Draft

Environmental Assessment

Travis Air Force Base
C-17 Use of Instrument Routes 264, 275, 280, 281 and 282 in Central Nevada

Department of the Air Force
Air Mobility Command
60th Air Mobility Wing
Travis Air Force Base, California

April 2012

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Department of the Air Force
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5 April 2012

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DRAFT FINDING OF NO SIGNIFICANT IMPACT
TRAVIS AIR FORCE BASE C-17 USE OF INSTRUMENT ROUTES 264, 275, 280, 281, AND 282 IN CENTRAL NEVADA

AGENCY

Department of the Air Force, Air Mobility Command (AMC), 60th Air Mobility Wing, Travis Air Force Base (AFB), California

BACKGROUND

Travis AFB must provide unrestricted and realistic low level navigation training to C-17 aircrews to prepare them to safely and adequately meet the global mission of this aircraft. Training must take place in varied terrain and weather conditions. Travis AFB's current low level navigation training program uses 19 Military Training Routes (MTRs) that are originated and scheduled by other Department of Defense (DoD) units. Most of these 19 MTRs are distant from Travis AFB and are heavily used by other units' aircraft, precluding maximum training opportunities for Travis AFB C-17 aircrews. In 2006, Travis AFB became the originating and scheduling authority of five dedicated MTRs in Central Nevada that would meet these training requirements.

Pursuant to National Environmental Policy Act (NEPA) guidance, 32 Code of Federal Regulations (CFR) 989 (*Air Force Environmental Impact Analysis Process*), and other applicable regulations, the Air Force completed an Environmental Assessment (EA) of the potential environmental consequences of proposed low level navigation training using IRs 264, 275, 280, 281, and 282 in central Nevada for C-17 aircrews based at Travis AFB. The attached EA, which is incorporated herein by reference and supports this Finding of No Significant Impact, evaluated the No Action Alternative and the Proposed Action.

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

PROPOSED ACTION: The Proposed Action, described as Alternative 1 in the EA, is for Travis AFB to begin using five currently inactive MTRs in central Nevada to train C-17 aircrews in low level navigation under a variety of terrain and weather conditions. These MTRs, designated IR 264, IR 275, IR 280, IR 281 and IR 282 are instrument routes (IRs) and can be flown in clear or inclement weather using visual flight rules or instrument flight rules as required. Travis AFB C-17 aircrews may or may not fly an MTR in its entirety on a single training mission. Most likely aircrews would enter and exit a route at published alternate entry and exit points and fly only segments of various routes during planned training missions. Using varying entry and exit points increase training options available to the crews. Given the number of options available with five routes, repetitive use of the same segments would be infrequent.

ALTERNATIVE 2 ACTION: The Action described as Alternative 2 in the EA, is for Travis AFB to increase the use of existing MTRs scheduled by other U.S. Military organizations. This alternative was evaluated using selection standards summarized in the EA. Alternative 2 did not meet all the selection standards and was therefore eliminated from further analyses in the EA.

NO ACTION ALTERNATIVE: Under the No Action Alternative, IRs 264, 275, 280, 281, and 282 would continue to be inactive; however, Travis AFB would maintain originating and scheduling authority for the routes. If the Proposed Action is not implemented, Travis AFB would request that it be allowed to retain the routes and maintain them in an inactive status until a determination can be made that they are of no future practical use to the base. At that time, Travis AFB would turn the MTRs over to the Air Force for proper disposition but request that they be kept in reserve to accommodate possible future needs. These routes would work well for a typical C-17 profile as well as those used by other USAF Weapon Systems. If the Proposed Action is not implemented, Travis AFB would request to reserve the right to reinitiate actions as necessary if future training needs dictate. Travis AFB C-17 aircrews would continue to train using MTRs originated and scheduled by other DoD organizations.

DECISION

After review of the EA, the Air Force has decided to proceed with the Proposed Action. As indicated in the attached EA, the potential impacts to the human and natural environment were evaluated relative to the existing environment. Overall, the analysis for this EA indicates that proceeding with the Proposed Action

will not result in or contribute to significant negative direct, cumulative or indirect impacts to the environment or resources in the region.

FINDING OF NO SIGNIFICANT IMPACT

In accordance with the CEQ regulations implementing NEPA and the Air Force Environmental Impact Analysis Process, the Air Force concludes that the Proposed Action will have not a significant impact on the quality of the human environment and that the preparation of an environmental impact statement is not warranted.

The project will be implemented upon approval and after a public review period. A copy of the draft EA and FONSI is available at the Fairfield Civic Center Library, the Suisun City Library, the Vacaville Public Library Cultural Center, the Mitchell Memorial Library and on Travis AFB public website at http://www.travis.af.mil/enviro, under the heading entitled Draft Environmental Assessment. Copies of the draft EA and FONSI are also provided to Nevada libraries, Native American tribes near the proposed action area and the Nevada State Clearinghouse. A notice of availability (NOA) for the draft EA and FONSI will be published in local and Nevada newspapers and is posted on the Travis AFB public website. The NOA will provide for a 30 day public comment period. All interested agencies, groups and persons are invited to submit comments to christopher.krettecos@travis.af.mil. Written comments may be faxed to (707) 424-5105 or mailed to the address below within 30 days of this notice for consideration by Travis AFB:

Department of the Air Force
60 CES/CEA
411 Airmen Drive
Travis AFB CA 94535-2001

Attn: Christopher J. Krettecos

Signed:

DWIGHT C. SONES, Colonel, USAF
Commander

Date

Attachment: Environmental Assessment Travis Air Force Base C-17 Use of Instrument Routes 264, 275, 280, 281, and 282 in Central Nevada, 5 April 2012

ENVIRONMENTAL ASSESSMENT
Travis AFB C-17 Use of
Instrument Routes 264, 275, 280, 281, and 282 in Central Nevada

Responsible Agency: Department of the Air Force, Air Mobility Command, 60th Air Mobility Wing, Travis Air Force Base (AFB), California.

Proposed Action: Travis AFB C-17 Use of Instrument Routes 264, 275, 280, 281, and 282 in Central Nevada

Abstract: The Air Force proposes to conduct low level navigation training for C-17 aircrews based at Travis AFB using five military training routes in central Nevada that were formerly scheduled and originated by Mountain Home AFB in southwestern Idaho. The purpose of the Proposed Action is to establish Travis AFB C-17 aircrews as the primary user for Instrument Routes 264, 275, 280, 281, and 282. This EA evaluates the No Action Alternative and the Proposed Action. Under the No Action Alternative, Travis AFB C-17 aircrews would continue to utilize training routes that are originated, scheduled, and heavily used by other Department of Defense organizations. Travis AFB C-17 aircrews would fly each of the five instrument routes as many as 104 times per year. Resources considered in the impact analysis of this Environmental Assessment (EA) were: airspace operations (to include aircraft safety and Bird/Wildlife-Aircraft Strike Hazard); noise; land use; air quality; biological resources; and, cultural resources.

For Further Information: Written comments and inquiries regarding this document should be directed to: Mr. Christopher J. Krettecos, 60 CES/CEA, 411 Airmen Drive, Travis AFB, California 94535-2001. Phone: (707) 424-7517.

Privacy Advisory: Your comments on this Draft EA are requested. Letters or other written comments provided may be published in the Final EA. As required by law, comments will be addressed in the Final EA and made available to the public. Any personal information provided will be used only to identify your desire to make a statement during the public review period for this document, or to fulfill requests for copies of the Final EA or associated documents. Private addresses will be compiled to develop a mailing list for those requesting copies of the Final EA. However, only the names of the individuals making comments and specific comments will be disclosed. Personal home addresses and phone numbers will not be published in the Final EA.

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ACRONYMS AND ABBREVIATIONS

^{o}C	degree(s) Centigrade
^{o}F	degree(s) Fahrenheit
60 AMW	60th Air Mobility Wing
60 CES/CEAO	60th Civil Engineering Squadron, Environmental Flight
A.D.	anno Domini
AFB	Air Force Base
AGL	above ground level
AFI	Air Force Instruction
AHAS	Avian Hazard Advisory System
a.m.	ante meridiem
AMC	Air Mobility Command
APE	area of potential effect
AQCR	air quality control region
ARTCC	air route traffic control center
B.A.	Bachelor of Arts
BAM	Bird Avoidance Model
B.S.	Bachelor of Science
BASH	bird/wildlife-aircraft strike hazard
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CY	Calendar Year
dB	decibel
dBA	A-weighted sound level measured in decibels
DNL	day-night average sound level
DoD	U.S. Department of Defense
DoE	U.S. Department of Energy
DTRO	Desert Tortoise Recovery Office
EA	environmental assessment
EIAP	environmental impact analysis process
EIS	environmental impact statement
E.O.	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FL	floor
FICAN	Federal Interagency Committee on Aviation Noise
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise

FONSI	finding of no significant impact
GIS	Geographic Information System
GND SFC	ground surface
GWP	global warming potential
HUD	United States Department of Housing and Urban Development
Hwy	Highway
Hz	hertz
ICA	Intergovernmental Coordination Act of 1968
IFR	instrument flight rules
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
IMC	instrument meteorological conditions
IPCC	Intergovernmental Panel on Climate Change
IR	instrument route
KIAS	knots indicated airspeed
L_{dnmr}	day-night average A-weighted sound level
L_{eq}	average noise
LOAEL	Lowest Observed Adverse Effects Level
L_{max}	maximum sound level
LT	left
M.A.	Master of Arts
MARSA	Military Authority Assumes Responsibility for Separation of Aircraft
$\mu g/m^3$	micrograms per cubic meter
mg/m^3	milligrams per cubic meter
MOA	military operations area
mph	mile(s) per hour
M.S.	Master of Science
MSL	mean sea level
MTR	military training route
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NFL	Naval Air Station Fallon
NHPA	National Historic Preservation Act
NM	nautical mile(s)
NO	nitric oxide
NO_2	nitrogen dioxide
NOAEL	No Observed Adverse Effects Level
NO_x	nitrogen oxides
NPS	National Park Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NRIS	National Register Information System
NSAW	Naval Strike and Warfare Center
NSAWC	Naval Strike Air Warfare Center
NV	Nevada

NWR	National Wildlife Refuge
O_3	ozone
OPR	Office of Planning and Research (State of California)
Pb	lead
Ph.D.	Doctor of Philosophy
P.L.	Public Law
p.m.	post meridiem
PM_{10}	particulate matter equal to or less than 10 microns in aerodynamic diameter
$PM_{2.5}$	particulate matter equal to or less than 2.5 microns in aerodynamic diameter
ppm	parts per million
psf	pound(s) per square foot
ROI	region of influence
RT	right
SEL	sound exposure level
SHPO	State Historic Preservation Office
SIP	state implementation plan
SO_2	sulfur dioxide
SO_x	sulfur oxides
SR	slow route
SUA	special use airspace
the Base	Travis AFB
tpy	tons per year
TSP	total suspended particulates
U.S.	United States
USAF	United States Air Force
U.S.C.	United States Code
USDA	United States Department of Agriculture
USDOC	United States Department of Commerce
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USFS	United States Forest Service
VOC	volatile organic compounds
West Coast C-17 Basing EA	Environmental Assessment West Coast Basing of C-17 Aircraft, June 2003
VFR	visual flight rules
VR	visual route
WMA	Wildlife Management Area

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CHAPTER 1
PURPOSE OF AND NEED FOR ACTION

The Department of the Air Force, Air Mobility Command (AMC), 60th Air Mobility Wing (60 AMW), Travis Air Force Base (AFB), California (the Responsible Agency for this EA and the proponent for this action) proposes to conduct low level navigation training for C-17 aircrews based at Travis AFB on five military training routes (MTR) in central Nevada. The originating and scheduling activities for these routes, which were previously accomplished by Mountain Home AFB in southwestern Idaho, were assumed by Travis AFB in 2006. The routes have been inactive since that time. This EA evaluates the potential impact of Travis AFB as the primary user of Instrument Routes (IR) 264, IR 275, IR 280, IR 281, and IR 282. Figure 1-1 shows the location of IRs 264, 275, 280, 281, and 282, all of which are located in central Nevada.

1.1 PURPOSE OF AND NEED FOR ACTION

C-17 aircrews are required to maintain proficiency in low level navigation skills to meet the need for the global mission of the aircraft. To achieve this proficiency, aircrews must have access to MTRs that enable them to train at altitudes below 10,000 feet above mean sea level (MSL) and at airspeeds up to 300 knots indicated airspeed (KIAS), or about 345 miles per hour (mph). MTRs must be readily available and provide diversified training opportunities over varied terrain features. Ideally, MTRs should be designated Instrument Routes (IR) which allow aircrews to train in adverse weather conditions under Instrument Flight Rules (IFR) as well as during improved Visual Flight Rules (VFR) weather conditions.

Figure 1-1. Location of Proposed Action in Central Nevada

Travis AFB's current low level navigation training program developed for C-17 aircrews (see *Environmental Assessment West Coast Basing of C-17 Aircraft, June 2003* [West Coast C-17 Basing Environmental Assessment [EA]) makes use of 19 MTRs that are originated and scheduled by other Department of Defense (DoD) units. Most of these 19 MTRs are distant from Travis AFB and are heavily used by other units' aircraft, precluding maximum training opportunities for Travis AFB C-17 aircrews.

Dedicated IR routes provide the flexibility for access on an as-needed basis for the effective and unrestricted training for the C-17 crew force.

An efficient, effective, and realistic low level navigation training program would allow Travis AFB to conduct C-17 low level navigation training on MTRs (preferably IRs) that provide diversified training over varied terrain and preferably for which the Base is the scheduling unit and primary user.

1.2 SCOPE OF THE ENVIRONMENTAL REVIEW

The National Environmental Policy Act (NEPA) of 1969, as amended, requires federal agencies to consider environmental consequences in the decision-making process. The President's Council on Environmental Quality (CEQ) issued regulations to implement NEPA. The Air Force Environmental Impact Analysis Process (EIAP) is accomplished through adherence to the procedures set forth in CEQ regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508) and 32 CFR 989, *Air Force Environmental Impact Analysis Process*. These federal regulations establish both the administrative process and substantive scope of the environmental impact evaluation designed to ensure that deciding authorities have a proper understanding of the potential environmental consequences of a contemplated course of action. The CEQ regulations require that an EA:

- Briefly provide sufficient evidence and analysis to determine whether an environmental impact statement (EIS) or Finding of No Significant Impact (FONSI) should be prepared;
- Aid in an agency's compliance with NEPA when no EIS is required; or
- Facilitate preparation of an EIS, when required.

This EA identifies, describes, and evaluates the potential environmental impacts that may result from Proposed Action and the No Action Alternative. As appropriate, the affected environment and environmental consequences of the Proposed Action are described in terms of site-specific descriptions or regional overview. Finally, the EA identifies measures that would prevent or minimize environmental impacts, if required.

1.2.1 Resources Evaluated in this Environmental Assessment

The intent of this EA is to meet the NEPA requirements established in 32 CFR 989 (EIAP) and the U.S. Department of Transportation, Federal Aviation Administration (FAA) Order 1050.1E, *Environmental Impacts: Policies and Procedures* (FAA, 2004). The FAA may adopt this EA to fulfill its NEPA requirements established in Order 1050.1E. The following resource areas are discussed in detail in this EA:

- Airspace Operations (including aircraft safety and Bird/Wildlife-Aircraft Strike Hazard [BASH]);
- Noise;
- Land Use;
- Air Quality;
- Biological Resources; and,
- Cultural Resources.

1.2.2 Resources Eliminated from Detailed Analysis

No additional personnel would be based at Travis AFB, and no construction activities would occur at the Base or within central Nevada, as a result of the Proposed Action. No construction or ground disturbing activities would be required to support proposed flying activities. Travis AFB C-17 aircrews would continue to accomplish operations on the MTRs assessed in the West Coast C-17 Basing EA as well as initiating operations on IRs 264, 275, 280, 281, and 282. Operations on the MTRs assessed in the West Coast C-17 Basing EA would not exceed the levels previously assessed in the EA. Therefore, this EA evaluates only the Proposed Action and the No Action Alternative. Resource areas that have been eliminated from further detailed study in this document and the rationale for eliminating them are presented in the following paragraphs.

- **Earth, Water, Floodplains, and Wetlands Resources**. No construction or ground disturbing activities would occur in central Nevada as a result of the Proposed Action. None of the activities associated with the Proposed Action have the potential to increase flood hazards to new or existing development by effectively increasing flood heights and/or velocities or by inadequate

floodproofing. None of the proposed activities would result in any alteration of surface water flows that would change existing downstream flows. Although wetlands occur within central Nevada, none of the activities associated with the Proposed Action would have potential for long-term loss or degradation of wetlands.

- **Hazardous Waste, Hazardous Materials, and Stored Fuels**. No aircraft maintenance or refueling activities would occur in central Nevada as a result of the Proposed Action. No solid waste would be generated in central Nevada.
- **Socioeconomic Resources and Infrastructure and Utilities**. No personnel would be based and no construction would occur in central Nevada as a result of the Proposed Action.
- **Environmental Management**. No structures would be demolished. Therefore, no asbestos or lead-based paint would be encountered in central Nevada as a result of the Proposed Action.

1.2.3 Environmental Justice and Protection of Children

In 1994, President William J. Clinton issued Executive Order (E.O.) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, in response to growing concern that minority and low-income populations bear adverse health and environmental effects disproportionately. E.O. 12898 encourages federal facilities to achieve "environmental justice" by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. Accompanying E.O. 12898 was a Presidential transmittal memorandum, which referenced existing federal statutes and regulations to be used in conjunction with E.O. 12898. One of the items in this memorandum was the use of the policies and procedures of NEPA, specifically that, "Each Federal agency shall analyze the environmental effects, including human health, economic, and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by the NEPA 42 U.S.C. Section 4321, et seq." In 1997, E.O. 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, was issued by President William J. Clinton. This order requires a similar analysis for children, where Federal agencies must identify and assess environmental health risks and safety risks that may disproportionately affect children. Environmental health risks or safety risks refer to risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as air, food, drinking water, recreational water, and soil).

Each of the ten counties in Nevada overflown by the MTRs exhibits minority populations that are less than the state of Nevada population (33 percent). Four of these counties in Nevada (Esmerelda, Mineral, Nye, Pershing and White Pine) exhibit a higher low-income population than the State of Nevada (12.4 percent). Based on the analyses conducted for this EA, the Proposed Action does not result in significant or adverse effects at any location for the following resources: aircraft operations; aircraft safety; bird/wildlife-aircraft strike hazard; noise; land use; air quality; biological resources; and, cultural resources. Since the Proposed Action would not have any adverse effect, no disproportionately high or adverse impacts upon minority and low-income populations would be anticipated. Therefore, impacts on environmental justice would not occur. Likewise, the Proposed Action would not cause environmental health or safety risks that may disproportionately affect children.

1.2.4 FAA Environmental Impact Analysis

Although there would be no structural changes to the five MTRs in central Nevada (*i.e.,* the altitudes, widths, and geographic locations would not change as a result of the Proposed Action), the FAA continually reviews airspace activities for environmental compliance. The USAF has obtained technical input from the FAA in the preparation of this of EA. The Air Force continues to work cooperatively with the FAA to ensure that adoption of the findings of this EA enable continued airspace management that serves military aviation needs in the future.

Based on FAA Order 1050.1e, Section 518h, the FAA may adopt, in whole or in part, draft, or final environmental impact statements (or assessments) prepared by other agencies (see 40 CFR 1506.3). When the FAA adopts another agency's NEPA document in whole or in part, the responsible FAA official must independently evaluate the information contained in the document, take full responsibility for scope and content that addresses FAA actions, and issue its own FONSI or Record of Decision. Table 1-1 lists

the FAA's environmental impact analysis categories and the subchapter of the EA that contains the impact analysis for each category for the action evaluated in this EA.

Table 1-1. Impact Analysis Categories Identified in FAA Order 1050.1E

FAA Impact Analysis Categories	How Addressed by EA Analysis [relevant section]	Remarks
Air Quality	Subchapters 3.4, 4.1.4, and 4.2.4	
Coastal Resources	(Not evaluated in this EA)	The Proposed Action would not affect coastal resources because the Nevada is over 180 miles from the Pacific Ocean coast.
Compatible Land Use	Subchapters 3.3, 4.1.3, and 4.2.3	
Construction Impacts	Subchapter 1.2.2 (Not evaluated in this EA)	No construction activities would occur in central Nevada or at Travis AFB as a result of the Proposed Action.
Department of Transportation Act: Section 4(f)	(Not evaluated in this EA)	Designation of airspace for military flight operations is exempt from Section 4(f). The National Defense Authorization Act for Fiscal Year 1998 (Public Law 105-85) provided that "no military flight operations (including a military training flight), or designation of airspace for such an operation, may be treated as a transportation program or project for purposes of section 303(c) of Title 49, United States Code." Note that Section 4(f) of the U.S. Department of Transportation (DOT) Act was codified and renumbered in 1983 as section 303(c) of 49 United States Code.
Farmlands	(Not evaluated in this EA)	None of the activities associated with the Proposed Action have the potential to convert farmland to non-agricultural uses.
Fish, Wildlife, and Plants	Subchapters 3.5, 4.1.5, and 4.2.5	
Floodplains	Subchapter 1.2.2 (Not evaluated in this EA)	None of the activities associated with the Proposed Action have the potential to increase flood hazards to new or existing development by effectively increasing flood heights and/or velocities or by inadequate floodproofing.
Hazardous Materials, Pollution Prevention, and Solid Waste	Subchapter 1.2.2 (Not evaluated in this EA)	No aircraft maintenance or refueling activities would occur in central Nevada as a result of the Proposed Action. No solid waste would be generated in central Nevada.
Historical, Architectural, Archaeological, and Cultural Resources	Subchapters 3.6, 4.1.6, and 4.2.6	
Light Emissions and Visual Impacts	(Not evaluated in this EA)	The Proposed Action would not produce lighting that would annoy people or situations where the visual sight of aircraft would be intrusive.

Table 1-1. Impact Analysis Categories Identified in FAA Order 1050.1E (Cont'd)

FAA Impact Analysis Categories	How Addressed by EA Analysis [relevant section]	Remarks
Socioeconomic Impacts, Environmental Justice, Safety Risks	▪ Socioeconomics are not evaluated in this EA (see Subchapter 1.2.2). ▪ Environmental Justice is discussed in Subchapter 1.2.3. ▪ Aircraft safety risks are evaluated in Subchapters 3.1, 4.1.1, and 4.2.1.	No personnel would be based and no construction would occur in central Nevada or at Travis AFB as a result of the Proposed Action.
Natural Resources and Energy Supply	(Not evaluated in this EA)	The Proposed Action would not result in any change in the number of personnel, aircraft, or flying hours (C-17 training already occurs using other MTRs); therefore, there would be no change in fuel consumption requirements for the Air Force. The Proposed Action would not require construction; therefore, natural resources (*i.e.,* sand, gravel or aggregate) would not be consumed for the project.
Noise	Subchapters 3.2, 4.1.2, and 4.2.2	
Cumulative Impacts	Subchapter 2.4	
Water Quality	(Not evaluated in this EA)	The Proposed Action would not result in any discharges to water bodies or other impacts to water resources in central Nevada. The Proposed Action would not result in any degradation of surface or groundwater quality.
Wetlands	Subchapter 1.2.2 (Not evaluated in this EA)	None of the activities associated with the Proposed Action have the potential for impact to wetlands.
Wild and Scenic Rivers	(Not evaluated in this EA)	The Proposed Action would not impact any wild and scenic rivers. There are no rivers in Nevada that are designated by the U.S. Department of the Interior, National Park Service in the National Wild and Scenic Rivers System.

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CHAPTER 2
ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes the elements associated with development of alternatives that were considered by the Air Force. The specifics of the proposal for meeting the project's purpose and need are discussed for each alternative. The methodology used to identify alternatives and the alternatives considered but not carried forward for analysis are provided in Subchapter 2.1. Subchapter 2.2 describes the No Action Alternative in accordance with CEQ regulations (40 CFR 102.14(d). Elements of the Proposed Action are described in Subchapter 2.3.

2.1 ALTERNATIVES FORMULATION AND CONSIDERATION

NEPA and its implementing regulations (*i.e.,* CEQ regulations) require not only an analysis of the Proposed Action, but also of "all reasonable alternatives" to the Proposed Action, including a No Action Alternative. CEQ regulations allow for eliminating alternatives from detailed study and require an EIS to discuss the reasons that an alternative was eliminated. The Air Force EIAP (32 CFR Part 989) provides a process for determining "reasonable" alternatives (thus requiring analysis) and a process based on reasonable selection standards for eliminating from detailed analysis alternatives determined not to be "reasonable."

"Reasonable" alternatives are those that meet the underlying purpose and need for the Proposed Action that would cause a reasonable person to inquire further before choosing a particular course of action. The Air Force also must consider reasonable alternatives raised during the scoping process or suggested by others, as well as combinations of alternatives. The Air Force need not analyze highly speculative alternatives, such as those requiring a major, unlikely change in law or governmental policy. If the Air Force identifies a large number of reasonable alternatives, it may limit alternatives selected for detailed environmental analysis to a reasonable number of examples covering the full spectrum of alternatives (32 CFR Part 989.8(b)).

The Air Force may expressly eliminate alternatives from detailed analysis based on reasonable selection standards (e.g., operational, technical, or environmental standards suitable to a particular project). The Air Force may develop written selection standards to firmly establish what is a "reasonable" alternative for a particular project, but it must not so narrowly define these standards that it unnecessarily limits considerations to the proposal initially favored by proponents (32 CFR Part 989.8(c)).

2.1.1 Selection Standards for Alternatives

To achieve efficient, effective, and realistic low level training for Travis AFB C-17 aircrews, MTRs must meet the following standards:

- Be near Travis AFB to reduce "transit" time between the Base and the route entry/exit points. Transit time is undesirable in flying training programs because training events are not accomplished during that time. Flying training programs are developed to maximize the number of training events accomplished in the shortest period possible to conserve valuable training funds that include fuel consumption costs.
- Allow for frequent and unrestricted operation (*i.e*., be the originating and scheduling unit) in which Travis AFB C-17 aircrews would be the primary user and would not have to "compete" with other military units for access to the route.
- Allow airspeeds greater than 250 KIAS.
- Have the ability to provide an altitude structure that allows flight as low as 300 feet above ground level (AGL) while providing sufficient altitude to vertically clear terrain and other obstacles by 2,000 feet under IFR conditions.
- Allow for a minimum of 25 minutes (about 150 linear miles) of low level flying time each time the MTR is flown.
- Diversified training over varied terrain.

2.1.2 Identification of Alternatives

Travis AFB personnel reviewed options to develop alternatives to establish an effective, efficient, and realistic low level navigation training program. As a result of the process and in addition to the No Action Alternative, Travis AFB personnel identified the following alternatives to satisfy the need identified in Subchapter 1.1:

- **Alternative 1**. Conduct low level navigation training on IRs 264, 275, 280, 281, and 282.
- **Alternative 2**. Increase the use of MTRs scheduled by other U.S. military organizations.

Airspace is an entity that can be used for multiple aviation purposes. Travis AFB personnel also considered creating a new MTR. Establishing an MTR in a high-density aircraft traffic area such as that surrounding Travis AFB (*i.e.*, major airports at nearby Oakland and Sacramento, California, Reno, or Nevada) would be difficult because there are high levels of aircraft operations associated with these airports and other airports that "compete" for use of airspace. Northern California currently has numerous MTRs and special use airspaces such as military operations areas that would make establishing a new MTR near Travis AFB difficult. Thus, creating a new MTR was not considered as a viable alternative.

2.1.3 Application of Selection Standards to Alternatives Considered

Travis AFB personnel compared the alternatives identified in Subchapter 2.1.2 to the selection standards in Subchapter 2.1.1. Table 2-1 summarizes the selection process and the following discussion explains how the selection standards were applied. "Yes" indicates the alternative would meet the standard. An alternative would have to meet all six selection standards to be considered viable.

Table 2-1. Application of Selection Standards to Alternatives Considered

Standard		Alternative	
		1	2
		Conduct Low Level Navigation Training on IRs 264, 275, 280, 281, and 282	Increase the Use of MTRs Scheduled by Other U.S. Military Organizations
1	Near Travis AFB	Yes	Yes
2	Frequent and Unrestricted Use by Travis AFB; the Base is the Originating/Scheduling Unit	Yes	No
3	Airspeeds Greater than 250 KIAS	Yes	Yes
4	Allow Operation between 300 feet AGL and Vertically Clear Terrain by 2,000 Feet under IFR conditions	Yes	Yes
5	Minimum of 25 Minutes Low Level Flying Time Each Time the MTR is Flown	Yes	Yes
6	Varied Terrain	Yes	Yes
Eliminated from Consideration?		No	Yes

Alternative 2 does not meet all six selection standards (see Table 2-1) nor does it meet the Purpose and Need stated in Subchapter 1.1. For these reasons and based on the summary in Table 2-1, Alternative 1 (*i.e.,* use of IRs 264, 275, 280, 281, and 282) was identified as the alternative that meets the need identified in Subchapter 1.1.

2.2 DESCRIPTION OF THE NO ACTION ALTERNATIVE

The Air Force EIAP (32 CFR 989.8(d)) states: "Except in those rare instances where excused by law, the Air Force must always consider and assess the environmental impacts of the 'no action' alternative." Thus, the alternative of not accomplishing operations on the five MTRs was also identified (No Action Alternative) and is analyzed in detail in this EA.

Under the No Action Alternative, IRs 264, 275, 280, 281, and 282 would continue to be inactive; however, Travis AFB would continue to be the originating and scheduling unit for the routes. Travis AFB C-17 aircrews would continue flying the MTRs originated and scheduled by other DoD organizations, and which

were environmentally assessed in the West Coast C-17 Basing EA. The types and levels of operations on the MTRs would continue at the levels assessed in the two EAs.

If the Proposed Action is not implemented, Travis AFB would request that it be allowed to retain the routes and maintain them in an inactive status until a determination can be made that they are of no future practical use to the base. At that time, Travis AFB would turn the MTRs over to the Air Force for proper disposition but request that they are kept in reserve to accommodate possible future needs. These routes would work well for a typical C-17 profile as well as those used by other USAF Weapon Systems. If the Proposed Action is not implemented, Travis AFB would request to reserve the right to reinitiate actions as necessary if future training needs dictate.

2.3 DESCRIPTION OF THE PROPOSED ACTION

The availability of five dedicated MTRs in central Nevada would provide a variety of training options. As such, Travis AFB C-17 aircrews may not fly an MTR in its entirety on a single training sortie. The likely scenario would be that an aircrew would plan to enter and exit a route at published alternate entry and exit points and fly segments of various routes during a planned sortie. Each route has numerous entry and exit points that increase the options available to the crews for use during a training sortie. Under this concept, Travis AFB crews could fly a portion of more than one route on a single sortie. Given the number of options available with five routes, flights using the same segments would be infrequent. For evaluation purposes, it is estimated that:

- Travis AFB C-17 aircrews would normally fly routes two (2) times each weekday (Monday through Friday).
- Use of the five MTRs would be 10 sorties per week, or a total of 520 sorties per year.
- 75 percent of the total sorties would be flown during the daytime (7:00 a.m. to 10:00 p.m.), or 390 daytime sorties per year.
- 25 percent of the total sorties would be flown during the nighttime (10:00 p.m. to 7:00 a.m.), or 130 nighttime sorties per year.
- The number of annual sorties for each of the five routes would be 111 when including the sorties by other aircraft types. Travis AFB C-17s would fly 78 daytime and 26 nighttime sorties (assuming equal distribution of sorties).

Table 2-2 presents the numbers of annual and monthly operations by Travis AFB C-17 aircrews, as well as the aircrews associated with other aircraft types, for IRs 264, 275, 280, 281, and 282. Aircraft would file a flight plan with the FAA and get to and from the routes via normal air traffic control routing. No modification of the currently published route structures would be necessary (*i.e.*, there would be no change to the MTR widths, upper and lower altitude limits, geographic location, or alternate entry and exit points). (Please refer to Figure 2-1 which depicts the location of the five IRs.)

Table 2-2. Proposed Use of Instrument Routes 264, 275, 280, 281, and 282

Aircraft Type	Instrument Route									
	264		275		280		281		282	
	annual	monthly	annual	monthly	annual	monthly	annual	monthly	annual	monthly
C-17	104	8.67	104	8.67	104	8.67	104	8.67	104	8.67
C-130	5	0.42	5	0.42	5	0.42	5	0.42	5	0.42
F-15E	2	0.17	2	0.17	2	0.17	2	0.17	2	0.17
Total	111	9.26	111	9.26	111	9.26	111	9.26	111	9.26

Note: About 75 percent of the sorties for each aircraft type would occur during daytime (*i.e.,* 7:00 a.m. to 10:00 p.m.) and 25 percent would occur during environmental nighttime (*i.e.,* 10:00 p.m. to 7:00 a.m.). The F-15E is a representative aircraft for other fighter/trainer type aircraft that could fly the routes (e.g., F-18, F-16, or T-38). Altitude for each aircraft type on each MTR would be 300 ft AGL or the published floor (see Tables 2-3 through 2-6, whichever is lower).

Figures 2-2 through 2-7 depict each of the five IRs individually, while Tables 2-3 through 2-6 provide altitude structure, route width and length information for each segment within IRs 264, 275, 280, 281 and 282. Table 2-8 lists the approximate time it would take an aircraft to fly a particular route.

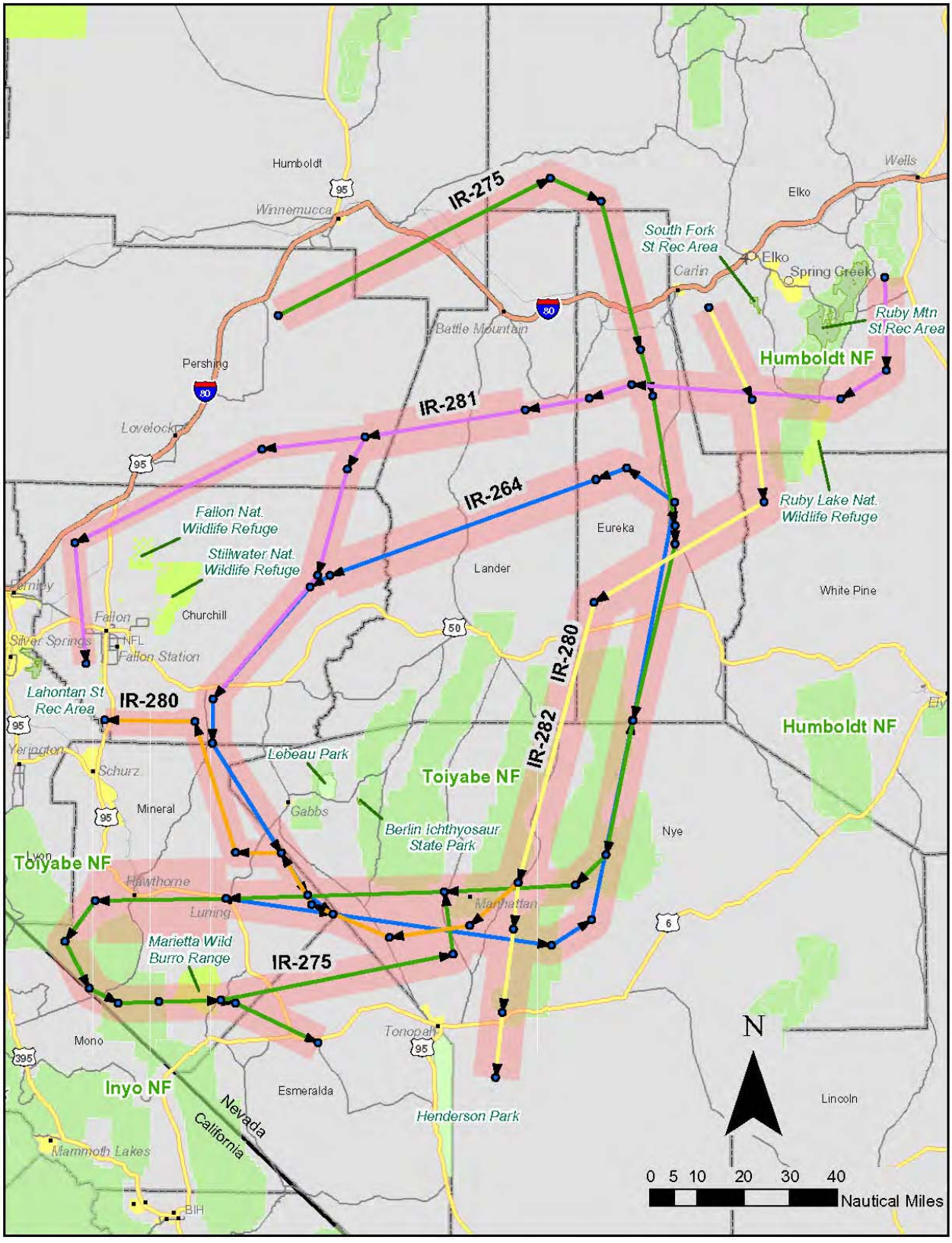

Figure 2-1. Location of Instrument Routes 264, 275, 280, 281, and 282

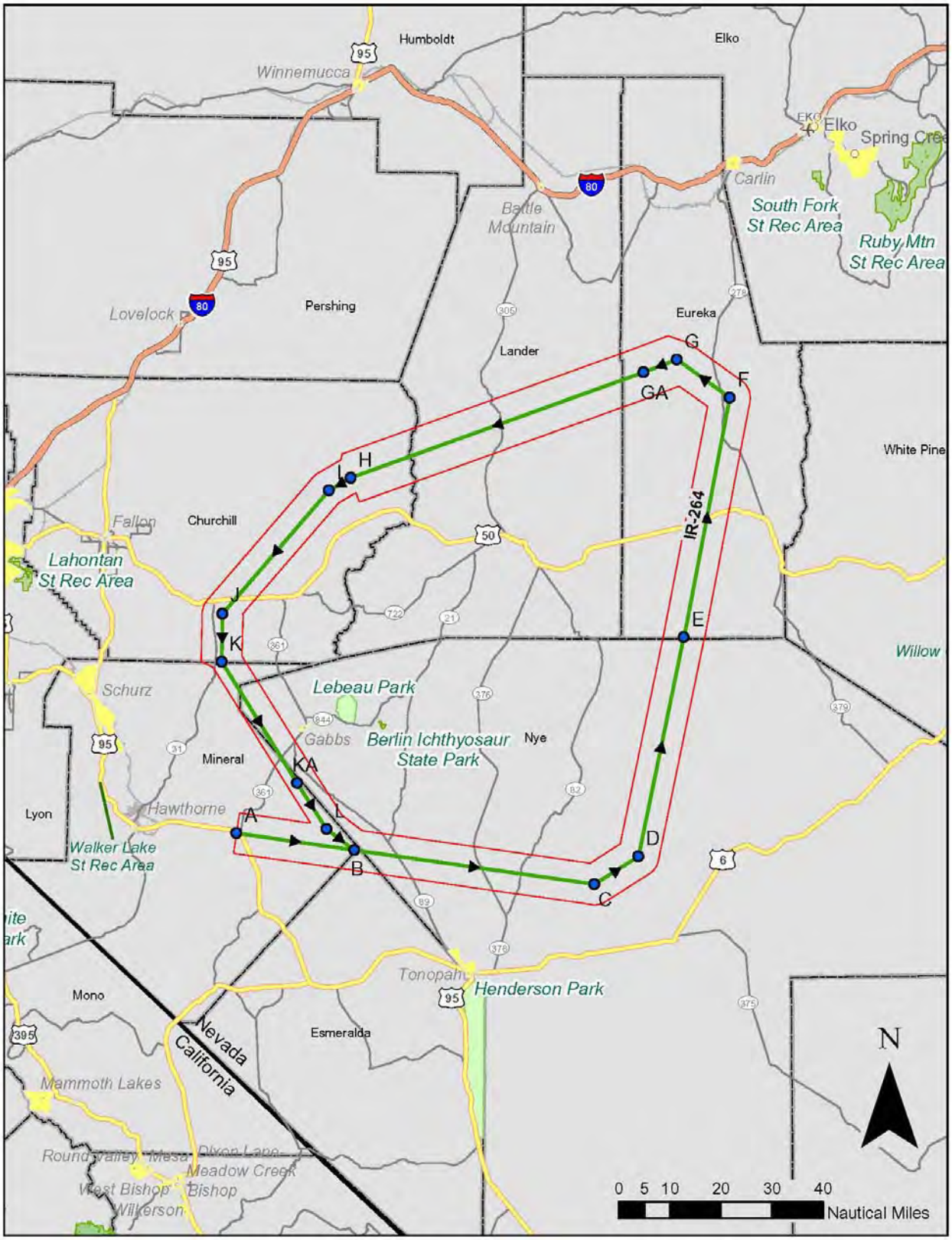

Figure 2-2. Location of Instrument Route 264

Table 2-3. IR 264 Route Description

Segment	Altitude Block (floor-ceiling)	Route Width (NM)	Length (NM)
A-B	13,000 MSL-17,000 MSL	4 LT – 4 RT	23
B-C	GND SFC-13,000 MSL	4 LT – 4 RT	48
C-D	GND SFC-13,000 MSL	4 LT – 4 RT	10
D-E	GND SFC-12,000 MSL	4 LT – 4 RT	44
E-F	GND SFC-12,000 MSL	4 LT – 4 RT	48
F-G	GND SFC-12,000 MSL	4 LT – 4 RT	13
G-GA	GND SFC-11,000 MSL	5 LT – 5 RT	7
GA-H	GND SFC-11,000 MSL	5 LT – 5 RT	61
H-I	GND SFC-11,000 MSL	3 LT – 4 RT	5
I-J	GND SFC-11,000 MSL	3 LT – 4 RT	32
J-K	GND SFC-12,000 MSL	4 LT – 4 RT	9
K-KA	GND SFC-12,000 MSL	2 LT – 4 RT	27
KA-L (End)	12,000 MSL	2 LT – 4 RT	11
L-B (Reentry Track; Reentry Point for Route)	12,000 MSL-13,000 MSL	4LT – 4 RT	7

GND SFC = ground surface
LT = NM distance left of route center line
MSL = feet above mean sea level
NM = nautical miles
RT = NM distance right of route center line
Source: DoD, 2011

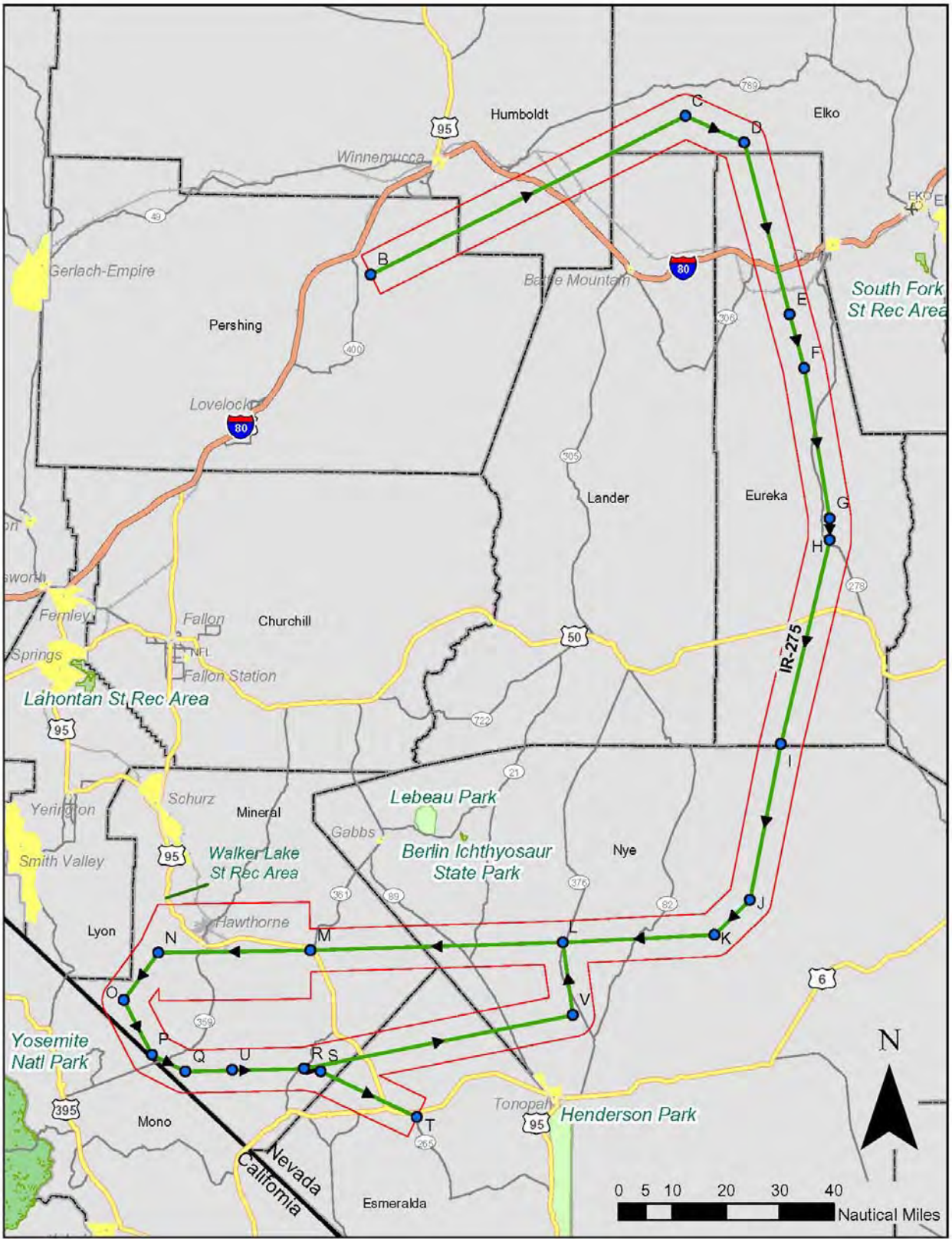

Figure 2-3. Location of Instrument Route 275

Table 2-4. IR 275 Route Description

Segment	Altitude Block (floor-ceiling)	Route Width (NM)	Length (NM)
B-C	11,000 MSL-FL200	4 LT – 4 RT	65
C-D	9,000-11,000 MSL	4 LT – 4 RT	12
D-E	GND SFC-11,000 MSL	4 LT – 4 RT	33
E-F	GND SFC-11,000 MSL	4 LT – 4 RT	10
F-G	GND SFC-11,000 MSL	4 LT – 4 RT	28
G-H	GND SFC-11,000 MSL	4 LT – 4 RT	4
H-I	GND SFC-12,000 MSL	4 LT – 4 RT	39
I-J (Alternate Exit Point)	GND SFC-12,000 MSL	4 LT – 4 RT	30
J-K	GND SFC-13,000 MSL	4 LT – 4 RT	9
K-L	GND SFC-13,000 MSL	4 LT – 4 RT	28
L-M	GND SFC-13,000 MSL	4 LT – 4 RT	47
M-N	13,000 MSL	4 LT – 4 RT	28
N-O	13,000 MSL-15,000 MSL	4 LT – 4 RT	11
O-P	15,000 MSL	4 LT – 4 RT	11
P-Q	15,000 MSL	4 LT – 4 RT	7
Q-R	15,000 MSL-17,000 MSL	4 LT – 4 RT	22
R-S	17,000 MSL	4 LT – 4 RT	3
S-T (End)	17,000 MSL	4 LT – 4 RT	20
R-V (Reentry Track)	14,000 MSL	4 LT – 4 RT	49
V-L (Reentry Track; Resume Published Route)	13,000 MSL-14,000 MSL	4 LT – 4 RT	14
I-J (Alternate Entry at I)	13,000 MSL-FL230	4 LT – 4 RT	30
J-K (Resume Published Route)	13,000 MSL-FL230	4 LT – 4 RT	9
K-L (Alternate Entry Point; Resume Published Route	GND SFC-13,000 MSL	4 LT – 4 RT	28

AGL = above ground level
FL = floor
GND SFC = ground surface
LT = NM distance left of route center line
MSL = feet above mean sea level
NM = nautical miles
RT = NM distance right of route center line
Source: DoD, 2011

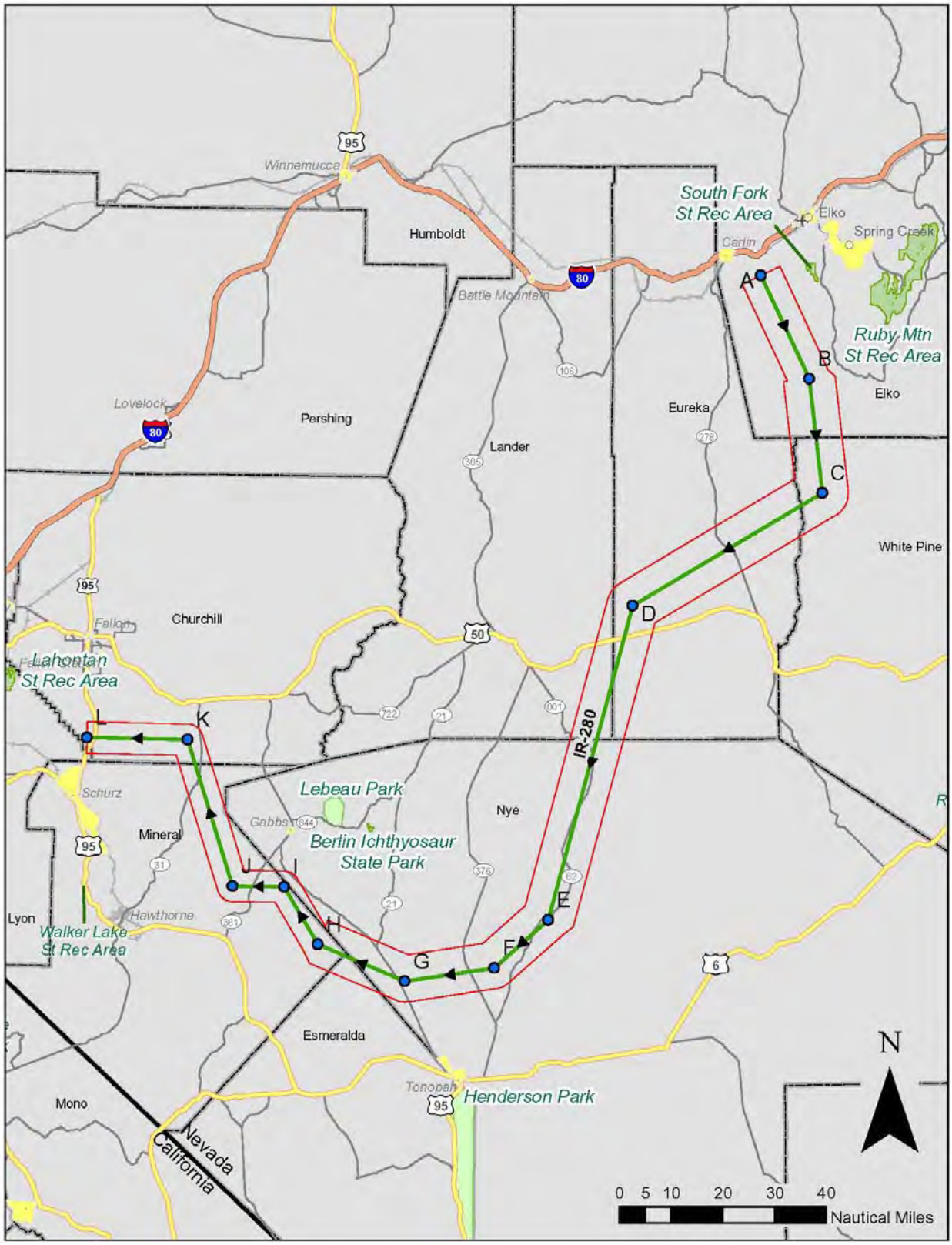

Figure 2-4. Location of Instrument Route 280

Table 2-5. IR 280 Route Description

Segment	Altitude Block (floor-ceiling)	Route Width (NM)	Length (NM)
A-B	14,000-17,000 MSL	4 LT – 4 RT	22
B-C	100 AGL-14,000 MSL	5 LT – 5 RT	11
C-D	100 AGL-14,000 MSL	5 LT – 5 RT	11
D-E	100 AGL-14,000 MSL	5 LT – 5 RT	38
E-F	100 AGL-14,000 MSL	4 LT – 5 RT	14
F-G	100 AGL-14,000 MSL	4 LT – 5 RT	17
G-H (Alternate Exit Point)	100 AGL-14,000 MSL	4 LT – 5 RT	18
H-I	100 AGL-14,000 MSL	3 LT – 3 RT	13
I-J	100 AGL-8,500 MSL	3 LT – 3 RT	10
J-K	100 AGL-8,500 MSL	3 LT – 3 RT	30
K-L (End)	100 AGL-8,500 MSL	3 LT – 3 RT	19

AGL = above ground level
GND SFC = ground surface
LT = NM distance left of route center line
MSL = feet above mean sea level
NM = nautical miles
RT = NM distance right of route center line
Source: DoD, 2011

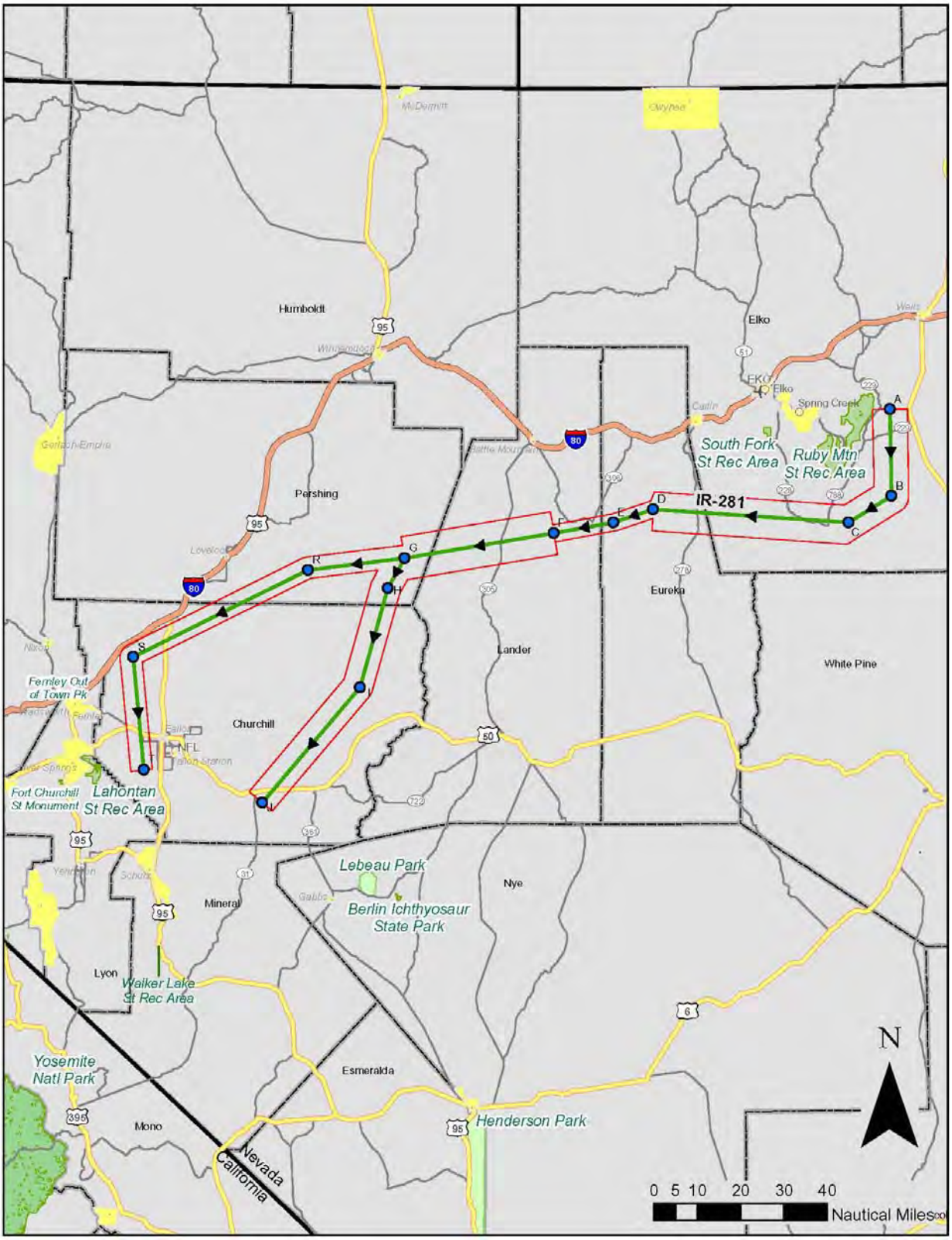

Figure 2-5. Location of Instrument Route 281

Table 2-6. IR 281 Route Description

Segment	Altitude Block (floor-ceiling)	Route Width (NM)	Length (NM)
A-B	14,000 MSL-17,000 MSL	4 LT – 4 RT	20
B-C	12,000 MSL-14,000 MSL	4 LT – 4 RT	12
C-D	100 AGL-12,000 MSL	5 LT – 4 RT	55
D-E	100 AGL-11,000 MSL	2 LT – 2 RT	10
E-F	100 AGL-11,000 MSL	2 LT – 2 RT	14
F-G	100 AGL-11,000 MSL	5 LT – 5 RT	35
G-H	100 AGL-11,000 MSL	3 LT – 4 RT	8
H-I	100 AGL-11,000 MSL	3 LT – 4 RT	24
I-J (End)	100 AGL-11,000 MSL	3 LT – 4 RT	35
G-R	100 AGL-8,500 MSL	2 LT – 3 RT	22
R-S	100 AGL-7,500 MSL	2 LT – 3 RT	45
S-T (alternate Exit Point)	100 AGL-7,000 MSL	2 LT – 3 RT	26

AGL = above ground level
GND SFC = ground surface
LT = NM distance left of route center line
MSL = feet above mean sea level
NM = nautical miles
RT = NM distance right of route center line
Source: DoD 2011

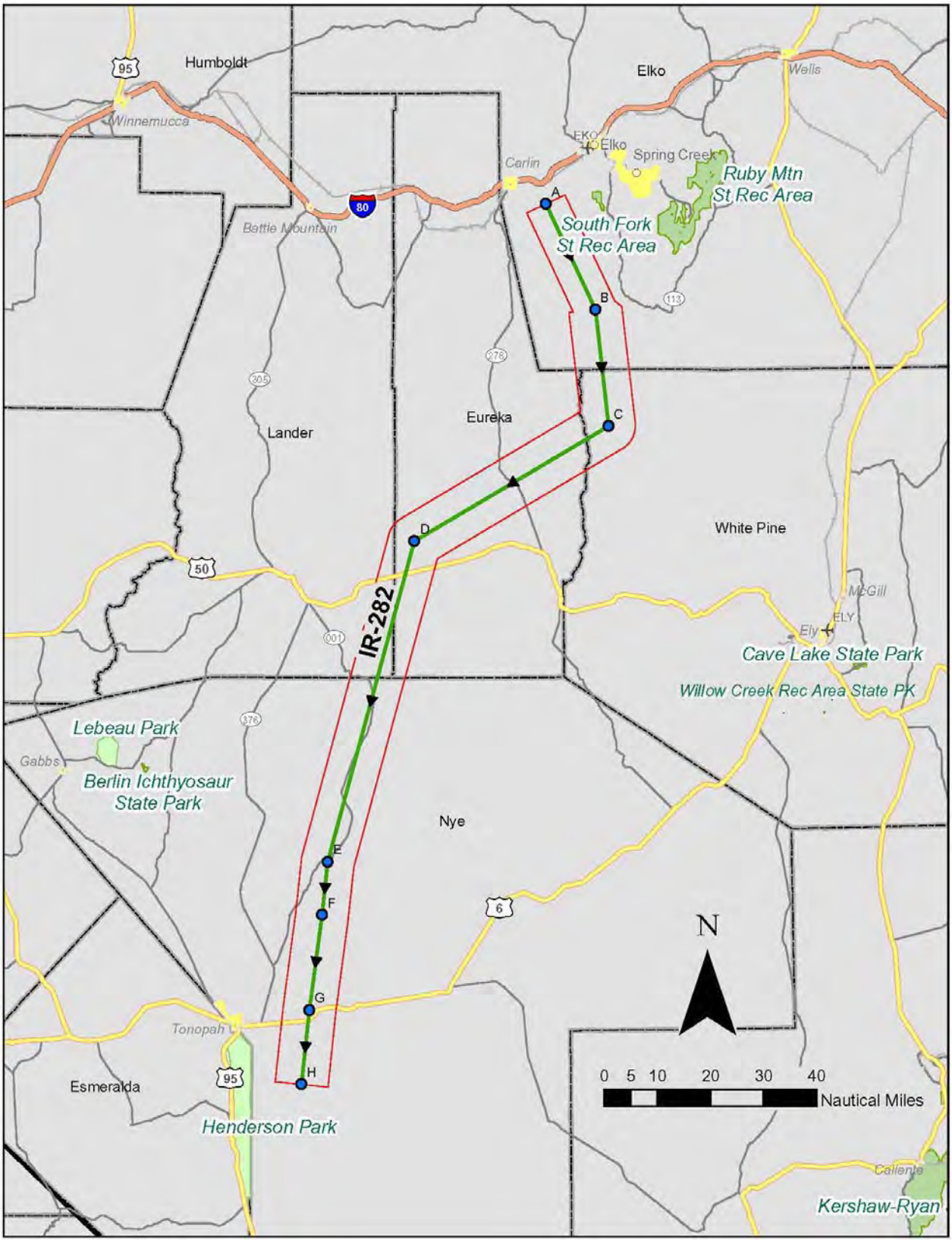

Figure 2-6. Location of Instrument Route 282

Table 2-7. IR 282 Route Description

Segment	Altitude Block (floor-ceiling)	Route Width (NM)	Length (NM)
A-B	14,000 MSL-17,000 MSL	4 LT – 4 RT	22
B-C	100 AGL-14,000 MSL	5 LT – 5 RT	22
C-D	100 AGL-14,000 MSL	5 LT – 5 RT	38
D-E	100 AGL-14,000 MSL	5 LT – 5 RT	62
E-F	100 AGL-11,400 MSL	5 LT – 5 RT	10
F-G	100 AGL-10,400 MSL	5 LT – 5 RT	18
G-H (End)	100 AGL-10,400 MSL	5 LT – 5 RT	14

AGL = above ground level
GND SFC = ground surface
LT = NM distance left of route center line
MSL = feet above mean sea level
NM = nautical miles
RT = NM distance right of route center line
Source: DoD, 2011

Table 2-8. Estimated Time for an Aircraft to Fly an MTR

MTR	Aircraft Type		
	C-17	C-130	F-15
IR-264	1.4	1.6	0.7
IR-275	1.5	1.8	0.7
IR-280	1.1	1.3	0.5
IR-281	0.8	1.0	0.4
IR-282	0.8	0.9	0.4

Note: Data reflect time in hours. Average airspeeds would be: C-17, 250 KIAS (288 mph); C-130, 210 KIAS (242 mph); and, F-15, 520 KIAS (590 mph).

2.4 DESCRIPTION OF PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

The complete EIAP of the No Action Alternative and the Proposed Action must consider cumulative impacts due to other actions. A cumulative impact, as defined by the CEQ (40 CFR 1508.7), is the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

The primary element of the proposed C-17 flight training operations in central Nevada is to enable military aircraft training. Based on a review of the State of Nevada Department of Administration Division of Budget and Planning (Nevada State Clearinghouse), there are no other planned projects in the central Nevada that involve aircraft flying activities within or near the airspace corridors associated with IRs 264, 275, 280, 281, and 282. Thus, there would be no cumulative impacts from the No Action Alternative or Proposed Action at this airfield.

2.5 PREFERRED ALTERNATIVE

The preferred alternative is the Proposed Action, which would establish Travis AFB as the primary user of IRs 264, 275, 280, 281, and 282 in central Nevada.

2.6 COMPARISON OF ENVIRONMENTAL EFFECTS OF ALTERNATIVES ASSESSED IN THIS EA

Table 2-9 summarizes the impacts of the No Action Alternative and the Proposed Action.

Table 2-9. Summary of Environmental Impacts for Travis AFB Use of Military Training Routes in Central Nevada

Aircraft Operations, Aircraft Safety, and Bird/Wildlife-Aircraft Strike Hazard
No Action Alternative There would be no change to the structure of IRs 264, 275, 280, 281, and 282. There would be no airspace, aircraft safety, or bird-aircraft strike issues because the routes would remain inactive.
Proposed Action ▪ The potential for conflict between aircraft operating on IRs 264, 275, 280, 281, and 282 and other aircraft operating in the airspaces around the IRs would be low because the scheduling and air traffic control procedures used by air traffic control and DoD flying units are designed to deconflict aircraft operations on the MTRs from operations in adjoining airspaces. ▪ The existing structures of IRs 264, 275, 280, 281, and 282 would require no modification and would accommodate the proposed operations. ▪ The risk that an aircraft involved in an accident along the MTR would strike a person or structure on the ground would continue to be low. Likewise, it would continue to be unlikely that a bird/wildlife-aircraft strike incident along the MTR would involve injury either to aircrews or to the public, or damage to property (other than the aircraft).
Noise
No Action Alternative Noise levels would continue to range from approximately Day-Night Average Sound Level (DNL) 25 A-weighted decibels (dBA) in rural nighttime areas to daytime levels of about DNL 80 dBA in urban areas.
Proposed Action ▪ The greatest onset-rate adjusted monthly day-night average sound level (L_{dnmr}) for any segment of any of the five MTRs would be 47 dBA, a level that is below the L_{dnmr} 55 dBA level at and below which there is no reason to expect the general population would be at risk from any of the effects of noise. ▪ To minimize the potential for noise impacts, MTRs are designed so that the aircraft avoid overflight of populated areas. ▪ Disruptions to speech would last only as long as noise from the overflying aircraft remains at 66 dB or greater. ▪ No structural or vibration damage would be expected from aircraft operations on IRs 264, 675, 280, 281, and 282. ▪ Neither noise induced hearing damage nor nonauditory health effects would occur.
Land Use
No Action Alternative There would be no change to the existing conditions for sensitive land uses, population areas, and land use plans.
Proposed Action ▪ Operations on IRs 264, 275, 280, 281, and 282 would not cause non-conformance with existing land use plans and ordinances or physical and/or functional obsolescence of existing land uses within any of the IR corridors. ▪ Aircraft overflight of national forests, wildlife management areas, wilderness areas, non-congested areas, and cities, towns, and groups of people would be accomplished in accordance with the Air Force and FAA procedures established for overflight of these areas.
Air Quality
No Action Alternative There would be no additional air emissions from military aircraft conducting low level navigation training out of Travis AFB other than by routes previously assessed.
Proposed Action ▪ Because air pollutant emissions from the Proposed Action would be less than 10 percent of baseline emissions, the Proposed Action would not to cause or contribute to new violations of any national ambient air quality standard in the affected area. ▪ Greenhouse gas emissions from the Proposed Action would amount to approximately 0.0004 percent of the total greenhouse gas emissions generated by the U.S. in 2009; there would be no measurable impacts to global climate change.

Table 2-9. Summary of Environmental Impacts for Travis AFB Use of Military Training Routes in Central Nevada (Cont'd)

Biological Resources
No Action Alternative There would be no change to biological resources brought about by aircraft operation on IRs 264, 275, 280, 281, and 282.
Proposed Action ▪ The IRs corridors, ranging from 4 to 10 miles in width cover a broad diversity of ecoregions with their own unique assemblage of plants and wildlife. The Nevada Central Valley ecoregion underlies the most corridors. IR 281 is the only route that potentially impacts the Wetlands Ecoregions. ▪ All of the MTRs would expose small song birds, raptors and small mammals to noise levels that might illicit a temporary response in individuals. The overall impact to these species populations in the region would be minor due to the infrequent nature of the flights and volume of territory not affected by this activity. ▪ There would be no adverse affect to ungulates in these ecoregions due to the infrequent exposure to aircraft noise. ▪ The Stillwater and Ruby Lake National Wildlife Refuges would be slightly impacted by aircraft using IR 281. There would some temporary disturbance of waterfowl flocks or individuals due to noise or visual cues. Because noise levels would be below 90 dBA SEL at 2000 feet lateral distance, it is unlikely that disturbance of nesting species would reduce populations of bird species. ▪ Threatened, endangered or candidate species would not be adversely affected by aircraft using these MTR corridors. ▪ There would be a potential to expose isolated individuals of bald and golden eagles to aircraft noise. There are no known nesting areas near any of the routes that would be affected by noise levels laterally or beneath the aircraft. ▪ Based on the bird strike estimate of 3.2 strikes annually and the lack of a species of bird population at risk, the potential impact on bird populations from bird-aircraft strike is extremely low.
Cultural Resources
No Action Alternative Impacts from C-17 flying operations on cultural resources would remain low due to routine airfield maintenance and aircraft operations activities.
Proposed Action ▪ The maximum sound level that would be generated by C-17 activities at 300 feet directly overhead would be 101 dBA, which is below the threshold at which structural damage would occur (*i.e.*, 130 dBA). The probability for direct ground disturbance from aircraft accidents and noise-induced vibration, and resultant adverse effect on the 18 NRHP listed archaeological sites is very low. ▪ No structural damage to the 123 NRHP-listed historic properties from noise-induced vibration would be expected. C-17 operations would not be expected to adversely impact the NRHP listed traditional cultural property in Lander County. ▪ Travis AFB would seek to eliminate or minimize the potential for adverse effects to Native American resources (*i.e.*, burial sites and ceremonial and gathering areas) including disruption to Tribal activities in the area through an ongoing Government-to-Government relationship with the Tribes and through Section 106 consultations, should any Tribes accept the Base's invitation to consult regarding this Proposed Action. However, the potential for significant adverse impacts is believed to be low.

2.7 MITIGATION

The environmental analysis contained in this EA has found that no significant impacts would result from implementation of the Proposed Action. Therefore, no mitigation measures would be recommended.

CHAPTER 3
AFFECTED ENVIRONMENT

This chapter describes the existing environmental resources that could be affected by or could affect the No Action Alternative and the Proposed Action. Only those specific resources relevant to potential impacts are described in detail. The baseline represents the current condition for the respective resource or conditions that may exist due to the No Action Alternative.

3.1 AIRCRAFT OPERATIONS, AIRCRAFT SAFETY, AND BIRD/WILDLIFE-AIRCRAFT STRIKE HAZARD

3.1.1 Aircraft Operations

3.1.1.1 Definition of Resource

Airspace is a finite resource defined vertically, horizontally, and temporally. As such, it must be managed and used in a manner that best serves commercial, general, and military aviation needs. The FAA is responsible for overall management of airspace and has established different airspace designations to protect aircraft while operating to or from an airport, transiting en route between airports, or operating within "special use" areas identified for defense-related purposes. Rules of flight and air traffic control procedures were established to govern how aircraft must operate within each type of designated airspace. The Federal Aviation Regulations apply to both civil and military aircraft operations unless the FAA grants the military service an exemption or a regulation specifically excludes military operations. All aircraft operate under either IFR or VFR. Appendix D contains additional information on airspace management and aircraft overflight altitude limitations.

3.1.1.2 Baseline Conditions

Several factors reduce risks between MTRs and other airspace used by civil and military aviation activities. The ceiling of many MTRs is below the minimum enroute altitude established for most of the federal airways with which they intersect. Additionally, IRs and visual routes (VR) are clearly designated on aeronautical charts. However, slow routes (SR) are not on aeronautical charts used by civil pilots. Both military and civil pilots follow the general "see and avoid" rules of flight. Military Training Routes may also interact with other elements of military training airspace, either transiting through Special Use Airspace (SUA) such as Military Operations Areas (MOA) and restricted areas, or intersecting and merging with other MTRs. Military Training Routes are coordinated through the scheduling unit's operations plan to eliminate simultaneous aircraft operations on conflicting routes scheduled by the installation. Aircrews monitor radio frequencies assigned by air traffic control or as stated in the DoD Flight Information Publications for the type of route being flown (*i.e.,* IR, VR, or SR) or the specific route. These actions advise aircrews of the location of other aircraft and help reduce the potential for airspace conflicts between aircraft operating on MTRs, in MOAs, and other aircraft in surrounding airspace.

Instrument Routes allow the aircraft to operate below 10,000 feet above MSL at speeds in excess of 250 KIAS, or approximately 288 mph, in both IFR and VFR weather conditions. VRs are guided by the same restrictions as IRs but are additionally limited to flight in VFR weather conditions. Instrument Flight Rules weather conditions represent weather conditions in which factors such as visibility, cloud distance, cloud ceilings, and weather phenomena cause visual conditions to drop below the minima required to operate by visual flight referencing. VFR weather conditions require the pilot to remain clear of clouds by specified distances to ensure separation from other aircraft under the concept of see and avoid. Instrument Flight Rules represents the regulations and restrictions a pilot must comply with when flying in weather conditions that restrict their ability to fly the plane only by instruments. A pilot can fly under IFR in VFR weather conditions; however, pilots cannot fly under VFR in IFR weather conditions. Slow Routes, which are not technically part of the MTR system, are low level navigation training routes that are flown at airspeeds of less than 250 KIAS, at altitudes less than 1,500 feet above ground level (AGL), and in VFR weather conditions.

FAA Joint Order 7610.4, *Special Military Operations*, does not establish minimum altitudes for MTRs. Establishment of minimum MTR altitudes considers the above restrictions and an altitude that corresponds

with the primary aircraft type for which the route is developed. Additionally, MTR operations attempt to duplicate, to the maximum extent practicable, conditions in which they would operate in a combat environment. Therefore, MTRs for highly maneuverable (fighter) aircraft that have special equipment such as terrain-following radar tend to fly lower altitudes. Larger aircraft that are less maneuverable and typically do not have equipment that safely allows low level flight (transport aircraft) fly MTRs at higher altitudes. Typical effective low level training altitudes for transport aircraft (*e.g.*, C-17 and C-130) are 300 feet AGL. However, the minimum altitudes flown consider the restrictions for overflying congested area, people, airports, and areas such as national parks, wildlife refuges, and wilderness and primitive areas.

Operations on IRs are conducted in accordance with IFR procedures regardless of weather conditions. Operations on VRs are conducted in accordance with VFR procedures with flight visibility of five miles or more. Flights on VRs shall not be conducted below a ceiling of less than 3,000 feet AGL.

Instrument Flight Rules weather conditions represent conditions in which factors such as visibility, cloud distance, cloud ceilings, and weather phenomena cause visual conditions to drop below the minima required to operate by visual flight referencing. VFR weather conditions require the pilot to remain clear of clouds by specified distances to ensure separation from other aircraft under the concept of see and avoid. IFR represents the regulations and restrictions a pilot must comply with when flying in weather conditions that restrict their ability to fly the plane only by instruments. A pilot can fly under IFR in VFR weather conditions; however, pilots cannot fly under VFR in IFR weather conditions.

Nonparticipating aircraft are not prohibited from flying within an MTR; however, extreme vigilance should be exercised when conducting flight through or near these routes. Pilots should contact FAA Flight Service Stations within 100 miles of a particular MTR to obtain current information on route usage in their vicinity. Information available includes times of scheduled activity, altitudes in use on each route segment, and actual route width. When requesting MTR information, pilots should give the Flight Service Station their position, route of flight, and destination in order to reduce frequency congestion and permit the Flight Service Station specialist to identify the MTR that could be a factor.

Tables 2-3 through 2-6 provide altitude structure, width, and length information for each segment of IRs 264, 275, 280, 281 and 282. Table 3-1 contains specific information such as federal airways that intersect the five IRs, other MTRs that intersect the IRs, and airports within the IR corridors. Figures 3-1 and 3-2, respectively, depict the relationship of the IRs and SUA as well as the other MTRs and federal airways that intersect the IRs. As mentioned in Subchapter 1.1, IRs 264, 275, 280, 281, and 282 have been inactive since 2006. The five IRs pass through airspace controlled by the Oakland and Salt Lake City Air Route Traffic Control Centers (ARTCC). Table 3-2 lists the Special Operating Procedures that are published for IRs 264, 275, 280, 281, and 282 in the DoD Flight Information Publication, Area Planning, Military Training Routes, North and South America. Table 3-3 lists the altitude structure and hours of operation of the SUA overlying/underlying, or adjacent IRs 264, 275, 280, 281, and 282.

Table 3-1. Airports, Military Training Routes, Federal Airways, and Special Use Airspace Intersecting, Overlying/Underlying, or Adjacent to IRs 264, 275, 280, 281, and 282

MTR	Airports	Military Training Routes	Federal Airways	Special Use Airspace
IR 264	Less than 2 miles from Eureka, NV Airport	Tangent to IRs 281, 206, 280, and 275	Intersects with V230	R-4816N, R-4816S, and R-4804A
	--	Intersects with IRs 282, 237, 236, and 238	--	Gabbs Central MOA, Gabbs North MOA, Austin 1 MOA, and Austin 2 MOA
	--	Intersects with VRs 1264,1252, 209, 1253, and 1260	--	--
IR 275	Less than 2 miles from Winnemucca, NV Airport	Intersects with VRs 1259, 1253,1260, 209, 208, 1252, 1264, and 1255	Intersects with V8, V32, V105, and V564	Less than 3 miles south of Gabbs Central MOA, Less than 2 miles south of Gabbs South MOA
	Less than 2 miles from Gabbs Airport, Nye County, NV	Intersects with IRs 280, 281, 282 238, 237, 264, and 206	--	--
	Less than 2 miles from Hawthorne Airport, Mineral County, NV	Tangent to IR 264	--	--
	Less than 2 miles from Eureka, NV Airport	--	--	--
IR 280	Less than 2 miles from Elko, NV Regional Airport	Intersects with VRs 1253, 209, 1260, and 1259	None	Ranch High and Ranch MOA Gabbs Central MOA Gabbs South MOA
	Less than 2 miles from Gabbs Airport, Nye County, NV	Intersects with IRs 275 and 281	--	R-4810 Less than 0.5 mile from R-4804A
	Less than 2 miles from Eureka, NV Airport	Tangent to IRs 206, 264, and 282	--	--
	Less than 2 miles from 1 Private Runway	--	--	--
IR 281	Less than 2 miles from Tonopah, NV Airport	Intersects with VR 1259	Intersects with V-32 and V-293	R-4816N, R-4816S and R-4804A
	Less than 2 miles from 3 Private Runways	Intersects with IRs 280, 281, and 282	--	Austin 1 MOA Gabbs North MOA Gabbs Central MOA
	--	Tangent to VRs 1259 and 1260	--	--
	--	Tangent to IR 264	--	--
IR 282	Less than 1 mile from Tonopah, NV Airport	Intersects with VRs 1259, 1253, 1260, and 209	None	Less than 0.5 mile from R-4807A and R-4809
	Begins less than 2 miles from Elko Regional Airport	Intersects with IRs 281, 275, 264, and 200	--	Austin 2 MOA Austin 2 MOA
	Less than 2 miles from Eureka, NV Airport	Tangent to IR 280 (280-282 coincidental IR for much of route)	--	--
	Less than 2 miles from 1 Private Runway	--	--	--

Table 3-2. Special Operating Procedures for IRs 264, 275, 280, 281, and 282

IR 264	IR 275	IR 280	IR 281	IR 282
MARSA (see note)	MARSA (see note)	MARSA (see note)	MARSA (see note)	MARSA (see note)
Cross U.S. Highway 50, Segment I-J, below 2,000 AGL or above 4,000 AGL.	Aircraft would cross the end maneuver area at the specified minimum IFR altitude.	Requesting units would furnish the scheduling agency with call sign, number and type of aircraft, planned entry time, entry point, proposed speed, and exit time.	Except for IMC terrain following radar operations, aircrews encountering IMC would climb to the minimum IFR altitude prior to IR route crossing.	Except for instrument IMC terrain following radar operations, aircrews encountering IMC would climb to the minimum IFR altitude prior to IR route crossing.
Aircraft planning the published re-entry would file each re-entry as a separate route.	Aircrews would contact Oakland ARTCC passing Point L and report the number of re-entries. No report is required passing Point L during re-entry.	Except for instrument meteorological conditions (IMC) terrain following radar operations, aircrews encountering IMC would climb to the minimum IFR altitude prior to IR route crossing.	Requesting units would furnish the scheduling agency with call sign, number and type of aircraft, planned entry time, entry point, proposed speed, and exit time.	Requesting units would furnish the scheduling agency with call sign, number and type of aircraft, planned entry time, entry point, proposed speed, and exit time.
Terrain following operations would be authorized for the entire route.	Use Alternate Exit J only in conjunction with IR 279 entry to restricted areas R-4809/R-4807.	Clearance to fly this route does not include clearance to enter the Gabbs MOA or Naval Air Station Fallon restricted areas.	Clearance to fly this route does not include clearance to enter the Gabbs MOA or Naval Air Station Fallon restricted areas.	Terrain following operations would be authorized for the entire route.
--	Terrain following operations would be authorized for the entire route.	Terrain following operations would be authorized for the entire route.	Noise sensitive area at N40-18-30 W116-35-00. Overfly at or above 1,500 AGL or avoid by 1 nautical mile.	--

Note: Military Authority Assumes Responsibility for Separation of Aircraft (MARSA) is a condition where the military services involved assume responsibility for the separation between participating military aircraft in the Air Traffic Control system. It is used only for required IFR operations that are specified in letters of agreement or other appropriate FAA or military documents.
Source: DoD, 2011

Table 3-3. Altitude Structure and Hours of Operation of Special Use Airspaces Overlying/Underlying, or Adjacent to Instrument Routes 264, 275, 280, 281, and 282

SUA	Altitude Structure	Hours of Operation
R-4816N	1,500 feet AGL to, but not including, FL 180	7:15 a.m. to 11:30 p.m., daily
R-4816S	500 feet AGL to, but not including, FL 180	7:15 a.m. to 11:30 p.m., daily
R-4810	ground surface to, and including, 17,000 feet MSL	7:15 a.m. to 11:30 p.m., daily
R-4804A	ground surface to, but not including, FL 180 excluding 2,000 feet AGL; up to, but not including, 8,500 feet MSL, north of and within 1 NM of U.S. Highway 50 between the intersection of U.S. Highway 50 with W118-26-00, and W118-08-00	7:15 a.m. to 11:30 p.m., daily
R-4807A	unlimited	7:00 a.m. to 8:00 p.m., Monday through Friday
R-4809	unlimited	8:15 a.m. to 4:59 p.m., daily
Austin 1 MOA	200 feet AGL up to, but not including, FL 180	8:00 a.m. to 9:00 p.m., Monday through Friday
Austin 2 MOA	200 feet AGL up to, but not including, FL 180	8:00 a.m. to 9:00 p.m., Monday through Friday
Gabbs Central MOA	100 feet AGL up to, but not including, FL 180	7:15 a.m. to 11:30 p.m., daily
Gabbs North MOA	100 feet AGL up to, but not including, FL 180	7:15 a.m. to 11:30 p.m., daily
Gabbs South MOA	100 feet AGL up to, but not including, FL 180	7:15 a.m. to 11:30 p.m., daily
Ranch High MOA	9000 feet MSL to 13,000 feet MSL	7:15 a.m. to 10:45 p.m., daily
Ranch MOA	500 feet AGL to 9,000 feet MSL	7:15 a.m. to 10:45 p.m., daily

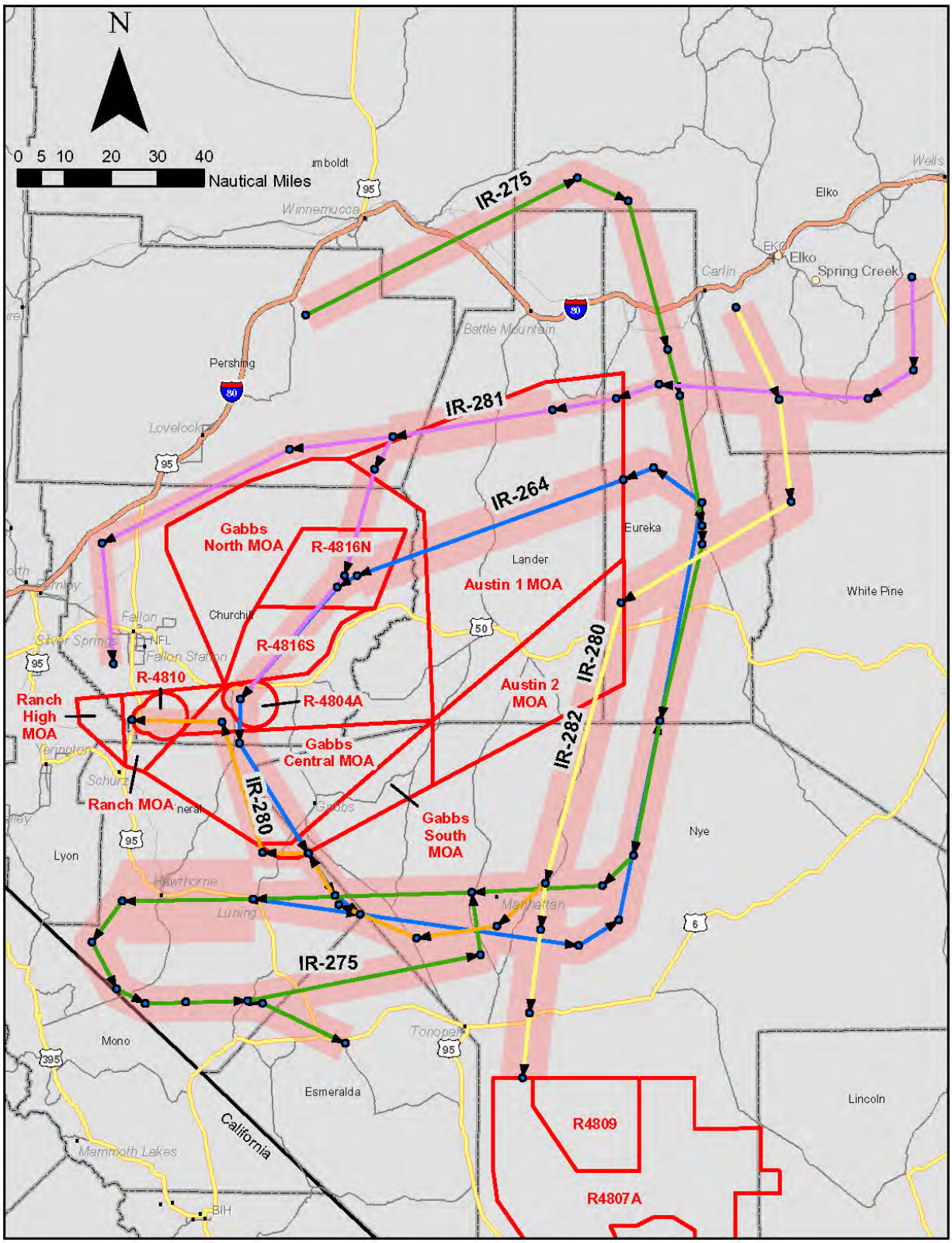

Figure 3-1. Special Use Airspace Intersecting, Overlying/Underlying, or Adjacent to Instrument Routes 264, 275, 280, 281, and 282

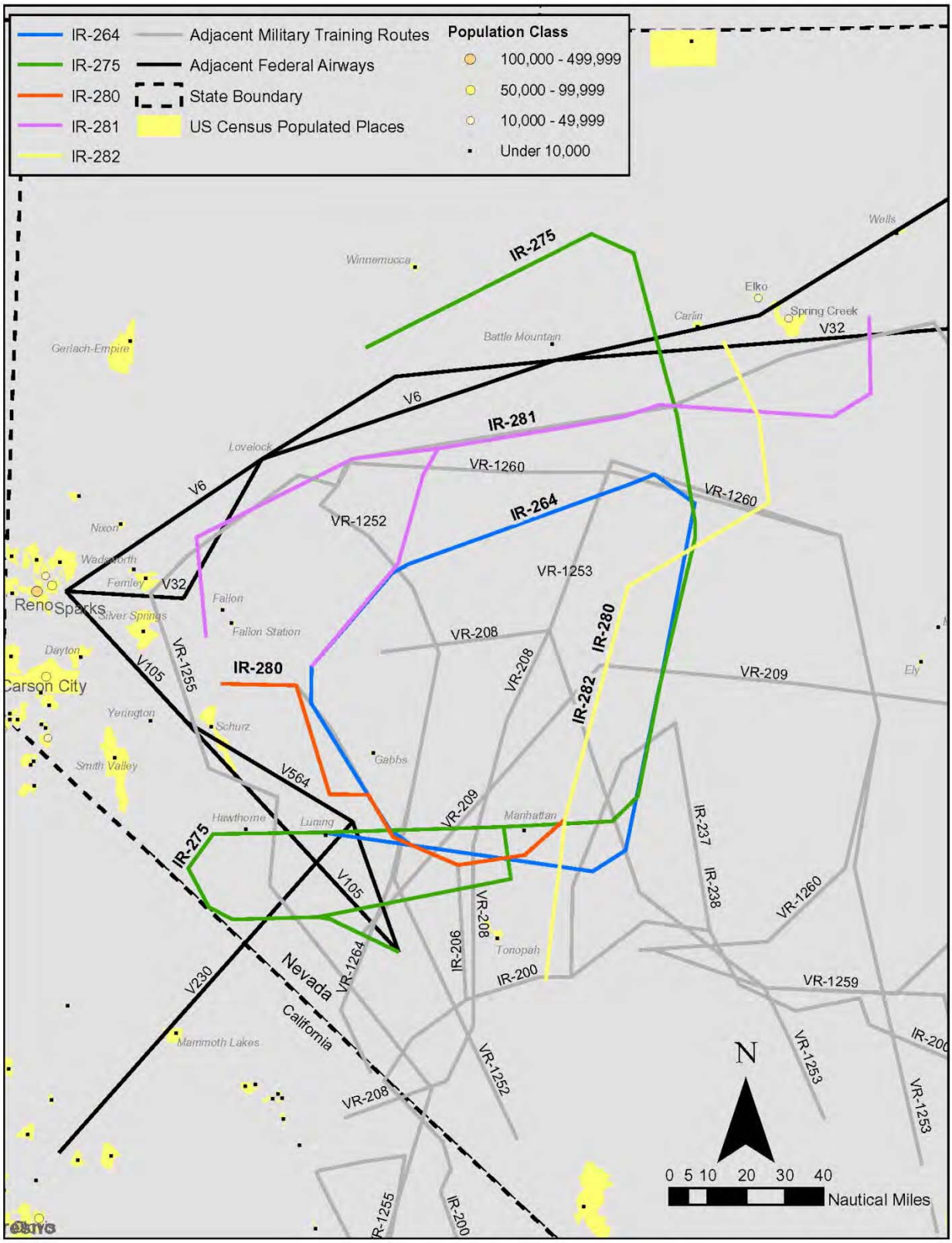

Figure 3-2. Military Training Routes and Federal Airways Intersecting or Adjacent to Instrument Routes 264, 275, 280, 281, and 282

3.1.2 Aircraft Safety

3.1.2.1 Definition of Resource

Areas on the ground within an MTR corridor are exposed to the possibility of aircraft accidents, even with well-maintained aircraft and highly trained aircrews. Despite stringent maintenance requirements and countless hours of training, past history makes it clear that accidents are going to occur. Appendix D contains additional information on aircraft safety.

3.1.2.2 Baseline Conditions

Class A mishaps are the most serious of aircraft-related accidents and represent the category of mishap most likely to result in a crash. Table 3-4 lists the 10-year Class A mishap rates for the C-17, C-130, and F-15 aircraft that would fly IRs 264, 275, 280, 281, and 282. The table reflects the Air Force-wide data, which includes all elements of all missions and sorties for each aircraft.

Table 3-4. Ten-Year Class A Aircraft Mishap Information for C-17, C-130 and F-15 Aircraft

Aircraft	Class A Mishap Rate
C-17	1.23
C-130	0.32
F-15E	1.85

Note: The mishap rate is an annual average based on the total mishaps and 100,000 flying hours.
Source: USAF, 2011

3.1.3 Bird/Wildlife-Aircraft Strike Hazard

3.1.3.1 Definition of Resource

Bird and wildlife strikes constitute a safety concern because of the potential for damage to aircraft, injury to aircrews, or local populations if an aircraft strike and subsequent aircraft accident should occur in a populated area.

3.1.3.2 Baseline Conditions

AFI 91-202 (*The U.S. Air Force Mishap Prevention Program*) requires that Air Force installations supporting a flying mission have a BASH plan for the base. The Travis AFB plan provides guidance for reducing the incidents of bird strikes in and around areas where flying operations are being conducted, to include MTRs. The plan is reviewed annually and updated as needed. Appendix D contains additional information about BASH, to include the Bird Avoidance Model (BAM) and the Avian Hazard Advisory System (AHAS).

Collisions between aircraft and birds are an inherent risk. However, aircrews operating on MTRs have access to the data in the BAM for the specific route. The Model is a predictive bird avoidance model that uses Geographic Information System (GIS) technology for analysis and correlation of bird habitat, migration, and breeding characteristics to reduce the risk of bird collisions with aircraft. Use of the model allows aircrews to avoid severe BASH risk areas if the mission allows.

Air Force-wide, 5,902 bird-aircraft strikes occurred during MTR operations in 2002 (USAF, 2003a) during a total of 1,127,064 flying hours (USAF, 2003b), or a rate of 0.0052 strikes per flying hour. Aircraft may encounter birds at altitudes of 30,000 feet MSL or higher; however, most birds fly close to the ground. Over 95 percent of reported bird strikes occur below 3,000 feet AGL. Approximately 49 percent of bird strikes occur in the airport environment, and 15 percent during low level cruise (USAF, 2003a). Table 3-5 contains the distribution of Air Force-wide bird/wildlife-aircraft strikes by altitude for low level operations such as MTRs and weapons ranges.

Table 3-5. Air Force Wildlife Strikes by Altitude (Low Level/Ranges)

Altitude (ft AGL)	Percent of Total	% Cumulative
0-99	2.33%	2.33%
100-199	2.35%	4.68%
200-299	2.87%	7.55%
300-399	8.32%	15.88%
400-499	3.04%	18.92%
500-599	31.06%	49.98%
600-699	4.59%	54.57%
700-799	4.51%	59.08%
800-899	4.84%	63.92%
900-999	0.94%	64.86%
1,000-1,999	15.51%	80.37%
2,000-2,999	13.50%	93.87%
3,000-3,999	4.51%	98.02%
4,000-4,999	1.03%	99.05%
5,000 and greater	0.95%	100.00%

Note: Current as of January 1, 2007. Statistics reflect bird-aircraft strike data for which the altitude was known.
Source: USAF, 2011b

3.2 NOISE

3.2.1 Definition of Resource

Noise is considered unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. It may be intermittent or continuous, steady or impulsive. It may be stationary or transient. Stationary sources are normally related to specific land uses, e.g., housing tracts or industrial plants. Transient noise sources move through the environment, either along relatively established paths (e.g., highways, railroads, and aircraft flight tracks around airports), or randomly. There is wide diversity in responses to noise that not only vary according to the type of noise and the characteristics of the sound source, but also according to the sensitivity and expectations of the receptor, the time of day, and the distance between the noise source (e.g., an aircraft) and the receptor (e.g., a person or animal). Appendix E contains information regarding single event sound metrics, averaged noise metrics, noise analysis methods, and noise effects.

3.2.2 Baseline Conditions

Land uses in the areas below the MTR corridors ranges from rural ranching and grazing activities to communities with a population of about 8,000 residents. As noted in Figure E-1, noise levels within quiet rural nighttime areas would be approximately day-night average sound level (DNL) 25 A-weighted sound level measured in decibels (dBA) and the daytime levels in urban areas would be about DNL 80 dBA. As mentioned in Subchapter 1.1, IRs 264, 275, 280, 281, and 282 have been inactive since 2006. Thus, aircraft operations on the five MTRs do not contribute to the noise environment.

3.3 LAND USE

3.3.1 Definition of Resource

Land use, recreation, and visual resources consist of a variety of features of the man-made and natural environment. Land use refers to the use of land resources in man-made and natural forms. Man-made forms include the use of land resources converted from a natural state to economically productive and

functional uses (*e.g.*, residential, commercial, industrial, public, and recreational uses). Land use also includes passive use of open space areas left in a natural state (*e.g.*, parks and forests).

Recreational uses include a variety of active and passive pursuits for personal enjoyment. Active recreational uses include hunting, skiing, hiking, biking, backpacking, horseback riding, and fishing, while passive activities consist of bird and wildlife watching, photography, camping, and picnicking.

Visual and aesthetic resources include a composite of natural and man-made or cultural features of the landscape. Landscape character includes particular attributes, qualities, and traits of a landscape that give it an image and makes it identifiable as unique or special. Visual character resources and features include view points and views, landform types, vegetation types, hydrologic features, open spaces and undeveloped land, and developed land uses.

3.3.2 Baseline Conditions

The land use areas potentially affected by operations on IRs 264, 275, 280, 281, and 282 consist of those lands directly below and adjacent to the lateral boundaries defining the MTR corridors that traverse ten counties in Nevada. Approximately 83 percent of the land area of Nevada is under Federal ownership, the largest concentration of Federal public land in any one state. Federal land ownership within the counties traversed by the five IRs ranges from 73 percent in Elko County to 98 percent in Esmeralda County. The majority of the public lands are owned/managed by the U.S. Bureau of Land Management (BLM); DoD; U.S. Department of Energy (DoE); U.S. Fish and Wildlife Service (USFWS); and the U.S. Forest Service (USFS). The greater portions of the Federal lands are under BLM and DoD ownership/management. Thus, the areas potentially affected by the low level routes include primarily broad areas of public lands (*e.g.*, national forests, recreational areas, and wildlife refuge areas) and rural open spaces, with only a few scattered small population centers. Consequently, the majority of the land directly below and adjacent to the five MTR corridors is undeveloped.

Private land ownership outside of unincorporated and incorporated population centers within the ten-county area is generally associated with agriculture. Land Use Plans for the counties within the study area include policies, goals, and objectives for land management. These land use plans include provisions relating to public lands and how best to work collaboratively with Federal and State land management agencies by selectively increasing the amount of private land and locally managed land for furthering opportunities for economic development.

Existing land uses that underlie IRs 264, 275, 280, 281, and 282 include cattle grazing, agriculture (crop raising), mining, recreation, open spaces, transportation corridors, and a few population centers. There are no populated centers within the IR 280 and IR 282 corridors. Land uses associated with populated centers underlying IRs 264, 275, and 281 include residential, commercial, industrial, and public/institutional uses. All of the public/institutional uses are in Hawthorne, which lies entirely within the IR 275 corridor. Public/institutional uses in Hawthorne include three elementary schools, one high school, a hospital and ten or more churches. The largest concentration of residential development within the IR corridors occurs in Hawthorne and Fallon (IR 281). Table 3-6 lists the populated centers within each of the five MTRs. The population data provided in Table 3-5 for the larger communities were obtained from the 2010 U.S. Census. Population data for the small, unincorporated communities of Luning and Manhattan were obtained from 2005 U.S. Census estimates.

Table 3-6. Communities/Population Underlying IRs 264, 675, 280, 281, and 282

Military Training Route				
IR 264	**IR 275**	**IR 280**	**IR 281**	**IR 282**
Luning/≤100	Manhattan/125 Luning/≤100 Hawthorne/3,269	None	Fallon/8,606	None

Population data source: USDOC, 2010

Individual segments of the IRs vary from four to ten miles in width, with each IR crossing over numerous U.S., State, and county highways. The IR 264 corridor begins (segment A-B) near the unincorporated community of Luning at U.S. Hwy 95 in Mineral County, and traverses portions of Mineral, Nye, Eureka, Lander, and Churchill counties. The primary land use within this MTR is cattle grazing under allotments

issued by the BLM. There are several single-family residences associated with the ranching operations. There is an intensively developed, irrigated agricultural area with a few associated single-family residences east of State Hwy 278 north of the community of Eureka in Eureka County. The IR 264 corridor includes the Naval Strike and Warfare Center (NSAWC) Fallon, NV Electronic Warfare Range north of U.S. Hwy 50 (Austin Highway) in Churchill County. The NSAW Fallon Weapons Range Bravo-17A and B, including an airfield, is within the same area immediately south of U.S. Hwy 50 and east of State Hwy 31. In addition, there are portions of other military training areas within this corridor. A large mining operation occurs within the corridor south of the intersection of State Hwys 89 and 361 in Mineral County. Segments B-C, C-D, and D-E of IR 264 cross a portion of the Humboldt-Toiyabe National Forest in Nye County.

The IR 275 corridor begins (segment B-C) in Pershing County and crosses over Interstate 80 northward into Humboldt and Elko counties, then proceeds southward through Eureka, Nye, and Mineral counties. Cattle ranching and mining operations are the dominant uses within this corridor. There are several large mines that operate in Elko, Eureka, Nye, and Mineral counties. Several areas of intensively developed irrigated agricultural areas, with a few associated single-family residences, are within this corridor in Pershing and Eureka counties. Segments I-L transect a portion of the Humboldt-Toiyabe National Forest in Nye County, while segment I-J crosses over the Table Mountain Wilderness Area. The small, historic former community of Belmont, located on State Hwy 82, is within segment J-L of IR 275. This "ghost town" is on the National Register of Historic Places (NRHP) and there are plans to renovate and restore the town. The small, historic community of Manhattan is also located within this corridor, approximately fifteen miles west of Belmont. The Manhattan school is on the NRHP. The small, unincorporated community of Luning is within the L-M segment to the west. The entire City of Hawthorne and the associated Hawthorne Army Depot at U.S. Hwy 95 and State Hwy 359 further to the west are within the corridor. A portion of the Inyo National Forest is in the O-P segment, while the Marietta Wild Burro Range is in the U-R segment of IR 275.

Segments A-E of IRs 280 and 282 follow the same alignment through Elko, White Pine, and Eureka counties, and a portion of Nye County. The beginning (segment A-B) is just south of I-80, approximately ten miles west of Elko. The South Fork State Park Recreational Area is approximately five miles to the east of these two IRs. The primary land uses within this corridor are grazing and irrigated agriculture, with a few single-family residences associated with the latter in segment C-D in Eureka County. Segment D-E in Nye County traverses the Humboldt-Toiyabe National Forest and passes over the historic community of Belmont. The remainder of the IR 282 corridor (segments E-H) extends southward and passes over a mountainous area with some grazing, and terminates south of U.S. Hwy 6, approximately eight miles east of Tonopah. A portion of the Tonopah Army Air Force Base and Tonopah Test Range occur within segment G-H of IR 282.

The IR 280 corridor continues west from the point where the IR 282 corridor turns southward. Segment G-H of IR 280 in Nye County has an irrigated agricultural area with a number of associated single-family residences. A military-related development is within the corridor on Finger Rock Road in segment H-I. A number of Nevada State historical sites occur within segments I-J and J-K in Mineral County. The NSAW Fallon Weapons Range Bravo-19, which is east of U.S. Hwy 95, is within segment K-L, the western terminus of this corridor.

The IR 281 corridor begins south of I-80, just east of the Ruby Mountain State Recreation Area. Grazing and irrigated agriculture are the primary land uses within segment A-B. Significant recreational land uses within segments B-C and C-D include Franklin Lake and Franklin Lake Wildlife Management Area (WMA), Ruby Lake National Wildlife Refuge (NWR), Humboldt-Toiyabe National Forest, and a portion of the Ruby Crest Trailhead. IR 281 continues westward, passing south of the small, unincorporated community of Jiggs at State Hwy 228. Primary land uses within this corridor in segments E-H include grazing with some mining activity. The Dixie Valley Geothermal power plant is located within Segment H-I, with the NSAWC Fallon Electronic Warfare Range within segment I-J at U.S. Hwy 50. Segment R-S contains a variety of land uses, including grazing, irrigated agriculture with associated single-family residences, mining, and designated natural areas. The natural areas include Humboldt Lake and Humboldt State WMA. This corridor passes on the northern edge of the Fallon NWR. The final segment of IR 281, segment S-T, extends southward and crosses U.S. Hwy 50 at Fallon. Extensive urban residential development and intensively developed irrigated agriculture is within this corridor in Fallon.

Sensitive land uses include areas of environmental importance and concern, or areas reserved for specific public activities (*e.g.*, recreation, camping). There are several national forests, wildlife refuges, and

wilderness areas that underlie the IRs 264, 275, 280, 281, and 282 corridors. Table 3-7 lists the primary recreational activities beneath the five IRs.

Table 3-7. Recreational Lands Underlying IRs 264, 275, 280, 281, and 282

MTR	Recreational Area/Location	Major Activities
IR 264	Humboldt-Toiyabe National Forest	Biking, camping, fishing, hiking, historic/cultural sites, horseback riding, hunting, wildlife viewing, winter sports.
	Table Mountain Wilderness Area	Hiking, wildlife viewing.
IR 275	Humboldt-Toiyabe National Forest	(See IR 264)
	Table Mountain Wilderness Area	Camping, hiking, fishing, hunting, horseback riding, wildlife viewing
	Inyo National Forest	Camping, picnicking, hiking, backpacking, skiing, snowmobiling
	Marietta Wild Burro Range	Wildlife viewing, historic/cultural sites
IR 280	Humboldt -Toiyabe National Forest	(See IR 264)
IR 281	Franklin Lake	Fishing, camping
	Franklin Lake Wildlife Management Area	Hunting, wildlife viewing
	Humboldt-Toiyabe National Forest	(See IR 264)
	Humboldt Lake	Fishing, camping
	Humboldt State Wildlife Management Area	Hiking, hunting, wildlife viewing
	Ruby Lake National Wildlife Refuge	Fishing, hunting, waterfowl viewing, historic/cultural sites, museum/visitor center
	Ruby Crest Trailhead	Hiking, pack trains
IR 282	Humboldt National Forest	(See IR 264)

3.4 AIR QUALITY

3.4.1 Definition of Resource

Air quality in any given region is measured by the concentration of various pollutants in the atmosphere, typically expressed in units of parts per million (ppm) or in units of micrograms per cubic meter ($\mu g/m^3$). Air quality is not only determined by the types and quantities of atmospheric pollutants, but also by surface topography, size of the air basin, and by prevailing meteorological conditions.

3.4.1.1 Air Pollutants and Regulations

The Clean Air Act (CAA), as amended in 1977 and 1990, provides the basis for regulating air pollution to the atmosphere. Different provisions of the CAA apply depending on where the source is located, which pollutants are being emitted, and in what amounts. The CAA required the USEPA to establish ambient ceilings for certain criteria pollutants. These criteria pollutants are usually referred to as the pollutants for which the USEPA has established National Ambient Air Quality Standards (NAAQS). The ceilings were based on the latest scientific information regarding the effects a pollutant may have on public health or welfare. Subsequently, the USEPA promulgated regulations that set NAAQS. Two classes of standards were established: primary and secondary. Primary standards define levels of air quality necessary, with an adequate margin of safety, to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards define levels of air quality necessary to protect public welfare (e.g., decreased visibility, damage to animals, crops, vegetation, wildlife, and buildings) from any known or anticipated adverse effects of a pollutant.

Air quality standards are currently in place for seven pollutants or "criteria" pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur oxides (SO_x, measured as sulfur dioxide [SO_2]), lead (Pb), particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (PM_{10}), and particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers ($PM_{2.5}$). There are many suspended particles in the atmosphere with aerodynamic diameters larger than 10 micrometers. The collective of all particle sizes is commonly referred to as total suspended particulates (TSP). TSP is defined as particulate matter as measured by the methods outlined in 40 CFR Part 50, Appendix B. The

NAAQS are the cornerstone of the CAA. Although not directly enforceable, they are the benchmark for the establishment of emission limitations by the states for the pollutants USEPA determines may endanger public health or welfare.

Ozone (ground-level ozone), which is a major component of "smog," is a secondary pollutant formed in the atmosphere by photochemical reactions involving previously emitted pollutants or precursors. Ozone precursors are mainly nitrogen oxides (NO_x) and volatile organic compounds (VOC). NO_x is the designation given to the group of all oxygenated nitrogen species, including nitric oxide (NO), NO_2, nitrous oxide (N_2O), and others. However, only NO, NO_2, and N_2O are found in appreciable quantities in the atmosphere. VOCs are organic compounds (containing at least carbon and hydrogen) that participate in photochemical reactions and include carbonaceous compounds except metallic carbonates, metallic carbides, ammonium carbonate, carbon dioxide (CO_2), and carbonic acid. Some VOCs are considered non-reactive under atmospheric conditions and include methane, ethane, and several other organic compounds.

As noted above, ozone is a secondary pollutant and is not directly emitted from common emissions sources. Therefore, to control ozone in the atmosphere, the effort is made to control NO_x and VOC emissions. For this reason, NO_x and VOCs emissions are calculated and reported in emission inventories.

The CAA does not make the NAAQS directly enforceable. However, the Act does require each state to promulgate a State Implementation Plan (SIP) that provides for "implementation, maintenance, and enforcement" of the NAAQS in each Air Quality Control Region (AQCR) in the state. The CAA also allows states to adopt air quality standards more stringent than the federal standards. Table 3-8 lists the national and Nevada ambient air quality standards (Nevada Administrative Code 445B.22097).

Based on the requirements outlined in EPA's general conformity rule published in 58 Federal Register 63214 (November 30, 1993) and codified at 40 CFR Part 93, Subpart B (for federal agencies), a conformity analysis is required to analyze whether the applicable criteria air pollutant emissions associated with the project equal or exceed the threshold emission limits that trigger the need to conduct a formal conformity determination. The intent of the conformity rule is to encourage long range planning by evaluating the air quality impacts from federal actions before the projects are undertaken. This rule establishes an elaborate process for analyzing and determining whether a proposed project in a nonattainment area conforms to the SIP and federal standards.

3.4.2 Baseline Conditions

3.4.2.1 Regional Meteorology

The climate in the Great Basin region is semi-arid and is warm during the summer when the temperatures tend to be in the 90s (^{o}F) and very cold during winter when temperatures tend to be in the 30s (^{o}F). The warmest month of the year is July when the average is in the 90s (^{o}F) and the coldest month of the year is December when the average is in the 10s (^{o}F). Temperature variations between night and day tend to be relatively high due to low humidity. In general, average precipitation is highest in May ranging from 0.71 inches in Fallon (Churchill County) to 1.54 inches in Eureka (Eureka County). Wind speeds in the general area measured at 262 feet (80 meters) above ground range from 10 miles per hour (4.5 meters/sec) to 13.4 miles per hour (6 meters/second) (NREL, 2010).

Table 3-8. National and Nevada Ambient Air Quality Standards

Criteria Pollutant	Averaging Time	Primary NAAQS[a,b,c,e]	Secondary NAAQS[d,e]	Nevada Standards[e]
Carbon Monoxide	8-hour 1-hour	9 ppm (10 mg/m^3) 35 ppm (40 mg/m^3)	No standard No standard	9 ppm (10,500 μg/m^3) at < 5,000 ft above mean sea level 6 ppm (7000 μg/m^3) at ≥ 5,000 ft above mean sea level 35 ppm (40,500 μg/m^3)
Lead	Quarterly	1.5 μg/m^3	1.5 μg/m^3	1.5 μg/m^3
Nitrogen Oxides (measured as NO_2)	Annual	0.053 ppm (100 μg/m^3)	0.053 ppm (100 μg/m^3)	0.053 ppm (100 μg/ m^3)
Ozone	8-hour 1-hour	0.08 ppm (157 μg/ m^3) 0.12 ppm (235 μg/ m^3)	0.08 ppm (157 μg/ m^3) 0.12 ppm (235 μg/ m^3)	No Standard 0.12 ppm (235 μg/ m^3)
Ozone – Lake Tahoe Basin, #90	1-hour	No Standard	No Standard	0.10 ppm (195 μg/ m^3)
Particulate Matter (measured as PM_{10})	Annual 24-hour	50 μg/ m^3 150 μg/ m^3	50 μg/ m^3 150 μg/ m^3	50 μg/ m^3 150 μg/ m^3
Particulate Matter (measured as $PM_{2.5}$)	Annual 24-hour	15 μg/ m^3 66 μg/ m^3	15 μg/ m^3 66 μg/ m^3	No Standard No Standard
Sulfur Oxides (measured as SO_2)	Annual 24-hour 3-hour	0.03 ppm (80 μg/ m^3) 0.14 ppm (365 μg/ m^3) No standard	No standard No standard 0.50 ppm (1,300 μg/ m^3)	0.03 ppm (80 μg/ m^3) 0.14 ppm (365 μg/ m^3) 0.50 ppm (1,300 μg/ m^3)

[a] National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not be exceeded more than once a year. The ozone standard is attained when the highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24 hour standard is attained when 99 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. For PM2.5, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

[b] National Primary Standards: The levels of air quality necessary to protect the public health with an adequate margin of safety. Each state must attain the primary standards no later than three years after the state implementation plan is approved by the USEPA.

[c] New federal 8-hour ozone and fine particulate matter standards were promulgated by USEPA on July 18, 1997. The federal 1-hour ozone standard continues to apply in areas that violated the standard.

[d] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after the state implementation plan is approved by the USEPA.

[e] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon reference temperature of 25°C and a reference pressure of 760 mm of mercury. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of mercury (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

3.4.2.2 Regional Air Quality

The fundamental method by which the USEPA tracks compliance with the NAAQS is the designation of a particular region as "attainment" or "nonattainment". Based on the NAAQS, each state is divided into three types of areas for each of the criteria pollutants. The areas are:

- Those areas that are in compliance with the NAAQS (attainment);
- Those areas that do not meet the ambient air quality standards (nonattainment); and,
- Those areas where a determination of attainment/nonattainment cannot be made due to a lack of monitoring data (unclassifiable – treated as attainment until proven otherwise).

Generally, areas in violation of one or more of the NAAQS are designated nonattainment and must comply with stringent restrictions until all of the standards are met. In the case of O_3, CO, and PM_{10}, USEPA divides nonattainment areas into different categories, depending on the severity of the problem in each

area. Each nonattainment category has a separate deadline for attainment and a different set of control requirements under the SIP.

The IRs are situated in the following ten counties in the state of Nevada: Churchill, Pershing, Lander, Humboldt, Eureka, Elko, White Pine, Mineral, Esmeralda and Nye. Air quality in these counties is considered generally good and none of these counties are designated as nonattainment for any of the criteria pollutants (USEPA, 2011a). For this reason, a General Air Conformity Analysis is not applicable.

3.4.2.3 Air Pollutant Emissions

An air emissions inventory is an estimate of total mass emissions of pollutants generated from a source or sources over a period of time, typically a year. Accurate air emissions inventories are needed for estimating the relationship between emissions sources and air quality. All emission sources may be categorized as either mobile or stationary emission sources. Stationary emission sources may include boilers, generators, fueling operations, industrial processes, and burning activities, among others. Mobile emission sources typically include vehicle operations.

The calendar year (CY) 2002 air pollutant emissions inventory in tons per year (tpy) for the affected counties, which includes reported permitted stationary, mobile, and grandfathered air emission sources, is summarized in Table 3-9.

Table 3-9. Baseline Air Pollutant Emissions

Criteria Air Pollutant (CY 2002 by County)	CO (tpy)	VOC (tpy)	NOx (tpy)	SOx (tpy)	PM10 (tpy)	PM2.5 (tpy)
Churchill	16,461	3,365	1,595	254	5,749	1,226
Pershing	8,239	1,103	1,810	107	2,442	426
Lander	4,088	566	893	83	1,890	348
Humboldt	10,497	1,174	10,194	7,190	4,312	941
Eureka	3,371	510	1,396	372	1,801	381
Elko	29,757	3,104	5,795	501	6,572	1,151
White Pine	3,495	608	335	25	2,763	475
Mineral	1,823	1,189	151	21	1,797	475
Esmeralda	487	153	84	58	1,216	212
Nye	7,949	1,443	866	236	3,640	696
TOTAL	86,167	13,215	23,119	8,847	32,182	6,331

Note: VOC is not a criteria air pollutant. However, VOC is reported because, as an ozone precursor, it is a controlled pollutant.
Source: USEPA, 2011b (2002 emissions inventory data is the most current information available at this time).

3.5 BIOLOGICAL RESOURCES

3.5.1 Definition of Resource

Central Nevada has a vast assemblage of biological resources that include numerous ecosystems, habitats, and animal and plant species, as well as a varied topography. The primary stimuli for aircraft activity on biological systems is from noise and visual images. Birds and bird populations are usually the biotic environment most often considered in assessing the impact of military aircraft training flights on wildlife. Aircraft and birds, at times, occupy the same airspace or bird habitat depending on the aircraft flight profile and bird activity. Noise from aircraft may also disrupt important bird behavior such as nesting. Birds tend to concentrate in large numbers in wildlife refuges and other natural environments that provide food and shelter. Many birds move out from these areas of concentration to feed at other locations. The most massive movements occur during the spring and fall migrations. Other wildlife, such as ungulates, have also been noted to respond to noise from aircraft. A few reptiles and amphibians have also been studied for aircraft noise response. There are no known effects of low level aircraft overflight to vegetation communities or plant species.

3.5.2 Baseline Conditions

The MTRs described in the Proposed Action are located in central Nevada and primarily within the Central Basin and Range Ecoregion (Bryce *et al.,* 1999) as depicted on Figure 3-3. Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. Ecoregions are designated to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components.

The Central Basin and Range Ecoregion is composed of northerly trending fault-block ranges and intervening drier basins. Valleys, lower slopes, and alluvial fans are either shrub- and grass-covered, or shrub-covered. Higher-elevation mountain slopes support woodland, mountain brush, and scattered forests. The Central Basin and Range Ecoregion is internally drained by rivers flowing off the east slopes of the Sierra Nevada and by the Humboldt River, one of the longest internally drained river systems in North America. In western Nevada, Pleistocene Lake Lahontan inundated a large part of the ecoregion below approximately 4,400 feet in elevation. Today, evidence of Lake Lahontan exists as extensive, nearly flat playas covered by fine textured, alkaline or saline deposits. In general, the Central Basin Ecoregion is drier than the Sierra Nevada, cooler than the Mojave Basin and Range, and warmer and drier than the Northern Basin and Range. Soils grade upslope from Aridisols or Entisols to Mollisols. The land is primarily used for grazing, and a greater percentage is used for livestock grazing than in the Mojave Basin and Range Ecoregion. In addition, some irrigated cropland is found in valleys near mountain water sources. Within the Central Basin and Range Ecoregion, there are 25 other smaller ecoregions (Table 3-10) that make up this diverse area.

These ecoregions support a variety of birds, wildlife, and other biological forms. Some ecoregions provide habitats for seasonal migratory birds, others for larger mammals, some for birds and animals tied to desert shrubs, and some ecoregions are used for grazing and agriculture. These ecoregions also provide conditions for conservation programs such as National Wildlife Refuges, wilderness areas, and National Forests. Therefore, numerous ecological receptors may be potentially exposed to stressors (*i.e.,* noise and visual images) associated with aircraft overflights. Potential receptors include animals with habitats near or under the flight path or birds that migrate through the area. Also, birds that fly at the cruising altitude of the aircraft would have a high potential for exposure. Figure 3-3 depicts the ecoregions for the areas through which IRs 264, 275, 280, 281, and 282 traverse. Table 3-10 lists the names of the ecoregions and special features within the regions.

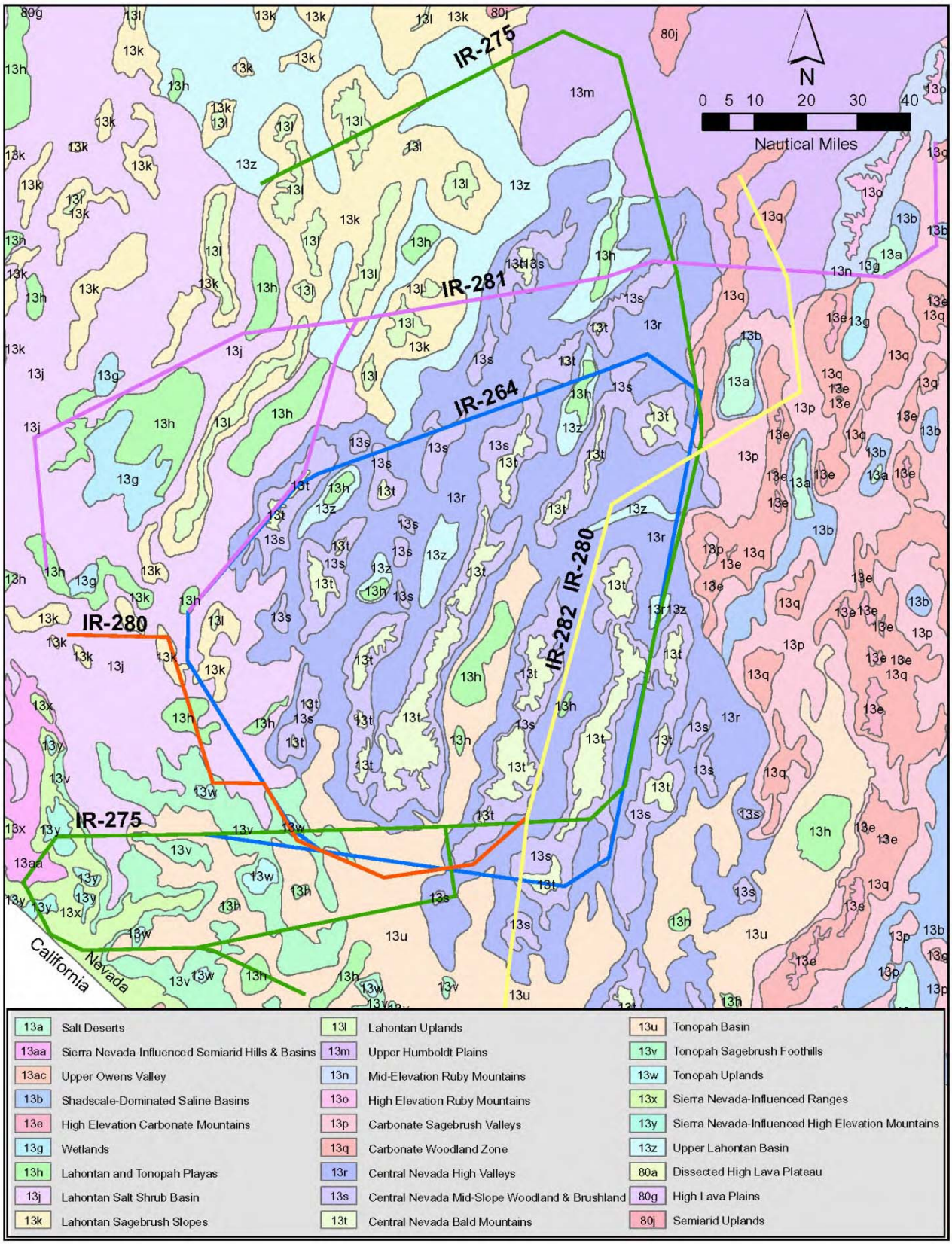

Figure 3-3. Ecoregions within the Central Basin and Range Ecoregion

Table 3-10. Ecoregions within the Central Basin and Range Ecoregion

Code	Description	Special Features
13a Salt Desert	This ecoregion is composed of nearly level playas, salt flats, mud flats, and saline lakes. These features are characteristic of those in the Bonneville Basin; they have a higher salt content than the Lahontan and Tonopah Playas. Water levels and salinity fluctuate from year to year; during dry periods salt encrustation and wind erosion occur. Vegetation is mostly absent although scattered salt-tolerant plants, such as pickleweed, iodinebush, black greasewood, and inland saltgrass occur. Soils are not arable.	There is very limited grazing potential. The salt deserts provide wildlife habitat, and serve some recreational, military, and industrial uses.
13b Shadscale-Dominated Saline Basins	This ecoregion is arid, internally drained, and gently sloping to nearly flat. These basins are in, or characteristic of, the Bonneville Basin; they are higher in elevation and colder in winter than the Lahontan Salt Shrub Basin to the west. Light-colored soils with high salt and alkali content occur and are dry for extended periods. The saltbush vegetation common to this ecoregion has a higher tolerance for extremes in temperature, aridity, and salinity than big sagebrush, which dominates Sagebrush Basin and Slopes ecoregion at somewhat higher elevations	Shrubland, rangeland, and wildlife habitat. Where cropland is present, streams are usually diverted for agricultural use. Cattle sometimes graze in shallow wetland habitats created from springs. Dune areas support highly diverse rodent and reptile communities. Streams contain endemic fishes such as the Diamond Valleyspeckled dace, Independence Valley tui chub, Newark Valley tui chub,White Riverspeckled dace, White River desert sucker, relict dace, and the federally-endangered Independence Valley speckled dace, White River spinedace, Morman White River springfish, and Clover Valley speckled dace. Ponds near Shoshone in Spring Valley support the federally-endangered Pahrump poolfish.
13e High Elevation Carbonite Mountains	This ecoregion includes a series of mountain ranges composed of limestone, dolomite, quartzite, and conglomerate in east central Nevada. These mountains are in the zone of summer rain, although much of the precipitation percolates through the porous rock to reemerge at lower elevations as springs. Still, these carbonate-dominated mountains support a wider variety of conifers, such as white fir, Douglas-fir, and Engelmann spruce, and a greater diversity of understory species than other ranges in Nevada at similar elevations. Bristlecone pines have their widest distribution on carbonate substrates above 9,500 feet elevation. Conditions do not favor alpine tundra; however, alpine plants are more limited than on the nearby granitic High Elevation Ruby Mountains.	Open forest, shrubland, grassland, summer rangeland, wildlife habitat, andrecreation. Limited numbers of Bonneville cutthroat trout inhabit streams in and near Great Basin National Park.

Table 3-10. Ecoregions within the Central Basin and Range Ecoregion (Cont'd)

Code	Description	Special Features
13g Wetlands	This ecoregion includes saline, brackish, or freshwater wetlands in flat to depressional terrain. Wetlands may dryup seasonally or be maintained by springs and groundwater infusions. Many wetlands have disappeared with farmland development, river channelization, and stream incision; others have been created as a result of reclamation projects and irrigation seepage. Bulrushes, Baltic rush, cattails, burreed, and reed grass are common marsh plants.	Marshland, wildlife habitat, rangeland, cropland, and recreation. Water, marsh, and shore birds are common. Many migratory birds, particularly waterfowl and shorebirds, depend on the wetlands and marshes of the Great Basin. Several state wildlife management areas and federal wildlife refuges occur. Marshes near Ruby Lake are critical trout and bass habitat and contain relict dace. Reclamation projects and irrigation seepage have created new wetlands. Wetlands in Lahontan Valley and near Humboldt Lake are at the terminus of rivers; they receive return flow from flood-irrigated fields which, in turn, degrades water quality.
13h Lahontan and Tonopah Playas	This nearly level and often barren ecoregion contains mud flats, alkali flats, and intermittent salinelakes, such as the Black Rock Desert, Carson Sink, and Sarcobatus Flat. Marshes, remnant lakes, and playas are all that remain of Pleistocene Lake Lahontan, which was once the size of Lake Erie. Playas occur at the lowest elevations in the Lahontan Basin and represent the terminus or "sink" of rivers flowing east off the Sierra Nevada. They fill with seasonal runoff from surrounding mountain ranges during winter, providing habitat for migratory birds. Black greasewood or four-winged saltbush may grow around the perimeter in the transition to the salt shrub community, where they often stabilize areas of low sand dunes. Windblown salt dust from exposed playas may affect upland soils and vegetation.	This ecoregion has very limited grazing potential. The Lahontan and Tonopah Playas are important as wildlife and migratory bird habitat and for some recreational and military uses.
13j Lahontan Salt Shrub Basin	This is an expansive dry plain that was once beneath Pleistocene Lake Lahontan. TheLahontan Basin, compared to the Bonneville Basin to the east in the Shadscale-Dominated Salne Basin ecoregion, is lower in elevation and warmer in winter. Although there is a direct connection to the south through low elevation valleys to the Mojave Basin and Range, winters are cold enough in this ecoregion to discourage the northward dispersal of many Mojavean species into the Lahontan Basin. In addition to shadscale, other salt-tolerant shrubs, such as Shockley desert thorn and Bailey greasewood, cover the lower basin slopes, and distinguish the Lahontan Salt Shrub Basin and Tonopah Basin from other Nevada salt shrub ecoregions. Sand dunes may occur where windblown sand accumulates against a barrier.	Shrubland, rangeland, wildlife habitat, irrigated alfalfa and small grain farming,urban areas, irrigated pastureland, and military reservations. Dune complexes support a specialized plant community and diverse small mammal populations. The Carson and Truckee rivers, originating in the Sierra Nevada, provide water for irrigated farming. Riparian corridors along these rivers support the only trees found in the ecoregion. Stream diversions for agriculture andevaporation have elevated dissolved salt concentrations in Walker Lake, endangering its fresh water fishery. The federally-threatened Lahontan cutthroat trout once thrivedin the Lahontan Basin but most populations have now been extirpated. The federally threatened desert dace is found in spring-fed areas near Soldier Meadows in western Humboldt County.

Table 3-10. Ecoregions within the Central Basin and Range Ecoregion (Cont'd)

Code	Description	Special Features
13k Lahontan Sagebrush Slopes	Hills, alluvial fans, and low mountains within the Lahontan Basin comprise this ecoregion. These areas are rock controlled and their soils lack the fine lacustrine sediments that are found in the lower parts of theLahontan Basin. Because moisture increases and alkalinity decreases with elevation, the shrub community grades from the greasewood–shadscale community on the basin floor to a shrub community dominated by Wyoming big sagebrush and the endemic Lahontan sagebrush at higher elevations. Understory grasses increase in productivity toward the northeast, outside the rain shadowinfluence of the Sierra Nevada. The low hills and mountains within the Lahontan Basin experience frequent summer lightning and fire. Introduced cheatgrass tends to replace the shrub community and provides fuel for recurrent fires.	Shrub- and grass-covered wildlife habitat,Limited grazing potential; livestock grazing has reduced native grasses and biological soil crusts. Stream flows are generally diverted for agriculture before reaching mainstem rivers. Water quality is moderately- to heavily-degraded by human activities. Includes both cold water fisheries and warm water fisheries.
13l Lahontan Uplands	This ecoregion is restricted to the highest elevations of the mountain ranges within the Lahontan Salt Shrub Basin. Slopes vary in elevation from 6,400 to 8,800 feet in elevation and are covered by sagebrush, grasses, and scatteredUtah juniper. Pinyon grows with juniper on the Stillwater Range and on Fairview Peak in the southeast portion of the Lahontan Basin, but it is otherwise absent from this ecoregion. Low sagebrush and black sagebrush grow to the mountaintops above the woodland zone. Cool season grasses, including bluebunch wheatgrass, dominate the understory in the north, but are replaced by warm season grasses, such as Indian ricegrass, in the south.	Woodland, shrubland, and grassland, rangeland, and wildlife habitat. Streams are used by fish for spawning, rearing, and/or migration. Includes streams that have been state-designated for protection as critical or high priority fishery habitat.
13m Upper Humbolt Plains	This ecoregion is an area of rolling plains punctuated by occasional buttes and low mountains. It is mostly underlain by volcanic ash, rhyolite, and tuffaceous rocks. Low sagebrush is common in extensive areas of shallow, stony soil, as are cool season grasses, such as bluebunch wheatgrass, Idaho fescue, and Sandberg bluegrass. The Upper Humboldt Plains ecoregion is wetter and cooler than other Nevada ecoregions in its elevation range. This ecoregion is transitional to the Northern Basin and Range that spans the Nevada–Oregon border. However, as in the warmer Lahontan Basin to the west, lightning fires are common and a post-fire monoculture of cheatgrass tends to replace the native grasses and shrubs.	Shrub- and grass-covered. Mostly rangeland; some cropland especially near the Humboldt River. Grazing has affected sagebrush communities by reducing nativegrasses and biological soil crusts. The Upper Humboldt River has been moderately-to heavily-degraded by human activities. Tributary water quality has been lightly- to moderately-degraded by human activities. The Humboldt River contains largemouth and smallmouth black bass, channel catfish, black bullhead, and carp. Some higher elevation tributaries contain the Columbia spotted frog and the federally-endangered Lahontan cutthroat trout. Other tributaries to the Humboldt River support a fishery containing rainbow trout, brook trout, brown trout, and mountain whitefish.

Table 3-10. Ecoregions within the Central Basin and Range Ecoregion (Cont'd)

Code	Description	Special Features
13n Mid-Elevation Ruby Mountains	This ecoregion covers the lower slopes of the Ruby Mountains in northeastern Nevada. Although its elevation range, 6,500 to 8,500 feet, is typical of the pinyon–juniper woodland zone, sagebrush and mesicmountain shrub species are dominant here. Pinyon and juniper are uncommon on the western slopes of the Ruby Mountains. At higher elevations within this ecoregion, curlleaf mountain mahogany and aspen groves form the transition to the High Elevation Ruby Mountains.	Woodland, shrubland, wildlife habitat, recreation, and rangeland. Water quality is only lightly infl uenced by human activities. Many streams have been state-designated for protection as critical or high priority fishery habitat. The federally-threatened Lahontan cutthroat trout occurs in some streams.
13o High Elevation Ruby Mountains	Thisecoregion represents those portions of the Ruby Mountains that are dominated by granitic and metamorphic rock types, and that were heavily glaciated during the Pleistocene. Extensive periglacial phenomena, such as solifluction fields, are still active at higher elevations. Since the end of Pleistocene glaciation, closed canopy conifer forests have not recolonized the Ruby Mountains, even though the Ruby Mountains receive more precipitation than the High Elevation Carbonate Mountains to the east. The High Elevation Ruby Mountains ecoregion is the wettest ecoregion inNevada outside of the High Elevation Sierra Nevada (5b). Some of the most extensive aspen groves in Nevada occur here. Subalpine meadows and scattered white fir, limber pine, and whitebark pine mingle upwards to the jagged, exposed peaks at elevations over 11,000 feet. Snowmelt moisture trapped by the impervious substrate supports extensive alpine meadows and alpine lakes are common.	Open forests, woodland, shrubland, alpine meadows, subalpine meadows, rangeland,wildlife habitat, and recreation. Wildlife includes mule deer, bighorn sheep, and mountain goats.Includes designated wilderness. Water is only lightly influenced by human activities. High mountain lakes contain brook trout, Lahontan cutthroat trout, and lake trout.
13p Carbonate Sagebrush Valleys	The basins and semi-arid uplands of this ecoregion surround the carbonate ranges of eastern Nevada. Like the ranges, the Carbonate Sagebrush Valleys are also largely underlain by limestoneor dolomite. The combination of summer moisture and a limestone or dolomite substrate affects regional vegetation, particularly interms of species dominance and elevational distribution. The substrate favors shrubs, such as black sagebrush and winterfat, that can tolerate shallow soil. Even in alluvial soils, root growth may be limited by a hard pan or caliche layer formed by carbonatesleaching through the soil and accumulating. As a result, shrub cover is sparse in contrast to other sagebrush-covered ecoregions in Nevada. The grass understory grades from a dominance of cool season grasses, such asbluebunch wheatgrass, in the north, to warm season grasses, such as blue grama (an indicator of summer rainfall) in the south. The grass understory grades from a dominance of cool season grasses, such asbluebunch wheatgrass, in the north, to warm season grasses, such as blue grama (an indicator of summer rainfall) in the south.	Shrubland. Mostly rangeland and wildlife habitat; some irrigated pastureland, irrigated alfalfa, and small grain farming. Livestock grazing has reduced nativegrasses and biological soil crusts. Stream diversions for agriculture are common. Stream quality has been heavily- to moderately-degraded by human activities. Water from springs in the upper portions of White River Valley provide downstreamhabitat to endemic fishes such as the Preston White River springfish, White River speckled dace, White River desert sucker, and the federally endangered White River spinedace. Echo Canyon Reservoir east of Pioche contains the endemic Meadow Valley Wash speckled dace and Meadow Valley desert sucker fish. The federally threatened and endemic Big Spring spinedace is found near Panaca.

Table 3-10. Ecoregions within the Central Basin and Range Ecoregion (Cont'd)

Code	Description	Special Features
13q Carbonate Woodland Zone	The pinyon–juniper woodland canopy overtops and spans the existing sagebrush andmountain brush communities. The pinyon–juniper woodland has a broader elevational range in the carbonate areas ofeastern Nevada than elsewhere in the Central Basin and Range Ecoregion, even extending onto the floors of the higher basins, partially because of greater summer precipitation. Large areas of pinyon–juniper woodland have been cleared to increase forage for cattle. The woodland understory is diverse due to the influence of carbonate substrates and summer rainfall. There are more springs and live streams in this ecoregion than in western non-carbonate woodlands (e.g. Central Nevada Mid-Slope Woodland and Brushland) because the carbonatesubstrate is soluble and porous, allowing rapid infiltration.	Woodland, shrubland, rangeland, wildlife habitat, and recreation. Woodlands were cleared to increase livestock forage and were also widely cleared for charcoal production between 1870 and 1900. Woodland has since recovered and is expanding into lower elevation sagebrush areas. Water quality has been lightly- to moderately-degraded by human activities. Some streams have been state-designated for protection as critical or high priority fishery habitat.
13r Central Nevada High Valleys	This ecoregion contains sagebrush-covered rolling valleys that are generally over 5,000 feet in elevation. Alluvial fans spilling from surrounding mountain ranges fill the valleys, often leaving little intervening flat ground. Wyoming big sagebrush and associated grasses are common on the flatter areas, and black sagebrush dominates on the volcanic hills and alluvial fans.	This ecoregion tends to have alower species diversity than many other sagebrush-dominated ecoregions because of its aridity and its isolation from more species-rich areas. Saline playas may occur on available flats. Less shadscale and fewer associated shrubs surround these playas than in otherlower, more arid ecoregions to the west, including the Lahontan Salt Shrub Basin and Tonopah Basin. Valleys with permanent water support endemic fish species, such as the Monitor Valley speckled dace.
13s Central Nevada Mid-Slope Woodland and Brushland	This ecoregion at 6,500 to 8,000 feet elevation is analogous in altitudinal range to other woodland areas in Nevada. However, continuous woodland is not as prevalent on the mountains of central Nevada as in other woodland ecoregions. Pinyon–juniper grows only sparsely throughthe shrub layer due to the combined effects of past fire, logging, and local climate factors, including lack of summer rain and thepattern of winter cold air inversions. Areas of black and Wyoming big sagebrush grade upward into mountain big sagebrush and curlleafmountain-mahogany, which straddles the transition between this mid-elevation brushland and the mountain brush zone of the higher Central Nevada Bald Mountains. Where extensive woodlands exist, understory diversity tends to be very low, especially inclosed canopy areas.	Pinyon and juniper were widely cleared for charcoal production between 1870 and 1900. Woodland has recovered, expanding into lower elevation sagebrush areas. Many stream diversions for agriculture occur. Extensive historic gold and silver mines. Water quality is lightly- to heavily influenced by human activities. Water temperatures vary and a variety of warm water and cold water fi sheries occur. Resident populations of cold water, threatened and endangered fish including Lahontan cutthroat trout are associated with the Reese River drainage. Available riparian habitat may contain the Columbia spotted frog.

Table 3-10. Ecoregions within the Central Basin and Range Ecoregion (Cont'd)

Code	Description	Special Features
13t Central Nevada Bald Mountains	The Central Nevada Bald Mountains are dry and mostly treeless. Although they rise only a hundred miles east of theSierra Nevada, they lack Sierra Nevada species because of the dry conditions. These barren-looking mountains are covered instead by dense mountain brush that is dominated by mountain big sagebrush, western serviceberry, snowberry, and low sagebrush. Scattered groves of curlleaf mountain-mahogany and aspen in moister microsites grow above the shrub layer. A few scattered limber or bristlecone pines grow on ranges that exceed 10,000 feet. TheToiyabe Range (west of Big Smoky Valley) is high enough to have an alpine zone, but it lacks a suitable substrate to retain snowmelt moisture.	Brushland, shrubland, summer rangeland, wildlife habitat, recreation, and mining. The isolation of "sky islands" has led to the development of many rare and endemic plant species. Because of fire, aridity, and dense shrub cover, trees have not reestablished after early settlement, mining, and logging. Stream discharge and water quality are typically only lightly influenced by human activities. Water temperatures vary and a wide range of warm water and cold water fi sheries occur. Populations of the federally-threatened Lahontan cutthroat trout are associated with the Reese River and Edwards Creek drainages.
13u Tonopah Basin	This ecoregion lies in the transition between the Great Basin and the more southerly Mojave Desert. The Tonopah Basin shows varying degrees of Great Basin and Mojave Desert characteristics. The west side of the Tonopah Basin is a continuation of the Lahontan Basin while the lower and hotter Pahranagat Valley on the east side is more like the Mojave Desert. Similar to basins farther north, shadscale and associated arid land shrubs cover broad rolling valleys, hills, and alluvial fans. However, unlike the Lahontan Salt Shrub Basin and Upper Lahontan Basin, the shrubs often co-dominate in highly diverse mosaics. The shrub understory includes warm season grasses, such as Indian rice grass and galleta grass.	Shrubland, rangeland, wildlife habitat, and some irrigated cropland growing alfalfa, small grains, potatoes, or sugar beets. Pahranagat Valley has many springs that are used for agriculture, domestic purposes, and wildlife and support the federally endangered White River springfish, Hiko White River springfish, and Pahranagat roundtail chub. Springs support endemic fish including the Railroad Valley tui chub and the federally-threatened Railroad Valley springfish.
13v Tonopah Sagebrush Foothills	This ecoregion includes the low mountains and hills rising from the floor of the flatterTonopah Basin. The substrate is rocky and lacks the fine sediments found at lower elevations in the Tonopah Basin ecoregion. Great Basin species are common in this ecoregion as they are further north in the Lahontan Sagebrush Slopes. However, because this coregion is in the rain shadow of the Sierra Nevada and is adjacent to the Mojave Desert, it is more arid than the Lahontan Sagebrush Slopes ecoregion. As a result, black sagebrush is more prevalent in the shrub overstory of, and the more mesic understory species that are found farther north and east are largely absent. Mojave desert species, such as blackbrush, Joshua tree, and cholla cactus, become more common in the east and south, where summer moisture is more prevalent. Streams are ephemeral and flow during and immediately after storms. Storm events can be of sufficient magnitude to move large quantities of sediment instreambeds.	Shrubland, rangeland, wildlife habitat, and military reservations. Grazing has affected sagebrush communities by reducing native grasses and biological soil crusts. Rangeland has a low carrying capacity for cattle.

Table 3-10. Ecoregions within the Central Basin and Range Ecoregion (Cont'd)

Code	Description	Special Features
13w Tonopah Uplands	This ecoregion includes woodland- or shrub-covered hills and mountains ranging from 6,000 to 9,500feet in elevation. As elsewhere in the Tonopah region, Great Basin and Mojave Desert elements blend together especially toward the south and east, where some mountain brush and interior chaparral components, including Gambel oak, become more common. Pinyon–juniper woodland is extensive between 6,000 and 8,000 feet elevation. The highest peaks support a few white fir, limber pine, or bristlecone pine.	Woodland, shrubland, rangeland, wildlife habitat, and military reservations.
13x Sierra Nevada-influenced Ranges	These are wooded Great Basin mountains that have climatic and biotic affinities to the Sierra Nevada. Overall, this ecoregion receives greater precipitation than the mountain ranges of Central Nevada. However, in this ecoregion, precipitation amounts vary from range to range in relation to the local strength of the Sierra Nevada rain shadow. Because of minimal summer rainfall, this ecoregion contains pinyon–juniperwoodland, but lacks oak and Ceanothus species. The White, Sweetwater, Pine Nut, Wassuk, and Virginia ranges support varyingamounts of Sierra Nevada flora, including small stands of ponderosa, lodgepole, Jeffrey, and western white pine. Scattered ephemeral pools perched over areas of flat, impermeable volcanic bedrock are similar to those in the High Lava Plains and support unique assemblages of flora and fauna.	Woodland, brushland, rangeland, wildlife habitat, and recreation. High ranges near the Sierra Nevada are more likely to have perennial streams. Bighorn sheep, deer, and black bear inhabit these mountains. Includes streams that have been state-designated for protection as priority or critical cold water fi shery habitat. Stream diversions for agriculture occur.
13y Sierra Nevada_Influenced High Elevation Mountains	These mountains occupy the elevational zone above the woodland-covered Sierra Nevada-Influenced Ranges, and are affected in varying degrees by Sierra Nevada climate. Elevations range from 9,000 to nearly 14,000 feet. The ecoregion is generally covered by shrubs (e.g. mountain big sagebrush, low sagebrush, and mountain-mahogany), small aspen groves (on moist sites), scattered stands of high elevation conifers, and Sierra Nevada subalpineand alpine forbs. Moisture amounts captured by the highest ranges in this ecoregion result in substantial perennial stream flow in some areas.	Brushland, shrubland, open evergreen forest, deciduous trees, rangeland, wildlife habitat, and in some areas, recreation. mines.
13z Upper Lahontan Basin	This ecoregion lies outside of the rain shadow cast by the Sierra Nevada and records somewhat higher rainfall and cooler temperatures than other portions of the Lahontan Basin. Although its shadscale–greasewood plant community is similar to that in the Lahontan Salt Shrub Basin, some species differ due to climate gradations. For example, Bailey greasewood is less common and Thurber needlegrass is more common in the Upper Lahontan Basin than in the Lahontan Salt Shrub Basin. This ecoregion also has a shorter growing season than the rest of the Lahontan Basin.	This ecoregion also has a shorter growing season than the rest of the Lahontan Basin. Shrubland, rangeland, wildlife habitat, recreation, home sites, and irrigated pastureland and cropland. Stream diversions for agriculture are common. Livestock grazing has reduced native grasses and biological soil crusts. Some streams have been state-designated for protection as priority or critical cold water fishery habitat. Higher elevation streams associated with the Quinn River drainage support populations of the federally threatened Lahontan cutthroat trout. Hot springs influence water quality in streams.

Table 3-10. Ecoregions within the Central Basin and Range Ecoregion (Cont'd)

Code	Description	Special Features
80a Dissected High Lava Plateau	This ecoregion is a broad to gently rolling basalt plateau cut by deep, sheer-walled canyonsand covered with vast expanses of sagebrush. Ecoregion 80a differs from other sagebrush-dominated ecoregions in Nevada,such as Ecoregions 13c, 13p, 13k, and 13v, in having higher precipitation and colder winters. Cool season grasses, such asbluebunch wheatgrass and Idaho fescue, are associated with the sagebrush. Understory species are denser and biological soil cruststend to be more extensive and in better condition than in other ecoregions at similar elevations farther south in Nevada. Ecoregion 80a drains externally to the Snake River, unlike the similar High Lava Plains (80g) that are internally drained.	Shrub- and grass-covered. Primarily rangeland and wildlife habitat. Some irrigated pastureland and alfalfa, barley, and oat farming. At lower elevations, many stream diversions for agriculture. In general, water quality is lightly to moderately influenced by human activities. Concentrations of total dissolved solids and total suspended solids are low. Contains streams that have been state-designated for protection as critical or high priority fi shery habitat. The South Fork Owyhee River has a warm water fishery. Other streams can support cold water fisheries. Yellowstone cutthroat trout occur in the Goose Creek drainage.
80g High Lava Plains	The High Lava Plains of Nevada are part of a vast sagebrush steppe that extends northward to the Blue Mountains ofOregon. Ecoregion 80g is similar to the Dissected High Lava Plateau (80a) in its physiography, climate, and vegetation,but, unlike Ecoregion 80a, it is internally drained. As a result, the fish assemblage of Ecoregion 80g lacks anThe High Lava Plains of Nevada are part of a vast sagebrush steppe that extends northward to the Blue Mountains of Oregon. Ecoregion 80g is similar to the Dissected High Lava Plateau (80a) in its physiography, climate, and vegetation, but, unlike Ecoregion 80a, it is internally drained. As a result, the fish assemblage of Ecoregion 80g lacks ananadromous component. Bluebunch wheatgrass is generally associated with Wyoming big sagebrush, except where bunch grasses have been depleted by grazing and replaced by cheatgrass.	Scattered ephemeral pools on impermeable volcanic bedrock are characteristic of Ecoregion 80g in Nevada; they harbor unique flora and fauna as do those in the Sierra Nevada-Influenced Ranges(13x) of the Central Basin and Range (13). Shrub- and grass-covered. Mostly rangeland and wildlife habitat; some irrigated pastureland and alfalfa, barley, and oat cropand. Stream diversions for livestock are common. Scattered ephemeral pools on impermeable volcanic bedrock are characteristic of Ecoregion 80g; they harbor unique flora and fauna as do those in the Sierra Nevada-Influenced Ranges(13x) of the Central Basin and Range (13). Productive fisheries occur in small reservoirs or impoundments. Higher elevations once supported Lahontan cutthroat trout but water availability limits their present distribution. The federally-threatened Warner sucker fish lives in permanent but shallow, weedy lakes and spawns in Twelvemile Creek in northwesternmost Nevada. The Wall Canyon area supports a unique fish species, the Wall Canyon sucker.
80j Semiarid Uplands	This ecoregion covers disjunct areas across northern Nevada. It includes hills, low mountains, volcaniccones, and buttes that rise out of the drier Dissected High Lava Plateau (80a) andHigh Lava Plains (80g). Elevational banding is much less apparent on the mountains of Ecoregion 80j than in Ecoregion 13q to the south. Mountain big sagebrush and grasses, such as Idaho fescue, are common. The density and extent of juniper woodland varies with long-term climate fluctuations, grazing pressure, and fire frequency. Juniper woodland is absent in the Jarbidge and Santa Rosa mountains, where mountain brush land scattered aspen groves occupy the woodland zone.	Woodland, mixed shrubland and grassland, rangeland, recreation, and wildlife habitat. Cold water fisheries occur; threatened bull trout are found in the Jarbidge River watershed and limited numbers of Lahontan cutthroat trout are found in a few drainages in the Santa Rosa Range east of McDermitt as well as in streams further to the west. Water quality has been lightly to moderately degraded by human activities. Historic gold mining south of Mountain City. Extensive gold mining operations continue, especially in the mountains near Jarbidge and Tuscarora.

Source: compiled from Bryce *et al.,* 1999

The MTRs overfly many of the ecoregions described in Table 3-10. However, the MTRs are so designed that overflight of certain ecoregions are more favorable for training than others. The potential for environmental impact is also considered in making these route location selections.

The IR 264 corridor begins (segment A-B) in the Tonopah Basin, passing over the Tonopah Foothills then into more of the Tonopah Basin. This MTR then enters the Central Nevada High Valleys ecoregion, passing over a small portion of the Ball Mountains. Surrounding the Ball Mountains is a Central Nevada Mid Slope Woodlands and Brushland ecoregion. The MTR continues (segments C-G) passing mostly over the Central Nevada High Valleys ecoregion, intermittently crossing over the Central Nevada Mid Slope Woodland and Brushland ecoregions. A portion of the route passes over the Lahontan and Tonopah Playas. Segment K-L passes south mostly over the Tonopah Basin ecoregion.

IR 275 (segment B-C) begins in the Upper Lahontan Basin and crosses over the Lahontan Sagebrush Playas and Lahontan Uplands before it ends in the Upper Humboldt Plains. Segments C-E continues through the upper Humboldt to the Central Nevada High Valleys where it joins with IR264 (segments F-J). The route continues west (segments J-N) passing over the following ecoregions: Central Nevada High Valleys; the Central Nevada Bald Mountains; the Central Nevada Mid Slope Woodland and Brushland; Tonopah Sage Brush Foothills; and, Tonopah Basin. The route does a turnaround back to the east. Segments N-L crossover the following ecoregions: the Sierra Nevada-Influenced Semiarid Hills and Basin; the Sierra Nevada Influenced High Elevation Mountains; the Sierra Nevada Influenced Ranges; the Tonopah Basin; and the Central Nevada High Valleys. The exit segment is primarily over the Tonopah Basin with Lahontan and Tonopah playas.

IRs 280 and 282 begin (segment A-B) in the Upper Humboldt Plains and Carbonate Woodland Zone. The MTRs continue (segment B-C) through the Carbonate Sagebrush Valleys, crossing the High Elevation Carbonate Mountains ecoregion. Segment C-D transitions from Carbonate Sagebrush Valley to the Central Nevada High Valleys ecoregion (segment D-E). The route also passes over a small portion of the Upper Lahontan Basin. The remainder of IR 282 (segments E-H) continues over the Central Nevada High Valley ecoregion, with intermittent passes over Central Nevada Mountains Mid-Slope Woodland and Brushland. This route terminates in the Tonopah Basin ecoregion.

The IR 280 corridor continues southwest from this point (segment G-H) into Nye County. The corridor passes over the Tonopah Basin and Lahontan Salt Shrub Basin, with intermittent passes over Tonopah Uplands and Tonopah Sagebrush foothills.

IR 281 corridor begins just east of the Ruby Mountains. Segments A-C overfly the Carbonate Sagebrush valleys ecoregion. This portion of the corridor passes over a Shadscale-Dominated Saline Basin ecoregion. Segment C-D borders a Wetland Ecoregion and passes over the Mid Elevation Ruby Mountains, the Upper Humboldt Plains, a Carbonate Woodland Zone, and across the Central Nevada High Valleys ecoregion. Segments D-G pass through several ecoregions: the Upper Lahontan Basin; Lahontan and Tonopah Playas; Central Nevada High valleys; Lahontan Sagebrush Slopes; and Lahontan Uplands. Segment G-H passes over Salt Desert, Lahontan Salt Shrub Basin Central Nevada Mid-Slope woodland and Brushland, Central Nevada Bald Mountains, and Central Nevada High Valleys. This segment terminates in the Lahontan Salt Shrub Basin and passes over the edges of Lahontan and Tonopah Playas as well as wetlands ecoregions.

3.5.3 Threatened, Endangered, and Candidate Species

The Endangered Species Act (ESA), 16 U.S.C. §1531 et seq. enacted in 1973, recognizes that many species of fish, wildlife, and plants are in danger of, or threatened with, extinction. The ESA established a national policy that all federal agencies should work toward conservation of these species. The Air Force complies with the mandates of the ESA by identifying endangered and threatened species, and critical habitats or Air Force lands, and implementing programs for the conservation of these species, in coordination with the USFWS.

Threatened and endangered species that may potentially occur within the MTRs in Nevada have been identified for the Proposed Action. The USFWS Pacific Southwest Region, lists Nevada's Endangered Threatened, Proposed and Candidate Species by county (USFWS, 2011a). Plants and other animal forms are not considered as a potential for impact due to noise or visual images. There are four listed species considered in this assessment which have a high probability of occurring within the IRs 264, 275, 280, 281, and 282 corridors. In accordance with Section 7.1.1 of AFI 32-7064 (*Integrated Natural Resources*

Management Plan), it is an Air Force policy to provide similar protection to Candidate species when practical.

Southwestern willow flycatcher (*Empidonax traillii extimus*). The southwestern willow flycatcher, a federally designated Endangered species, is a small passerine neotropical migratory bird. They typically arrive in their breeding territories by May or June and depart for wintering grounds in late August, resulting in an approximate 100-day breeding season. Dense vegetation near water courses or inundated wetlands is required for nesting, thus this species is considered a riparian obligate breeder. In Nevada, preferred vegetation consists of willows, cottonwoods, and Russian olive. Preferred water courses may include rivers, streams, springs, or marshes. An 18.6 mile stretch of the Virgin River, from the Arizona/Nevada border to the upstream boundary of the Overton State WMA was designated as critical habitat (Klinger and Furtek, 2007).

Greater sage grouse (*Centrocercus urophasianus*). The greater sage grouse is a large, rounded-winged, ground-dwelling bird, up to 30 inches long and two feet tall, weighing from two to seven pounds. It is the most common grouse in Nevada and is found in fifteen of the seventeen counties. The greater sage grouse is found in foothills, plains, and mountain slopes where sagebrush is present in mixtures of sage brush, meadows, and aspen in close proximity. Sagebrush is used for concealment and food. The birds build nests in depressions on the ground under the sagebrush. The breeding season for the sage grouse is March through June. The male sage grouse will strut at the leks[1] from March to early June. The females arrive later, usually during April to mid-May. Hens usually stay at the leks for two to three days while they choose one of the males, then mate. Hens then move out to the nearby sage flats to find a good nesting place (NDOW, 2011a). Evidence suggests that habitat fragmentation and destruction across much of the species range has contributed to significant population decline over the last century. In March 2010, the USFWS announced its decision to list the greater sage grouse as a candidate species for future eligibility under the ESA. The USFWS stated that the greater sage grouse warrants protection under the ESA but that listing the species as either endangered or threatened is precluded by the need to address higher priority species. As a candidate species, the greater sage grouse will not receive statutory protection under the ESA although individual states will continue to manage the bird and its habitat. The greater sage grouse will continue to be managed by the U.S. Bureau of Land Management and U.S. Forest Service under existing resource management plans on federal land. Management of the sage grouse as a candidate species remains consistent with ongoing federal guidance and local, state, and private land initiatives (Trihydro, 2010). The Nevada Department of Wildlife (NDOW), in its July 2011 correspondence to the Air Force, indicates that a great deal of the on-the-ground, population level planning for this greater sage grouse has been underway and facilitated by the Governor's Sage Grouse Conservation Team (see Appendix A).

Yellow-billed cuckoo (*Coccyzus americanus).* The yellow-billed cuckoo, a federally designated Candidate species, is a medium sized neotropical migrant that winters in primarily in South America. Generally, cuckoos arrive at their breeding grounds late in the season followed by a short time of egg laying to fledging in 17 days. The cuckoo inhabits woodlands with clearings and dense shrub understory, usually associated with water courses. Throughout the southwest during the breeding season, cuckoos seem to prefer desert riparian corridors consisting of cotton wood and dense mesquite thickets. In Nevada, the cuckoo has been documented in the western and southern portions of the state including along the Carson River, Lahontan Valley, and the Fallon area (Klinger and Furtek, 2007).

Columbia spotted frog (*Rana luteiventris*). The Columbia spotted frog, a federally designated Candidate species, was listed on September 19, 1997. Reproducing populations are found in habitats characterized by springs, floating vegetation, and larger bodies of pooled water (USFWS, 2011c). In Nevada, these frogs are currently found in the central portion (Nye County) and the northeast (Elko and Eureka Counties), usually at elevations between 5,600 and 8,700 feet elevation. Based on geography, these frogs in Nevada can be grouped further into three well defined subpopulations: (1) a large subpopulation located across the Jarbidge and Independence Ranges and the Tuscarrora Mountains located in the northern portion of Elko County and northern portion of Eureka County; (2) an isolated subpopulation located in Ruby mountains in

[1] A lek is a gathering of male animals of a particular species, in a specific location, for the purpose of competitive mating display.

the southeastern portion of Elk County; and, (3) an isolated population in the Toiyabe Range of Central Nevada in Nye County.

3.5.4 The Bald and Golden Eagle Protection Act

Bald Eagle Management Guidelines and Conservation Measures

The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c) enacted in 1940, and amended several times since then prohibits persons, without a permit issued by the Secretary of the Interior, from "taking bald eagles, including their parts, nests, or eggs. The act provides criminal penalties for persons who "…take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export for import, at any time or any manner, any bald eagle …(or any golden eagle), alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb (USFWS, 2011d).

For purposes of these guidelines, "disturb" means: to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior: or, (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habitats, and causes injury, death, or nest abandonment.

3.5.5 Protected Natural Areas

Several NWR boundaries are located within or near the IR 264, 275, 280, 281, and 282 corridors. This is especially the case for IR 281 (see Figure 2-1). The following paragraphs describe the importance of these biological resources in the region.

The Stillwater NWR is located between segments G–H and R-T for IR 281. It is part of a wildlife refuge complex in western Nevada consisting of Stillwater Refuge, Fallon Refuge, and Anaho Island Refuge (USFWS, 2011f). Together, these refuges encompass approximately 163,000 acres of wetland and upland habitats, freshwater, and brackish water marshes, cottonwood and willow riparian areas, alkali playas, salt desert shrub lands, sand dunes, and a 500-acre rocky island in a desert lake.

The refuges provide important migration, breeding, and wintering habitat for up to 1 million migratory birds including waterfowl, shorebirds, colonial nesting birds, and neotropical migratory birds. The Stillwater and Fallon Refuges are part of the Lahontan Valley Shorebird Reserve, one of only 16 sites recognized for their international importance by the Western Hemispheric Shorebird Reserve Network.

The Lahontan Valley wetlands are listed as a globally important bird area by the American Bird Conservancy. The Anaho Island Refuge provides secure habitat for one of the largest American white pelican breeding colonies in the western United States. To provide a secure environment for nesting birds, the Anaho Island Refuge is closed to all public use.

The Ruby Lake NWR lies at the southern end of the Ruby Valley in northeast Nevada (USFWS, 2011e). The northern portion of the refuge lies under IR 281 segments C-D. The refuge located at an elevation of 6,000 feet encompasses 39,928 acres. It consists of a marsh bordered by meadows, grasslands, and brush-covered uplands. Ruby Lake NWR serves as a magnet for a wide diversity of wildlife species and is strategically located along migration corridors serving both the Pacific and Central Flyways. The refuge is one of the most important waterfowl nesting areas in the Great Basin and intermountain West. The south marsh supports the largest population of nesting canvasback ducks west of the Mississippi River (outside Alaska). Due to habitat loss elsewhere in the Great Basin, the refuge has become increasingly important to resident wildlife, including mule deer, pronghorn antelope, and sage grouse.

3.5.6 Physical Collision with Birds

A high rate of bird collisions with certain species in a geographic area could impact the status or population well being of the species (*i.e.,* the species would be in decline or possibly a threatened or endangered species). The Air Force has developed the BAM (see Appendix D) to predict these collisions. Factors that

increase the probability of bird strikes in these models include the presence of food, water, shelter, open space, habitat, or migration routes at or near a military operation.

3.5.7 Domestic Animals

Most of the ecogregions underlying the proposed MTRs provide suitable areas for grazing in summer or year round, depending on the location and agriculture interest.

3.6 CULTURAL RESOURCES

3.6.1 Definition of Resource

Cultural resources include prehistoric and historic archaeological sites, buildings, structures, districts, artifacts, objects, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, or religious purposes. Pursuant to Section 106 of the NHPA of 1966, as amended, and its implementing regulations at 36 CFR 800, federal agencies must take into consideration the potential effect of an undertaking on "historic properties," which refers to cultural resources listed in, or eligible for inclusion in, the NRHP. Sites not yet evaluated are considered potentially eligible for inclusion in the NRHP and, as such, are afforded the same regulatory consideration as nominated or previously found eligible properties.

Numerous laws and regulations require federal agencies consider the effects of a Proposed Action on cultural resources. These laws and regulations stipulate a process for compliance, define the responsibilities of the federal agency proposing the action, and prescribe the relationship between other involved agencies (*e.g.*, State Offices of Historic Preservation, the Advisory Council on Historic Preservation).

Only those potential historic properties determined to be significant under cultural resource legislation are subject to protection or consideration by a federal agency. The quality of significance is considered in terms of applicability of the NRHP criteria. Significant cultural resources, either prehistoric or historic in age, are referred to as "historic properties."

Cultural resources are managed in accordance with E.O. 11593 (*Protection and enhancement of the cultural environment*); the National Historic Preservation Act of 1966, as amended; the Archeological and Historic Preservation Act of 1974 (P.L. 93-291); the Archaeological Resources Protection Act of 1979 (P.L. 96-95); the American Indian Religious Freedom Act of 1978 (P.L. 95-341); and, the Native American Graves Protection and Repatriation Act of 1990 (P.L. 101-601). Cultural resources on Air Force installations (the Proposed Action would not be located on an Air Force installation) are managed in accordance with 32-7065, *Cultural Resources Management) and* 32 CFR 989 (*Environmental Impact Analysis Process*). In addition, a proposed undertaking in Nevada must comply with the State Historic Preservation Office (SHPO) guidelines for the State of Nevada.

3.6.2 Baseline Conditions

For this analysis, the Region of Influence (ROI) is synonymous with the Area of Potential Effects (APE), as defined by the NHPA. The ROI for the analysis of cultural resources includes all area on the ground within the proposed IRs 264, 275, 280, 281, and 282 corridor in Nevada that would be used for C-17 aircrew training (as shown on Figure 2-1). These areas include the built environment (*i.e.*, urban, suburban, rural communities) and open space (*i.e.*, undeveloped lands, national and state forests, coastal, and riverine areas).

Identification of cultural resources potentially impacted by the Proposed Action was accomplished by reviewing the National Register Information System (NRIS) (NPS, 2011). A search of the NRIS was performed for NRHP-listed archaeological sites, historic resources, and traditional cultural properties in Nevada by affected counties. Given the vast area covered by the Mountain Home corridor, only those sites listed in the NRIS database were incorporated into this study. It is assumed that additional potentially NRHP-eligible sites exist in the project area, but are not listed in the NRIS.

3.6.2.1 Archaeological Resources

Archaeological resources are prehistoric or historic places where human activity has measurably altered the earth or left deposits of physical remains. Examples of archaeological resources include some surface deposits and below ground (subsurface) deposits. Examples of prehistoric archaeological resources

include village sites, campsites, lithic scatters, burials, hearths (or hearth features), processing sites, caves and rock shelters, and petroglyph and pictograph sites. Examples of historic archaeological resources include homesteads, mines, townsites, roads and trails, privies, and trash deposits.

Eighteen NRHP listed archaeological sites or archaeological districts have been identified in the vicinity of the IRs 264, 275, 280, 281, and 282 corridors in Nevada. Because the area below the MTR is vast and large areas are remote, there is a high probability that additional sites remain unrecorded. The recorded archaeological sites within IRs 264, 275, 280, 281, and 282 corridor include caves, petroglyphs, a rockshelter, and a wild horse trap. Table 3-11 identifies the number of NRHP listed archaeological sites or districts by county.

Table 3-11. NRHP Listed Archaeological Resources Within or Adjacent to the IRs 264, 275, 280, 281, and 282 Corridor

County	Number of Sites
Churchill	8
Elko	1
Esmeralda	0
Eureka	0
Humboldt	1
Lander	0
Mineral	0
Nye	3
Pershing	2
White Pine	2
Total	18

Sources: NPS, 2011 and Nevada SHPO, 2011

3.6.2.2 Historic Resources

For purposes of this analysis, historic resources include buildings and structures, and other physical remains of historic significance present above the ground. Historic resources date from the period of initial European contact in this area (*circa* A.D. 1770) and extend to the present. Examples of historic resources include houses, homesteads, farmsteads (and associated support structures or buildings), cabins, churches, forts, schools, bridges, dams, logging sites, military facilities, mines, structures or buildings, and townsites.

One hundred twenty-three NRHP listed historic properties have been identified in the vicinity of the IRs 264, 275, 280, 281, and 282 corridor. Because the area below the MTR is vast and large areas that are remote, there is a high probability that additional resources remain unrecorded. Structures identified include a cemetery; churches; club halls; commercial buildings; government buildings (city hall, courthouses, a jail, libraries, and post offices); ranch buildings; residential buildings; schoolhouses; a shrine; and transportation-related structures (bridges, and a railway passenger station). Several historic districts are also contained within the IRs 264, 275, 280, 281, and 282 corridors. Table 3-12 identifies the number of NRHP listed historic resources and districts within the IRs 264, 275, 280, 281, and 282 corridor by county.

Table 3-12. NRHP Listed Historic Properties Within or Adjacent to IRs 264, 275, 280, 281, and 282 Corridor

County	Number of Sites
Churchill	12
Elko	5
Esmeralda	1
Eureka	1
Humboldt	13
Lander	12
Lyon	8
Mineral	4
Nye	48[1]
Pershing	6
White Pine	16
Total	123

[1] Includes the historic former mining town of Belmont (Historic District) and the Manhattan School (building).

Sources: NPS, 2011 and Nevada SHPO, 2011

3.6.2.3 Native American Interests

Native American resources can include, but are not limited to, archaeological sites, burial sites, ceremonial areas, caves, mountains, water sources, trails, plant habitat or gathering areas, or any other natural area important to a culture for religious or heritage reasons. NRHP-eligible traditional sites are subject to the same regulations, and afforded the same protection, as other types of historic properties. The ROI for Native American traditional resources associated with project activities includes extensive areas throughout Nevada that may have been, or are currently, used for human activities. The ROI for Native American traditional resources is more expansive because of the amount of land associated with activities such as food cultivation or hunting by Native Americans. Table 3-13 identifies the number of NRHP listed traditional cultural properties by county.

Table 3-13. NRHP Listed Traditional Cultural Properties Within or Adjacent to the IRs 264, 275, 280, 281, and 282 Corridors

County	Number of Sites
Churchill	0
Elko	0
Esmeralda	0
Eureka	0
Humboldt	0
Lander	1
Lyon	0
Mineral	0
Nye	0
Pershing	0
White Pine	0
Total	1

Sources: NPS, 2011 and Nevada SHPO, 2011

Native American groups that may be present within the ROI for the proposed IRs 264, 275, 280, 281, and 282 in central Nevada were identified by comparing information on publications by the U.S. Department of the Interior, Bureau of Indian Affairs (BIA, 2010) and the Nevada Department of Transportation (NDOT, 2010) with the locations of each MTR. As shown on Figure 3-4, there are 12 tribes in the area of the Proposed Action. Table 3-14 lists the federally recognized Native American groups identified within the ROI for IRs 264, 275, 280, 281, and 282.

Table 3-14. Federally Recognized Native American Groups Located Within the Region of Influence for IRs 264, 275, 280, 281, and 282

Tribal Name	
Battle Mountain Band Council	South Fork Band Council
Duckwater Shoshone Tribe	Te-Moak Tribe of Western Shoshone Indians
Elko Band Council	Walker River Paiute Tribe
Ely Shoshone Tribe of Nevada	Wells Indian Colony Band Council
Lovelock Paiute Tribe	Yerington Paiute Tribe
Fallon Paiute-Shoshone Tribe	Yomba Shoshone Tribe

To ensure that any sites of traditional cultural value are identified and adequately considered under the Proposed Action, the Air Force has initiated Government-to-Government relationship requests with each of the tribes listed in Table 3-14 (see Appendix B), and has requested to consult with each tribe under Section 106 of the NRHP and other relevant Executive Orders regarding the Proposed Action. Initial steps in the consultation process are documented in Appendix B and will continue with publication of the Draft EA and FONSI for public review.

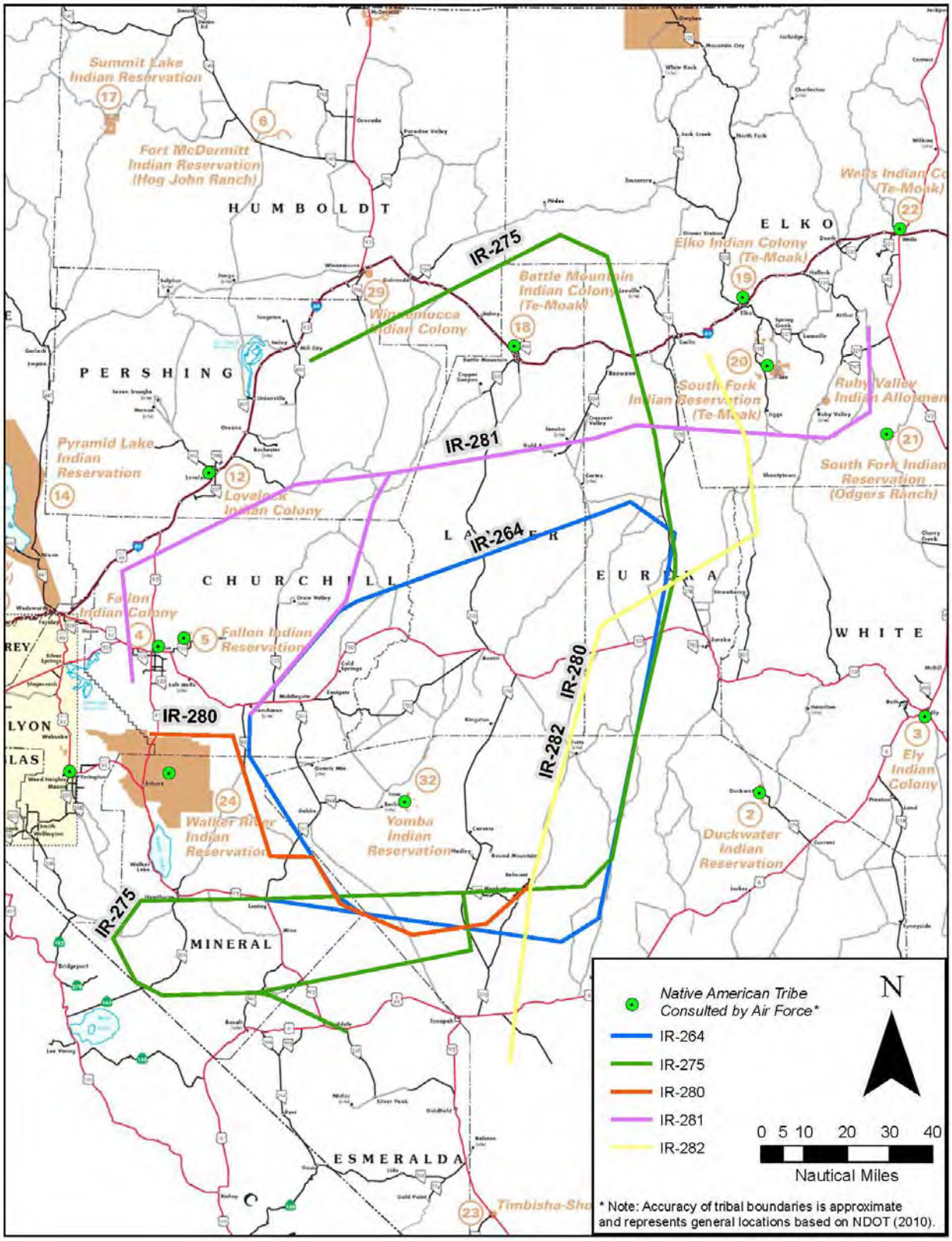

Figure 3-4. Location of Native American Tribes in Relation to the Proposed MTRs

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CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

This chapter provides analysis of the environmental consequences of the No Action Alternative and the Proposed Action. The primary basis for the analysis is the introduction of low level navigation training for C-17 aircrews based at Travis AFB using five inactive military training routes in central Nevada.

4.1 NO ACTION ALTERNATIVE

Under the No Action Alternative, IRs 264, 275, 280, 281, and 282 would continue to be inactive.

4.1.1 Airspace Operations, Aircraft Safety, and Bird/Wildlife-Aircraft Strike Hazard

Impacts are assessed by comparing projected military flight operations and proposed airspace utilization with baseline conditions, to include civil aviation activities. This assessment includes analyzing the capability of the affected airspace elements to accommodate the projected level of military flight activities, and determining whether such changes would have an adverse impact on overall use of the airspace. This includes consideration of such factors as the interaction of the proposed use of specific airspace with adjacent controlled, uncontrolled, or other military training airspace; possible impacts on other nonparticipating civil and military aircraft operations; and possible impacts on civil airports underlying or near the airspace projected for use in the Proposed Action. An aircraft safety impact would be significant if there would be a high probability that an aircraft involved in an accident would strike a person or structure on the ground. A BASH incident would be significant if it would likely result in an aircraft accident, involve injury either to aircrews or to the public, or damage to property (other than the aircraft). These significance criteria also apply to the Proposed Action.

There would be no change to the structure of IRs 264, 275, 280, 281, and 282 and Travis AFB would continue to be the originating and scheduling organization for the routes; however, the routes would continue to be inactive. There would be no aircraft safety or bird-aircraft strike issues because the routes would remain inactive. No significant airspace operations, aircraft safety, or BASH impacts would be anticipated as a result of the No Action Alternative.

4.1.2 Noise

One of the principal environmental concerns resulting from aircraft operations is noise. There are several characteristics of noise, including loudness (amplitude), sharpness or pitch (sound-wave frequency), and the length of time over which the noise is transmitted to a receptor (duration). The noise most often experienced as a result of aircraft operations is generally moderately loud, high-pitched, and lasting for up to several minutes per event (*e.g.*, takeoffs, landings, and flyovers). The overall level of noise perceived by an individual depends on distance from the source.

Several factors were examined to determine the significance of potential noise impacts, including whether or not the noise levels generated by aircraft operations on IRs 264, 275, 280, 281, and 282 would: (1) cause communication interference; (2) cause hearing damage; (3) cause structural damage; (4) interfere with sleep; (5) exceed the level "...requisite to protect the public health and welfare with an adequate margin of safety" (USEPA, 1974) (*i.e.*, DNL of 55 dBA); (6) cause nonauditory health effects; or, (7) interfere with wildlife activity. These significance criteria also apply to the Proposed Action.

Noise levels would continue to range from approximately DNL 25 dBA in rural nighttime areas to daytime levels of about DNL 80 dBA in urban areas. Noise from aircraft operations would not contribute to the noise environment. No significant impacts to noise would be anticipated from the No Action Alternative.

4.1.3 Land Use

An impact to land use would be considered significant if one or more of the following occur as a result of the Proposed Action: (1) conflict with applicable ordinances and/or permit requirements; (2) nonconformance with applicable land use plans; (3) preclusion of adjacent or nearby properties being used for existing activities; (4) conflict with established uses of an area; (5) physical obsolescence of existing

land use(s); and (6) elimination or decrease in economic value of existing/potential land uses. These significance criteria also apply to the Proposed Action.

There would be no change to the existing conditions for sensitive land uses, population areas, and land use plans. No significant impacts to land use would be anticipated from the No Action Alternative.

4.1.4 Air Quality

Impacts to air quality in attainment areas would be considered significant if pollutant emissions associated with the implementation of the federal action caused or contributed to a violation of any national, state, or local ambient air quality standard, exposed sensitive receptors to substantially increased pollutant concentrations, or exceeded any significance criteria established in the State Implementation Plan (SIP). Impacts to air quality in nonattainment areas would be considered significant if the net change in proposed pollutant emissions caused or contributed to a violation of any national, state, or local ambient air quality standard; increased the frequency or severity of a violation of any ambient air quality standard; or delayed the attainment of any standard or other milestone contained in the SIP. With respect to the General Conformity Rule, impacts to air quality would be considered significant if emissions exceeded de minimis threshold levels established in 40 CFR 93.153(b) for individual nonattainment pollutants or pollutants for which an area has been redesignated as a maintenance area.

Under the No Action Alternative, the IRs would continue to be inactive. C-17 aircrews at Travis AFB would continue to meet their low level navigation training requirements by flying the MTRs assessed in Environmental Assessments for the basing of West Coast C-17 and the Slow Routes 300 and 301 (USAF, 2007 and 2003, respectively). There would be no additional air emissions from military aircraft conducting low level navigation training out of Travis AFB other than by routes previously assessed. No significant impacts to air quality would be anticipated from the No Action Alternative.

4.1.4.1 Greenhouse Gas Emissions and Climate Change Analysis

Greenhouse gases (GHG) are gases that trap heat in the atmosphere. These emissions occur from natural processes and human activities. Some studies suggest that the surface temperature of the earth has increased because of the presence in the air of GHGs that absorb infrared radiation. Recent observed changes due to global warming include shrinking glaciers, thawing permafrost, a lengthened growing season, and shifts in plant and animal ranges (IPCC, 2007).

The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Examples of GHGs emitted primarily through human activities include fluorinated gases (hydrofluorocarbons and perfluorocarbons) and sulfur hexafluoride (SF_6). Each GHG is assigned a global warming potential (GWP), which is the ability of a gas or aerosol to trap heat in the atmosphere. The GWP rating system is standardized to CO_2, which has a value of one. For example, CH_4 has a GWP of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal-mass basis. Total GHG emissions from a source are often reported as a CO_2 equivalent (CO_2e). The CO_2e is calculated by multiplying the emission of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs.

On February 18, 2010, the CEQ released its *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions*, which suggests that proposed actions that would be reasonably anticipated to emit 25,000 metric tons or more of CO_2e GHG emissions annually should be evaluated by quantitative and qualitative assessments. This is not a threshold of significance but a minimum level that would require consideration in NEPA documentation. The purpose of quantitative analysis of CO_2e GHG emissions in this EA is for its potential usefulness in making reasoned choices among alternatives.

Global warming poses a serious threat to the economic well-being, public health, natural resources, and environment. The potential adverse impacts of global warming include the exacerbation of air quality problems, wildfires, a reduction in the quality and supply of water from snowpack, a rise in sea levels resulting in the displacement of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems (OPR, 2008). While it is difficult to predict the precise effects or timing of such effects, adverse impacts associated with global climate change could have a common and widespread impact on communities throughout the country.

The No Action Alternative would not result in any low level navigation training for C-17 aircrews using the five inactive military training routes in central Nevada. Impacts from the generation of greenhouse gases would not occur. C-17 aircrews at Travis AFB would continue to meet their low level navigation training requirements by flying the MTRs assessed in the West Coast C-17 Basing EA and the 300/301 EA. There would be no additional greenhouse gas emissions from military aircraft conducting low level navigation training out of Travis AFB other than by routes previously assessed. No significant impacts to greenhouse gases would be anticipated from the No Action Alternative.

4.1.5 Biological Resources

An impact to biological resources would be considered significant if noise and visual images from the Proposed Action would: (1) adversely affect a federally listed candidate, threatened or endangered species; (2) substantially diminish habitat or population within an ecoregion for a regionally or locally important animal species: or, (3) interfere substantially with local wildlife movement or reproductive behavior that would result in an adverse affect on a species population.

Under the No Action Alternative, IRs 264, 275, 280, 281, and 282 would continue to be inactive. There would be no change to the existing condition. No significant impacts to biological resources would be anticipated from the No Action Alternative.

4.1.6 Cultural Resources

An undertaking is considered to have an effect on a historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the NRHP. An effect is considered adverse when it diminishes the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic properties would include, but would not be limited to:

- physical destruction, damage, or alteration of all or part of the property;
- isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register;
- introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting;
- neglect of a property resulting in its deterioration or destruction; and,
- transfer, lease, or sale of the property out of federal ownership (36 CFR 800.9[b]).

Any ground-disturbing action in the area of an NRHP-eligible or potentially eligible archaeological site, or modification to such a site, can affect the integrity of that cultural resource, resulting in alteration or destruction of those characteristics or qualities which make it significant and potentially eligible for inclusion in the NRHP. While archaeological sites or historic buildings or structures can be destroyed during a single event, more often it is the cumulative effect of recurrent disturbing actions that diminish the integrity of the cultural resource and its significant characteristics.

No supersonic flight or supersonic events would occur as a result of the Proposed Action. Activities with potential to adversely affect cultural resources would be potential aircraft crashes and noise. A discussion of the current level of information relating to the ways in which noise could affect cultural resources is provided in the following paragraphs.

P.L. 100-91, passed in August 1987, directed the U.S. Forest Service and the NPS to conduct studies and make recommendations to Congress on aircraft overflight that may be affecting either visitors or resources of the National Forest System and National Parks. Completed in July 1992, this cooperative study (USDA, 1992) concluded the following:

- Because many cultural resources are located in remote and uninhabited areas, documented observations of aircraft noise effects are rare; and
- Most of the available literature relates to research by the Air Force, National Aeronautics and Space Administration, and the FAA and has focused on the effects of sonic booms.

A recently developed prediction method places a definite risk of damage to prehistoric structures (*e.g.*, rock art [petroglyphs and pictographs], rock alignments, rock cairns) from low overflight of heavy bombers and

heavy helicopters; however, measurement programs have been conducted which conclude that there is minimal risk of damage to structures from light, low-flying subsonic jet aircraft and light helicopters.

Some evidence exists that long-term effects of noise exposure could result in damage by initiating or accelerating the deterioration process, especially to already fragile resources. Long-term effects appear as: (1) fatigue effects in walls and other structural elements after extensive exposure; (2) moisture damage initiated by cosmetic cracks in exterior surfaces; and, (3) gradual erosion of surface materials (*e.g.,* adobe structure mud-plastered walls) from repeated events.

A study that examined noise effects of low level B-52 overflights on Long House, a 1,000-year old Arizona adobe, concluded that noise from a B-52 aircraft would have no significant effects. Noise levels generated by the B-52 aircraft during this study were as high as 113 dBA. Noise-induced landslides and rockfalls are less probable (less than 0.001 percent probability), so by inference, rock art, rock alignments, and cairns are unlikely to be disturbed. Based on these data, noise impacts to archaeological and historic resources are not expected as a result of low level subsonic aircraft overflight.

Effects of aircraft accidents on cultural resources are unpredictable. There are two potential ways for aircraft accidents to affect cultural resources. These are: (1) aircraft crashing onto or into and damaging sites; and, (2) personnel and vehicles in the process of retrieving falling objects driving over or otherwise damaging cultural resources. However, the occurrence of aircraft accidents is statistically low. There is only a small probability that potential historic properties might be affected by aircraft accidents.

For this analysis, the ROI is synonymous with the APE, as defined by the NHPA. The ROI is the geographic area within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.

Under the No Action Alternative, IRs 264, 275, 280, 281, and 282 would continue to be inactive. There would be no change to the existing condition. No significant impacts to cultural resources would be anticipated from the No Action Alternative.

4.2 PROPOSED ACTION

Under the Proposed Action, C-17 aircraft would fly each MTR about 8.67 times per month (about 0.3 times per day). About 2.2 of the monthly sorties (0.08 daily) on a route would occur during the nighttime (*i.e.,* 10:00 p.m. to 7:00 a.m.). Monthly C-130 and F-15 sorties on each of the routes would be about 0.42 and 0.17 sorties, respectively.

4.2.1 Airspace Operations, Aircraft Safety, and Bird/Wildlife-Aircraft Strike Hazard

4.2.1.1 Airspace Operations

Under the Proposed Action, IRs 264, 275, 280, 281, and 282 would be flown primarily by C-17 aircraft, with infrequent use by C-130 and F-15E aircraft. The route width, length, and the latitude and longitude for the points along the IRs would remain as listed for the current condition in Tables 2-3 through 2-7. The minimum and maximum altitudes for the segments of the IRs are listed in the tables. The Special Operating Procedures listed in Subchapter 3.1.2 would continue to apply to use of the IRs. Likewise, the Air Force Low-Altitude Flying Restrictions listed in Subchapter 3.1.2 would apply to operations on the five MTRs.

IRs 264, 275, 280, 281, and 282 would continue to be published on aeronautical charts that are available to all military and civil pilots. Publication of the routes would increase awareness of the existence of the routes to pilots.

Several conditions reduce the potential “competition” for the same airspace at intersecting points by aircraft on as federal airway, within SUA, and aircraft on an MTR. The federal airway can be flown under both VFR and IFR conditions, as can an IR. Under IFR conditions, aircraft are radar identified and controlled by air traffic control, and the pilots maintain radio communication with air traffic control agencies, thereby improving aircraft separation conditions. When flying in visual meteorological conditions, pilots use the “see and avoid” concept. A VR is flown only under VFR conditions. Therefore, potential for conflict between aircraft during VFR conditions is greater than for IFR because aircraft are not necessarily radar identified. However, VFR conditions provide a better opportunity for pilots to “see and avoid” each other. Additionally, aircraft on airways and aircraft on the MTR monitor common air traffic control frequencies for air traffic advisories and guard frequencies for emergency notification. Air traffic control personnel monitor

aircraft directly by radar monitoring and communication with aircraft through periodic receipt of aircraft position through position reporting. Position reporting and traffic advisories, combined with visual contact between pilots and radar control of aircraft, reduce the potential for two aircraft at the same altitude, at the same point, at the same time. Given the conditions mentioned in this paragraph, the probability would be very low that an aircraft on a federal airway and an aircraft on IRs 264, 275, 280, 281, and 282 would be at the same altitude at the same position.

Pilots flying an MTR would contact the SUA controlling agency on the published radio frequency for clearance to pass through the airspace prior to entry into the airspace. Alternatively, pilots could exit the MTR at an alternate exit point prior to the SUA to avoid entry into active SUA.

As listed in Table 3-1, some MTRs could penetrate airspace associated with instrument approaches at airports along the routes. As mentioned earlier in this subchapter, the operating guidance that is published for IRs 264, 275, 280, 281, and 282 directs aircrews flying on the IRs to monitor the common tower advisory frequency associated with the airport for traffic advisories to avoid other traffic. Additionally, directives request that aircraft on an MTR avoid airports by 3 nautical miles and 1,500 feet AGL where practicable. Continuation of these procedures would assist Travis AFB C-17 aircrews to deconflict operations with aircraft operating at airports along the route.

In summary, IRs 264, 275, 280, 281, and 282 have the capacity to accommodate the additional operations associated with the Proposed Action and the airspace surrounding the proposed IR structure would not be affected by operations on the IRs. The potential for conflict between aircraft operating on IRs 264, 275, 280, 281, and 282 and other aircraft operating in the airspaces around the IRs would be low because the scheduling and air traffic control procedures used by air traffic control and DoD agencies are designed to deconflict aircraft operations on the MTRs from operations in adjoining airspaces. No significant impacts to airspace operations would be anticipated from the Proposed Action.

4.2.1.2 Aircraft Safety

It is impossible to predict the precise location of an aircraft accident. However, MTRs are developed to avoid overflying residences and built-up areas to the maximum extent practicable. The types of C-17, C-130, and F-15E operations that would occur on IRs 264, 275, 280, 281, and 282 would be consistent with those flown over the lifetime for each aircraft. Thus, it is anticipated the class A mishap rates (listed in Table 3-3), would apply to the operations anticipated under the Proposed Action. For these reasons, the probability is low that an aircraft involved in an accident on IRs 264, 275, 280, 281, and 282 would strike a person or structure on the ground. No significant impacts to aircraft safety would be anticipated from the Proposed Action.

4.2.1.3 Bird/Wildlife-Aircraft Strike Hazard

Collisions between aircraft and birds would continue to be an inherent risk. However, aircrews operating on IRs 264, 275, 280, 281, and 282 would use the guidance in the Travis AFB BASH Plan to minimize the potential for bird-aircraft strikes. Additionally, aircrews would have access to the data in the BAM, and use of the Model during mission planning would allow aircrews to avoid severe BASH risk areas (mission permitting). Appendix D contains BAM figures for each of the IRs for March, June, September, and December. As depicted on the BAM figures, none of the routes occur in a severe BASH risk area.

It is estimated C-17, C-130, and F-15 aircrews would fly a combined total of 621.3 hours annually on IRs 264, 275, 280, 281, and 282. Using this estimate of flying time and the Air Force-wide data for 2002 (*i.e.,* 0.0052 strikes per flying hour [derived from USAF 2003c and USAF 2003d]), it is anticipated that a total of about 3.2 bird-aircraft strikes would occur annually from aircraft operations on IRs 264, 275, 280, 281, and 282. It is anticipated that the altitude distribution of the bird-aircraft strikes would follow the data in Table 3-4.

The number of bird/wildlife aircraft strikes described in the previous paragraph could fluctuate as a result of the cyclical patterns of bird populations. Historically, 1/2 of 1 percent of all reported bird/wildlife aircraft strikes involving Air Force aircraft resulted in a serious mishap. Therefore, it is unlikely that any of these bird/wildlife aircraft strike incidents would involve injury either to aircrews or to the public, or damage to property (other than the aircraft). No significant BASH impacts would be anticipated from the Proposed Action.

Subchapter 4.5 contains a detailed description of the effects of aircraft operations on wildlife, especially for species of concern.

4.2.1.4 Mitigation

There would be no significant airspace operations, aircraft safety, or BASH impacts. No mitigation is recommended.

4.2.2 Noise

Subchapter 4.5 contains a detailed description of the effects of aircraft noise on wildlife, especially for the species of concern.

4.2.2.1 Single Event Noise Analysis

Table 4-1 lists the sound exposure level (SEL), maximum sound level (L_{max}), and average noise (L_{eq}) values for the C-17, C-130, and F-15 aircraft at an altitude of 300 feet AGL when directly overhead and at various slant range distances.

Table 4-1. Aircraft Noise Levels (in dBA) in Sound Exposure Level, Maximum Sound Level as a Function, and Average Noise Directly Overhead and at Various Slant Range Distances

Sound Metric/Aircraft	Aircraft Directly Overhead at 300 ft AGL	Aircraft at 300 ft AGL				
		500 Feet Lateral Distance to Ground Track/583 ft Slant Distance to Aircraft	1,000 Feet Lateral Distance to Ground Track/1,044 ft Slant Distance to Aircraft	2,000 Feet Lateral Distance to Ground Track/2,022 ft Slant Distance to Aircraft	4,000 Feet Lateral Distance to Ground Track/4,011 ft Slant Distance to Aircraft	6,000 Feet Lateral Distance to Ground Track/6,008 ft Slant Distance to Aircraft
Sound Exposure Level (SEL)						
C-17	102	96	89	80	69	61
C-130H	96	91	86	79	70	63
F-15E	107	102	97	90	81	75
Maximum Sound Level (L_{max})						
C-17	101	94	86	75	62	53
C-130H	95	88	82	73	62	54
F-15E	104	97	91	82	72	64
Average Noise (L_{eq})						
C-17	52	46	40	31	19	12
C-130H	47	42	37	30	20	13
F-15E	58	52	47	41	32	25

Note: Phase of flight cruise power.

Listeners in normal voice communication at a distance of 10 feet in a steady background noise of L_{eq} 56 dBA should be able to communicate with 95 percent intelligibility (see Table F-1). As shown in Table 4-1, L_{eq} noise for a C-17 at 300 feet AGL would be about 52 dBA. Therefore, noise from a C-17 overflight should not significantly impair communication. However, listeners in normal communication in a steady background noise of 56 dB that increases to 66 dB due to aircraft noise and are at a distance of 10 feet from each other would have to move to about 3 feet apart to maintain the same intelligibility or raise their voices (see Table F-1). Their speech intelligibility would decrease considerably if they remain at 10 feet of separation. However, greater difference between the SEL and the L_{eq} for the event reduces the duration of speech intelligibility during the event. The potential for communication interference would last only as long as noise from the overflying aircraft remains at 66 dB or greater.

The loudest L_{eq} values for any of the three aircraft that would operate on the MTRs (*i.e.*, 58 dBA for an F-15 directly overhead at 300 feet AGL in Table 4-1) would not exceed the L_{eq} for the most conservative at-ear exposure level and condition (*e.g.*, 78 dB for intermittent, 8-hour noise exposure 250 days per year in Table F-2) that could produce hearing damage. Thus, hearing damage would not occur due to the Proposed Action.

The loudest maximum sound level (L_{max}) for any of the three aircraft that would operate on IRs 264, 675, 280, 281, and 282, would be about 107 dBA (*i.e.*, an F-15 at 300 feet AGL and directly overhead), which is well below the threshold at which structural damage would occur (*i.e.*, 127 dBA). Additionally, the

maximum sound level from any of the three aircraft would not exceed the level at and above which window panes may vibrate (*i.e*., 110 dBA). Thus, no structural or vibration damage would be expected from aircraft operations on IRs 264, 675, 280, 281, and 282.

Based on FICAN recommendations, outdoor SELs of 80 to 100 dBA (60 to 80 dBA indoors) could result in 4 to 10 percent awakenings, respectively, in the exposed population. Over the course of sleeping, different individuals might be awakened by different events, and some individuals might be awakened more than once. Individuals in residences in the area directly below a MTR could be exposed to indoor SEL of about 76 to 87 dBA (see Table 4-1) during normal sleep periods (10:00 p.m. to 7:00 a.m.). As many as 10 percent of the persons who would live below a MTR and within the parameters associated with the noise data in Table 4-1 (*i.e*., where the aircraft is directly overhead at 300 feet AGL could be awakened by aircraft noise during normal sleep periods. Those individuals who sleep between 7:00 a.m. and 10:00 p.m. likely would be affected just as those persons who sleep during normal nighttime sleep periods. Avoiding overflight of populated areas and/or structures in accordance with the guidance in Subchapter 3.1.1 (*i.e*, no lower than 1,000 feet above a congested area or flying no closer than 500 feet to any structure) would minimize the potential for noise impacts, to include sleep awakenings.

No significant single event noise impacts would be anticipated as a result of the Proposed Action.

4.2.2.2 Averaged Noise Analysis

Table 4-2 presents the onset rate adjusted day-night average A-weighted sound level (L_{dnmr}) noise levels for each segment of each of the five MTRs. The values reflect the cumulative noise levels from operations in those situations where the MTRs intersect, are coincidental, or are parallel. Noise modeling with MR_NMAP considers loudness, pitch, duration, flight track profiles, and distance for the various aircraft operations generated during a 24-hour day. These noises are calculated in terms of L_{dnmr} as dBA for averaged noise analysis.

As indicated in the Table 4-2, the greatest L_{dnmr} for any segment of any of the five MTRs would be 47 dBA. Noise impacts would not be anticipated because there is no reason to expect the general population would be at risk from any of the effects of noise for sound levels at and below L_{dnmr} 55 dBA (USEPA, 1974).

Individuals would not be exposed to aircraft noise at L_{eq} noise levels of 75 dBA and higher for an 8-hour day. Thus, nonauditory health effects from chronic noise exposure would not occur due to the Proposed Action.

Studies of aircraft noise and sonic boom, both in the U.S. and overseas, have addressed: acute effects, including effects of startle responses (sheep, horses, cattle, fowl), and effects on reproduction and growth (sheep, cattle, fowl, swine); parental behaviors (fowl, mink); milk letdown (dairy cattle, dairy goats, swine); and, egg production. High noise may trigger a startle response which raises the heart rate, but heart rate returns to normal in a very short time. There are good dose-response relationships describing the startle tendency to various levels of noise. However, studies have determined that there would be no long-term behavioral or breeding effects.

Studies on wildlife have shown that noise levels as high as 95 dBA have little or no effect on turkey vultures, great egrets, and grebes. Noise levels between 85 to 95 dBA could disturb or agitate the ring-necked duck, coot, gadwall, purple gallinule, and pintail duck. Noise levels within the range of 110 to 135 dBA would affect the nesting of turkeys. Another study, using low flying F-16 aircraft, has shown that noise levels of up to 100 dBA would not alter the reproductive behavior of the great egret, snowy egret, tricolor heron, little blue heron, and cattle egret. No significant averaged noise impacts would be anticipated from the Proposed Action.

4.2.2.3 Mitigation

No noise impacts were identified. Therefore, no mitigation would be required.

4.2.3 Land Use

4.2.3.1 Land Use, Recreation, and Visual Resources

Aircraft operations on IRs 264, 275, 280, 281, and 282 would be accomplished in accordance with published low altitude flying restrictions to avoid land use impacts. Specifically, aircraft on the MTRs would not:

- fly lower than 2,000 feet above the terrain of national parks, monuments, seashores, lakeshores, recreation areas, and scenic river ways administered by the National Park Service;
- fly lower than 2,000 feet above the terrain of national wildlife refuges, big game refuges, game ranges, and wildlife refuges administered by the United States Fish and Wildlife Service;
- fly lower than 2,000 feet above wilderness and primitive areas administered by the U.S. Forest Service;
- fly over cities, towns, and groups of people at an altitude of less than 1,000 feet above the highest obstacle within 2,000 feet of the aircraft;
- fly over non-congested areas at an altitude of less than 500 feet above the surface except over open water, in SUA, or in sparsely populated areas; and,
- operate closer than 500 feet to any person, vehicle, vessel, or structure.

The majority of the IR corridors occur over expansive open and unpopulated or sparsely populated areas. Major activities within these corridors include grazing, crop production, mining, and military training, none of which would be impacted by the Proposed Action. In addition, there are several recreational/wilderness areas that are generally within the outer portion or on the edge of the IR corridors. These more sensitive land uses could be exposed to higher noise levels, potentially annoying or disturbing visitors and users of these areas. However, when considering the low frequency of flight operations (*i.e.*, 0.3 operations per day on a single MTR, or 0.6 operations per day where two routes have coincidental segments) and the short duration of flight time at any point within an IR corridor, the potential for impacts would be minor and of short-duration. Therefore, no significant impacts to sensitive land uses would be anticipated due to the noise from aircraft overflight.

Sensitive land uses (*e.g.*, wildlife management areas, parks, residential) could be exposed to noise levels as high as L_{dnmr} 47 dBA. This level of noise would be below DNL 65 dBA, the maximum level considered acceptable for unrestricted residential use. Additionally, the noise would be below L_{dnmr} 55 dBA, the noise level at which there is no reason to expect the general population would be at risk from any of the effects of noise (USEPA,1974).

Table 4-2. Proposed Action Noise (L_{dnmr})

IR-264			IR-275			IR-280			IR-281			IR-282		
Segment	**L_{dnmr} (dBA)**	**No. of Events above SEL 65 dBA**	**Segment**	**L_{dnmr} (dBA)**	**No. of Events above SEL 65 dBA**	**Segment**	**L_{dnmr} (dBA)**	**No. of Events above SEL 65 dBA**	**Segment**	**L_{dnmr} (dBA)**	**No. of Events above SEL 65 dBA**	**Segment**	**L_{dnmr} (dBA)**	**No. of Events above SEL 65 dBA**
A-B	15	0.1	B-C	10	0.0	A-B	14	0.0	A-B	14	0.0	A-B	14	0.0
B-C	45	0.2	C-D	17	0.2	B-C	44	0.1	B-C	16	0.2	B-C	44	0.1
C-D	45	0.2	D-E	45	0.2	C-D	44	0.1	C-D	45	0.2	C-D	44	0.1
D-E	45	0.2	E-F	45	0.2	D-E	44	0.1	D-E	47	0.2	D-E	44	0.1
E-F	45	0.2	F-G	45	0.2	E-F	45	0.2	E-F	47	0.2	E-F	44	0.1
F-G	45	0.2	G-H	45	0.2	F-G	45	0.2	F-G	44	0.1	F-G	44	0.1
G-GA	45	0.2	H-I	45	0.2	G-H	45	0.2	G-H	46	0.2	G-H	44	0.1
GA-H	44	0.1	I-J	45	0.2	H-I	46	0.2	H-I	46	0.2	--	--	--
H-I	44	0.1	J-K	45	0.2	I-J	46	0.2	I-J	46	0.2	--	--	--
I-J	46	0.2	K-L	45	0.2	J-K	46	0.2	G-R	46	0.2	--	--	--
J-K	46	0.2	L-M	15	0.1	K-L	46	0.2	R-S	46	0.2	--	--	--
K-KA	45	0.2	M-N	13	0.0	--	--	--	S-T	46	0.2	--	--	--
KA-L	46	0.2	N-O	15	0.1	--	--	--	--	--	--	--	--	--
L-B	17	0.2	O-P	14	0.0	--	--	--	--	--	--	--	--	--
--	--	--	P-Q	14	0.0	--	--	--	--	--	--	--	--	--
--	--	--	Q-R	14	0.0	--	--	--	--	--	--	--	--	--
--	--	--	R-S	12	0.0	--	--	--	--	--	--	--	--	--
--	--	--	S-T	12	0.0	--	--	--	--	--	--	--	--	--
--	--	--	R-V	12	0.0	--	--	--	--	--	--	--	--	--
--	--	--	V-L	12	0.0	--	--	--	--	--	--	--	--	--
--	--	--	I-J	45	0.1	--	--	--	--	--	--	--	--	--
--	--		J-K	45	0.1	--	--		--	--		--	--	
--	--		K-L	45	0.1	--	--		--	--		--	--	

See Tables 2-3 through 2-7 for MTR altitude, width, length, and alternate route entry/exit information as well as aircraft airspeed.

There are only a few concentrations of population within the five IR corridors. Populated areas include Fallon, Hawthorne, Luning, and Manhattan. The larger communities of Fallon and Hawthorne could experience some potential noise and visual impacts. The far western portion of Fallon is within the IR 281 corridor and, therefore, would have increased potential for impacts. This area includes an extensive residential area. However, there are no sensitive land uses, such as schools, churches, or hospitals within this portion of the community and the noise levels would not exceed the level at which the general population would be at risk from any of the effects of noise. The entire community of Hawthorne is within IR 275, with sensitive land uses including several schools and churches, and a hospital. However, considering the low frequency of flights and short duration of flight time within these IRs, these impacts would be minor and short-term. Like the community of Fallon, the noise levels at Hawthorne would not exceed the level at which the general population would be at risk from any of the effects of noise. As noted in Subchapter 3.1.1.1, MTRs are designed so that disturbance to persons or property on the ground is minimized. Aircrews would avoid overflight of populated areas. However, if avoidance is not possible, aircrews would fly at a higher altitude when approaching and flying over populated areas.

Any impacts on land use within the IR corridors would be negligible to minor, and of a short-term basis. The Proposed Action would not result in a change in existing or proposed land uses nor would it cause non-conformance with existing land use plans and ordinances or physical and/or functional obsolescence of existing land uses within any of the IR corridors. Therefore, there would be no significant impacts on land use under the Proposed Action.

4.2.3.2 Mitigation

There would be no significant land use impacts. No mitigation is recommended.

4.2.4 Air Quality

Table 4-3 presents the numbers of annual operations by Travis AFB C-17 and other military aircraft aircrews for IRs 264, 275, 280, 281 and 282.

Table 4-3. Annual Usage of Instrument Routes 264, 275, 280, 281 and 282

Aircraft Type	Instrument Route				
	264	275	280	281	282
C-17	6	6	6	6	6
C-130	5	5	5	5	5
F-15E	2	2	2	2	2

Emissions from aircraft operations were calculated using the Air Force's *Air Emissions Factor Guide to Air Force Mobile Sources, December 2009*. Annual air emissions from low level navigation training in IRs 264, 275, 280, 281 and 282 in the affected counties are presented in Table 4-4. These emissions do not include take offs and landings at Travis AFB as those have already been analyzed and accounted for in the Environmental Assessments for the basing of West Coast C-17 and the Slow Routes 300 and 301 (USAF, 2007 and 2003b, respectively).

Table 4-4. Annual Emissions from Use of Instrument Routes 264, 275, 280, 281 and 282 by Travis AFB Aircrews

Aircraft Type	Criteria Air Pollutant (tons per year)					
	CO	VOC	NOx	SOx	PM10	PM2.5
C-17	5.51.32	1.60	424.35	0.02	2.76	2.47
C-130	0.32	0.05	1.23	0.00	0.04	0.04
F-15E	0.01	0.01	0.63	0.00	0.01	0.01
Total	5.84	1.66	426.21	0.02	2.81	2.52
Baseline Area Emissions	86,167	13,215	23,119	8,847	32,182	6,331
Percent of Baseline Area Emissions	0.0068	0.0126	1.8435	0.0002	0.0087	0.0398

Since the Proposed Action is located in an area in attainment for all criteria pollutants and the increase in criteria pollutant emissions is less than 10 percent of baseline area emissions, the Proposed Action has been demonstrated by USEPA standards not to cause or contribute to new violations of any national ambient air quality standard in the affected area. No significant air quality impacts would be anticipated from the Proposed Action.

4.2.4.1 Mitigation

There are no significant air quality impacts from the Proposed Action; therefore, mitigation measures are not recommended.

4.2.4.2 Greenhouse Gas Emissions and Climate Change Analysis

The Proposed Action would result in aircraft GHG emissions generated during C-17 training along the five IRs only. Greenhouse gas emissions were calculated by multiplying jet fuel use rates by the total operating time in the IRs, by the corresponding jet fuel emission factors for GHGs, and by the total number of operations in the IRs. Aircraft GHG emissions from the Proposed Action are then compared to the U.S. 2009 GHG baseline emissions in Table 4-5.

Table 4-5. Greenhouse Gas Emissions from the Proposed Action

	Greenhouse Gases, metric tons per year			
	CO_2	CH_4	N_2O	CO_2e
Proposed Action	28,227	1	1	28,605
U.S. 2009 GHG Baseline Emissions[a]				6,633,200,000
Percent of U.S. 2009 GHG Baseline Emissions				0.0004

[a] Source: USEPA, 2011

Greenhouse gas emissions from the Proposed Action would represent approximately 0.0004 percent of the total GHG emissions generated in the U.S. in 2009. When this individual project's contribution to greenhouse gas emissions is compared to that produced by activities elsewhere in the world, the mass of greenhouse gas emissions generated by the Proposed Action would be so small that the concentration of greenhouse gas emissions in the atmosphere would not be expected to change. For this reason, the Proposed Action's individual impact to global climate change is not significant. The project's incremental contribution to cumulative effects on a regional and global scale would not be considerable. There would be no measureable impacts to global climate change from the Proposed Action. No significant impacts from greenhouse gases would be anticipated from the Proposed Action.

4.2.5 Biological Resources

4.2.5.1 Wildlife

Ecoregions

The corridors, ranging from 4 to 10 miles in width, cover a broad diversity of ecoregions with their own unique assemblage of plants and wildlife. The exposure of wildlife and animal life to noise and visual cues depends on their location to the path of the aircraft. Receptors directly under the aircraft have the highest potential for exposure. Exposure decreases with the lateral distance from the aircraft.

The ecoregion exposed to the greatest number of routes and the longest part of a continuous route is the Central Nevada High Valleys ecoregion. From an ecological perspective, it has fewer biological resources that might be impacted by the Proposed Action. This ecoregion tends to have lower species diversity than many other sagebrush-dominated ecoregions. All routes except IR 281 fit into this diversity condition. Following the Central Nevada High Valleys ecoregion in exposure to routes are the Lahontan Salt Brush Basin and the Tonopah Basin.

IR 281 is the only route that potentially impacts the Wetlands Ecoregion. While the route is not directly over the Wetland Ecoregion, the corridor is near the edges of several wetland ecoregions. These wetland ecoregions support migratory waterfowl. This occurs in segments C-D in the east and G-H in the west. This route also crosses, and is near, the Lahontan and Tonopah Playas Ecoregions which support migratory birds and waterfowl as well.

IR 275 in southwest Nevada crosses the Sierra Nevada-Influenced Ranges Ecoregion which supports bighorn sheep, deer, and black bear. Similarly, the IR281 corridor is near the High Elevation Ruby Mountains Ecoregion in northeast Nevada. This ecoregion supports mule deer, bighorn sheep, and mountain goats.

No significant impacts to ecoregions would be anticipated from the Proposed Action.

Wildlife

Wildlife can be expected to respond in a variety of ways to aircraft noise and visual cues. Numerous studies and opportunistic observations of low altitude overflights have been undertaken in the past thirty years that have resulted in empirical effects models, mostly simple thresholds. A threshold is a Lowest Observed Adverse Effects Level (LOAEL). As stated above, an assessment endpoint should include a significant level of effect (*e.g.*, a 20 percent decrement in hatchling survival) in its definition; however, there is no consensus in the regulatory community about the level of effect that is deemed important. As a practical matter, it is generally impossible to extrapolate from a particular level of effect on a behavioral endpoint to a particular level of effect on reproduction or abundance. Thresholds presented below are extracted from a study where effects were detected at a level of 5 percent or above. Exposures at which no effects occurred (*i.e.*, NOAELs) are also used in this assessment. The major stressors for which quantitative threshold models are available are (1) sound and (2) sound and visual stressors, combined (actual studies of overflights). Information compiled by Efromyson et al. (2000) is given in Appendix E for many of the animal types existing in these ecoregions and potentially exposed to aircraft noise. These tables are referenced to assist in the making the assessment determination in this section.

The ecoregions exposed to aircraft noise and aviation activity support a variety of birds, wildlife, and other small mammals. There would a combined average 9.26 flights per month for all aircraft on each MTR. Noise from these aircraft when at 300 feet AGL would range from SEL 96 to 107 dBA when the receptor is directly below the aircraft, SEL 91 to 102 dBA at 500 feet lateral distance, SEL 86 to 97 dBA at 1,000 feet lateral distance, and SEL 79 to 90 dBA at 2,000 feet lateral distance.

All the MTRs include populations of small mammals on the ground surface, small song birds at elevations near the desert floor, and raptors at higher elevations. The response of raptors to noise from various aircraft is shown in Appendix E, Table E-1. When comparing this data to noise mentioned in the preceding paragraph, some adverse affect to individual raptors could be expected when the receptor is directly below the aircraft and out to a lateral distance of 500 feet. However, the overall impact to raptor populations in the region would be minor due to the infrequent nature of the flights and the volume of territory not exposed to the aircraft noise. Few studies exist detailing the response of small birds to aircraft noise. It was found that California gnatcatchers reproduced near a military flying operation in places exceeding 80 db for several hours a day (Aubrey and Hunsaker, 1997). Studies showing the response of small mammals to aircraft noise can be found in Appendix E, Table E-4. Based on this data and the infrequent exposure, there is only slight potential adverse affect for a few individuals.

Populations of ungulates are recognized as being special features of the ecoregions underlying MTR Routes. The High Elevation Ruby Mountains Ecoregion underlying IR 281 supports mule deer, bighorn sheep, and mountain goats. Bighorn sheep and deer are also found in the Nevada Influenced Ranges Ecoregion underlying IR 275. Effects of aircraft noise on a number of ungulate species is given in Appendix E, Table E-3. Based on responses to aircraft and the noise in these studies, there would be no adverse affect to ungulates in these ecoregions for brief exposure they would experience.

No significant impacts to wildlife would be anticipated from the Proposed Action.

Threatened, Endangered, and Candidate Species

Species are considered if the IR route occurs in the county where the species is listed (other species that may occur in the area are shown in Table 3-10).

Southwestern willow flycatcher. There are no IR corridors over extensive riparian areas. There may be noise exposure laterally to isolated riparian habitats. Noise levels would in most cases would be less than 80 dBA coupled with an infrequency of flights at less than 9.26 per month. The potential for exposure to this species is very low. There is no IR corridor that would affect designated critical habitat along the 18.6 mile stretch of the Virgin River, from the Arizona/Nevada border to the upstream boundary of the

Overton State WMA. This species would not be adversely affected by aircraft using these MTR corridors.

Greater sage grouse. Sage brush is the predominant plant community under the IRs. Since this is the primary habitat for the greater sage grouse and the species is widely distributed across the region, it is likely that the grouse would be exposed to noise levels directly under the aircraft as well as laterally from the aircraft. The general (*i.e.,* yearlong) distribution and nesting areas of the greater sage grouse is shown on Figures 4-1 and 4-2, respectively.

All routes cross the general habitat except for the portions of the routes in the western section of central Nevada. Nesting areas are less concentrated under the flight corridor than shown for general activity or distribution. It appears that the nesting birds are concentrated more along the foothills. These nesting birds are more likely to be exposed to a lower level of lateral noise than direct noise under the aircraft.

Table 4-1 identifies noise levels for the various aircraft for levels below and lateral to the aircraft. Noise levels for most aircraft at a lateral distance of 2,000 feet are 80 dBA or below. There are no studies on effects of aircraft noise on this species. However, the effects of aircraft overflight and aircraft noise for a similar species has been reported. A USFWS study on the effects of low altitude aircraft on Attwater's prairie chicken showed no adverse impact (Gladwin *et al.,* 1988). A comprehensive study was conducted to determine the response of the lesser prairie chicken on leaks to aerial surveys using R-22 and R-44 helicopters (McRoberts *et al.,* 2011). These studies showed that there was occasional flushing of a few individuals from the leks. These birds would return within an hour. When subsequent exposures were made, flushing did not occur. This may have been due to habituation or likely a different sensitivity condition in the lekking period. Biologists did not observe a single instance of the lesser-prairie chicken abandoning a lek as a result of aerial surveys. Noise intensity for the R-44 and R-22 helicopters was 81.9 and 81.3 db, respectively. No flushing of lesser prairie chicken lekking was observed from a Cessna 172 at 50 meters overhead for five responses.

This potential noise and visual effect from aircraft flying these MTRs would be brief and infrequent. Only 9.26 flights per month would be flown for each route. The response to the low flying aircraft would be expected to be similar to that of the Attwater's prairie chicken and lesser-prairie chicken in response to helicopter flights. Like other bird species, there would likely be a temporary effect on individual bird behavior. This species would not be adversely affected by aircraft using these MTR corridors.

Yellow-billed cuckoo. There are no IR corridors over extensive riparian areas. There is a potential for exposing riparian areas laterally from IR 281 in the Fallon area where the species has been documented. However, exposure to these noise levels would be infrequent and the levels would be below SEL 80 dBA. This species would not be adversely affected by aircraft using these MTR corridors.

Columbia spotted frog. Occurrences of this frog may occur in ecoregions underlying several IR routes. Bryce et al. (1999) have identified the Upper Humboldt Plains and Central Nevada Mid Slope Woodland and Brushland as ecoregions for potential occurrence of this species. IRs 275 and 281 traverse the Upper Humboldt Plains for some distance. There are only intermittent crosses of the Nevada Mid Slope Woodland and Brushland by the other IRs. Although the effects of noise on amphibians have not been extensively studied, results of one study is provided in Appendix E (Table E-5). Due to the infrequency of flights and limited potential for exposure to aircraft, adverse impacts to the Columbia spotted frog are unlikely. This species would not be adversely affected by aircraft using these MTR corridors.

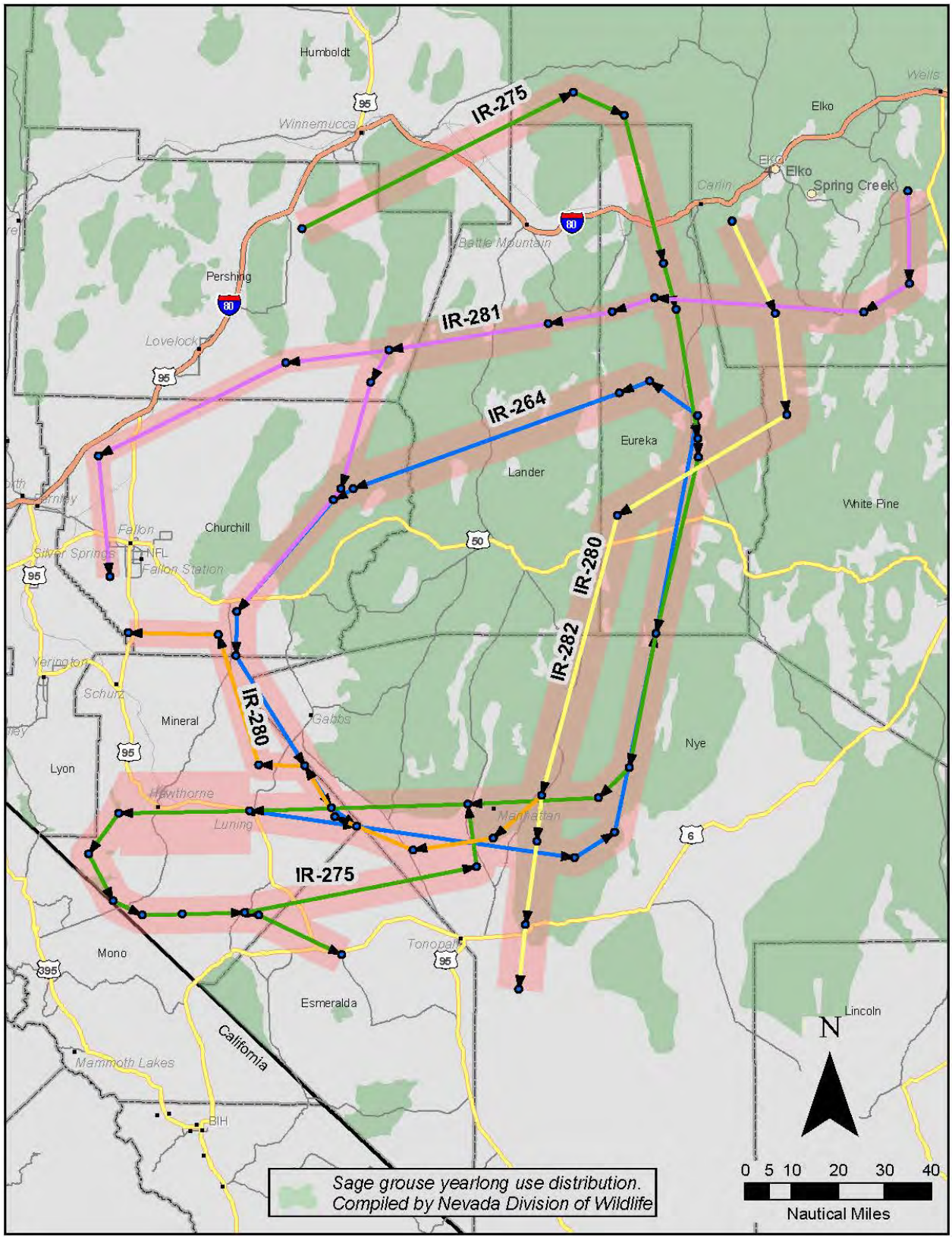

Figure 4-1. Yearlong Distribution of Greater Sage Grouse in Central Nevada

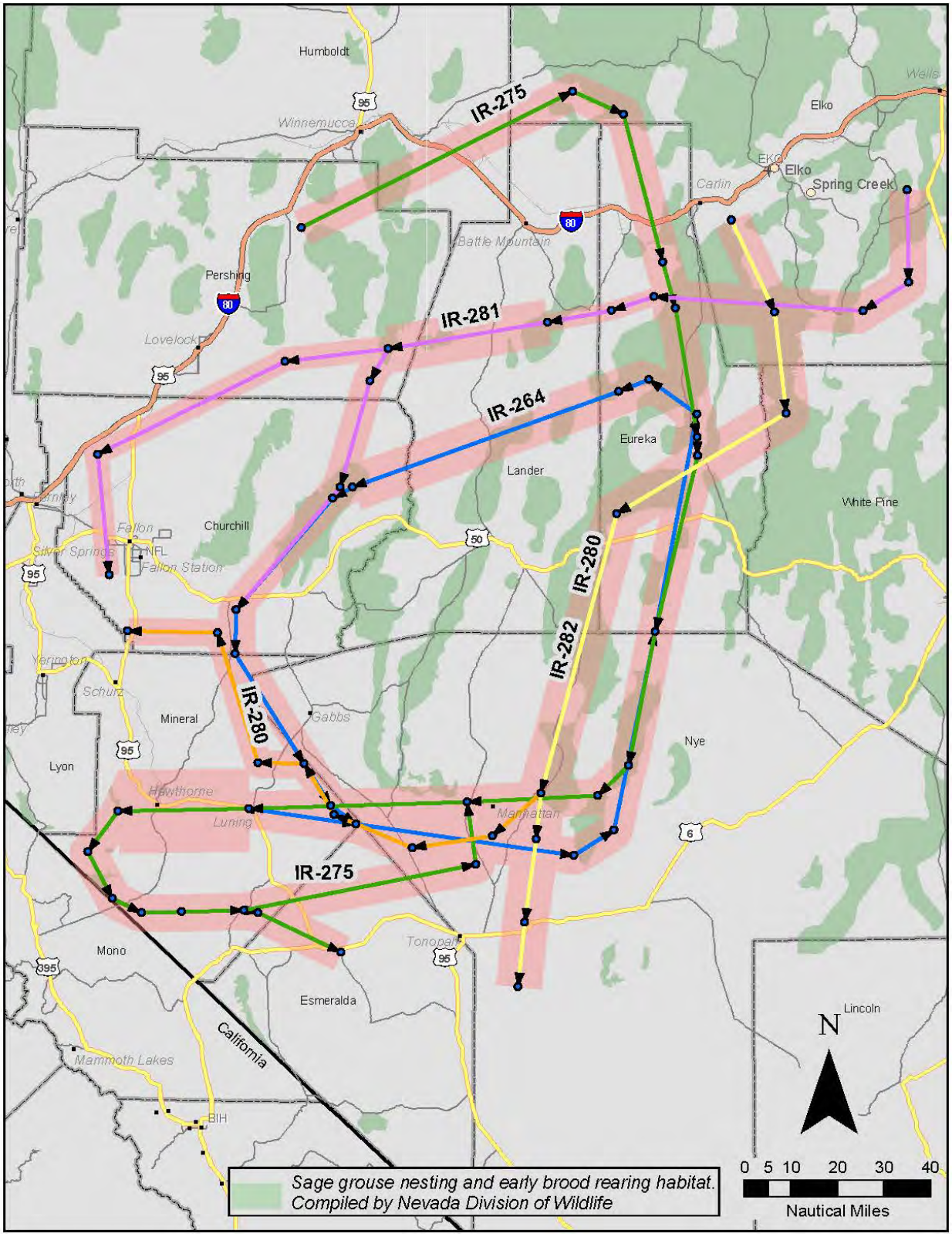

Figure 4-2. Nesting and Early Brood Rearing Areas for Greater Sage Grouse in Central Nevada

Bald and Golden Eagle

It is estimated that from 60 to 200 bald eagles occur in the state. The Nevada USFWS office reports that these raptors occur throughout the state. However, large concentrations may be found along Lake Meade and in the Carson Valley. There are no known nesting areas or concentrated staging areas near any of the routes that would be affected laterally or directly below the MTR corridors. Based on informational studies in Appendix E, Table E-1, flushing from the nest or other activity does occur in some eagles due to aircraft noise and activity. While the potential exposure of eagles to aircraft noise within these corridors is low due to few birds and infrequent flights, there would likely be some individual bird responses. Only 9.26 flights per month are projected for each corridor. There would be no adverse impact on population for these two species.

Protected Natural Areas

The Stillwater NWR complex lies between segments G–H and R-T of IR 281 in western Nevada. Another NWR, the Ruby Lake NWR, lies at the southern end of the Ruby Valley in northeast Nevada (USFWS, 2011e). The northern portion of the refuge lies under IR 281 segments C-D. These NWRs are located in the wetland ecoregion. While IR 281 does not overlie the Stillwater refuge complex, there is a potential for impact due to the large number of waterfowl attracted to the area and bird movement locally and during bird migration. The effects of noise on waterfowl from aircraft are given in Appendix E, Table E-2. Based on responses in birds from these observations and the bird activity in the area, there would likely be some temporary disturbance of bird flocks or individuals due to noise or visual cues. Because noise levels would be below SEL 90 dBA at 2,000 feet lateral distance, it is unlikely that there would be disturbance of nesting species to the point where populations of birds species would be reduced. These effects would similar for both refuges.

Physical Collision with Birds

A bird population for a given species could be reduced if a high number of bird collisions for a species occurred in a given area. Also the effects could be adverse if such a population was at risk due to size of the population. For the Proposed Action, it is estimated C-17, C-130, and F-15 aircrews would fly a combined total of 621.3 hours annually on IRs 264, 275, 280, 281, and 282. Using this estimate of flying time and the Air Force-wide data for 2002 (*i.e.,* 0.0052 strikes per flying hour derived from USAF [2003c and USAF 2003d]), it is anticipated that about 3.2 bird-aircraft strikes would occur annually from aircraft operations on IRs 264, 275, 280, 281, and 282. It is anticipated that the altitude distribution of the bird-aircraft strikes would follow the data in Table 3-4. Data from the BAM model given in Appendix D indicate that the higher risk for bird strikes occurs during the overwintering migratory season and the highest risk occurs for IR 281, the route nearest wetland ecoregions. Based on the bird strike estimate above and the lack of a species of bird population at risk, the potential impact on bird populations from bird-aircraft strike is extremely low.

Domestic Animals

A majority of the literature reviewed indicates that domestic animals exhibit some behavioral responses to military overflights but generally seem to habituate to the disturbance over a period of time. Mammals in particular appear to react to noise at sound levels higher than 90 db with responses including the startle response, freezing (*i.e*., becoming temporarily stationary) and fleeing from the sound. Most species seem to readily acclimate to some form of sound disturbance. Although some studies have reported such primary and secondary effects such as reduced milk production, rate of milk release, and increased heart rate, the latter effects appear to represent a small percentage of the findings occurring in the existing literature. A majority of the studies reviewed suggest that there is little or no effect of aircraft noise on cattle. Horses have also been observed to exhibit random movements and biting/kicking behavior when exposed to aircraft overflights. However, no injuries or abortions have occurred. Habituation also seems to readily occur to these disturbances. Generally, the literature findings for swine appear to be similar to those reported for cows and horses (Wyle, 2008).

The potential noise effects on domestic animals from aircraft flying these MTRs would be brief and infrequent. Only 9.26 flights per month would occur on each route. Domestic animals (cows ,horses, and swine) would not be adversely affected by aircraft flying these MTR corridors.

4.2.5.2 Mitigation

There would be no significant impacts. No mitigation is recommended.

4.2.6 Cultural Resources

4.2.6.1 Archaeological Resources

Eighteen NRHP listed archaeological resources or sites were identified within the IRs 264, 275, 280, 281, and 282 corridors (see Table 3-11). The only potential impacts to archaeological resources as a result of operation of the Proposed Action would be from direct ground disturbance from aircraft accidents and noise-induced vibration. As discussed above, the probability of an adverse effect occurring to an archaeological site as a result of aircrafts accidents is very low. As shown on Table 4-1, the L_{max} for a C-17, C-130H, and F-15E at 300 feet directly overhead would be 101.4, 95.2, and 104.0 dBA, respectively. These maximum noise levels would be well below the threshold at which structural damage would occur (*i.e*., 130 dBA). Thus, no structural damage to archaeological resources (*i.e*., petroglyphs) from noise-induced vibration would be expected from C-17, C-130H, or F-15E operations on IRs 264, 275, 280, 281, and 282. No adverse archaeological impacts would be anticipated from the Proposed Action.

4.2.6.2 Historic Resources

One hundred twenty-three NRHP listed historic resources (including historic districts) were identified within the IR 264, 275, 280, 281, and 282 corridors (see Table 3-12). The only potential impacts to historic resources as a result of operation on the Proposed Action MTR would be from direct ground disturbance from aircraft accidents and noise-induced vibration. As discussed above, the probability of an adverse effect occurring to historic resources as a result of aircrafts accidents is very low.

Based on studies of noise overflight from B-52 aircraft as discussed in Subchapter 4.1.6, noise impacts to archaeological and historic resources are not expected as a result of low level subsonic aircraft overflight. The L_{max} generated by the C-17 (101 dBA at 300-feet AGL) on IRs 264, 275, 280, 281, and 282 would be less than the 113 dBA generated by B-52 aircraft in the study (USAF, 1997). As shown on Table 4-1, the L_{max} for a C-17, C-130H, and F-15E at 300 feet directly overhead would be 101, 95, and 104 dBA, respectively. These maximum noise levels would be well below the threshold at which structural damage would occur (*i.e*., 130 dBA). Thus, no structural damage to historic resources (*i.e.*, standing structures) from noise-induced vibration would be expected from C-17, C-130H, or F-15E operations on IRs 264, 275, 280, 281, and 282. No adverse impacts to historic resources would be anticipated from the Proposed Action.

4.2.6.3 Native American Interests

The Air Force has initiated Government-to-Government relationship requests with each of the tribes listed in Table 3-14 (see Appendix B), and has requested to consult with each tribe under Section 106 of the NHRP and other relevant Executive Orders regarding the Proposed Action. Initial steps in the consultation process are documented in Appendix B and will continue with publication of the Draft EA and FONSI for public review. To date, two of the tribes have expressed concerns as follows:

- The Duckwater Shoshone Tribe is concerned with expansion of tribal land adjacent to existing property, and the installation of a wind farm on tribal lands and the impact on low level-flights;
- The South Fork Bank Council expressed concern associated with elevation of the flight plan on tribal property and the impact on ranching.

It is unlikely that Travis AFB's use of an MTR over nearby property that the Duckwater Shoshone Tribe has identified for wind farm activities will impact either wind turbine development or the Base's use of the MTR. Travis AFB has extensive experience dealing with the impacts of wind farms on its air traffic control radar and its flight operations. Over 800 turbines are located in an area within 5 to 12 nautical miles of the Base's runways. Travis AFB has demonstrated an ability to work with wind turbine developers and to mitigate its flight operations to account for the location and effects of wind turbines. Otherwise, as indicated in Subchapter 4.1.6, it is unlikely use of the MTRs would affect tribal historic properties,cultural resources, or ranching activities as indicated earlier in Subchapter 4.2.5.1 (Domestic Animals).

4.2.6.4 Mitigation

There would be no significant impacts. No mitigation is recommended.

4.3 UNAVOIDABLE ADVERSE IMPACTS

4.3.1 Air Quality

The emission of air pollutants associated with C-17 training operations using the five MTRs in central Nevada would be an unavoidable condition, but would not considered significant and a Clean Air Act General Conformity Determination would not be required. Since the Proposed Action would be located in an area that is in attainment for all criteria pollutants and the increase in criteria pollutant emissions is less than 10 percent of baseline AQCR emissions, the Proposed Action in central Nevada has been demonstrated by USEPA standards not to cause or contribute to new violations of any national ambient air quality standard in the affected area. Although air pollutant emissions associated with the Proposed Action would be unavoidable, this impact would not be considered significant.

4.3.2 Emissions of Greenhouse Gases

Generation of greenhouse gases from C-17 training operations using the five MTRs in central Nevada would be an unavoidable condition, but would not be significant because it would represent approximately 0.0004 percent of the total GHG emissions generated in the U.S. in 2009. As discussed in Subchapter 4.2.4.2, no measureable impacts to global climate change would result from the Proposed Action.

4.3.3 Noise

Noise resulting from C-17 aircrew training activities using the five MTRs in central Nevada would be an unavoidable condition. Sleep disturbance, annoyance, and speech interference would not be expected. Neither noise induced hearing damage nor nonauditory health effects would occur. Disruptions to speech would be an unavoidable condition and last only as long as noise from the overflying aircraft remains at 66 dB or greater. To minimize the potential for noise impacts, C-17 aircrew training operations would be initiated and flown primarily over unpopulated areas. No structural damage would occur from aircraft noise at or around the airfield.

4.3.4 Biological Resources

The generation of intermittent noise from C-17 aircrew training activities would be an unavoidable condition. In general, military overflights within the IRs 264, 275, 280, 281, and 282 corridors would be infrequent, random, and pose no threat to wildlife at the behavioral (individual), population, or species level.

4.3.5 Energy Resources

The energy impacts associated with C-17 training operations using the five MTRs in central Nevada involve the use of aviation fuel which is not in short supply. The use of fossil fuels, a nonrenewable natural resource, by the Proposed Action would be considered an unavoidable adverse impact. Energy supplies, although relatively small, would be committed to the Proposed Action. The use of nonrenewable resources is unavoidable, although not considered significant.

4.3.6 Safety

The potential for aircraft mishaps is an unavoidable condition associated with the Proposed Action. Although the potential for this unavoidable situation would increase when compared to baseline conditions, the increase would not be considered significant.

4.4 RELATIONSHIP BETWEEN SHORT-TERM USES AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The Proposed Action would not result in intensification of land use within the IRs 264, 275, 280, 281, and 282 corridors in central Nevada. Implementation of the Proposed Action or No Action Alternative would not result in any loss of open space as a result of C-17 aircrew training activities. Therefore, it is not

anticipated that the Proposed Action or No Action Alternative would result in any cumulative land use or aesthetic impacts. Long-term productivity of land within the IRs 264, 275, 280, 281, and 282 corridors would not be affected by implementation of the Proposed Action.

4.5 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The irreversible environmental changes that would result from implementation of the Proposed Action involve consumption of energy and human resources. The use of this resource is considered to be permanent.

4.5.1 Energy Resources

Use of jet fuel associated with the Proposed Action represents an irreversible commitment of natural resources and would be irretrievably lost. To conserve energy, advance planning and maximization of training schedules would continue to be implemented for C-17 aircrew training. Consumption of jet fuel would not place a significant demand on their supply systems or within the region.

4.5.2 Land

Implementation of the Proposed Action or the No Action Alternative would not require construction of new facilities. Thus, no land would be lost to other uses.

4.5.3 Biological Habitat

Neither the Proposed Action nor the No Action Alternative Action would result in the destruction or loss of vegetation and wildlife habitat.

4.5.4 Human Resources

The use of human resources for C-17 aircrew training is considered an irretrievable loss only in that it would preclude the personnel from engaging in other work activities. However, the use of human resources for the Proposed Action contributes to C-17 aircrew proficiency, and is considered beneficial.

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CHAPTER 5
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CHAPTER 6
PERSONS AND AGENCIES CONSULTED

The following persons and agencies were consulted during preparation of this EA.

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CHAPTER 7
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APPENDIX A

INTERAGENCY AND INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING

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INTERAGENCY AND INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING

Air Force Instruction (AFI) 32-7060, *Interagency and Intergovernmental Coordination for Environmental Planning*, provides the procedures to comply with applicable federal, state, and local directives for Interagency and Intergovernmental Coordination for Environmental Planning (IICEP). The AFI implements the following:

- Air Force Planning Document 32-70, *Environmental Quality*;
- Department of Defense (DoD) Directive 4165.61, Intergovernmental coordination of DoD Federal Development Programs and Activities;
- Executive Order 12372, Intergovernmental Review of Federal Programs;
- Title IV of the Intergovernmental Coordination Act (ICA) of 1968; and
- Section 204 of the Demonstration Cities and Metropolitan Development Act of 1966.

Section 401(b) of the ICA states that, "All viewpoints-national, regional, state, and local…will be fully considered…when planning Federal or federally assisted development programs and projects."

To comply with the IICEP, Travis AFB notified 24 agencies in Nevada of the intent to prepare an EA for its proposed use of IRs 264, 275, 280, 281 and 282 for C-17 aircrew training. The letter to the agencies and the distribution list are contained in this appendix. One response letter from the Nevada Department of Wildlife (dated July 5, 2011) has been received to date. Comments in this letter have been incorporated into this EA.

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DEPARTMENT OF THE AIR FORCE
60TH CIVIL ENGINEER SQUADRON (AMC)

10 JUN 2011

MEMORANDUM FOR ATTACHED DISTRIBUTION LIST

FROM: 60 CES/CEA
411 Airman Drive
Travis AFB CA 94535-2001

SUBJECT: Environmental Assessment for Travis AFB C-17 Use of Instrument Routes 264, 275, 280, 281 and 282

The U.S. Air Force is preparing an Environmental Assessment (EA) for the proposed use of five Central Nevada military training routes (MTRs) by C-17 aircrews from Travis Air Force Base (AFB), California as depicted in the attached Figures 1 and 2. The MTRs will serve as Instrument Routes (IRs) and are designated IR 264, IR 275, IR 280, IR 281 and IR 282. The need arises from the requirement for C-17 aircrews at Travis AFB to maintain proficiency in low-level navigation skills. Frequent, unrestricted use of dedicated low-level MTRs and, more importantly IRs with varied terrain, is essential. These MTRs previously originated and were scheduled out of Mountain Home AFB in Idaho and were flown predominantly by bomber aircraft such as B-1s and B-52s. They became inactive and, in 2006, Travis AFB assumed the originating and scheduling responsibilities through an Air Force-wide review and reallocation process. An Environmental Assessment is being prepared to assess the potential impacts of C-17s flying these MTRs. A June 2003 Environmental Assessment for the West Coast Basing of C-17 Aircraft evaluated 16 MTRs for use by the Travis based C-17 aircrews, however, the MTRs evaluated were not dedicated to Travis, are heavily used and must be scheduled through other installations.

The five MTRs listed above are divided into segments allowing for multiple entrance and exit points. This allows aircrews to enter a training route without committing to fly the entire route. When flying IRs, aircraft fly down to 300 feet above ground level. When flying the IR under Instrument Flight Rules (IFR) aircraft maintain 2,000 feet above the highest obstacle (whether natural or man made) within that segment and airspeeds are in excess of 250 knots, or approximately 288 miles per hour mph.

It is unlikely that Travis AFB C-17 aircrews would fly any MTR in its entirety on a single training sortie. The likely scenario is that aircrews would plan to enter and exit a route at published alternate entry and exit points and fly segments of the routes during planned sorties. Each route has numerous entry and exit points that increase the options available to the crews for use during a training sortie. Under this concept, aircrews could fly a portion of more than one route on a single sortie. Given the amount of options available with the five routes, flights using the same segments would be infrequent. For evaluation purposes, it is estimated that:

- Travis AFB C-17 aircrews would normally fly low routes two (2) times each weekday (Monday through Friday).

- Use of the five MTRs would be ten (10) sorties per week or 520 sorties per year.
- 75 percent (approximately 390 sorties per year) of the total sorties would be flown during the daytime (7:00 a.m. to 10:00 p.m.).,
- 25% (approximately 130 sorties per year) of the total sorties would be flown during the nighttime (10:00 p.m. to 7:00 a.m.).
- The number of annual sorties for each of the five routes would be 104 (78 daytime and 26 nighttime) assuming equal distribution of sorties.

Aircraft would file a flight plan and get to and from the routes via normal air traffic control routing. No modification of the currently published route structures would be necessary (i.e., there would be no change to the MTR widths, upper and lower altitude limits, or alternate entry and exit points).

In accordance with Executive Order 12372, Intergovernmental Review of Federal Programs, we request your participation and solicit comments on the Proposed Action (your agency will be provided with a copy of the Draft EA at a later date). Comments may include any issues related to this EA. Please provide any comments no later than 30 days from the date of this letter directly to Mr. Chris Krettecos, 60 CES/CEAO, 411 Airman Drive, Travis AFB, CA 94535-2001.

Additionally, we solicit your assistance to identify any resources within your agency's purview that may be impacted. We also request point-of-contact information, relevant documentation available that would assist in preparing the EA, or identification of any other major projects you are aware of that may contribute to cumulative effects and would facilitate cumulative impact analysis for this EA. The environmental analysis will focus on potential impacts to: airspace operations (to include aircraft safety and bird/wildlife aircraft strike hazard); noise; land use; air quality; biological resources; cultural resources; and, environmental justice and the protection of children.

If members of your staff have any questions on this EA, please contact Mr. Chris Krettecos at (707) 424-7517.

Sincerely,

DAVID H. MUSSELWHITE, GS-13, DAF
Chief, Asset Management

3 Attachments
1. Figure 1
2. Figure 2
3. Distribution List

Figure 1. Project Location Map

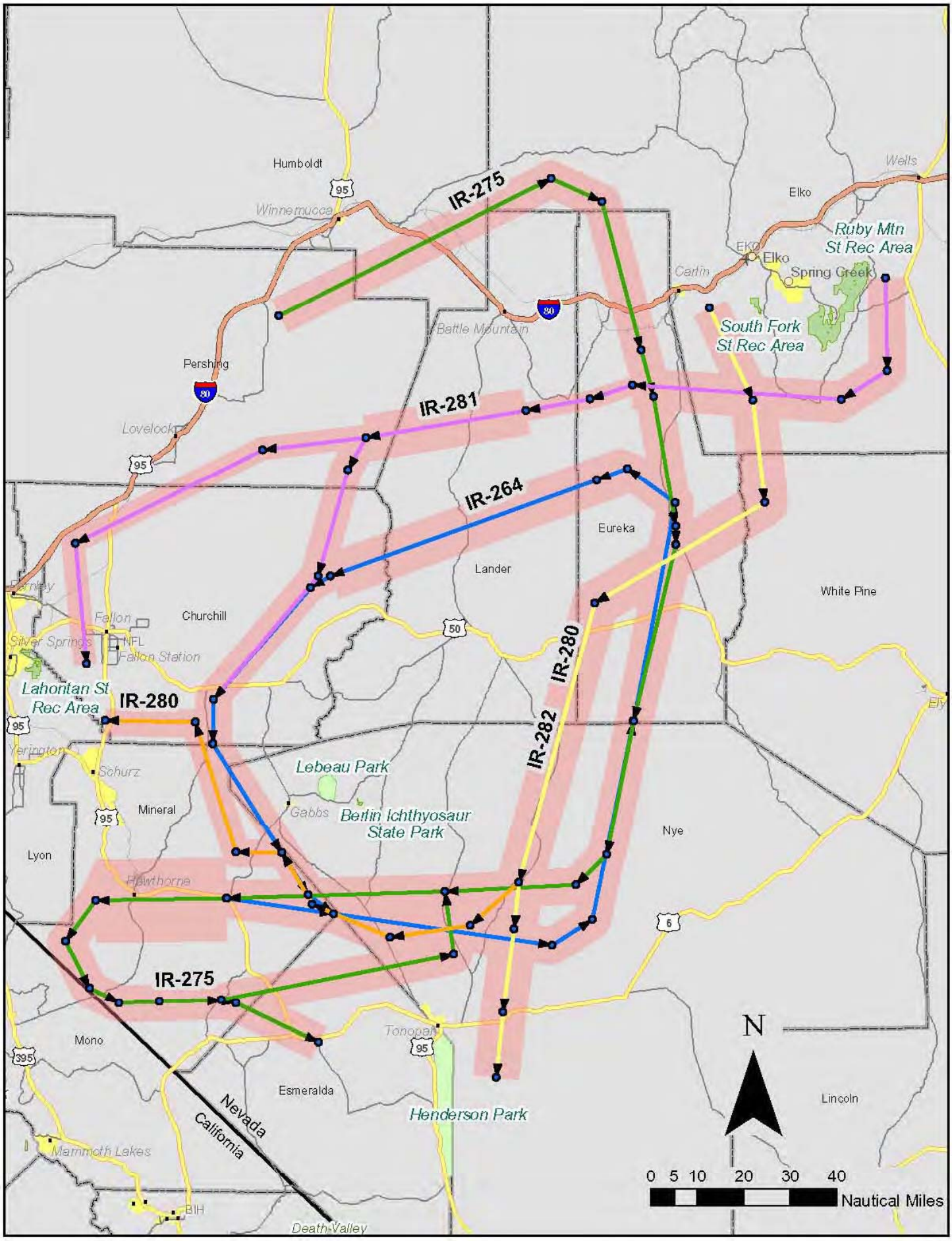

Figure 2. Location of Instrument Routes 264, 275, 280, 281, and 282

Distribution List	
Mr. William C. Withycombe FAA Western Pacific Region P.O. Box 92007 Los Angeles, CA 90009-2007	Air Force Western Regional Environmental Office Attn: Gary Munsterman, AFCEE/RO-W 50 Fremont Street, Suite 2450 San Francisco, CA 94105
U.S. Fish and Wildlife Service, Region 8 Attention: Ecological Services, Jana Affonso Federal Building 2800 Cottage Way, Room W-2606 Sacramento, CA 95825-1846	Kathy Goforth U.S. Environmental Protection Agency Pacific Southwest, Region 9 75 Hawthorne Street, CED-2 San Francisco, CA 94105
Nevada Department of Wildlife Headquarters, Western Region 1100 Valley Rd. Reno, NV 89512	California Department of Fish and Game Region 6 – Inland Deserts Region 3602 Inland Empire Boulevard, Suite C-220 Ontario, CA 91764
Mr. Ronald James, SHPO Historic Preservation Office 100 North Stewart Street Capitol Complex Carson City, NV 89701-4285	Mr. Milford Wayne Donaldson, SHPO Office of Historic Preservation Department of Parks & Recreation 1725 23rd Street, Suite 100, Sacramento, CA 95816
Nevada State Clearinghouse 209 E. Musser Street, Room 200 Carson City, Nevada 89701-4298	State Clearinghouse P.O. Box 3044 Sacramento, CA 95812-3044
Esmerelda County Commissioners P.O. Box 517 Goldfield, NV 89013	Steve P. Osborne Nye County –Tonopah/Pahrump Planning Offices 250 N. Hwy 160, Suite 1 Pahrump, NV 89060
Mark Nixon Mineral County Planning Commission P.O. Box 85 Hawthorne, NV 89415	Eureka County Planning Commission P.O. Box 596 Eureka, NV 89316
Humboldt County Planning Director Planning and Zoning Department 50 W. 5th Street Winnemuca, NV 89445	Elko County Planning & Zoning Department 571 Idaho Street Elko, NV 89801
White Pine County Community and Economic Development Department 957 Campton Street Ely, NV 89301	Michael K. Johnson Pershing County Planning and Building Department 398 Main Street Lovelock, NV 89419
Pershing County Regional Planning Commission 400 Main Street Lovelock, NV 89419	Ms. Eleanor Lockwood, Planning Director Churchill County Planning Department 155 N. Taylor, Suite 194 Fallon, NV 89406
Lander County Planning and Zoning Department 825 N. Second Street Battle Mountain, NV 89820	Mono County Community Development Planning Department 74 N. School Street Annex 1, 1st Floor Bridgeport, CA 93517

BRIAN SANDOVAL
Governor

STATE OF NEVADA

STEPHANIE DAY
Interim Director

DEPARTMENT OF ADMINISTRATION
209 E. Musser Street, Room 200
Carson City, Nevada 89701-4298
(775) 684-0222
Fax (775) 684-0260
nevadabudget.org

July 7, 2011

David Musselwhite
Travis Air Force Base
60 CES/CEA
411 Airman Drive
Travis AFB, CA 94535-2001

Re: SAI NV # **E2011-169**

Reference: **EA for C-17s in IRs 264, 275, 280, 281, and 282**

Project: **Scoping for Travis Air Force Base C-17s Use of Five Central Nevada Military Training Routes**

Dear David Musselwhite:

Enclosed are comments from the agencies listed below regarding the above referenced document. Please address these comments or concerns in your final decision.

Department of Wildlife, Director's Office

Division of State Lands

This represents the comments provided to the State Clearinghouse regarding the referenced document, but does not purport to represent an exhaustive list of requirements that may be imposed by state agencies on this undertaking. Further, this document does not supersede existing regulatory requirements that may apply to your undertaking. If you have questions, please contact me at (775) 684-0213.

Sincerely,

Maud Naroll

Maud Naroll
Nevada State Clearinghouse

BRIAN SANDOVAL
Governor

STATE OF NEVADA
DEPARTMENT OF WILDLIFE
1100 Valley Road
Reno, Nevada 89512
(775) 688-1500 • Fax (775) 688-1595

KENNETH E. MAYER
Director
RICHARD L. HASKINS, II
Deputy Director
PATRICK O. CATES
Deputy Director

July 5, 2011

SAI#: E2011-169

Mr. Chris Krettecos
60 CES/CEAO
411 Airman Drive
Travis AFB, CA 94535-2001

Re: Preparation of an Environmental Assessment (EA) for Proposed Use of Five Central Nevada Military Training Routes (MTRs) by C-17 Crews from Travis Air Force Base

Dear Mr. Krettecos

The Nevada Department of Wildlife (NDOW) welcomes this opportunity in providing input to the subject EA process. While appreciating the need for our country's military to be proficient in accomplishing its mission, NDOW is interested in the variety of land use values and activities potentially affecting Nevada's wildlife resources. Perusal of the Air Force's memorandum (dated 10 June 2011) and the two accompanying figures piqued a need for further clarification of spatial and temporal usage regarding the proposed Instrument Routes (IRs). Presently, at least two avian species were identified to which there is uncertain potential for direct and cumulative effects associated with the proposed IR designations and use. The need arose mindful of the heightened sensitivity by the U.S. Fish & Wildlife Service (USFWS) for Bald and Golden Eagle protection and a final determination expected in 2015 as to whether protection is warranted for the Greater Sage-grouse under the federal Endangered Species Act (ESA).

As you may be aware, Nevada supports populations, either seasonal, resident, or both for these species. NDOW is greatly concerned of the possible ESA-listing of the Greater Sage-grouse and the implicated management and land use restrictions it would bring. A great deal of on-the-ground, population level planning has been underway, facilitated by the Governor's Sage-Grouse Conservation Team. Guidance for avoiding conflicts with Bald and Golden Eagles relative to wind energy facilities raised the notch for consideration of these large raptors. Coincidence of nesting and foraging areas with the proposed IR's is of potential concern. With this in mind, NDOW would request the opportunity to consult and cooperate with the Air Force and USFWS for GIS information sharing in the prospect of improved understanding in how to avoid or minimize possible significant impacts to wildlife.

We look forward to working with the Air Force and the USFWS. Please contact me at 775-688-1561 or by email at ssiegel@nodow.org for further assistance. Thank you again for keeping us informed of presently proposed and future projects having potential for influencing the health and sustainability of the State's wildlife resources.

Sincerely,

Steven Siegel
Habitat Staff Specialist

Nevada State Clearinghouse

From: Skip Canfield
Sent: Wednesday, June 29, 2011 9:12 AM
To: Nevada State Clearinghouse
Subject: RE: E2011-169 Scoping for Travis Air Force Base C-17s Use of Five Central Nevada Military Training Routes -

The Nevada Division of State Lands has no comment on this proposal and defers to the respective counties that these flights traverse.

Skip Canfield

From: Nevada State Clearinghouse
Sent: Thursday, June 16, 2011 4:49 PM
To: Skip Canfield
Subject: E2011-169 Scoping for Travis Air Force Base C-17s Use of Five Central Nevada Military Training Routes -

NEVADA STATE CLEARINGHOUSE
Department of Administration, Budget and Planning Division
209 East Musser Street, Room 200, Carson City, Nevada 89701-4298
(775) 684-0213 Fax (775) 684-0260

TRANSMISSION DATE: 6/16/2011

Division of State Lands

Nevada SAI # E2011-169

Project: Scoping for Travis Air Force Base C-17s Use of Five Central Nevada Military Training Routes

Follow the link below to download an Adobe PDF document concerning the above-mentioned project for your review and comment.
E2011-169

Please evaluate it with respect to its effect on your plans and programs; the importance of its contribution to state and/or local areawide goals and objectives; and its accord with any applicable laws, orders or regulations with which you are familiar unless those regulations and/or laws require direct consultation with your agency.

Please submit your comments no later than Tuesday, July 5, 2011.

Use the space below for short comments. If significant comments are provided, please use agency letterhead and include the Nevada SAI number and comment due date for our reference.

Clearinghouse project archive

Questions? Maud Naroll, (775) 684-0223 or clearinghouse@state.nv.us

____No comment on this project ____Proposal supported as written

AGENCY COMMENTS:

Signature:

Date:

Distribution: Sandy Quilici, Department of Conservation & Natural Resources
Gary Derks, Division of Emergency Management
David Mouat, Desert Research Institute
Nancy Boland, Esmeralda County
Chad Hastings, Fire Marshal
Kirk Bausman, Hawthorne Army Depot
Skip Canfield, AICP, Division of State Lands
Cory Lytle, Lincoln County
Zip Upham, NAS Fallon
Ed Rybold, NAS Fallon
Terri Compton, Department of Transportation
Timothy Mueller, Department of Transportation
Bill Thompson, Department of Transportation, Aviation
Steve Siegel, Department of Wildlife, Director's Office
Alan Jenne, Department of Wildlife, Elko
D. Bradford Hardenbrook, Department of Wildlife, Las Vegas
Craig Stevenson, Department of Wildlife, Las Vegas
Robert Martinez, Division of Water Resources
Tod Oppenborn, Nellis Air Force Base
Ms. Deborah MacNeill, Nellis Air Force Base
William Cadwallader, Nellis Air Force Base
99ABW, Nellis Air Force Base
Octavious Q. Hill, Nellis Air Force Base
James D. Morefield, Natural Heritage Program
Linda Cohn, National Nuclear Security Administration
Jennifer Scanland, Division of State Parks
Mark Harris, PE, Public Utilities Commission
Jason Woodruff, Public Utilities Commission
Pete Konesky, State Energy Office
Tara Vogel, State Energy Office
Rebecca Palmer, State Historic Preservation Office
Terry Rubald, Nevada Department of Taxation, Local Government, Centrally Assessed Property
Clearinghouse, zzClearinghouse

APPENDIX B

NATIVE AMERICAN CONSULTATION

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NATIVE AMERICAN CONSULTATION

To ensure that any sites of traditional cultural value are identified and adequately considered under the Proposed Action, Travis AFB sent the consultation letters to Native American tribal groups to inform each group of the action and to request concerns regarding the Proposed Action. A copy of these consultation letters is included in this appendix. A log of communications with the Native American tribal groups is provided herein.

Tribal Consultation Record for Travis AFB C-17
Use of Instrument Routes 264, 275, 280, 281, and 282 in Central Nevada

#	Date	Method	To	Tribe	From	Remarks
1	11/1/2011	phone/email	Ms. Patricia Knight, Tribal Resources Manager	Duckwater Shoshone Tribe	Brian Sassaman, CEAN	Initial contact with Tribe regarding G2G/C-17 MTR. Concerns generated regarding expansion of tribal land adjacent to existing property and installation of wind farm on tribal lands and impact on low-level flights. Provided electronically copy of C-17 MTR map per Virginia Sanchez (Chairperson).
2	11/2/2011	phone/email	Ms. Tammy Sample, Tribal Administrator	Battle Mountain Band Council	Brian Sassaman, CEAN	Initial contact with Tribe regarding G2G/C-17 MTR. Ms. Sample requested a copy of the 8 Sep 11 G2G/C-17 MTR be sent electronically for review.
3	11/2/2011	phone/email	Ms. Echo Power, Admin Assistant	Elko Band Council	Brian Sassaman, CEAN	Initial contact with Tribe regarding G2G/C-17 MTR. Ms. Power took the necessary contact information and said she would have the Chairman Temoke contact me.
4	11/2/2011	phone/email	Ms. Sandra Barela, Tribal Coordinator	Ely Shoshone Tribe	Brian Sassaman, CEAN	Initial contact with Tribe regarding G2G/C-17 MTR. Ms. Barela requested a copy of the 8 Sep 11 G2G/C-17 MTR letter be sent electronically for review to her and the Tribal Chairperson, Alvin S. Marques.
5	11/2/2011	phone	No answer	Lovelock Paiute Tribe	Brian Sassaman, CEAN	Initial contact with Tribe regarding G2G/C-17 MTR. No answer, left message with receptionist.
6	11/3/2011	phone	Rosemary Bracher, Secretary Assistant	Fallon Paiute-Shoshone Tribe	Brian Sassaman, CEAN	Initial contact with Tribe regarding G2G/C-17 MTR. Spoke with secretary assistant and offered to send 8 Sep 11 G2G/C-17 letter electronically for review by Tribal Chairman, Alvin Moyle.
7	11/2/2011	phone	Ms. Desiree Beem, Tribal Administrator	South Fork Bank Council	Brian Sassaman, CEAN	Initial contact with Tribe regarding G2G/C-17 MTR. Spoke with Tribal Administrator, Ms. Desiree Beem. Letter was received by Tribe. Provided email address in the event that Tribal members have additional questions. Only concern at this time per Desiree involves elevation of flight plan or Tribal property and impact on ranching.

Tribal Consultation Record for Travis AFB C-17
Use of Instrument Routes 264, 275, 280, 281, and 282 in Central Nevada (Cont'd)

#	Date	Vehicle	To	Tribe	From	Remarks
8	11/2/2011	phone	Joe Moon, Receptionist	Te-Moak Tribe of Western Shoshone Indians	Brian Sassaman, CEAN	Initial contact with Tribe regarding G2G/C-17 MTR. Mr. Joe Moon requested a copy of the 8 Sep 11 G2G/C-17 MTR letter be sent electronically for review.
9	11/2/2011	phone	Ms. Sharon Thomas, Secretary	Walker River Paiute Tribe	Brian Sassaman, CEAN	Initial contact with Tribe regarding G2G/C-17 MTR. Ms. Thomas requested a copy of the 8 Sep 11 G2G/C-17 MTR be sent electronically for review.
10	11/2/2011	phone	Paula Salazar, Chairperson	Wells Indian Colony Band Council	Brian Sassaman, CEAN	Initial contact with Tribe regarding G2G/C-17 MTR. Ms. Paula Salazar requested a copy of the 8 Sep 11 G2G/C-17 MTR letter be sent electronically for review.
11	11/2/2011	phone	Mr. Marlin Thompson, Cultural Resources Manager	Yerinton Paiute Tribe of Yerington Colony and Campbell Ranch	Brian Sassaman, CEAN	Initial contact with Tribe regarding G2G/C-17 MTR. Spoke with receptionist, Vicky, how forwarded name and telephone number to Linda Howard (Chairperson) and Justin Whiteside (EPA Director). Later that day, Marlin Thompson (Cultural Resources Manager/NAGPAR) call and ask that the letter 8 Sep 11 G2G/C-17 letter be sent to him for review.
12	11/2/2011	phone	Ms. Bonny Bobb PhD, Tribal Administrator	Yomba Shoshone Tribe	Brian Sassaman, CEAN	Initial contact with Tribe regarding G2G/C-17 MTR. Ms. Bonny Bobb requested a copy of the 8 Sep 11 G2G/C-17 MTR letter be sent electronically for review.

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 60TH AIR MOBILITY WING (AMC)

0 8 SEP 2011

Colonel Dwight C. Sones
Commander
400 Brennan Circle
Travis AFB CA 94535

Honorable James Birchum, Chairman
Yomba Shoshone Tribe
H. C. 61 Box 6275
Austin NV 89310

Chairman Birchum

Travis Air Force Base (AFB) in California is currently preparing an Environmental Assessment to evaluate the potential for a new mission that proposes to utilize low-level navigation along five instrument routes in northwestern Nevada, as illustrated in the attached figure. Travis C-17 aircraft will be the primary user of existing Instrument Routes 264, 275, 280, 281, and 282.

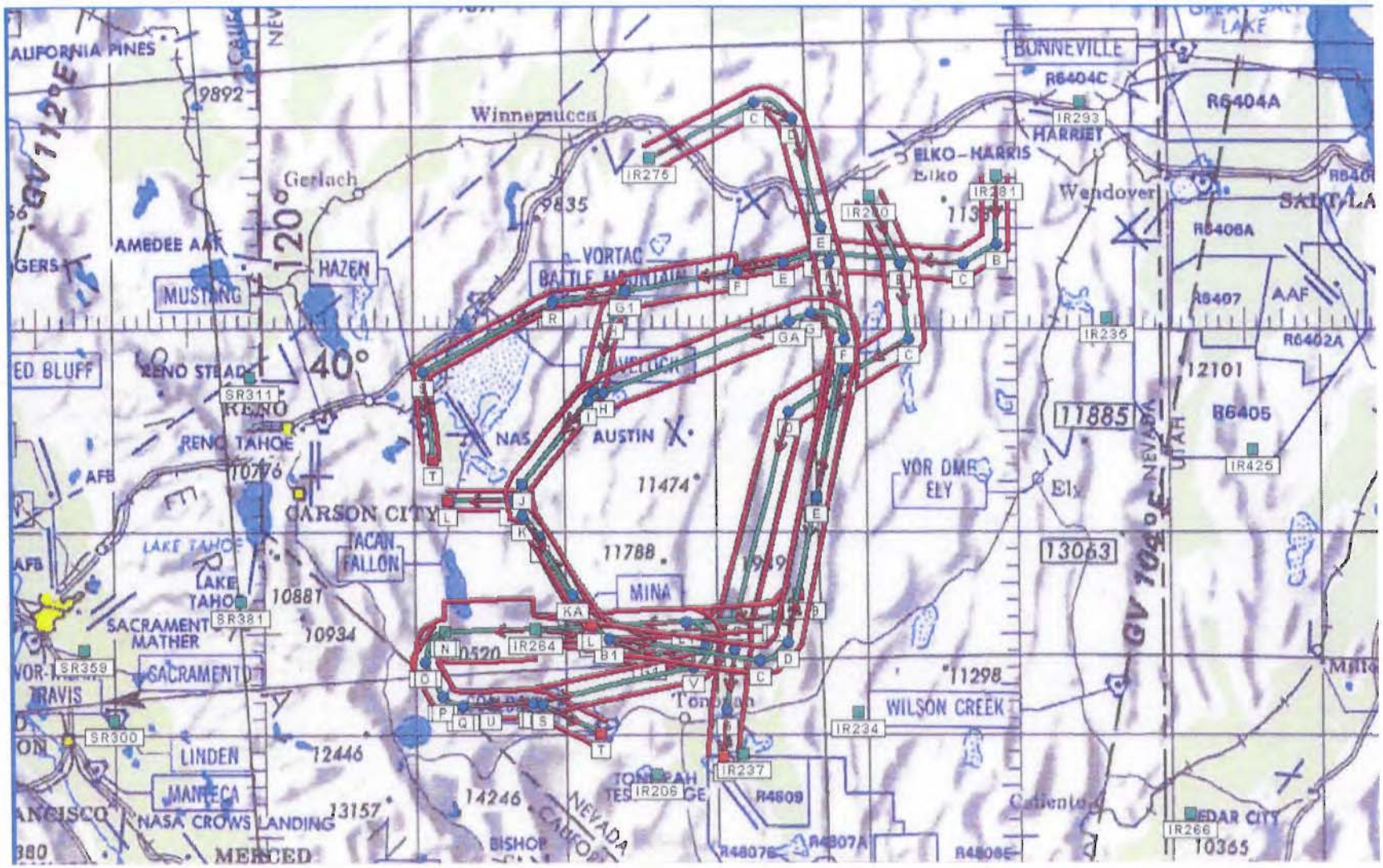
Please accept this letter to initiate a government-to-government relationship in order to discuss the proposed activities, address any concerns you might have regarding this project, and understand any potential effect upon your tribe's natural or cultural resources.

We will be contacting you to set up a meeting, and to designate appropriate contacts for future consultation between the Yomba Shoshone Tribe and Travis AFB. The phone number we have for you is 775-964-2463. If this is incorrect, please call my office at 707-424-2452 with your appropriate contact information. Thank you for your cooperation and interest in this matter.

Sincerely

DWIGHT C. SONES, Colonel, USAF
Commander

Attachment:
Location of Instrument Routes 264, 275, 280, 281, and 282



Location of Travis AFB C-17 Instrument Routes 264, 275, 280, 281, and 282

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 60TH AIR MOBILITY WING (AMC)

0 8 SEP 2011

Colonel Dwight C. Sones
Commander
400 Brennan Circle
Travis AFB CA 94535

Honorable Elwood L. Emm, Chairman
Yerington Paiute Tribe of Yerington Colony and Campbell Ranch
171 Campbell Lane
Yerington NV 89447

Chairman Emm

Travis Air Force Base (AFB) in California is currently preparing an Environmental Assessment to evaluate the potential for a new mission that proposes to utilize low-level navigation along five instrument routes in northwestern Nevada, as illustrated in the attached figure. Travis C-17 aircraft will be the primary user of existing Instrument Routes 264, 275, 280, 281, and 282.

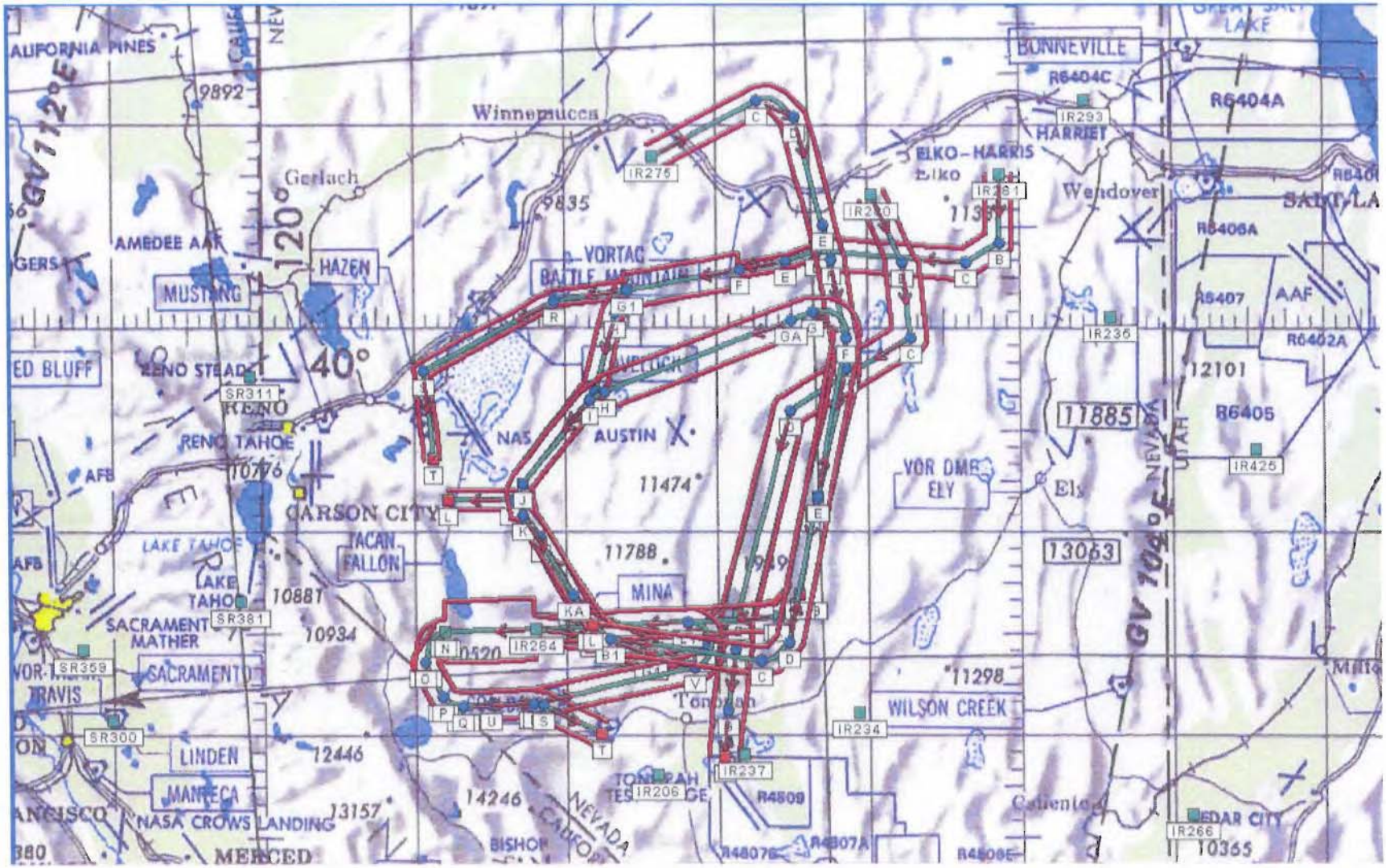
Please accept this letter to initiate a government-to-government relationship in order to discuss the proposed activities, address any concerns you might have regarding this project, and understand any potential effect upon your tribe's natural or cultural resources.

We will be contacting you to set up a meeting, and to designate appropriate contacts for future consultation between the Yerington Paiute Tribe of Yerington Colony and Campbell Ranch and Travis AFB. The phone number we have for you is 775-463-3301. If this is incorrect, please call my office at 707-424-2452 with your appropriate contact information. Thank you for your cooperation and interest in this matter.

Sincerely

DWIGHT C. SONES, Colonel, USAF
Commander

Attachment:
Location of Instrument Routes 264, 275, 280, 281, and 282



Location of Travis AFB C-17 Instrument Routes 264, 275, 280, 281, and 282

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 60TH AIR MOBILITY WING (AMC)

0 8 SEP 2011

Colonel Dwight C. Sones
Commander
400 Brennan Circle
Travis AFB CA 94535

Honorable Paula Salazar, Chairperson
Wells Indian Colony Band Council
P.O. Box 809
Wells NV 89835

Chairperson Salazar

Travis Air Force Base (AFB) in California is currently preparing an Environmental Assessment to evaluate the potential for a new mission that proposes to utilize low-level navigation along five instrument routes in northwestern Nevada, as illustrated in the attached figure. Travis C-17 aircraft will be the primary user of existing Instrument Routes 264, 275, 280, 281, and 282.

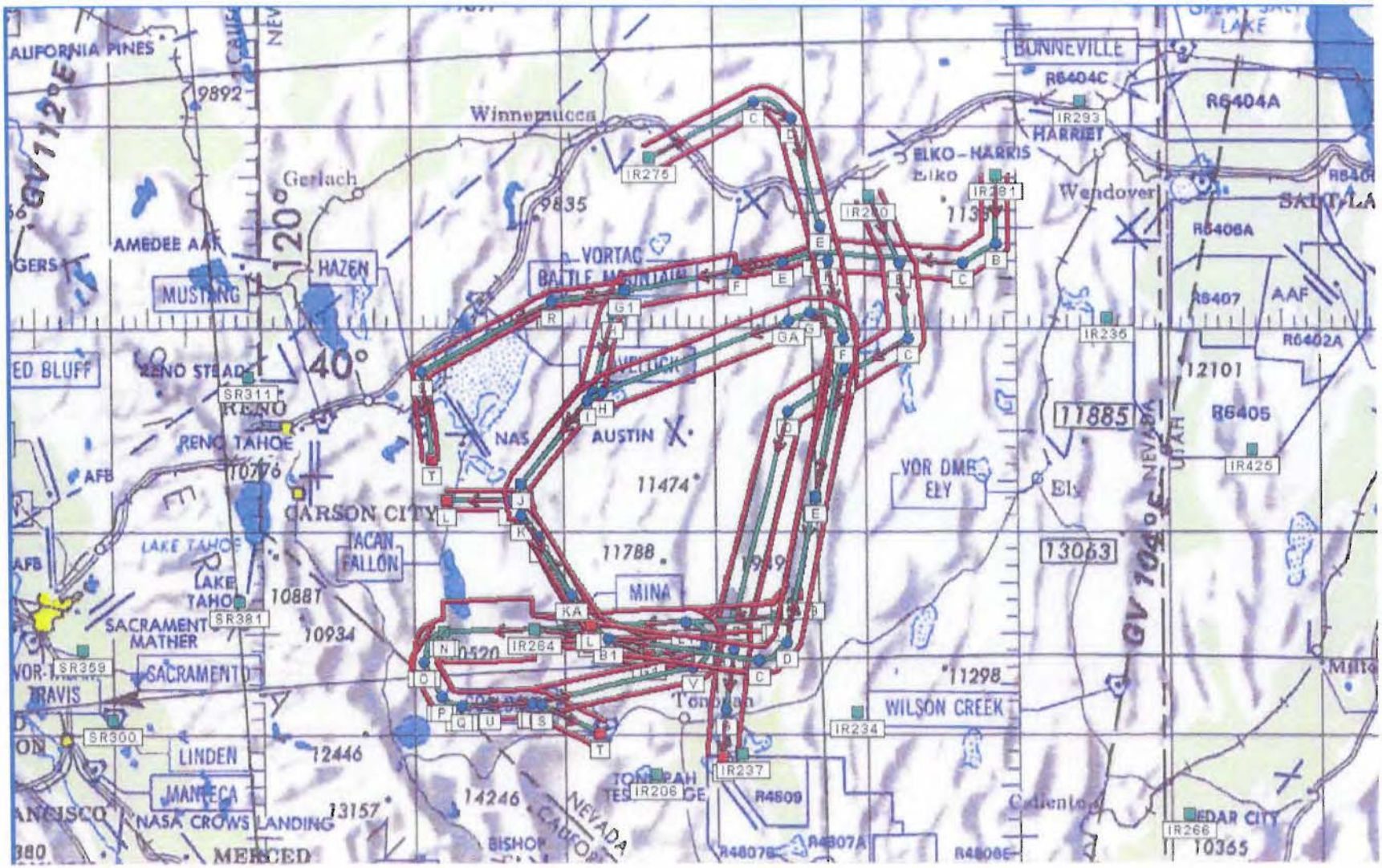
Please accept this letter to initiate a government-to-government relationship in order to discuss the proposed activities, address any concerns you might have regarding this project, and understand any potential effect upon your tribe's natural or cultural resources.

We will be contacting you to set up a meeting, and to designate appropriate contacts for future consultation between the Wells Indian Colony Band Council and Travis AFB. The phone number we have for you is 775-752-3045. If this is incorrect, please call my office at 707-424-2452 with your appropriate contact information. Thank you for your cooperation and interest in this matter.

Sincerely

DWIGHT C. SONES, Colonel, USAF
Commander

Attachment:
Location of Instrument Routes 264, 275, 280, 281, and 282



Location of Travis AFB C-17 Instrument Routes 264, 275, 280, 281, and 282

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 60TH AIR MOBILITY WING (AMC)

0 8 SEP 2011

Colonel Dwight C. Sones
Commander
400 Brennan Circle
Travis AFB CA 94535

Honorable Melanie McFalls, Chairperson
Walker River Paiute Tribe
P.O. Box 220
Schurz NV 89427

Chairperson McFalls

Travis Air Force Base (AFB) in California is currently preparing an Environmental Assessment to evaluate the potential for a new mission that proposes to utilize low-level navigation along five instrument routes in northwestern Nevada, as illustrated in the attached figure. Travis C-17 aircraft will be the primary user of existing Instrument Routes 264, 275, 280, 281, and 282.

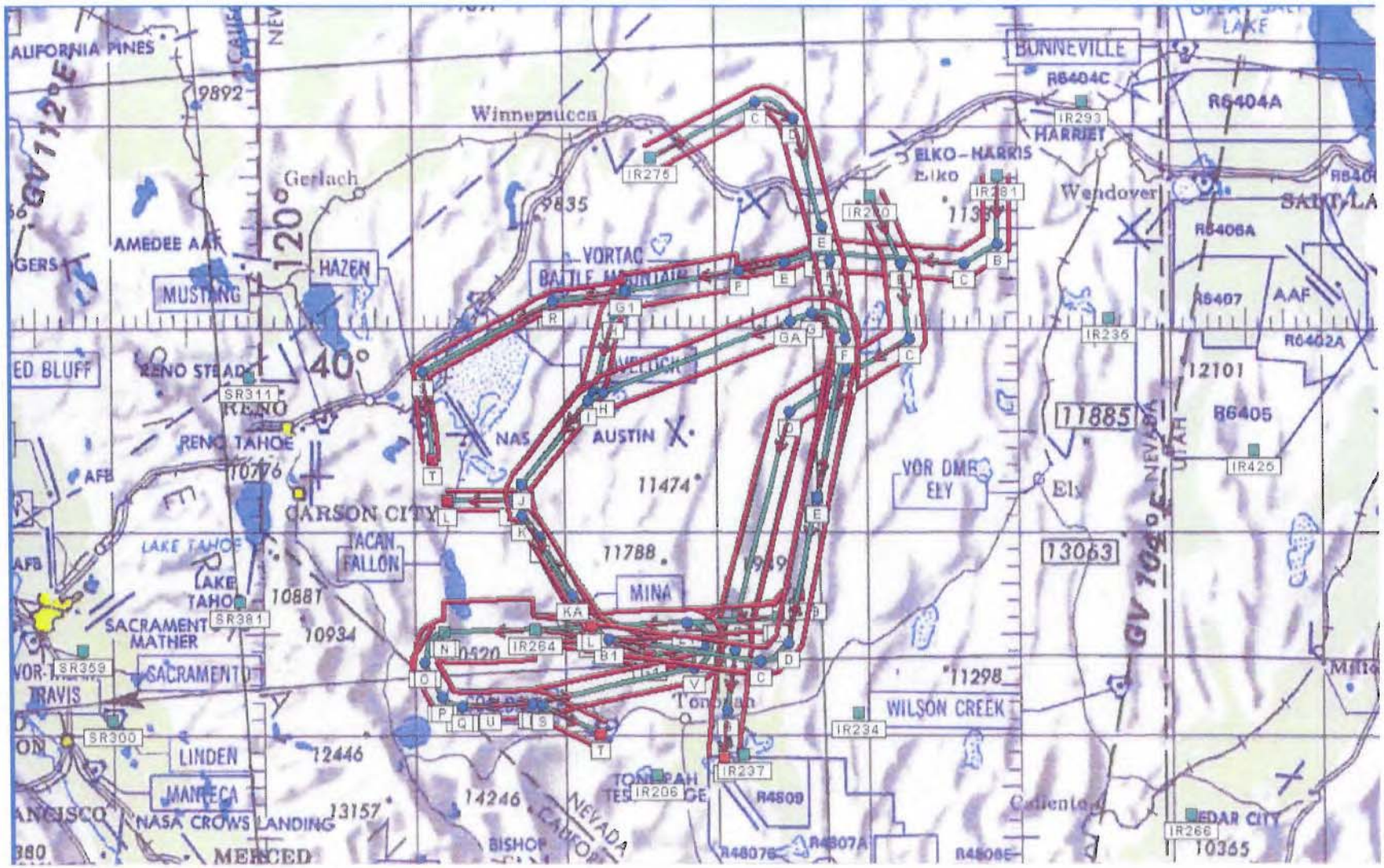
Please accept this letter to initiate a government-to-government relationship in order to discuss the proposed activities, address any concerns you might have regarding this project, and understand any potential effect upon your tribe's natural or cultural resources.

We will be contacting you to set up a meeting, and to designate appropriate contacts for future consultation between the Walker River Paiute Tribe and Travis AFB. The phone number we have for you is 775-773-2306. If this is incorrect, please call my office at 707-424-2452 with your appropriate contact information. Thank you for your cooperation and interest in this matter.

Sincerely

DWIGHT C. SONES, Colonel, USAF
Commander

Attachment:
Location of Instrument Routes 264, 275, 280, 281, and 282



Location of Travis AFB C-17 Instrument Routes 264, 275, 280, 281, and 282

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 60TH AIR MOBILITY WING (AMC)

0 8 SEP 2011

Colonel Dwight C. Sones
Commander
400 Brennan Circle
Travis AFB CA 94535

Honorable Bryan Cassadore, Chairman
Te-Moak Tribe of Western Shoshone Indians
565 Sunset Street
Elko NV 89801

Chairman Cassadore

Travis Air Force Base (AFB) in California is currently preparing an Environmental Assessment to evaluate the potential for a new mission that proposes to utilize low-level navigation along five instrument routes in northwestern Nevada, as illustrated in the attached figure. Travis C-17 aircraft will be the primary user of existing Instrument Routes 264, 275, 280, 281, and 282.

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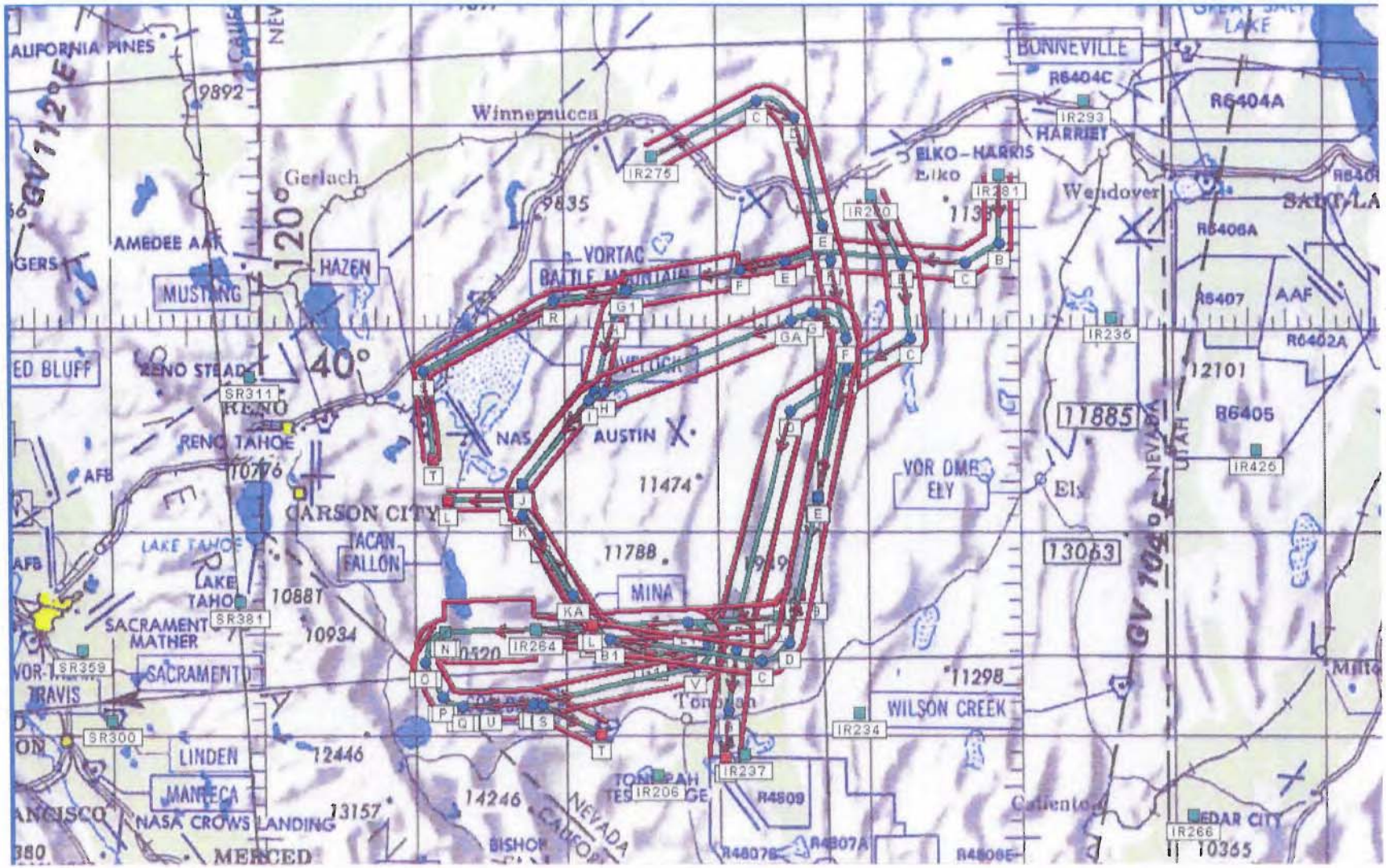
We will be contacting you to set up a meeting, and to designate appropriate contacts for future consultation between the Te-Moak Tribe of Western Shoshone Indians and Travis AFB. The phone number we have for you is 775-738-9251. If this is incorrect, please call my office at 707-424-2452 with your appropriate contact information. Thank you for your cooperation and interest in this matter.

Sincerely

DWIGHT C. SONES, Colonel, USAF
Commander

Attachment:
Location of Instrument Routes 264, 275, 280, 281, and 282



Location of Travis AFB C-17 Instrument Routes 264, 275, 280, 281, and 282

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 60TH AIR MOBILITY WING (AMC)

0 8 SEP 2011

Colonel Dwight C. Sones
Commander
400 Brennan Circle
Travis AFB CA 94535

Honorable Sim Malotte, Chairman
South Fork Band Council
H.C. 30 Box B-13
Spring Creek NV 89815

Chairman Malotte

Travis Air Force Base (AFB) in California is currently preparing an Environmental Assessment to evaluate the potential for a new mission that proposes to utilize low-level navigation along five instrument routes in northwestern Nevada, as illustrated in the attached figure. Travis C-17 aircraft will be the primary user of existing Instrument Routes 264, 275, 280, 281, and 282.

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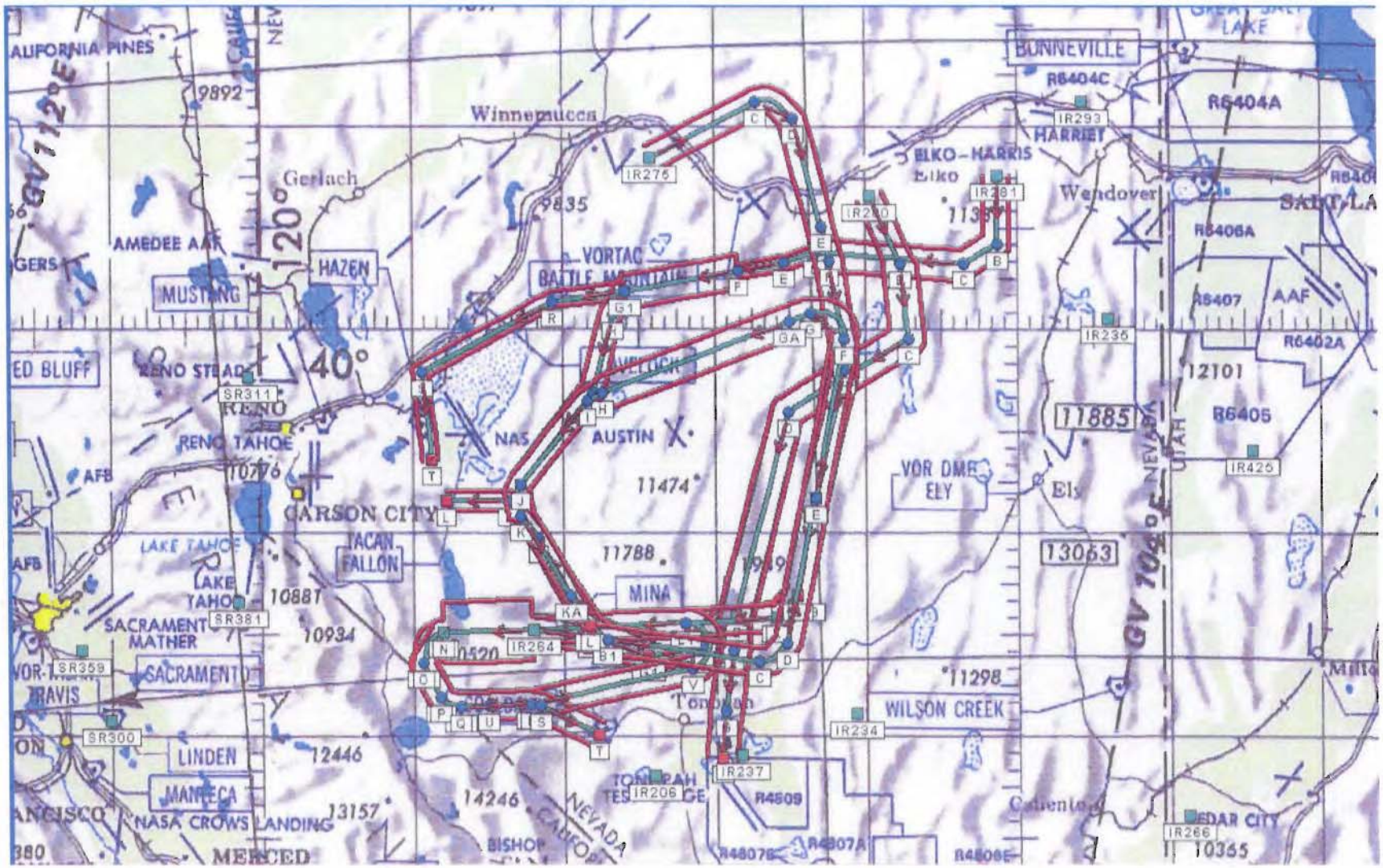
We will be contacting you to set up a meeting, and to designate appropriate contacts for future consultation between the South Fork Band Council and Travis AFB. The phone number we have for you is 775-744-4273. If this is incorrect, please call my office at 707-424-2452 with your appropriate contact information. Thank you for your cooperation and interest in this matter.

Sincerely

DWIGHT C. SONES, Colonel, USAF
Commander

Attachment:
Location of Instrument Routes 264, 275, 280, 281, and 282



Location of Travis AFB C-17 Instrument Routes 264, 275, 280, 281, and 282

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 60TH AIR MOBILITY WING (AMC)

08 SEP 2011

Colonel Dwight C. Sones
Commander
400 Brennan Circle
Travis AFB CA 94535

Honorable Alvin Moyle, Chairman
Fallon Paiute-Shoshone Tribe
565 Rio Vista Road
Fallon NV 89406

Chairman Moyle

Travis Air Force Base (AFB) in California is currently preparing an Environmental Assessment to evaluate the potential for a new mission that proposes to utilize low-level navigation along five instrument routes in northwestern Nevada, as illustrated in the attached figure. Travis C-17 aircraft will be the primary user of existing Instrument Routes 264, 275, 280, 281, and 282.

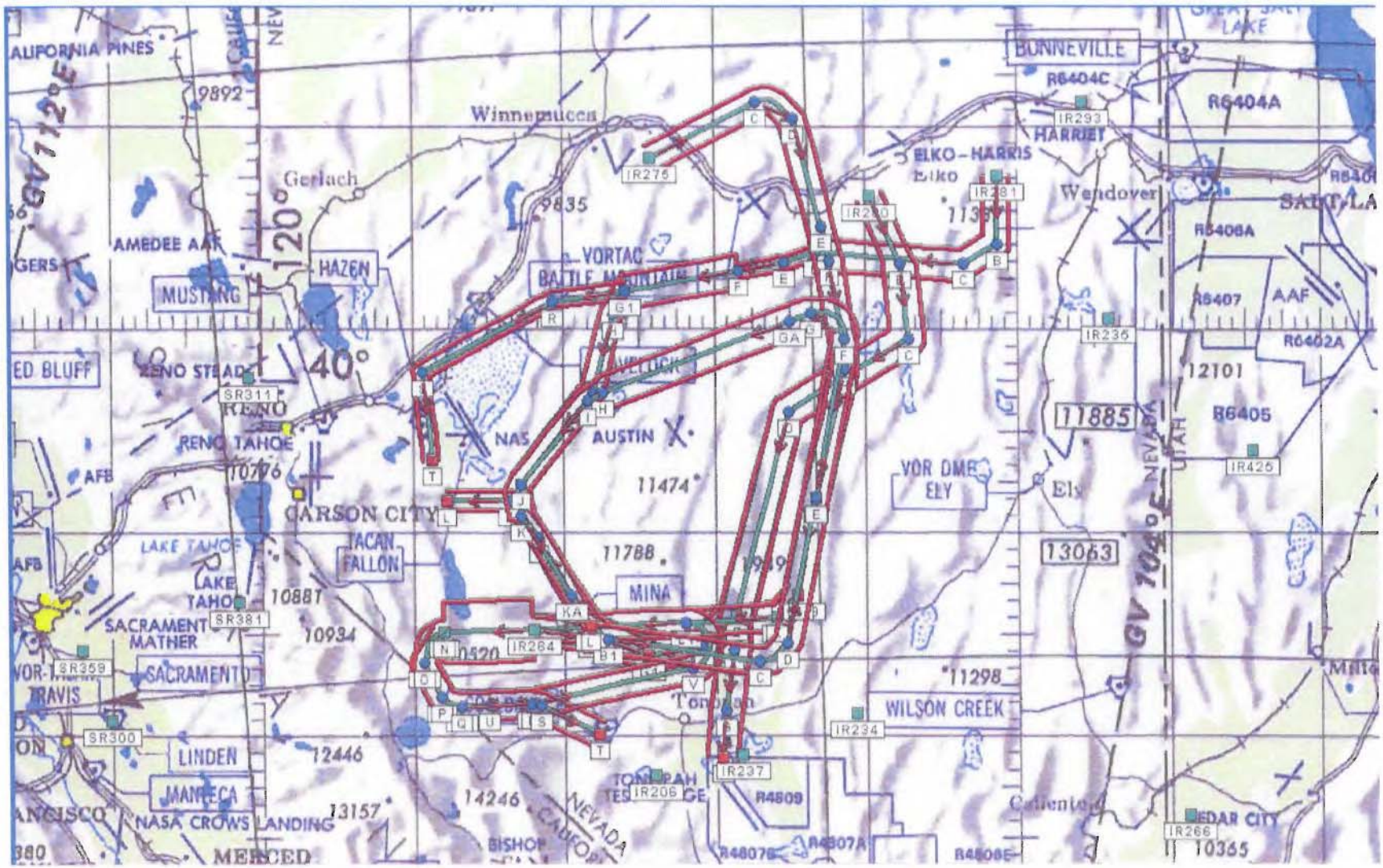
Please accept this letter to initiate a government-to-government relationship in order to discuss the proposed activities, address any concerns you might have regarding this project, and understand any potential effect upon your tribe's natural or cultural resources.

We will be contacting you to set up a meeting, and to designate appropriate contacts for future consultation between the Fallon Paiute-Shoshone Tribe and Travis AFB. The phone number we have for you is 775-423-6075. If this is incorrect, please call my office at 707-424-2452 with your appropriate contact information. Thank you for your cooperation and interest in this matter.

Sincerely

DWIGHT C. SONES, Colonel, USAF
Commander

Attachment:
Location of Instrument Routes 264, 275, 280, 281, and 282



Location of Travis AFB C-17 Instrument Routes 264, 275, 280, 281, and 282

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 60TH AIR MOBILITY WING (AMC)

0 8 SEP 2011

Colonel Dwight C. Sones
Commander
400 Brennan Circle
Travis AFB CA 94535

Honorable Victor Mann, Chairman
Lovelock Paiute Tribe
P.O. Box 878
Lovelock NV 89419

Chairman Mann

Travis Air Force Base (AFB) in California is currently preparing an Environmental Assessment to evaluate the potential for a new mission that proposes to utilize low-level navigation along five instrument routes in northwestern Nevada, as illustrated in the attached figure. Travis C-17 aircraft will be the primary user of existing Instrument Routes 264, 275, 280, 281, and 282.

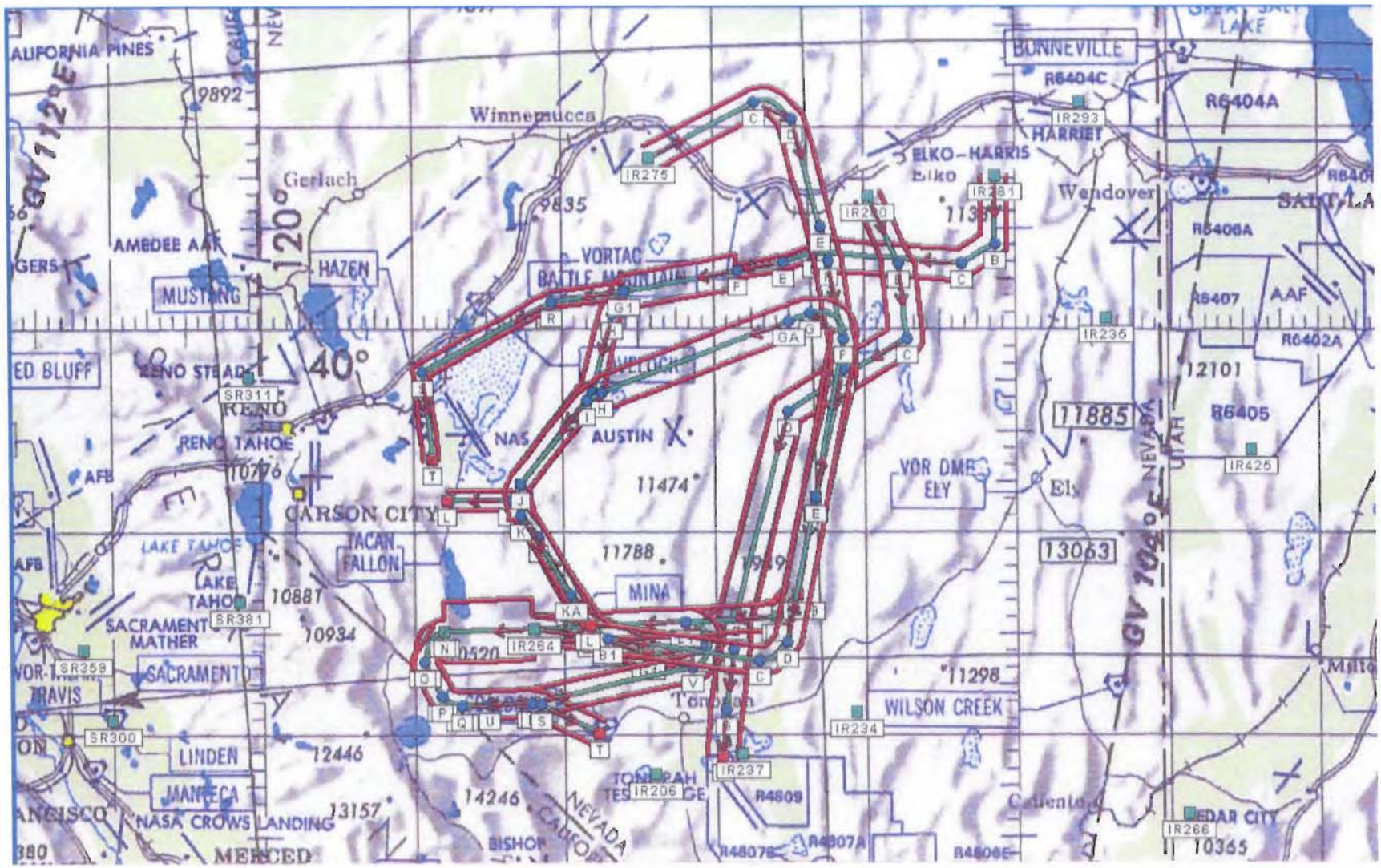
Please accept this letter to initiate a government-to-government relationship in order to discuss the proposed activities, address any concerns you might have regarding this project, and understand any potential effect upon your tribe's natural or cultural resources.

We will be contacting you to set up a meeting, and to designate appropriate contacts for future consultation between the Lovelock Paiute Tribe and Travis AFB. The phone number we have for you is 775-273-7861. If this is incorrect, please call my office at 707-424-2452 with your appropriate contact information. Thank you for your cooperation and interest in this matter.

Sincerely

DWIGHT C. SONES, Colonel, USAF
Commander

Attachment:
Location of Instrument Routes 264, 275, 280, 281, and 282



Location of Travis AFB C-17 Instrument Routes 264, 275, 280, 281, and 282

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 60TH AIR MOBILITY WING (AMC)

08 SEP 2011

Colonel Dwight C. Sones
Commander
400 Brennan Circle
Travis AFB CA 94535

Honorable Alvin S. Marques, Chairperson
Ely Shoshone Tribe
16 Shoshone Circle
Ely NV 89301

Chairperson Marques

Travis Air Force Base (AFB) in California is currently preparing an Environmental Assessment to evaluate the potential for a new mission that proposes to utilize low-level navigation along five instrument routes in northwestern Nevada, as illustrated in the attached figure. Travis C-17 aircraft will be the primary user of existing Instrument Routes 264, 275, 280, 281, and 282.

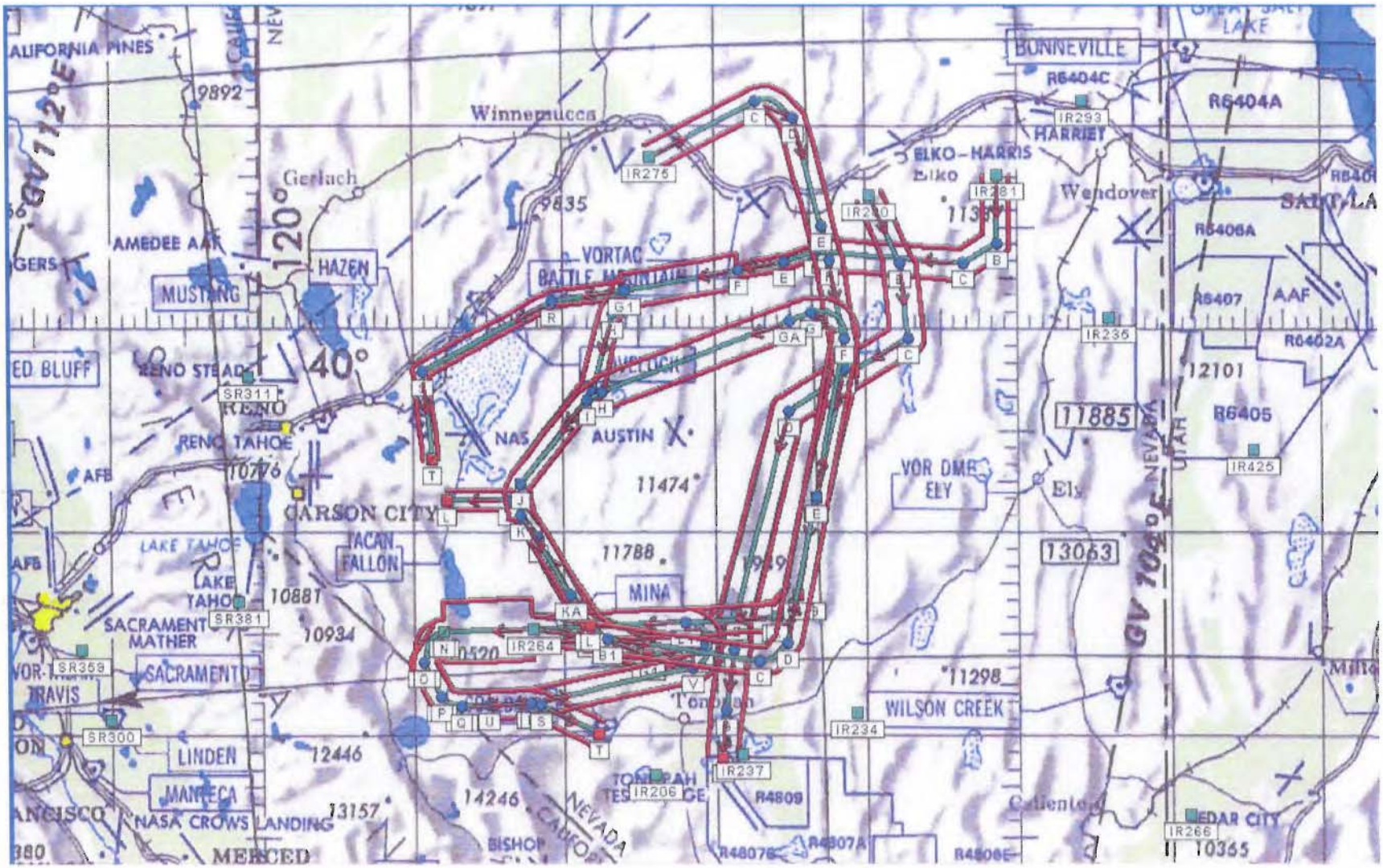
Please accept this letter to initiate a government-to-government relationship in order to discuss the proposed activities, address any concerns you might have regarding this project, and understand any potential effect upon your tribe's natural or cultural resources.

We will be contacting you to set up a meeting, and to designate appropriate contacts for future consultation between the Ely Shoshone Tribe and Travis AFB. The phone number we have for you is 775-289-3013. If this is incorrect, please call my office at 707-424-2452 with your appropriate contact information. Thank you for your cooperation and interest in this matter.

Sincerely

DWIGHT C. SONES, Colonel, USAF
Commander

Attachment:
Location of Instrument Routes 264, 275, 280, 281, and 282



Location of Travis AFB C-17 Instrument Routes 264, 275, 280, 281, and 282

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 60TH AIR MOBILITY WING (AMC)

08 SEP 2011

Colonel Dwight C. Sones
Commander
400 Brennan Circle
Travis AFB CA 94535

Honorable Gerald Temoke, Chairman
Elko Band Council
511 Sunset Street
Elko NV 89803

Chairman Temoke

Travis Air Force Base (AFB) in California is currently preparing an Environmental Assessment to evaluate the potential for a new mission that proposes to utilize low-level navigation along five instrument routes in northwestern Nevada, as illustrated in the attached figure. Travis C-17 aircraft will be the primary user of existing Instrument Routes 264, 275, 280, 281, and 282.

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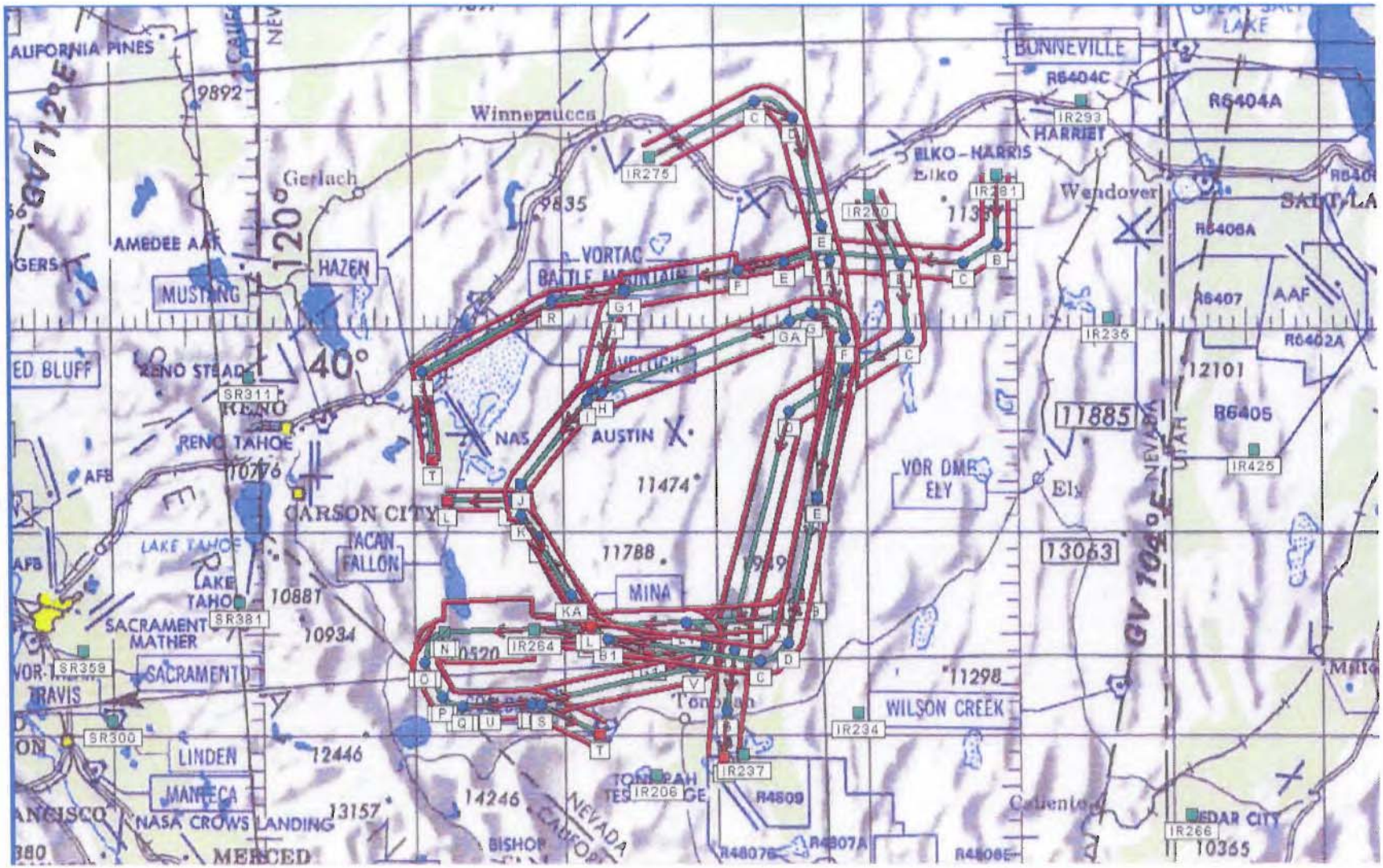
We will be contacting you to set up a meeting, and to designate appropriate contacts for future consultation between the Elko Band Council and Travis AFB. The phone number we have for you is 775-738-8889. If this is incorrect, please call my office at 707-424-2452 with your appropriate contact information. Thank you for your cooperation and interest in this matter.

Sincerely

DWIGHT C. SONES, Colonel, USAF
Commander

Attachment:
Location of Instrument Routes 264, 275, 280, 281, and 282



Location of Travis AFB C-17 Instrument Routes 264, 275, 280, 281, and 282

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 60TH AIR MOBILITY WING (AMC)

08 SEP 2011

Colonel Dwight C. Sones
Commander
400 Brennan Circle
Travis AFB CA 94535

Honorable Michael Price, Chairman
Battle Mountain Band Council
37 Mountain View Drive #C
Battle Mountain NV 89820

Chairman Price

Travis Air Force Base (AFB) in California is currently preparing an Environmental Assessment to evaluate the potential for a new mission that proposes to utilize low-level navigation along five instrument routes in northwestern Nevada, as illustrated in the attached figure. Travis C-17 aircraft will be the primary user of existing Instrument Routes 264, 275, 280, 281, and 282.

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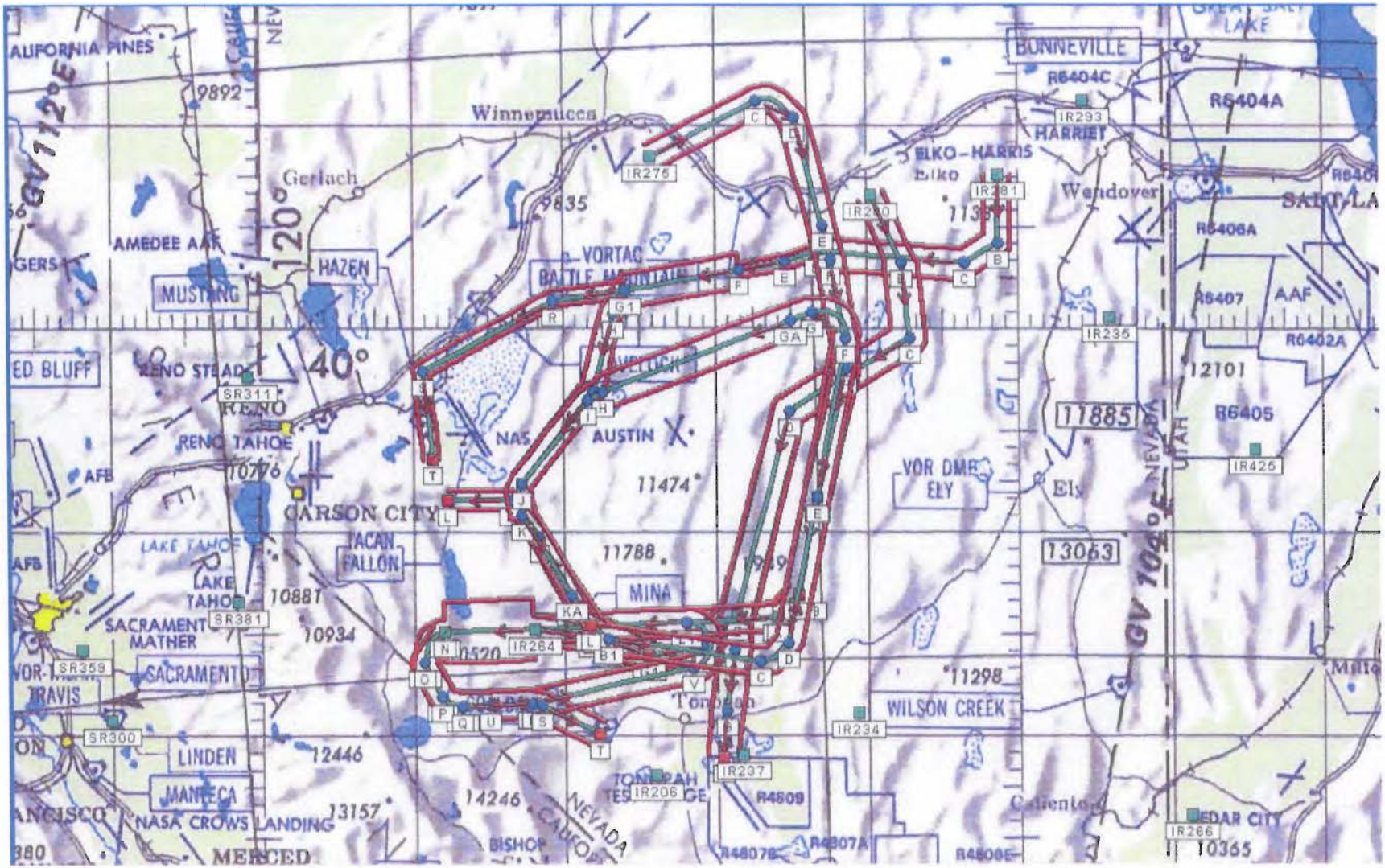
We will be contacting you to set up a meeting, and to designate appropriate contacts for future consultation between the Battle Mountain Band Council and Travis AFB. The phone number we have for you is 775-635-2004. If this is incorrect, please call my office at 707-424-2452 with your appropriate contact information. Thank you for your cooperation and interest in this matter.

Sincerely

DWIGHT C. SONES, Colonel, USAF
Commander

Attachment:
Location of Instrument Routes 264, 275, 280, 281, and 282



Location of Travis AFB C-17 Instrument Routes 264, 275, 280, 281, and 282

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 60TH AIR MOBILITY WING (AMC)

08 SEP 2011

Colonel Dwight C. Sones
Commander
400 Brennan Circle
Travis AFB CA 94535

Honorable Virginia Sanchez, Chairperson
Duckwater Shosone Tribe
P.O. Box 140068
Duckwater NV 89314

Chairperson Sanchez

Travis Air Force Base (AFB) in California is currently preparing an Environmental Assessment to evaluate the potential for a new mission that proposes to utilize low-level navigation along five instrument routes in northwestern Nevada, as illustrated in the attached figure. Travis C-17 aircraft will be the primary user of existing Instrument Routes 264, 275, 280, 281, and 282.

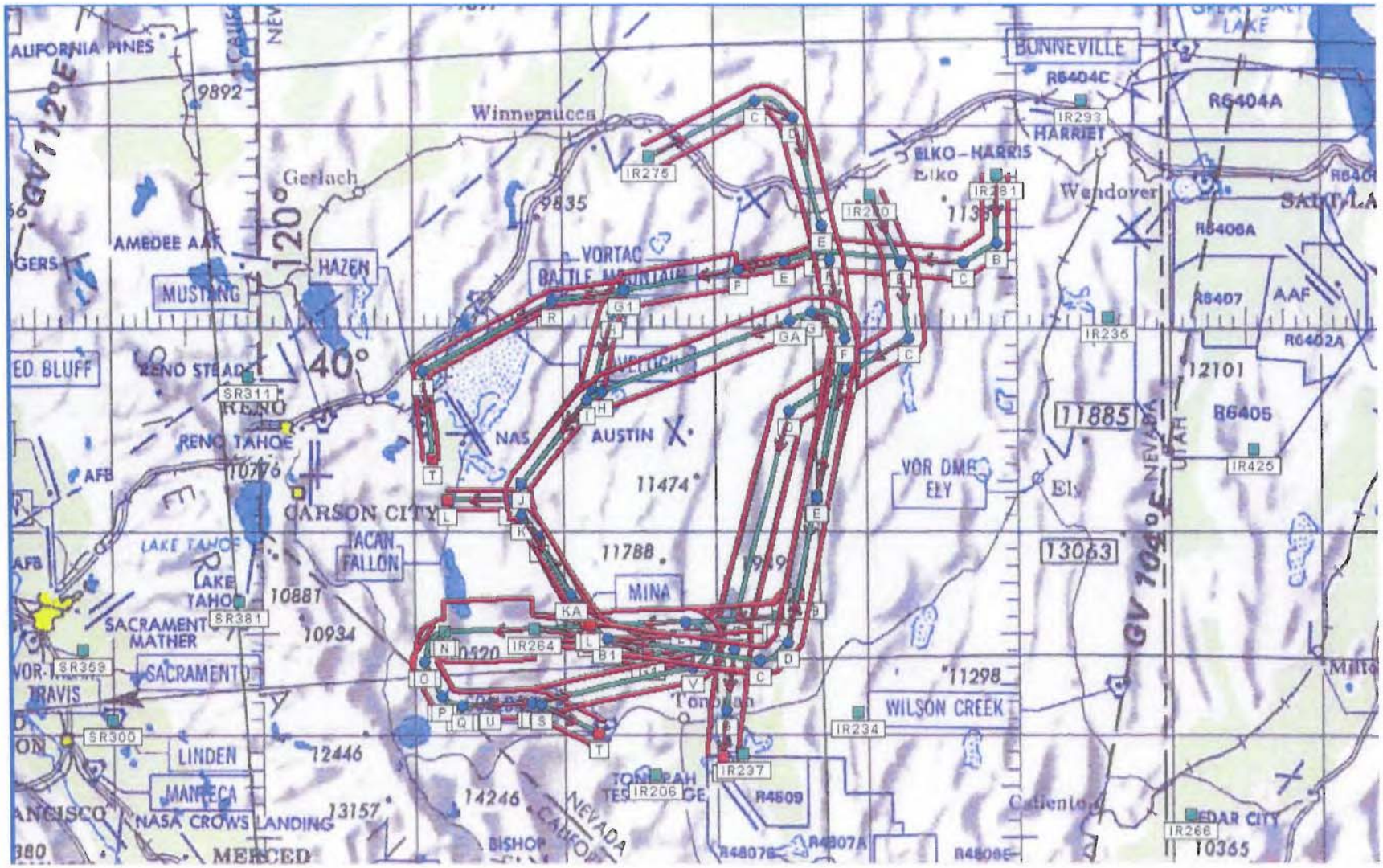
Please accept this letter to initiate a government-to-government relationship in order to discuss the proposed activities, address any concerns you might have regarding this project, and understand any potential effect upon your tribe's natural or cultural resources.

We will be contacting you to set up a meeting, and to designate appropriate contacts for future consultation between the Duckwater Shoshone Tribe and Travis AFB. The phone number we have for you is 775-863-0227. If this is incorrect, please call my office at 707-424-2452 with your appropriate contact information. Thank you for your cooperation and interest in this matter.

Sincerely

DWIGHT C. SONES, Colonel, USAF
Commander

Attachment:
Location of Instrument Routes 264, 275, 280, 281, and 282



Location of Travis AFB C-17 Instrument Routes 264, 275, 280, 281, and 282

APPENDIX C
PUBLIC INVOLVEMENT

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PUBLIC INVOLVEMENT

The *Air Force Environmental Impact Analysis Process* (32 CFR 989), 15 Jul 99, and amended 28 Mar 01, states that the environmental assessment and Finding of No Significant Impact should be made available to agencies under the IICEP (see Appendix A) and the public for comment.

Prior to release of the Draft EA, the Air Force provided advance notification of the Proposed Action to 24 agencies in Nevada (see IICEP letter dated 10 June 2011 in Appendix A). One response letter from the Nevada Department of Wildlife (dated July 5, 2011) was received. Comments in this letter have been incorporated into this EA.

A notice announcing the 30-day public comment period and the availability of the Draft EA will be published in the following newspapers:

- Mineral County Independent-News
- Lahontan Valley News/Fallon Eagle Standard
- Tonopah Times Bonanza
- Vacaville Reporter
- Travis AFB Tailwind
- Daily Republic

The Draft EA is available online at http://travis.af.mil/. A copy of the Draft EA has been placed in seven libraries for public review:

Libraries

Mineral County Public Library 110 First Street Hawthorne, NV 89415	Smoky Valley Public Library Highway 377 and Gold Street Manhattan, NV 89022	Churchill County Public Library 553 S. Maine Street Fallon, NV 89406
Fairfield Civic Center Library 1150 Kentucky Street Fairfield, CA 94533	Suisun City Library 601 Pintail Drive Suisun City, CA 94585	Vacaville Public Library Cultural Center 1020 Ulatis Drive Vacaville, CA 95688
Mitchell Memorial Library 510 Travis Boulevard Travis AFB, CA 94535		

The Draft EA will be provided to the following 23 agencies and 12 Native American tribes:

Agencies

Mr. William C. Withycombe FAA Western Pacific Region P.O. Box 92007 Los Angeles, CA 90009-2007	Kathy Goforth U.S. Environmental Protection Agency Pacific Southwest, Region 9 75 Hawthorne Street, CED-2 San Francisco, CA 94105	Nevada State Clearinghouse 209 E. Musser Street, Room 200 Carson City, Nevada 89701-4298
Mr. Ronald James, SHPO Historic Preservation Office 100 North Stewart Street Capitol Complex Carson City, NV 89701-4285	U.S. Fish and Wildlife Service Nevada Fish & Wildlife Office 1340 Financial Blvd., Suite 234 Reno, Nevada 89502	Nevada Department of Wildlife Headquarters, Western Region 1100 Valley Rd. Reno, NV 89512
U.S. Forest Service Intermountain Region 324 25th Street Ogden, Utah 84401	BLM Battle Mountain District Office 50 Bastian Road Battle Mountain, NV 89820	BLM Carson City District Office 5665 Morgan Mill Road Carson City, NV 89701

Agencies (Cont'd)

BLM Winnemucca District Office 5100 E. Winnemucca Blvd. Winnemucca, NV 89445	BLM Elko District Office 3900 E. Idaho Street Elko NV 89801	BLM Ely District Office 702 N. Industrial Way Ely, NV 89301
Jeanne Higgins, Forest Supervisor Humboldt-Toiyabe National Forest 1200 Franklin Way Sparks, NV 89431	Elko County Planning & Zoning Department 571 Idaho Street Elko, NV 89801	Michael K. Johnson Pershing County Planning and Building Department 398 Main Street Lovelock, NV 89419
Pershing County Regional Planning Commission 400 Main Street Lovelock, NV 89419	Humboldt County Planning Director Planning and Zoning Department 50 W. 5th Street Winnemuca, NV 89445	Eureka County Planning Commission P.O. Box 596 Eureka, NV 89316
Mark Nixon Mineral County Planning Commission P.O. Box 85 Hawthorne, NV 89415	Steve P. Osborne Nye County –Tonopah/Pahrump Planning Offices 250 N. Hwy 160, Suite 1 Pahrump, NV 89060	Lander County Planning and Zoning Department 825 N. Second Street Battle Mountain, NV 89820
Esmerelda County Commissioners P.O. Box 517 Goldfield, NV 89013	White Pine County Community and Economic Development Department 957 Campton Street Ely, NV 89301	

Native American Tribes and Groups

Battle Mountain Band Council	South Fork Band Council
Duckwater Shoshone Tribe	Te-Moak Tribe of Western Shoshone Indians
Elko Band Council	Walker River Paiute Tribe
Ely Shoshone Tribe of Nevada	Wells Indian Colony Band Council
Lovelock Paiute Tribe	Yerington Paiute Tribe
Fallon Paiute-Shoshone Tribe	Yomba Shoshone Tribe

APPENDIX D

AIRSPACE OPERATIONS, AIRCRAFT SAFETY, AND BIRD/WILDLIFE-AIRCRAFT STRIKE HAZARD

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AIRSPACE OPERATIONS, AIRCRAFT SAFETY, AND BIRD/WILDLIFE-AIRCRAFT STRIKE HAZARD

D1. AIRSPACE OPERATIONS

Airspace management involves the direction, control, and handling of flight operations in the volume of air that overlies the geopolitical borders of the U.S. and its territories. Airspace is a resource managed by the FAA, with established policies, designations, and flight rules to protect aircraft in the airfield and en route; in Special Use Airspace (SUA) identified for military and other governmental activities; and in other military training airspace.

Management of this resource considers how airspace is designated, used, and administered to best accommodate the individual and common needs of military, commercial, and general aviation. Because of these multiple and sometimes competing demands, the FAA considers all aviation airspace requirements in relation to airport operations, Federal Airways, Jet Routes, military flight training activities, and other special needs to determine how the National Airspace System can best be structured to satisfy all user requirements.

The FAA regulates military operations in the National Airspace System through the implementation of FAA Order 7400.2, *Procedures for Handling Airspace Matters* and FAA Joint Order 7610.4, *Special Military Operations*. The latter was jointly developed by the DOD and FAA to establish policy, criteria, and specific procedures for ATC planning, coordination, and services during defense activities and special military operations.

The objective of airspace management is to meet military training requirements through the safe and efficient use of available navigable airspace. Air Force Instruction (AFI) 11-202, Volume 3 (*General Flight Rules*) provides general flight and operating instructions and procedures applicable to the operation of all Air Force aircraft and related activities. Chapter 11 of FAA Joint Order 7610.4 defines MTRs.

Restricted areas contain airspace identified by an area on the surface of the earth within which the flight of aircraft, while not wholly prohibited, is subject to restrictions. Activities within these areas must be confined because of their nature or limitations imposed upon aircraft operations that are not a part of those activities or both. Restricted areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Penetration of restricted areas without authorization from the using or controlling agency may be extremely hazardous to the aircraft and its occupants.

A Military Operations Area (MOA) is airspace of defined vertical and lateral limits established to separate and segregate certain non-hazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. MOAs are considered “joint use” airspace. Non-participating aircraft operating under VFR are permitted to enter a MOA, even when the MOA is active for military use. Aircraft operating under IFR must remain clear of an active MOA unless approved by the responsible ARTCC. Flight by both participating and VFR non-participating aircraft is conducted under the “see-and-avoid” concept, which stipulates that “when weather conditions permit, pilots operating IFR or VFR are required to observe and maneuver to avoid other aircraft.

The Department of Defense (DoD) and the Federal Aviation Administration (FAA) mutually develop and published MTRs throughout the United States on which military aircrews conduct low-level navigation training. There are two types of MTRs: Instrument Route (IR) and Visual Route (VR). IRs allow the aircraft to operate below 10,000 feet above mean sea level (MSL) at speeds in excess of 250 knots indicated airspeed (KIAS), or approximately 288 miles per hour (mph), in both Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) weather conditions. VRs are guided by the same restrictions as IRs but are additionally limited to flight in VFR weather conditions. Instrument Flight Rules weather conditions represent weather conditions in which factors such as visibility, cloud distance, cloud ceilings, and weather phenomena cause visual conditions to drop below the minima required to operate by visual flight referencing. VFR weather conditions require the pilot to remain clear of clouds by specified distances to ensure separation from other aircraft under the concept of see and avoid. IFR represents the regulations and restrictions a pilot must comply with when flying in weather conditions that restrict their ability to fly the plane only by instruments. A pilot can fly under IFR in VFR weather conditions; however, pilots cannot fly under VFR in IFR weather conditions. Slow Routes (SRs), which are not technically part of the MTR

system, are low-level navigation training routes that are flown at airspeeds of less than 250 KIAS, at altitudes less than 1,500 feet above ground level (AGL), and in VFR weather conditions.

FAA guidance places limitations on low altitude flying for pilots. AFI 11-202, which implements FAA guidance for Air Force operations, states aircraft cannot be flown:

- Over congested areas (*e.g.,* cities, towns, and groups of people) at an altitude of less than 1,000 feet above the highest obstacle within 2,000 feet of the aircraft; and
- Over non-congested areas at an altitude of less than 500 feet above the surface except over open water, in SUA, or in sparsely populated areas. Under such exceptions, aircraft must not operate closer than 500 feet to any person, vehicle, vessel, or structure.

Additionally, AFI 11-202 states that, except for SUA, low altitude tactical navigation areas, and MTRs, aircraft should not be flown lower than 2,000 feet above the terrain of national parks, monuments, seashores, lakeshores, recreation areas, and scenic river ways administered by the National Park Service, national wildlife refuges, big game refuges, game ranges, and wildlife refuges administered by the United States Fish and Wildlife Service; and wilderness and primitive areas administered by the U.S. Forest Service.

Chapter 11 of FAA Joint Order 7610.4 states the following.

- All IRs to be flown at/below 1,500 feet AGL should be designed to permit aircraft flying the route to avoid charted, uncontrolled airports by 3 nautical miles or 1,500 feet.
- Routes should be designed so that disturbance to persons or property on the ground is minimized.

D2. AIRCRAFT SAFETY

The risk of people on the ground being killed or injured by aircraft accidents is miniscule. However, an aircraft accident is a high-consequence event and, when a crash does occur, the result is often catastrophic. Because of this, the Air Force does not attempt to base its safety standards on accident probabilities.

The Air Force defines five categories of aircraft flight mishaps: Classes A, B, C, E, and High Accident Potential. Class A mishaps result in loss of life, permanent total disability, a total cost in excess of $2 million, destruction of an aircraft, or damage to an aircraft beyond economical repair. Class B mishaps result in total costs ranging between $500,000 and $2 million or result in permanent partial disability, but do not involve fatalities. Class C mishaps result in more than $50,000 (but less than $500,000) in total costs, or a loss of worker productivity exceeding eight hours. Class E mishaps represent minor incidents not meeting the criteria for Classes A through C. High Accident Potential events are significant occurrences with a high potential for causing injury, occupational illness, or damage if they occur and do not have a reportable mishap cost. Class C and E mishaps, the most common types of accidents, represent relatively unimportant incidents because they generally involve minor damages and injuries, and rarely affect property or the public.

D3. BIRD/WILDLIFE-AIRCRAFT STRIKE HAZARD

AFI 91-202 (*The U.S. Air Force Mishap Prevention Program*) requires that Air Force units supporting a flying mission have a BASH Plan. The Travis AFB BASH Plan provides guidance for reducing the incidents of bird strikes in and around areas where flying operations are being conducted, to include operations on MTRs. The Plan is reviewed annually and updated as needed. Bird/Wildlife-Aircraft Strike Hazard Plans typically contain the following guidance to reduce bird-aircraft strikes.

In addition to other elements, the BASH Plan is designed to: (1) establish procedures to identify high hazard situations and to aid supervisors and aircrews in altering/discontinuing flying operations when required; (2) establish aircraft operating procedures to avoid high hazard situations; and, (3) disseminate information to aircrews on bird hazards and procedures for bird avoidance.

Flying unit commanders: (1) ensure guidelines are in place for declaring, disseminating, and terminating bird watch conditions; (2) makes operational changes to avoid areas and times of known hazardous bird concentrations, mission permitting; and, (3) considers the use of training locations (*e.g*., airports, military operations areas, military training routes, and special use airspace) based on any reported bird hazard or from Bird Avoidance Model (BAM) analysis.

Flying safety officers: (1) ensure aircrews are briefed to promptly report all bird-aircraft strikes and hazardous conditions; (2) ensure applicable bird hazard information and BAM graphs are readily available and used for briefing aircrews; (3) ensure aircrews are aware of proper flight operations during risk conditions low, moderate, and severe; and, (4) brief aircrews on seasonal bird hazards.

The USAF developed the BAM using Geographic Information System (GIS) technology as a key tool for analysis and correlation of bird habitat, migration, and breeding characteristics, combined with key environmental, and man-made geospatial data. The model consists of GIS raster grids, which span the conterminous United States and Alaska (AHAS, 2010).

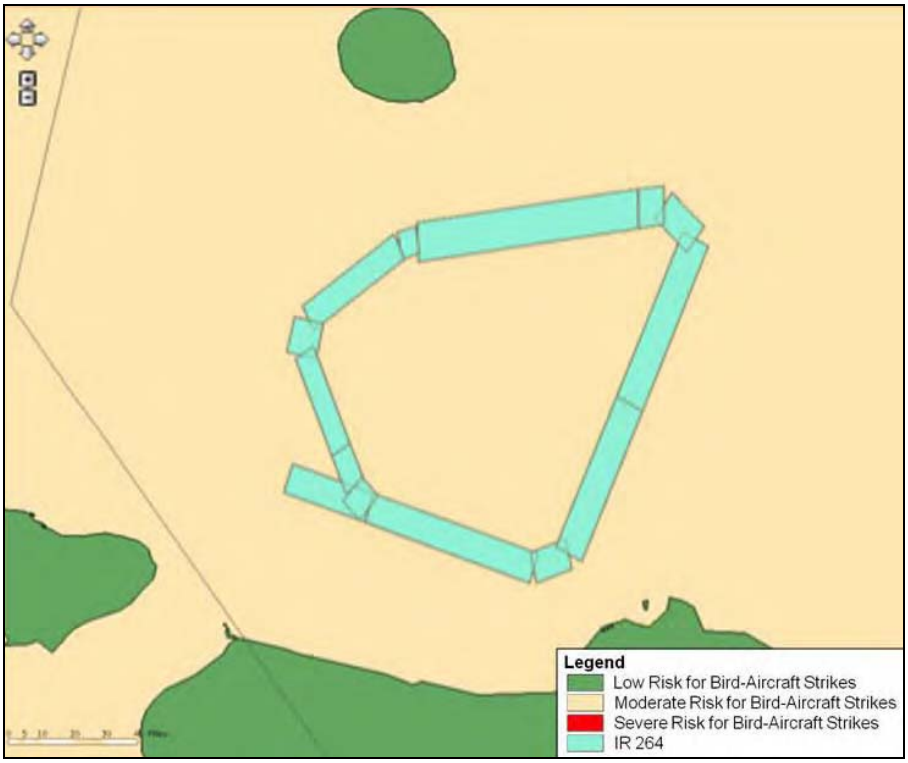
The Avian Hazard Advisory System (AHAS) was constructed with the best available geospatial bird data to reduce the risk of bird collisions with aircraft. Its use for flight planning can reduce the likelihood of a bird collision but would not eliminate the risk. The risk levels describe three predicted risk classes: Low, Moderate, and Severe. The classes are based upon the bird mass in ounces per square kilometer. In other words, the risk levels represent the amount of birds (bird mass) in a kilometer squared spatial area. The "Moderate Zone" indicates a risk ratio that is 57-708 times the risk of the "Low Zone," while the "Severe Zone" indicates a risk ratio that is 2,503-38,647 times the risk of the "Low Zone." These risk values are derived using a logarithmic scale for the risk surfaces (AHAS, 2010).

Figures D-1 through D-20 present the BAM for IRs 264, 275, 280, 281, and 282 for March, June, September, and December, respectively, for each route.

D4. REFERENCES CITED

AHAS, 2011. United States Avian Hazard Advisory System. Available at http://www.usahas.com/bam/?month=2&Day=1&Hour=15&type=IRoute&NAME=IR234/ Downloaded on July 10, 2011.

AHAS, 2010. United States Avian Hazard Advisory System, http://www.usahas.com/home/, July 9, 2010.



Source: AHAS, 2011

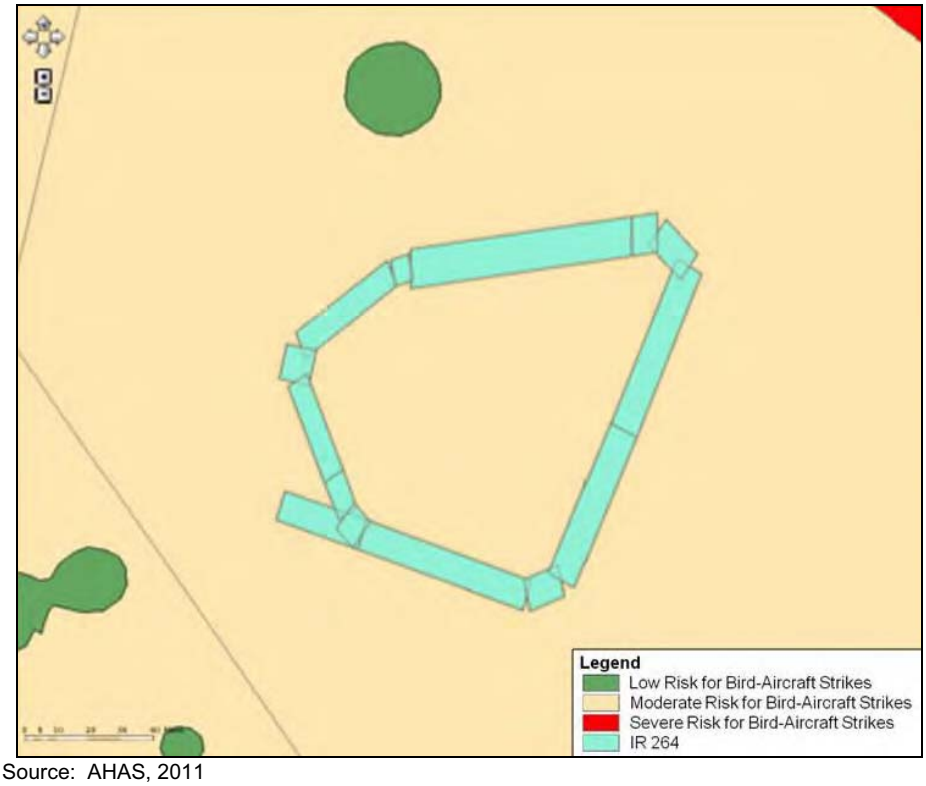
Figure D-1. Bird Avoidance Model, IR 264, March

Source: AHAS, 2011

Figure D-2. Bird Avoidance Model, IR 264, June

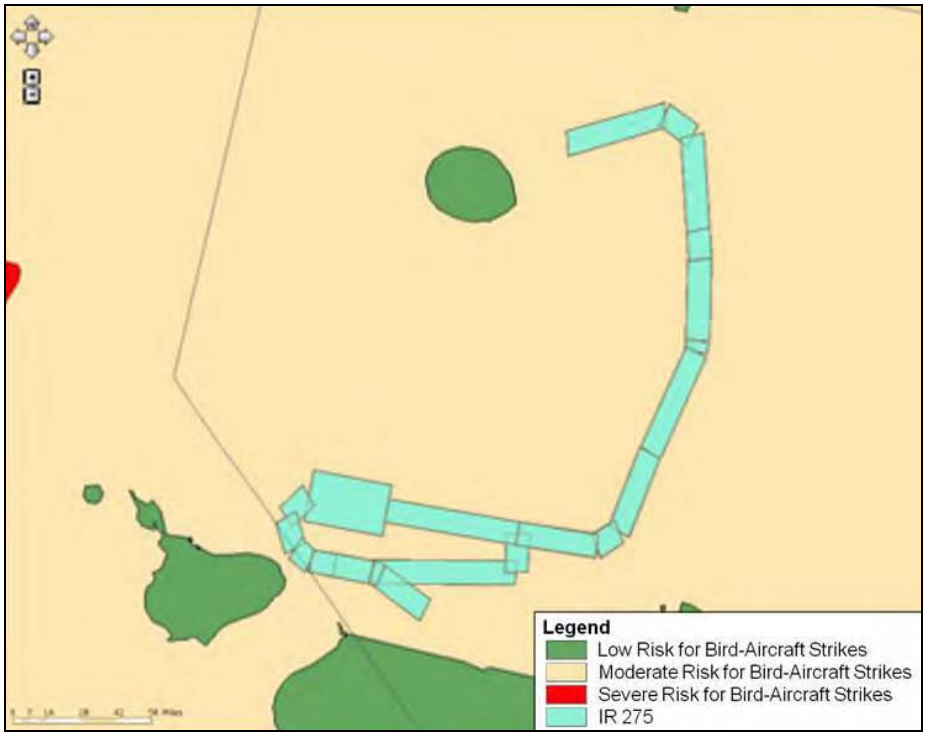
Source: AHAS, 2011

Figure D-3. Bird Avoidance Model, IR 264, September



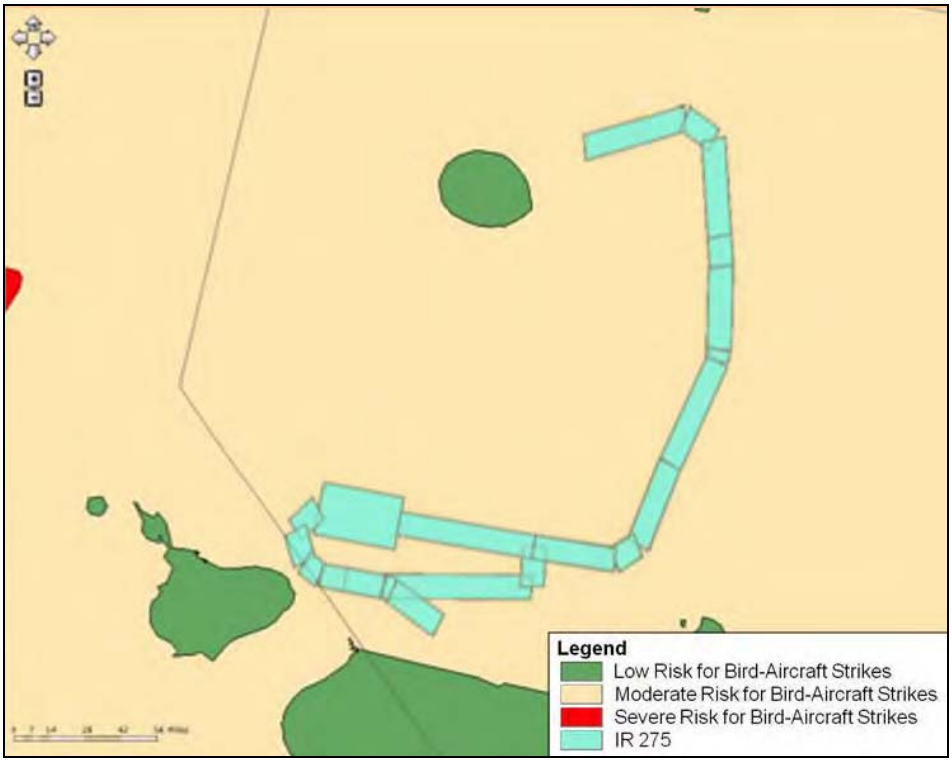
Source: AHAS, 2011

Figure D-4. Bird Avoidance Model, IR 264, December



Source: AHAS, 2011

Figure D-5. Bird Avoidance Model, IR 275, March

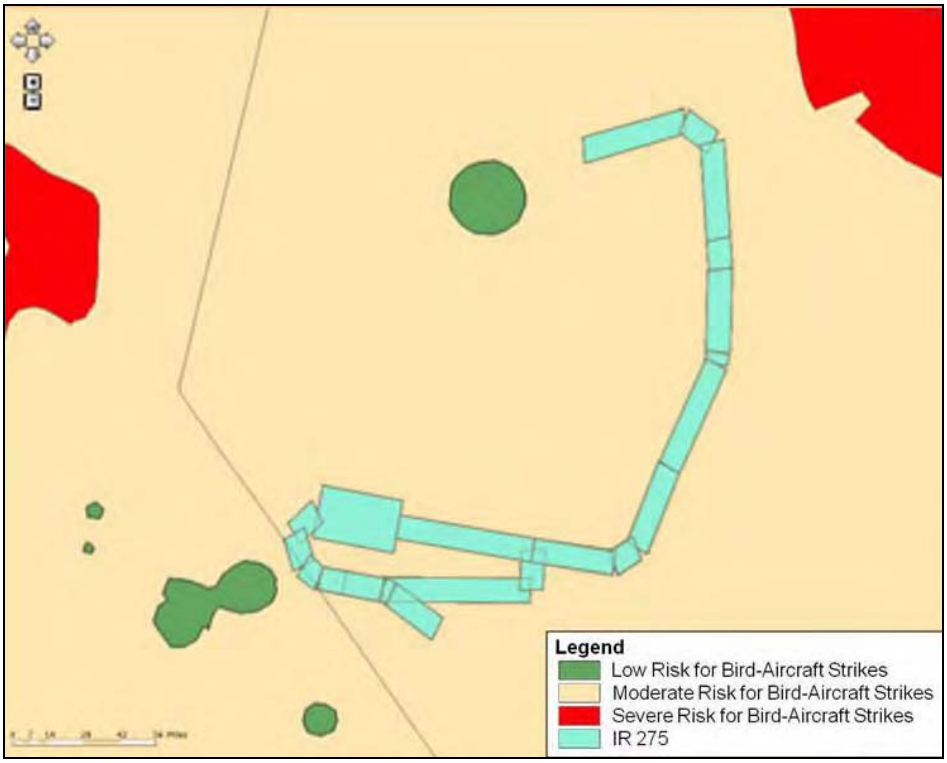


Source: AHAS, 2011

Figure D-6. Bird Avoidance Model, IR 275, June

Source: AHAS, 2011

Figure D-7. Bird Avoidance Model, IR 275, September



Source: AHAS, 2011

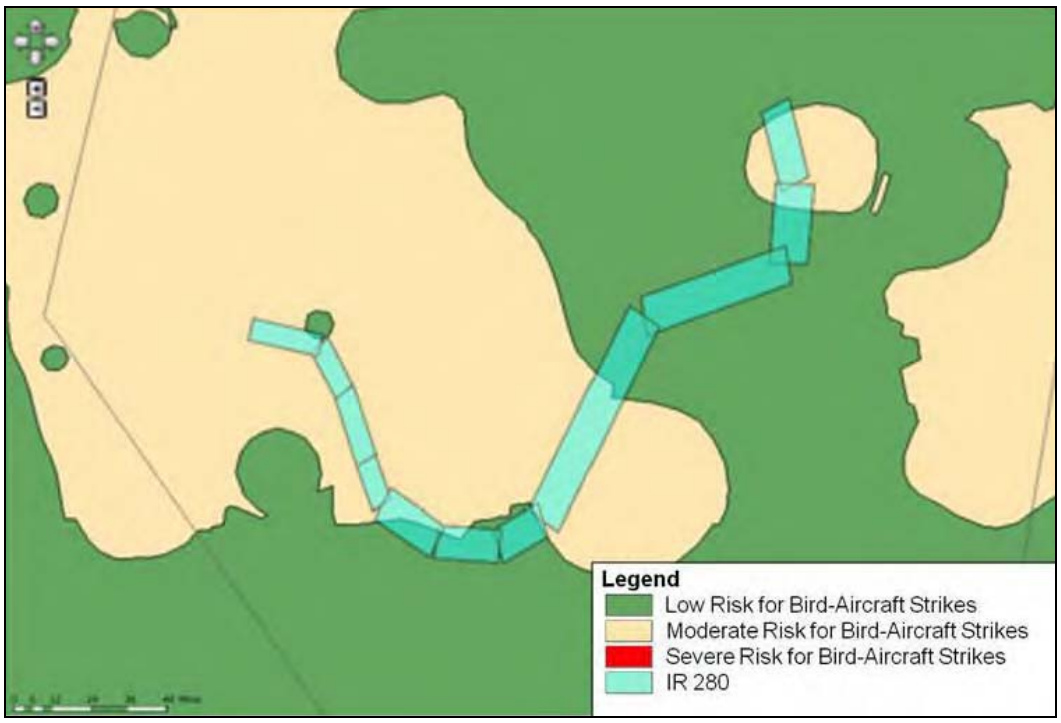
Figure D-8. Bird Avoidance Model, IR 275, December

Source: AHAS, 2011

Figure D-9. Bird Avoidance Model, IR 280, March

Source: AHAS, 2011

Figure D-10. Bird Avoidance Model, IR 280, June



Source: AHAS, 2011

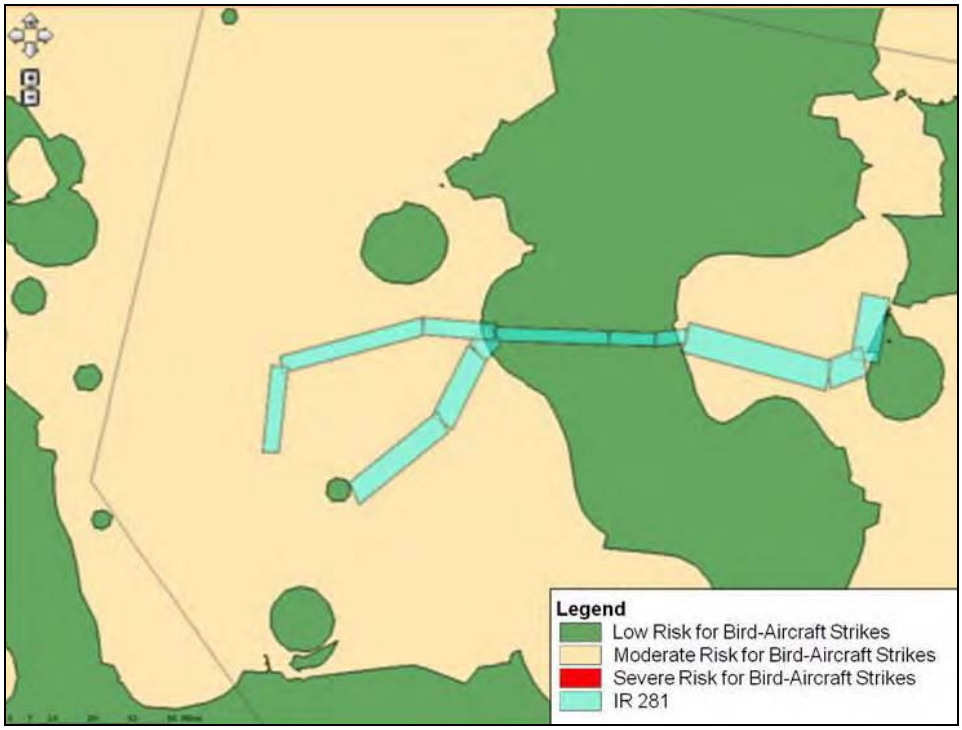
Figure D-11. Bird Avoidance Model, IR 280, September

Source: AHAS, 2011

Figure D-12. Bird Avoidance Model, IR 280, December

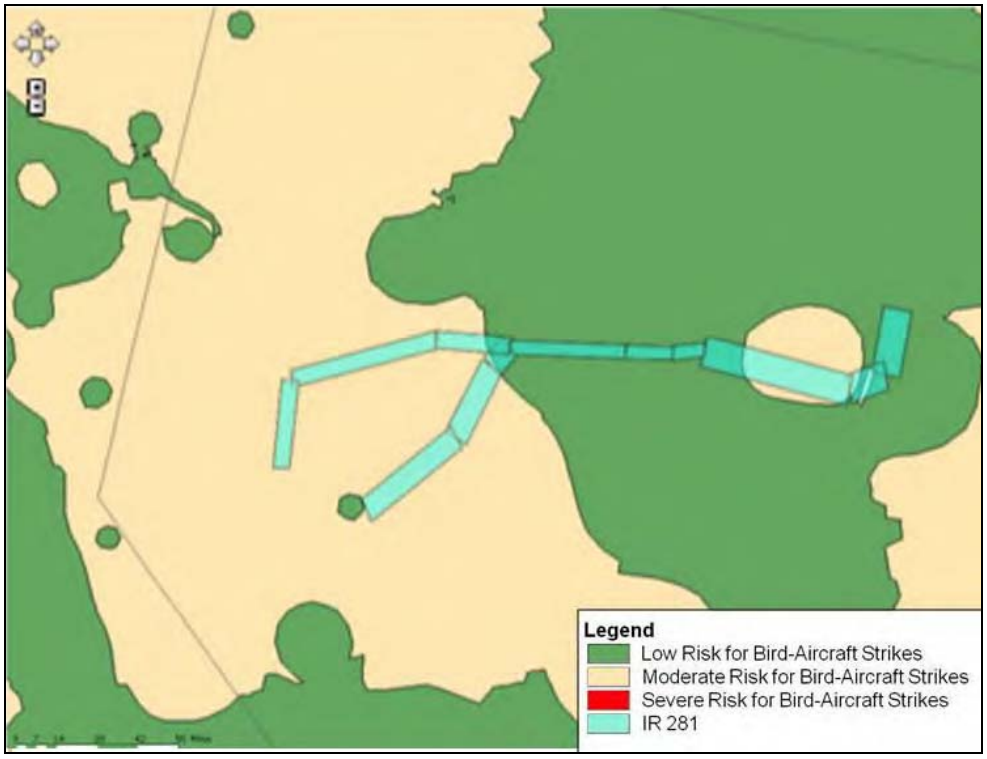
Source: AHAS, 2011

Figure D-13. Bird Avoidance Model, IR 281, March



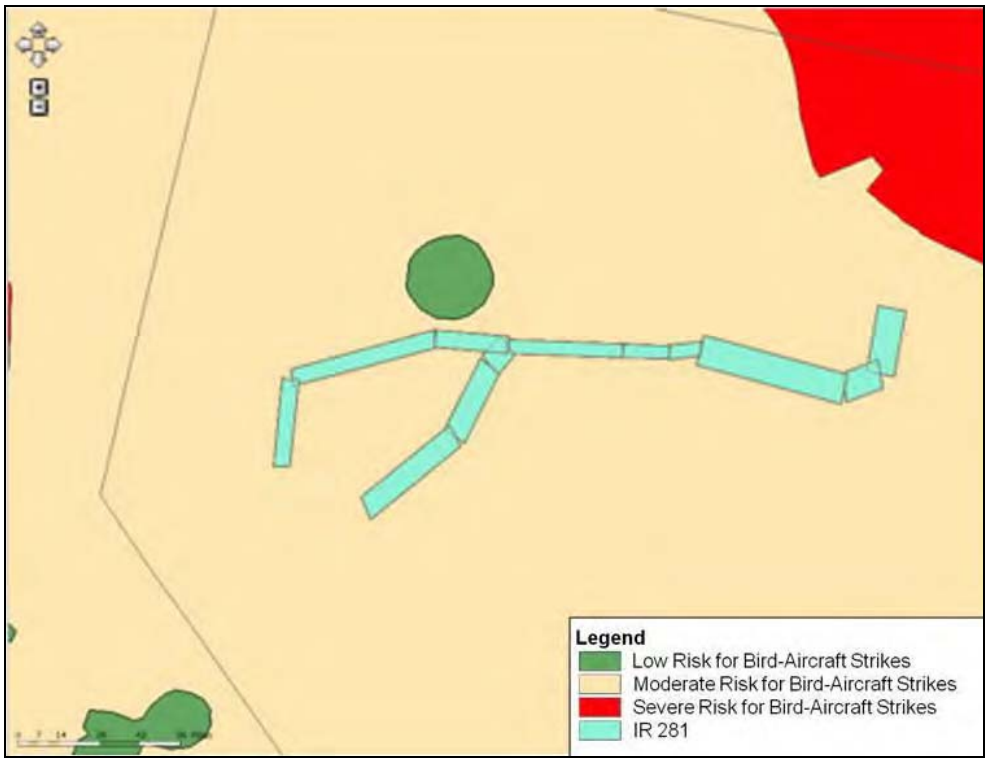
Source: AHAS, 2011

Figure D-14. Bird Avoidance Model, IR 281, June



Source: AHAS, 2011

Figure D-15. Bird Avoidance Model, IR 281, September

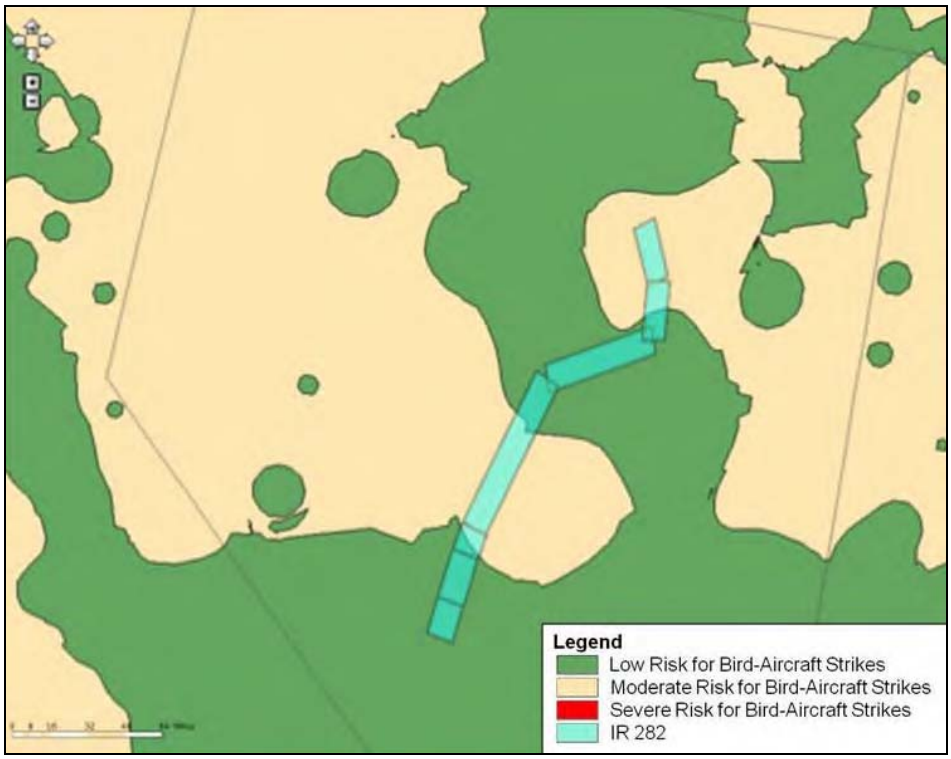


Source: AHAS, 2011

Figure D-16. Bird Avoidance Model, IR 281, December

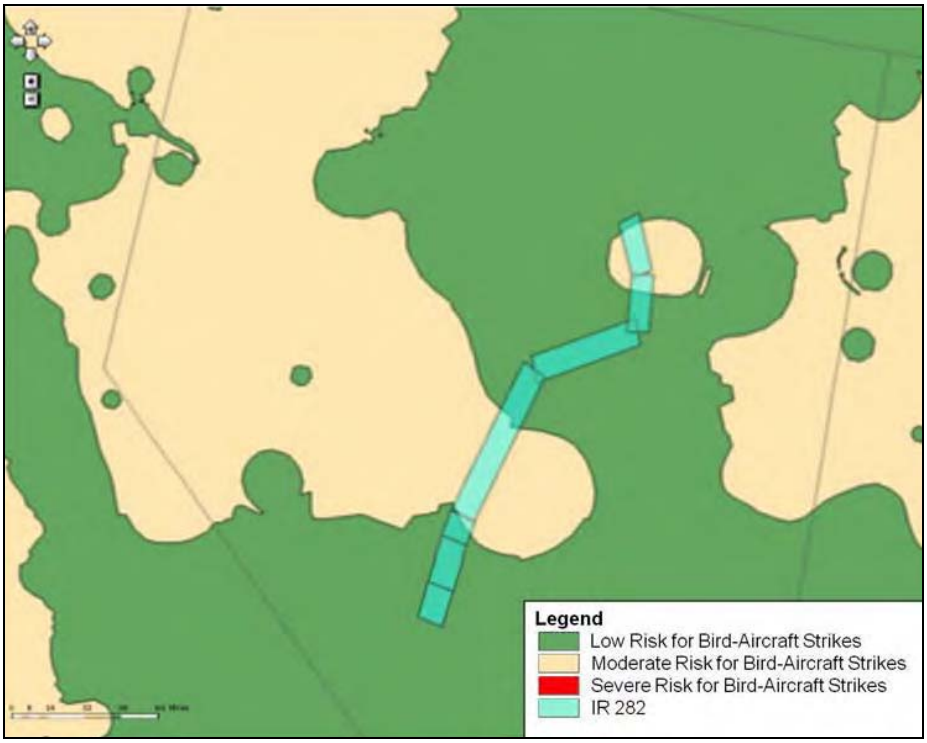
Source: AHAS, 2011

Figure D-17. Bird Avoidance Model, IR 282, March



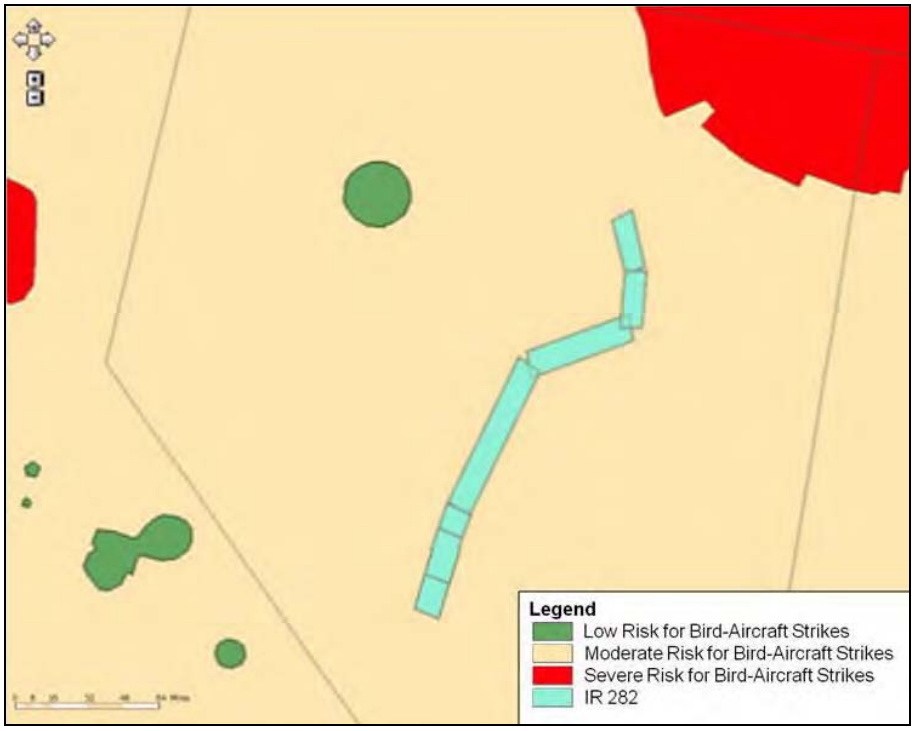
Source: AHAS, 2011

Figure D-18. Bird Avoidance Model, IR 282, June



Source: AHAS, 2011

Figure D-19. Bird Avoidance Model, IR 282, September



Source: AHAS, 2011

Figure D-20. Bird Avoidance Model, IR 282, December

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APPENDIX E
SOUND PRESSURE THRESHOLDS FOR WILDLIFE

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SOUND PRESSURE THRESHOLDS FOR WILDLIFE

Tables E-1 through E-5, respectively, contain sound pressure thresholds for effects on raptors, waterfowl, ungulates, small mammals, and reptiles and amphibians.

Table E-1. Aircraft Distance and Sound Pressure Thresholds for Effects on Raptors

Species	Stressor Aircraft in Study	LOAEL	NOAEL	Response	Location	Reference
Cooper's hawk (*Accipiter cooperii*)	A-4 Skyhawk, A-7 Corsair II, A-10 Thunderbolt II, F-4 Phantom, F-15 Eagle, and/or F-104 Starfighter		150 m slant distance (dBA-max between 89 and 105)	no interruption of high-priority behavior, protest calls, cowering or flying out, mid-nestling stage	most in southern half of Arizona	Ellis et al. 1991
Common black hawk (*Buteogallus anthracinus*)	A-4 Skyhawk, A-7 Corsair II, A-10 Thunderbolt II, F-4 Phantom, F-15 Eagle, and/or F-104 Starfighter		150 m slant distance (dBA-max between 89 and 105)	1/11 (9%) late-nestling stage young bird cowered (crouched), but none flew out	most in southern half of Arizona	Ellis et al. 1991
zone-tailed hawk (*Buteo albonotatus*)	A-4 Skyhawk, A-7 Corsair II, A-10 Thunderbolt II, F-4 Phantom, F-15 Eagle, and/or F-104 Starfighter	150 m slant distance (dBA- max between 89 and 105)	500 m slant distance	13/113 (12%) displayed significant change in behavior (interruption of high-priority behavior, protest calls, cowering, or flying out); only late-nestling stage birds affected	most in southern half of Arizona	Ellis et al. 1991
red-tailed hawk (*Buteo jamaicensis*)	A-4 Skyhawk, A-7 Corsair II, A-10 Thunderbolt II, F-4 Phantom, F-15 Eagle, and/or F-104 Starfighter	150 m slant distance (dBA- max between 89 and 105)	500 m slant distance[1]	4/78 (5%) displayed significant change in behavior (interruption of high-priority behavior, protest calls, cowering, or flying out); only early-nestling stage adult birds affected	most in southern half of Arizona	Ellis et al. 1991
red-tailed hawk (*Buteo jamaicensis*)	single Army UH-1 helicopter, flew directly at nests and passed within 30 m, 45-65 km/h, daytime	100 m mean slant distance, 30-45 m altitude	500 m > slant distance > 100 m	9/17 (53%) flushed (not previously habituated to overflights)	Pinyon Canyon Maneuver Site in southeastern Colorado	Andersen et al. 1989
red-tailed hawk (*Buteo jamaicensis*)	single Army UH-1 helicopter, flew directly at nests and passed within 30 m, 45-65 km/h, daytime	10 m mean slant distance, 30-45 m altitude	about 11 m slant distance	1/12 (8%) flushed (previously. habituated to overflights)	Fort Carson Military Reservation in east Central Colorado	Andersen et al. 1989

Table E-1. Aircraft Distance and Sound Pressure Thresholds for Effects on Raptors (Cont'd)

Species	Stressor Aircraft in Study	LOAEL	NOAEL	Response	Location	Reference
rough-legged hawk (*Buteo lagopus*)	helicopter		150, 300 m slant distance	no flushing of 2 birds from nest	unknown	Platt 1977
endangered Florida Everglade kite (*Rostrhamus sociabilis plumbeus*)	mostly Boeing 727 aircraft, few Learjets		230 m altitude, over nesting island, 89 dBA	no birds took flight	vicinity of Dade County Training jetport, FL	Snyder et al. 1978
golden eagle (*Aquila chrysaetos*)	A-4 Skyhawk, A-7 Corsair II, A-10 Thunderbolt II, F-4 Phantom, F-15 Eagle, and/or F-104 Starfighter		150 m slant distance (dBA-max between 89 and 105)	no interruption of high-priority behavior, protest calls, cowering or flying out, mid-nestling stage	most in southern half of Arizona	Ellis et al. 1991
golden eagle (*Aquila chrysaetos*)	helicopter	150 m		½ birds flushed from nest	unknown	Platt 1977
bald eagle (*Haliaeetus leucocephalus*)	UH-1 Huey and OH-58 Bell helicopters, 35-55 km/h	60-120 m altitude		43% of adults and 54% of subadults flushed	Fort Lewis Army Reservation, Washington	Stalmaster and Kaiser 1997
bald eagle (*Haliaeetus leucocephalus*)	sample of 25% military jets, 51% light planes, 24% helicopters	400 m slant distance	850 m slant distance	25% took flight; helicopters had highest response	Arizona and Michigan	Grubb and Bowerman 1997
bald eagle (*Haliaeetus leucocephalus*)	Hiller/Soloy UH-12E or Bell 206-BIII	>120 m		93% flushed; % flushed birds independent of distance from <30 to >120 m	7 county region of Puget Sound, northwestern Washington	Watson 1993
bald eagle (*Haliaeetus leucocephalus*)	Cessna fixed wing aircraft		20-200 m slant distance	no flushing of incubating or brooding birds	Chippewa National Forest in north-central Minnesota	Fraser et al. 1985
bald eagle (*Haliaeetus leucocephalus*)	727 jet, 4 overflights per day		>300 m slant distance, 90-105 dB	4.5% flushing of birds, no significant changes in density of eagles	Bellingham, WA	Fleishner and Weisberg 1986

Table E-1. Aircraft Distance and Sound Pressure Thresholds for Effects on Raptors (Cont'd)

Species	Stressor Aircraft in Study	LOAEL	NOAEL	Response	Location	Reference
prairie falcon (*Falco mexicanus*)	A-4 Skyhawk, A-7 Corsair II, A-10 Thunderbolt II, F-4 Phantom, F-15 Eagle, and/or F-104 Starfighter	150 m slant distance (dBA- max between 89 and 105)	500 m slant distance[1]	15/194 (8%) displayed significant change in behavior (interruption of high-priority behavior, protest calls, cowering, or flying out); only courtship stage birds affected	most in southern half of Arizona	Ellis et al. 1991
prairie falcon (*Falco mexicanus*)	military aircraft	150 m mean (about 60-250 m range) slant distance		flight from nest	unknown	Awbrey and Bowles 1989
gyrfalcon (*Falco rusticolus candicans*)	Bell 206 helicopter	1600 m		flight of pre-egg-laying birds from a single nest, 1/4 (25%) of overflights		Platt 1977
gyrfalcon (*Falco rusticolus candicans*)	military aircraft	300 m mean (about 100-500 m range) slant distance		flight from nest	unknown	Awbrey and Bowles 1989
peregrine falcon (*Falco peregrinus*)	A-4 Skyhawk, A-7 Corsair II, A-10 Thunderbolt II, F-4 Phantom, F-15 Eagle, and/or F-104 Starfighter	150 m slant distance (dBA- max between 89 and 105)	500 m slant distance	19/37 (51%) displayed significant change in behavior (interruption of high-priority behavior, protest calls, cowering, or flying out); mostly mid-nestling stage birds affected	most in southern half of Arizona	Ellis et al. 1991
peregrine falcon (*Falco peregrinus*)	military jets from 11th Air Force		1000 m slant distance	little reaction (8 male birds or 3% flight response), minimal population response, no detectable difference in rate of prey brought to nests	interior Alaska	D. Roby (personal communicati o n 3/99)
peregrine falcon (*Falco peregrinus*)	military aircraft	300 m mean (100-500 m range) slant distance		flight from nest	unknown	Awbrey and Bowles 1989
peregrine falcon (*Falco peregrinus*)	helicopter		150-600 m slant distance	0/6 birds flew from nest	unknown	Platt 1977
peregrine falcon (*Falco peregrinus*)	Bell 206 helicopter or Cessna 185	105 m slant distance		5/48 birds (10.4%) flushed from nest	unknown	Windsor 1977

Table E-1. Aircraft Distance and Sound Pressure Thresholds for Effects on Raptors (Cont'd)

Species	Stressor Aircraft in Study	LOAEL	NOAEL	Response	Location	Reference
Mexican spotted owl (*Strix occidentalis lucida*)	Sikorsky, HH-60G, Pave hawk, and twin-jet helicopters, 150-170 km/h	61-105 m slant distance (effect observed at 89 m)	105 m slant distance, 104 dBO (92 dBA) SEL	5% flush frequency of owls	Sacramento Ranger District of Lincoln National Forest, south-central New Mexico	Delaney et al. 1999
Mexican spotted owl (*Strix occidentalis lucida*)	Sikorsky, HH-60G, Pave hawk, and twin-jet helicopters, 150-170 km/h	96 m slant distance (95% prediction interval between 28 and 164 m)		estimated threshold distance for negative effect on prey delivery rate	Sacramento Ranger District of Lincoln National Forest, south-central New Mexico	Delaney et al. 1999
Mexican spotted owl (*Strix occidentalis lucida*)	Sikorsky, HH-60G, Pave hawk, and twin-jet helicopters, 150-170 km/h		30 m slant distance	no difference in reproductive success of nests, nest attentiveness, or number of female trips from nest	Sacramento Ranger District of Lincoln National Forest, south-central New Mexico	Delaney et al. 1999
osprey (*Pandion haliaetus*)	CF-18 Hornets with McDonnell Douglas with two low-bypass F404-GE-400 engines, > 2 overflights per day		1.39 km horizontal distance, 30 m altitude, 100 dB maximum sound pressure levels	no startle effect or nest departure	along Naskaupi River near Goose Bay Labrador, Canada	Trimper et al. 1998
osprey (*Pandion haliaetus*)		50 m		usually flushed		Carrier and Melquist 1976
turkey vulture (*Cathartes* sp.)	Bell 476 helicopter		31-310 m, 96 dBA	0/6 birds flushed	unknown	Edwards et al. 1979

Source: Efromyson *et al.,* 2000

Table E-2. Thresholds of Distance, Sound, and Disturbance Frequency for Effects of Overflights on Waterfowl

Species	Stressor Aircraft in Study	LOAEL	NOAEL	Response	Location	Reference
crested tern (*Sterna bergii*)	pre-recorded sound from overflight of DHC-2 Beaver floatplane, 30-35 sec duration, propeller-generated frequencies dominant below 500 Hz	peak level of 95 dB(A)	85 dB (A)	12% of unhabituated animals startled (moved from nest or flapped wings)	Eagle Cay, Great Barrier Reef Marine Park	Brown 1990
Pacific brant (*Branta bericla nigricans*)	fixed wing aircraft: single-engine (Arctic Tern, Piper 150, Cessna 206, Cessna 185) and twin-engine (Piper Navajo, Grumman goose, Twin Otter), 150-240 km/h	400-1100 m lateral distance	about 2000 m lateral distance	22% of flocks took flight	Izembek Lagoon, Alaska	Ward et al. 1999
Pacific brant (*Branta bericla nigricans*)	rotary wing aircraft: single-engine (Bell 206-B Jet Ranger, Hughes 500-D, Bell 205) and twin-engine (Sikorsky HH-3F), 150-240 km/h	1200-2000 m lateral distance	about 2000 m lateral distance	28% of flocks took flight	Izembek Lagoon, Alaska	Ward et al. 1999
Canada goose (*Branta canadensis taverneri*)	fixed wing aircraft: single-engine (Arctic Tern, Piper 150, Cessna 206, Cessna 185) and twin-engine (Piper Navajo, Grumman goose, Twin Otter), 150-240 km/h	<400-2000 m lateral distance		5% of flocks took flight	Izembek Lagoon, Alaska	Ward et al. 1999
Canada goose (*Branta canadensis taverneri*)	rotary wing aircraft: single-engine (Bell 206-B Jet Ranger, Hughes 500-D, Bell 205) and twin-engine (Sikorsky HH-3F), 150-240 km/h	<400-2000 m lateral distance		11% of flocks took flight	Izembek Lagoon, Alaska	Ward et al. 1999
greater snow goose (*Chen caerulescens atlantica*)	low-flying aircraft	mean frequency of 2.0 disturbances per hour		number of birds lower at site the next day	Montmagny Bird Sanctuary, Quebec	Belanger and Bedard 1989
molting pink-footed goose (*Anser brachyrhynchus*)	Bell 206 helicopter, usu. not initially visible	6.5 km, <120 m altitude		lateral distance threshold at which 1/5 or more flocks "reacted"	Jameson Land, east Greenland	Mosbech and Glahder 1991

Table E-2. Thresholds of Distance, Sound, and Disturbance Frequency for Effects of Overflights on Waterfowl (Cont'd)

Species	Stressor Aircraft in Study	LOAEL	NOAEL	Response	Location	Reference
molting pink-footed goose (*Anser brachyrhynchus*)	Bell 212 helicopter	23 km, <120 m altitude		lateral distance threshold at which 1/42 or more flocks "reacted"	Jameson Land, east Greenland	Mosbech and Glahder 1991
molting barnacle goose (*Branta leucopsis*)	Bell 206 helicopter	5 km, <120 m altitude		lateral distance threshold at which 1/31 or more flocks "reacted"	Jameson Land, east Greenland	Mosbech and Glahder 1991
molting barnacle goose (*Branta leucopsis*)	Bell 212 helicopter	15 km, <120 m altitude		lateral distance threshold at which 1/12 or more flocks "reacted"	Jameson Land, east Greenland	Mosbech and Glahder 1991
wintering dark-bellied brent goose (*Branta bernicla bernicla*)	various nonmilitary airplanes and helicopters	500 m altitude, 1.5 km lateral distance		frequent flight response; "panic" caused by helicopters	coastline in Essex, England	Owens 1977
ring-necked duck, coot, gadwall, purple gallinule, pintail duck	helicopter	about 300 m slant distance		flight response	Aransas National Wildlife Refuge, TX	Edwards et al. 1979
herring gull (*Larus argentatus*) habituated to aircraft takeoffs and landings	Boeing 707s, 727s, and 747s		101 dBA	number of nesting birds flying over area was not different from non- aircraft conditions	Jamaica Bay National Recreation Area 2 km from Kennedy Int'l Airport	Burger 1981
mixed colony of fulmars (*Fulmaris glacialis*), shags (*Phalacrocorax aristotelis*), herring gulls (*Larus argentatus*), kitiwakes (*Rissa tridactyla*), guillemots (*Uria aalge*), razorbills (*Alca torda*), and puffins (*Fratercula arctica*)	Sikorsky S61 helicopter or Piper Aztec (twin-engine)		100 m above cliff top (and above birds),150 m above sea level	attendance of incubating and brooding birds not affected (too few puffins and fulmars for conclusive results for those species)	Buchan Cliffs, 40 km north of Aberdeen, Scotland monoplane	Dunnet 1977
colonies of great egrets (*Casmer-odius albus*), snowy egrets (*Egretta thula*, Louisiana herons (*Hydranassa tricolor*), double-crested cormorants (*Phalacrocorax auritus*), wood storks (*Mycteria americana*), and others	Lake single engine amphibian and Bell 47G-2		60 m altitude	no bird left the nest and failed to return within 5 min; 5% of birds left next for average of 1.4 min	southern Florida	Kushlan 1979

Source: Efromyson *et al.,* 2000

Table E-3. Sound Thresholds for Effects on Ungulates

Species	Stressor	LOAEL	NOAEL	Response	Location	Reference
mountain goat (*Oreamnos americanus*)	Bell-212 twin engine and Bell-206B turbo helicopter	>1500 m horizontal distance		37% of flights caused at least moderate group reaction (movement of 10-100 m or alertness between 2 and 10 min, over 50% of animals)	Caw Ridge, Alberta	Côté 1996
desert mule deer (*Odocoileus hemionus crooki*)	Cessna 172, Cessna 182 or Maule (M-5-235C)		<50 m altitude	animals did not change habitat	Picacho Mountains, south-central Arizona	Krausman et al. 1986
mountain sheep (*Ovis canadensis*)	F-16 aircraft, 90% power setting		125 m above ground level, 85 to 110 dB	no altered behavior	Desert National Wildlife Refuge, Nevada	Krausman et al. 1998
mountain sheep (*Ovis canadensis*)	Cessna 172 or 182	> 100 m		23% of sheep moved up to 100 m and continued their pre-survey activities		Krausman and Hervert 1983
mountain sheep (*Ovis canadensis*)	helicopter surveys, sampling intensity 0.8 min/km^2 or 2.0 min/km^2	50-200 m		moved 2.5 times farther the day following survey than previous day; 35-52% of animals changed polygons (8-83 km2) following sampling, compared to 11% day before	San Bernardino County, California	Bleich et al. 1990
mountain sheep (*Ovis canadensis*)	Bell 206B-III turbine powered helicopter	100 m above ground level		about 33-47% more animals changed their use of vegetation types following overflights; about 20-45% more animals changed sampling blocks following overflights	San Bernardino County, California	Bleich et al. 1994
mountain sheep (*Ovis canadensis*)	Bell 206B-III turbine powered helicopter	100 m above ground level		female mountain sheep moved farther the day of the survey than other days in spring, summer, and fall, but not in winter	San Bernardino County, California	Bleich et al. 1994

Table E-3. Sound Thresholds for Effects on Ungulates (Cont'd)

Species	Stressor	LOAEL	NOAEL	Response	Location	Reference
desert bighorn sheep (*Ovis canadensis nelsoni*)	Helicopters	250-450 m slant distance		reduction in foraging efficiency; effect may only exist in winter	Grand Canyon National Park	Stockwell et al. 1991
pronghorn antelope	OH-58 helicopter	150 m slant distance, 46 m altitude, 77 dBA	120 m altitude, slant range 900 m (60 dBA)	running	Otero Mesa in southern New Mexico	Luz and Smith 1976
moose	fixed-wing aircraft	60 m altitude		"frightened"		EPA 1980
woodland caribou (*Rangifer tarandus caribou*)	F-4, F-5, F-16, F-18, Tornado fixed wing aircraft, 775-825 km/h	300 m altitude, 70 m horizontal distance		30% response (daily activity level or daily distance traveled)	Canadian Forces Base, Goose Bay	Harrington and Veitch 1991
woodland caribou (*Rangifer tarandus caribou*)	F-16 fixed-wing	25-60 m altitude		15-50% response (movement several meters after pass)	Canadian Forces Base, Goose Bay	Harrington and Veitch 1991
woodland caribou (*Rangifer tarandus caribou*)	Bell 206L helicopter	30 m altitude		movement of 100% of individuals away from helicopter's path, prior to passing	Canadian Forces Base, Goose Bay	Harrington and Veitch 1991
woodland caribou (*Rangifer tarandus caribou*)	A-star 300D helicopter	30-150 m altitude		movement away from helicopter path prior to passing	Canadian Forces Base, Goose Bay	Harrington and Veitch 1991
Peary caribou (*Rangifer tarandus pearyi*)	Bell 206B helicopter	301-400 m altitude		trotting or galloping by 29.3% of animals	Prince of Wales Island	Miller and Gunn 1979
barren-ground caribou (*Rangifer tarandus*)	jet turbine helicopters	150 m	about 300 m	10% to 25% of groups exhibited at least a mild escape response	northern Yukon and Alaska	Calef et al. 1976
barren-ground caribou (*Rangifer tarandus*)	fixed wing aircraft	150 m	about 300 m	65% to 75% of groups exhibited at least a mild escape response	northern Yukon and Alaska	Calef et al. 1976
caribou	Helicopter	150-300 m		30000 animals "fled"		Jakimchuk et al. 1974
muskox	Bell 206B helicopter	301-400 m		32% trotting or galloping		Miller and Gunn 1979

Table E-3. Sound Thresholds for Effects on Ungulates (Cont'd)

Species	Stressor	LOAEL	NOAEL	Response	Location	Reference
non-habituated horse	simulated F-4 aircraft noise	113.4 dB max, 112.2 SEL 4 exposures per day		all horses (pregnant mares) exhibited flight posture (highly elevated head, wide open eye lids, dilated nostrils, quick forward or sideways movement) and movement of horses was significantly higher in treatment group	barn	LeBlanc et al. 1991
habituated horse	simulated F-4 aircraft noise		113.4 dB max, 112.2 SEL 6 events per hour	no horses (pregnant mares) exhibited more than an alert or irritated posture; no horses had elevated cortisol levels	barn	LeBlanc et al. 1991
non-habituated horse	simulated F-4 aircraft noise	113.4 dB max, 112.2 SEL 4 exposures per day		38% of horses (pregnant mares) had mild heart rate increases sustained for 20 sec	barn	LeBlanc et al. 1991
non-habituated horse	simulated F-4 aircraft noise	113.4 dB max, 112.2 SEL 4 exposures per day		cortisol elevated in 3 of 8 tested mares	barn	LeBlanc et al. 1991
lamb	USA Standard Institute White Noise (USASI)	100 dB	75 dB	increase in heart rate of lamb not acclimated to sound		
lamb	USA Standard Institute White Noise (USASI)		100 dB	no increase in heart rate of lamb acclimated to sound		
sheep	USA Standard Institute (USASI) White Noise	75 dB, continuous for 14 days		lower dry matter intake (only 2% difference)	laboratory	Harbers et al. 1975

Source: Efromyson *et al.,* 2000

Table E-4. Sound Thresholds for Effects on Small Mammals

Species	Stressor	LOAEL	NOAEL	Response	Location	Reference
feral house mice (*Mus musculus*)	airport noise	average noise of incoming and outgoing aircraft: 110 dB1		increase in adrenal gland mass	fields near Memphis International Airport	Chesser et al. 1975
mice	Parisian subway noise, recording played for 1 hour 4x per day	105 dB1		higher mortality pre-weaning, irregular intervals between litter production, slight effect on weight of pups		Busnel and Molin 1978
heteromyid rodent populations Merriam's kangaroo rat (*Dipodomys merriami*), Arizona pocket mouse (*Perognathus amplus*), desert pocket mouse (*Chaetodipus penicillatus*), white-throated wood rat (*Neotoma albigula*), southern grasshopper mouse (*Onychomys torridus*)	military jets, primarily F-15 Eagle, F-16 Falcon, A-10 Warthog (also somewhat different habitats in exposed and control areas)	mean # flights above 80 dBA–30.2/day; mean # flights above 100 dBA–4.2/day average maximum daily level from each site 68.8 dBA; highest SEL in area 115.5 dBA, where aircraft climbed rapidly		47% mean length of time on study plots, decrease of 4 to 7% survival rate (including losses due to dispersal)	under training racetracks of Barry M. Goldwater Air Force Range, south-Central Arizona	McClenaghan and Bowles (1995)
Merriam's kangaroo rat (*Dipodomys merriami*)	military jets, primarily F-15 Eagle, F-16 Falcon, A-10 Warthog (also somewhat different habitats in exposed and control areas)	mean # flights above 80 dBA- - 30.2/day; mean # flights above 100 dBA-- 4.2/day average maximum daily level from each site 68.8 dBA; highest ASEL in area 115.5 dBA, where aircraft climbed rapidly		hearing threshold (3 dB difference from control); may be due to differences among individuals	under training racetracks of Barry M. Goldwater Air Force Range, south-Central Arizona	Francine and Bowles 1995
kangaroo rats (*Dipodomys* spp.)	military jets, primarily F-15 Eagle, F-16 Falcon, A-10 Warthog		SEL>100 dBA	no significant differences in diversity or abundance of small mammals	on the Barry M. Goldwater Air Force Range, south- Central Arizona	Bowles et al. 1993

Table E-4. Sound Thresholds for Effects on Small Mammals (Cont'd)

Species	Stressor	LOAEL	NOAEL	Response	Location	Reference
desert kangaroo rat (*Dipodomys deserti*)	recorded dune buggy sounds, frequency range from 0.085 to 8.0 kHz with high energy below 2.0 kHz	95 dBA, 8.5 min duration		temporary threshold shift in behavioral hearing sensitivity; 10 min after exposure, 2 of 2 tested animals did not kick sand when recordings of sidewinder (*Crotalus cerastes*) crawls were played; 21 days required for recovery	Trapped in Riverside County, CA	Brattstrom and Bondello 1983
desert kangaroo rat (*Dipodomys deserti*)	recorded dune buggy sounds, frequency range from 0.085 to 8.0 kHz with high energy below 2.0 kHz	95 dBA, 8.5 min duration		ran in circles, defecated, pushed at openings of cages, chewed on cages, frantically groomed themselves, performed repeated slides, shivered on hind limbs	trapped in Riverside County, CA	Brattstrom and Bondello 1983

[1] Assumed to be unweighted decibels
Source: Efromyson *et al.,* 2000

Table E-5. Sound Thresholds for Effects on Reptiles and Amphibians

Species	Stressor	LOAEL	NOAEL	Response	Reference
Couch's spadefoot toad (*Scaphiopus couchi*)	amplified, recorded motorcycle noise	95 dB(A)		emergence from burrows (5 to 35% after 10 min exposure, 20 to 55% after 20 min exposure, 30 to 60% after 30 min exposure)	Brattstrom and Bondello 1983
Desert tortoise (*Gopherus agassizii*)	recorded sound from Air Force aircraft, 20 exposures of 40 min separated by 2 or more hours	94.6-114.2 dB CSEL[1]		freezing with extended appendages, decrease in activity, immobilization for up to 113 min; animals stopped activities such as walking or eating; recovery within 2-4 hours; 7-8% decrease in heart rate	Bowles et al. 1997a
Desert tortoise (*Gopherus agassizii*)	recorded sound from Air Force aircraft, 20 exposures over 40 minutes		114.2 CSEL[1], 126.1 maximum sound pressure level	no temporary acoustic threshold shift	Bowles et al. 1997b
Desert iguana (*Dipsosaurus dorsalis*)	simulated motorcycle noise	115 dBA, 1 hr duration		decreased cochlear responses (acoustical sensitivity) greater than 7 days duration	Bondello 1976
Couch's spadefoot toad (*Scaphiopus couchi*)	amplified, recorded motorcycle noise	95 dB(A)		emergence from burrows (5 to 35% after 10 min exposure, 20 to 55% after 20 min exposure, 30 to 60% after 30 min exposure)	Brattstrom and Bondello 1983
Mojave fringe-toed sand lizard (*Uma scoparia*)	recorded dune buggy sounds	95 dBA, 8.5 min duration, in cycles of 30 sec on, 5 sec off		decreased amplitudes and increased latencies of neural responses to standard auditory stimuli (hearing loss), duration unknown	Brattstrom and Bondello 1983

[1] C-weighted sound exposure level; C-weighting includes audible sounds as well as low inaudible frequencies that lead to vibration of buildings; C-weighting is a common metric for human community annoyance associated with blast noise

Source: Efromyson *et al.,* 2000

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APPENDIX F
NOISE

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NOISE

The physical characteristics of noise or sound include its intensity, frequency, and duration. Sound is created by acoustic energy, which produces minute pressure waves that travel through a medium, like air, and are sensed by the eardrum. This may be likened to the ripples in water that would be produced when a stone is dropped into it. As the acoustic energy increases, the intensity or amplitude of these pressure waves increase, and the ear senses louder noise. The unit used to measure the intensity of sound is the decibel (dB). Sound intensity varies widely (from a soft whisper to a jet engine) and is measured on a logarithmic scale to accommodate this wide range. The logarithm, and its use, is nothing more than a mathematical tool that simplifies dealing with very large and very small numbers. For example, the logarithm of the number 1,000,000 is 6, and the logarithm of the number 0.000001 is -6 (minus 6). Obviously, as more zeros are added before or after the decimal point, converting these numbers to their logarithms greatly simplifies calculations that use these numbers.

The frequency of sound is measured in cycles per second, or hertz (Hz). This measurement reflects the number of times per second the air vibrates from the acoustic energy. Low frequency sounds are heard as rumbles or roars, and high frequency sounds are heard as screeches. Sound measurement is further refined through the use of "A-weighting." The normal human ear can detect sounds that range in frequency from about 20 Hz to 15,000 Hz. However, not all sounds throughout this range are heard equally well. Because the human ear is most sensitive to frequencies in the 1,000 to 4,000 Hz range, some sound meters are calibrated to emphasize frequencies in this range. Sounds measured with these instruments are termed "A-weighted," and are indicated in terms of A-weighted decibels (dBA).

The duration of a noise event and the number of times noise events occur are also important considerations in assessing noise impacts. Figure E-1 depicts typical A-weighted sound pressure levels for various sources. As indicated in Figure E-1, 65 dBA is equivalent to normal speech at a distance of three feet.

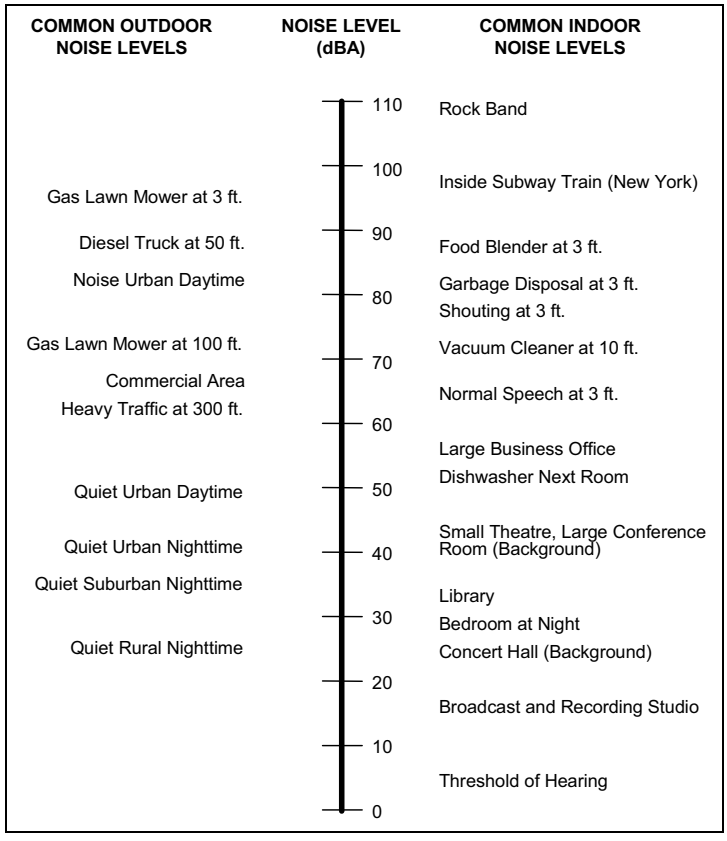

Figure F-1. Typical A-Weighted Noise Levels

F.1 NOISE METRICS

Single Event Sound Metrics

Although the highest dBA level measured during an event (*i.e.*, maximum sound level, L_{max}) is the most easily understood descriptor for a noise event, alone it provides little information. Specifically, it provides no information concerning either the duration of the event or the amount of sound energy. Thus, sound exposure level (SEL), which is a measure of the physical energy of the noise event and accounts for both intensity and duration, is used for single event noise analysis. Subjective tests indicate that human response to noise is a function not only of the maximum level, but also of the duration of the event and its variation with respect to time. Evidence indicates that two noise events with equal sound energy will produce the same response. For example, a noise at a constant level of 85 dBA lasting for 10 seconds would be judged to be equally as annoying as a noise event at a constant level of 82 dBA and duration of 20 seconds (*i.e.,* 3 dBA decrease equals one half the sound energy but lasting for twice the time period). This is known as the "equal energy principle."

Sound exposure levels values should not be confused with either the average noise (L_{eq}) or L_{max} associated with a specific event. SEL accounts for both the maximum sound level and the length of time a sound lasts. SEL does not directly represent the sound level heard at any given time. Rather, it provides a measure of the total sound exposure for an entire event averaged over one second. Numerous studies that evaluated the impacts of noise on wildlife have used SEL as the metric. For this reason, SEL is used as the metric to evaluate noise on wildlife in this EA.

The L_{eq} is the constant level that has the same A-weighted sound energy as that contained in the time-varying sound. L_{max} is the highest sound level measured during a single, noise producing event. For an observer, the noise level starts at the ambient noise level, rises up to the maximum level as the aircraft flies closest to the observer, and returns to the ambient level when the aircraft recedes into the distance. When an event lasts longer than one second, the SEL value will be higher than the L_{max} from the event. The L_{max} would typically be 5 to 10 dBA below the SEL value for aircraft overflight. Figure F-2 presents the relationship of SEL, L_{max}, and L_{eq} to the time history for a noise event from aircraft overflight.

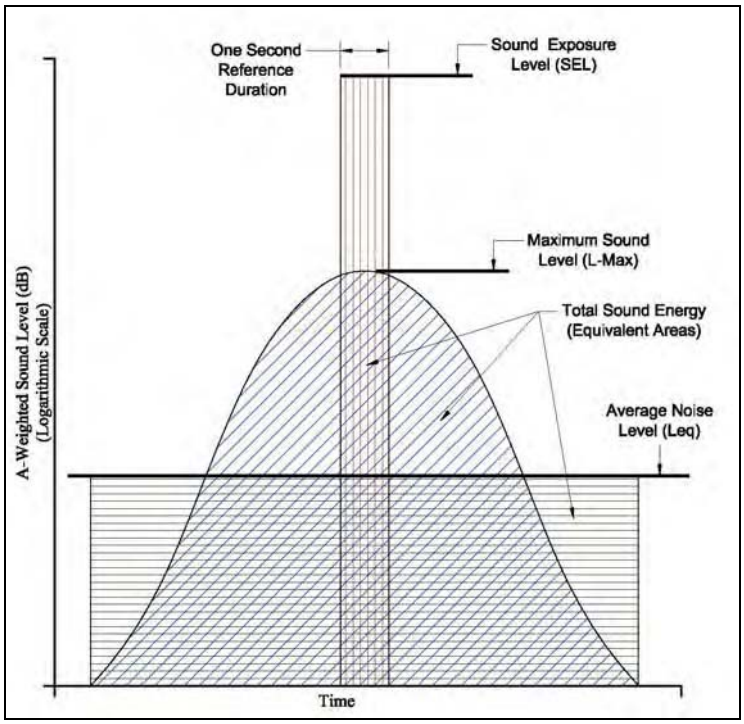

Figure F-2. Sound Exposure Level, Maximum Noise Level, and Average Noise Level Comparison to Aircraft Noise Time History

Noise from low-flying aircraft operating at night may cause sleep disturbance. Day-Night Average Sound Level (DNL) incorporates consideration of sleep disturbance by assigning a 10 dBA penalty to the SELs of nighttime noise events (10:00 p.m. to 7:00 a.m.). However, single noise events, not average sound levels, correlate better with sleep disturbance.

Averaged Noise Metrics

Single event analysis has a major shortcoming -- single event metrics do not describe the overall noise environment. DNL is the measure of the total noise environment. As previously mentioned, DNL averages the sum of all aircraft noise producing events over a 24-hour period, with a 10-dBA upward adjustment added to the nighttime events (between 10:00 p.m. and 7:00 a.m.) because people are more sensitive to noise during normal sleep hours when ambient noise levels are lower. DNL has been determined to be a reliable measure of community sensitivity to noise and has become the standard metric used in the United States to quantify noise in military noise studies.

Figure F-3 depicts the relationship of the single event, the number of events, the time of day, and DNL. This adjustment is an effort to account for increased human sensitivity to nighttime noise events. The summing of sound during a 24-hour period does not ignore the louder single events, it actually tends to emphasize both the sound level and number of those events. The logarithmic nature of the dB unit causes sound levels of the loudest events to control the 24-hour average. However, an individual does not "hear" DNL and its use is intended for land use planning and not to describe what someone hears when a single event occurs. The noise levels experienced inside a contour may be similar to that experienced outside a contour line at a given point in time depending on temperature, wind, and other factors.

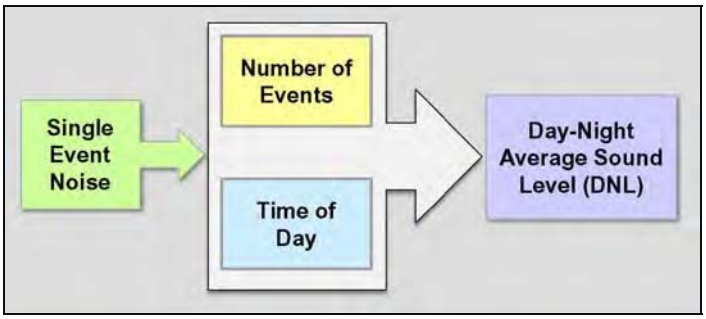

Figure F-3. Day-Night Average A-Weighted Sound Level

DNL is the accepted unit for quantifying annoyance to humans from general environmental noise, including aircraft noise. The Federal Interagency Committee on Urban Noise (FICUN) developed land use compatibility guidelines for noise exposure areas (FICUN, 1980). Based on these FICUN guidelines, the FAA and Air Force developed recommended land uses in aircraft noise exposure areas. The Air Force uses DNL as the method to estimate the amount of exposure to aircraft noise and to predict impacts. Land use compatibility and incompatibility are determined by comparing the predicted DNL level at a site with the recommended land uses.

F.2 NOISE ANALYSIS METHODS

Military aircrews conduct combat training over land at low altitudes and high airspeeds. Additionally, these aircraft seem to come from nowhere with a great noise and, just as quickly, disappear again. Assessing noise from military aircraft during these operations requires the use of a modified noise metric to appropriately account for the "startle" effect of the onset-rate of aircraft noise on humans. The adjusted DNL is designated as the onset-rate adjusted day-night average sound level. This metric is used to assess noise associated with Special Use Airspace (SUA) and MTRs. The noise modeling software used to assess the noise associated with SUA and MTRs is MOA Range NOISEMAP (MR_NMAP).

Another unique characteristic of military operations is that they occur in sporadic fashion. For example, operations may occur as frequently in a MOA or on a MTR (*e.g.,* 1,000 operations) or less than a couple of times per year in a temporary MOA designed for exercises. Because of the sporadic occurrences of operations, the number of average daily operations is determined by using the number of flying days in a calendar month. This metric is designated as onset-rate adjusted monthly day-night average sound level (L_{dnmr}), which incorporates the adjustment for noise events with an onset-rate equal to or greater than

15 dB per second. The Air Force recommends L_{dnmr} values be applied to the same interpretive criteria as DNL values (USAF, 1987).

MR_NMAP was developed for the DoD by the Air Force. The program considers airspace information, the horizontal distribution of operations, flight profiles (*i.e.*, airspeed, altitude, and power setting at various points), and the number of operations.

A limitation for computer modeling is encountered when calculating time-averaged sound levels for airspaces for lower levels (below 55 dB). The reliability of results varies due to the increased variability of effects of atmospheric conditions on individual aircraft sound levels at the longer distances and the presence of other noise sources. Additionally, when flight activity is infrequent, the time-averaged sound levels are generated by only a few individual aircraft noise events and may not be statistically representative of the aircraft being modeled.

While there is no technical reason why a lower level cannot be measured or calculated for comparison purposes, DNL 65 dBA:

- was adopted by the DoD, U.S. Environmental Protection Agency (USEPA), FAA, and Department of Housing and Urban Development (HUD) as the threshold for comparing and assessing community noise effects; and
- represents a noise exposure level normally dominated by aircraft noise and not other community or nearby highway noise sources.

DNL 55 dBA, which is applied to the same interpretive criteria as L_{dnmr}, is established as the level "...requisite to protect the public health and welfare with an adequate margin of safety". It is also the maximum level compatible with adequate speech communication indoors and outdoors (USEPA, 1974).

F.3 NOISE EFFECTS

Effects of Noise on Communication

The sound level of speech outdoors decreases with increased distance between the speaker and listener. Table F-1 presents the distances between the speaker and listener for satisfactory outdoor speech intelligibility at two levels of vocal effort at steady background noise levels. The levels for normal and raised voice satisfactory conversation presented in the table permit sentence intelligibility of 95 percent at each distance. This level of intelligibility usually permits reliable communication. If the noise levels in Table E-1 are exceeded, the speaker and listener must either move closer together or expect reduced intelligibility (USEPA, 1974). Based on the data in the table, listeners in normal communication at a distance of 10 feet in a steady background noise of L_{eq} 56 dB and who experience an increase in a background noise to L_{eq} 66 dB would have to move to about 3 feet apart to maintain the same intelligibility or raise their voices. Their speech intelligibility would drop from 95 to 65 percent if they remain at 10 feet of separation.

Table F-1. Steady A-Weighted Sound Levels (dBA) that Allow Communication with 95 Percent Intelligibility over Distances Outdoors for Different Voice Levels

	Distance (feet)					
	1.5	**3**	**6.5**	**10**	**13**	**16**
Normal Voice	72	66	60	56	54	52
Raised Voice	78	72	66	62	60	58

Note: Values reflect average noise levels (L_{eq}) and dBA.
Source: USEPA, 1974

The discussion in the preceding paragraph relates to steady background noise conditions. Time varying environmental noise in which the magnitude varies with time (*e.g.*, aircraft overflight), but has the same L_{eq} as a steady background noise, would lead to better intelligibility than the steady background noise condition. Speech interference where the magnitude varies with time tends to decrease as the fluctuations of the noise become more extreme (USEPA, 1974). Greater difference between the sound exposure level (*i.e.*, SEL) during the event and the steady state noise of the event (*i.e.*, L_{eq}) reduces the duration of speech intelligibility during the event.

Nonauditory Health Effects

Nonauditory health effects of long-term noise exposure, where noise may act as a risk factor, were never found to occur at levels below those protective against noise-induced hearing loss. Most studies attempting to clarify such health effects found that noise exposure levels established for hearing protection would also protect against any potential nonauditory health effects, at least in workplace conditions. The best scientific summary of these findings is contained in the lead paper at the National Institute of Health Conference on Noise and Hearing Loss, held on 22-24 January 1990 in Washington, D.C.

The nonauditory effects of chronic noise exposure, when noise is suspected to act as one of the risk factors in the development of hypertension, cardiovascular disease, and other nervous disorders, have never been proven to occur as chronic manifestations at levels below these criteria (an average of 75 dBA for complete protection against hearing loss for an 8-hour day). At the 1988 International Congress on Noise as a Public Health Problem, most studies attempting to clarify such health effects did not find them at levels below the criteria protective of noise-induced hearing loss, and even above these criteria, results regarding such health effects were ambiguous. Consequently, one comes to the conclusion that establishing and enforcing exposure levels protecting against noise-induced hearing loss would not only solve the noise-induced hearing loss problem but also any potential nonauditory health effects in the work place" (Von Gierke, 1990).

Although these findings were directed specifically at noise effects in the work place, they are equally applicable to aircraft noise effects in the community environment. Research studies regarding the nonauditory health effects of aircraft noise are ambiguous, at best, and often contradictory. Yet, even those studies, which purport to find such health effects, use time-average noise levels of 75 dBA and higher for their research.

Hearing Loss

Table F-2 contains at-ear noise exposure levels that produce negligible hearing loss of no more than 5 dB for both an eight-hour and 24-hour exposure on a yearly and working day basis. The eight-hour data assume the remaining 16 hours of the day are spent in relative quiet (USEPA, 1974). According to USEPA (1974), changes in hearing levels of 5 dB are generally not considered noticeable or significant. As shown in Figure D-2, the average noise (L_{eq} in Table F-2) from a noise-producing event is less than the L_{max} or SEL from the event.

Table F-2. At-Ear Exposure Levels that Produce No More than 5 dB Noise-Induced Hearing Damage over a 40-Year Period

Exposure	Steady (continuous) Noise	Intermittent Noise	With Margin of Safety
L_{eq} 8-Hour			
250 days per year	73.0	78.0	--
365 days per year	71.4	76.4	75.0
L_{eq} 24-Hour			
250 days per year	68.0	73.0	--70.0
365 days per year	66.4	71.4	--

Source: USEPA, 1974

Sleep Interference

Noise from low-flying aircraft operating at night may cause sleep disturbance. DNL incorporates consideration of sleep disturbance by assigning a 10 dBA penalty to the SELs of environmental nighttime noise events (10:00 p.m. to 7:00 a.m.). However, single noise events, not average sound levels, correlate better with sleep disturbance.

Studies have estimated the percentage of awakenings that may be experienced by people exposed to different SELs. The Federal Interagency Committee on Aviation Noise (FICAN, formed in 1993 as recommended by the Federal Interagency Committee on Noise [FICON]), based on field studies, recommends a dose-response curve for predicting sleep awakening. Figure F-4 compares the FICAN recommendation of 1997 to the 1992 FICON recommendation for predicting sleep awakening. FICAN

takes the conservative position that, because the adopted curve represents the upper limit of the data presented, it should be interpreted as predicting the maximum percentage of the exposed population expected to be awakened. Based on the updated position, it is estimated that outdoor SELs of 80 to 100 dBA could result in 4 to 10 percent awakenings in the exposed population. Noise must penetrate the residence to disturb sleep. Interior noise levels are lower than exterior levels due to the attenuation of the sound energy by the structure. The amount of attenuation provided by the building is dependent on the type of construction and whether the windows are open or closed. The approximate national average attenuation factors are 15 dBs for open windows and 25 dBs for closed windows. Twenty dBA is conservatively used to estimate attenuation for a typical dwelling unit (USEPA 1974).

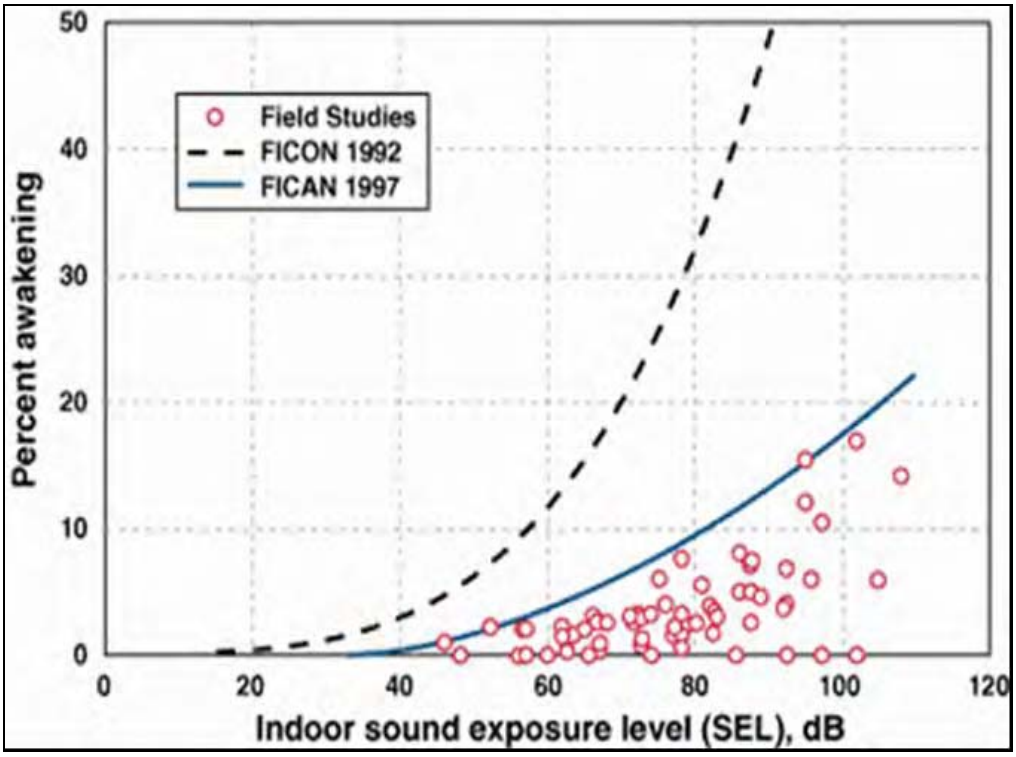

Figure F-4. Recommended Sleep Disturbance Dose Response Relationship

Noise Effects on Wildlife

Animal species differ greatly in their response to noise. Noise effects on domestic animals and wildlife are classified as primary, secondary, and tertiary.

- Primary effects consist of direct, physiological changes to the auditory system, and most likely include the masking of auditory signals. Masking would cause the inability to hear environmental signals from mates, predators, or pray.
- Secondary effects could include non-auditory issues such as stress, behavior modifications, interference with mating and reproduction, and impaired ability to obtain food, cover, or water.
- Tertiary effects would be the direct result of the primary and secondary effects and include population decline and habitat loss.

Numerous studies that evaluated the impacts of noise on wildlife have used SEL as the metric. For this reason, SEL is used as the metric to evaluate noise on wildlife in this EA.

Effects of Noise on Structures

Some building materials are more sensitive than others to external pressures and induced vibrations. Windows with large panes of glass are most vulnerable. Plaster walls in frame buildings are susceptible to cracking. Components that are least likely to experience damage are masonry walls of stone, concrete block, adobe, or brick. Appropriate building design can also reduce the possibility of damage from vibration. Research has not proven categorically that old buildings are more vulnerable to vibration than

newer buildings, but prudence dictates special consideration be given to unique structures of historical significance. Table F-3 lists the effects of sound on structures.

Table F-3. Effects of Noise on Structures

dBA	psf[a]	Effects Summary	
0-127	0-1	Typical community exposures	No damage to structures No significant public reaction
127-131	1.0-1.5	(generally below 2 psf)	Rare minor damage Some public reaction
131-140	1.5-4.0	Window damage possible, increasing public reaction, particularly at night	
140-146	4.0-8.0[b]	Incipient damage to structures	
146-171	8.0-144.0	Measured booms at minimum altitudes experienced by humans; no injury	
185	720.0	Estimated threshold for eardrum rupture (maximum overpressure)	
194	2,160.0	Estimated threshold for lung damage (maximum overpressure)	

psf = pounds per square foot

Note: With the exception of window glass breakage, booms less than 11 psf should not damage "building structures in good repair" (Clarkson and Mayes, 1972).

Source: Speakman, 1992

Noise induced structural vibration may also cause "rattle" of objects within a dwelling. Window panes may vibrate when exposed to high levels of airborne noise. In general, such noise-induced vibrations occur at sound levels of 110 dB or greater.

F4. REFERENCES CITED

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