Tanana Valley State Forest (ADF&G 1980; ADNR 1988b).

Table 3-21 Land Use Designation Summary: BUFFALO MOA

Management Unit	Primary Surface Use
5C - North Slope of Alaska Range	public recreation, wildlife habitat, forestry, settlement
7D - Goodpaster River	wildlife habitat, forestry, public recreation
7E - Volkmar	public recreation, settlement
7F - Tanana River	wildlife habitat, forestry, public recreation
7K - Bison Range	wildlife habitat
7L - Greely Reserve	public recreation, settlement
7M - Delta Wildlands	minerals, public recreation, wildlife habitat
7N - Dry Creek	public recreation, wildlife habitat, forestry

Source: ADNR 1991c.

Aesthetics/Quality of Life Characteristics

There are rural residences located along the Alaska Highway and its side roads, and in the Native community of Healy Lake. Many residents chose to live in this area because of its remote, rural nature.

The central portion of the area under the MOA has a concentration of recreational uses and activities, due in part to the scenic quality of the Tanana and Delta River valleys and to relative accessibility from the Alaska and Richardson Highways. The Alaska Highway is the main highway route of entry into Alaska. Development activities have historically and are presently occurring on lands beneath the MOA, including rural development and agriculture. In addition, the area lies under the previously utilized BUFLO TMOA and experiences occasional aircraft noise.

3.8.3.2 EIELSON MOA

Land Status

Less than 1 percent of the 959 square miles of lands beneath the MOA are managed by the federal government. The area under the proposed EIELSON MOA is not accessible by road. There is a small portion of the Fort Greely Military Reservation under the southeast corner of the MOA, and a very small portion of the Fort Wainwright Military Reservation under the northwest corner of the MOA. There are no undesignated federal lands under this MOA.

The majority of lands under this MOA are undesignated state lands. While there are no designated state management units under this MOA, two discrete areas in the northeastern corner have been designated for settlement and may be offered for sale (ADNR 1991c), including recreation home use. The Gold King Homestead I and II area is located just west of the Japan Hills; the Wood River I and II Homestead is located north of the Japan Hills on the Wood River.

A portion of the MOA is over the southern boundary of the FNSB. However, there are no municipal or Native lands under this MOA; small parcels of private land may be present.

Land Use

The area under this MOA is remote and not road-accessible, with primary use as fish and wildlife habitat and secondary summer/fall use for hunting, fishing, hiking and climbing, and other forms of recreation. The overlying airspace is currently used as the EIELSON B TMOA and borders the Blair Lakes range (R-2211). As indicated above, the state has designated two settlement disposals in the area, but these have not occurred and there is no existing settlement land use.

Land Management

Federal lands under the jurisdiction of Fort Greely and Fort Wainwright Military Reservations are managed following the management and base comprehensive plans for these areas. State lands under the EIELSON MOA are managed by the ADNR under the guidelines of the TBAP, Parks Highway and West Alaska Range Subregion. Lands subject to the TBAP are located in the management units listed in Table 3-22.

The northern portion of the MOA falls within the boundaries of the FNSB. The Borough Comprehensive Plan provides a foundation for zoning and other land use regulations, was significantly revised in 1984, and was last amended in 1990. Within the Comprehensive Plan, the areas underneath this MOA are designated for a variety of military, open space, and natural reserve area uses.

Table 3-22 Land Use Designation Summary: EIELSON MOA

Management Unit	Primary Surface Use
4P - North Slope of Alaska Range	minerals, wildlife habitat
4Q - Lower Dry Creek, Japan Hills	wildlife habitat, settlement

Source: ADNR 1991c.

Aesthetics/Quality of Life Characteristics

The area under this MOA, at the northern foot of the Alaska Range, is remote and not road-accessible. There are no communities under this MOA, although there may be a few remote homesteads. Due to limited access, visitation is relatively low, although those who use the area probably values its remoteness and lack of development. The area underlies the previously utilized EIELSON B TMOA and borders the Blair Lakes range, and, as a result, experiences some military activities.

3.8.3.3 BIRCH MOA

Land Status

Less than 3 percent of the 807 square miles of lands beneath the MOA are administered by the federal government. There is a small portion of the Fort Wainwright Military Reservation under the northwest corner of the proposed BIRCH MOA. There are no undesignated federal lands under this MOA.

There are three designated areas of state land under this MOA with primary or secondary recreation use. The Harding Lake SRA is located under the western portion of the MOA, east of the Richardson Highway and 42 miles south of Fairbanks. The Birch Lake SRA is located 58 miles south of Fairbanks on the Richardson Highway. It has a large parking lot and rest room facilities. A portion of the Tanana Valley State Forest Lands are also located under this MOA. The majority of the lands under the MOA are undesignated state lands.

A portion of the MOA is over the southern boundary of the FNSB. However, there are no municipal or Native lands under this MOA. There are a few parcels of private lands, primarily along and north of the Alaska Highway and the upper Salcha River.

Land Use

Land use under the BIRCH MOA is a combination of rural residential, commercial, agricultural, military training, subsistence, and recreation activities. Rural residential, commercial, and agricultural use areas are located along the Alaska Highway in the southern portion of the MOA; remote cabins are located on the upper Salcha River. Military training activities occur in the airspace of the previously utilized EIELSON A TMOA and on the ground in the Fort Wainwright Military Reservation. Much of the area is not accessible by road, and most of the existing road access is along the Alaska Highway. Recreation uses occur in the state recreation areas.

Land Management

Federal lands under the jurisdiction of Fort Wainwright Military Reservation are managed following the management and base comprehensive plans for this area. State lands located beneath the BIRCH MOA are managed by the ADNR under the guidelines of the TBAP, Parks Highway, West Alaska Range, Delta-Salcha, and FNSB Subregions. Lands subject to the TBAP are located in the management units listed in Table 3-23.

The northern portion of the MOA falls within the boundaries of the FNSB. The Borough Comprehensive Plan provides a foundation for zoning and other land use regulations, was significantly revised in 1984, and was last amended in 1990. Within the Comprehensive Plan, the areas under this MOA are designated for a variety of military, open space, and natural reserve area uses.

Table 3-23 Land Use Designation Summary: BIRCH MOA

Management Unit	Primary Surface Use
4Q - Lower Dry Creek, Japan Hills	wildlife habitat, settlement
7A - Shaw Creek	wildlife habitat, forestry, public recreation
7B - Quartz Lake	forestry, public recreation
7F - Tanana River	wildlife habitat, forestry, public recreation
7G - Delta Creek	wildlife habitat, forestry, public recreation, watershed, settlement
1Y - Salchaket River	wildlife habitat, forestry, public recreation
1Z - Harding-Birch Lake	forestry, public recreation, agriculture, settlement

Source: ADNR 1991c.

Aesthetics/Quality of Life Characteristics

There are rural residences located along the Richardson Highway and its side roads, and on Harding and Quartz lakes. Many residents chose to live in this area because of its remote, rural nature.

The central portion of the area underlying the MOA has a concentration of recreation uses and activities, due in part to the scenic quality of the lakes and the Tanana River valley, and to relative accessibility from the Richardson Highway. However, development activities have historically and are presently occurring on lands underlying the MOA, including rural development and agriculture. In addition, the area lies under the previously utilized EIELSON A TMOA and experiences occasional aircraft noise.

3.8.3.4 CLEAR CREEK MOA

Land Status

Approximately 68 percent of the 404 square miles of lands beneath the proposed MOA are administered by the federal government. With the exception of the lower Salcha River, the lands under this MOA are within the Fort Wainwright Military Reservation. The western two-thirds of this MOA is not accessible by road. Much of the federal land has been selected by the State of Alaska under its remaining statehood entitlement. The Blair Lakes range (R-2211) is located at the southeast corner of the CLEAR CREEK MOA. There are no undesignated federal lands under this MOA.

Designated state lands include the Salcha River SRS, located under this MOA just east of the Alaska Highway, 42 miles south of Fairbanks. A portion of the Tanana Valley State Forest Lands are also located under this MOA. The Harding Lake SRA is located just south of, but not under this MOA. General state lands are located in the eastern corner of the MOA north of the Salcha River SRS.

A portion of the MOA is over the southern boundary of the FNSB. There are several parcels of Borough lands located along the Richardson Highway in the northeast corner of the MOA. There are no Native lands under this

MOA. There are a few parcels of private lands, primarily along the Richardson Highway and the lower Salcha River.

Land Use

Land use beneath the CLEAR CREEK MOA is a combination of rural residential, commercial, agricultural, military training, and recreation activities. Rural residential, commercial, and agricultural use areas are located along the Richardson Highway in the southern portion of the MOA; remote cabins are located on the lower Salcha River. Military training activities occur on the ground in the Fort Wainwright Military Reservation. Much of the area is not accessible by road, and most of the existing road access is along the Richardson Highway or up the Salcha River. Recreation uses occur in the state recreation areas and along the Salcha River.

Land Management

Federal lands under the jurisdiction of Fort Wainwright Military Reservation are managed following the management and base comprehensive plans for this area. State lands beneath the CLEAR CREEK MOA are managed by the ADNRC under the guidelines of the TBAP, Parks Highway, West Alaska Range, Delta-Salcha, and FNSB Subregions.

The northern portion of the area under the MOA falls within the boundaries of the FNSB. The Borough Comprehensive Plan provides a foundation for zoning and other land use regulations, was significantly revised in 1984, and was last amended in 1990. Within the Comprehensive Plan, the areas under this MOA are designated for a variety of military, open space, and natural reserve area uses.

Aesthetics/Quality of Life Characteristics

There are rural residences located along the Richardson Highway and its side roads, and along the Salcha River. Many residents chose to live in this area because of its remote, rural nature.

The central portion of the MOA has a concentration of recreation uses and activities, due in part to the scenic quality of the lakes and the Tanana River valley, and to relative accessibility from the Richardson Highway. However, development activities have historically and are presently occurring on lands under the MOA, including rural development and agriculture.

3.8.3.5 FALCON MOA

Land Status

About 61 percent of the approximately 100 square miles of lands beneath the FALCON MOA are military land withdrawals for Eielson AFB and the Fort Wainwright Military Reservation. The remainder are general state lands. There are no designated state lands under the proposed MOA.

The lands underlying the MOA are part of the FNSB. There are a few parcels of private lands, primarily along the Richardson Highway.

Land Use

Land use beneath the FALCON MOA is a combination of military, residential, commercial, agricultural, and recreation activities. Limited rural residential, commercial, and agricultural use areas are located along the Richardson Highway. Military training activities occur on Eielson AFB and the Fort Wainwright Military Reservation.

Land Management

Federal lands under the jurisdiction of Eielson AFB and Fort Wainwright Military Reservation are managed in accordance with the management and base comprehensive plans for these areas. State lands beneath the MOA are managed by the ADNR under the guidelines of the TBAP.

The FNSB Comprehensive Plan provides a foundation for zoning and other land use regulations, was significantly revised in 1984, and was last amended in 1990. Within the Comprehensive Plan, the areas under this MOA are designated for a variety of military, open space, and natural reserve area uses.

Aesthetics/Quality of Life Characteristics

The Eielson AFB cantonment comprises most of the area underlying this proposed MOA.

3.8.3.6 Eielson Air Force Base

The noise associated with aircraft activities at Eielson AFB is characteristic of the noise at most Air Force installations and commercial flying facilities. During periods of no aircraft activity, noise results primarily from maintenance and shop operations, ground traffic movement, occasional construction, and similar sources. This noise is almost entirely restricted to the base itself, and is comparable to sounds that occur in adjacent communities. It is during periods of aircraft ground or flight activity that the noise environment changes. For these reasons, noise analysis was limited to aircraft operations. Refer to Appendix F for a more thorough discussion of sound analysis methodologies and effects.

The F-16C and KC-135 operations are the dominant noise sources during routine training, with the OA-10As contributing to a lesser degree. To reduce noise impacts, the 354 FW limits most of its intensive operations to weekdays between 7:00 a.m. and 10:00 p.m. Specific noise abatement procedures are also in place to reduce impacts on the local community, including alternating flight tracks to avoid overflight of the community of Moose Creek, use of hush houses for engine testing, and locating engine run-up areas away from on- and off-base residential populations.

The NOISEMAP program was used to generate noise contours. The methodology used in the NOISEMAP program is based on predicting aircraft operations on the "average busy day." The Air Force generally defines operations on the "average busy day" as the average number of operations that occur on routine busy days. This EIS assumes there are 240 routine busy days per year, which includes both routine and MFE training days. Noise contours for the existing noise environment around Eielson AFB (routine training plus current MFE operations) are illustrated in Figure 3-56.

The residential on-base population is estimated at 5,698 (Bureau of the Census 1990). An estimated 919 of these residents are exposed to Day-Night Average A-Weighted Sound Level (DNL) 65 to 69 decibels (dB), and approximately 193 of these are anticipated to be "highly annoyed." No on-base residents are exposed to DNL $\geq$ 70 dB. An estimated 171 off-base residents are exposed to DNL 65 to 69 dB, and approximately 36 of these are anticipated to be "highly annoyed." No off-base residents are exposed to DNL $\geq$ 70 dB. Table 3-24 and Table 3-25 depict the number of on- and off-base residents exposed to DNL $\geq$ 65 dB, the number expected to be "highly annoyed," and the land area affected by current operations.

Although Eielson AFB has quiet hours for routine operations between the hours of 10:00 p.m. and 7:00 a.m., nighttime operations are occasionally necessary. When this occurs, there is a potential for sleep disturbance and associated annoyance. The major contributing flight paths that create outdoor Sound Exposure Levels (SELs) in excess of 85 dB in the vicinity of Eielson AFB are estimated to occur an average of once every 42 days throughout the year. To estimate the number of residents expected to be awakened by nighttime operations, SEL levels were combined with population data to estimate the number of people exposed to SEL levels above 85 dB.

These exposure estimates were then multiplied by the average percent expected to be awakened using both the Air Force interim prediction and the Ollerhead prediction procedures (see section 3.3.1). Of the 380 residents possibly exposed to nighttime operations on any given evening, the Air Force interim procedure predicts 61 are awakened, and the Ollerhead procedure predicts 3 are awakened.

Table 3-24 On-Base Population Exposure to Aircraft Noise $\geq$ DNL 65 dB from Eielson AFB Operations - Routine Daily Training plus Six MFEs per Year

DNL Intervals (dB)	Current Operations		
	Area (mi ²)	No. of Persons	No. Highly Annoyed
65 - 69	3.72	919	193
70 - 74	2.41	0	0
75 - 79	1.31	0	0
≥ 80	1.07	0	0
Totals:	8.51	919	193

Sources: USAF 1993b; Bureau of the Census 1990.

Table 3-25 Off-Base Population Exposure to Aircraft Noise $\geq$ DNL 65 dB from Eielson AFB Operations - Routine Daily Training Plus Six MFEs per Year

DNL Intervals (dB)	Current Operations		
	Area (mi ²)	No. of Persons	No. Highly Annoyed
65 - 69	1.28	171	36
70 - 74	0.00	0	0
75 - 79	0.00	0	0
≥ 80	0.00	0	0
Totals:	1.28	171	36

Sources: USAF 1993b; Bureau of the Census 1990.

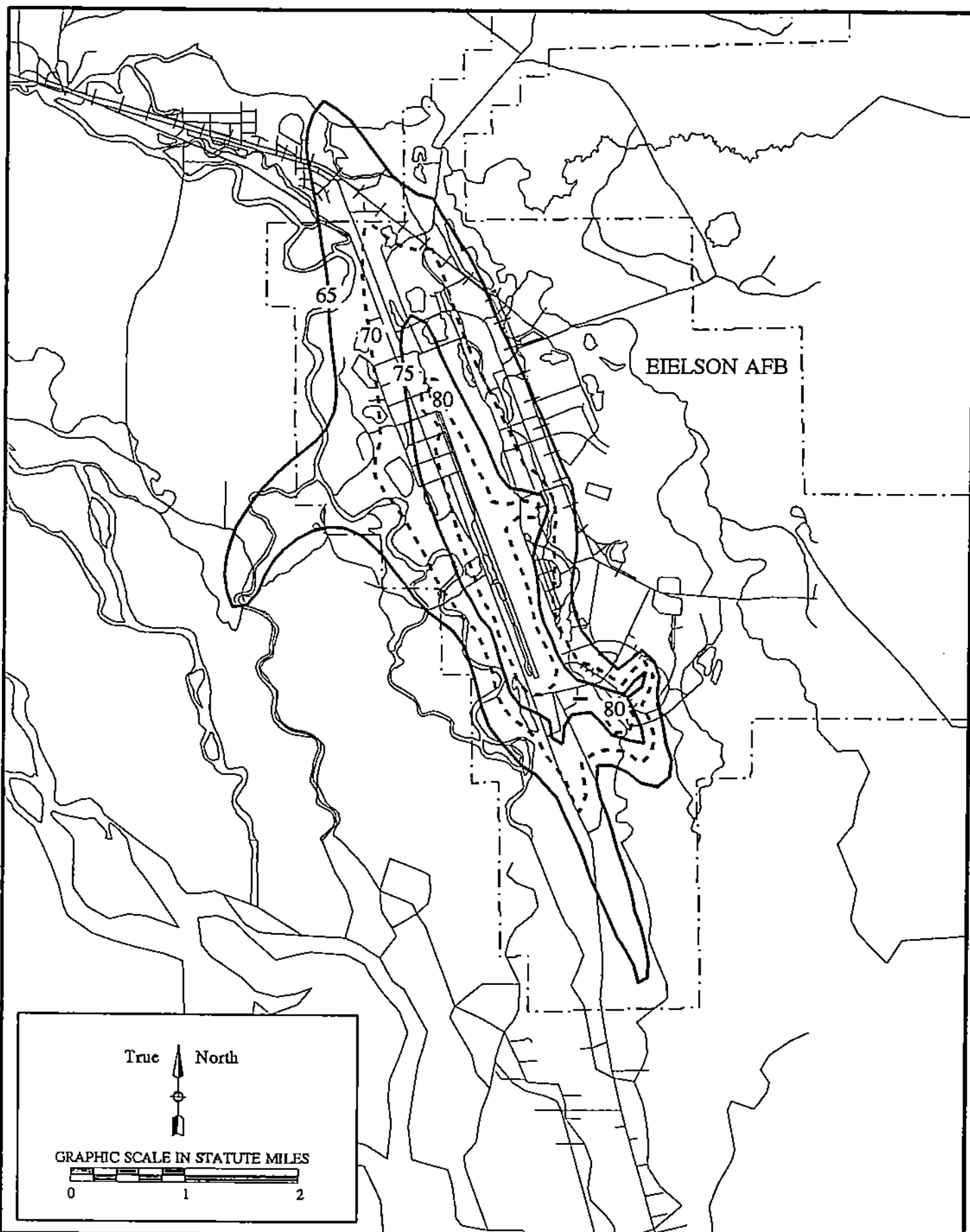


Figure 3-56 DNL Contours for Current Operations at Eielson AFB - Routine Daily Training Plus Six MFES per Year

3.8.4 Southcentral Region

The lands underneath the southcentral region MOAs are a mix of designated and undesignated state and federal lands, Native village and Native regional corporation lands, municipal lands, and other private lands. Table 3-26 shows the approximate percent of land status of the lands underlying the Southcentral Region MOAs. Level of detail is to the township. Figure 3-57 and Figure 3-58 show land status under the Southcentral Region MOAs.

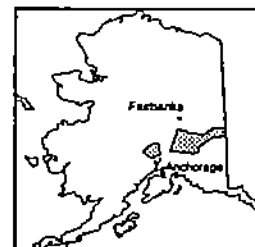


Table 3-26 Southcentral Region Land Status (by percent of land total underneath MOA)¹

Southcentral MOAs	State Lands	Federal Lands	Native Corporation Lands	Military Lands
SUSITNA	1.9% ²	45.5%	0%	0%
	50.4% ³	2.2%		
FOX	4.1%	0%	1.4%	0%
	24.1%	70.5%		
TANANA	7.8%	0%	3.8%	0%
	62.5%	25.9%		

¹Figures may not equal 100 percent due to rounding.

²Top figure is designated lands (e.g., parks, refuges, recreation rivers).

³Bottom figure is undesignated or general management land.

3.8.4.1 SUSITNA MOA

Land Status

Approximately 47 percent of the 3,243 square miles of lands beneath the MOA are administered by the federal government. Almost all of the federal lands underneath the MOA are on the south side of the Denali National Park and Preserve (NPP), administered by the NPS. The MOA is located several miles south of Mt. McKinley and the wilderness-designated region of Denali NPP. The remaining federal land is comprised of all or portions of two townships of undesignated, mostly state-selected lands underneath the central part of the MOA (ADNR 1985). These lands are managed by the BLM until conveyance is completed.

All state lands under the SUSITNA MOA are within the Matanuska-Susitna (Mat-Su) Borough boundaries. Designated state lands underneath SUSITNA MOA include portions of Denali State Park and the Susitna Basin Recreation Rivers. Two of the six designated recreation rivers, Lake Creek and the northern portions of the Deshka River, are located underneath the MOA. The MOA overlies two to three townships of the western arm of Denali State Park, west of the Parks Highway. The State Park land underneath the MOA is entirely state-owned except for an area of mining claims in the vicinity of the Dutch Hills and Peters Hills (ADNR 1989).

The remainder of this area is mostly state-owned with some areas in Mat-Su Borough, Native, and university ownership (ADNR 1985). There are small areas of Mat-Su Borough lands and Native allotments. Many lakes in this region are ringed by private lots (ADNR 1985).

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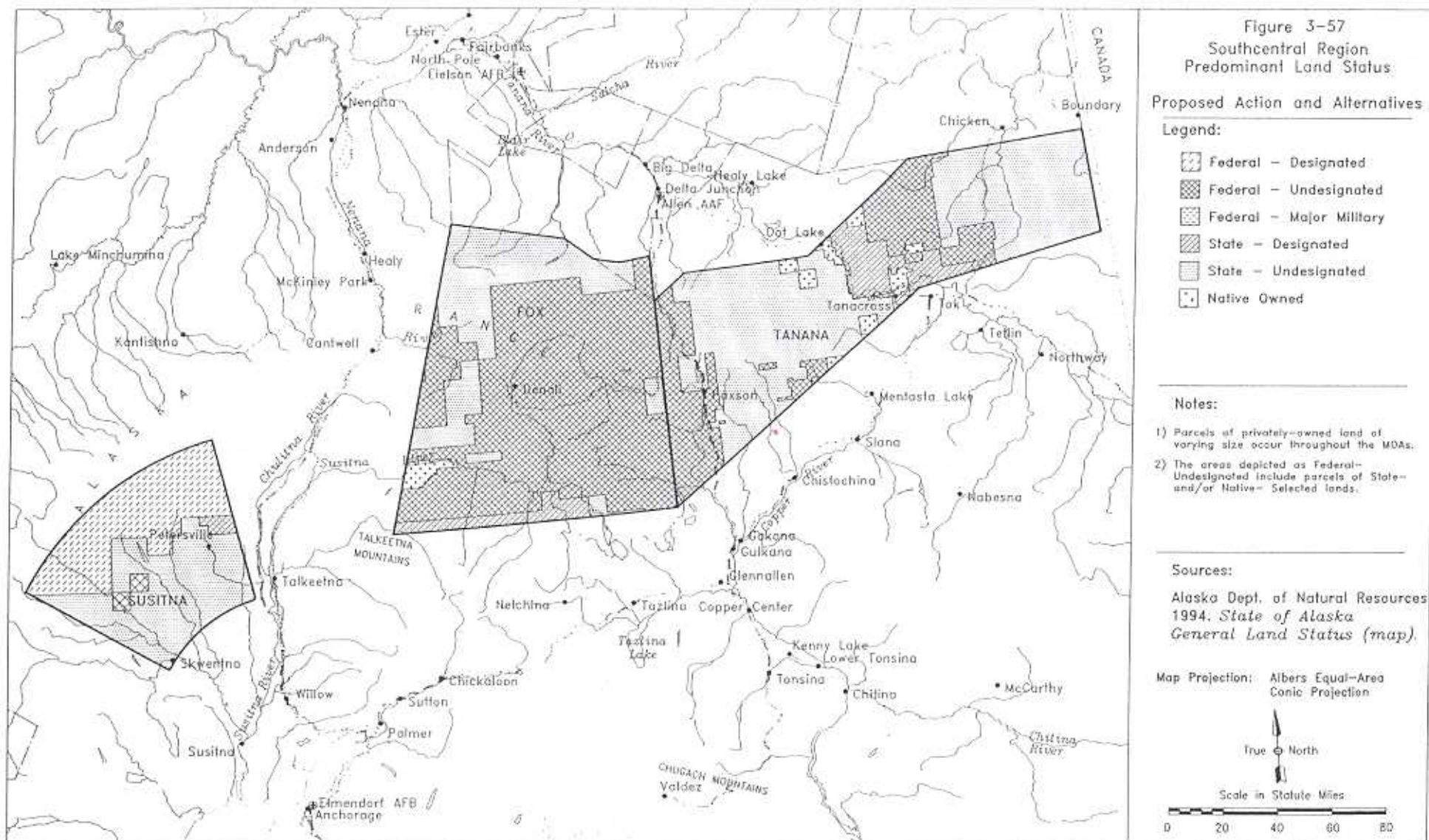


Figure 3-57
Southcentral Region
Predominant Land Status

Proposed Action and Alternative

Legend:

-  Federal - Designated
-  Federal - Undesignated
-  Federal - Major Mineral
-  State - Designated
-  State - Undesignated
-  Native Owned

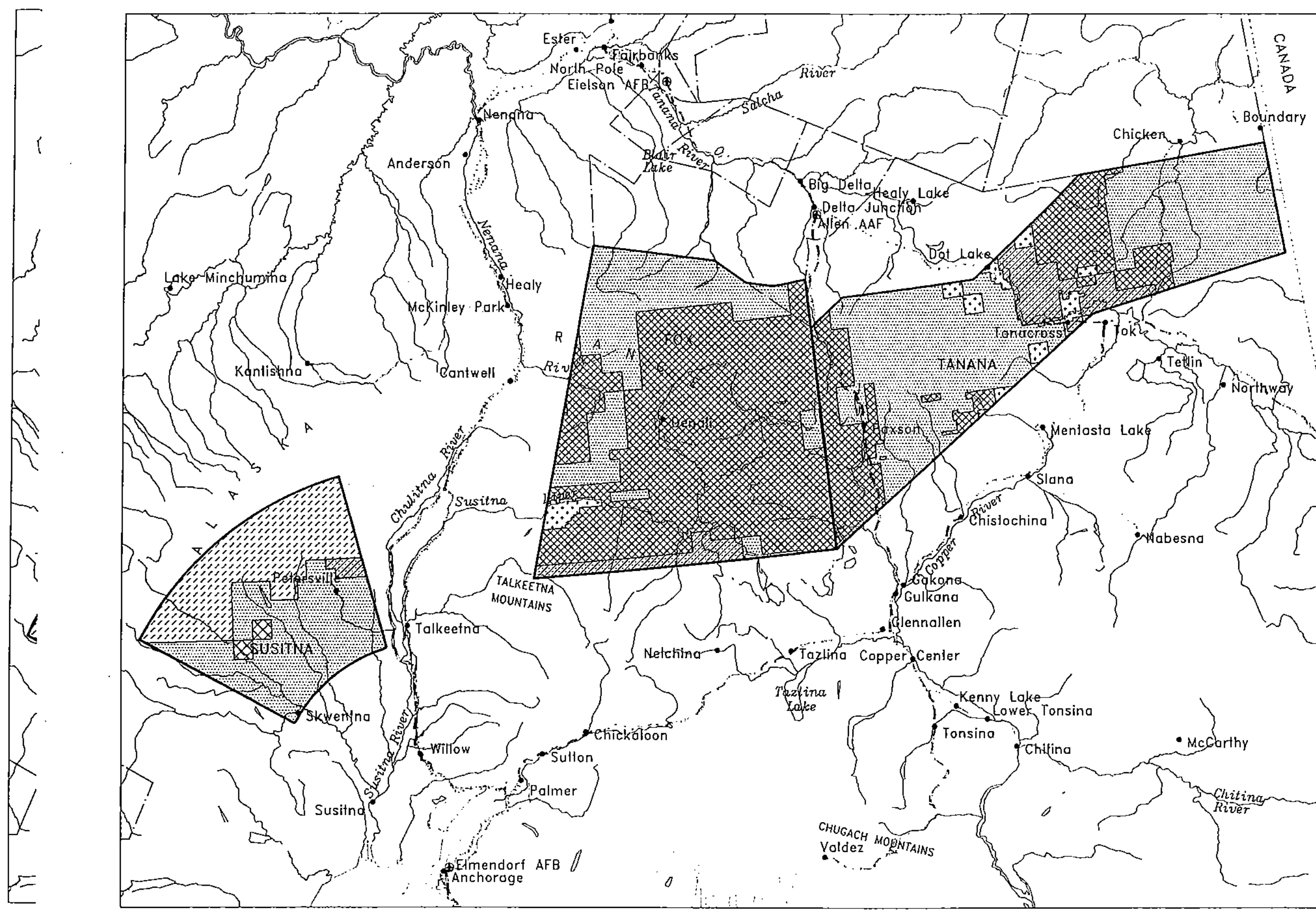
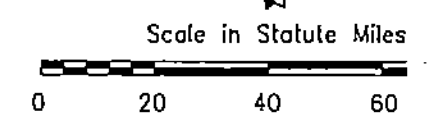
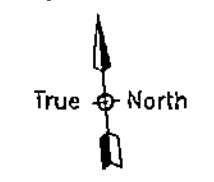
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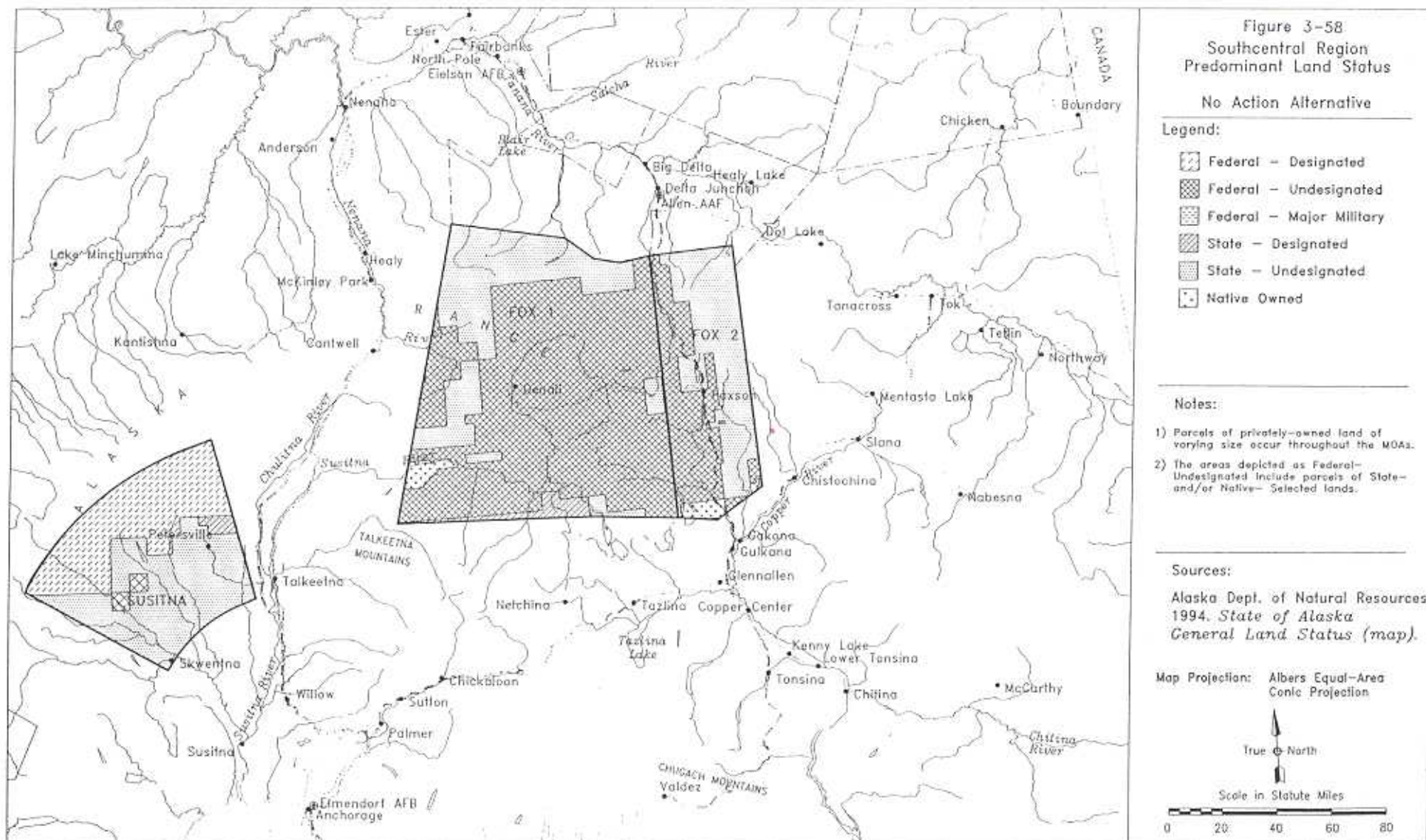
- 1) Parcels of privately-owned land of varying size occur throughout
- 2) The areas depicted as Federal Undesignated include parcels and/or Native-Owned land

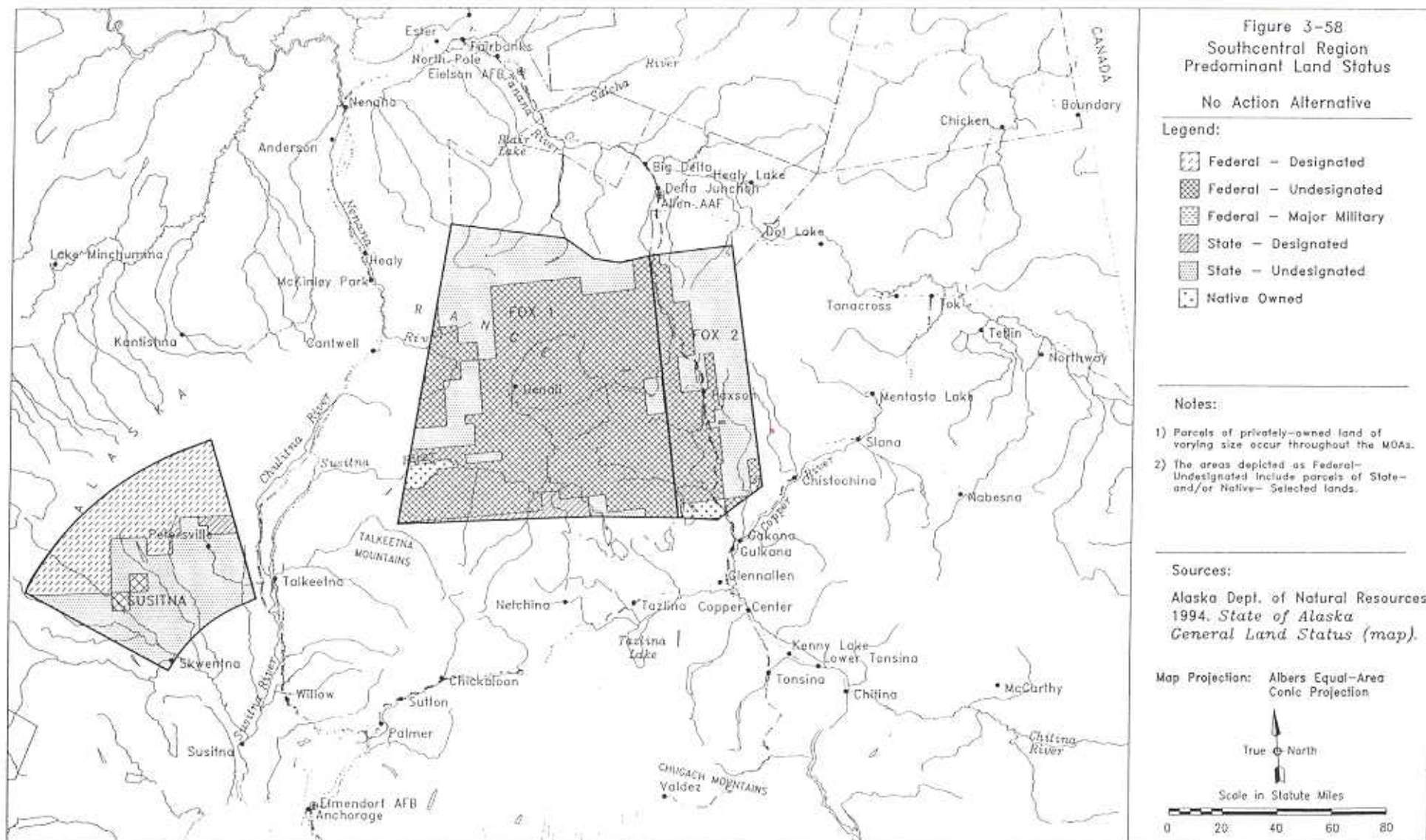
Sources:

Alaska Dept. of Natural Resources
1994. *State of Alaska General Land Status*

Map Projection: Albers Equal Area Conic Projection







Land Use

The state lands under the eastern side of the MOA are high settlement areas, particularly along the Petersville Road (ADNR 1985). Settlement areas are also located along or near the major lakes throughout the area. There is relatively little mining in this area (ADNR 1985). Some small scale agriculture occurs along the Petersville Road (ibid.).

Harvest of fish and wildlife occurs in this region; however, the economy of the plan area is almost exclusively dependent on government, service, retail, and construction sectors, which in turn are based on the state's current oil wealth (ADNR 1985). According to the area plan, subsistence is not a primary use (ibid.). Recreational hunting and fishing, and river-oriented recreation activities are common. Denali State Park is used for camping, fishing, hiking, sightseeing, and other recreational activities (ADNR 1989). The State Park is accessible via the Parks Highway. The south side of Denali NPP sees large amounts of mountaineering and winter recreation activities. Mountaineering activities are typically accessed via aircraft.

Land Management

The NPS manages Denali NPP according to the General Management Plan (NPS 1986). Roughly, the eastern half of the NPP underneath the SUSITNA MOA is designated "Park"; the western half is designated "Preserve." The MOA does not overlie the NPP's designated wilderness area, but is located just south of the area's south/southeast boundary.

Undesignated state lands underneath the SUSITNA MOA are managed by the ADNR according to the *Susitna Area Plan* (ADNR 1985). The MOA overlies the Petersville Road, Sunflower Basin, and portions of the Susitna Lowlands and Alaska Range Plan Subregions. This Plan is a joint borough-state plan that presents policies consisting of goals and management guidelines to be applied to land and water management decisions (ADNR 1985). Under this Plan, lands in this area will be managed for multiple use, including forestry, development of mineral resources, recreation, tourism, and protection and use of fish and wildlife (ibid.). A primary goal of the plan is to allow forestry, agriculture, mining, and other types of development to occur, but manage these uses to minimize environmental impacts (ibid.).

The *Susitna Basin Recreation Rivers Management Plan* (ADNR 1991b) was adopted in 1991. Two of the six recreation rivers, the Lake Creek Recreation River corridor and the Moose Creek and Kroto Creek portions of the Doshka corridor, are located underneath the SUSITNA MOA. These recreation rivers are located within the *Susitna Area Plan* planning area; however, the Recreation Rivers Act and Management Plan supersedes this Plan for the lands within the river corridors (ADNR 1991). The primary purpose for the establishment of the six Recreation Rivers is the maintenance and enhancement of the land and water for recreation (Recreation Rivers Act [AS41.23.500(1-6)]). Management is for a variety of resources and use, including fish and wildlife, recreation, economic use, the enjoyment of the public, multiple use of the uplands, and the accommodation of access (ADNR 1991b).

Denali State Park is managed by the ADNR, Division of Parks and Outdoor Recreation, according to the *Denali State Park Master Plan* (ADNR 1989). The Master Plan has zoned the area of the park that is underneath the MOA for recreation development and natural with some special management considerations. There is no wilderness zone in this part of the Denali State Park.

Permission for use and management of Native lands is set by village and regional corporation guidelines. Regional Native corporations with use interests in the lands under SUSITNA MOA are Cook Inlet Region Inc., Doyon Ltd., and Ahtna Inc. (ADCRA 1993; NPS 1986).

Table 3-27 summarizes the primary land use designations of the lands underlying SUSITNA MOA.

Table 3-27 Land Use Designation Summary: SUSITNA MOA

Area Plan	Management Unit (MU) (subunit)	Primary Surface Use (by subunit)
SAP ¹	Petersville Road	MUs 1-6: forestry, public recreation, water resources, wildlife habitat, settlement, commercial development, borough land bank, private lands
	Sunflower Basin	MUs 1-7: settlement, minerals, wildlife habitat, public recreation, water resources, forestry
	Susitna Lowlands	MUs 1,2,4,5,7,8,9: water resources, wildlife habitat, public recreation, settlement, resource management, primarily private land, forestry, borough land bank
	Alaska Range	1b: public recreation, wildlife habitat 1c: wildlife habitat
RRMP ²	Lake Creek, Deshka River Corridors	fish and wildlife, recreation, economic use, public enjoyment, multiple use of uplands, access accommodation
DSPMP ³	recreation natural natural (spec. consid.)	recreation zone: intended to allow large-scale recreation and tourism facility development natural zone: moderate to low impact and dispersed recreation, trumpeter swan habitat protection

¹SAP: *Susitna Area Plan* (ADNR 1985).

²RRMP: *Susitna Basin Recreation Rivers Management Plan* (ADNR 1991b).

³DSPMP: *Denali State Park Master Plan* (ADNR 1989).

Aesthetics/Quality of Life Characteristics

Developed areas are centered around the Petersville Road area around the communities of Petersville, Peters Creek, and around Skwentna. There is road access to the Petersville Road Subregion between the Parks Highway to Petersville. There are numerous remote cabins in the area (public scoping; ADNR 1985). The mouth of Lake Creek has several lodges, boat moorings, and plane access for anglers and recreational users of the river. Powerboating on Lake Creek is limited to the Chelatna Lake area and the first 2.5 miles of the river from the mouth (ADNR 1991b). The portion of Deshka River under the MOA does not receive as much use as it is relatively inaccessible by powerboat or fly-in (ADNR 1991b).

Portions of the area underneath the SUSITNA MOA are remote and inaccessible by road or railroad. Small planes are the primary means of access. Much of this area is comparatively settled; however, the remote-cabin lifestyle is typical of rural Alaska. Many residents chose to live in this area because of its remote, rural nature.

3.8.4.2 FOX MOA

Land Status

Approximately 71 percent of the 7,456 square miles of lands beneath the MOA are administered by the federal government. The lands beneath FOX MOA are primarily undesignated federal lands under BLM jurisdiction. Most of these federal "intermanagement" lands are state tentatively approved and state selected. After conveyances are completed, most of the lands under the MOA will belong to the state (ADNR 1993a). The Tangle Lakes, Tangle River, Delta River, and Gulkana River are components of the National Wild and Scenic River system and are managed by the BLM. These areas are located along the Denali Highway under the eastern side of the MOA.

State-owned lands include lands under the northern quarter of the MOA; a few townships just north of the Susitna River under the western side of the MOA; and a couple of townships under the southeastern corner in the Lake Louise vicinity. The northern boundary of the Nelchina Public Use Area lies just inside the southern MOA boundary.

Private lands include numerous scattered parcels throughout the Susitna Planning Area (ADNR 1985). Most are located along the Denali Highway, along the Susitna River and other drainages, and near Valdez and Windy creeks. These private lands include Native, Native-selected, university, and other private lands. Two small areas of Native lands occur under the western boundary of the MOA, along the Susitna River, and along the Denali Highway near Cantwell (ADNR 1991a). Private lands in the Talkeetna Mountains subunit are primarily Native-owned (patented, interim conveyed, and selected) (ADNR 1985). Regional Native corporations with use interests in the lands under FOX MOA are Ahtna Inc., Cook Inlet Region Inc., and Doyon Ltd. Tyone Village is located just inside the southern MOA boundary. There are 4 lodges, an estimated 450 private property parcels, and approximately 250 cabins located in the Lake Louise, Lake Susitna, and Tyone Lake area, at the extreme southeastern edge and predominantly outside of the MOA. These areas support extensive recreational use, particularly during the summer, holidays, and hunting seasons. Clarence and Watana lakes, located under the southwestern corner of the MOA, are also used for recreation throughout the year, but especially during the summer.

No municipal lands have been identified. The majority of the MOA overlies a portion of the Matanuska-Susitna Borough.

Land Use

Land use under the FOX MOA is a combination of recreation, subsistence, and mining activities. Recreation use is high along the Denali Highway; in the Tangle Lakes and Tangle River area; along the Delta and Gulkana Wild and Scenic Rivers and their tributaries; and along the Susitna River and other major river drainages. Recreational activities include camping, river floating, sightseeing, snowmachining, and hunting. There are numerous guide and hunting camps throughout the area under the MOA. Lake Louise, a popular recreation area, is located just outside of the southeastern corner of the area beneath the MOA.

The Denali Highway bisects the MOA horizontally, connecting the communities of Paxson and Cantwell. This is the only road access into the region. Trails branching off of the highway provide more primitive access. Other means of access into the area include landing strips, fly-in lakes, and navigable rivers (ADNR 1985). The western portion of the highway is open year-round from Cantwell to a mine operation at Valdez Creek; the eastern portion of the highway is maintained between approximately mid-May to October (Kajdan 1993). A number of lodges are located along this road.

Land Management

Table 3-28 gives the area plan use designation summary for FOX MOA. Federal lands are managed by the BLM as interim-conveyed lands until conveyance is complete. There is no federal management plan for this area. State of Alaska land selections, filed in December 1992, put the BLM's Southcentral Resource Management Plan in limbo pending the state's selection prioritization (Mushovic 1993).

State lands are managed by the ADNR according to the *Susitna Area Plan* (ADNR 1985). Protecting and improving access to recreation, protecting hunting opportunities, and protecting scenic quality along the Denali Highway are major objectives for this area (ADNR 1985). The Nelchina Public Use Area was designated for caribou habitat protection (ADNR 1985). Legislation has directed the ADNR to adopt a management plan for the Nelchina Public Use Area (ADNR 1993b). However, management planning has not yet been scheduled and the land will be managed in the interim according to the guidelines in the *Susitna Area Plan* (ibid.).

The BLM manages the Tangle Lakes and Tangle River recreation areas and campgrounds; the Tangle Lakes Archaeological District; and Brushkana campground.

Table 3-28 Land Use Designation Summary: FOX

MOA	PLAN	Management Unit (MU)	Primary Surface Use (by subunit)
FOX	SAP ¹	Talkeetna Mountains MU1: Denali Hwy MU2: Nelchina Public Use Area	1a: private lands 1b: public recreation, wildlife habitat 1c: public recreation, wildlife habitat 2a: public recreation, wildlife habitat 2b: public recreation, wildlife habitat
		Lake Louise MU3: Tyone Lake	3a: wildlife habitat 3b: public recreation, wildlife habitat 3c: public recreation, wildlife habitat

¹SAP: *Susitna Area Plan* (ADNR 1985).

Aesthetics/Quality of Life Characteristics

The Denali Highway traverses a predominantly undeveloped landscape with unobstructed panoramic views of the Alaska Range to the north, Mt. McKinley to the west, river valleys, alpine vegetation, and wildlife. Scenic qualities of the Denali Highway led to the federal withdrawal of public lands for study and possible Scenic Highway designation (ADOT 1981; ANILCA 1980, Section 1311). However, it has not been designated a Scenic Highway. The rugged, Talkeetna Mountains planning subregion is expected to remain remote and very sparsely developed (ADNR 1985).

3.8.4.3 TANANA MOA

Land Status

Approximately 26 percent of the 6,835 square miles of lands beneath the MOA are administered by the federal government. Federal lands underneath the TANANA MOA include lands west of the Richardson Highway at the western boundary of the MOA and an area north of the Alaska Highway and west of Taylor highway. These are general federal lands under the jurisdiction of the BLM. A third portion of one township of general federal lands is located under the east-southeastern corner of the MOA, along the border with Canada. These federal lands may be in various stages of state-, Native-, or state-/Native-selection and conveyance. In addition to these

lands, portions of the designated Fortymile National Wild, Scenic, and Recreational River and the Gulkana National Wild River are located beneath this MOA. These rivers are managed by the BLM.

Most of the lands under the TANANA MOA are state-owned. A section of land under the middle of the MOA is part of the Tok Management Area of the Tanana Valley State Forest. The remaining state lands are of general designation.

Areas of Native- or private-owned lands are scattered throughout the vicinity. Concentrations of Native lands occur around Tanacross (Tanacross Inc.), Dot Lake (Dot Lake Native Corp.), and lands owned by regional corporations, including Doyon Ltd. and Ahtna Inc.

The unincorporated communities of Tanacross and Paxson are located under the MOA. However, there are no borough boundaries or municipal lands under the TANANA MOA.

Land Use

Land use under the TANANA MOA is a combination of recreation, tourism, rural community and remote residential, subsistence, forestry, and mining activities. Recreation and tourism uses are concentrated along the Alaska, Taylor, and Richardson Highways and the regions rivers and lakes. Dispersed recreation activity such as snowmachining, cross-country skiing, hiking, all-terrain vehicle use, and canoeing occur throughout the basin (ADNR 1986). Rural community and remote residential uses occur in the vicinity of Tanacross and Paxson, and along the three highways. Limited forestry activities occur in the Tanana Valley State Forest. Parts of the area have been mined since the early 1900s, primarily for gold and silver. Mining occurs in the Slate Creek-Chisna River Area (ADNR 1986) and in the area south of Chicken.

Land Management

Federal lands in the northeastern corner of the TANANA MOA are managed by the BLM.

State lands are managed by the ADNR according to the Tanana Basin (three subregions) and Copper River Basin (five subregions) Area Plans (ADNR 1985). As shown in Table 3-29, these lands are managed for a variety of public recreation, settlement, forestry, wildlife habitat, mining, and water resources uses. The TBAP incorporated the Delta-Salcha Area Plan, the draft Little Chena Management Plan, and the Nenana-Totchaket Management Plan (ADNR 1991c). The Tanana Valley State Forest (TVSF) lands are managed under the guidelines of the TVSF Management Plan.

Permission for use and management of Native lands is set by village and regional corporation guidelines. Regional Native corporations with use interests in the lands under TANANA MOA are Doyon Ltd. and Ahtna Inc. (ADCRA 1993). Village corporations include Tanacross, Dot Lake, and Mentasta Lake.

Aesthetics/Quality of Life Characteristics

The area under this MOA, particularly along the Alaska, Taylor, and Richardson Highways, is extremely scenic and receives heavy summer recreation and tourism use. These aesthetic characteristics have contributed to the National Wild and Scenic River designations in the area. Relative accessibility from the highways also contributes to its popularity. Much of the area under the TANANA MOA is comparatively settled; however, the remote-cabin lifestyle is typical of rural Alaska. Many residents chose to live in this area because of its remote, rural nature.

Table 3-29 Land Use Designation Summary: TANANA MOA

Area Plan	Management Unit (subunit)	Primary Surface Use (by subunit)
TBAP ¹	5-East Alaska Range 6-Upper Tanana (Tetlin) 7-Delta-Salcha	5a1: wildlife habitat. 5b1: Fielding Lake: public recreation, wildlife habitat. 5b2: public recreation, transportation corridor, wildlife habitat. 5c2: public recreation, wildlife habitat. 6a: fish and wildlife habitat. 6b: fish and wildlife habitat, forestry, recreational. 6c3: wildlife habitat. 6d: forestry, public recreation, fish and wildlife habitat. 6e: minerals, wildlife habitat. 6f3: public recreation, wildlife habitat. 6g: forestry, wildlife habitat. 6h: recreation, fish and wildlife habitat, agriculture. 7m1: minerals, public recreation, wildlife habitat. 7m2: wildlife habitat. 7o1: minerals, public recreation, wildlife habitat.
TVSF ²	12-Tower Bluffs 13-Porcupine Creek	12a: passive multiple use, low timber and mineral value. 12b: commercial timber production, habitat and public use. 13a: passive multiple use. 13b: commercial and personal timber production, habitat and public use.
CRBAP ³	27-Gulkana River/Richardson Hwy 28-Summit Lake 29-Upper Gakona, Chistochina, Slana R. drainages 30-Alaska Range 31-Slate Creek, Chisna R.	27a: transportation corridor, wildlife habitat, public recreation. 27b: settlement, transportation corridor, wildlife habitat, public recreation. 27c (river and lake): public recreation, wildlife habitat. 27d: public recreation, wildlife habitat. 28a,b: public recreation, wildlife habitat. 28b only: water resources. 29a,b: wildlife habitat. 29b only: public recreation. 30: resource management, low value. 31: minerals, wildlife habitat.

¹TBAP: Tanana Basin Area Plan for State Lands (ADNR 1991c).²TVSF: Tanana Valley State Forest: Forest Management Plan (ADNR 1988b).³CRBAP: Copper River Basin Area Plan for State Lands (ADNR 1986).

3.8.4.4 Elmendorf Air Force Base

The noise associated with aircraft activities at Elmendorf AFB is characteristic of the noise at most Air Force installations and commercial flying facilities. During periods of no aircraft activity, noise results primarily from maintenance and shop operations, ground traffic movement, occasional construction, and similar sources. This noise is almost entirely restricted to the base itself and is comparable to sounds that occur in adjacent communities. It is during periods of aircraft ground or flight activity that the noise environment changes. For these reasons, noise analysis was limited to aircraft operations. Refer to Appendix F for a more thorough discussion of sound analysis methodology and effects.

The F-15 operations are the dominant noise source during routine training, with C-130s, C-12s, and E-3s contributing to a lesser degree. To reduce noise impacts, the 3 WG limits most of its intensive operations to weekdays between 7:00 a.m. and 10:00 p.m. Specific noise abatement procedures are also in place to reduce impacts on the local community, including alternating flight tracks to avoid overflight of the Mountain View subdivision and population centers on Fort Richardson, use of hush houses for engine testing, and locating engine run-up areas away from on- and off-base populations.

The NOISEMAP program was used to generate noise contours. The methodology used in the NOISEMAP program is based on predicting aircraft operations on the "average busy day." The Air Force generally defines operations on the "average busy day" as the average number of operations that occur on routine busy days. This EIS assumes there are 240 routine busy days per year, which includes both routine and MFE training days. Noise contours for the existing noise environment around Elmendorf AFB (routine training plus current MFE operations) are illustrated in Figure 3-59.

The residential on-base population is estimated at 6,738 (Bureau of the Census 1990). An estimated 2,905 of these residents are exposed to $\text{DNL} \geq 65$ dB, and approximately 833 of these are anticipated to be "highly annoyed." No on-base residents are estimated to be exposed to $\text{DNL} \geq 80$ dB. An estimated 497 off-base residents are exposed to DNL 65 to 69 dB, and approximately 104 of these are expected to be "highly annoyed." No off-base residents are exposed to $\text{DNL} \geq 70$ dB. Table 3-30 and Table 3-31 depict the number of on- and off-base residents exposed to $\text{DNL} \geq 65$ dB, the number expected to be "highly annoyed," and the land area affected by current operations.

Although Elmendorf AFB has quiet hours for routine operations between the hours of 10:00 p.m. and 7:00 a.m., nighttime operations are occasionally necessary. When this occurs, there is a potential for sleep disturbance and associated annoyance. The major contributing flight paths that create outdoor SEL levels in excess of 85 dB in the vicinity of Elmendorf AFB are estimated to occur an average of once every 11 days throughout the year. To estimate the number of residents expected to be awakened by nighttime operations, SEL levels were combined with population data to estimate the number of people exposed to SEL levels above 85 dB. These exposure estimates were then multiplied by the average percent expected to be awakened using both the Air Force interim prediction and the Ollerhead prediction procedures (see section 3.3.1). Of the 6,453 residents possibly exposed to nighttime operations on any given evening, the Air Force interim procedure predicts 1,195 are awakened, and the Ollerhead procedure predicts 69 are awakened.

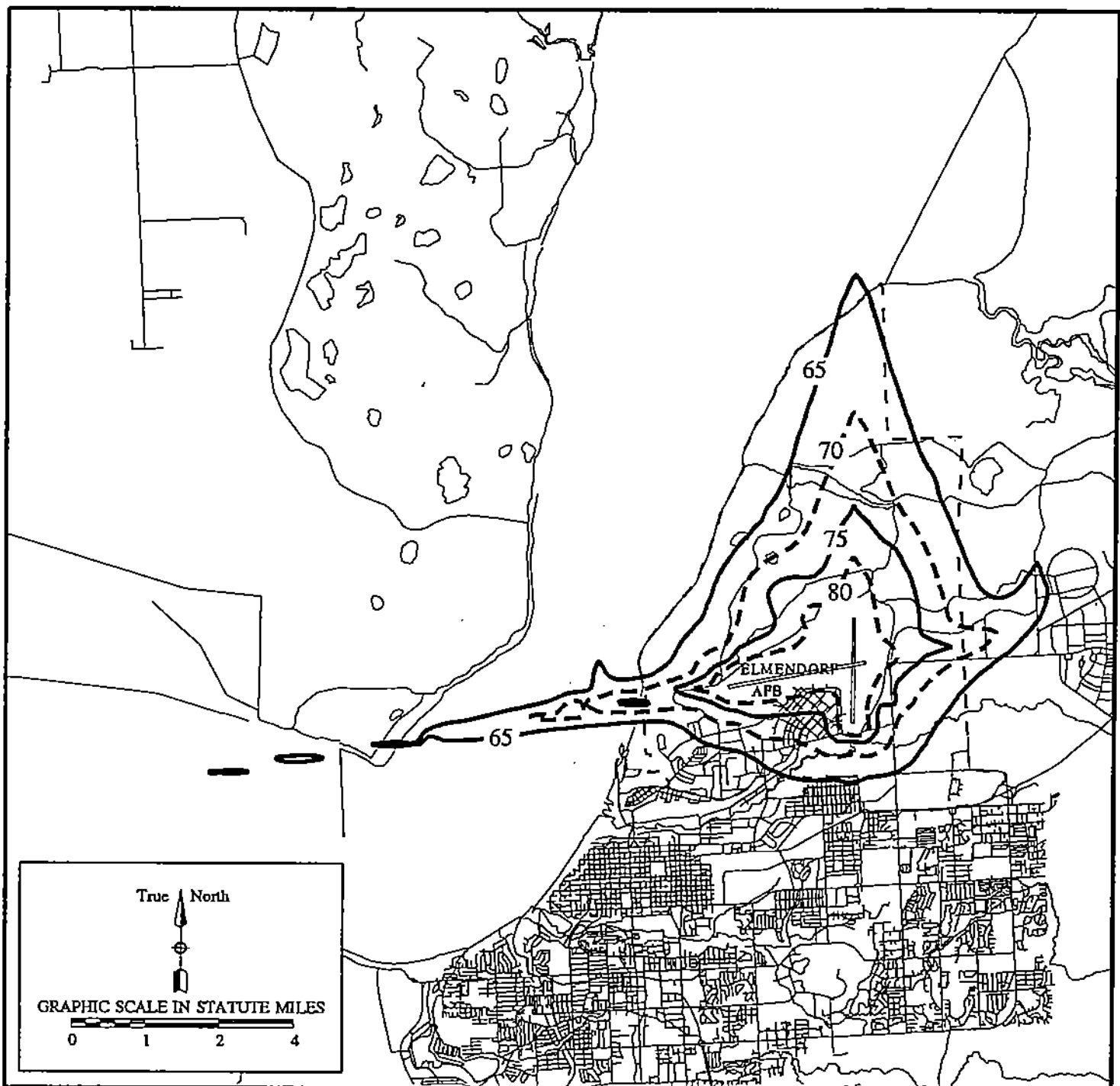


Figure 3-59 DNL Contours for Current Operations at Elmendorf AFB - Routine Daily Training Plus Six MFEs per Year

Table 3-30 On-Base Population Exposure to Aircraft Noise $\geq$ DNL 65 dB from Elmendorf AFB Operations - Routine Daily Training plus Six MFEs per Year

DNL Intervals (dB)	Current Operations		
	Area (mi ²)	No. of Persons	No. Highly Annoyed
65 - 69	6.46	1,145	240
70 - 74	4.07	1,546	495
75 - 79	2.73	214	98
≥ 80	2.38	0	0
Totals:	15.64	2,905	833

Sources: USAF 1993b; U.S. Bureau of the Census 1990.

Table 3-31 Off-Base Population Exposure to Aircraft Noise $\geq$ DNL 65 dB from Elmendorf AFB Operations - Routine Daily Training Plus Six MFEs per Year

DNL Intervals (dB)	Current Operations		
	Area (mi ²)	No. of Persons	No. Highly Annoyed
65 - 69	2.50	497	104
70 - 74	0.37	0	0
75 - 79	0.07	0	0
≥ 80	0.00	0	0
Totals:	2.94	497	104

Sources: USAF 1993b; U.S. Bureau of the Census 1990.

3.8.5 Western Region

The lands underneath the Western Region MOAs are a mix of designated and undesignated state and federal lands, Native village and Native regional corporation lands, municipal lands, and other private lands. Table 3-32 shows the approximate percent of land status of the lands underlying the Western Region MOAs. Level of detail is to the township. Figure 3-60 shows land status under the Western Region MOAs.

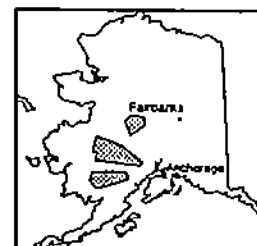


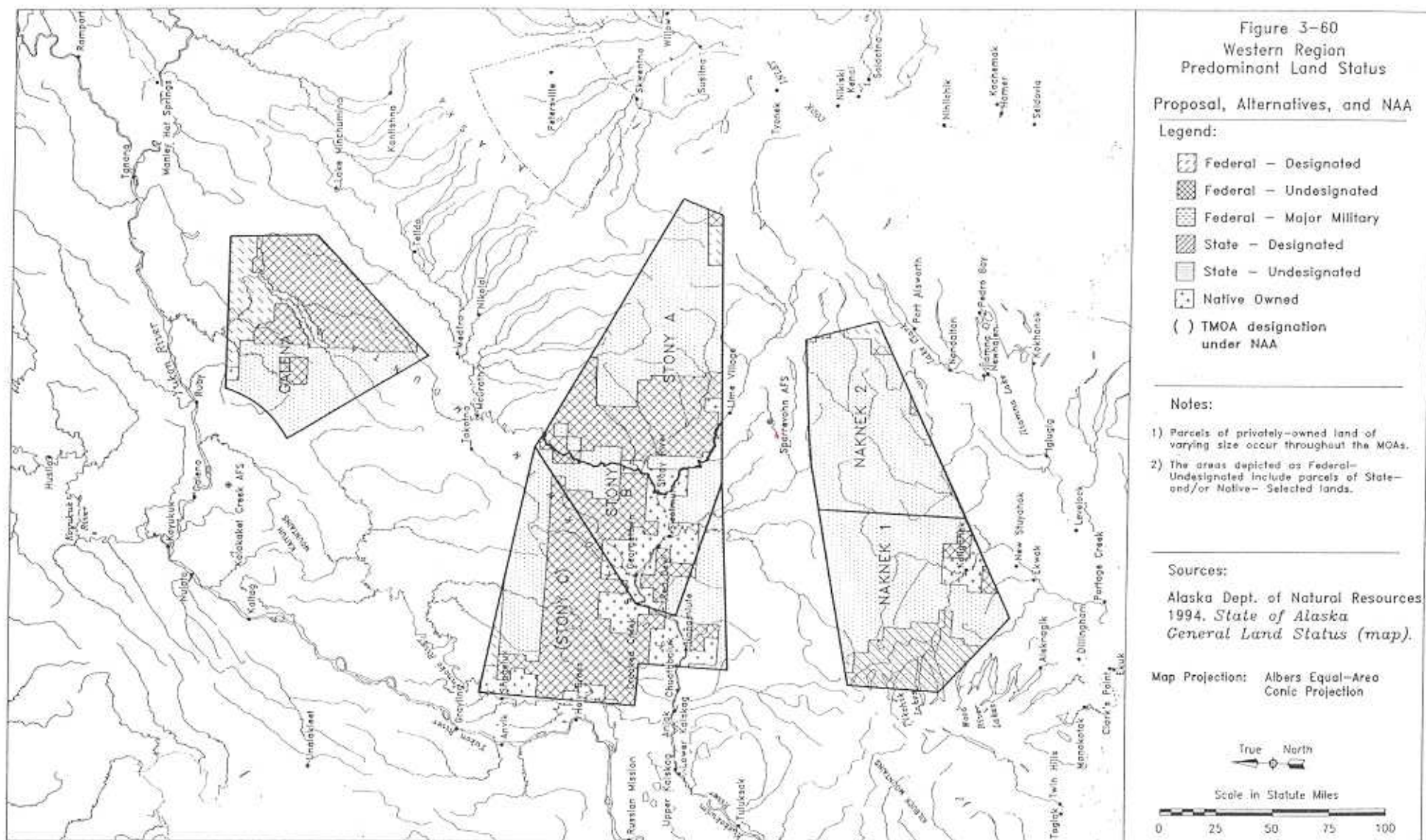
Table 3-32 Western Region Land Status (by percent of land total underneath MOA)¹

Western MOAs	State Lands	Federal Lands	Native Corporation Lands	Military Lands
GALENA	0% ²	18.0%	0.7%	0%
	35.9% ³	45.4%		
NAKNEK 1	24.8%	0%	5.4%	0%
	66.6%	3.2%		
NAKNEK 2	0%	4.2%	0%	0%
	95.2%	0.6%		
STONY A	0%	2%	3.7%	0%
	57.9%	36.4%		
STONY B	0%	0%	34%	0%
	32.9%	33.1%		
STONY C	0%	1.8%	18.6%	0%
	33.2%	46.4%		

¹Figures may not equal 100 percent due to rounding.

²Top figure is designated lands (e.g., parks, refuges, recreation rivers).

³Bottom figure is undesignated or general management land.



3.8.5.1 GALENA MOA

Land Status

Approximately 63 percent of the 5,166 square miles of lands beneath the MOA are administered by the federal government. The USFWS manages the Nowitna National Wildlife Refuge (NWR) and the Nowitna National Wild and Scenic River, located under the north and central portions of the MOA. Undesignated federal lands (BLM) are located primarily under the eastern two-thirds of the MOA. Most of these BLM "intermanagement" lands are state-selected (filed Dec. 92 and Jan 93) (ADNR 1994).

State lands account for most of the lands underneath the western portion of GALENA MOA. A small parcel (less than one township) of state land is located under the eastern MOA boundary.

All or some portion of one township of Native land is located under the extreme northwestern corner of the MOA, south-southeast of the community of Ruby and bordering the south bank of Big Creek. There are conveyed or selected parcels within the Nowitna NWR along the Sulatna and Nowitna Rivers (USFWS 1987a); the majority of parcels conveyed or selected (within the Refuge) are located near the mouth of the Nowitna River where it empties into the Yukon River (USFWS 1987a), outside of the northern MOA boundary. Most allotments in the BLM-managed area are located along major water bodies, such as the Yukon and Koyukuk Rivers (BLM 1986); it is undetermined here whether or not they are located under the MOA.

There are no municipal lands in the GALENA MOA vicinity. Private parcels may be located along the Ruby-Poorman road in the northwestern area of the MOA.

Land Use

Land use underneath the GALENA MOA is a combination of remote subsistence, recreation, and some mining activities. Residents of Ruby, Tanana, Lake Minchumina, and Telida are among those individuals who use the area underneath the MOA for subsistence hunting and trapping. Subsistence activities are concentrated along the river drainages. Usage is not thought to be extensive (BLM 1986). While the population of Lake Minchumina increased from 22 in 1980 to 32 in 1990, the combined populations of Ruby, Tanana, and Telida decreased by 92 during the same period (ADL 1991).

The Nowitna National Wild and Scenic River offers outstanding remote recreation (USFWS 1987a), and the region possesses other outstanding values related to dispersed types of recreational activities (BLM 1986). However, remote recreation opportunities are limited by the difficulty of access into this area (BLM 1986).

A placer gold mine at Long Creek, about 35 miles south of Ruby, has operated since the early 1900s (ADCRA 1987). Gold, platinum, tungsten, and tin mining claim activity is located along the Ruby-Poorman Road under the northwestern corner of the MOA (USFWS 1987a). ADCRA (1987) reported small scale mining in the hills around Ruby. Other occurrences of gold placer activities are southeast of the Nowitna NWR along Sun Creek, California Creek, Baker Creek, and American Creek; these may include abandoned locations (USFWS 1987a). The BLM lands in the northern half of the MOA are open to mineral leasing.

Land Management

Table 3-33 Land Use Designation Summary: GALENA MOA

Area Plan	Management Unit (subunit)	Primary Surface Use (by subunit)
KAP ¹	6-Nixon Fork	6d: wildlife habitat
CYRMP ²	Kuskokwim Subunit	multiple use
NNWR ³	minimal management wild river	maintain diversity of fish and wildlife, their habitats, and other natural resources, provide subsistence, other multiple uses

¹KAP: *Kuskokwim Area Plan for State Lands* (ADNR 1988a).

²CYRMP: *Central Yukon Planning Area Resource Management Plan* (BLM 1986).

³NNWR: *Nowitna National Wildlife Refuge Final Comprehensive Conservation Plan, Wild River Plan, Wilderness Review, and Environmental Impact Statement* (USFWS 1987a).

Federal lands under the jurisdiction of the USFWS are managed according to the Comprehensive Conservation Plan (USFWS 1987a). The management directions set forth by this plan are to maintain fish and wildlife values and natural diversity by designating most of the Refuge's land for minimal management; to provide subsistence; to maintain opportunities for hunting, fishing, and wildlife observation; and to designate no wilderness. BLM lands in the northern half of the MOA are in the Kuskokwim Subunit as designated and managed according to the *Central Yukon Planning Area Resource Management Plan* (BLM 1986). The BLM has identified the Sulukna River Watershed Area of Critical Environmental Concern (ACEC), which has been prescribed multiple use to protect salmon and sheefish habitats. The Plan designates two Research Natural Areas (RNAs); however, these two areas lie outside of the MOA boundaries and Region of Influence. The remaining lands administered by BLM underlie the southeast quadrant of the MOA. These lands are managed by the Anchorage District Office of BLM. There are no land management plans developed for these lands.

State lands are managed by the ADNR; however, there is no Area Plan available for most of the state land beneath this MOA region. A small portion of state lands managed according to the *Kuskokwim Area Plan for State Lands* (ADNR 1988a) are located under and along the extreme southeastern boundary of the MOA. According to this Plan, most of the lands are state-owned; some are state- and Native-selected. The state maintains the 35-mile Ruby-Poorman access road to gold mines. Primary surface uses in this area are settlement, wildlife habitat, and general use (low resource values) (ADNR 1988a). As of June 1993, an Area Plan is not scheduled for the remaining state-managed area underneath the GALENA MOA. There are no specially designated areas of state lands (i.e., parks, refuges, recreation areas, etc.).

Permission for use and management of these lands is set by village and regional corporation guidelines. Dineega Corporation is the Ruby village corporation; most Ruby residents are shareholders in Doyon Ltd. regional corporation (ADCRA 1987). Telida residents are shareholders in MTNT Ltd. village corporation.

No municipal or local government lands have been determined in this area.

Aesthetic/Quality of Life Characteristics

There are no communities located underneath the MOA. Mining activity areas are found at Sulatna Crossing, Poorman, and Placerville, located south of Ruby along the Ruby-Poorman Road. This road passes under the most westerly corner of the MOA and offers access to the Nowitna River via the Sulatna River. Communities in the vicinity of the area under GALENA MOA are Ruby, population 170 (ADL 1991), 10 to 12 miles to the

northwest; Lake Minchumina, population 32 (ADL 1991), 20 to 25 miles to the east; Telida, population 11 (ADL 1991), 50 miles to the southeast; and Medfra, population 0 (ADL 1991), 10 to 12 miles south. McGrath, Nikolai, and Takotna are located 40 to 50 miles to the south of the GALENA MOA boundaries. Placerville, Poorman, Sulatna Crossing, and Long Creek are mining settlements that operated during the early 1900s (ADCRA 1987). There are a handful of small trapping cabins in the NWR, most located along the Nowitna River.

There is no designated wilderness underneath GALENA MOA. The area is generally remote, seldom visited, and access is difficult. Most recreation in the NWR occurs along the Yukon and Sulatna Rivers (USFWS 1987a). Difficulty of access limits the uses of hunting and recreation in the NWR; it is reasonable to expect that these characteristics apply to most of the region underneath the MOA. The wilderness review conducted by Nowitna NWR (USFWS 1987a) evaluated all the lands in the Refuge for wilderness suitability, and with the exception of the Nowitna National Wild River, the Refuge did not contain outstanding resource values that would be unique to the wilderness system. Habitat types, species, and recreational opportunities are similar to those found elsewhere in the state. The BLM has rated the scenic qualities (in the North Kuskokwim subunit) class B scenery in the upland areas and class C scenery in the plains and lowlands of the central and northern portions of the subunit. Class B areas are where landscape characteristics are common throughout the region and are not outstanding. Class C is applied to areas whose landscape characteristics provide only minimal or no variety and is generally monotonous (BLM 1986).

During public meetings conducted by the BLM for the CYRMP, local residents reported a preference for limited access as it serves to deter an influx of visitors, thus ensuring privacy and preserving the present lifestyle (BLM 1986). Many of these recreational values result from the remote and isolated characteristics that have protected the area from the pressures of public use (BLM 1986).

3.8.5.2 STONY MOAs

Land Status

The STONY MOA complex includes STONY A and B MOAs, and STONY C TMOA. Of the 15,610 square miles of lands beneath the MOAs, approximately 38 percent of STONY A, 33 percent of STONY B, and 47 percent of STONY C TMOA are administered by the federal government. The southeastern corner of STONY A overlies all or portions of four townships of the northern tip of Lake Clark National Park and Preserve (Lake Clark NPP); at least half of this Park area under the MOA is designated wilderness (Roberts 1993). The northwestern corner of STONY C TMOA overlies portions of eight townships of the southern portion of Innoko NWR, managed by the USFWS; this part of the Innoko NWR is designated wilderness.

Other federal lands under the STONY MOA complex are undesignated, "intermanagement" lands under the jurisdiction of the BLM (Vernimen 1993). These lands are located primarily in the central (east of the Kuskokwim River) and western portions of the MOA complex. There are other smaller areas of these intermanagement lands under the southern portions of the MOA complex, particularly underneath STONY B MOA and STONY C TMOA. Most of these undesignated federal lands are state- and Native-selected (Vernimen 1993).

Most of the lands underlying the eastern portion of STONY A are state-owned; a concentration of state lands occurs under the center of the complex around the Kuskokwim River area; and the northern and southern portions of STONY C TMOA are state-owned. State lands underneath the STONY MOAs have no formal designations (i.e., no parks, refuges, public use areas, etc.). Once land conveyances are completed, the state will be the predominant landholder underneath the STONY complex (ADNR 1993a).

Portions of five townships of the Matanuska-Susitna Borough are underneath the extreme eastern portion of STONY A MOA. Less than one township under the southeastern corner of the STONY A MOA is within the Kenai Peninsula Borough boundary. However, there are no municipal lands underneath the STONY MOAs.

Concentrations of Native lands occur in the vicinities of the communities of Shageluk, Holy Cross, Napamiute, Chuathbaluk, Crooked Creek, Georgetown, Red Devil, Sleetmute, Stony River, and Lime Village. There are scattered parcels of private lands, mostly Native allotments, throughout the Kuskokwim Planning area. Many allotments are located along the Kuskokwim, Swift, and Stony rivers and other major drainages (ADNR 1988a).

Land Use

The lands under the STONY complex are used by residents of the communities of Crooked Creek, Shageluk, Holy Cross, Aniak, Chuathbaluk, Napaimute, Georgetown, Red Devil, Sleetmute, Stony River, Lime Village, and McGrath-area residents for big game hunting, trapping, fishing, and berry picking. Rivers in the area provide reasonable access to lands for these subsistence activities. Activities are concentrated along the drainages throughout the area (ADNR 1988a). Hunting, trapping, and subsistence uses are prohibited within the "Park"-designated portion of Lake Clark NPP; the "Preserve"-designated area, however, allows these uses (NPS 1984).

Commercial guide use is relatively high for big game hunting, particularly in the vicinity under the eastern STONY A MOA along the Alaska Range. This region, Management Unit 13 of the Kuskokwim Planning Area, has more commercial guide (big game hunting) use take place than in any other unit in the planning area (ADNR 1988a).

The lands under the eastern part of STONY A in and near the Alaska Range are used by river runners, hikers, and climbers. Guided and unguided sport hunting occurs. The upper Stony River is used for recreation, mostly hunting float trips; sport hunting was increasing rapidly in 1988 for the lands under the eastern STONY A MOA (ADNR 1988a). However, use of the eastern region is limited and probably concentrated during hunting season, and access difficulty limits the number of users (Roberts 1993).

The state ranks mining potential high in the Kuskokwim mountains, along the western MOA complex area. Active placer mining occurs in the Flat-Iditarod, Crooked Creek, Granite Creek, and Moore Creek areas (ANDR 1988a).

Land Management

Table 3-34 Land Use Designation Summary: STONY MOA Complex

MOA	Area Plan	Management Unit (subunit)	Primary Surface Use (by subunit)
STONY A	KAP ¹	5-Kuskokwim River 11-Swift River 12-South Alaska Range 13-North Alaska Range 14-Stony River	5a: forestry, public recreation, wildlife habitat. 5f: settlement. 5g: settlement. 5h: resource management. 5i: general use: low resource values. 5j: wildlife habitat. 11a: wildlife habitat. 11b: general use: low resource value. 12a: public recreation, wildlife habitat. 12b: resource management. 12c: general use: low resource values. 13a: public recreation, wildlife habitat. 14b: wildlife habitat. 14c: general use: low resource values.
	SAP ²	1-Alaska Range	1b: public recreation, wildlife habitat. 1d: minerals.
STONY B	KAP ¹	5-Kuskokwim River 14-Stony River 15-Holitna River 16-Holokuk-Oskawalik	5a,g,i,j: (see above). 14a: forestry, wildlife habitat. 14b, 14c: (see above). 14d: public recreation, wildlife habitat. 15a: forestry, wildlife habitat. 15b: wildlife habitat. 15c: water resources, wildlife habitat. 15d: general use: low resource values. 15e: settlement. 16a: wildlife habitat.
STONY C	KAP ¹	8-Dishna-Iditarod 9-Takotna River 10-George River 16-Holokuk-Oskawalik 17-Aniak River	8b: resource management. 8c: minerals, wildlife habitat. 8e: general use: low resource values. 8g: wildlife habitat. 9a: general use: low resource values. 9b: wildlife habitat. 9c: minerals. 9d: forestry, public recreation, wildlife habitat. 10b: minerals, wildlife habitat. 16a: (see above). 16b: general use: low resource values. 17b: public recreation, wildlife habitat. 17c: general use: low resource values.

¹KAP:Kuskokwim Area Plan for State Lands (ADNR 1988a).²SAP:Susitna Area Plan (ADNR 1985).

Federal lands under the jurisdiction of the NPS are managed according to directions set forth by the *General Management Plan and Environmental Assessment: Lake Clark National Park and Preserve, Alaska* (NPS 1984). Most of the Lake Clark NPP under the STONY A MOA is within the "Park"-designated portion of the unit; at least half of this area is designated wilderness (Roberts 1993; NPS 1984). The portions of the Chilikadrotna, Mulchatna, and Tiikakila Rivers within the Lake Clark NPP are designated wild rivers (NPS 1984; ANILCA 1980). The Park Service is charged with cooperatively monitoring use of the rivers (NPS 1984). The Park Service will also encourage the state to manage its segments of the Mulchatna and Chilikadrotna rivers as wild rivers (ibid.). None of these rivers underlies the STONY MOA complex; however, portions underlie the NAKNEK MOA complex (see section 3.8.5.3). BLM lands are within the Anchorage District jurisdiction and are "intermanagement" lands. There is no formal management plan for the BLM lands in the NAKNEK MOA area.

Most of the state lands under the STONY MOAs are managed by the ADNR according to the *Kuskokwim Area Plan for State Lands* (ADNR 1988a). Lands managed according to the Kuskokwim Area Plan are mostly state-owned with some state- and Native-selected. Primary surface uses in this area are settlement, wildlife habitat, public recreation, multiple use resource management, and general use (low resource values) (ADNR 1988a) (see Table 3-34). There are no special-designated state lands (i.e., parks, refuges, recreation areas, etc.) under the STONY MOAs.

All or portions of five townships located at the eastern end of the STONY A MOA are managed by the state according to the *Susitna Area Plan* (ADNR 1985). Mining, commercial guiding for big game, trapping, non-guided hunting, and recreation are primary uses (ADNR 1985) (see Table 3-34). Use of this area is light and occurs primarily in the summers and during hunting seasons (ADNR 1985). Settlement of this area is also a primary objective (ADNR 1985).

Permission for use and management of Native lands are set by village corporation (Kuskokwim Corporation) and regional corporation (Calista Corp., Doyon Ltd.) guidelines. Native residents are shareholders in the Kuskokwim Corporation and are also served by the non-profit Kuskokwim Native Association. A small portion of the eastern STONY A MOA overlies both the Matanuska-Susitna and Kenai Peninsula Boroughs. Both boroughs have general borough-wide comprehensive plans that apply to those areas but provide no specific guidance. No local management plans or policies have been determined.

Aesthetics/Quality of Life Characteristics

In general, the western portion of the MOA complex under the STONY B MOA and STONY C TMOA is more developed than under STONY A to the east. There are no communities located under the STONY A MOA; however, Lime Village (1990 pop. 42) is located just south of the southern boundary of the MOA. The communities located underneath the STONY B MOA are Stony River (1990 pop. 51), Sleetmute (1990 pop. 106), Red Devil (1990 pop. 53), and Georgetown (1990 pop. 0). The communities of Crooked Creek (1990 pop. 106), Napaimute (1990 pop. 3), and Flat-Iditarod are located underneath STONY C TMOA; Holy Cross, Shageluk, Chuathbaluk, and Aniak are located just outside the western STONY C TMOA boundary. These communities are representative of typical small Alaskan bush communities.

The portion of Lake Clark NPP that lies underneath STONY A MOA is designated wilderness. The portion of Innoko NWR under STONY C TMOA is also designated wilderness. The eastern portion of the MOA complex in the vicinity of the Alaska Range is considered to have high scenic qualities (ADNR 1988a); the alpine scenery brings in a number of river runners, hikers, and climbers (ibid.). In general, STONY A is remote and is difficult to access, particularly the rugged eastern reaches. Most recreation and settlement occurs along the major river drainages. Habitat types, species, and recreational opportunities are similar to those found elsewhere in the state.

3.8.5.3 NAKNEK MOAs

Land Status

Approximately 8 percent (3 percent of NAKNEK 1 and 5 percent of NAKNEK 2) of the total 9,263 square miles of lands beneath the MOAs are administered by the federal government. Federal lands account for no more than 18 townships underneath the NAKNEK MOA complex. Portions of 10 townships located under the eastern boundary of the NAKNEK complex are administered by the NPS as the Lake Clark NPP. These lands are within the designated "Preserve" portion of the Lake Clark NPP. The remaining federal lands underneath the NAKNEK MOA complex include portions of two townships of undesignated lands under the southeastern boundary of NAKNEK 2 MOA. Portions of six townships of undesignated federal land occur under the southern portion of NAKNEK 1 MOA. Most of these lands are state selected (ADNR 1984).

State lands account for the majority of the lands beneath the NAKNEK MOAs. These include a portion of the Wood-Tikchik State Park, which is located under the western half of NAKNEK 1 MOA. There are no other designated state lands underneath these MOAs.

NAKNEK 1 MOA overlies portions of at least 10 townships of Native-owned land in the southeast portion of the MOA along the Nuyakuk, Nushagak, and Mulchatna rivers, in the vicinity of Koliganek (1990 pop. 181). Koliganek Natives Ltd. is the village corporation (Alaska Northwest Books 1991). Koliganek village is located near the southern boundary of NAKNEK 1 MOA. Bristol Bay Native Corporation and Cook Inlet Region Inc. are the regional Native corporate land owners under these MOAs.

Concentrations of Native allotments in Wood-Tikchik State Park are found along the north shore of Lake Chauekuktuli, the lower reaches of Tikchik River, the outlet of Nuyakuk River, and all around Tikchik Lake (ADNR 1987). There are scattered parcels of other private, patented land in this state park (ADNR 1987). Native allotments are also located along the Nushagak, Mulchatna, and other rivers under the MOAs.

The greater and eastern part of the NAKNEK 2 MOA overlies Bristol Bay Coastal Resource Service Area, but no municipal lands are under the NAKNEK MOA complex.

Land Use

Land use under the NAKNEK MOA complex is predominantly related to subsistence and recreational activities. Other remote land uses are represented by scattered trapping cabins and summer fish camps along the rivers. Two townships of state lands under the northeastern corner of NAKNEK 2 MOA have been designated for remote settlement (the Half Cabin Lake Settlement) (ADNR 1984). There is potential for village agricultural use along the Nushagak River (ibid.). The Bristol Bay Area Plan (BBAP) has indicated that there might be a high potential for mineral development in the area underneath the southern portion of NAKNEK 1 MOA (ibid.).

The area is inaccessible by road. Subsistence and recreational activities center around the rivers and lakes, which offer the only access to fish and wildlife resources. Many commercial lodges and guides utilize the fish and game resources in the area, using boats and planes for access. Residents of Koliganek move to summer fish camps along the Nushagak River (ADNR 1984).

Land Management**Table 3-35 Land Use Designation Summary: NAKNEK MOA Complex**

Area Plan	Management Unit (subunit)	Primary Surface Use (by subunit)
KAP ¹	15-Holitna River	15b: wildlife habitat. 15c: water resources, wildlife habitat. 15d: general use: low resource values. 15f: settlement.
BBAP ²	6-Nushagak, Mulchatna 7-Upper Mulchatna	6: fish and wildlife habitat and harvest, recreation. 7: fish and wildlife habitat and harvest, river-oriented recreation.
WTSPMP ³	1-Upper Tikchik River 2-Chikuminuk Lake 3-Nuyakuk Lake 5-Kulik/Beverly Lakes	1: wilderness purposes. 2: wilderness purposes. 3: managed as a natural area. 5: managed as a natural area, Golden Horn and Silver Horn areas managed as wilderness zone.

¹ KAP: *Kuskokwim Area Plan for State Lands* (ADNR 1988a).

² BBAP: *Bristol Bay Area Plan for State Lands* (ADNR 1984).

³ WTSPMP: *Wood-Tikchik State Park Management Plan* (ADNR 1987).

The NPS manages the Lake Clark NPP according to the *General Management Plan and Environmental Assessment: Lake Clark National Park and Preserve, Alaska* (NPS 1984). The portions of the NPP underneath the MOA are within the "Preserve" designation and are not designated wilderness (NPS 1984). Two National Wild and Scenic Rivers, the Mulchatna and Chilikadrotna, flow in this area of the Preserve. These rivers are designated as Wild and Scenic Rivers only within the Lake Clark NPP boundaries (*Wild and Scenic Rivers Act*, 16 U.S.C. 1271 *et seq.*). The NAKNEK 2 MOA overlies a Wild and Scenic-designated portion of the Mulchatna River under the northeastern corner of the MOA. The MOA also overlies a small length of the Chilikadrotna National Wild River. A third National Wild River, the Tikakila, heads in Summit Lake and flows 51 miles to Lake Clark within the Preserve, but does not underlie the MOA.

There are no other designated areas of federal lands beneath the NAKNEK MOA complex. The general federal lands are managed by the BLM, Anchorage District Office, as "intermanagement" lands, or lands that have been state- or Native-selected (Vernimen 1993). BLM is responsible for managing lands selected by the state or Native corporations until these lands are conveyed to the selector (Vernimen 1993).

State lands are managed by the ADNR under the guidelines of the Wood-Tikchik State Park Management Plan (western MOA complex), the Bristol Bay Area Plan (central and southern MOA complex), and the Kuskokwim Area Plan (northern MOA complex). Lands subject to these plans are located in several management units, which are listed in Table 3-35.

Most of the NAKNEK MOA complex falls within the boundaries of the Bristol Bay Coastal Resource Service Area. Activities on the ground that require state or federal approval must be consistent with the policies of the coastal management plan. Use and management of Native lands is set by village and regional corporation guidelines.

Aesthetics/Quality of Life Characteristics

The majority of the area underneath the NAKNEK MOA complex is undeveloped and remote. There is no road access to this area. The only community underneath the NAKNEK MOAs is Koliganek, population 181 (ADL 1991). Developments include scattered lodges, trapping cabins, and summer fish camps, most located along rivers and lakes that provide river boat or floatplane access.

The northern and central portions of Wood-Tikchik State Park around Chikuminuk Lake Management Unit are designated by the state as wilderness zones because of the limited recreation and subsistence use activities (ADNR 1987). These wilderness zones have been established to promote, perpetuate, and, where necessary, restore the wilderness character of the land and its specific values of solitude, physical and mental challenge, scientific study, inspiration, and primitive recreational opportunities (ADNR 1987). The NAKNEK MOAs do not overlie any other federal- or state-designated wilderness.

The scenic qualities and fish and wildlife resources of Wood-Tikchik State Park attract recreational visitors (ADNR 1987). Two commercial fishing lodges in Management Unit 3 of the Park generate a substantial amount of aircraft and boat travel. Frequent flights to and from the lodges in the park "might be considered to be an intrusion" (ADNR 1987).

3.8.6 Federal Conservation System Units

Table 3-36 outlines the purposes for which Congress set aside certain lands in Conservation System Units (CSUs) under the Alaska National Interest Lands Conservation Act (ANILCA). The presence of a MOA at the time of establishment or expansion of a CSU is also noted.

The following table outlines the purposes for which Congress set aside certain lands in Conservation System Units (CSUs) under ANILCA. The presence of a MOA at the time of establishment or expansion of a CSU is also noted.

Table 3-36 ANILCA Conservation System Units in the Region of Influence

Conservation System Unit (Managing Agency)	Mandated Purpose(s) under ANILCA December 2, 1980, <i>et seq.</i>	Overlying MOA(s) ✓ = MOA Pre-dates ANILCA
Yukon-Charley Rivers National Preserve (NPS)	To maintain the environmental integrity of the entire Charley River basin, including streams, lakes and other natural features, in its undeveloped natural condition for public benefit and scientific study; to protect habitat for, and populations of, fish and wildlife including, but not limited to, the peregrine falcons and other raptorial birds, caribou, moose, Dall sheep, grizzly bears, and wolves; and in a manner consistent with the foregoing, to protect and interpret historical sites and events associated with the gold rush on the Yukon River and the geological and paleontological history and cultural prehistory of the area. (Title II, Sec. 201)	✓YUKON 1/2 MOAs YUKON 3/4 MOAs (YUKON 3 TMOA)
Yukon Flats National Wildlife Refuge (USFWS)	To conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, caribou and other migratory birds, Dall sheep, bears, moose, wolves, wolverines and other furbearers, caribou (including participation in coordinated ecological studies and management of the Porcupine and Fortymile caribou herds), and salmon; to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats; to provide . . . the opportunity for continued subsistence uses by local residents; and to ensure, to the maximum extent practicable . . . water quality and necessary water quantity within the refuge. (Title III, Sec. 301)	YUKON 5 MOA (YUKON 4 TMOA)
Steese National Conservation Area (BLM)	To provide for the immediate and future protection of the lands in Federal ownership within the framework of a program of multiple use and sustained yield and for the maintenance of environmental quality; special values to be considered in planning and management of the area are caribou range and Birch Creek. (Title IV, Sec. 401)	✓YUKON 2 MOA
Charley National Wild River (NPS)	The entire river, including its major tributaries, Copper Creek, Bonanza Creek, Hosford Creek, Derwent Creek, Flat-Orthmer Creek, Crescent Creek, and Moraine Creek, within the Yukon-Charley Rivers National Preserve to be administered as Wild. ¹ (Title VI, Sec. 601)	✓YUKON 1/2 MOAs YUKON 3/4 MOAs (YUKON 3 TMOA)
Birch Creek National Wild River (BLM)	The segment of the main stem from the south side of Steese Highway in township 7 north, range 10 east, Fairbanks meridian, downstream to the south side of the Steese Highway in township 10 north, range 16 east; to be administered as Wild. ¹ (Title VI, Sec. 603)	✓YUKON 2 MOA
Fortymile National Wild River (BLM)	The main stem consisting of Napoleon Creek (Scenic, 7 miles source to mouth); Franklin Creek (Scenic, 6 miles source to mouth); Uhler Creek (Scenic, 8 miles source to mouth); Wade Creek (Recreational, 10 miles source to mouth); Champion Creek (Wild, 29 miles); and O'Brien Creek (Scenic, 27 miles source to mouth). The Middle Fork (Wild, 42 miles Joseph Creek to mouth at North Fork confluence); and Joseph Creek (Wild, 23 miles source to mouth). The North Fork (Wild, 58 miles source to mouth); and Hutchison Creek (Scenic, 19 miles source to mouth). The South Fork (Scenic, 28 miles source to mouth); Mosquito Fork (Wild, 38 miles Kechumstuk to mouth); Dennison Fork (Scenic, 19 miles from West Fork of Dennison Fork to mouth); West Fork of Dennison Fork (Scenic, 13 miles from Logging Cabin Creek to mouth); Logging Cabin Creek (Scenic, 17 miles source to mouth at West Fork of Dennison Fork); and Walker Fork (Scenic, 12 miles Liberty Creek to mouth). ¹ (Title VI, Sec. 603)	YUKON 3 MOA (YUKON 3 TMOA) TANANA MOA

Conservation System Unit (Managing Agency)	Mandated Purpose(s) under ANILCA December 2, 1980, <i>et seq.</i>	Overlying MOA(s) ✓ = MOA Pre-dates ANILCA
Denali National Park and Preserve (NPS)	To protect and interpret the entire mountain massif, and additional scenic mountain peaks and formations; and to protect habitat for, and populations of fish and wildlife including, but not limited to, brown/grizzly bears, moose, caribou, Dall sheep, wolves, swans and other waterfowl; and to provide continued opportunities, including reasonable access, for mountain climbing, mountaineering and other wilderness recreational activities. (Title II, Sec. 202)	✓SUSITNA MOA
Delta National Wild River (BLM)	The segment from and including all of the Tangle Lakes to a point one-half mile north of Black Rapids; to be administered by the Secretary of the Interior. The upper 24 miles (Tangle Lakes section) are classified Scenic; from the lower lakes to a point opposite milepost 212 on the Richardson Highway (20 miles) is classified Wild; and from milepost 212 on the Richardson Highway to one-half mile north of Black Rapids (18 miles) is classified Recreational. ¹ (Title VI, Sec. 603)	FOX MOA (FOX 1 TMOA)
Gulkana National Wild River (BLM)	The main stem from the outlet of Paxson Lake in township 12 north, range 2 west, Copper River meridian to the confluence with Sourdough Creek (47 miles); the south branch of the west fork from the outlet of an unnamed lake in sections 10 and 15, township 10 north, range 7 west, Copper River meridian to the confluence with the west fork (24 miles); the north branch from the outlet of two unnamed lakes, one in sections 24 and 25, the second in sections 9 and 10, township 11 north, range 8 west, Copper River meridian to the confluence with the west fork (30 miles); the west fork from its confluence with the north and south branches downstream to its confluence with the main stem (79 miles); and the middle fork from the outlet of Diekey Lake in township 13 north, range 5 west, Copper River meridian to the confluence with the main stem (32 miles). Entire system classified as Wild. ¹ (Title VI, Sec. 603)	FOX MOA (FOX 1 TMOA)
Lake Clark National Park and Preserve (NPS)	To protect the watershed necessary for perpetuation of the red salmon fishery in Bristol Bay; to maintain unimpaired the scenic beauty and quality of portions of the Alaska Range and the Aleutian Range, including active volcanoes, glaciers, wild rivers, lakes, waterfalls, and alpine meadows in their natural state; and to protect habitat for the populations of fish and wildlife including, but not limited to, caribou, Dall sheep, brown/grizzly bears, bald eagles, and peregrine falcons. (Title II, Sec. 201)	✓STONY A MOA ✓NAKNEK 2 MOA
Mulchatna National Wild River (NPS)	That portion of the river within the Lake Clark National Park and Preserve to be administered as Wild. ¹ (Title VI, Sec. 601)	✓NAKNEK 2 MOA
Nowitna National Wildlife Refuge (USFWS)	To conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, trumpeter swans, white-fronted geese, canvasbacks and other waterfowl and other migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike; to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats; to provide, . . . the opportunity for continued subsistence uses by local residents; and to ensure, to the maximum extent practicable . . . , water quality and necessary water quantity within the refuge. (Title III, Sec. 302)	✓GALENA MOA
Nowitna National Wild River (USFWS)	That portion of the river from the point where the river crosses the west limit of township 18 south, range 22 east, Kateel River meridian, to its confluence with the Yukon River within the boundaries of the Nowitna National Wildlife Refuge to be administered as Wild. ¹ (Title VI, Sec. 602)	✓GALENA MOA

¹Wild rivers are "vestiges of primitive America," generally inaccessible by roads; scenic rivers are mostly "primitive" with shorelines "largely undeveloped"; and recreational rivers are "readily accessible by roads" and may have more development (Palmer 1993).

Conservation System: Unit (Managing Agency)	Mandated Purpose(s) under ANILCA December 2, 1980, <i>et seq.</i>	Overlying MOA(s) ✓ = MOA Pre-dates ANILCA
Innoko National Wildlife Refuge (USFWS)	To conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, waterfowl, peregrine falcons, other migratory birds, black bear, moose, furbearers, and other mammals and salmon; to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats; to provide, . . . the opportunity for continued subsistence uses by local residents; and to ensure, to the maximum extent practicable . . . , water quality and necessary water quantity within the refuge. (Title III, Sec. 302)	(STONY C TMOA)

Sources: ANILCA 1980; BLM 1992; and Palmer 1992.

3.9 Air Quality

Air quality is protected under the Clean Air Act of 1963, as amended. The Act includes standards, known as National Ambient Air Quality Standards (NAAQS), for a number of air pollutants, which should not be exceeded. Areas that have exceeded the NAAQS for one or more pollutants are called "nonattainment areas." The Clean Air Act requires that these areas take measures to reduce air pollutant emissions to bring them back into compliance with the NAAQS within a specified period of time. The State of Alaska also has adopted air quality standards that are equal to the federal standards and, in compliance with the provisions of the Clean Air Act, has adopted a State Implementation Plan designed to maintain air quality in attainment areas and improve air quality in nonattainment areas. The adoption of *40 CFR 51 and 93* in November 1993 made it necessary to revise the State Implementation Plan, which is in the process of being amended. These amendments include requirements for the development of conformity determinations for proposed federal actions that have the potential to affect air quality in nonattainment areas. Federal actions must not affect the adopted milestones for improvement of air quality unless reductions are made elsewhere to offset the effect, or the State Implementation Plan is amended. Further information is provided in Appendix K. Operations at Elmendorf AFB have the potential to affect air quality in the Anchorage carbon monoxide nonattainment area. Operations at Eielson AFB have the potential to affect air quality in the Fairbanks carbon monoxide nonattainment area.

3.9.1 Background

Four air quality control regions have been established in Alaska. The Region of Influence encompasses three of these regions. Elmendorf AFB, most of the SUSITNA MOA, FOX MOA, and the proposed TANANA MOA area lie within Cook Inlet Intrastate Air Quality Region, Number 008, which covers 44,000 square miles including the Municipality of Anchorage and the Kenai Peninsula. Eielson AFB, the YUKON MOAs, EIELSON A TMOA (BIRCH MOA), and BUFLO TMOA (BUFFALO MOA) lie within the Northern Intrastate Air Quality Control Region, Number 009, which covers a total of 320,000 square miles and includes the northern half of the state. NAKNEK 1 and 2, STONY A and B, GALENA, and a small portion of SUSITNA MOAs lie within Southcentral Intrastate Air Quality Control Region, Number 010. This region covers 180,000 square miles; the area is in attainment for all NAAQS.

The Region of Influence spans two climate zones. One is a transition zone between the coastal mountains and the Alaska Range, which includes Anchorage and the Matanuska Valley. The other is the continental zone, which covers the majority of Interior Alaska, lying between the Alaska Range and the Brooks Range (Alaska Northwest Books 1991). Seasonal temperatures vary considerably in the interior of Alaska, ranging from an average low of minus 28°F in January to an average high of 72°F in July at Fort Yukon. There is very little wind in this region, resulting in frequent inversions in the winter and during the evening in the summer. In the winter, the air is layered with inversions, resulting in horizontal dispersion of air emissions, but very limited vertical dispersion. Farther south and closer to the coast, in Anchorage, temperatures do not vary as widely; with an average low in January of 6°F to an average high in July of 65°F. There is more wind than in the interior lowlands, although the Chugach Mountains often create a wind shadow when winds are from the east. The area experiences frequent temperature inversions during the cold winters, reducing the amount of air mixing that occurs.

The State of Alaska has four Prevention of Significant Deterioration (PSD) Class I air quality areas that were established by Congress as pristine areas deserving protection from air pollution and visibility degradation. These areas are associated with national parks and wilderness areas. Denali National Park and Preserve is the only PSD Class I air quality area located within the Region of Influence. Two area views from the park are also protected from visibility degradation.

Air quality in the Region of Influence is generally very good. The arctic haze phenomenon is observed at times; it is a condition resulting from air emissions on the Eurasian continent (Bowling 1994). There are a few areas

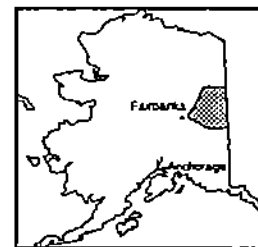
that have diminished air quality, particularly during the winter months, including two nonattainment areas for carbon monoxide. The nonattainment areas are located in and around the urban areas of Anchorage and Fairbanks. The Fairbanks carbon monoxide nonattainment area also includes a small area at the community of North Pole, which is not connected to the city of Fairbanks nonattainment area. The community of Eagle River (a suburb of Anchorage) occasionally has high particulate levels. The MOAs are not located within any of these nonattainment areas.

Most of the carbon monoxide generated in the nonattainment areas is from motor vehicles. The highest concentrations occur during the winter months when most temperature inversions occur, air mixing heights are at their lowest, and motor vehicle engines are least efficient. The high readings normally occur in the afternoon, when numerous cold automobiles are all started at nearly the same time. Improved motor vehicle emission control technology and the institution of vehicle inspection and maintenance programs are credited with the gradual downward trend of carbon monoxide levels in both Anchorage and Fairbanks, although increasing population and with it, motor vehicles, moderates this trend.

Eagle River has nonattainment status for particulate matter 10 microns or smaller in size. Major sources of particulate matter include motor vehicles, industrial land uses, and construction activity. In Eagle River, the major source of particulate matter is road dust. Particulate levels have decreased since some roads in the area have been paved and all road grading is now done with the use of water.

3.9.2 Northern Interior Region

The airspace located in the Northern Interior Region was modeled using a box model to simulate the inversion layers that form, particularly in the winter. In a box model, air emissions are dispersed equally throughout a rectangular, or box-shaped, volume of air. The YUKON 1 MOA was the only MOA modeled because it has the highest level of aircraft usage and would therefore have the highest level of aircraft air pollutant emissions. In the YUKON 1 MOA, more aircraft operations occur below 1,000 feet AGL than at any other altitude. Therefore, emissions were calculated for this layer of airspace



since, because of the nature of the air inversions in this area, emissions at different altitudes do not mix. For these calculations, each aircraft travels at the same altitude along the same route within the MOA and emissions have been dispersed through a volume of air that is 300 meters (approximately 990 feet) wide by 10 meters (approximately 33 feet) high; in practice the aircraft do not remain at a constant altitude and the aircraft do not follow the same route in the MOA. The length of the box was determined by the distance the aircraft fly in the time spent in the MOA. OA-10As and F-16s based at Eielson AFB are the primary users of the MOAs during the winter months. The different MOAs would be used at differing rates, but if the most-used airspace is modeled, one OA-10A, five F-16, and three F-15 (from Elmendorf AFB) sorties would be the maximum usage of a MOA in a single period (2 per day) below 1,000 feet AGL. The OA-10A and the F-16s each spend 45 minutes in the MOA per sortie, at average airspeeds of 350 miles per hour for the OA-10A and 550 miles per hour for the F-16. Table 3-37 and Table 3-38 show the winter and summer pollutant concentrations (measured over the same averaging time as the NAAQS used for comparison).

These estimates are for aircraft operations that occur, at least during some portion of the sortie, at 300 feet AGL. In the winter, air mixing is at its lowest, and very little vertical mixing occurs. This results in the lowest dispersion of air emissions and the highest air pollutant concentrations of any season. Because vertical mixing is limited, air emissions occurring at or above 300 feet would not be expected to affect ground level air quality. The highest number of aircraft operations occurs during the summer months of June, July, and August, when most of the MFEs take place. In addition, mixing heights are at their highest during these months, allowing greater dispersion of air pollutants. The YUKON 1 MOA is the most heavily used MOA in the Northern and Southern Interior Regions, and air pollutant emissions are therefore the highest. YUKON 1 MOA is the only MOA for which pollutant concentrations were estimated, since the other MOAs would have even lower pollutant levels.

Summer air pollutant concentrations were also estimated using a box model. The dimensions of the box were 300 meters (approximately 990 feet) wide by 490 meters (approximately 1,637 feet) high. The width and length of the box remained the same as in the previous calculations. The height of the box was based on the average mixing height for Fairbanks in the summer quarter (1,637 feet).

Table 3-37 Baseline Aircraft Air Pollutant Emissions Estimates for the YUKON 1 MOA in Winter (December, January, February)

Pollutant	Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Time	Percentage of Primary NAAQS
Carbon Monoxide	23.3	1-Hour	0.05
Nitrogen Oxides	0.8	Annual	0.80
Particulates	1.0	24-Hour	0.70
Sulfur Dioxide	1.7	24-Hour	0.50

Table 3-38 Baseline Aircraft Air Pollutant Emissions Estimates for the YUKON 1 MOA in Summer (June, July, August)

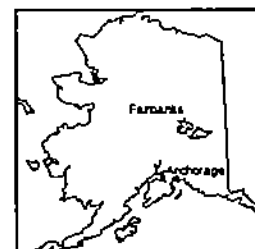
Pollutant	Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Time	Percentage of Primary NAAQS
Carbon Monoxide	13.5	1-Hour	0.03
Nitrogen Oxides	1.7	Annual	1.70
Particulates	0.6	24-Hour	0.40
Sulfur Dioxide	0.2	24-Hour	0.06

Fall and spring pollutant concentrations fall in between the winter and summer estimates. The number of aircraft operations per day and the average mixing height is lower than the summer quarter and higher than the winter quarter. Because they represent such a small portion of the standards within the range defined by the winter and summer quarters, they were not analyzed in detail. The estimates provided above show that air quality within this airspace is not being degraded to any appreciable degree by Air Force aircraft operations.

3.9.3 Southern Interior Region

3.9.3.1 Eielson AFB

Current Air Force activities at Eielson AFB, including motor vehicle use, electrical power generation, and aircraft operations, have the potential to impact air quality. Eielson AFB participates in a motor vehicle emissions inspection and maintenance program with the Fairbanks North Star Borough designed to reduce air pollution, particularly the generation



generation of carbon monoxide. Eielson AFB's location in relation to the carbon monoxide nonattainment area is shown in Figure 3-61.

Aircraft operations affect local air quality when they occur below the mixing height. Mixing heights are influenced by the intensity of solar radiation, wind speeds, cloud cover, and the presence of snow on the ground. The mixing height can vary a great deal from one day to the next and from the morning to the afternoon. The region between the Brooks Range and the Alaska Range, in which Fairbanks is located, has little wind (often less than 1 meter per second, or approximately 2.2 miles per hour) all year long and little temperature change with increase in altitude during the winter months. These conditions result in the formation of local steep inversions, which reduce vertical air mixing to almost zero. The bottom inversion layer is often at 10 meters (33 feet) or less and sometimes at ground surface. Summer conditions usually allow for much more air mixing, with cumulus convection in the day, although inversions often occur during the evening hours (Bowling 1994). Mixing heights are highly variable from day to day; in 1991, morning inversions ranged from 16 feet on April 8 to 6,504 feet on June 1. Afternoon inversions, which are normally higher, ranged from 26 feet on December 25 to 12,116 feet on May 15. The mean seasonal mixing heights provided in Table 3-39 are very general and represent the conditions that may be present for some of the days during the year. These figures show that, in general, mixing heights are lowest in the winter and highest in the summer.

Table 3-39 Mean Seasonal Mixing Heights for Fairbanks, Alaska

Season	Mixing Height (feet)	
	Morning	Afternoon
Winter (December through February)	649	725
Spring (March through May)	991	4,572
Summer (June through August)	1,637	6,252
Fall (September through November)	1,227	1,978

Source: EPA 1994.

Estimates of baseline air emissions from aircraft operations were calculated for Eielson AFB using the Aircraft Engine Emissions Estimator (Seitchek 1985). The aircraft operations include annual landings, take-offs, and touch-and-go cycles for the types of assigned, deployed training, and transient aircraft at the installation, including MFEs, as well as aircraft maintenance activities. These baseline emissions estimates are presented in Table 3-40.

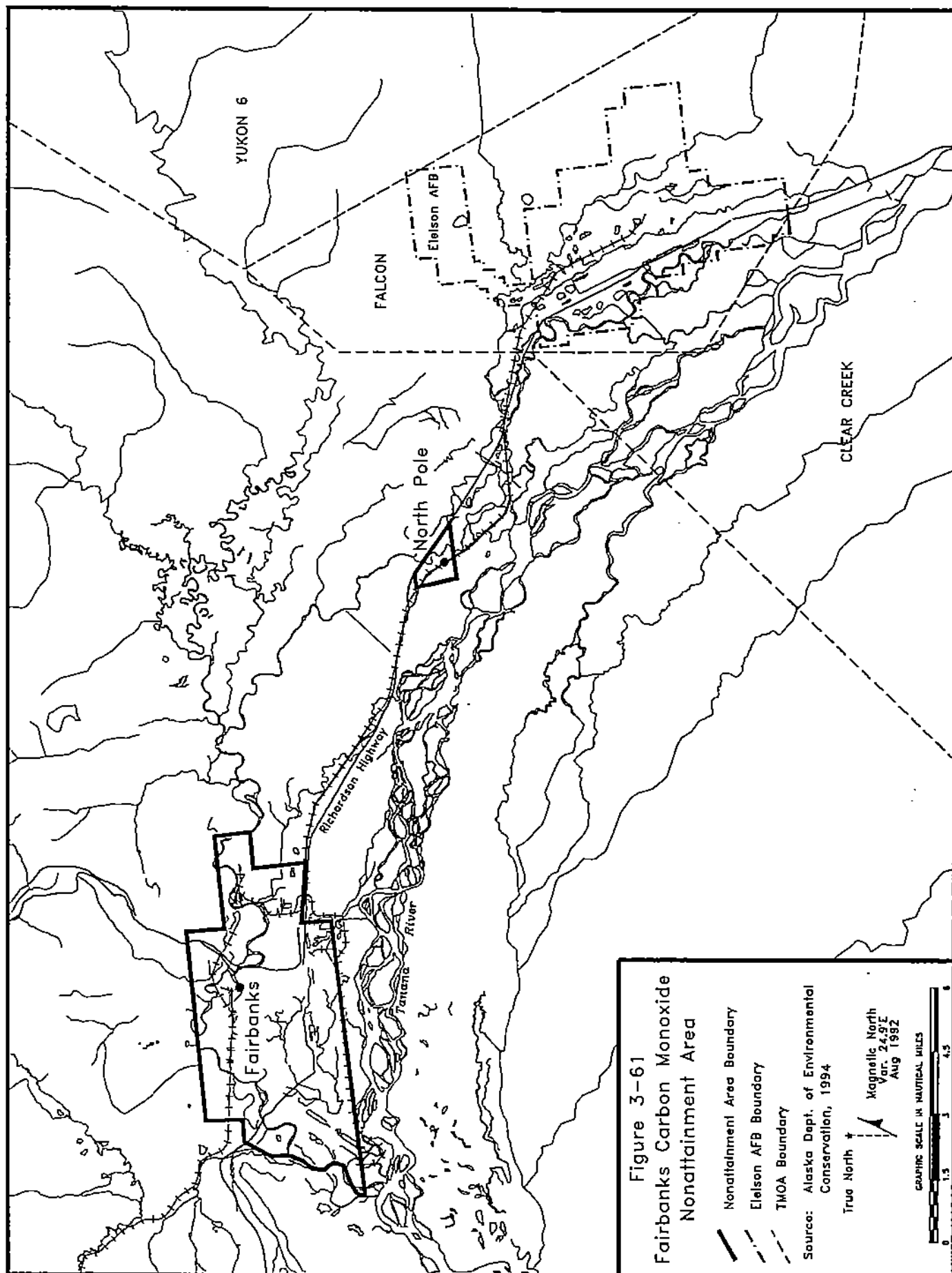


Table 3-40 Baseline Aircraft Air Pollutant Emissions Estimates for Eielson AFB, Alaska

Location	Pollutants Emitted (Tons per Year)				
	CO	HC	NO _x	PM ₁₀	SO ₂
Eielson AFB	323.6	161.9	87.6	4.1	13.4

Source: USAF 1992a.

3.9.3.2 Military Operations Areas

Climatological conditions for this area are similar to those described for the Northern Interior Region. Fewer aircraft operations occur in the MOAs in this region than in the Northern Interior Region. Since the air emissions resulting from aircraft operations are so low and result in pollutant concentrations that are such a small fraction of the state and national standards, separate calculations were not performed for this region. Pollutant concentrations resulting from aircraft operations in this region are less than those estimated for the Northern Interior Region and do not appreciably affect ambient air quality.

3.9.4 Southcentral Region

3.9.4.1 Elmendorf AFB

Mean seasonal mixing heights for the period between 1979 and 1986 for Anchorage were determined from data collected by the Anchorage Air Pollution Control Agency in 1988. Lower mixing heights are expected during the fall and winter, and higher mixing heights during the spring and summer, with an annual average of 2,219 feet. These averages are provided in Table 3-41.

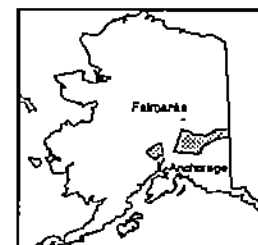


Table 3-41 Mean Seasonal Mixing Heights for Anchorage, Alaska

Season	Mixing Height (feet)	
	Morning	Afternoon
Winter (December through February)	1,217	797
Spring (March through May)	2,132	3,642
Summer (June through August)	2,667	4,068
Fall (September through November)	1,555	1,676

Source: Anchorage Air Pollution Control Agency 1988.

Elmendorf AFB is located adjacent to the northern boundary of the Anchorage carbon monoxide nonattainment area, as shown in Figure 3-62. Almost 90 percent of carbon monoxide emissions in the area are from motor vehicle use. Aircraft activities, including those at Anchorage International Airport and Merrill Field, and

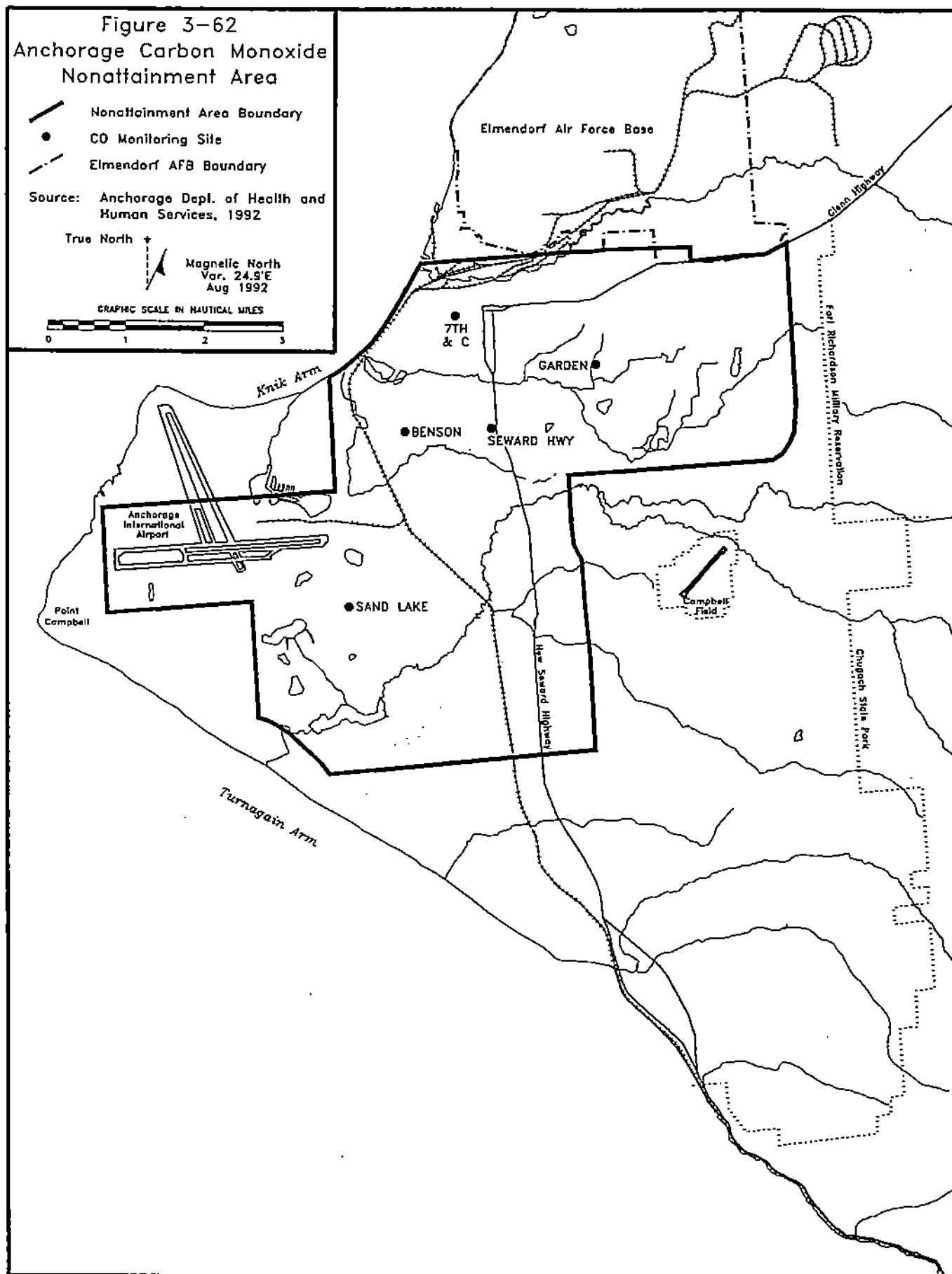
Figure 3-62
Anchorage Carbon Monoxide
Nonattainment Area

-  Nonattainment Area Boundary
-  CO Monitoring Site
-  Elmendorf AFB Boundary

Source: Anchorage Dept. of Health and Human Services, 1992

True North ↑
Magnetic North
Var. 24.9°E
Aug 1992

GRAPHIC SCALE IN NAUTICAL MILES
0 1 2 3



stationary industrial sources in the area make up the remaining 10 percent. Some of the carbon monoxide emissions from activities at Elmendorf AFB may affect the nonattainment area when the prevailing winds are from the north. Elmendorf AFB's contribution to the level of carbon monoxide in the nonattainment area is very low, since aircraft operations are directed away from the nonattainment area as most operations use flight tracks that avoid overflight of Anchorage (USAF 1992b). In addition, the base participates in the Municipality's motor vehicle inspection and maintenance program in order to minimize motor vehicle emissions. Activities and conditions at Elmendorf AFB are similar to those described for Eielson AFB. Draft data from base air emissions inventory indicate that aircraft operations constitute less than 40 percent of the total carbon monoxide emissions created by on-base activities. The aircraft operations include annual landings, take-offs and touch-and-go cycles for the types of assigned, deployed training, and transient aircraft at the installation, including MFE participants, as well as aircraft maintenance activities. Personal vehicle use is estimated at 0.2 percent of total carbon monoxide emissions (Opperman 1994). The majority of air emissions from on-base activities comes from stationary sources (the power plant), fleet vehicles, and fleet equipment. These estimates are presented in Table 3-42.

Table 3-42 Baseline Aircraft Air Pollutant Emissions Estimates for Elmendorf AFB, Alaska

Pollutants Emitted (Tons per Year)					
Location	CO	HC	NO _x	PM ₁₀	SO ₂
Elmendorf AFB	490.7	190.8	194.9	9.8	35.0

Source: USAF 1992b.

3.9.4.2 Military Operations Areas (including the TANANA MOA area)

The SUSITNA MOA is located adjacent to the southern boundary of Denali National Park and Preserve. As a PSD Class I air quality area, air quality and visibility must be protected and maintained. Integral vistas are viewed from observation points along the Denali Park Road from the park headquarters at the George Parks Highway, past the Eielson Visitor Center, along the northern boundary of the park. The vistas are located north and east of the park. Key features include Mount Deborah, the Alaska Range, and the Interior lowlands. The SUSITNA MOA is located on the opposite side of the park from the vistas, and does not affect air quality in the vicinity of the vistas. FOX 1 TMOA (FOX MOA) is located over the Alaska Range and Mount Deborah. The floor is 3,000 feet AGL; and all aircraft operations occur at or above this level. Since the mountains of the Alaska Range are so high, the northern portion of the TMOA is seldom used; most use is concentrated in the southern half, away from the area observed from the Denali National Park and Preserve integral vista sites. The FOX 2 TMOA (TANANA MOA) is located east of FOX 1 TMOA, over 100 km (60 miles) from the Denali National Park and Preserve Class I air quality area, and does not affect air quality or integral vistas of the Class I area. The TANANA MOA would be located east of the FOX MOA complex. The area is not currently used for military aircraft operations. No measurable impacts to air quality currently result from military aircraft operations in this area.

Air emissions from aircraft operations in these areas were modeled using the Multiple Aircraft Instantaneous Line Source (MAILS) atmospheric dispersion model, developed for Military Training Routes (MTRs) (Liebsch et al. 1991). The model includes only those operations that occur below the mixing height of an area, as emissions above the mixing height do not affect ground-level air quality. Applying this model to a MOA results in very conservative (high) estimates of actual conditions, as some parts of a MOA are used more than others and the model estimates emissions in the most highly used portion(s) of the MOA. Aircraft operations in these areas

contribute pollutant levels that are a very small percentage of NAAQS and do not have an appreciable effect on ambient air quality. Table 3-43 and Table 3-44 show estimates of baseline pollutant concentrations that are well below NAAQS, and less than 2 percent of the PSD increment of any of the pollutants modeled. Refer to Table K-1 in Appendix K for the specific national air quality standards not to be exceeded. During the fall and winter months (September through February), all aircraft operations occur above the average mixing heights, and therefore do not affect ground-level ambient air quality.

Table 3-43 Baseline Aircraft Air Pollutant Emissions Estimates for the Southcentral Region MOAs/TMOAs in Spring (March, April, May)

Location (MOA Name)	Pollutant Concentrations ($\mu\text{g}/\text{m}^3$)			
	CO	SO ₂	NO _x	Particulate
	1 hr/ 8 hr	3 hr/ 24 hr/ annual	annual	24 hr/ annual
FOX 1 and 2	0.0052/0.0023	0.0022/0.0003/0	0.0002	0.0006/0
SUSITNA ¹	0	0	0	0

¹ All aircraft operations occur above the average mixing height and do not measurably affect ground-level air quality.

Table 3-44 Baseline Aircraft Air Pollutant Emissions Estimates for the Southcentral Region MOAs/TMOAs in Summer (June, July, August)

Location (MOA Name)	Pollutant Concentrations ($\mu\text{g}/\text{m}^3$)			
	CO	SO ₂	NO _x	Particulate
	1 hr/ 8 hr	3 hr/ 24 hr/ annual	annual	24 hr/ annual
FOX 1 and 2	0.0052/0.0023	0.0022/0.0003/ 0.0001	0.0006	0.0006/0.0001
SUSITNA ¹	0	0	0	0

¹ All aircraft operations occur above the average mixing height and do not measurably affect ground-level air quality.

3.9.5 Western Region

Aircraft operations in this region contribute pollutant levels that are a very small percentage of NAAQS and do not have an appreciable effect on ambient air quality. Table 3-45 through Table 3-48 show estimates of baseline pollutant concentrations that are well below NAAQS, and less than 2 percent of the PSD increment of any of the pollutants modeled.

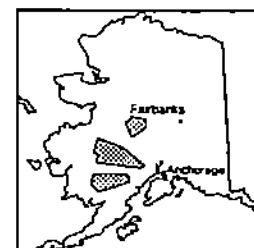


Table 3-45 Baseline Aircraft Air Pollutant Emissions Estimates for the Western Region MOAs/TMOAs in Winter (December, January, February)

Location (MOA Name)	Pollutant Concentrations ($\mu\text{g}/\text{m}^3$)			
	CO	SO ₂	NO _x	Particulate
	1 hr/ 8 hr	3 hr/ 24 hr/ annual	annual	24 hr/ annual
GALENA ¹	0	0	0	0
STONY A	0/0.0101	0.0104/0.0016/ 0.0004	0.0043	0.0008/ 0.0002
STONY B ¹	0	0	0	0
STONY C ²	N/A	N/A	N/A	N/A
NAKNEK 1 ¹	0	0	0	0
NAKNEK 2 ¹	0	0	0	0

¹ All aircraft operations occur above the average mixing height and do not measurably affect ground-level air quality.

² STONY C TMOA is not used during this season;

N/A = not available.

Table 3-46 Baseline Aircraft Pollutant Emissions Estimates for the Western MOAs/TMOAs in Spring (March, April, May)

Location (MOA Name)	Pollutant Concentrations ($\mu\text{g}/\text{m}^3$)			
	CO	SO ₂	NO _x	Particulate
	1 hr/ 8 hr	3 hr/ 24 hr/ annual	annual	24 hr/ annual
GALENA ¹	0	0	0	0
STONY A	0.0339/ 0.0076	0.01016/ 0.0012/0.0003	0.0030	0.0006/ 0.0001
STONY B	0/0.0006	0.0011/ 0.0001/0	0.0002	0.0001/0
STONY C	0/0.0004	0.0005/ 0.0001/0	0	0/0
NAKNEK 1	0/0.0002	0.0005/0/0	0.0001	0/0
NAKNEK 2	0/0.0002	0/0/0	0.0001	0/0

¹ All aircraft operations occur above the average mixing height and do not measurably affect ground-level air quality.

Table 3-47 Baseline Aircraft Air Pollutant Emissions Estimate for the Western MOAs/TMOAs in Summer (June, July, August)

Location (MOA Name)	Pollutant Concentrations ($\mu\text{g}/\text{m}^3$)			
	CO	SO ₂	NO _x	Particulate
	1 hr/ 8 hr	3 hr/ 24 hr/ annual	annual	24 hr/ annual
GALENA ¹	0	0	0	0
STONY A	0.0339/ 0.0076	0.0106/0.0012/0.0004	0.0035	0.0006/ 0.0002
STONY B	0/0.0006	0.0010/0.0001/0	0.0002	0.0001/0
STONY C	0/0.0004	0.0005/0.0001/0	0.0001	0/0
NAKNEK 1	0/0.0002	0.0005/0/0	0.0001	0/0
NAKNEK 2	0/0.0002	0/0/0	0.0001	0/0

¹ All aircraft operations occur above the average mixing height and do not measurably affect ground-level air quality.

Table 3-48 Baseline Aircraft Air Pollutant Emissions Estimates for the Western MOAs/TMOAs in Fall (September, October, November)

Location (MOA Name)	Pollutant Concentration ($\mu\text{g}/\text{m}^3$)			
	CO	SO ₂	NO _x	Particulate
	1 hr/ 8 hr	3 hr/ 24 hr/ annual	annual	24 hr/ annual
GALENA ¹	0	0	0	0
STONY A	0.0339/0.007 8	0.0106/0.0012/ 0.0003	0.0031	0.0006/0.0001
STONY B ¹	0	0	0	0
STONY C ¹	0	0	0	0
NAKNEK 1 ¹	0	0	0	0
NAKNEK 2 ¹	0	0	0	0

¹ All aircraft operations occur above the average mixing height and do not measurably affect ground-level air quality.

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3.10 Socioeconomics

3.10.1 Introduction

Of the questionnaires received during scoping, approximately 4 percent of the respondents ranked socioeconomic issues as "Very Important." Out of 120 surveys received, only 5 respondents listed socioeconomics as a topic of concern for the EIS. Nine comments pertaining to socioeconomics were recorded during the public and agency scoping meetings. Most of these focused on tourism and subsistence issues, which are addressed in the sections in the EIS dealing with Recreation and Subsistence specifically. Because of the nature of the Proposed Action and Alternatives, the Region of Influence for socioeconomics is limited to the Economic Impact Regions of Eielson and Elmendorf AFBs.

3.10.2 Eielson Air Force Base

The Economic Impact Region of Eielson AFB is comprised of population centers within 50 miles of the base (USAF 1992). The communities most closely associated with the base are Salcha, Moose Creek, North Pole, and Fairbanks. In Fiscal Year 1993, Eielson AFB employed a total of 2,771 active duty military personnel, 427 civil service personnel, 633 non-appropriated fund and other personnel, and 704 Air National Guard personnel (active duty, traditional, and guard technicians). There were also 4,284 family members accompanying the active duty personnel. This information along with a summary of Eielson AFB's gross annual payroll is presented in Table 3-49.

Table 3-49 Eielson AFB Personnel and Payroll for Fiscal Year 1993

Classification	Number	Payroll
Active Duty Military	2,771	\$90,500,000.00
Dependents	4,284	N/A ¹
Air National Guard	704	²
Civil Service Employees	427	\$39,200,000.00
Non-Appropriated Fund and Other Civilian Employees	633	³
TOTAL	8,819	\$129,700,000.00

¹ N/A means not available.

² Air National Guard payroll included with Active Duty Military payroll.

³ Non-Appropriated Fund and Other Civilian Employees Payroll included with Civil Service Employees payroll.

Source: Beyer 1994.

The 1993 population of the Fairbanks North Star Borough (FNSB) was 79,730 (ADCRA 1993). The 8,819 personnel associated with Eielson AFB represent 11.6 percent of the Borough's total population. While the number of active duty military and dependent personnel has declined approximately 16.7 percent since 1990, the combined military and civilian payroll has increased roughly 8.1 percent, and civilian payroll alone has increased 30.2 percent in the same period of time.

3.10.3 Elmendorf Air Force Base

The Economic Impact Region of Elmendorf AFB is comprised of population centers within 50 miles of the base. The communities most closely associated with the base are Anchorage, Eagle River, Wasilla, and Palmer. In Fiscal Year 1993, Elmendorf AFB employed a total of 6,769 active duty military personnel, 1,180 civil service personnel, and 440 non-appropriated fund personnel. There were also 10,320 family members accompanying the active duty personnel. A total of 6,150 military retirees, all branches, also live in the Anchorage area. This information is summarized in Table 3-50.

Table 3-50 Elmendorf AFB Personnel and Payroll for Fiscal Year 1993

Classification	Number	Payroll
Active Duty Military	6,769	\$204,700,000.00
Dependents	10,320	N/A ¹
Civil Service Employees	1,180	\$32,500,000.00
Non-Appropriated Fund and Other Civilian Employees	440	\$8,223,800.00
Retirees (All Branches)	6,150	\$102,900,000.00 ²
TOTAL	24,859	\$348,323,800.00

¹ N/A means not available.

² Fiscal Year 1993 expenditures for all military retirees in Alaska.

Source: Asselin 1994; Proctor 1994.

The 1993 population of the Municipality of Anchorage was 240,258 (ADCRA 1993). The 24,859 personnel associated with Elmendorf AFB, including the 6,150 retirees, represent 10.4 percent of the Municipality's total population. The number of people associated with the base has increased roughly 17.3 percent since 1990, while payroll for active duty military personnel and civilian employees has increased about 8 percent.

3.10.4 Major Flying Exercises

Although the economic effects of MFEs on the Economic Impact Regions of Eielson and Elmendorf AFBs are difficult to quantify, approximately 3,000 military personnel came to Eielson AFB for MFEs in 1992 (Turner 1993). While all of these personnel were housed on-base, other transient personnel not associated with the MFEs were displaced and subsequently housed in Fairbanks hotels. An estimated 2,554 "bed-nights" were incurred by these displaced personnel (ibid.). According to the 354 WG Comptroller Squadron, per diem rates for Air Force personnel deployed to Eielson AFB (the base to which the majority of MFE participants deploy) are \$106.00 for lodging and \$59.00 for meals per day during the summer (May 15 to September 15) and \$68.00 for lodging and \$55.00 for meals per day during the winter (September 16 to May 14). Using the winter lodging rates would result in an expenditure of \$173,672.00 for lodging in 1992 as a direct result of MFEs. In the Eielson AFB Economic Impact Region, expenditures by transient military personnel participating in MFEs in 1993 were estimated at more than \$2,000,000.00 (USAF 1994).

3.10.5 Air Force Expenditures Summary

Total Air Force expenditures in the State of Alaska for Fiscal Years 1992 and 1993 are presented in Table 3-51.

Table 3-51 Total Air Force Expenditures in Alaska, Fiscal Year 1992 and Fiscal Year 1993

Category	FY 92	FY 93	Percent Change
Payroll	\$339,800,000.00	\$337,000,000.00	< 1% decrease
O&M	\$196,600,000.00	\$253,900,000.00	29% increase
Construction	\$29,000,000.00	\$40,600,000.00	40% increase
Other Procurement	\$80,200,000.00	\$18,600,000.00	76.8% decrease
All Military Retirees	\$95,500,000.00	\$102,900,000.00	7.7% increase
TOTAL	\$741,100,000.00	\$753,000,000.00	1.6% increase

Source: Proctor 1994.

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