Draft Environmental Assessment for Proposed Airspace Changes for Paradise East and Paradise West Military Operations Areas (MOAs) at Mountain Home Air Force Base (MHAFB) Idaho

June 2009

DRAFT FINDING OF NO SIGNIFICANT IMPACT

1.0 NAME OF THE PROPOSED ACTION

Proposed Airspace Changes for Paradise East and Paradise West Military Operations Areas (MOAs) at Mountain Home Air Force Base, ID.

2.0 DESCRIPTION OF THE PROPOSED ACTION

Based on the analysis in the draft Environmental Assessment, the Air Force is proposing Alternative B as the Proposed Action.

The Proposed Action is to reconfigure (expand) the lateral and vertical boundaries of Paradise East and Paradise West MOAs. The floor of the MOAs would be lowered from 14,500 feet above mean sea level (MSL) to 10,000 feet MSL or 3,000 feet above ground level (AGL), whichever is higher, and would add approximately 16,985 cubic nautical miles (NM) of training airspace. The lateral boundaries of air traffic control assigned airspace (ATCAA) would correspond with the new MOA boundaries.

The proposed Paradise MOAs would be charted and communicated to airspace users, but could also be internally subdivided into separate operating areas (sectors). These sectors would be transparent to airspace users but would allow Salt Lake Air Route Traffic Control Center (ARTCC) more flexibility in activating or deactivating sectors to respond to situations such as diverting nonmilitary aircraft through portions of the MOA complex to avoid adverse weather. Sectors could be activated separately or jointly to accommodate training requirements.

The Proposed Action would provide improved aircrew training, which is directly related to combat readiness. If training can better simulate combat conditions, the gained aircrew experience will limit attrition in actual combat. To maximize combat capability and preserve valuable combat resources, fighting units must have access to a realistic combat training environment on a regular and frequent basis. An expanded airspace allows fighter aircrews the opportunity to train in realistic conditions and maximizes the full potential of their aircraft’s capabilities.

Expanding the airspace would provide sufficient special use airspace to meet the 366th Fighter Wing requirement to train fighter aircrews in offensive and defensive operations. Practicing in an improved training environment would provide multi-role fighter crews with realistic training scenarios to maximize the effectiveness of the aerial combat and air superiority mission experience.

3.0 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

The Environmental Assessment analyzes the potential environmental impacts from the Proposed Action or Alternatives. According to the analysis in this EA, implementation of the Proposed Action would not result in significant impacts to any resource category or significantly affect existing conditions within the Mountain Home Range Complex or the area underlying the proposed airspace expansion area**.** The following summarizes and highlights the results of the analysis by resource category.

Airspace Management and Use. The Proposed Action will deconflict airspace use and spread operations over a wider area. No significant impacts would occur from the proposed airspace expansion.

Noise. Empirical modeling was conducted using nearly 24,000 hours of noise monitoring data from 1,141 instrument-days at eight sites in the Jarbidge and Owyhee MOAs in 2002. Noise values in A-weighted decibels (dB) within the proposed expansion area range from 45.0 to 47.5 dB. Average noise levels would increase to levels of 45.0 to 45.8 dB with implementation of the proposed action. Day-Night Average sound levels (L_{dn})would decrease slightly in Owyhee and Jarbidge MOAs, and increase slightly in Paradise West and Paradise East MOA. The average L_{dn} for Paradise East and West MOAs is 44.7 dB and would change to 45.2 dB under the Proposed Action. Therefore, except for periodic direct overpasses or a sonic boom, the average noise level would not change significantly.

*Air Quality***.** Air emissions from aircraft will result in an insignificant increase in air pollutants in the expansion area. Air emissions will decrease within the current boundaries of the MOAs. No significant impacts would occur.

Hazardous Materials, Hazardous Waste, and Solid Waste. No significant impacts would occur from the proposed airspace expansion.

Biological Resources. Noise will increase slightly throughout the MOA and expansion area, but the increase would be insignificant. No significant impacts to biological resources would occur from the proposed airspace expansion.

Safety, Light Emissions and Energy Supply. No significant impacts would occur from the proposed airspace expansion.

Environmental Justice. No disproportionate or significant impacts to children, economically disadvantaged, or minority populations would occur from the proposed airspace expansion.

Land Management Use, Visual, and Recreational Resources. No changes to land use would occur and no significant impacts would occur. Noise increases are expected over the Santa Rosa-Paradise Peak Wilderness Area and Jarbidge Wilderness Area. Effects would be insignificant.

Cultural Resources. No significant impacts to cultural resources would occur from the proposed airspace expansion.

Water Resources and Hydrology. No significant change from current conditions would occur.

Earth Resources. No significant change from current conditions would occur.

Socioeconomics and Physical Resources. No significant impacts would occur from the proposed airspace expansion.

4.0 CONCLUSION

On the basis of the analysis provided the EA, which has been conducted in accordance with the National Environmental Policy Act, the Council on Environmental Quality regulations, and 32 CFR Part 989, implementing the Proposed Action would not result in significant impacts to human health or the natural environment. Therefore, a Finding of No Significant

Impact is warranted and further analysis under an Environmental Impact Statement is not required.

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JOHN D. BIRD II, Colonel, USAF Commander Date

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Executive Summary

This Environmental Assessment (EA) analyzes the potential environmental effects resulting from a United States Air Force (Air Force) proposal to expand Paradise East and Paradise West Military Operating Areas (MOAs) in Oregon and Nevada. This EA has been prepared in accordance with the Code of Federal Regulation Title Part 989, known as the Air Force Environmental Impact Analysis Process, and with the National Environmental Policy Act (NEPA), as amended (PL 91-190), the Council on Environmental Quality regulations, and Department of Defense Directive 6050.1. The FAA has jurisdiction for establishing controlled and special use airspace within the U.S., and in accordance with 32 CFR 989 is a cooperating agency during this environmental analysis.

Purpose and Need for the Action

The purpose of expanding the airspace is to provide sufficient special use airspace to meet the 366th Fighter Wing requirement to train fighter aircrews in offensive and defensive operations including:

- Basic Fighter Maneuvers (BFM)
- Air Combat Maneuvers (ACM)
- Offensive and Defensive Counter-air (OCA/DCA)
- Dissimilar Air Combat Tactics (DACT)
- Surface Attack Tactics (SAT)
- Large Force Exercise (LFE)

An expanded training environment would provide multi-role fighter crews with realistic training scenarios to maximize the effectiveness of the aerial combat and air superiority mission experience.

The proposed airspace expansion is needed to provide effective training and is directly related to combat readiness. If the available training can better simulate combat conditions, the gained aircrew experience will limit attrition in actual combat.

To maximize combat capability and to preserve valuable combat resources, fighting units must have access to a realistic combat training environment on a regular and frequent basis. The ability to conduct unrestricted maneuvering during air-to-air training engagements is an important aspect of combat training. It allows fighter aircrews the opportunity to train in near-realistic conditions and maximizes the full potential of their aircraft's capabilities. A 90-NM engagement set-up allows aircrews to realistically search, track, and target adversaries, while a set-up of less than 90 NM introduces artificial parameters into the training scenario. The aircraft Radio Detection and Ranging (RADAR) equipment will automatically acquire targets when engagement set-ups are less than 90 NM, which does not provide aircrews with target acquisition training. The current configuration of the Paradise MOAs allows only one major engagement with a 60-NM set-up. In order for pilots to fully exploit the weapon system's true capability, additional lateral and vertical airspace is required. The proposed project would afford greater accessibility to more airspace and provide greater flexibility in scheduling activities within the MHRC.

Proposed Action and Alternatives

No-Action Alternative: Alternative A

Under the No Action Alternative, training activities in the Paradise East and West MOAs would continue as currently authorized and implemented. The lateral and vertical boundaries would remain the same and aircraft would fly above 14,500 feet MSL. Operational deficiencies would continue to limit the effectiveness of flight training.

Proposed Action: Alternative B

The proposed action would expand the lateral and vertical boundaries of the Paradise East/West MOAs. The floor of the MOAs would be lowered from 14,500 feet above mean sea level (MSL) to 10,000 feet MSL or 3,000 feet above ground level (AGL), whichever is higher, and would add approximately 16,985 cubic nautical miles (NM) of training airspace for a total volume of 66,270 cubic NM. The lateral boundaries of air traffic control assigned airspace[1] (ATCAA) would correspond with the new MOA boundaries. Supersonic flight currently conducted in the ATCAA would be extended over the proposed MOA expansion in corresponding ATCAA airspace.

Alternative C

Alternative C would incorporate the lateral, but not the vertical expansion of the Paradise East/West MOAs described for the Proposed Action. Alternative C provides the same 29 percent increase in MOA area, but represents a more modest increase in MHRC airspace volume; by only about 26 percent more than provided in the No Action Alternative (compared with a 34 percent volume increase for the Proposed Action). Training activities would be enhanced compared to the No Action Alternative, but a number of operational deficiencies would remain.

Alternative D

Alternative D incorporates the vertical, but not the lateral expansion of the Paradise East/West MOAs described for the Proposed Action. This alternative, therefore, represents a more modest increase in MHRC vertical airspace volume by about 5.4 percent over the No Action Alternative (compared with a 34 percent volume increase with the Proposed Action and a 26 percent volume increase for Alternative C). Training activities under Alternative D would be enhanced compared to the No Action Alternative, but a number of operational deficiencies would remain.

Summary of Environmental Consequences

This section compares potential impacts among the alternatives. A comparison of potential impacts for proposed airspace changes are presented in Table ES.1. Resource areas for which impacts may occur include noise impacts to people and biological resources (wildlife). According to the analysis in this EA, implementing the Proposed Action or

[1] ATCAA is uncharted airspace that overlies the MOA, at altitudes from Flight Level (FL) 180 through FL 500 (approximately 18,000 feet to 50,000 feet MSL). Flight Levels are defined as altitudes (in hundreds of feet) based on a standardized aircraft altimeter setting of 29.92 inches of mercury.

Alternatives would have a negligible, insignificant effect on the environment and human health.

TABLE ES.1
Alternatives Comparison of Potential Impacts for Proposed Airspace Changes of the MOAs at MHRC

Resource Area	Alternative A No Action	Alternative B Proposed Action	Alternative C	Alternative D
Airspace Management and Use	No change from current conditions	Highest potential for deconflicting airspace use and spreading operations over a wider area as compared to the No Action Alternative	Moderate potential for deconflicting airspace use and spreading operations over a wider area as compared to the No Action Alternative	Lowest potential for deconflicting airspace use and spreading operations over a wider area as compared to the No Action Alternative
Noise	No change from current conditions	Very small to no increase in average hourly noise levels over existing conditions	Very small to no increase in average hourly noise levels over existing conditions	Very small to no increase in average hourly noise levels over existing conditions
Biological Resources (Wildlife)	No documented effect	No effect	No effect	No effect

1.0 Purpose and Need for Action

1.1 Introduction

The U.S. Air Force (USAF) has proposed to change the boundaries and use of the current Military Operations Areas (MOAs) in the Mountain Home Range Complex (MHRC) for Mountain Home Air Force Base (MHAFB). The proposed project would result in a lateral expansion of the current Paradise MOA structures, and a vertical increase by modification of the altitude floors currently authorized for use in the existing, contiguous MOA. Figure 1 shows the project area and existing MOAs.

This Environmental Assessment (EA) has been prepared to evaluate the potential environmental effects from implementation of the Proposed Action or alternatives. The alternatives have been prepared in accordance with 32 CFR 989, Air Force Environmental Impact Analysis Process and with the National Environmental Policy Act (NEPA), as amended (PL 91-190). The FAA has jurisdiction for establishing controlled and special use airspace within the U.S., and in accordance with 32 CFR 989 is a cooperating agency during this environmental analysis.

This EA is organized into five chapters as follows:

- *Chapter 1, Purpose and Need for Action.* This chapter includes background information about the proposal, MHAFB and the MHRC MOA, and the purpose of and need for the project.
- *Chapter 2, Description of the Proposed Action and Alternatives.* This chapter provides a more detailed description of the Proposed Action and alternatives to the Proposed Action.
- *Chapter 3, Affected Environment.* This chapter describes the human and natural environments in the analysis area. It is organized by resource area.
- *Chapter 4, Environmental Consequences.* This chapter presents the environmental consequences of implementing the Proposed Action and alternatives, including direct, indirect, and cumulative effects.
- *Chapter 5, References.* This chapter presents references consulted during development of the EA.
- *Chapter 6, List of Contributors and Preparers.* This chapter outlines the list of professionals who participated in the creation of this document.

1.2 Background

Air Combat Command (ACC) requires fighter and bomber aircrews to train in offensive and defensive BFM, ACM, OCA/DCA, and DACT. The current MHAFB Paradise MOA configuration allows only one major engagement with a 60-NM set-up. An expanded configuration would permit three separate engagements with 50-NM set-ups, two engagements with 75-NM set-ups, or one large engagement with an over 90-NM set-up. An expanded MOA complex providing an additional 16,985 cubic NM of airspace is desired to enable MHAFB to better achieve current mission requirements.

An expanded MOA complex would also provide more options in the event ARTCC needs to reroute civil air traffic over or through the MOAs. Incorporating sectors into the Paradise MOAs would allow the Paradise airspace to be activated incrementally by sector rather than the current all or nothing situation. It would also allow for more flexibility in scheduling the airspace with both military and civil airspace users.

Effective training and combat readiness are directly related. Unrestricted maneuvering during air-to-air training represents one important facet of realistic training. It allows fighter and bomber aircrews the opportunity to train realistically and realize the maximum potential of their aircraft's capabilities.

1.2.1 Mountain Home Air Force Base

MHAFB is located approximately 50 miles southeast of Boise, Idaho, and 8 miles southwest of Mountain Home, Idaho (Figure 1). MHAFB includes the base proper plus a Small Arms Range, the Rattlesnake Radar Station, Middle Marker, and C.J. Strike Dam Recreation Complex. The 6,844 acres of MHAFB includes all of Sections 20, 21, 22, 27, 28, 29, 32, 33, and 34 as well as 10 acres in Section 19 in Township 4 South (T4S), Range 5 East (R5E).

1.2.2 Mountain Home Range Complex

The Mountain Home Range Complex (MHRC) encompasses many properties in Owyhee County and one property in Twin Falls County. Saylor Creek Air Force Range (SCR) and Juniper Butte Range (JBR) are part of this complex (Figure 1).

SCR is located in T7S, R7E, Sections 1-36; T7S, R8E, Sections 1-36; T8S, R7E, Sections 1-5, 8-17, 20-29, and 32-36; T8S, R8E, Sections 1-36; T9S, R7E, Sections 1-5, 8-17, and portions of 24, 25, and 36; and T9S, R8E, Sections 1-18 and portions of 19, 20, 29, 30, 31, and 32. The public-use area of the 109,466-acre SCR is located in the relatively flat upland of the Inside Desert at an average elevation of 3,700 feet.

JBR is located approximately 25 miles southeast of SCR in Owyhee County, Idaho. JBR occupies portions of Sections 31, 32, and 33 in Township 12 South, Range 10 East; portions of Sections 35 and 36 in Township 12 South, Range 9 East; all of Sections 5, 6, 7, 8, 9, 16, 17, and 18, and portions of Sections 4, 19, 20, and 21 in Township 13 South, Range 10 East; all of Sections 1, 12, and 13, and portions of Sections 2, 11, 14, 23, and 24 in Township 13 South, Range 9 East.

Five no-drop targets, 20 quarter acre emitter sites, and 10 one-acre emitter sites exist in the Jarbidge MOA, Owyhee County, Idaho.

All MHRC properties are found within the boundaries of the Jarbidge MOA. No other MOAs contain training ranges, conventional targets, no-drop targets, emitter sites, or other on the ground assets.

1.3 Proposed Federal Action

The proposed action would expand the lateral and vertical boundaries of the Paradise East/West MOAs (Figure 2). The floor of the MOAs would be lowered from 14,500 feet above mean sea level (MSL) to 10,000 feet MSL or 3,000 feet above ground level (AGL), whichever is higher. 14,500 feet MSL in Paradise East MOA corresponds to 1,403-9,196 feet

AGL depending on terrain. The current range of 14,500 feet MSL in Paradise West is between 4,000-8,664 feet AGL. The proposed changes would add approximately 16,985 cubic nautical miles (NM) of training airspace. The lateral boundaries of air traffic control assigned airspace[2] (ATCAA) would correspond with the new MOA boundaries. Supersonic flight currently conducted above the Paradise MOA in ATCAA airspace would be extended over the proposed MOA lateral expansion.

No training ranges, conventional targets, no-drop targets, emitter sites, or other on-the-ground assets are part of this proposed action. No increase in the total number of aircraft operations is planned.

1.4 Purpose and Need

The **purpose** of expanding the airspace is to provide sufficient special use airspace to meet the 366th Fighter Wing requirement to train fighter aircrews in offensive and defensive operations including:

- Basic Fighter Maneuvers (BFM)
- Air Combat Maneuvers (ACM)
- Offensive and Defensive Counter-air (OCA/DCA)
- Dissimilar Air Combat Tactics (DACT)
- Surface Attack Tactics (SAT)
- Large Force Exercise (LFE)

An expanded airspace training environment would provide multi-role fighter crews with realistic training scenarios to maximize the effectiveness of the aerial combat and air superiority mission experience.

The proposed airspace expansion is **needed** to provide effective training and is directly related to combat readiness. If the available training can better simulate combat conditions, the gained aircrew experience will limit attrition in actual combat. To maximize combat capability and to preserve valuable combat resources, fighting units must have access to a realistic combat training environment on a regular and frequent basis. The ability to conduct unrestricted maneuvering during air-to-air training engagements is an important aspect of combat training. It allows fighter aircrews the opportunity to train in near-realistic conditions and maximizes the full potential of their aircraft's capabilities. A 90-NM engagement set-up allows aircrews to realistically search, track, and target adversaries, while a set-up of less than 90 NM introduces artificial parameters into the training scenario. The aircraft Radio Detection and Ranging (RADAR) equipment will automatically acquire targets when engagement set-ups are less than 90 NM, which does not provide aircrews with target acquisition training. The current configuration of the Paradise MOAs allows only one major engagement with a 60-NM set-up. In order for pilots to fully exploit the weapon system's true capability, additional lateral and vertical airspace is required. The proposed project would afford greater accessibility to more airspace and provide greater flexibility in scheduling activities within the MHRC.

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[2] ATCAA is uncharted airspace that overlies the MOA, at altitudes from Flight Level (FL) 180 through FL 500 (approximately 18,000 feet to 50,000 feet MSL). Flight Levels are defined as altitudes (in hundreds of feet) based on a standardized aircraft altimeter setting of 29.92 inches of mercury.

The need for the proposed airspace expansion can be further characterized by the following specific operational limitations and deficiencies resulting from the constrained MOA airspace:

- The current Paradise MOA airspace boundaries cause “funneling” of aircraft because of the MOA boundary configurations (triangular shaped). This limitation is compounded when exercising large force exercise (LFE) formations where many aircraft must operate in increasingly confined space when approaching the MOA boundary. This containment minimizes the aircraft performance capabilities and training scenarios. Sufficient airspace to allow maximum aircraft performance is needed in order to train to obtain an “air superiority” environment.
- When restricted into either Paradise West or East (i.e., en-route traffic re-routing because of weather), aircrews lose an appreciable amount of airspace, which restricts the available lateral maneuvering area. Re-configuration/expansion would provide more options to activate and deactivate MOA sectors to continue mission training when the amount of available airspace is reduced due to ARTCC weather deviations of civilian or commercial air traffic.
- The current restricted and funneled configuration also results in a higher probability for “spill-out” (training aircraft inadvertently flies outside of the MOA). These events significantly increase the ARTCC/Military RADAR Unit (MRU) coordination workload to maintain separation of military training aircraft from nonparticipating aircraft.
- The airspace size is further constrained by a Settlement Agreement between the Shoshone-Paiute Tribes of the Duck Valley Reservation (DVR) and the United States. This Settlement Agreement restricts military training aircraft operations within its vertical and lateral boundaries. When combined with the DVR geographic location within the MOA complex, the available military aircraft operating area is significantly lessened, especially to the south and east in the Paradise East MOA.
- Vertical and lateral MOA enlargement would decrease potential conflict between training aircraft packages and enhance range safety margins. During LFEs, the opportunity to stratify the airspace would allow larger formations to perform required training with reduced interference from adjacent training packages, and improve training mission effectiveness.
- Larger airspace dimensions would allow better use of the daily flying window by accommodating concurrent training operations, which may result in a shorter flying window and fewer manpower requirements necessary to complete training. The expanded airspace would better accommodate LFEs, increasing the productivity of the airspace.

Figure 1

Figure 1 Project Area, Alternative A, No Action Alternative

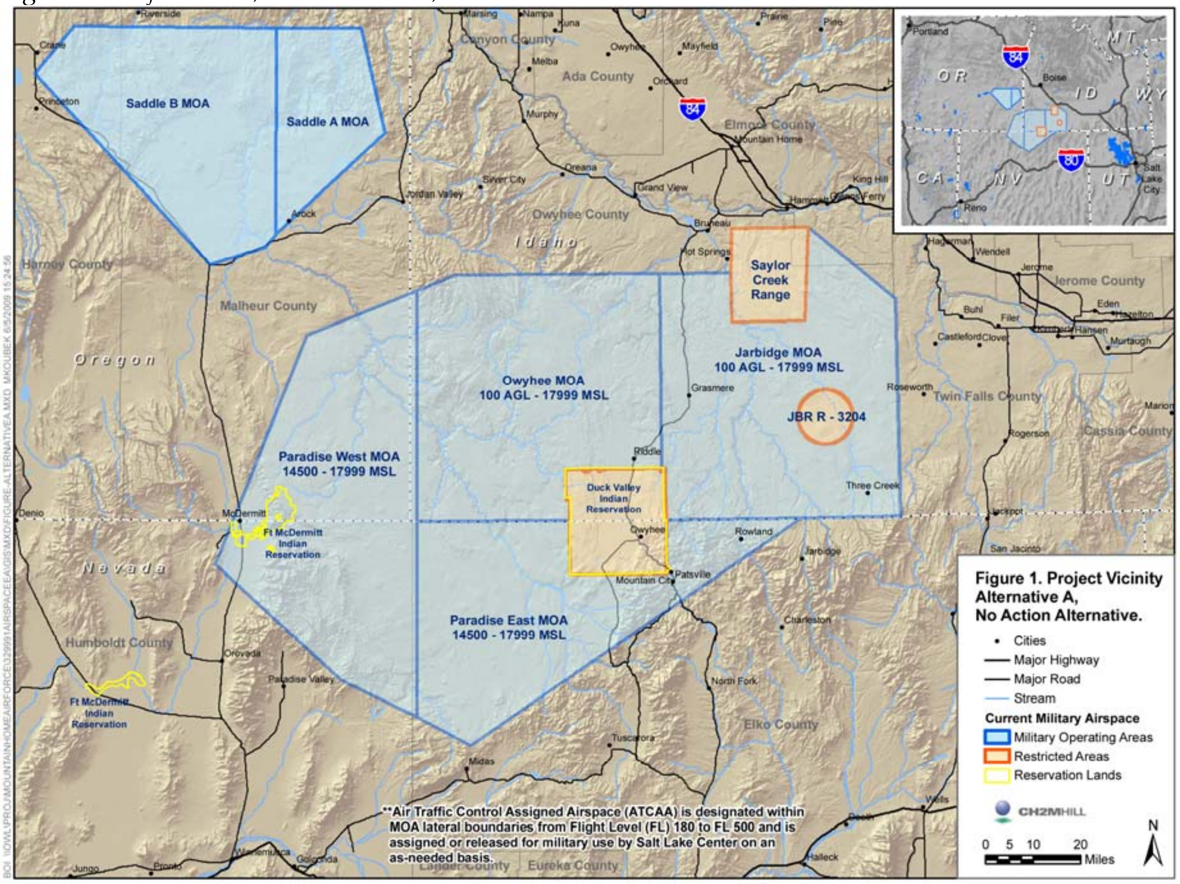


Figure 1 (back)

Figure 2

Figure 2 Alternative B, Proposed Action, Increased Lateral and Vertical Airspace

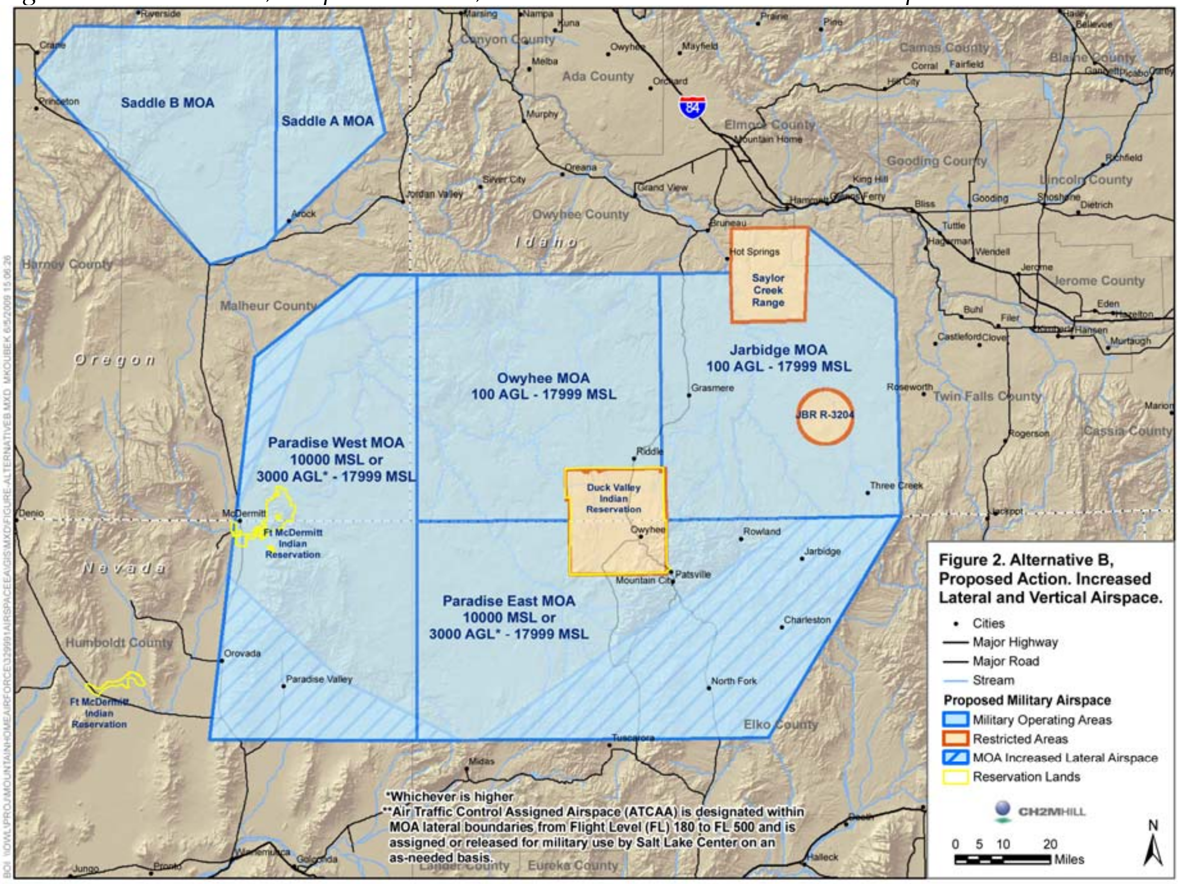


Figure 2 (back)

2.0 Description of Proposed Action and Alternatives

2.1 Introduction

This chapter presents the No Action Alternative, Proposed Action, and other action alternatives. All alternatives are described in detail and a summary comparison is included.

Federal agencies are required by NEPA to evaluate a range of reasonable alternatives to the action being proposed. All alternatives evaluated must satisfy the purpose and need for the action.

2.2 Background and Airspace Review

MOAs are established by the Federal Aviation Administration (FAA) to separate military training operations such as air combat tactics, air intercepts, aerobatics, formation training, and low-altitude tactics from other aircraft operating under instrument flight rules (IFR). In addition, aircraft operating under visual flight rules (VFR) are expected to exercise extreme caution while flying within a MOA when military activity is being conducted. MOA lateral and vertical limits are depicted on VFR and IFR aeronautical charts.

The Proposed Action and other action alternatives would involve changes to airspace boundaries and uses (except for the No Action Alternative, where no changes would occur). To understand the Proposed Action and alternatives it is necessary to have a basic understanding of the classification and use of airspace. The FAA has adopted the International Civil Aviation Organization (ICAO) classification[3] of controlled and uncontrolled airspace, with letter designators for different classes of airspace. The general intent of the five classes of controlled airspace is to protect IFR enroute operations and approaches to airports. In addition, there is one class of uncontrolled airspace where IFR operations are infrequent or not anticipated. A summary of airspace classes in the continental U.S. (with emphasis on operational considerations) is listed below, in the order of most restrictive to least restrictive airspace. Only airspace categories that may be affected or are in close proximity to the MOAs are discussed. For example, the proposal directly affects Classes A and G airspace and moves closer to Class E airspace. Classes B, C, and D are not discussed.

- **Class A**. This high altitude airspace begins at 18,000 feet MSL and extends up to and including flight level (FL) 600[4]. VFR operations are prohibited in Class A airspace. All civil aircraft must operate under IFR flight plans (with assigned routes and altitudes). High altitude routes are established in this airspace as "Jet routes" (or J-routes), generally between ground-based radio navigation aids. This airspace and the associated J-routes are charted by the FAA on IFR enroute high altitude charts. Class A airspace is the only airspace class above 18,000 feet MSL.
- **Class E**. This broad class of controlled airspace contains the low altitude enroute airways used for IFR navigation as well as airspace that transitions from the enroute system to surface-based airspace at airports with instrument approaches. The key operational

[3] FAA airspace classifications are not entirely consistent with ICAO classifications, but are very similar, including the use of letter-based airspace classes. The descriptions of airspace in this EA are based on FAA regulations in Title 14 CFR, Part 71.

[4] FLs are defined as altitudes (in hundreds of feet) based on a standardized aircraft altimeter setting of 29.92 inches of mercury. For example, FL 300 is ±30,000 feet.

consideration for Class E airspace is that this airspace does not impose specific communication or navigation requirements on aircraft operators, but it does require higher VFR weather minimums (greater separation from clouds and greater visibility required for VFR aircraft), compared to uncontrolled airspace described below. Because IFR traffic operations are expected within Class E airspace, the higher weather minimums provide more opportunity for VFR traffic to see and avoid IFR traffic that may be operating in and out of clouds while enroute or approaching an airport. Unless designated at a lower altitude, Class E airspace begins at 14,500 feet MSL and extends up to the beginning of Class A airspace (FL 180). Ground-based Class E airspace is established around uncontrolled airports to contain instrument approaches, with the vertical airspace limit defined by any overlying controlled airspace. Transition Class E airspace generally begins at either 700 or 1,200 feet AGL and extends up to overlying controlled airspace and laterally to the enroute airway system. The low altitude enroute airways are numbered Federal Airways, also referred to as "Victor" airways (phonetic alphabet for "V"), because these airways are generally defined by VOR[5] radio navigation aids. Victor airways are the primary enroute navigation system for IFR aircraft (slowly being replaced by direct point-to-point navigation systems such as Global Positioning Systems (GPS). Victor airways are established by VOR radials, which define the centerline of each airway, with a nominal airway width of 4 NM on either side of the centerline. Enroute Class E airspace also includes controlled airspace in areas where the Victor airway system is absent or inadequate, but where IFR operations are expected to occur. Enroute Class E airspace generally begins at 1,200 feet AGL up to any overlying controlled airspace.

- **Class G**. Uncontrolled airspace that is not designated as Class A, B, C, D, or E (there is no Class F controlled airspace in the U.S.) extends from the ground surface to any overlying controlled airspace. IFR aircraft are generally not expected in this airspace because it is far from the enroute airway system and from airports with instrument approaches. IFR aircraft are not prohibited in this airspace; however, they are not likely to be found here because of the lack of ATC services. There are no communication requirements for aircraft operating in Class G airspace and the weather minimums are less restrictive than in controlled airspace.

In addition to the above classes of controlled and uncontrolled airspace, the FAA designates several categories of special use airspace, depicted graphically in Figure 3. Special use airspace confines activities that may be hazardous to aircraft or it imposes specific operating limitations on air space and aircraft (i.e., ATC has the option to reroute IFR traffic or take back MOA airspace when needed). The two categories of regulatory special use airspace (with operational restrictions established through the 14 CFR, Part 73 rulemaking process) include: Prohibited Areas and Restricted Areas. Non-regulatory special use airspace (with no operating restrictions beyond normal VFR and IFR rules) includes warning areas, alert areas, controlled firing areas, and MOAs. Although not categorized by the FAA as special use airspace, Military Training Routes (MTRs) and ATCAA are established for movement of high-performance military aircraft while outside other protected airspace. Only Restricted

[5] VOR stands for very-high-frequency omnidirectional range, a ground-based navigation facility that transmits radio signals in 360 discrete degrees (radials) oriented to magnetic north. Aircraft navigation receivers can display the relationship of the aircraft to any of the 360 radials emanating from a VOR.

Areas, MOAs, MTRs, and ATCAA are found within the vicinity of the project area, so these categories of airspace are described below.

- **Restricted Area**. These areas contain unusual, often invisible hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Penetration of Restricted Areas without authorization is extremely hazardous to an aircraft and its occupants. Each restricted area is charted with vertical and lateral dimensions, as well as the time of use and controlling agency. When this airspace is inactive and released to the controlling agency (normally Air Traffic Control (ATC)), aircraft may be allowed to transit the airspace. All non-participating aircraft desiring to transit a restricted area must contact the controlling agency to determine whether the area is active ("hot"), or inactive ("cold"), and must receive a clearance to enter the restricted area.
- **Military Operations Area**. The purpose of a MOA is to separate military training operations such as air combat tactics, air intercepts, aerobatics, formation training, and low-altitude tactics, from other aircraft operating under IFR. Within a MOA, the maximum vertical limit is 17,999 feet MSL. Within a MOA, military aircraft are exempt from regulatory prohibitions against aerobatic flight within controlled airspace and are allowed to exceed 250 knots below 10,000 feet[6]. If ATC can provide separation for non-participating IFR aircraft, these aircraft can be cleared through an active (hot) MOA. Otherwise, ATC will reroute or divert non-participating IFR traffic from the active MOA or take airspace as needed for moving the IFR traffic. VFR aircraft have no operating or communication requirements or restrictions within a MOA; they can operate within the MOA even if it is hot. However, VFR aircraft are encouraged to contact the MOA controlling agency to determine whether the MOA is hot or cold to be aware of potential military aircraft traffic. Military traffic within the MHRC MOAs is the responsibility of Cowboy Control Military Radar Unit (MRU).
- **Military Training Route**. Because of the need to train for low-level aerial combat, a joint venture between the FAA and Department of Defense resulted in the establishment of MTRs for low-level, high-speed training. MTRs are generally below 10,000 feet MSL and involve military aircraft operating in excess of 250 knots. Because of the maneuvering and high speeds of military aircraft in these routes, normal "see-and-avoid" VFR traffic scanning practices may not be adequate to avoid aircraft conflicts. Therefore, non-participating civil aircraft exercise extreme caution and vigilance in the vicinity of an MTR. MTR segments are identified and charted as either IR routes (IFR) or VR routes (VFR), where IR routes can be used regardless of weather. MTRs are designated as one-way routes.
- **Air Traffic Control Assigned Airspace**. Outside of any other special use airspace, ATC may define airspace for the purpose of separating activities such as military training from non-participating IFR traffic. ATCAA is typically established through a letter of agreement between the controlling ATC facility and the cognizant military authority. Availability of ATCAA is dependent on weather and IFR traffic conditions.

[6] 14 CFR Section 91.117 establishes aircraft speed restrictions. In general, below 10,000 feet MSL aircraft speed is restricted to below 250 knots indicated airspeed. In airspace underlying Class B airspace and within 4 NM of a primary Class C or Class D airport, aircraft cannot exceed 200 knots indicated airspeed.

The final airspace element within the MHRC MOAs is an uncharted airspace area overlying the DVR, located near the middle of the MOA complex. The airspace overlying the DVR, shown in Figure 1 (Chapter 1), is airspace with restrictions on military aircraft operations established through a 1996 Settlement Agreement between the United States and the Shoshone–Paiute Tribes and implemented by local MHAFB directives. The agreement states that MHAFB will not conduct training flights within the airspace overlying DVR below 15,000 feet AGL or over the town of Owyhee NV at any altitude. Under the Proposed Action and alternatives, the restrictions from the 1996 Settlement Agreement would still apply and remain in effect over the DVR.

The Proposed Action (Alternative B) and other alternatives are described below in terms of airspace configuration, proposed use, and relationships with airspace operation.

2.3 Alternative A—No Action Alternative

Under the No Action Alternative (Alternative A), training activities in the MHRC MOAs would continue as currently authorized and implemented. Consequently, the operational deficiencies identified in Section 1.3 (Chapter 1) would continue to limit the effectiveness of flight training.

2.3.1 Airspace Configuration

As shown in Figure 1 (Chapter 1), there are four MOAs within the existing MHRC. These include the Jarbidge MOA, Owyhee MOA, Paradise West MOA, and Paradise East MOA. The training airspace would also include the ATCAA between FL 180 and 500 when it is made available by Salt Lake Center. Flight training restrictions from the Settlement Agreement would remain in effect over the DVR. The existing MOA airspace floor of 14,500 feet MSL for the Paradise East MOA (1,403-9,196 feet AGL) and Paradise West MOA (4,000-8,664 feet AGL) would continue to define the available vertical airspace for maneuvering. The MHRC would continue to contain about 7,501 square NM and a volume of approximately 49,285 cubic NM of training airspace.

Four public and three private general aviation (GA) airports are located within the MOA complex (Table 2.1) in Class G, uncontrolled airspace. All of these airports are uncontrolled (no ATCT) and would remain within the lateral boundaries of the MOA complex.

Figure 3. Airspace Graphic (front)

Figure 3 Airspace

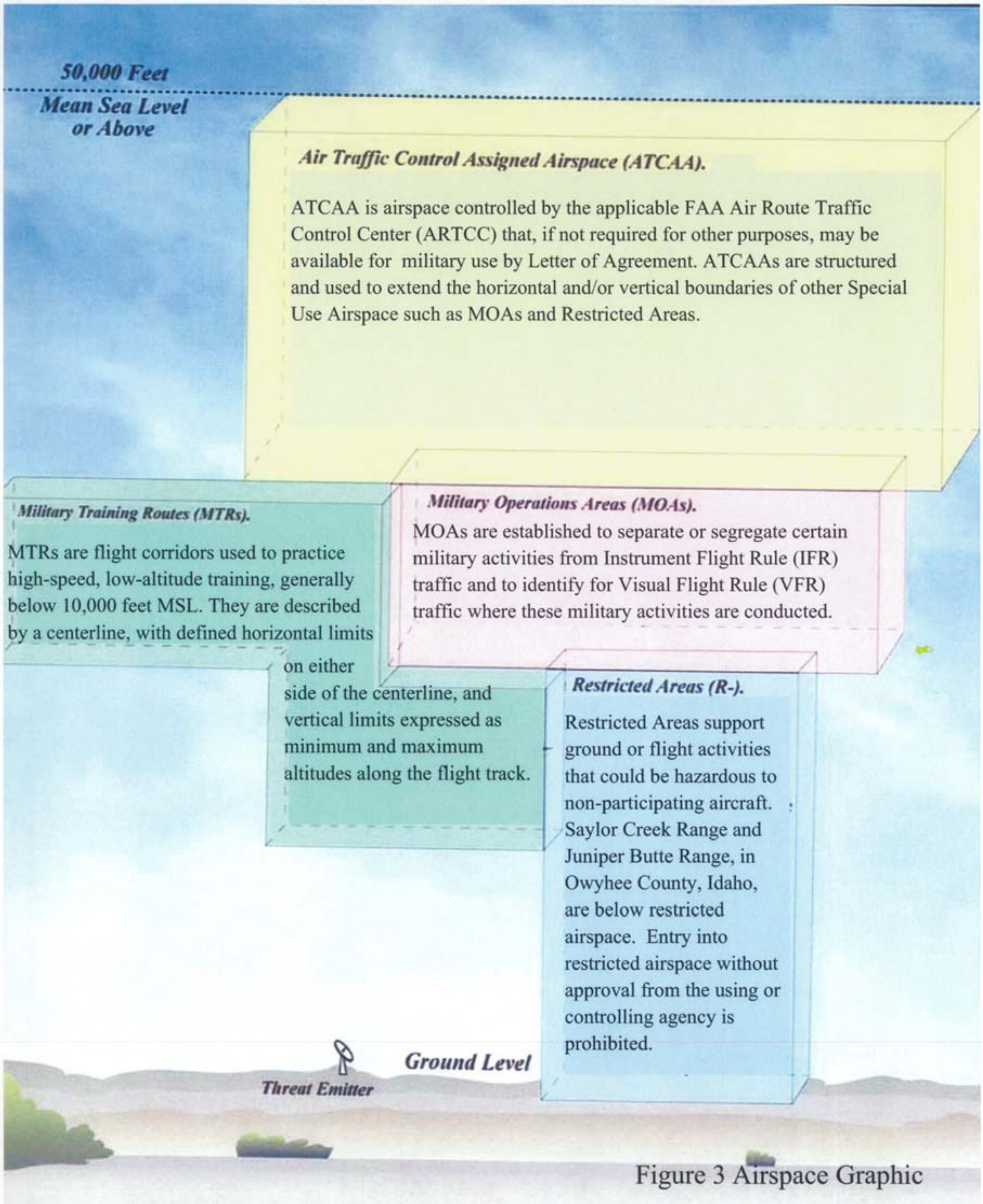


Figure 3 Airspace Graphic

(back)

TABLE 2.1
Airports Located Within the MOA Complex Uncontrolled Airspace

Airport	Identifier	Elevation (feet MSL)	Longest Runway (100 feet)
McDermitt State	26U	4478	59
Grasmere	U91	5134	27
Owyhee	10U	5374	67
Murphy Hot Springs	3U0	5829	52
I-L	Private	5368	52
Riddle	11ID	5331	31
Petan	NV08	5616	75

2.3.2 Operational Characteristics

The existing lateral dimensions of the MOA complex would continue to govern military training aircraft access to the available MOA airspace. The DVR Settlement Agreement flight restrictions, in combination with Juniper Butte (R-3204) and Saylor Creek (R-3202) Restricted Areas, would continue to confine access to the eastern portion of the Paradise East MOA to a very narrow access corridor south and east of the DVR. VFR traffic would continue to be able to operate within the MOA complex without communication or operations requirements or restrictions. IFR traffic would continue to be diverted from the MOA complex when it is active or take airspace as needed for moving the IFR traffic through the area, unless ATC can provide adequate aircraft separation. The existing limitations of the MHRC airspace would continue to constrain the numbers and quality of aircrew training that could be accomplished in the MHRC due to the following operational characteristics.

- The MHRC would continue to be limited to one LFE or two smaller air combat engagements at a time in an East/West engagement configuration, with a maximum initial separation distance between opposing forces of 60 to 70 NM. There is only airspace for two or three smaller North/South engagement configurations with an initial maximum separation between forces of 60 to 70 NM. This initial separation distance would continue to reduce the realism of aircrew training in target search, tracking, and acquisition, due in part to the DVR restrictions previously mentioned. The amount of vertical airspace currently available also directly impacts the quality of the ACM/BFM fight development in the Paradise MOAs.
- The geometry of the eastern portion of Paradise East MOA further constrains activity as this area “funnels” the movement to an area where the MOAs converge and reduces the airspace available for aircraft maneuvering during opposing force scenario set ups. The geometry described above makes this airspace unusable for any quality air-to-air training because of the MOA layout and the proximity to DVR.

- Juniper Butte and Saylor Creek Restricted Areas further restrict maneuvering in the east side of the MHRC. The presence of aircraft using those Restricted Areas results in a de-conflicting requirement for the airspace by moving the air-to-air training to a higher altitude.
- When weather conditions or other IFR flight plans require diversion of IFR flights through the ATCAA/MOAs, the size of the MHRC limits the ability of ATC to allow uninterrupted/unimpeded mission training. Consequently, ATC denies use of all or part of the MHRC to safely accommodate the diverted flights into the airspace. When the ATCAA airspace is taken back for traffic weather deviations, the MOA airspace is the only operational airspace for training. Because of the limited vertical structure in these areas (17,999 feet MSL), the aircrews are not able to incorporate reasonable vertical maneuvering into the training scenarios, thus rendering the airspace unusable for BFM, ACM, or DCA/OCA training. The most likely situation is that the ARTCC will take the airspace back and will stop training entirely until the IFR traffic has transited (also discussed in Chapter 3).
- The limited airspace available for training potentially results in "spill-out" as described in Chapter 1. These events increase the ATC workload. Spill-outs are due, in part, to the maneuvering requirements for opposing force set-ups, where the aircrews are trying to get as much airspace between them as possible prior to beginning the fight scenario. The effect of having additional airspace is that it allows the aircrews to maneuver for the set-up with greater distances between aircraft and better utilization of the aircraft system's RADAR capabilities without having to brush up against the airspace boundaries as is currently the case.
- Currently, supersonic operations are authorized above the Paradise MOAs at or above 30,000 feet MSL in the ATCAA airspace. Maintaining the existing MOA and overlying ATCAA configuration would not change the effect of supersonic operations on DVR or other identified noise-sensitive sites.
- Safety within the current airspace configuration periodically requires de-confliction due to the number of flights necessary to complete the training requirements. To accommodate the number of required training flights within the limited flying window, aircraft are scheduled into a smaller amount of airspace, which requires more frequent and restrictive de-confliction than might be expected with a larger training area.

Current airspace use, including RSAF aircraft, is expected to remain the same over all alternatives. Table 2.2 describes the annual number of sorties and sortie-operations under the No Action Alternative. A *sortie* is the flight of a single aircraft from takeoff through landing. A *sortie-operation* is defined as the use of one airspace unit by one aircraft.

TABLE 2.2
Annual Sorties and Sortie-Operations in each MOA under Alternative A—No Action Alternative

MOA	# of Sorties	# of Sortie-Operations	Average Duration in MOA (minutes)	Percent Time at Altitude (feet AGL)		
				500-2,000	**2,000-10,000**	**> 10,000**
Jarbidge+		10,827	38	19%	37%	44%
Owyhee		9,646	20	13%	17%	70%
Saddle		2,875	60	NA	NA	100%
						> 14,500
Paradise East		3,695	20	NA	NA	100%
Paradise West		4,756	20	NA	NA	100%
Total	10,264*	31,799				

+ Includes aircraft activity over Saylor Creek Range and Juniper Butte Range.
* Includes MHAFB based aircraft (9,570 sorties) and transients (694).
(Adapted from Air Force 2007)

2.3.3 Chaff and Flare Use

Chaff and flares are the principal defensive countermeasures dispensed by military aircraft to avoid detection or attack by enemy air defense systems. A bundle of chaff consists of approximately 0.5 to 5.6 million fibers smaller than the size of a hair that reflect radar signals and, when dispensed in sufficient quantities from aircraft, form a “cloud” that breaks the radar signal and temporarily hides the maneuvering aircraft from radar detection. Flares ejected from aircraft provide high-temperature heat sources that mislead heat-sensitive or heat-seeking targeting systems. Chaff and flares are used to keep aircraft from being successfully targeted by weapons such as surface-to-air missiles, anti-aircraft artillery, and other aircraft.

Chaff and flares are used in the current MOAs. In the baseline year 2005, MHAFB aircraft used approximately 91,942 bundles of chaff and 47,182 flares annually. After the 2005 BRAC Commission actions are fully implemented and the Republic of Singapore beddown occurs at MHAFB, the total number of chaff bundles expected to be used annually will be 74,519 and the number of flares will increase to 62,070 (Air Force 2007). Flares are deployed above 14,500 feet MSL in the Paradise East and Paradise West MOAs. Chaff and flares authorized for employment in Paradise MOAs must be in accordance with the current Air Force Instruction (AFI) 13-212 Volume 1, Air Combat Command Supplement, Mountain Home AFB Supplement, Addendum A. Flares must be self-protection flares. Chaff must be training chaff, unless otherwise authorized in advance. Chaff and flares are not authorized for release over manned sites, inhabited areas, or over the DVR at any altitude.

2.4 Alternative B—Proposed Action

Under the Proposed Action (Alternative B), training activities in the MHRC would be enhanced by a 29 percent increase in the airspace surface area available for training. The overall increase in training airspace volume under the Proposed Action would be approximately 34 percent. This expansion would eliminate or reduce the operational deficiencies identified in Section 1.3 (Chapter 1).

No training ranges, conventional targets, no-drop targets, emitter sites, or other on-the--ground assets are part of this proposed action. No increase in the total number of aircraft operations is planned.

2.4.1 Airspace Configuration

The proposed action is to reconfigure (expand) the lateral and vertical boundaries of the Paradise East and Paradise West MOAs, as shown in Figure 2 (Chapter 1). The Jarbidge MOA dimensions would not change. The Owyhee MOA lateral boundary would only change slightly at the northwest corner to provide a straight transition to the expanded Paradise West MOA (an increase in area of approximately one-half percent [0.5%] or 10.4 square NM). The two Restricted Areas associated with the MHRC MOAs, Saylor Creek Restricted Area (R-3202) and Juniper Butte Restricted Area (R-3204), would not change dimension or use. The floor of the Paradise East and Paradise West MOAs would be lowered from 14,500 feet MSL to 10,000 feet MSL or 3,000 feet AGL, whichever is higher. The Proposed Action would add approximately 2,179 square NM of training airspace within the two Paradise MOAs. The lateral boundaries of the ATCAA would also be expanded to correspond with the new MOA boundaries, while retaining the altitude range between FL 180 and FL 500. The Proposed Action would add approximately 16,985 cubic NM to the training airspace volume, for a total of 66,270 cubic NM.

ATCAA airspace over the expansion area would involve a larger area of Class A airspace and would expand the overlap with Jet route J523 to the west of the current MHRC by about 7 NM. Class C, D, or E airspace in the vicinity of the project would not change. However, the proposed new MOA complex boundaries would be relocated closer to several portions of Class E airspace associated with Victor airways. Specifically, the new boundaries would be relocated to within approximately 5 NM of the Class E edge of Victor airways segments V113 to the west and V293 to the southeast.

VFR non-participating traffic would continue to be able to operate within the MOA without communication or operations requirements or restrictions (IAW FAR, Part 91). All GA airports encompassed by this proposal are uncontrolled and lie within Class G uncontrolled airspace.

With the Proposed Action, one additional GA airport would fall under the expanded Paradise East MOA, in addition to the airports listed in Table 2.1. This private airport is uncontrolled and lies within uncontrolled airspace (Table 2.3). The Proposed Action would introduce military aircraft training activity at 10,000 feet MSL or 3,000 feet AGL, whichever is higher, above this airport where such activity does not currently exist.

TABLE 2.3
Additional GA Airport in Uncontrolled Airspace that Would Fall within the Expanded Paradise MOAs Lateral Boundaries

Airport	Identifier	Elevation (feet MSL)	Longest Runway (100 feet)
Stevens-Crosby	08U	6397	36

2.4.2 Operational Characteristics

The expanded lateral and vertical dimensions of the MOA complex under the Proposed Action would enhance the operational efficiency and training efficacy of the MHRC compared to the No Action Alternative, as follows.

- The expanded MOA complex could accommodate up to three simultaneous East/West maneuvering/engagement areas with set-up distances of up to 90 NM, and up to four simultaneous North/South set-ups of 60-70 NM. This represents an improvement over current conditions of up to two East/West and three North/South engagements. Six "full-up" BFM sortie areas requiring a 30 X 30 NM "box", with 25,000 feet of vertical airspace could be accommodated under this alternative as well, compared with up to three "full-up" BFM sortie areas under the current configuration. The expanded MHRC would, therefore, increase the number of maneuvering areas by approximately 40 to 50 percent. Further, the increased lateral distance and available training altitudes would allow aircrews to search, track, and target adversaries more effectively and in a more realistic way.
- The two expanded Paradise MOAs would allow full vertical maneuvering throughout the MOAs, except as restricted by the Settlement Agreement in the airspace over the DVR. This additional lateral and vertical airspace would allow more flexibility in conducting LFE and BFM training compared to the No Action Alternative.
- The two expanded Paradise MOAs could also be internally subdivided into Special Use Airspace sub-areas (SUA sub-areas). These sectors would provide Salt Lake Center more flexibility to respond to situations such as weather deviation by non-participating IFR aircraft through the MOA complex. These sectors could be activated/deactivated separately or in combination by the ARTCC as needed to accommodate transient over-flights while maintaining the training environment.
- The Proposed Action would provide expanded airspace to reduce the potential of "spill-out" events that increases ATC workload. The available airspace for marshalling of forces would be greater, providing for longer set-ups and relieving the need to press against the airspace boundaries.
- Lateral expansion of the ATCAA boundaries above the Paradise MOAs would increase the separation of supersonic operations in the expanded ATCAA airspace by providing greater lateral separation from DVR and other noise-sensitive areas.

Current airspace use, including RSAF aircraft, is expected to remain the same over all alternatives. Table 2.4 describes the annual number of sorties and sortie-operations under Alternative B—Proposed Action. A *sortie* is the flight of a single aircraft from takeoff through landing. A *sortie-operation* is defined as the use of one airspace unit by one aircraft.

TABLE 2.4
Annual Sorties and Sortie-Operations in each MOA under Alternative B—Proposed Action

MOA	# of Sorties	# of Sortie-Operations	Average Duration in MOA (minutes)	Percent Time at Altitude (feet AGL)		
				500-2,000	2,000-10,000	> 10,000
Jarbidge+		10,827	38	19%	37%	44%
Owyhee		9,646	20	13%	17%	70%
Saddle		2,875	60	NA	NA	100%
					3,000-10,000	
Paradise East		3,695	20	NA	40%	60%
Paradise West		4,756	20	NA	40%	60%
Total	10,264*	31,799				

+ Includes aircraft activity over Saylor Creek Range and Juniper Butte Range.
* Includes MHAFB based aircraft (9,570 sorties) and transients (694).
(Adapted from Air Force 2007)

2.4.3 Chaff and Flare Use

Chaff and flares are the principal defensive countermeasures dispensed by military aircraft to avoid detection and keep aircraft from being successfully targeted by weapons such as surface-to-air missiles, anti-aircraft artillery, and other aircraft. (See 2.3.3 for a description of chaff and flares.)

Chaff and flare use will extend into the proposed expansion area. In the baseline year 2005, MHAFB aircraft used approximately 91,942 bundles of chaff and 47,182 flares annually. After the 2005 BRAC Commission actions are fully implemented and the Republic of Singapore beddown occurs at MHAFB, the total number of chaff bundles expected to be used annually will be 74,519 and the number of flares will increase to 62,070 (Air Force 2007). A portion of the expected chaff and flare use will be in the expanded Paradise MOA. Flares would be used above 10,000 feet MSL, or 3,000 feet AGL, whichever is higher.

Chaff and flares authorized for employment in Paradise MOAs must be in accordance with the current Air Force Instruction (AFI) 13-212 Volume 1, Air Combat Command Supplement, Mountain Home AFB Supplement, Addendum A. Flares must be self-protection flares. Chaff must be training chaff, unless otherwise authorized in advance. Chaff and flares are not authorized for release over manned sites, inhabited areas, or over Duck Valley Reservation at any altitude.

2.5 Alternative C

Alternative C would increase the available training airspace in the southern portion of the MOA complex and would mitigate the effects of the airspace restrictions over the DVR. In concept, this alternative incorporates the lateral, but not the vertical expansion of the MHRC described for the Proposed Action (Figure 4). Alternative C provides the same 29 percent increase in MOA area, but represents a more modest increase in MHRC airspace volume, about 26 percent more than provided in the No Action Alternative (compared with a

34 percent volume increase for the Proposed Action). Training activities in the MHRC would be enhanced compared to the No Action Alternative, but a number of the operational deficiencies identified in Section 1.3 (Chapter 1) would remain. Maintaining the current vertical MOA structure would limit the potential for a vertical stratification of airspace, making it less likely for operations to occur simultaneously at different altitudes within the airspace. Stratification of the airspace would result in reduced interference or decreased potential conflict between training aircraft packages, thereby improving training mission effectiveness.

No training ranges, conventional targets, no-drop targets, emitter sites, or other on-the--ground assets are part of this alternative. No increase in the total number of aircraft operations is planned.

2.5.1 Airspace Configuration

Alternative C would have the same lateral expansion of the Paradise East and Paradise West MOA boundaries as shown for the Proposed Action. Alternative C differs from the Proposed Action in that the MOA floor would not be lowered, but rather would remain at 14,500 feet MSL. The Owyhee and Jarbidge MOA lateral dimensions would not change except as indicated for the Proposed Action above. The two Restricted Areas, R-3202 and R-3204, associated with the MHRC MOAs would not change dimension or use. This alternative would add 2,179 square NM of lateral training airspace to the existing complex. As in the Proposed Action, ATCAA would be expanded to correspond with the new MOA boundaries, while retaining the current altitude range between FL 180 and FL 500. Including the expanded ATCAA, Alternative C would add approximately 12,741 cubic NM to the training airspace volume for a total volume of 62,026 cubic NM.

Alternative C would result in the same expansion into ATCAA airspace and the same overlap with Jet airway J523 as described for the Proposed Action. This alternative would still not change the configuration or the operations within Class C, D, or E airspace in the vicinity of the project. Like the Proposed Action, the new lateral MOA boundaries would be closer to several Victor airway segments and would narrow the gap with the Saddle MOA complex. The lateral expansion of the MOAs under Alternative C would include the same eight (seven existing and one added) GA airports as identified for the Proposed Action and shown in Tables 2.1 and 2.2.

2.5.2 Operational Characteristics

Although this alternative does not provide all of the operational benefits of the Proposed Action, the expanded lateral dimensions of the MOA complex proposed in Alternative C would enhance the operational efficiency of the MHRC compared to the No Action Alternative, as follows.

- Alternative C would permit the same set-up configurations as indicated in the Proposed Action. The expanded MHRC would, therefore, increase the number of maneuvering scenarios by approximately 40 to 50 percent over the No Action Alternative. Further, the increased lateral distance would allow aircrews to search, track, and target adversaries more effectively and realistically. The two expanded Paradise MOAs would allow more flexibility in conducting LFE training compared to the No Action Alternative, but would somewhat restrict full vertical maneuvering throughout the MOA/ATCAA, unlike the Proposed Action.

- Alternative C would maintain the option provided in the Proposed Action of subdividing the Paradise MOAs into sectors for airspace use flexibility. This alternative would also reduce the potential of "spill-out" events as indicated for the Proposed Action.
- Lateral expansion of the ATCAA boundaries above the Paradise MOAs would increase the separation of supersonic operations in the expanded ATCAA airspace by providing greater lateral separation from DVR and other noise-sensitive areas.

Current airspace use, including RSAF aircraft, is expected to remain the same over all alternatives. Table 2.5 describes the annual number of sorties and sortie-operations under the Alternative C—Lateral Expansion. A *sortie* is the flight of a single aircraft from takeoff through landing. A *sortie-operation* is defined as the use of one airspace unit by one aircraft.

TABLE 2.5
Annual Sorties and Sortie-Operations in each MOA under Alternative C—Lateral Expansion

MOA	# of Sorties	# of Sortie-Operations	Average Duration in MOA (minutes)	Percent Time at Altitude (feet AGL)		
				500-2,000	2,000-10,000	> 10,000
Jarbidge+		10,827	38	19%	37%	44%
Owyhee		9,646	20	13%	17%	70%
Saddle		2,875	60	NA	NA	100%
						>14,500
Paradise East		3,695	20	NA	NA	100%
Paradise West		4,756	20	NA	NA	100%
Total	10,264*	31,799				

+ Includes aircraft activity over Saylor Creek Range and Juniper Butte Range.
* Includes MHAFB based aircraft (9,570 sorties) and transients (694).
(Adapted from Air Force 2007)

2.5.3 Chaff and Flare Use

Chaff and flares are the principal defensive countermeasures dispensed by military aircraft to avoid detection and keep aircraft from being successfully targeted by weapons such as surface-to-air missiles, anti-aircraft artillery, and other aircraft. (See 2.3.3 for a description of chaff and flares.)

Figure 4 (front)

Figure 4 Alternative C, Increased Lateral Airspace, Current Vertical Airspace

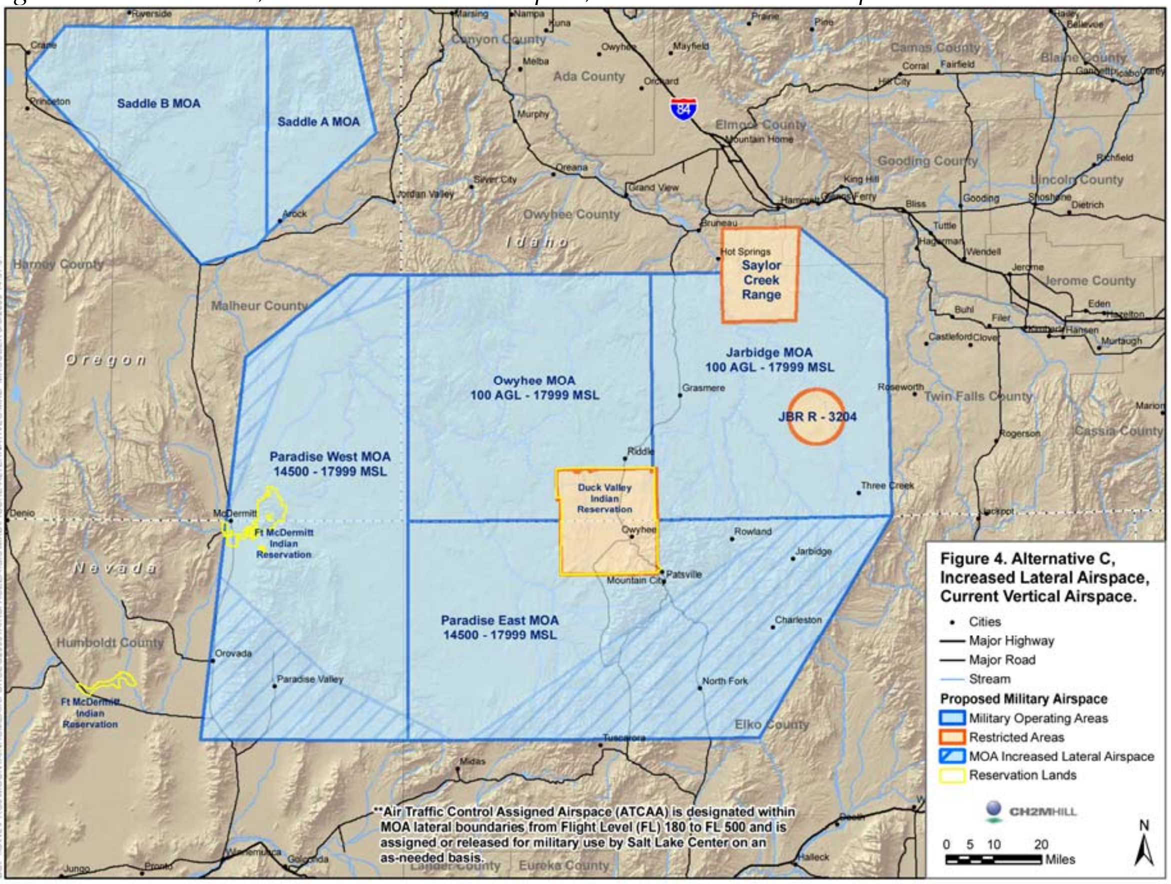


Figure 4 (back)

Chaff and flare use will extend into the proposed expansion area. In the baseline year 2005, MHAFB aircraft used approximately 91,942 bundles of chaff and 47,182 flares annually. After the 2005 BRAC Commission actions are fully implemented and the Republic of Singapore beddown occurs at MHAFB, the total number of chaff bundles expected to be used annually will be 74,519 and the number of flares will increase to 62,070 (Air Force 2007). A portion of the expected chaff and flare use will be in the expanded Paradise MOA. Flares would continue to be deployed at 14,500 feet MSL or higher.

Chaff and flares authorized for employment in Paradise MOAs must be in accordance with the current Air Force Instruction (AFI) 13-212 Volume 1, Air Combat Command Supplement, Mountain Home AFB Supplement, Addendum A. Flares must be self-protection flares. Chaff must be training chaff, unless otherwise authorized in advance. Chaff and flares are not authorized for release over manned sites, inhabited areas, or over Duck Valley Reservation at any altitude.

2.6 Alternative D

In concept, Alternative D incorporates the vertical, but not the lateral expansion of the MHRC described for the Proposed Action (Figure 5). This alternative, therefore, represents a more modest increase in MHRC vertical airspace volume by about 5.4 percent over the No Action Alternative (compared with a 34 percent volume increase with the Proposed Action and a 26 percent volume increase for Alternative C). Training activities in the MHRC under Alternative D would be enhanced compared to the No Action Alternative, but a number of the operational deficiencies identified in Section 1.3 (Chapter 1) would remain. No training ranges, conventional targets, no-drop targets, emitter sites, or other on-the--ground assets are part of this alternative. No increase in the total number of aircraft operations is planned.

2.6.1 Airspace Configuration

Alternative D would retain the current lateral boundaries of the Paradise East and Paradise West MOAs. The Owyhee and Jarbidge MOA dimensions would not change. The two Restricted Areas, R-3202 and R-3204, associated with the MHRC MOAs would also not change dimension or use. With this alternative, the floor altitude of the two Paradise MOAs would be lowered from 14,500 feet MSL to 10,000 feet MSL or 3,000 feet AGL, whichever is higher (as in the Proposed Action), adding about 2,661 cubic NM for a total airspace volume of 51,946 cubic NM. There would be no expansion of the ATCAA lateral boundaries and the altitudes would remain between FL 180 and FL 500. The one additional GA public airport that would be encompassed by the Proposed Action and Alternative C would not be encompassed in Alternative D.

2.6.2 Operational Characteristics

Alternative D does not provide all of the operational benefits of the Proposed Action or Alternative C. The expanded vertical dimensions of the MOA complex proposed in Alternative D would provide minimal operational benefits compared to the No Action Alternative, as follows.

- Alternative D would continue to support one LFE or two smaller air combat East/West engagement(s) with a 60 NM setup within the MOA complex, representing little to no improvement over the No Action Alternative from an operational perspective.
- The “funneling” of aircraft approaching the outer portions of the Paradise MOAs would continue because the current boundaries converge in a triangular shape. Access limitations to the eastern portion of the Paradise East MOA caused by the airspace restrictions in the Settlement Agreement over DVR would also continue. The lateral constraints in conducting LFE training would be the same as under the No Action Alternative.
- Because the lateral MOA dimensions would remain unchanged, the Paradise West and Paradise East MOAs and overlying ATCAA do not facilitate being subdivided into smaller sectors as extensively as described in the Proposed Action and Alternative C. ATC would continue to have limited ability to permit mission training when weather conditions require deviation of non-participating IFR flights through the MOA/ATCAA. Consequently, ATC would continue to deny use of all or part of the MHRC to accommodate such deviations, which further limits mission accomplishment.
- The vertical airspace expansion in the Paradise MOAs would allow full vertical maneuvering throughout the MOAs, except for the airspace over the DVR, as restricted in the Settlement Agreement. This additional vertical airspace would allow more flexibility in conducting LFE and BFM training compared to the No Action Alternative, but not as much capability as in the Proposed Action and Alternative C.
- Alternative D would not change the dimensions or use of the ATCAA and, therefore, would not increase separation of supersonic operations that would be provided in the Proposed Action and Alternative C. ATCAA controls and restrictions would remain the same as for the No Action Alternative.

Current airspace use, including RSAF aircraft, is expected to remain the same over all alternatives. Table 2.6 describes the annual number of sorties and sortie-operations under the Alternative D—Vertical Expansion. A *sortie* is the flight of a single aircraft from takeoff through landing. A *sortie-operation* is defined as the use of one airspace unit by one aircraft.

Figure 5 (front)

Figure 5 Alternative D, Current Lateral Airspace, Increased Vertical Airspace

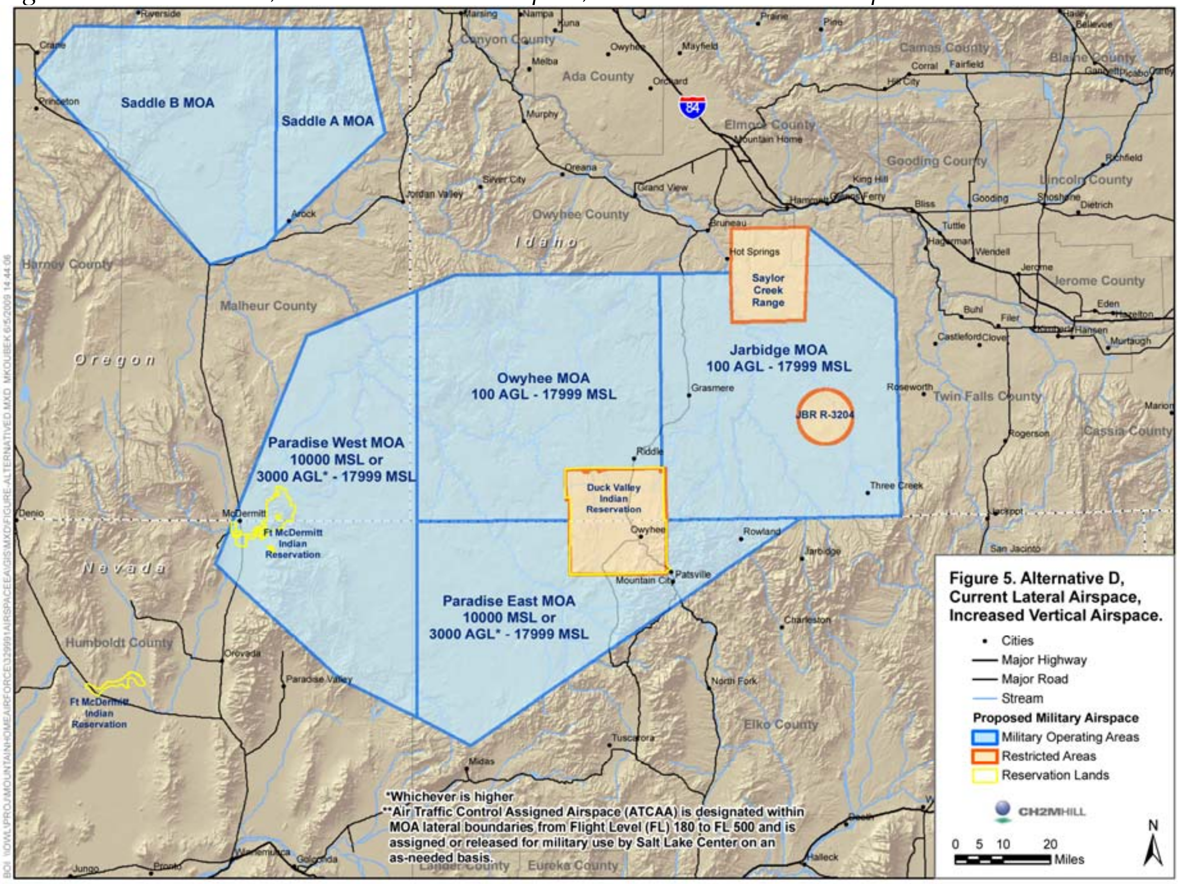


Figure 5 (back)

TABLE 2.6
Annual Sorties and Sortie-Operations in each MOA under Alternative D—Vertical Expansion

MOA	# of Sorties	# of Sortie-Operations	Average Duration in MOA (minutes)	Percent Time at Altitude (feet AGL)		
				500-2,000	2,000-10,000	> 10,000
Jarbidge+		10,827	38	19%	37%	44%
Owyhee		9,646	20	13%	17%	70%
Saddle		2,875	60	NA	NA	100%
					3,000-10,000	
Paradise East		3,695	20	NA	25%	75%
Paradise West		4,756	20	NA	25%	75%
Total	10,264*	31,799				

+ Includes aircraft activity over Saylor Creek Range and Juniper Butte Range.
* Includes MHAFB based aircraft (9,570 sorties) and transients (694).
(Adapted from Air Force 2007)

2.6.3 Chaff and Flare Use

Chaff and flares are the principal defensive countermeasures dispensed by military aircraft to avoid detection and keep aircraft from being successfully targeted by weapons such as surface-to-air missiles, anti-aircraft artillery, and other aircraft. (See 2.3.3 for a description of chaff and flares.)

In the baseline year 2005, MHAFB aircraft used approximately 91,942 bundles of chaff and 47,182 flares annually. After the 2005 BRAC Commission actions are fully implemented and the Republic of Singapore beddown occurs at MHAFB, the total number of chaff bundles expected to be used annually will be 74,519 and the number of flares will increase to 62,070 (Air Force 2007). Chaff and flares would continue to be used in Paradise East and West MOAs. Flares would continue to be deployed at 14,500 feet MSL or higher.

Chaff and flares authorized for employment in Paradise MOAs must be in accordance with the current Air Force Instruction (AFI) 13-212 Volume 1, Air Combat Command Supplement, Mountain Home AFB Supplement, Addendum A. Flares must be self-protection flares. Chaff must be training chaff, unless otherwise authorized in advance. Chaff and flares are not authorized for release over manned sites, inhabited areas, or over Duck Valley Reservation at any altitude.

2.7 Alternative Comparisons

This section compares potential impacts among the alternatives. A comparison of potential impacts for proposed airspace changes are presented in Table 2.7. Resource areas for which impacts may occur include noise impacts to people and biological resources (wildlife). The reader is directed to the appropriate section of Chapter 4 for resource-specific discussions.

TABLE 2.7
Alternatives Comparison of Potential Impacts for Proposed Airspace Changes of the MOAs at MHRC

Resource Area	Alternative A No Action	Alternative B Proposed Action	Alternative C	Alternative D
Airspace Management and Use	No change from current conditions	Highest potential for deconflicting airspace use and spreading operations over a wider area as compared to the No Action Alternative	Moderate potential for deconflicting airspace use and spreading operations over a wider area as compared to the No Action Alternative	Lowest potential for deconflicting airspace use and spreading operations over a wider area as compared to the No Action Alternative
Noise	No change from current conditions	Very small to no increase in average hourly noise levels over existing conditions	Very small to no increase in average hourly noise levels over existing conditions	Very small to no increase in average hourly noise levels over existing conditions
Biological Resources (Wildlife)	No documented effect	No effect	No effect	No effect

3.0 Affected Environment

NEPA requires that an impact analysis of the resources and areas potentially affected by a project be conducted. It further directs that while all resources must be considered, those resources that will not be affected by the proposal need not be analyzed in detail. This EA will only focus on those resources potentially affected.

Chapter 3 is organized by resource area. Effects to be discussed in this EA are the direct or indirect result of the expansion of the MOA airspace only. Chaff and flares will be used in the expanded airspace similar to current operations. Resource areas considered include: airspace management and use; noise; air quality; biological resources; safety; environmental justice; land management use; visual and recreational resources; cultural resources; water and soil resources; coastal zone and floodplain resources; hazardous materials; and socioeconomics. These resources areas include several categories presented in Appendix A of FAA Order 1050.1E, and as shown in Table 3.1.

Table 3.1 summarizes the resources originally evaluated and indicates which of the resources are based on Air Force or FAA categories. In accordance with CEQ regulations, the Air Force determined that several resource areas warrant no further examination in Chapter 4, Environmental Consequences (and these are shown in Table 3.1). Only wildlife resources, noise resources, and airspace management and use were carried forward for detailed analysis. The rationale for why resource discussions were not carried forward in Chapter 4 is explained by resource in this chapter, Chapter 3, Affected Environment.

FAA and Air Force resource categories to be evaluated in NEPA documents are somewhat different, but they have been combined where feasible for discussion purposes.

TABLE 3.1
Air Force and FAA Resources Analyzed in the Environmental Impact Analysis Process

Air Force		FAA	
Resource	**Carried Forward for Detailed Analysis**	**Resource**	**Carried Forward for Detailed Analysis**
Airspace Management and Use	Yes	Department of Transportation; Construction Impacts: Secondary Impacts	No
Noise	Yes	Noise and Compatible Land Use	Yes
Land Management and Use; Visual and Recreation Resources	No	Farmlands; and Visual Impacts; and Wild and Scenic Rivers	No
Air Quality	No	Air Quality	No
Biological Resources	No (Vegetation and Fish) Yes (Wildlife)	Fish, Wildlife, and Plants	No (Vegetation and Fish) Yes (Wildlife)
Cultural Resources	No	Historical, Architectural, Archeological, and Cultural Resources	No

TABLE 3.1
Air Force and FAA Resources Analyzed in the Environmental Impact Analysis Process

Air Force		FAA	
Resource	**Carried Forward for Detailed Analysis**	**Resource**	**Carried Forward for Detailed Analysis**
Environmental Justice	No	Environmental Justice, and Children's Environmental Health and Safety Risks	No
Safety	No	Light Emissions	No
Water Resources. and Soils	No	Water Quality; Natural Resources, Floodplains, and Wetlands	No
Coastal Zone, Floodplains, and Wetlands	No	Coastal Resource, Floodplains, and Wetlands	No
Hazardous Materials and Hazardous Waste Management	No	Hazardous Materials, Pollution Prevention, and Solid Waste	No
Socioeconomics	No	Socioeconomic Impacts	No

3.1 Noise

3.1.1 Definition of Resource

Noise is often defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, diminishes the quality of the environment, or is otherwise annoying. Response to noise varies by the type and characteristics of the noise source, distance between source and receptor, receptor sensitivity, and time of day. Noise may be intermittent or continuous, steady or impulsive, and may be generated by stationary or mobile sources. Although aircraft are not the only source of noise in any area, they are readily identifiable to those affected by their noise emissions and are routinely singled out for special attention and criticism.

Noise is represented by a variety of quantities, or "metrics." Each noise metric was developed to account for the type of noise and the nature of what (i.e., receptor) may be exposed to the noise. Human hearing is more sensitive to medium and high frequencies than to low and very high frequencies, so it is common to use "A-weighted" metrics, which account for this sensitivity. Impact of impulsive supersonic noise depends on factors other than human hearing, so that is often quantified by "C-weighted" metrics.

Different time periods also play a role with regard to noise. People hear the sound that occurs at a given time, so it is intuitive to think of the instantaneous noise level, or perhaps the maximum level that occurs during an aircraft flyover. However, the effects of noise over a period of time depends on the total noise exposure over extended periods, so "cumulative" noise metrics are used to assess the impact of ongoing activities within the MHRC.

Within this EA, noise is described by the Day-Night Average Sound Level (DNL), and Onset Rate-Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}).

- Day-Night Sound Average Level is a noise metric combining the levels and durations of noise events, and the number of events over an extended time period. It is a cumulative average, computed over a given time period like a year, to represent total noise exposure. DNL also accounts for more intrusive nighttime noise, adding a 10-dB penalty for sounds after 10:00 p.m. and before 7:00 a.m. DNL is the measure used to appropriately account for total noise exposure around airfields such as Mountain Home AFB.
- Onset Rate Adjusted Monthly Day-Night Sound Average Level is the measure used for subsonic aircraft noise in military operations airspace. L_{dnmr} accounts for the fact that when military aircraft fly low and fast, the sound can rise from ambient to its maximum very quickly. Known as an onset-rate, this effect can make noise seem louder than its actual level. Penalties of up to 11 dB are added to account for this onset rate (Air Force 2007).

Appendix A contains the empirically predicted effects on aircraft noise levels for airspace modifications in the Mountain Home Range Complex. Appendix B contains the noise analysis supplemental calculations of maximum A-weighted and Day-Night Average Sound Levels of aircraft noise. These supplemental calculations were completed at the request of the FAA to produce metrics similar to those used previously in the *Enhanced Training in Idaho, Environmental Impact Statement* (Air Force 1998). This methodology is acceptable to the FAA (Warren, pers. comm., 2008).

3.1.2 Status and Current Conditions

Noise monitors at eight sites in the Mountain Home Range Complex continuously recorded A-weighted sound levels during consecutive one-second periods for 1,141 instrument-days throughout most of an eight month period from April through November of 2002 (Fidell et al. 2003). Partial or complete radar flight tracks for 4,655 military aircraft sorties were captured during the time that the unattended monitors were recording noise levels.

Existing conditions of noise within the MOA complex is based on extrapolations of empirically-derived flight track information (Figure 6) collected in 2002 and analyzed in 2003. The track information is used in conjunction with extensive measurements of actual aircraft noise contributions to the indigenous noise environment of the Owyhee and Jarbidge MOAs. Nearly 24,000 hours of noise monitoring was conducted over the course of 1,141 instrument-days at eight sites in the Jarbidge and Owyhee MOAs from 24 April through 16 November 2002 (see Appendix A, Figure 1) Flight tracks for 4,655 military aircraft sorties were collected for the same time period. It was found that except during a few late morning and afternoon weekday periods, operations of military aircraft in the vicinity of monitoring sites did not appreciably elevate hourly equivalent indigenous sound levels. Three key findings of noise measurements within the existing MOA complex are:

Indigenous noise sources generally control sound levels about 90 to 95 percent of the time at all measurement sites;

Aircraft operations do not elevate hourly equivalent sound levels at measurement sites for more than a few hours a day; and

Individual aircraft operations at slant ranges beyond a few km from measurement sites have little effect on cumulative noise levels (Fidell et al. 2003).

Figure 6 shows the number of flight tracks over any given point for the baseline/no-action conditions. Eight reference points were chosen for analysis and comparison. Figure 6 and the figures in Appendices A and B are useful for understanding noise-related impacts because without them, it would be difficult to understand where the maximum noise levels would occur for the No Action Alternative and Alternatives B, C, and D.

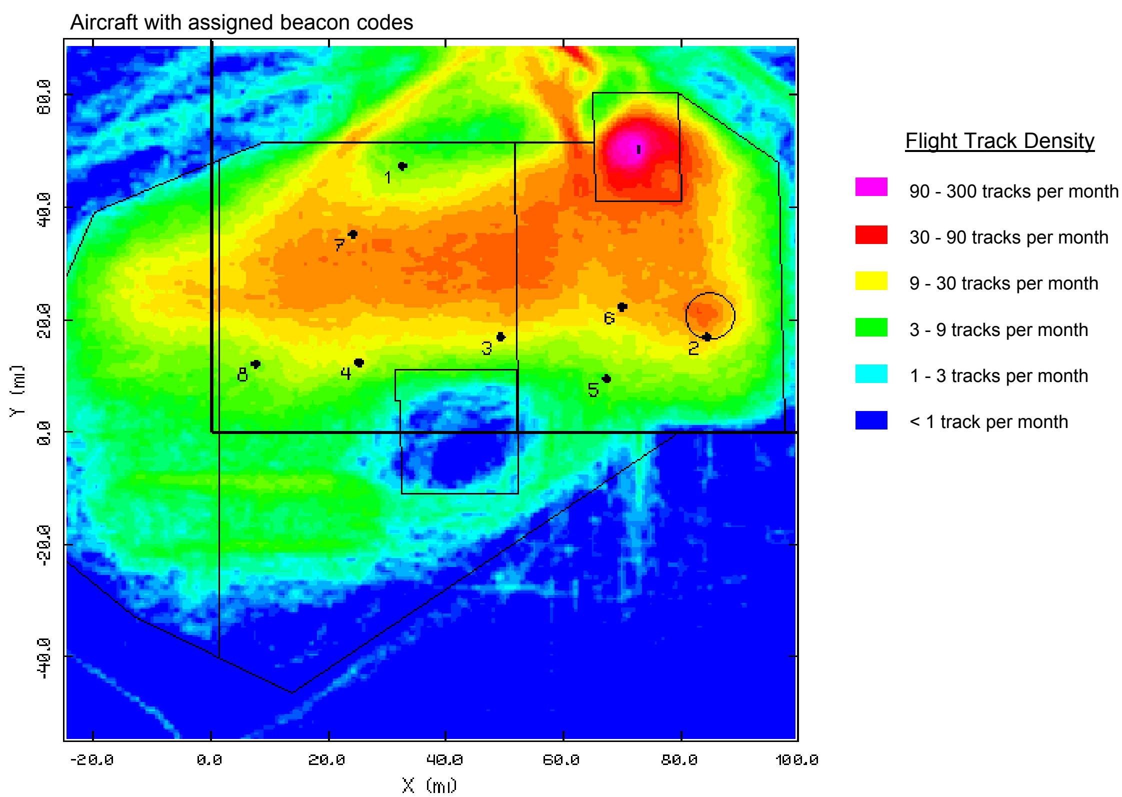


FIGURE 6
Extrapolations of Empirically-Derived Flight Track Information. Note: Flights over Duck Valley Indian Reservation are conducted at 15,000 feet above ground level or higher.

The cumulative L_{dmnr} (onset-rate adjusted, monthly day-night average sound level) can range from a low of 44.2 dB to a high of 48.5 dB for the No Action Alternative (see Appendix , Table 4). Under the No Action Alternative, the aircraft operations are concentrated and bottlenecked along the eastern edge of the Paradise East MOA and along the western edge of the Paradise West MOA.

3.2 Department of Transportation, Construction, and Secondary Induced Impacts

Department of Transportation resources are not considered further in this analysis. In addition, designation of airspace for military flight operations is exempt from the Department of Transportation Act, Section 4(f). The proposal to expand the MHAFB MOA complex would not involve any construction activities or affect land transportation resources. As such, this EA does not further analyze construction impacts. No known secondary induced impacts—as described in FAA 1050.1E—would be anticipated or expected from either the Proposed Action or Alternatives.

3.3 Land Management and Use/Wild and Scenic Rivers

Most of the land in the analysis area is federally held and managed, primarily by the Bureau of Land Management (BLM), with a considerably lesser amount managed by the U.S. Forest Service (part of the Humboldt-Toiyabe National Forest [H-TNF] in Nevada). Existing land uses in the analysis area consist predominantly of livestock grazing (Air Force 1998). Special use lands or areas (for example, Wilderness Study Areas [WSAs]) that have been recommended for designation as Wilderness Areas, and designated and eligible Wild and Scenic Rivers) in the analysis area require particular management attention because of their designation or proposed designation by Congress, the BLM, or the Forest Service. Department of Defense land beneath the MOA complex includes Saylor Creek Air Force Range, and Juniper Butte Range, but these ranges are within the existing Jarbidge MOA and not proposed for expansion.

Aside from federally administered lands, Tribal, state school endowment, and private lands are also present in the analysis area. Tribal lands consist of the Duck Valley Reservation (DVR) on the Idaho-Nevada border and the Fort McDermitt Reservation on the Oregon-Nevada border (Air Force 1998). Most of the land in the analysis area is unimproved, and very little developed land exists. Small communities are scattered in the analysis area. Examples include Mountain City in Nevada, Burns Junction in Oregon, and Owyhee on the DVR (Air Force 1998).

Under the Proposed Action, types of land use and land status beneath the MOA expansion would be the same as beneath the existing MOAs. Grazing would continue to be the predominant land use, federal agencies (primarily the BLM) would continue to be the largest land managers, and public lands would not be withdrawn for military use. Land use and land management beneath the existing MOAs would not be impacted by overhead training activities. Expanding the lateral and vertical boundaries of the Paradise East and West MOAs under the Proposed Action—which would include lowering the floor of the MOAs from 14,500 ft above mean sea level (MSL) to 10,000 ft MSL or 3,000 ft above ground level (AGL), whichever is higher—would not change general land use patterns, land ownership, or affect management of lands or special use land areas beneath the MOAs.

In a previous assessment regarding the effects of Air Force training overflights on the suitability of special land use areas such as WSA, and possible designation as Wilderness Areas, the BLM (1991, in Air Force 1998) stated in the *Idaho Wilderness Study Report:*

> *BLM recognizes the importance of these military training operations for the national defense preparedness of this country, but did not consider the impacts of*

> *the overflights as sufficient to warrant a nonsuitable recommendation for any of the WSAs within the designated flight operation area.*

In summary, these resources and special use areas (i.e., Wild and Scenic Rivers, Wilderness Areas, Wilderness Study Areas, Wildlife Management Areas, and Research Natural Areas [as described below]) would not be significantly affected by implementation of the Proposed Action or Alternatives and have not been further assessed in this EA.

3.3.1 Wild and Scenic Rivers

The Wild and Scenic Rivers Act (16 USC 1271-1287)—Public Law 90-542, approved October 2, 1968, (82 Stat. 906) established a National Wild and Scenic Rivers System and prescribed the methods and standards through which additional rivers may be identified and added to the system. Rivers designated as Wild and Scenic within the proposed expansion area include a portion of the Owyhee River in Oregon (Wild and Scenic Rivers Act, http://www.rivers.gov/wsract.html).

Legislation that was signed into law by U.S. President Barack Obama on March 30, 2009 (H.R. 146: Omnibus Public Land Management Act of 2009 [now known as Public Law No. 111-11]) designated certain land as components of the National Wilderness Preservation System, and authorized certain programs and activities in the Department of the Interior and the Department of Agriculture, in addition to other purposes.

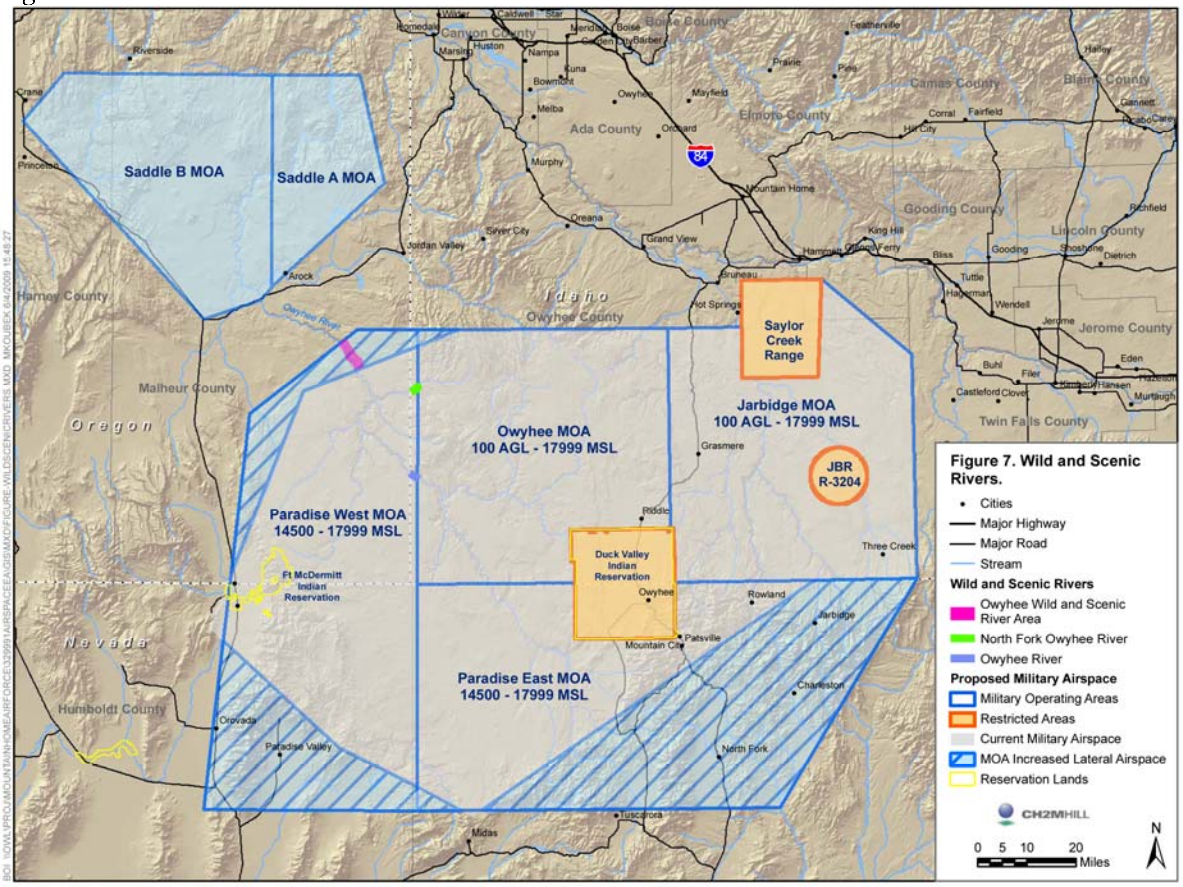
Subtitle F of P.L. 111-11– Owyhee Public Land Management, Section 1504, Designation of Wild and Scenic Rivers, designated a number of river reaches as Wild and Scenic Rivers. Two of the new designated reaches fall within the existing Paradise West MOA—the North Fork of the Owyhee River, and the Owyhee River (Figure 7). Military activity over those locations is not precluded by the legislation and will not affect the use of the rivers. No impacts would occur with implementation of the proposed project.

3.3.2 Wilderness Study Areas

Several Wilderness Study Areas (WSAs) are located within the proposed MOA expansion area. These include a small area of the North Fork of the Little Humboldt River WSA and roughly one-quarter of the Little Humboldt River WSA in Nevada and the Rough Hills WSA south and east of the of the Paradise East MOA. A narrow leg in the upper region of the Owyhee Canyon WSA in Oregon (Figure 8) called the Owyhee Canyon WSA has been withdrawn. The proposed project would not involve any activities that would change the nature of the remaining WSA areas and affect their status as WSAs. There are no new WSAs in the Paradise MOAs or proposed expansion areas.

Insert Figure 7 (front)

Figure 7 Wild and Scenic Rivers



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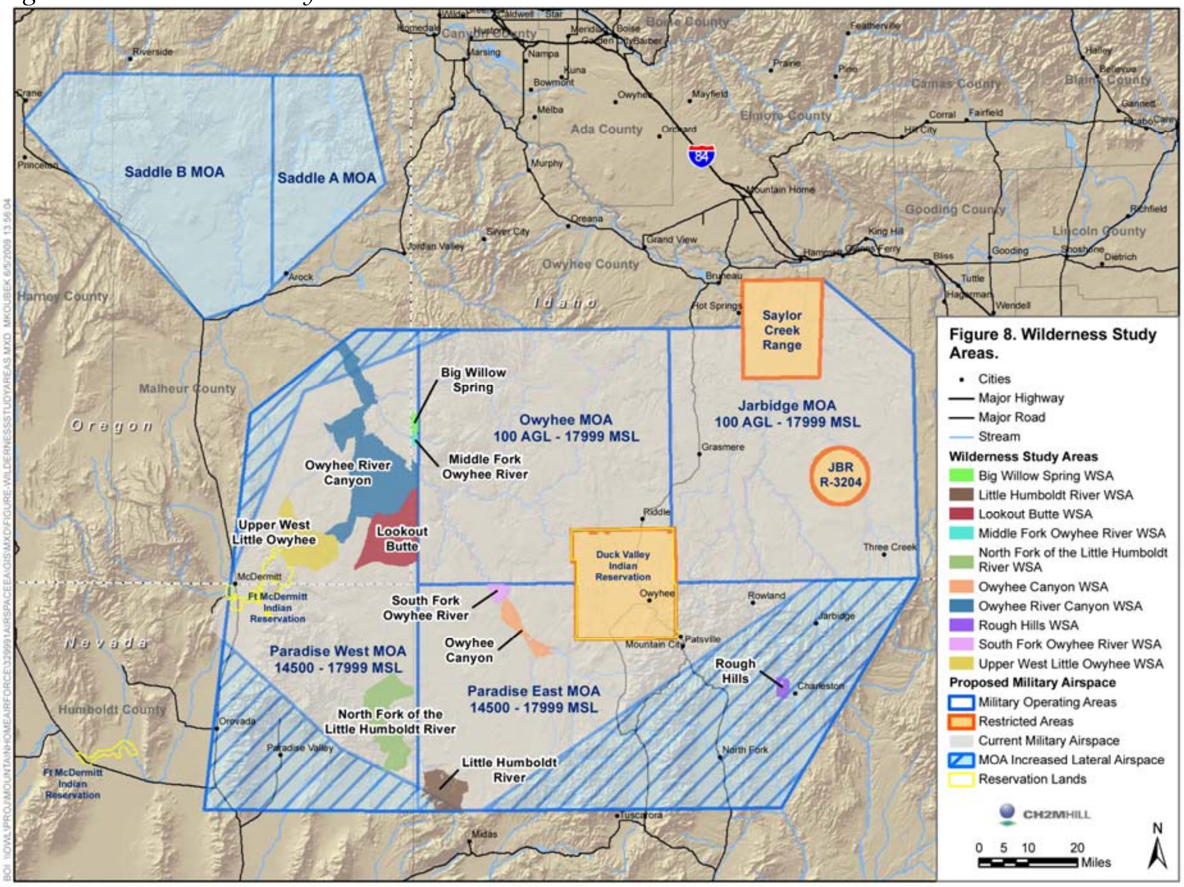
Insert Figure 8 (front)

Figure 8 Wilderness Study Areas



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3.3.3 Wilderness Areas

Two wilderness areas are located beneath the proposed expanded MOA (Figure 9). These include the Santa Rosa–Paradise Peak Wilderness Area and the Jarbidge Wilderness Area. According to Section 11 of the Nevada Wilderness Protection Act of 1989 (P.L. 101-195):

> *"Nothing in this Act shall preclude low level overflights of military aircraft, the designation of new units of special airspace, or the use or establishment of military flight training routes over the Alta Toquima, Arc Dome, Currant Mountain, or Table Mountain Wilderness areas."*

The Santa Rosa-Paradise Peak and Jarbidge are not specifically cited.

The Wilderness Act [16 U.S.C. 1133 (d)(1)] states in the special provisions section that:

> *"The following special provisions are hereby made:*
>
> *(1) Aircraft or motorboats; fire, insects, and diseases. Within wilderness areas designated by this Act [16 USCS §§ 1131 et seq.] the use of aircraft or motorboats, where these uses have already become established, may be permitted to continue subject to such restrictions as the Secretary of Agriculture deems desirable. In addition, such measures may be taken as may be necessary in the control of fire, insects, and diseases, subject to such conditions as the Secretary deems desirable."*

Discussions with Jose Noriega, the District Ranger on the Santa Rosa District of the H-TNF, indicated that there is no Wilderness Plan for the Santa Rosa–Paradise Peak Wilderness. He also said that military overflights are neither precluded nor guaranteed for the Santa Rosa–Paradise Peak Wilderness, nor for the Jarbidge Wilderness (Noriega, pers. comm., 2007). The wilderness areas are shown in Figure 9.

Santa Rosa–Paradise Peak Wilderness Area is located in Nevada's high desert mountains between Winnemucca, about 30 miles to the south, and McDermitt, roughly 30 miles to the north. The area occupies more than 32,000 acres of the high ridges on the southern end of the Santa Rosa Mountains. The two tallest peaks within the boundaries include Santa Rosa Peak (9,701 ft) and Paradise Peak (8,650 ft).

This Wilderness Area features no lakes, alpine meadows or forests. Its outstanding characteristics are the towering granite peaks above pockets of aspen trees. Although bounded on the west by Interstate Highway 95 and on the east by State Highway 290, the area is relatively unvisited (USFS 2007).

Jarbidge Wilderness Area is located in Nevada, six miles south of the Idaho border. Elevations in this Wilderness Area range from 5,000 ft to over 10,000 ft above sea level. Matterhorn, at 10,838 ft, is the highest point in the Jarbidge Wilderness Area. Numerous peaks in this Wilderness Area tower over 10,000 ft, including Mary's River, God's Pocket, and Jumbo peaks. Because access to the area is by improved dirt roads and many of these are inaccessible most of the year due to snow, it is very isolated.

Section 1503 (b)(11) of Public Law No. 111-11 indicates that military overflights, flight testing and evaluation, and the designation or creation of new units of special use airspace or the establishment of military flight training routes over the new wilderness areas are not restricted or precluded. A very small portion of the new Owyhee Wilderness Area identified in Public Law No. 111-11 falls within the Paradise West MOA. No impacts would occur, as per the legislation, and these areas are not discussed further.

3.3.4 Wildlife Management Areas

There are no Wildlife Management Areas in the proposed expansion area.

3.3.5 Research Natural Areas

Research Natural Areas (RNAs) are areas of high ecological integrity designated and managed by the USDA Forest Service. These areas are established to protect biological diversity, to serve as a baseline reference, and for monitoring long-term ecological changes. Activities permitted on RNAs are restricted to low-impact studies for educational purposes.

The Fall Creek Research Natural Area, established in 1996, is located within the Jarbidge Wilderness about 4 miles southeast of the town of Jarbidge. The Fall Creek RNA supports the following vegetation types, which are of significant ecological interest:

- Pond alpine barrens
- Whitebark pine
- Englemann spruce-subalpine fir
- Aspen
- Sagebrush steppe
- Mountain mahogany-oak scrub
- Western ponderosa forest stream talus

Fall Creek RNA ranges from about 6,600 ft to over 10,800 ft in elevation, and is characterized by steep topography and unusual geologic formations.

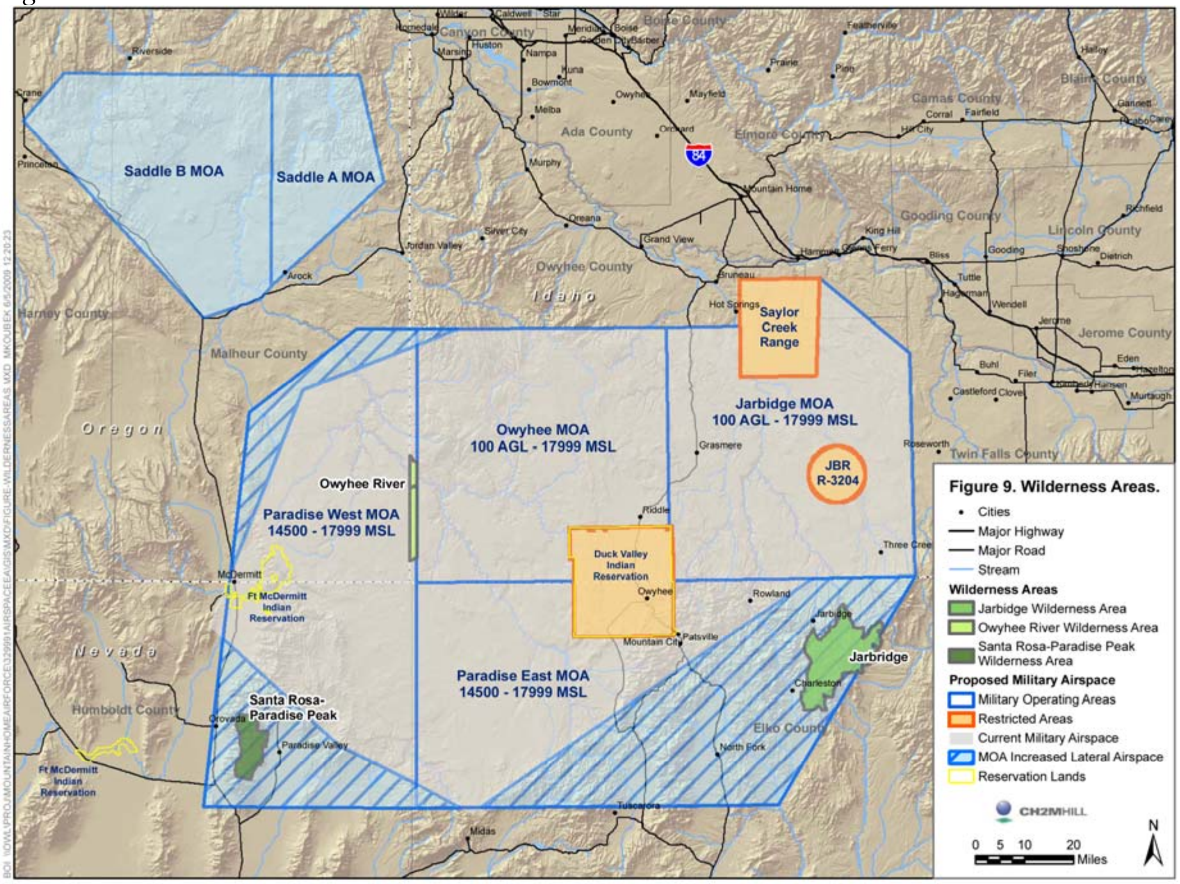
3.4 Visual and Recreational Resources

Expanding the lateral and vertical boundaries of the Paradise East and West MOAs under the Proposed Action or Alternatives would not be expected to change current Resource Opportunity Spectrum (ROS) or Visual Resource Management (VRM) classifications or the types of recreation opportunities and visual resources available to the public in the analysis area. However, much more of the H-TNF and its recreation opportunities and visual resources would be covered by the expanded airspace boundaries than at present. Recreation and visual resources would experience increased training aircraft sightings over the laterally expanded MOA boundaries (for example, in the H-TNF). Training aircraft also may be more apparent beneath all of the expanded Paradise East and West MOAs because of the vertical boundary changing to 10,000 ft MSL or 3,000 ft AGL, whichever is higher. Increased noise levels, because of the lower vertical boundary, may temporarily detract from the solitude of primitive or semi-primitive recreational experiences while training aircraft pass overhead. The BLM addressed this effect in the Final Environmental Impact Statement (EIS) for the Oregon Wilderness (BLM 1989, in Air Force 1998), stating that the influence of low-level military flights.

> *"on a visitor's perception of solitude is quite temporary, but extreme for a short period of time (one minute or less). These flights do not have a significant, long-lasting adverse effect on a visitor's opportunity to find solitude."*

Insert Figure 9 (front)

Figure 9 Wilderness Areas



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In summary, these resources would not be significantly affected by implementation of the Proposed Action or Alternatives and have not been further assessed in this EA.

3.4.1 Air Quality

Air quality at a given location is described by the concentration of various pollutants in the surrounding atmosphere. National Ambient Air Quality Standards (NAAQS) are established by the U.S. Environmental Protection Agency (EPA) for criteria pollutants including ozone (O_3) carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter equal to or less than 10 micrometers in diameter (PM_{10}), and lead (Pb). NAAQS represent the maximum levels of background pollution that are considered safe, with an adequate margin of safety to protect public health and welfare.

Based on measured ambient criteria pollutant data, the EPA designates areas of the U.S. as having air quality better than (attainment) or worse than (nonattainment) the NAAQS. Individual states are delegated the responsibility to regulate air quality in order to achieve or maintain air quality in attainment with these standards. States are required to develop a state implementation plan (SIP) that sets forth how the CAA provisions will be implemented within the state. The SIP is the primary means for the implementation, maintenance, and enforcement of the measures needed to attain and maintain the NAAQS in each state. According to plans outlined in the SIP, designated state and local agencies implement regulations to control sources of criteria pollutants (Air Force 2007). EPA-approved SIPs for the states of Oregon and Nevada do not regulate aircraft emissions when acting as a mobile source. Aircraft emissions can be regulated as a stationary source if aircraft engines are tested on a test stand (Trimberger 2008).

The CAA prohibits federal agencies from supporting any activities that do not conform to an EPA approved SIP. In 1993, the EPA developed the final rules for determining air quality conformity. Under these rules, certain actions are exempted from conformity determinations, while others are assumed to be in conformity if total project emissions are below *de minimis* levels established under 40 CFR Section 93- 153 (Air Force 2007). Because the Proposed Action and Alternatives are proposed for an area that meets all NAAQS, an air conformity analysis is not required.

In addition to NAAQS, the CAA establishes a national goal of preventing any further degradation or impairment of visibility within federally designated attainment areas. Attainment areas are classified as Class I, II, or III and are subject to the Prevention of Significant Deterioration (PSD) program. Mandatory Class I status was assigned by Congress to all international parks, national wilderness areas, and memorial parks larger than 5,000 acres and national parks larger than 6,000 acres in existence on August 7, 1977. Class III status is assigned to attainment areas to allow maximum industrial growth while maintaining compliance with NAAQS. All other attainment areas are designated Class II. In Class I areas, visibility impairment is defined as a reduction in regional visual range and atmospheric discoloration or plume blight (such as emissions from a smokestack). Determination of the significance of an impact on visibility with a PSD Class I area is typically associated with stationary emission sources. Mobile sources, including aircraft and their operations, are generally exempt from permit review under this regulation (Air Force 2007).

Paradise East and Paradise West MOAs do not occur within Air Quality Control Regions with designated nonattainment areas. The rural nature of this region and the lack of substantial population centers or industrial facilities to serve as significant sources of air pollution contribute to relatively good air quality in the region. One Class I PSD area is located in the Jarbidge Wilderness Area.

Based on an annual sortie rate of 10,264 (Air Force 2007) and assuming all the aircraft sorties are by F-15E and F-15SG aircraft (only 7 percent of sorties are by other aircraft types), a rough estimate of air emissions can be extrapolated per unit area. Other assumptions used in calculating representative air emissions include that aircraft engines are using maximum engine power for the entire sortie and each sortie is 1.2 hours. Afterburner data are not included, as afterburners are used only briefly in the MOAs (very high fuel consumption) or on take-off. Likewise, partial engine power data are not used in the calculations, even though the aircraft would be using less than maximum engine power for a majority of the time while flying the sortie. The emissions calculated in Table 3.2 represent the maximum aircraft emissions per unit area for the existing Paradise MOAs compared to the Proposed Action and Alternatives.

TABLE 3.2
Estimated Maximum Air Emissions Data for F-15E and F-15SG Aircraft for the Proposed Action and Alternatives Per Unit Area

Pollutant	Pounds of pollutant emitted per sortie[a]	Total tons of pollutant emitted per year[b]	Emissions per cubic nautical mile per year- Alternative A: No- Action[c]	Emissions per cubic nautical mile per year - Alternative B: Proposed Action[c]	Emissions per cubic nautical mile per year - Alternative C[c]	Emissions per cubic nautical mile per year - Alternative D[c]
CO	18.2	93.4	3.8	2.8	3.0	3.6
VOC	15.0	77.0	3.1	2.3	2.5	3.0
NO_x	1,589.8	8158.9	331.1	246.2	263.1	314.1
SO_2	12.1	62.1	2.5	1.9	2.0	2.4
PM_{10}	30.9	158.6	6.4	4.8	5.1	6.1
Total pounds	1,666.0	8549.9	346.9	258.0	275.7	329.2

[a] Sortie length is 1.2 hours
[b] Annual emission calculation is based on 10,264 sorties per year
[c] Units are pounds of pollutant per cubic nautical mile of airspace

Pollutants considered in this EA include the criteria pollutants measured by state and federal standards. These include volatile organic compounds (VOCs), which are precursors to (indicators of) O_3, nitrogen oxides (NO_x), which are also precursors to O_3, as well as CO, SO_2, and PM_{10}. Airborne emissions of lead (Pb) are not addressed because the affected areas contain no significant sources of these criteria pollutants nor is it associated with the Proposed Action and Alternative A.

No change in the current sortie rate would occur in the MOA complex expansion. Because additional sorties are not included in the Proposed Action or Alternatives, no additional pollutants will be discharged from aircraft within the MOA complex. Because the number of sorties would remain relatively the same and are spread over a larger area, emissions in the existing portions of Paradise East and Paradise West would decrease. Emissions in the proposed airspace expansion area would increase from (presumably) no emissions to 258.0 pounds per cubic nautical mile. This increase is not significant and NAAQS would continue to be met in the MOAs under the Proposed Action and Alternatives. The Class I PSD area in the Jarbidge Wilderness Area would not be adversely affected by the Proposed Action and Alternatives. No further analysis of this resource was conducted.

3.5 Biological Resources

3.5.1 Definition of Resource

Biological resources include all of the living components of an ecosystem. For this EA, biological resources have been divided into five major categories: vegetation, wildlife, species with conservation status, fish, and wetlands.

3.5.2 Wildlife

The USFWS, Oregon Department of Fish and Wildlife, Nevada Department of Wildlife, BLM, and USFS manage wildlife within the Proposed Action Area. The Shoshone-Paiute Tribes manage wildlife resources within the Duck Valley Reservation. The Paiute and Shoshone Tribes manage wildlife resources in the Fort McDermitt Reservation. Wildlife in the Proposed Action Area is diverse and well adapted to the available habitats. In general, quality wildlife habitat includes a diverse mixture of native forbs, grasses, shrubs, and available water sources. These features form the basis of ecosystem community structure. Wildlife resources include large mammals, small mammals, furbearers, small carnivores, reptiles, amphibians, and birds.

3.5.2.1 Large Mammals

Large mammals are highly mobile and may have home ranges up to hundreds of square miles. Many of the large mammals in southwestern Idaho, northwestern Nevada, and western Oregon use different habitats on a seasonal basis.

California bighorn sheep (*Ovis canadensis californiana*) inhabit grasslands adjacent to steep canyons and rimrock in the Nevada expansion area. They migrate seasonally (Northwest Power Planning Council 2004). Bighorn sheep are discussed further in Section 3.5.5.2.

Mule deer (*Odocoileus hemionus*), pronghorn antelope (*Antilocapra americana*), and elk (*Cervus elaphus nelsoni*) winter in low elevation areas to escape deep snow. These animals migrate to higher elevations during the spring and summer. Cougar (*Puma concolor*) are found in higher elevation areas, typically in forested portions of the project analysis area. Black bear (*Ursus americanus*) habitat exists in the project area, but the species is restricted to areas in western Nevada. A brief discussion of these species habitat requirements and status follows below.

Pronghorn Antelope

Pronghorn are highly dependent on sagebrush for year-round food and cover, but it is especially important in winter (Johnson 1979). Big sagebrush (*Artemisia tridentata*), rabbitbrush (*Chrysothamnus nauseosus*), and bitterbrush (*Purshia tridentata*) have been identified as being particularly important winter food sources for antelope in the Great Basin (Allen et al. 1984). Migration routes are traditional, but vary by snow conditions, water availability, vegetation condition, and disturbance (Crenshaw 1991). Pronghorn numbers are good within the project area. In the winter of 2006-07, the Nevada Department of Wildlife (NDOW) removed 190 pronghorn from the winter range areas in Management Unit 6, which covers much of the Nevada segment of the project expansion area, and moved them to other management units (Cox et al. 2007). Within Area 6, 363,000 acres in the North Central Elko County units burned in 2006. The most devastating results of these fires were approximately 27,000 acres of crucial pronghorn winter habitat that burned along Deeth, Elbutz, and Susie creeks. Trapping and increased harvest in this area, which covers the east side of the Nevada expansion area, have decreased pronghorn numbers to better conserve crucial winter range.

Fires also burned the center of the Nevada Area 6 (Management Unit 66); however, sagebrush had already been devastated by moths in this unit and was in poor condition (Cox et al. 2007). Pronghorn populations in this unit are stable or increasing.

Management Unit 51 is within the west side of the Nevada expansion. This area appears to have increasing pronghorn populations based on survey results (Cox et al. 2007). Increased precipitation appears to be increasing forage in this area.

Pronghorn population numbers on both wildlife management units in Oregon, especially in winter counts appear to be increasing (ODFW 2006a).

Mule Deer

Specific habitat characteristics supporting mule deer populations in the Great Basin include aspen with abundant herbaceous understory, sagebrush, and mixed grass/shrub habitat with shrub cover up to 75 percent. Although specific data are not available, deer utilize low elevation sagebrush for winter range.

Wildfires have significantly reduced mule deer sagebrush habitats in the same areas as for pronghorn. A total of 662,730 acres burned in Area 6 in 2006. Much of the area burned was either crucial winter range or important transitional range for deer (NDOW 2007). Loss of many acres of crucial winter range to cheatgrass invasion is likely to occur as an aftermath of these fires. Fawn ratios in the eastern units of the project area were down from previous averages in 2006. Although approximately 105,000 acres of crucial habitat that burned on the east side of the expansion area were seeded in 2006, lack of spring precipitation in early 2007 produced poor germination results from these seedings (Cox et al. 2007).

On the west side of the Nevada expansion area, mule deer populations have increased slightly in Unit 51 (Cox et al. 2007). An emergency antlerless hunt was initiated in the center of the Nevada portion (Unit 66), which is part of the current air space, in order to protect crucial mule deer habitat that burned in 2006 fires.

In Oregon, mule deer objectives for the two wildlife management units within the project area are set for a total of 10,500 mule deer (ODFW 2005). The Oregon Department of Fish and Wildlife (ODFW) would like to revise the Whitehorse Management unit objectives for mule deer from the current total of 5,500 for the whole unit to 3,200 for East Whitehorse and to 2,800 for the Trout Creek Mountains. They base these recommended changes on changing distribution of mule deer populations in this unit. In the Owyhee Management Unit, the ODFW would like to revise the objectives up to 8,000 from the current 5,000. This increase is based on better population estimates.

Elk

Elk habitat varies seasonally and with altitude. In the summer, elk are primarily associated with mountain meadows and coniferous forests. In winter months, elk move to lower elevations of foothills, valleys, and shrublands. Elk forage on grasses, sedges, conifer needles, serviceberry (*Amelanchier alnifolia*), sagebrush, and other plant material.

Fires within elk habitats on the east side of the expansion area in Nevada do not appear to have impacted elk to the same degree as they have pronghorn and mule deer. Fires have promoted grass, which elk prefer. Elk numbers are currently increasing in management units on the east side of the Nevada air space project expansion (Cox et al. 2007). No elk habitat occurs on the west side.

Elk habitat for the Oregon portion of the air space is much more limited. The ODFW has set population objectives for the two wildlife management units within the project area, which they consider to be high desert habitat, at a total of only 1,000 elk (ODFW 2005).

Cougar

Cougar can be found in rugged mountains and semi-wooded canyon habitat. These animals feed primarily on mule deer and other large game in addition to a wide variety of small mammals. Primary prey in the project area typically would be mule deer, elk, bighorn sheep, and porcupines. Prey availability directly influences cougar reproduction and mortality rates. Studies indicate cougar populations increase as available prey increases. Cougar density is primarily influenced by a combination of prey availability, habitat structure, and tolerance for other cougars (ODFW 2006b).

Potential habitat, typically comprised of pinyon pine, juniper, and mountain mahogany in rocky terrain, is available in the mountains of the western and southeastern regions of the proposed expansion area as well as in the Bruneau/Jarbidge and Owyhee river canyon complexes.

Cougar populations are believed to be stable within the expansion area in Nevada, but if wildfires result in a decrease in mule deer populations, cougar populations are expected to decrease as well. The NDOW currently assess habitat in good condition throughout the Eastern Region with an ample prey base and minimal overall loss of habitat due to development activities (Cox et al. 2007). They also conclude that range fires during previous summers converted thousands of acres of deer habitat to vegetation dominated by grasses and annuals in the Eastern Region, burning some important deer summer ranges and some key deer winter ranges. Although the future status and trend of deer herds in the burned areas will have a significant impact on cougar productivity and survivability, the NDOW believes that documented mortality in the form of harvest and accidental loss has not exceeded the reproductive or recruitment capabilities of the mountain lion resource. Although harvest objectives for some units had been met under the previous unit-based approach, the collective harvest objective for cougars for the east side of the project expansion area in Nevada has never been achieved (Cox et al. 2007).

Populations of cougar in eastern Oregon are low. Few are harvested in either of the management units within the expansion. The best habitat for cougar is north of the expansion area in northeastern Oregon (ODFW 2006b).

Black Bear

Black bears are primarily associated with forested mountains and wooded areas in the western U.S. Throughout their range, prime habitat is characterized by relatively inaccessible terrain, brushy vegetation, and food sources in the form of fruits and nuts, insects, tubers and eggs (Crowe 1986, Burt and Grossenheider 1980). Presumably black bears once occurred in the proposed expansion area in the region named Bear Creek, located in the northern part of the upper elevations of the Paradise East MOA.

Although potential black bear habitat is available in the mountains of the western and southeastern regions of the proposed expansion area, the managed range of the black bear by the NDOW is restricted to "mountainous areas and foothills of Lake Tahoe, the Sierra Nevada Mountains and nearby mountain ranges in extreme western Nevada", which are outside the proposed expansion area (NDOW 2007a). Black bear are not hunted in Nevada.

Black bear are not known to occur in the Oregon expansion area.

3.5.2.2 Furbearing Mammals and Small Carnivores

Furbearers include mink (*Mustela vision*), river otter (*Lutra canadensis*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethica*), bobcat (*Lynx rufus*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), and badger (*Taxidea taxus*). Small carnivores include coyote (*Canis latrans*), kit fox (*Vulpes macrotis*), skunks (*Mephitis mephitis*), and long-tailed weasels (*Mustela frenata*). Fourteen furbearing and small carnivore species may potentially occur within the MOA complex as year-round residents.

Coyotes and kit fox are typically found in a wide variety of habitats but are most numerous in the uplands. Both are found in grasslands and sagebrush habitats. This habitat is found in the current air space as well as the southeast and western portion of the Nevada expansion area and the expansion area in Oregon.

Beaver, river otter, muskrat, and mink are associated with river environments and have the potential to occur in the Bruneau, Jarbidge, Owyhee, and Humboldt River systems within the MOA complex. Smaller river systems in the expansion area include the Little Humboldt River complex and numerous smaller drainages including the south fork of the Owyhee River and Martha, Deep, and Canyon creeks. Most protected areas of these channels are willow or alder dominated, often with cottonwood and aspen components.

Bobcats and weasels are most likely to occur on canyon slopes near water courses. Bobcats inhabit a wide variety of community types but prefer areas with rocky terrain, which is common in the proposed expansion area. Long-tailed weasels are typically found near water as well.

Raccoons, skunk, red fox, and coyote all utilize agricultural areas (Air Force 1998).

3.5.2.3 Small Mammals

Small mammals include voles, mice, squirrels, rabbits, and shrews. Small mammals are found in a diversity of habitats ranging from the desert to montane vegetation communities. Both the presence of vegetation for concealment, food supply, and bedding, and the composition of the soil (rocks, gravel, and sand) are important microhabitat features that influence the small mammal species composition of an area (Air Force 1998).

Thirty-seven small mammal species have the potential to occur within the affected environment of the MOA complex (Keller 1992). In two field surveys, deer mice (*Peromyscus maniculata*) were the most common species trapped, followed by the Great Basin pocket mouse (*Perognathus parvus*). The pocket mouse was trapped at a much lower frequency of occurrence than the deer mouse. All other small mammals were trapped at very low or undetected frequencies.

Bats

Essential habitat components for insectivorous bat populations are appropriate day roosts and foraging habitat. Foraging habitat must provide sufficient insect densities within the air column and be of some acceptable distance from roosts. Habitat preferences vary among species, but suitable habitat must contain adequate roosting and foraging sites. Additionally, the presence of open water has been found to enhance habitat for species that live in arid environments (Carpenter 1969). In addition to hydration, open water also provides habitat for insect prey.

Three species of bats are likely to occur in Nevada in the proposed expansion area: little brown myotis bat (*Myotis lucifugus)*; Townsend's big-eared bat (*Corynorhinus townsendii*); and spotted bat (*Euderma maculatum*). Little brown myotis bat and Townsend's big-eared bat are unprotected in the state of Nevada and spotted bat is protected and listed as Threatened. Known threats can include "Habitat loss, collection, recreational rock climbing, water impoundments, grazing, mining operations, and pesticide use" (NDOW Wildlife data, online at http://ndow.org/wild/animals/facts/index.shtm#mammals).

Bat species that may occur in the proposed expansion area in Oregon include the pallid bat (*Antrozous pallidus*), spotted bat, and Townsend's big-eared bat. Spotted and Townsend's big-eared bats are both ranked G4; pallid bat is ranked G5. All three species fall within the state rank of S2. Threats can include disturbance at roosts, patchy distribution, loss of habitat, pesticides, and natural rareness (ODFW Conservation Strategy 2006).

3.5.2.4 Birds

Upland Game Birds

Upland game birds known to occur within the expansion area of the MOA complex include four native species; sage grouse (*Centrocercus urophasianus*), mourning dove (*Zenaida macroura*), mountain quail (*Oreortyx pictus*), and blue grouse (*Dendragapus obscurus*). An additional four introduced species: chukar (*Alectoris chukar*), gray partridge (*Perdix perdix*), ring-necked pheasant (*Phasianus colchicus*), and California quail (*Callipepla californica*) occur here as well. Sage grouse are discussed in Section 3.4.5.1.

Mourning doves occupy a variety of habitats including grassy meadows, cultivated fields, woodlands and sagebrush stands. They nest primarily in shrubs and trees. They are expected to occur in all expansion areas in both Nevada and Oregon.

Mountain quail typically are found in dense brush and woodlands up to 10,000 ft in elevation, but move to lower elevations in cold weather. In the fall and winter, they congregate in coveys. The Sierra Nevada is the main population center for this species in Nevada (NDOW 2005). They may have once occurred within the project expansion area. NDOW has released and plans additional supplemental releases of this species in the eastern region of the expansion area in Nevada.

Blue grouse require a winter range of conifers and a summer range that is open and contains a diversity of plant life and topography (Bendell and Zwickel 1980). Blue grouse have a limited distribution in the expansion area and only occur in the forested regions of the eastern side of the Nevada expansion (Espinosa et al. 2007). Blue grouse populations in Nevada appear to be stable. Blue grouse are listed with ruffed grouse as forest grouse in Nevada, but ruffed grouse are not native to the state. It is unlikely that ruffed grouse occur within the project area, but if they do, they would primarily be associated with aspen (Espinosa et al. 2007). Blue grouse are not known to occur within the Oregon expansion area.

The gray partridge, ring-necked pheasant, and California quail nest on the ground, are somewhat gregarious, and are year-round residents. Gray partridge and ring-necked pheasant are primarily associated with cultivated farmland such as corn or hay fields, which have some component of vegetative cover. Sagebrush-grass dominated habitats are also used by gray partridges (IDFG 1990). California quail can be found in farmlands, brushy foothills, and deserts, which contain riparian areas or some type of water source with cover. Chukars prefer rocky and brushy canyons with grassland and scattered sagebrush. They occur within these habitats in the proposed expansion areas.

Waterbirds

A diverse group of waterbirds inhabit the project area, including ducks, swans, herons, ibises, sandpipers, plovers, gulls, terns, and many other birds primarily associated with aquatic environments. Aquatic environments provide nesting and foraging habitat for most of the water bird species. Waterbirds also use temporarily flooded areas and ephemeral ponds as resting and foraging stops during migration. Concentrations of waterbirds occur on Wildhorse Reservoir and Sunflower Reservoir in the eastern expansion area in Nevada. NDOW surveys these reservoirs for waterfowl. Other riverine and wetland areas within the expansion areas support nesting, migrating, and wintering habitats for both shorebirds and waterfowl. These are primarily found in the expansion areas of Nevada. The abundance and seasonality of each habitat type is variable. However, in Oregon, Owyhee Reservoir provides important waterbird habitat.

Marsh habitat provides important nesting habitat for both waterfowl and some shorebirds. Several areas of marsh (Palustrine Emergent [PEM]) occur within the project expansion areas. In Nevada, these include the Adams Slough, Martin Creek, and Big Cottonwood Creek drainage complex located east of the Santa Rosa–Paradise Peak Range, and the Little Humboldt River complex and reservoirs.

In addition, one of the two Important Bird Areas (IBAs) located within the proposed eastern expansion area in Nevada support waterfowl and shorebird use: Mary’s River. The Mary’s River IBA watershed is considered to be the last functioning segment of the Humboldt River system. Its wetlands and riparian corridors are home to a large variety of birds including raptors and riparian obligates. Waterfowl species that are known to nest in this watershed include cinnamon teal, green-wing teal, common mergansers, gadwalls, and mallards. Shore or marsh nesting birds that are known to nest in this watershed include sandhill cranes, snowy egrets, Wilson’s phalaropes, Forster’s terns, and common snipe.

Raptors

Raptors include hawks, eagles, falcons, vultures, and owls. Diversity of vegetation communities within the existing MOA complex provides suitable nesting and foraging habitat for many raptor species, especially along canyon walls and riparian areas. Some raptors are migratory species; however, raptors that are likely to be year-round residents, and which utilize canyon walls for nesting, include golden eagles (*Aquila chrysaetos*), prairie falcons (*Falco mexicanus*), peregrine falcons (*Falco peregrinus anatum*), red-tailed hawks (*Buteo jamaicensis*), American kestrels (*Falco sparverius*), great horned owls (*Bubo virginianus*), western screech owls (*Otus kennicottii*), and barn owls (*Tyto alba*). Suitable nesting habitat within the MOA complex includes the canyons of the Owyhee Canyon Wilderness Study Area in the Oregon expansion area, and other areas of rimrock elsewhere within the complex.

Raptor species that would nest in trees along the Mary's River in the eastern Nevada expansion area include Swainson's (*Buteo swainsoni*), ferruginous (*Buteo regalis*), and red-tailed hawks, long-eared owls (*Asio otus*), great horned owls, and western screech owls. Areas with appropriate nesting habitat for these species tend to be found at higher elevations, in canyons, or along drainages.

Short-eared owls (*Asio flammeus*) and northern harriers (*Circus cyaneus*) nest on the ground in grassland, shrub-steppe, or marsh habitats. Both species may be found nesting in grass-lands, shrub-steppe, and near agricultural areas throughout the uplands of the MOA complex. At higher elevations, forests in the eastern Nevada expansion area provide nesting habitat for accipiter species, including northern goshawk (*Accipiter gentilis*), Cooper's hawk (*Accipiter cooperii*), and sharp-shinned hawk (*Accipiter striatus*).

Non-Game Bird Species

A large variety of non-game avian species occur within the proposed expansion area, including sparrows, warblers, thrushes, wrens, nighthawks, swifts, hummingbirds, and woodpeckers.

Riparian areas within the MOA complex, especially those found in the major canyons, support between 40 and 47 species of birds (Saab and Groves 1992). In addition to game birds and raptors, canyon bird species include rock wren (*Salpinctes obsoletus*), canyon wren (*Catherpes mexicanus*), white-throated swift (*Aeronautes saxatalis*), belted kingfisher (*Ceryle alcyon*), northern rough-winged swallow (*Stelgidopteryx serripennis*), Say's phoebe (*Sayornis saya*), rock dove (*Columba livia*), and yellow-breasted chat (*Icteria virens*). For example, the Mary's River IBA in the eastern Nevada expansion area lists the following non-game bird species that are known to nest in this area: yellow-breasted chat, Lewis's woodpecker (*Melanerpes lewis*), sage thrasher (*Oreoscoptes montanus*), bobolink (*Dolichonyx oryzivorus*), mountain bluebird (*Sialia currucoides*), and long-billed curlew (*Numenius americanus*).

Sage sparrows (*Amphispiza belli*), sage thrashers, and Brewer's sparrows (*Spizella breweri*) are obligate sagebrush species that nest in sagebrush stands within all expansion areas. Loggerhead shrikes (*Lanius ludovicianus*) also favor sagebrush habitats.

Western meadowlarks (*Sturnella neglecta*), vesper sparrows (*Pooecetes gramineus*), and Savannah sparrows (*Passerculus sandwichensis*) are found in grasslands and sagebrush-grasslands in the expansion areas of both Oregon and Nevada.

Between 17 and 31 species of birds are found within the pinyon-juniper and aspen wood-land habitat types (Saab and Groves 1992). These habitats are found in river canyons in all expansion areas, but are especially prevalent in the Nevada expansion areas. These birds include mountain bluebirds, American robin (*Turdus migratorius*), Hammond's flycatcher (*Empidonax hammondii*), Swainson's thrush (*Catharus ustulatus*), pine siskin (*Carduelis pinus*), western wood-pewee (*Contopus sordidulus*), Lewis' woodpecker, Townsend's solitaire (*Myadestes townsendi*), and spotted towhee (*Pipilo maculatus*).

The coniferous forests associated with higher elevations along the eastern Nevada extension area is home to many of the same species listed about for pinyon-juniper and aspen stands. Coniferous forest also provide nesting and foraging habitat for other bird species, including several species of warblers, dark-eyed juncos (*Junco hyemalis*), Clark's nutcrackers (*Nucifraga columbiana*), and red-crossbills (*Loxia curvirostra*). Tree swallows (*Tachycineta bicolor*) also occur in areas near water in this expansion area.

3.5.2.5 Amphibians and Reptiles

Seven species of amphibian and 15 species of reptile potentially occur within the affected environment. These species are year-round residents. Amphibians are restricted to moist habitats, whereas reptiles have a greater tolerance for a variety of dry and wet habitats. During the winter, all of the amphibian and reptile species hibernate. Many reptiles gather in communal overwintering sites known as *hibernacula*. Conserving these rare hibernacula is essential to maintaining a significant proportion of the reptile population in a given area.

Four amphibian species—bullfrog (*Rana catesbeiana*), Pacific tree frog (*Hyla regilla*), Great Basin spadefoot (*Spea intermontana*), Woodhouse's toad (*Bufo woodhousii*)—are known to occur within the existing MOA complex and would be expected to occur in suitable habitat in the expansion areas. The bullfrog is native to eastern North America, but has invaded many areas of the west. Its range expansion may be partially to blame for the decline of native frog species. The bullfrog and Pacific tree frog are mostly limited to riverine systems in canyon bottoms or wetlands. The Great Basin spadefoot, and Woodhouse's toad are adapted to arid conditions and might occur in both wetland and upland environments.

Populations of an additional amphibian species, Columbia spotted frog (*Rana luteiventris*) have been found in several areas of the Nevada eastern expansion area (Columbia Spotted Frog Technical Team 2006). This frog is a candidate species for listing under the Endangered Species Act. This species is also found near lakes, ponds, marshes, and slow-moving streams in eastern Oregon. Fifteen reptile species (seven snakes and eight lizards) that have habitat within the existing MOA complex are expected to occur within the expansion areas. The gopher snake (*Pituophis melanoleucus*), racer (*Coluber constrictor*), western fence lizard (*Sceloporus occidentalis*), sagebrush lizard (*Sceloporus graciosus*), and western rattlesnake (*Crotalus viridis*) are widespread and are considered common throughout the MOA complex. The western garden snake (*Thamnophis elegans*) is limited to riparian or wetland areas. The western whiptail lizard (*Cnemidophorus tigris*), long-nosed leopard lizard (*Gambelia wislizenii*), and desert horned lizard (*Phrynosoma platyrhinos*) are commonly found in sandy or sandy loam soils. The night snake (*Hypsiglena torquata*), striped whipsnake (*Masticophis taeniatus*), western ground snake (*Sonora semiannulata*), rubber boa (*Charina bottae*), western skink (*Eumeces skiltonianus*), and short-horned lizard (*Phrynosoma douglassii*) are more limited in their distributions and would be considered locally uncommon or rare (Air Force 1998). Neither Oregon nor Nevada appears to actively monitor populations of these reptile species.

3.5.3 Vegetation

Vegetation includes terrestrial plants and plant communities, plant species of concern, and weed species of concern. A plant community is a combination of plants that depend upon and modify their environment, and influence each other. Together with their common habitat, microclimates, and associated organisms, communities form an ecosystem, which in turn is influenced by neighboring ecosystems and the climate of the region.

Dominant landscape features of the Proposed Action area include rolling plateaus, low buttes, and incised canyons. Land within MHRC MOAs lies within the regional landform and vegetation classification known as the Intermountain Sagebrush Province/Sagebrush Steppe Ecosystem (Bailey and Kuchler 1996), which is widespread over much of southern Idaho, eastern Oregon, eastern Washington, and portions of northern Nevada, California, and Utah. This ecosystem contains a large diversity of landforms and vegetation types, ranging from the vast expanses of flat sagebrush-covered plateaus to rugged mountains blanketed with juniper woodlands and grasslands.

Elevation within the proposed expansion area ranges from approximately 5,000 to well over 10,000 ft above sea level. Vegetation types represented within this area include salt desert scrub, black sagebrush, low sagebrush, basin big sagebrush, Wyoming big sagebrush, mountain big sagebrush, bitterbrush, rabbitbrush, mountain shrub, aspen, coniferous forest, Utah and western juniper, bunchgrass or forbland, and areas of agriculture. Additional land cover includes dunes, barren/rock/lava, exotic species, marsh/wetland areas, open water, wet meadow, riparian, and a small percentage of snow/ice (Bruneau Subbasin Assessment 2004).

Proposed airspace changes to the MOA complex would not affect vegetation. The use of training materials such as rockets or chaff are not part of the Proposed Action or Alternatives, and as such, no ground disturbance would occur. Because no ground disturbing activities are proposed, no further analysis of this resource was conducted.

3.5.4 Fish

A variety of fish species can be found in the project vicinity. These include leatherside chub (*Gila copei*), white sturgeon (*Acipenser transmontanus*), Shoshone sculpin (*Cottus greenei*), interior redband trout (*Oncorhynchus mykiss gairdneri*), bull trout (*Salvelinus confluentus*), and Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*).

Few studies have evaluated the effects of aircraft noise on fish. Sonic booms apparently caused no change in rainbow trout blood stress indicators and "very slight" reactions to the noise (Manci et al. 1998). Rainbow trout, cutthroat trout, and Chinook salmon eggs showed no mortality increases from sonic boom vibrations compared to eggs not exposed to the noise (Manci et al. 1988). Based on this limited research, no effects are expected to fish species in the project area due to periodic, infrequent, and small increase in noise in the expanded MOA area. No further analysis of this resource was conducted.

3.5.5 Species with Conservation Status

Species with Conservation Status include a variety of organisms that appear on agency lists and are considered important. These status species range from threatened or endangered species to game species of special concern. Threatened and endangered species include plants and animals that are rare and have federal protection under the Endangered Species Act of

1973 (ESA). Protection of federally listed species under the ESA is the responsibility of U.S. Fish and Wildlife Service (USFWS). In addition to threatened and endangered species, the USFWS maintains a list of species that are candidates and proposed candidates for listing. While candidate and proposed candidate species do not have protection from the full force of the ESA, the USAF manages their activities to avoid significant impacts to candidate or proposed candidate species.

In addition to federally-listed species, each state determines the status of species that are rare or declining within their own state boundaries. State species of concern can include game species that are abundant in some portions of the state, but exist in low numbers or have declining populations in other portions of that state. For this EA, state-listed species for Nevada and Oregon are considered. The EA also encompasses large areas that are managed by federal agencies, including BLM lands and Forest Service lands. Each federal agency is responsible for determining a list of special-status species on their lands and for protecting those species from further population declines.

Laws protecting wildlife include, but are not limited to, the Bald Eagle Act of 1940, which protects eagles and hawks, the Migratory Bird Treaty Act of 1972, which protects neo-tropical migrant birds, and the ESA. Raptors have statutory protection from indiscriminate killing under the Federal Migratory Bird Treaty Act. Eagles are also protected under the Federal Bald and Golden Eagle Protection Act.

Many plant species with conservation status in the three-state area are under the proposed air space change; however, effects discussed in this EA are the result of expansion of the MOA airspace only. No changes to plant species with conservation status are anticipated. No changes in operations and no construction activities are proposed and so would not affect vegetation resources.

Table 3.3 lists all protected and sensitive wildlife species with conservation status having the potential to occur within the proposed project area. The table includes species' ranking under the ESA (USFWS 2006), and BLM designations, habitat notes, and the potential for impact. A discussion of species with conservation status that may be potentially impacted by the proposed MOA expansion follows the table. Species without the potential for impact will not be addressed. Table 3.3 shows the federally listed and candidate species identified by the U.S. Department of Interior Fish and Wildlife Service, Nevada office (USFWS 2006) as having the potential to occur in the project area. These include bull trout, Lahontan cutthroat trout, yellow-billed cuckoo, and Columbia spotted frog.

TABLE 3.3
Protected and Sensitive Animal Species That Are Known to Occur or That Are Expected to Occur Based on Known Distribution and Suitable Habitat within the Expansion Area

Common Name	Species Name	Species Status[1]	Habitat Description	Known Occurrence and/or Potential Habitat In or Near Expansion Areas	Potential Impacts to Species or Habitat from Proposed Project
Invertebrates					
California floater	*Anodonta californiensis*	Nevada BLM Sensitive	Shallow areas with soft substrate in clean, clear lakes, ponds and large rivers.	Yes	No
Fish					
Bull trout (Jarbidge River Distinct Population Segment)	*Salvelinus confluentus*	ESA Threatened	Jarbidge River in southern Idaho and northern Nevada supports a migratory population of bull trout.	Yes	No
Interior redband trout	*Oncorhynchus mykiss gairdneri*	Nevada BLM Sensitive	Perennial streams including Bruneau and Jarbidge rivers. Rare in most of the Owyhee River, but common in Red Canyon Creek where spawning occurs	Yes	No
Lahontan cutthroat trout	*Oncorhynchus clarki henshawi*	ESA Threatened	The current distribution is broken into small, reproductively isolated groups generally restricted to small streams and reaches, often in isolation.	Yes	No
Amphibians & Reptiles					
Northern leopard frog	*Rana pipiens*	BLM Sensitive	Permanent, slow-moving water with aquatic vegetation such as marshes.	Yes	No
Columbia spotted frog (Great Basin Distinct Population Segment)	*Rana luteiventris*	ESA Candidate	In or near cold, slow moving streams, springs or marshes, ponds and small lakes where emergent vegetation is relatively sparse.	Yes	No
Western toad	*Bufo boreas*	BLM Sensitive	Widespread, but typically near moist or wet areas.	Yes	No
Mojave black-collared lizard	*Crotaphytus bicinctores*	BLM Sensitive	Typically rocky arid areas or deserts with sparse vegetation.	Yes	No

TABLE 3.3
Protected and Sensitive Animal Species That Are Known to Occur or That Are Expected to Occur Based on Known Distribution and Suitable Habitat within the Expansion Area

Common Name	Species Name	Species Status[1]	Habitat Description	Known Occurrence and/or Potential Habitat In or Near Expansion Areas	Potential Impacts to Species or Habitat from Proposed Project
Longnose snake	*Rhinocheilus lecontei*	BLM Sensitive	Dry, often rocky, grassland and sagebrush steppe.	Yes	No
Western groundsnake	*Sonora semiannulata*	BLM Sensitive	Rocky, dry sagebrush steppe and grasslands, often near moist areas or wetlands.	Yes	No
Birds					
Bald eagle	*Haliaeetus leucocephalus*	BLM and FS Sensitive	Nest in mature forests and large trees near open water in areas with a large prey base. Winters in areas with open water or areas with substantial big game winter die off. Roost in large mature trees.	Yes	No
Ferruginous hawk	*Buteo regalis*	BLM and FS Sensitive	Flat and rolling grasslands and shrub steppe with buttes or trees for nest structures.	Yes.	No
Northern goshawk	*Accipiter gentiles*	FS Sensitive	Dense coniferous and mixed forest. Nest in mature and old-growth forest of mixed tree species, often near riparian or aspens stands.	Limited areas of suitable habitat in the Eastern Nevada Expansion Area	No
Peregrine falcon	*Falco peregrinus*	BLM and FS Sensitive	Wide-ranging over open landscapes such as grasslands and sagebrush steppe. Nest sites are typically on cliffs associated with river canyons.	Yes	No
Prairie falcon	*Falco mexicanus*	BLM Sensitive	Arid or semi-arid plains and open country where it typically nests on rock cliffs.	Yes	No
Western burrowing owl	*Speotyto cunicularia*	BLM Sensitive	Inhabits dry, open grasslands where it nests in burrows excavated by mammals, usually badger (*Taxidea taxus)*, ground squirrel (*Spermophilus* spp.), or coyote (*Canis latrans*).	Yes	No

TABLE 3.3
Protected and Sensitive Animal Species That Are Known to Occur or That Are Expected to Occur Based on Known Distribution and Suitable Habitat within the Expansion Area

Common Name	Species Name	Species Status[1]	Habitat Description	Known Occurrence and/or Potential Habitat In or Near Expansion Areas	Potential Impacts to Species or Habitat from Proposed Project
Sage grouse	*Centrocercus urophasianus*	BLM Sensitive	Requires sagebrush, especially for nesting and brooding. Broods need diverse forbs mixed with grass as well. Courtship occurs in open areas called leks in spring. Low flying planes can disrupt courtship.	Yes	No
Columbia sharp-tailed grouse	*Tympanuchus phasianellus*	BLM Sensitive	Mountain and foothills shrub communities of serviceberry, snowberry, chokecherry, and Gambel oak; sagebrush-grassland; and willow riparian habitats. Courtship occurs on open ridges or knolls.	Suitable habitat exists	No
Mountain quail	*Oreortyx pictus*	BLM Sensitive	Nests in shrub-dominated communities such as brushy draws or riparian thickets.	Yes	No
White-faced ibis	*Plegadis chihi*	Nevada Species of Conservation Priority	Forage in marshes or swamps, or near ponds or rivers. Construct nests on the ground or low in trees or shrubs in marshes or riparian areas. White-faced ibis nesting colonies are patchily distributed.	Yes	No
Loggerhead shrike	*Lanius ludovicianus*	BLM Sensitive	In shrub-steppe habitat, they nest in big sagebrush, antelope bitterbrush, and greasewood. Nest sites have greater shrub canopy, taller shrubs, and less annual grass cover than unoccupied sites.	Yes	No
Brewer's sparrow	*Spizella breweri*	BLM Sensitive	Sagebrush obligate. Nest in sagebrush stands.	Yes	No
Sage sparrow	*Amphispiza belli*	BLM Sensitive	Sagebrush obligate. Nest in sagebrush stands.	Yes	No
Grasshopper sparrow	*Ammodramus savannarum*	BLM Sensitive	Prairies, grasslands, and open sagebrush-grasslands with herbaceous cover and not too many shrubs.	Yes	No
Bobolink	*Dolichonyx oryzivorus*	BLM Sensitive	Open grasslands, pastures or hayfields.	Yes	No
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	BLM Sensitive	Cattail marshes for nesting.	Potential habitat	No

TABLE 3.3
Protected and Sensitive Animal Species That Are Known to Occur or That Are Expected to Occur Based on Known Distribution and Suitable Habitat within the Expansion Area

Common Name	Species Name	Species Status[1]	Habitat Description	Known Occurrence and/or Potential Habitat In or Near Expansion Areas	Potential Impacts to Species or Habitat from Proposed Project
Yellow-billed cuckoo (Western US Distinct Population Segment)	*Coccyzus americanus*	ESA Candidate	Riparian areas with dense willows combined with mature cottonwoods. Also known to use wooded parks, cemeteries, tree islands, Great Basin shrub-steppe, and high elevation willow thickets.	Marginal or fragmented habitats. Mary's River has best potential habitat.	No
Lewis' woodpecker	*Melanerpes lewis*	BLM and FS Sensitive	Mature cottonwood riparian zones and woodlands or burned conifers for nesting.	Yes	No
Red-naped sapsucker	*Sphyrapicus nuchalis*	BLM Sensitive	Coniferous or deciduous forests that include aspen or cottonwood.	Yes	No
Mammals					
Fringed myotis	*Myotis thysanodes*	BLM and FS Sensitive	Old growth forest with mature snags for roosts and nurseries.	Yes	No
Long-eared myotis	*Myotis evotis*	BLM Sensitive	Forage over sagebrush and rocky slopes in the Owyhee and Jarbidge area (Doering and Keller 1998).	Yes	No
Long-legged myotis	Myotis volans	BLM Sensitive	Forage close over sagebrush and rocky slopes in the Owyhee and Jarbidge area (Doering and Keller 1998).	Yes	No
Big Brown Bat	*Eptesicus fuscus*	BLM Sensitive	Forage in riparian willow areas in the Owyhee-Jarbidge area (Doering and Keller 1998).	Yes	No
Spotted Bat	*Euderma maculatum*	BLM Sensitive	Roost in canyon walls, forage over sagebrush near riparian areas in the Owyhee-Jarbidge area with highest density along Mary's Creek (Doering and Keller 1998).	Yes	No
Townsend's Big-eared Bat	*Corynorhinus townsendii*	BLM and FS Sensitive	Found in the Bruneau Jarbidge River canyon complex foraging over sagebrush stands near riparian zones (Doering and Keller 1998).	Yes	No

TABLE 3.3
Protected and Sensitive Animal Species That Are Known to Occur or That Are Expected to Occur Based on Known Distribution and Suitable Habitat within the Expansion Area

Common Name	Species Name	Species Status[1]	Habitat Description	Known Occurrence and/or Potential Habitat In or Near Expansion Areas	Potential Impacts to Species or Habitat from Proposed Project
Yuma Myotis	*Myotis yumanensis*	BLM Sensitive	Preferred foraging areas in the Owyhee-Jarbidge area appears to be over water, especially river slackwater (Doering and Keller 1998).	Yes	No
Dark kangaroo mouse	*Microdipodops megacephalus*	BLM Sensitive	Basin shrub habitats with sandy or gravelly substrates.	Potential habitat	No
Pygmy rabbit	*Brachylagus idahoensis*	BLM Sensitive	Sagebrush cover with deep soils.	Yes	No
Kit fox	*Vulpes macrotis*	BLM and FS Sensitive	Desert and arid habitats, typically in sagebrush or juniper habitats.	Yes	No
California bighorn sheep	*Ovis canadensis californiana*	BLM Sensitive	Semi-open, precipitous terrain with rocky slopes, ridges, and rugged canyons. Forage, water, and escape terrain are the most important components of bighorn sheep habitat.	Yes	No

3.5.5.1 Sage Grouse

Sage Grouse are an example of a game species with conservation status. Sage grouse are hunted in Idaho, Oregon, and Nevada. All large expanses of sagebrush are potential sage grouse (*Centrocercus urophasianus)* habitat or transit areas. Sage grouse also occur in mosaics of sagebrush, grasslands, and aspen, but not in woodland habitats. Males display on leks in gatherings of a few to a few hundred birds; leks are used exclusively for display and mating. They are in open areas surrounded by sagebrush or where sagebrush density is low—often ridges and knolls. The grouse nest in shallow ground nests lined with grass and sage leaves. Grouse benefit from restoration of native forb and perennial bunchgrass communities, and from maintenance of patches of tall and dense big sagebrush within sagebrush shrublands.

Multiple sage grouse leks have been identified (Wilson, pers. comm., 2007) south and east of DVR. These lek areas are bisected by the current Paradise East diagonal boundary with the most southern and eastern portions of lek habitat occurring under the proposed lateral expansion of the Paradise East MOA. Wildfires in both 2006 and 2007 destroyed additional acres of sagebrush habitat, especially in the eastern Nevada expansion area on BLM lands. The expansion area is one of the areas of northeastern Nevada where sage grouse had already been facing severe challenges from increasing invasion of exotic species (cheatgrass) and a devastating fire cycle in 1999-2000 that destroyed 1.6 million acres of range, much of it prime mule deer and sage grouse habitat (Western Governors' Association and USDA-NRCS 2004). Since 1994, NDOW has implemented restoration work on nearly 40,000 acres in the western portion of the Elko County where the wildfire and cheat grass issue has impacted nearly 90 percent of historic deer winter range in one mule deer management area. Almost all of this project work is within historic or existing sage grouse habitat. The overarching goal of many of these projects is to reestablish sagebrush in areas where wildfires have effectively eliminated this essential element of mule deer and sage grouse habitat. Sage grouse can still be legally hunted in Nevada.

Sage grouse populations in Oregon have been declining since 1957. Remaining sage grouse populations are present in the expansion area (www.dfw.state.or.us/wildlife/sagegrouse/pdf/section_3.pdf - 2005-08-23).

3.5.5.2 California Bighorn Sheep

California Bighorn Sheep are another example of a game species that has conservation status, and is hunted in Idaho, Oregon, and Nevada. California bighorn sheep prefer rugged, open habitat that provides high visibility of their surroundings. Cliffs, rimrock, and rocky outcrops provide important habitat components for bighorn sheep survival. These habitats are particularly important for lambing and escape from predators (ODFW 2006c). Grasses are a staple in the bighorn's diet through most of the year. Forbs and shrubs are of seasonal importance depending on type and availability. Bighorn sheep do not normally use tree cover to the extent that deer or elk do, but it is not unusual to find them seeking shade under conifers, juniper, or mountain mahogany where available.

Water is an essential requirement of bighorn sheep and in some cases may limit their distribution, especially in southeastern Oregon (ODFW 2006c). Other limiting factors for bighorn sheep include habitat degradation, disease, predation, and competition for forage with livestock (Klott 1996). Off-road vehicles, historic poaching, drought, disease transmitted from domestic sheep, and mountain lion predation are believed to be major factors that have depressed bighorn sheep populations to a sensitive level.

In Nevada, aerial surveys were conducted for California bighorn in virtually all occupied ranges during 2006 (Cox et al. 2007). An intensive aerial survey was conducted in the Santa Rosa Mountain Range in Unit 051, which is within the western Nevada expansion area during this survey because of concerns related to the health of recently transplanted sheep in the Martin Creek Drainage. All three subpopulations were surveyed and relatively good samples were obtained. This survey found 125 sheep with high ram and lamb ratios indicating that concerns about the health of this population were unfounded. Based on recent surveys in the Santa Rosas the NDOW believes that this population is rebuilding from a significant die-off that occurred fall-winter 2003 (Cox et al. 2007). Although some areas of Nevada have been closed to hunting, total numbers for Nevada have been increasing. Bighorn sheep numbers appear to be stagnant in the eastern expansion area in Nevada (Cox et al. 2007). This may be a result of fires that burned through Rock Creek Gorge and Black Mountain areas. Since these areas were considered to be in good ecological conditions prior to the 2006 fires, the NDOW believes they will recover and provide good habitat for California bighorn sheep in the relatively near future.

California bighorn sheep were extirpated from Oregon by 1945. The ODFW begin to transplant the species back to historic habitats in the Upper Owyhee Canyon in 1983. As a result, several hundred bighorn sheep now live in or near the proposed Oregon expansion area (ODFW 2006c).

3.6 Cultural Resources

Cultural resources include "historic properties" as defined in the National Historic Preservation Act (NHPA), Title 16. United States Code, section 470, et seq., (16 U.S.C. §470, et seq.; "cultural items" as defined in the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. §§3001-3013; "archaeological resources" as defined in the Archaeological Resources Protection Act (ARPA), 16 U.S.C. §§470aa-470mm; and "sacred sites" as defined in Executive Order (E.O.) 13007, Indian Sacred Sites, May 24, 1996. Cultural resources are often generally referred to as "heritage resources." "Historic properties" are cultural resources that are eligible for listing to the National Register of Historic Places (National Register).

In general, cultural resources are evidence of past human activity, and both the physical remains of and knowledge about past human activity. These may include prehistoric artifacts; prehistoric village sites or objects; rock inscription; human burial sites or earthworks; pioneer homes, buildings, old roads and trails; or structures with unique architecture. Cultural resources are nonrenewable resources that often yield unique information about past societies and environments, and provide answers for modern day social and conservation problems. Although many have been discovered and protected, numerous undiscovered or unprotected cultural resources remain to be identified. Cultural resources are managed for the long-term benefits of all Americans.

Over the years, a variety of legislation has been passed to protect cultural resources. These regulatory documents are discussed below. The National Historic Preservation Act of 1966 (NHPA), as amended, protects historic and archaeological properties during the planning and implementation of federal projects. The Native American Graves Protection and Repatriation Act (NAGPRA) established regulations to protect American Indian burials and sacred items. The Archaeological Resources Protection Act (ARPA) makes it illegal to excavate or remove any archaeological resources from federal or Indian lands without a permit. It also provides for criminal penalties for the vandalism, alteration, or destruction of historic and prehistoric sites on federal and Indian lands, as well as for the sale, purchase, exchange, transport, or receipt of any archaeological resource if that resource were excavated or removed from public lands or Indian lands or were in violation of state or local law. The American Indian Religious Freedom Act (AIRFA) protects and preserves traditional Native American spiritual beliefs and practices by providing access to sites and providing for the use and possession of sacred objects.

Presidents have issued several Executive Orders (EOs) to protect heritage cultural resources. EO 12875 provides direction to federal agencies to enhance intergovernmental partnership to encourage government-to-government relations with American Indians. EO 13007 requires federal agencies to accommodate access and ceremonial use of sacred sites and to avoid adverse effects on the physical integrity of these sites. EO 13007 also requires federal agencies to protect and make accessible Indian sacred sites on public lands for Indian religious practitioners.

Traditional Cultural Properties (TCPs) are defined by the National Park Service (NPS) as properties that are eligible for inclusion in the National Register of Historic Place (NRHP) because of an association with cultural practices or beliefs of a living community that: 1) are rooted in that community's history; and 2) are important in maintaining the continuing cultural identity of the community. Currently, no TCPs are known to exist within the proposed expansion area. Identification of TCPs depends primarily on consultation with the people who value the resource and require the resource to maintain their spiritual or cultural beliefs within the Area of Potential Effect (APE).

Native American sites recorded in the proposed expansion area are diverse in type and include: hunting/gathering base camps, lithic scatters, rock shelters, hunting blinds, rock alignments, a game drive facility, petroglyph panels, quartzite quarry, plant processing/ short term camps, rock cairns, and pot shards scatters.

Euro-American sites are also diverse in type and include mining, roads, ditches, camp/dumps, trash scatters, mine adit, mining cabin, arboglyphs, sheepherders camps, Chinese placer mining sites, mill remains, placer mining townsite, structures, ranger station, stamp mill, ranch, placer mining ditches, mineral exploration, prospect pits, claim marker, cemetery, driveline, residential area, gold/silver mill, dugout, homestead, and rock cairns.

The total area found underneath the Proposed Action and Alternatives area includes 1,916,552 acres of land in Nevada, and Oregon. File searches were conducted for Oregon and Nevada and areas in Idaho bordering Oregon and Nevada. A total of 573 documented projects have been conducted in this area covering 228,180 acres or about 12 percent of the total area of the project. Within the surveyed areas, 1,110 sites were recorded. Of these sites, 799 of the sites are prehistoric, 311 of the sites are historic, and 50 of the sites have both prehistoric and historic components.

The NRHP was also reviewed for this project and six listings were found: five in Nevada and one in Idaho. The five listings in Nevada include the Adorno Station located in Winnemucca;

the Micca House, Paradise Valley Guard Station, and the Silver State Flour Mill located in Paradise Valley; and the Gold Creek Ranger Station near Mountain City. In Idaho, Camp Three Forks, a military installation near Silver City, is listed on the NRHP.

Because of the large amount of acreage covered by the Proposed MOA Expansion Area, only 12 percent of the area has been documented through cultural resources surveys. In the areas that have been surveyed, there are four areas that have a high percentage of site density.

The first area is located north of Elko, Nevada.
The second area is located north and east of Elko, Nevada
3. The third area is located in the Little Humboldt River watershed in Nevada.
4. The fourth area is located north of Paradise Valley, Nevada.

Cultural resources effects are not expected with implementation of the Proposed Action or Alternatives. This is because:

- No ground disturbing activities would be conducted.
- No TCPs have been identified which would be disturbed by noise.
- No new flight disturbances would occur over the Fort McDermitt Reservation, as Military Training Route (MTR) IR300 passes directly over the Reservation. Aircraft are authorized to go down to 100 ft AGL in that area while on MTR IR300, although most stay above 500 ft AGL. No complaints have been received by the USAF due to this activity. The expanded MOA would have planes flying at a higher altitude than 500 ft, presumably which would also not disturb the cultural resources on the Reservation.

3.6.1 Compliance with the NHPA as Amended

All Alternatives comply with NHPA guidelines. Although there are historic properties located with the proposed MOA Expansion Area, there will be no ground disturbing activities associated with the high and low altitude training exercises therefore there would be no potential for impact. Compliance would result in no historic properties affected.

3.6.2 Executive Orders Pertaining to the Consultation and Coordination with American Indian Tribal Governments

The project complies with EOs and would be subject to government-to-government consultation with federally recognized tribes during planning and prior to implementation activities.

3.7 Coastal Zone or Resources, Wetlands, and Floodplains

No coastal zones or resources exist in the project area. Floodplains are present adjacent to major rivers and streams in the project area. In arid environments, wetlands are critical resources for the survival of many wildlife species and represent a unique biotic ecosystem for a variety of plant and invertebrate species. Wetlands perform physical and chemical functions essential for the health of an ecosystem, including surface and subsurface storage of water, microbial processing, and organic carbon export, among others (Air Force 1998).

Coastal, floodplain, and wetland resources would not be affected by the Proposed Action or Alternatives, because no construction or ground-disturbing activities are proposed with this project. No further analysis of these resources was conducted.

Wetland delineation has been evaluated in the proposed expansion area (USGS 2007). Wetland components within the area are predominantly vegetated, water, and playa areas (Figure 10). Those classified as vegetated areas occur in primarily perennial riparian areas, and in flood plains that are likely to be seasonal or ephemeral in nature, supporting wildlife during spring breeding and nesting activities.

3.8 Environmental Justice

EO12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, issued in 1994, requires federal agencies to address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks (Protection of Children),* issued in 1997, directs federal agencies to identify and assess environmental health and safety risks that may disproportionately affect children.

For this analysis, Census County Divisions (CCDs) were compared to county-wide data to more accurately depict the ethnic characteristics, age profile, and income level of the population in the project area (Table 3.4). Counties are subdivided into CCDs along visible geographic features.

Military Training Route (MTR) IR300 passes directly over the Fort McDermitt Reservation. Aircraft are authorized to go down to 100 ft AGL in that area while on MTR IR300, although most stay above 500 ft AGL. No complaints have been received by the USAF due to this activity. The existing flight level floor of 14,500 ft MSL for the Paradise West MOA—in which the Fort McDermitt Reservation resides—would be lowered to 10,000 ft MSL or 3,000 ft AGL, whichever is higher. Neither 10,000 ft MSL nor 3,000 ft AGL would put aircraft below the level at which they currently operate around Fort McDermitt Reservation.

The four CCDs that contain the majority of the expanded MOA have populations of children age 14 or younger that range from 16.7 percent in the Jarbidge CCD to 25 percent in the McDermitt CCD (Table 3.4). All four CCDs have a smaller percentage of children under 14 than their respective county as a whole. The proposed airspace expansion would not have a disproportionate effect on this segment of the population.

Table 3.4 also addresses the percentage of individuals living below the U.S. poverty level in the affected counties. The poverty levels range from 8.9 percent of individuals in Elko County to 18.6 percent in Malheur County.

The proposed expansion of the airspace is likely to result in a reduction in the concentration of flights over any one location and would not result in disproportionately high or adverse human health or environmental effects to minority populations or children. Therefore, no further analysis of this resource was conducted.

Insert Figure 10 (front)

Figure 10 Wetlands (National Wetlands Inventory)

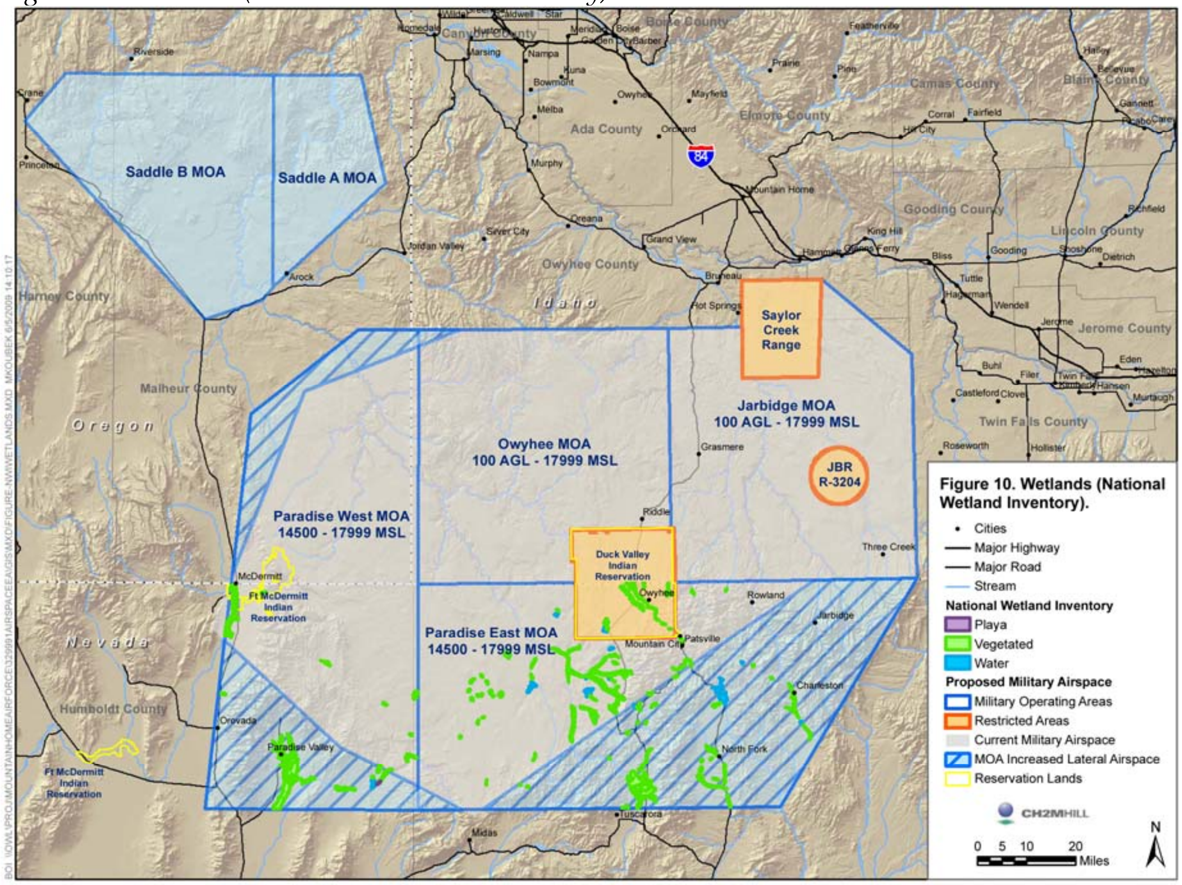

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TABLE 3.4
Ethnic and Age Distribution of Population in Census County Divisions (CCD) under Expanded MOAs compared to Whole County

	Elko County, NV			Humboldt County, NV		Malheur County, OR	
	Jarbidge CCD	**Mountain City CCD**	**Elko Co.- All**	**McDermitt CCD**	**Humboldt Co.- All**	**Jordan Valley CCD**	**Malheur Co.- All**
Total	**112**	**1,442**	**45,291**	**1,240**	**16,106**	**668**	**31,615**
White	98 (87.5%)	552 (38.3%)	37,159 (82%)	743 (59.9%)	13,401 (83.2%)	564 (88.9%)	23,959 (75.8%)
Black	0 (0%)	37 (2.6%)	287 (0.6%)	2 (0.2%)	82 (0.5%)	0 (0%)	387 (1.2%)
American Indian	4 (3.6%)	780 (54.1%)	2,400 (5.3%)	332 (26.8%)	647 (4%)	20 (3%)	322 (1%)
Asian	1 (0.9%)	6 (0.4%)	306 (0.1%)	3 (0.2%)	92 (0.6%)	3 (0.5%)	619 (2%)
Other	9 (8%)	67 (4.6%)	3,901 (8.6%)	161 (12.9%)	1,386 (8.6%)	51 (7.6%)	5520 (17.5%)
Children Under 14	19 (16.7%)	295 (20.5%)	12,129 (26.8%)	310 (25%)	4,187 (26%)	143 (21.4%)	7,249 (22.9%)
Percent of Individuals Under the Poverty Level	*N/A	*N/A	8.9%	*N/A	9.7%	*N/A	18.6%

Source: Bureau of the Census 2000.
*Poverty level is not reported at the CCD level as individuals, but numbers of families. Numbers of individuals are available only for the County level.

CCDs in the expansion area with major Native American populations are the Mountain City CCD in Nevada (54.1 percent), which contains a portion of the Duck Valley Reservation, and the McDermitt CCD (26.8 percent), which contains the Fort McDermitt Reservation. The percentage of other non-white ethnic groups range from 13.3 percent in the McDermitt CCD to 7.6 percent in the Mountain City CCD.

Both Fort McDermitt Reservation and the Duck Valley Reservation, where the highest percent of minority populations live, are within the current boundaries of Paradise East and Paradise West MOAs. The proposed airspace expansion in Oregon and Nevada would not have a disproportionate effect on these minority populations when compared to other areas within the proposed expansion.

The USAF entered into a Settlement Agreement with the Shoshone-Paiute Tribes of Duck Valley Reservation in 1996 in recognition that military training overflights may potentially impact Reservation residents. The Settlement Agreement sets flight level restrictions to reduce noise impacts inside the Duck Valley Reservation and would not be changed by the Proposed Action or Alternatives. The potential to move military aircraft operations farther from the DVR would result in less noise impacts on this population.

3.9 Physical and Socioeconomic Resources

3.9.1 Light Emissions

Light emissions are generated by flares and would be a part of the Proposed Action and Alternatives. See Sections 2.3.3, 2.4.3, 2.5.3, and 2.6.3. In the proposed airspace expansion area, flares are not currently deployed. Some of the projected 62,000 flares will be used in this area.

Light emissions from flares are unlikely to be disruptive to human or wildlife activities during daylight hours. Flares could be disruptive to night time activities and flare use would occur during some night operations. On average, Mountain Home AFB schedules night operations 167 times annually, with the majority of night operations occurring in winter months (November through February) to take advantage of earlier and longer darkness periods for training (Dauphinais 2008). As fewer people are likely to be recreating under the MOAs during winter, disruption of solitude values by light emissions from flares is likely to be insignificant for most of the year.

Aircraft training typically does not occur on weekends, so flare usage during summer months would be primarily limited to weekday, daylight hours, reducing the potential for light emission impacts on campers and summer recreationists who camp in larger numbers over weekends. The Proposed Action and Alternatives are unlikely to result in significant light emission impacts and no further analysis of this resource was conducted.

3.9.2 Safety

Safety issues include fire and flight safety considerations. Fire safety focuses on potential fire risks associated with aircraft accidents. Flight safety addresses the risk of aircraft mishaps and bird-aircraft strike hazards.

Aircraft flight activity, in and of itself, poses very little fire or ground safety risk. Concerns center on the potential for an aircraft accident resulting in fire. No aircraft accidents have occurred in or near the Paradise MOAs since 1998. The last two aircraft crashes in 1996 and 1998 did not result in a fire that spread beyond the immediate vicinity of the crashed aircraft. The location, intensity, and duration of wildfires caused by aircraft accidents are difficult to predict due to the specific and variable nature of aircraft accidents, weather conditions, vegetation type, and response time. Wildfire and emergency responders communicate through use of radios, cell phones, or satellite phones. In the event of a wildfire, military aircraft are generally removed from the affected area, and the area remains closed to military aircraft until such time as the fire is controlled, contained, or extinguished. Military aircraft exclusion prevents conflicts with aircraft tanker attacks on the fire, and prevents unsafe conditions for pilots and aircraft. Aircraft tanker attacks are coordinated with MHAFB Airspace Scheduling or Command Post. MHAFB has a Memorandum of Understanding (MOU) with the BLM for firefighting operations on USAF lands that includes communications procedures with Cowboy Control and the Range Control Officer. Outside of USAF lands, the BLM or other state, federal, tribal, or private landowner has firefighting responsibilities on lands it owns or manages. For protracted firefighting operations, BLM fire aviation sends out Temporary Flight Restrictions (TFR) for the affected area.

Fires from chaff and flare use are unlikely to occur in the expanded MOA airspace. Chaff does not typically cause fires as there is no incendiary component to chaff, although they may be ejected from the aircraft using a pyrotechnic device which remains on the aircraft. Flares are released at altitudes that ensure sufficient time to burn and cool before hitting the ground. When used anywhere except on the target area of SCR, flares are released no lower than 2,000 feet above the ground in accordance with a coordinated agreement with the BLM. This altitude is more than double the normally approved safe-release altitude designated by the Air Force for flare use over range impact areas (AFI 13-201-ACCSUP1-MOUNTAINHOMEAFBSUP1-2008). In accordance with the *Inter-Department Memorandum of Agreement among the Bureau of Land Management of Idaho, Nevada, and Oregon and Mountain Home Air Force Base, Idaho,* the following three agreements concerning flare usage are specified:

- The only approved aerial flares by any military aircraft (i.e., Army, Navy, Marine, Air Force, National Guard, Reserve) will be MJU-7 and M-206 flares. These flares totally burn up in less than 400 feet (approximately four seconds). The only failure experienced has been the failure of the cartridge to fire from the aircraft (one percent probability), in which case the flare remains in the aircraft.
- The minimum altitude for flare use in the MOAs will be 2,000 feet AGL in the Owyhee and Jarbidge MOAs, and 14,500 MSL in the Paradise East and Paradise West MOAs.
- No flare will be dropped or used in MTRs outside MOAs (Air Force 1998).

No flare started fires have been reported in Owyhee and Jarbidge MOAs. No fires caused by flares are expected from the Proposed Action or Alternatives based on the lack of flare started fires in the Jarbidge and Owyhee MOAs when released at altitudes above 2,000 feet AGL. Deploying flares in the Paradise East and West MOAs will not result in fires when released at 3,000 feet AGL or above.

Under the Proposed Action or Alternative D, in order to deploy flares at 3,000 feet AGL, the Memorandum of Agreement with the BLM would need to be reaccomplished to change the altitude at which flares could be released in the Paradise East and West MOAs.

Flight safety addresses the potential for aircraft accidents. Such mishaps may occur as a result of mid-air collisions, collisions with manmade structures or terrain, weather related accidents, mechanical failure, pilot error, or bird-aircraft strike. Projections for potential aircraft accidents are based on historical information regarding mishaps at all installations, and under all conditions of flight. The military calculates Class A mishap (loss of life, destruction of an aircraft, and total cost of more than $1 million) rates per 100,000 flying hours for each type of aircraft in the inventory (Air Force 1998). The average mishap rate for ACC for the period 2002 through 2006 is 2.38 (ACC Office of Safety 2007) (Table 3.5).

TABLE 3.5
Potential for Aircraft Accidents

	FY02	FY03	FY04	FY05	FY06
ACC Mishaps	10	12	5	12	4
ACC Mishap Rate	2.52	3.23	1.34	3.62	1.20

The Class A Mishap rate for MHAFB for the same time period was 2 Class A Mishaps per 100,000 flying hours = 0.00002 (366 FW Safety). Secondary effects of an aircraft crash include the potential for environmental contamination. The potential for contamination is dependent on the porosity of the surface soils, geologic structure of the region, and the location and characteristics of surface and groundwater in the area, which will determine the speed, direction, and extent of contamination associated with the aircraft accident.

Bird-aircraft strikes constitute a safety concern because of the potential for damage to aircraft or injury to aircrews or local populations if an aircraft crash should occur in a populated area. Aircraft may encounter birds at altitudes generally up to 13,000 feet AGL or higher. However, most birds fly close to the ground; 75 percent of songbirds migrate between 500 and 2,000 feet (Smithsonian Migratory Bird Center 2007). More than 95 percent of reported bird strikes occur below 3,000 ft AGL. The potential for bird-aircraft strikes is greatest in areas used as migration corridors or where birds congregate for foraging or resting.

No change to existing sortie operations would occur in the MOA complex expansion. Because additional sorties are not included in the Proposed Action or Alternatives, no increases in fire risk, flight risk, or bird strike risk are anticipated under the Proposed Action or Alternatives. In addition, the lower flight floor of the Proposed Action and Alternatives does not go below 3,000 ft AGL and remains above typical bird migration altitudes. As no increases in sortie numbers or intrusion into typical bird flight altitudes within bird migration zones are proposed, no further analysis of this resource was conducted.

3.9.3 Water Resources, Water Quality, Soils and Natural Resources and Energy Supply

Precipitation in the proposed expansion area ranges from below 10 inches in the low desert regions to nearly 30 inches annually in the higher elevations. Snotel data at Granite Peak in the Santa Rosa-Paradise Peak Wilderness Area range from a low of 19.4 inches to a high of 59.2 inches of snow for the twenty-five year period between 1981 and 2006, for an average annual snowfall of 32.7 inches. Lamance Creek, on the east side of this range, saw a range of 15.8 inches to 58.4 inches for an average annual snowfall of 28.6 inches. These numbers are typical of the range of annual snowfall in the higher elevations within the study area (Western Regional Climate Center 2007).

In the Jarbidge Wilderness Area, the northern drainages empty into the Snake River Basin and eventually into the Pacific Ocean, where the southern drainages exit to the south and east into the Great Basin and have no outlet. Primary drainages include Fall, God's Pocket, Cougar and Robinson creeks, and the main and East Fork Jarbidge rivers to the north. To the east, the Jarbidge Wilderness Area is drained by Canyon, Cottonwood, and Camp creeks and their tributaries and to the south by Mary's River and Dry, Willow, and Coyote creeks (USFS 2007).

Drainages in the Santa Rosa–Paradise Peak Wilderness Area include, on the west, Wood Canyon, Antelope, Dog, Pine, and Andorno creeks from north to south. Draining the east side of the range, north to south, are Mullinix, Big Cottonwood, Dry, Little Cottonwood, Lamance, Hanson, and Singas creeks.

Energy consumption relative to use of the MOAs following expansion would be similar to that currently consumed. The number of sorties and training missions would remain the same, with similar type aircraft.

No changes in operations and no construction activities exist that would affect water or soil resources. Although aircrews are authorized to discharge flares and chaff with certain restrictions and specified altitudes, these conditions would prevent impacts to water, soil, or energy resources. It is not anticipated that additional fuel or energy supplies would be required to implement the Proposed Action or Alternatives. In summary, these resources would not be affected by implementation of the Proposed Action or Alternatives and have not been further assessed in this EA.

3.9.4 Hazardous Materials and Hazardous Waste Management, Pollution Prevention, and Solid Waste

Hazardous materials are identified and regulated under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA); the Occupational Safety and Health Act (OSHA); and the Emergency Planning and Community Right–to-Know-Act (EPCRA). The Resource Conservation and Recovery Act (RCRA) defines hazardous waste as any solid, liquid, contained gaseous or semisolid waste, or any combination of wastes that could or do pose a substantial hazard to human health or the environment. Waste may be classified as hazardous because of its toxicity, reactivity, ignitability, or corrosiveness. The airspace proposal to lower the floor of the MHAFB MOA complex and expand its lateral boundaries does not involve construction activities or appreciably change how the airspace would be utilized. No increase in the use of hazardous materials, production of hazardous wastes, or production of solid waste would be expected from implementation of the Proposed Action or Alternatives. No new activities would be introduced that would warrant further assessment; therefore, these resources have not been further assessed.

3.9.5 Socioeconomics

Socioeconomics is defined as the social and economic activities associated with the human environment, particularly population and economic activity. Economic activity typically includes employment, personal income, and industrial growth. Impacts on economic activity can influence other components such as housing availability and public services.

No significant impacts to social or economic activity in the Proposed Expansion Area would be expected from implementation of the Proposed Action or Alternatives; therefore, this resource has not been carried forward for further analysis.

3.9.6 Farmlands

Although there is some limited irrigated agriculture in the project area, most agricultural activities revolve around grazing. The primary reason for this emphasis on grazing is that most of the project area is owned by federal, state, or tribal governments. The largest landowner, the BLM, authorizes livestock grazing on most of its land through a grazing allotment program. Allotments shift seasonally. The H-TNF also allows some grazing on the lands it manages. Existing aircraft noise has not been known to disturb livestock under the existing MOAs, and is not expected to significantly disturb livestock in the expanded MOAs; therefore, no significant impacts to farmlands would occur. No further analysis of this resource was conducted.

3.10 Airspace Management and Use

3.10.1 Definition of Resource

The primary objective of airspace management is to ensure the best possible use of available airspace, to meet user needs, and to segregate any use needs that are incompatible with other airspace or land uses. The FAA manages U.S. airspace by constantly reviewing civil and military airspace needs to ensure that all interests are served to the greatest extent possible (Air Force 1998).

Airspace is regulated and managed through the use of flight rules, airspace use designations shown on aeronautical maps, and ATC procedures and separation criteria. These measures are also used to identify areas where activities are conducted that require separation of users, either within the airspace or on the underlying land (Air Force 1998).

Military MOAs, by definition, are separated from other types of airspace to conduct training operations such as air combat tactics, air intercepts, aerobatics, formation training, and low-altitude tactics. Within MOA structures, IFR non-participating aircraft are afforded separation from participating aircraft by Air Traffic Control. Aircraft operating under VFR are expected to exercise extreme caution while flying within a MOA when military activity is being conducted.

3.10.2 Status and Current Conditions

3.10.2.1 Military Operations

The current MHAFB MOA complex includes the Jarbidge MOA, Owyhee MOA, Paradise West MOA, and Paradise East MOA (totaling 7,501 square NM [Figure 1 in Chapter 1]). This training airspace includes the ATCAA between FL180 and 500 when it is made available by the Salt Lake Center. The existing MOA airspace floor is 14,500 ft MSL for the Paradise East and West MOAs and is 100 AGL for the Owyhee and Jarbidge MOAs. Charted exclusionary areas exist in the eastern portion of Paradise East, the northern portions of Owyhee and Jarbidge MOAs, and within 3 NM of the Grasmere Airport. Altitudes in these areas are below 2,000 feet AGL, 500 feet AGL, and 1500 feet AGL, respectively. Similar flight restrictions are implemented over Juniper Butte and Saylor Creek Ranges due to the type of activity occurring there. The MHRC contains a volume of approximately 49,285 cubic NM of training airspace.

On average, there are about 32 missions a day and approximately 10,400 sorties per year in the MHRC (Air Force 2007). The MHRC airspace is typically used in blocks of flying time: conventional flying blocks are 1.2 hours in duration, averaging 10 aircraft per block. Training blocks significantly increase in length and composition during Large Force Exercises (LFE) and surges. The number of aircraft operating simultaneously within the MHRC can range from two aircraft to more than 40 aircraft during a LFE. The duration and frequency of training activities within the MHRC varies upon the syllabus requirements for each squadron. Typically, three or four GCI-controlled air-to-air and air-to-surface missions occur per day. In addition, approximately eight missions that do not require GCI or GCI support typically fly each day. The number of aircraft for these types of training flights averages eight total aircraft. Currently, only one flight at a time can be conducted when mission requirements dictate land range ACT/TI mission set-ups (East/West Owyhee/Jarbidge) (Henderson 2006). Daily users in the MHRC include three squadrons from MHAFB (F-15Cs and F15Es) and four squadrons from Gowen Field (A-10s, C-130s, HH-60s, and Apache Attack Helos). Other types of aircraft that frequently use the range including B-52s, B-1s, EA-6Bs, KC-135s, KC-10s, and F/A-18s (Henderson 2006).

MHRC flying operations are limited to one LFE or two smaller air combat engagements at a time into the East/West engagement configuration, with a maximum initial separation distance between opposing forces of 60-70 NM. Supersonic operations are authorized above the Paradise MOAs in ATCAA airspace at or above 30,000 MSL and above 10,000 ft AGL in the Owyhee and Jarbidge MOAs. In accordance with the 1996 Settlement Agreement, supersonic operations are not conducted over DVR.

Air–to-air missions use the Owyhee and Jarbidge MOAs and overlying ATCAAs predominantly because of boundary layout and vertical limitations of the Paradise MOAs. Air-to-ground missions are conducted in the Jarbidge MOA, which contains Saylor Creek Air Force Range and Juniper Butte Range. Air refueling is typically done in the south portion of the MHRC using the Paradise East refueling anchor track or in the north portion of the Saddle using the Saddle refueling anchor track. Cowboy Control assists with overseeing and implementing de-confliction plans, ensuring safety of flight and making traffic advisory calls, as necessary (Henderson 2006).

The airspace in the immediate vicinity of the DVR includes the Owyhee and Paradise MOAs. This airspace is currently used by DVR for medical emergencies, tourism, and other reasons. If an emergency flight through this MOA airspace should be necessary while training operations are taking place, the flight can be conducted under VFR procedures and the pilot can notify MHAFB to ensure that training activities in the vicinity are halted or redirected. The 1996 Settlement Agreement included restrictions on military overflight activities in the airspace over the DVR below 15,000 ft AGL, military overflights within a 5 NM radius of the City of Owyhee, supersonic training, and the use of chaff and flares above the DVR (Air Force 1998).

MOA airspace is scheduled and managed through the MHAFB Airspace Scheduling Office on a daily basis, to coordinate mission requirements and squadron activities within the airspace. However, conflicts between training packages do occur (such as between flights entering and leaving the training area) because of the limitations in available airspace and the lack of schedule breaks among training activities required to complete training objectives. Some training flights show up early and stay late to maximize their training time within the MHRC. Frequency of these conflicts vary as a result of factors such as weather, early/late departures, scheduling overlap, mission changes, and length of the flying window. On average, approximately five conflicts occur each day that the MHRC is in use.

Non-participating aircraft are not restricted from operating within a MOA, even when military training is taking place. These non-participating flights can include general aviation aircraft operating under VFR, as well as IFR aircraft (general aviation or air carrier) that may be diverted into MHRC to avoid adverse weather. Flights of non-participating aircraft into the MOA complex can interrupt military training flights. According to Cowboy Control, the frequency of interruptions is seasonal in nature, with more interruptions during the warmer months of the year when transient nonmilitary flights are more frequent. During the months of November through April, interruptions occur an average of 2 to 3 times per week. From May through October, interruptions occur an average of 10 to 12 times per week. On weekends, when general aviation flights are generally more frequent (and MHRC would be expected to be unoccupied by training flights) there may be 5 to 6 interruptions in a single day if a National Guard Unit is training within the complex. If Cowboy Control identifies a potential safety of flight issue with a non-participating aircraft within the MOA complex, training operations are interrupted. Depending on the location and circumstances of the interruption, the FAA Air Route Traffic Control Center, in conjunction with Cowboy Control will decide whether the whole MOA complex or MOA sectors will go cold, including which altitudes are affected. For example, priority handling of an air ambulance may only require a limited area to go cold, while a situation such as a large scale weather system requiring numerous flight diversions may require the entire MOA complex to go cold. As noted below, some non-participating aircraft are not detected by Salt Lake Center or Cowboy Control because of factors such as limitations in radar coverage in the vicinity of MHRC. In this situation, military and non-participating flight crews would be responsible for avoiding each other through visual "see-and-avoid" techniques. In the ATCAA airspace above MHRC, all flights are IFR, but ARTCC diversions are possible during military training activities. Generally, only emergencies, minimum fuel, and air ambulance flights would be routed through the active ATCAA by Salt Lake Center, as coordinated with Cowboy Control.

When a military aircraft inadvertently departs the horizontal or vertical limits of a MOA into adjoining airspace during a training operation, the event is referred to as a "spillout." The safety concern with spillouts is that other aircraft would not expect these military aircraft maneuvering outside of the MOA, so see-and-avoid vigilance would not be as high as within the MOA, increasing the potential for collision. MHAFB had 209 spillouts in 2005 and 183 spillouts in 2006. In the event of an imminent spillout, a "whiskey alert" is issued by Cowboy Control to Salt Lake Center when the aircraft is no less than 2.5 miles from, but still within, the airspace boundary. In response to a whiskey alert, the military aircraft are directed by Cowboy Control back into the MOA and Salt Lake Center would advise non-participating aircraft of the potential conflict if the aircraft is in radio contact with Salt Lake Center. Whiskey alerts and spillouts are tracked by the Air Force, with 678 MHRC whiskey alerts reported in 2005 and 564 whiskey alerts reported in 2006. Because the MOA and ATCAA airspace is released by Salt Lake Center for use to Cowboy Control, the airspace is subject to recall by Salt Lake Center. Although this is not frequently done, Salt Lake Center may recall the airspace in the event of repeated whiskey alerts or spillouts. Recall would be more likely when two conditions occur at the same time: when military aircraft training groups assemble and hold (referred to as the regeneration point) near the edge of the airspace resulting in numerous whiskey alerts, and when Salt Lake Center is very busy with operations outside of MHRC. Salt Lake Center will recall the airspace because Cowboy Control MRU is not an Air Traffic Control facility and is therefore limited procedurally. The location of DVR relegates the southeast area of the Paradise East MOA primarily as a managerial flow control area for aircraft, such as regeneration, kill-remove, and fight marshalling of aircraft during LFEs, and to transition to and from the tanker/refueling track in the Paradise East/West and the Elko/Sodhouse Orbit ATCAA. MHAFB estimates that approximately 3 to 4 aircraft per day pass through this airspace.

As noted previously, supersonic operations occur daily within the ATCAA. The frequency of supersonic operations is not quantifiable or predictable, but rather tied to a specific operation to accomplish a particular mission. Some operations, such as weapons delivery, require supersonic speed for employment. Supersonic operations below 10,000 feet AGL are not allowed in Owyhee and Jarbidge MOAs. The current FL300 floor for supersonic operations in the ATCAA above the Paradise MOAs limits ACT/TI missions in the ATCAA airspace to a single mission at a time.

3.10.2.2 Civilian Operations

As discussed in Section 2.2 (Chapter 2), there are four public (McDermitt State, Grasmere, Owyhee, and Murphy Hot Springs) and three private (I-L, Riddle, and Petan) general aviation airports within the MOA complex. All of these airports are uncontrolled (no ATCT). The closest air carrier airport (with scheduled airline operations) is Boise Air Terminal, approximately 50 NM north of the MHRC.

Factors such as radar limitations, the large volume of airspace, the unscheduled nature of civilian flight activity (other than airline flights), and the use of VFR transponder codes by both civilian aircraft and transient military aircraft make it difficult to assess the civilian flight operation portion of the affected environment and environmental consequences. The assessment provided here uses multiple sources of information such as radar track data from 2002, rough estimates of operations from experienced Cowboy Control and Salt Lake Center personnel, and rough estimates provided by airport operators who replied to inquiries for this EA. This assessment provides a general picture of airline and general aviation operations in the vicinity of the MHRC, with emphasis on current general routing and altitudes used by these civilian aircraft.

IFR operations (which include air carrier operations) are required to be conducted under a clearance issued by ATC. IFR clearances identify route of flight and altitudes issued to aircraft that are assigned unique transponder codes (departure and approach clearances provide additional information to assist aircraft with departing and approaching airports). Routings may include airways or direct routings (using GPS or other area navigation systems). Minimum en-route altitudes (MEA) along Victor airways vary, on the north side of the MOA complex between 6,000 and 9,400 ft MSL and between 10,000 and 11,000 ft MSL in other quadrants around the MOA complex. Minimum IFR off-route obstacle clearance altitudes charted within and in the vicinity of the MOA complex range from 10,100 to 13,500 ft MSL. As noted previously, IFR traffic will not be issued clearances into a MOA unless ATC can assure adequate separation from aircraft operating in the MOA. According to Salt Lake Center and radar track information, IFR flights appear to follow airways as well as file through the MOA/ATCAA complex. Non air carrier aircraft are more likely to go through the MOA, but may be diverted by ATC around the MOA during periods of high training activity. These smaller aircraft frequently operate IFR within the MOA complex above 10,000 ft (for terrain avoidance) but below the ATCAA. According to Salt Lake Center, the MOA complex frequently affects air carrier operations at high altitude, typically above FL290 in the heavily traveled north-south corridor between the Seattle and Phoenix areas. Because of the training activity in the ATCAA above MHRC as well as other MOAs to the north and south, approximately 70 percent of air carrier operations within this corridor are diverted to avoid the MOA footprint (Harrell 2007).

VFR operations are wide ranging in routes, altitudes, and types of operations. Flight track information from 2002 shows widely varying VFR traffic, including transient aircraft (transiting from one airport to another) as well as training operations (operation within a small training area, presumably from the same origin/destination airport) but inside and outside of the MOA complex. Altitudes of VFR traffic were generally in the 5,000 to 8,000 ft MSL range, as well as some flights above 10,000 ft MSL. Because of radar data limitations (no weekend traffic report; incomplete coverage; overlapping radar system tracks; and variations in reporting transponder code 1200 traffic as military or civilian aircraft) and the wide range and uncontrolled nature of VFR operations, it is impossible to confirm the number or characteristics of VFR operations with objective data. According to Salt Lake Center and individual airport operators, VFR traffic is characterized as "occasional" within the vicinity of the MOA complex, with higher traffic volume on weekends and during good weather such as between April and October. Average traffic operations reported at the airports within the existing and proposed MOA footprint were reported as follows (AirNav 2006, AOPA 2006):

- McDermitt State (26U): 42 operations per week
- Grasmere (U91): 27 operations per month
- Owyhee (10U): 50 operations per year
- Murphy Hot Springs (3U0): 83 operations per month
- Stevens-Crosby (08U): 25 operations per year
- Riddle Ranch (11ID): 42 operations per month
- Petan Ranch (NV08): only used on remote circumstances

The other airports within the footprint did not report the number of operations. Airports such as Grasmere and Murphy Hot Springs indicated that most flights were VFR recreation flights using single engine aircraft. However, operations from other nearby airports take place within the MOA complex boundaries. Winnemucca Airport, located about 18 NM southwest of the MOA, reported approximately 70 operations per day that include training flights (practice cross country flights), which in some cases use McDermitt State as the destination airport. These training flights to McDermitt are estimated to average between 6 to 10 per month, with more flights in the better weather months of the year. Typical altitudes are between 6,000 and 8,500 ft MSL. In addition, this airport is reported to be a frequent fueling stop for transient aircraft (an average of about 5 aircraft per day) traveling north beyond the MOA complex, such as to McCall Airport (80 miles north of Boise) where mountain flying training is offered. Many of these flights are believed to operate above 10,000 ft MSL in this general routing (McCoy 2007).

Operations within a MOA by non-participating VFR aircraft are widely recognized as adding risk to all aircraft operating therein. Guidance has been prepared regarding civilian aircraft operation in MOAs.

The Air Force requires that installations associated with MOAs prepare Mid-Air Collision Avoidance (MACA) programs and encourages the installations to brief civilian pilots on this information. MHAFB participates in MACA briefings at local area airports within 100 NM of the Mountain Home Range Complex. MHAFB has developed Wing MACA Plan 9601-05, updated every 18 months, a 23-page MACA pamphlet, and a two-page MACA handout.

The March 2006 issue of USAF *Flight Safety Magazine* contains an article specific to avoiding collisions with non-participating military and civilian aircraft. The FAA Aeronautical Information Manual (AIM)—a non-regulatory guidance manual (FAA, flight instructors, insurers, and industry associations strongly encourage follow AIM guidance and procedures)—states that VFR pilots should "exercise extreme caution while flying within a MOA when military activity is being conducted" (FAA 2006). The AIM strongly encourages pilots to contact Flight Service Stations or the controlling agency to determine the status (hot or cold) of the MOA before entering it. To specifically respond to the potential hazards associated with operations in MOAs and other special use airspace, a web-based tool is being developed by the FAA and the military to share information about operations within this airspace (SeeAndAvoid.org).

Civilian aviation organizations including the Aircraft Owners and Pilots Association (AOPA) and the Experimental Aircraft Association (EAA) periodically publish articles in their member magazines related to operations within MOAs. AOPA provide extensive searchable guidance documents including past member magazine articles and government publications on its website at AOPA.org (AOPA 2007). EAA also provides guidance to its members regarding MOAs, most recently in the February 2007 issue of its member magazine, *Sport Aviation* (EAA 2007).

4.0 Environmental Consequences

Chapter 4 is organized by resource area. Discussion is limited only to resource areas that have the potential to be affected by the Proposed Action and Alternatives. Resource areas not anticipated to be affected by the Proposed Action and Alternatives are discussed in Chapter 3, with no further analysis presented in this chapter.

4.1 Noise

No ground-disturbing activities are proposed as part of this action. Therefore, aircraft noise represents the main potential impact from implementation of an action alternative. Noise effects on specific resources are discussed in the following sections of this chapter.

It is possible to empirically predict the potential noise levels of flight operations in the Paradise East and West MOAs by using data gathered in the Owyhee and Jarbidge MOAs in 2002, and by assuming that the pattern of airspace use documented by the radar-based analyses of Fidell et al. (2003) has not changed.

Appendix A contains the empirically predicted effects on aircraft noise levels for airspace modifications in the Mountain Home Range Complex. Appendix B contains the noise analysis supplemental calculations of maximum A-weighted and Day-Night Average Sound Levels of aircraft noise. These supplemental calculations were completed at the request of the FAA to produce metrics similar to those used previously in the *Enhanced Training in Idaho, Environmental Impact Statement* (Air Force 1998). This methodology is acceptable to the FAA (Warren, pers. comm., 2008).

4.1.1 Noise Analysis

Field measurements and flight track data collected during 2002 were re-analyzed to support extrapolations of the prior findings to the anticipated effects of training operations in the proposed MOA expansion. Because the fleet mix (types of different aircraft expected to operate in the MOAs) does not differ significantly under Alternatives A through D from the fleet mix operating in the MOAs at the time of the 2002 measurements, and the types of training missions to be conducted in the MOAs differ little from those conducted in 2002, the primary difference in operations that might affect noise levels is the frequency of flight activity in the airspace. The primary differences between aircraft noise levels measured during 2002 and anticipated noise levels are expected to be directly proportional to such changes in flight activity. The frequency of flight activity is not proposed to change in the Proposed Action and Alternatives.

Since the nature of the training exercises conducted in the MOAs are not expected to change between Alternatives, the effect of increasing the area and volume of the Paradise MOAs is to redistribute noise impacts of operations over a wider range of altitudes and greater land areas. This redistribution was accomplished for Alternatives B, C, and D by redistributing the flight tracks collected during the 2002 noise measurements into the greater airspace volumes. Flight tracks associated with use of particular MHRC facilities (such as the Saylor Creek and Juniper Butte bombing ranges and refueling tracks) were considered fixed. Such flight tracks remained fixed under all Alternatives.

Figures 11 and 12 illustrate how flight paths were redistributed across the new MOAs. The figures show a flight track originally flown north of the Duck Valley Reservation (Figure 11) in 2002 as translated into airspace south of the Duck Valley Reservation (Figure 12). Approximately a third of the 2002 flight tracks available for aircraft that were on-range for at least 15 minutes were so translated.

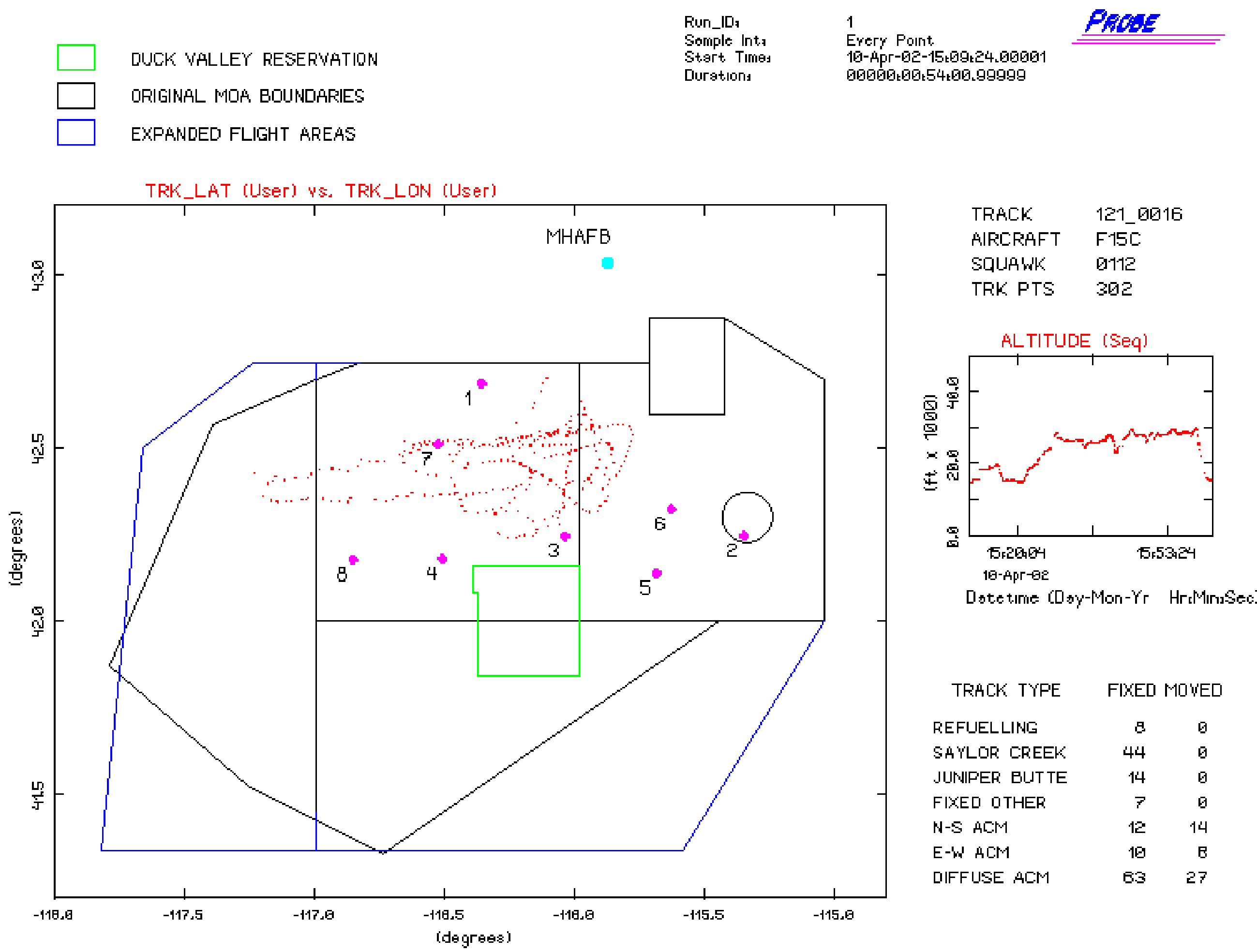

FIGURE 11

Example of Predominantly East/West Flight Track Actually Flown North of Duck Valley Reservation

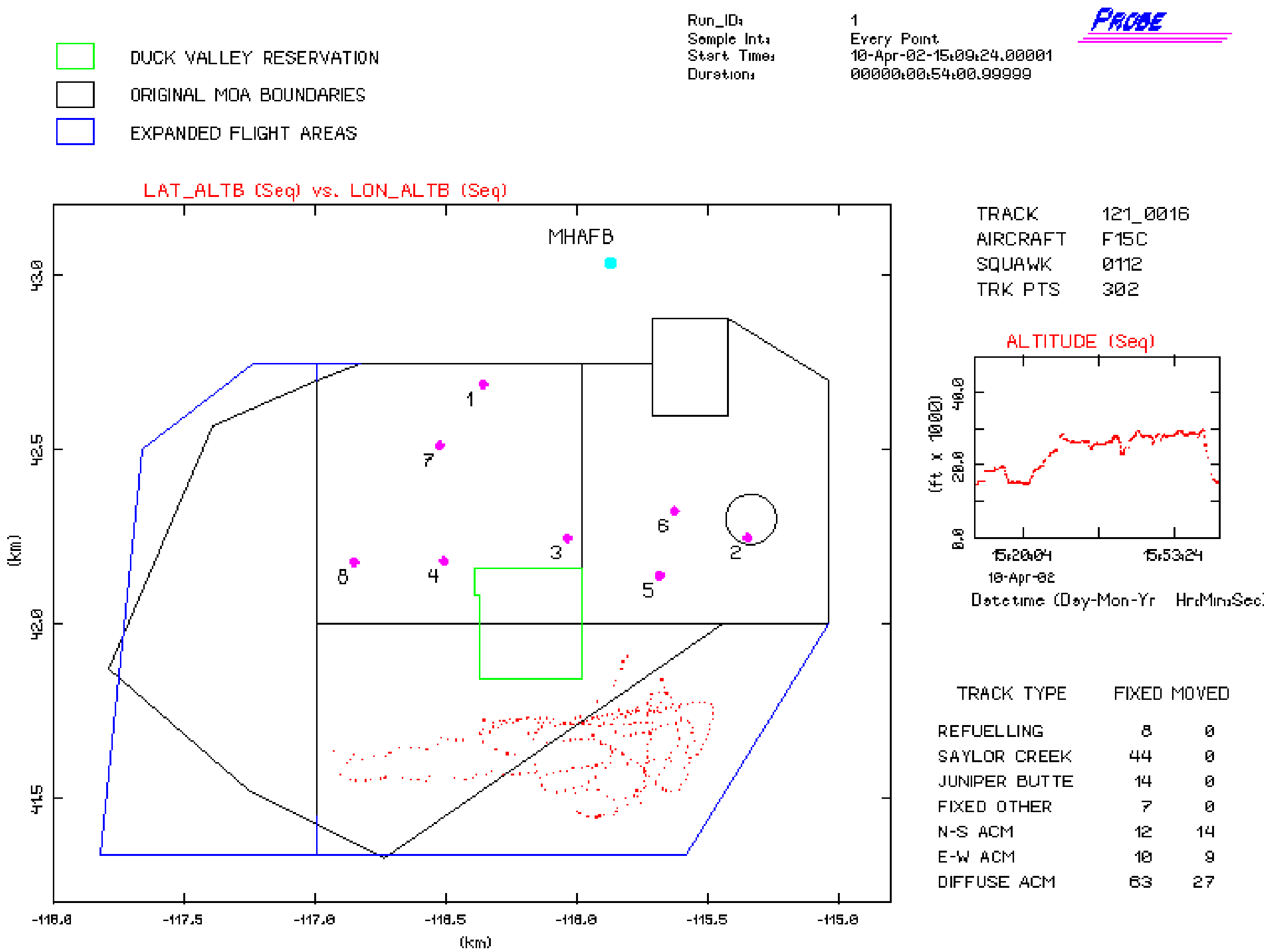

FIGURE 12

Example of Predominantly East/West Flight Track Translated Into Expanded Airspace South of Duck Valley Reservation

Closest points of approach (CPA) of flight tracks to the 2002 measurement points and to hypothetical points underlying the expanded Paradise East and West MOAs were then re-computed for the redistributed flight tracks for each of the four Alternatives, and the statistical analyses described in Appendices A and B were applied to the new sets of flight tracks to estimate noise impacts in the hypothetically-overflown areas.

Point 12 used for CPA calculations is near the Santa Rosa–Paradise Peak Wilderness Area and Point 16 used for CPA calculations is near the Jarbidge Wilderness Area (Figure 13). As discussed previously, military overflights are not precluded in the wilderness areas, but they are not guaranteed either. No significant noise effects in the wilderness areas are expected from the Proposed Action or Alternatives.

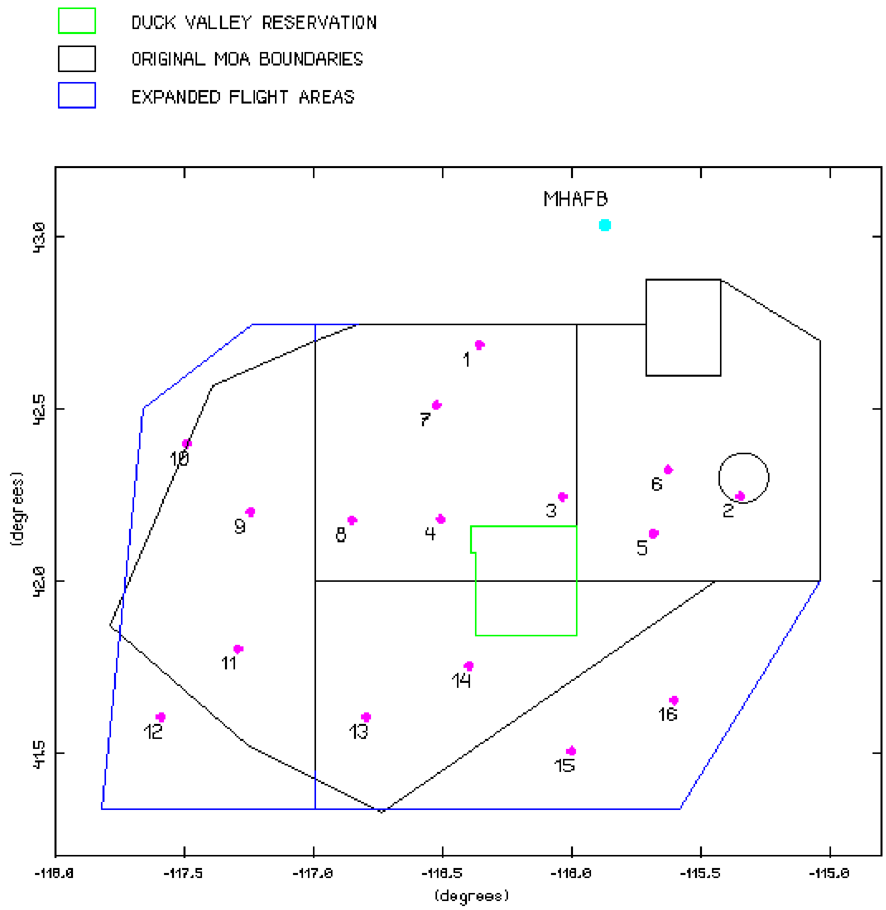

FIGURE 13
Locations of 16 Points Used for CPA Calculations

4.1.2 Alternative A—No Action Alternative

Aircraft training in the MOAs under the No Action Alternative would continue the same as at present. There would be no change from existing conditions and the Air Force would continue to train within the MOA complex as described in Chapters 1 and 2. As a result, there would be no change in noise levels.

4.1.3 All Action Alternatives

The Day-Night Average Sound Level was calculated by summing the predicted individual hourly levels (including the 10 dB penalty for the nighttime operations) using the same total numbers of flight operations as in the calculations described in Appendix A. L_{dn} was then calculated by taking 10 times the logarithm of this day-night sound exposure, averaged over 24 hours.

Table 4.1 summarizes the predicted levels for each of the 16 points shown in Figure 2. The values of L_{dn} and L_{dnmr} are identical in Table 2 for lack of any evidence (per Section 3.2, Appendix B) to justify application of an onset rate adjustment. The range of L_{dn} values from site to site is small because aircraft noise events control noise levels at the various sites for only small proportions of the day, and differences between indigenous noise levels at the sites are minor.

TABLE 4.1
Predicted L_{dn} and L_{dnmr} Values for all Alternatives

Location	Alternative A—No Action	Alternative B—Proposed Action	Alternative C—Lateral Expansion	Alternative D—Vertical Expansion
Site 1	47.1	46.7	46.7	47.2
Site 2	47.2	47.0	47.0	47.2
Site 3	47.6	46.9	46.9	47.7
Site 4	47.2	46.9	46.9	47.3
Site 5	46.1	46.1	46.1	46.1
Site 6	48.4	47.7	47.7	48.4
Site 7	49.5	48.5	48.5	49.6
Site 8	46.6	46.7	46.7	46.6
Average for Owyhee and Jarbidge MOAs (Sites 1-8)	**47.5**	**47.1**	**47.1**	**47.5**
Site 9	45.9	46.0	45.9	46.0
Site 10	44.9	44.9	44.9	44.9
Site 11	44.7	45.3	45.2	44.7
Site 12	44.2	44.6	44.6	44.2
Site 13	44.5	45.3	45.2	44.5
Site 14	44.9	45.6	45.5	45.0
Site 15	44.2	44.9	44.9	44.2
Site 16	44.2	45.1	45.0	44.2
Average for Paradise MOAs (Sites 9-16)	**44.7**	**45.2**	**45.2**	**44.7**

Noise values in A-weighted decibels (dB) within the proposed expansion area range from 45.0 to 47.5 dB (Appendix A, Table 5). Average noise levels would increase to levels of 45.0 to 45.8 dB with implementation of the Proposed Action. Day-Night Average sound levels (L_{dn})would decrease slightly or remain the same in Owyhee and Jarbidge MOAs across all action alternatives (Table 4.1, Sites 1-8). Day-Night Average sound levels would increase slightly or remain the same in Paradise West and Paradise East MOAs across all action alternatives (Table 4.1, Sites 9-16). The average L_{dn} for Paradise East and West MOAs under the No Action Alternative is 44.7 dB and would change to 45.2 dB under the Proposed Action. Therefore, except for periodic direct overpasses or a sonic boom, the average noise level would not change significantly.

Cumulative Impacts

No past, present, or future projects have been identified that would interact with the Proposed Action and Alternatives and result in cumulative effects. Given that the rural areas underlying the airspace of the MHRC are sparsely settled, and managed primarily for agricultural and outdoor recreational purposes, little noise other than wind is present. The very large size of land areas underlying the airspace of interest, the sporadic (i.e., infrequent and irregular) nature of anticipated flight operations, and the low levels of noise generated by the Proposed Action or Alternatives should not result in cumulative noise impacts.

TABLE 4.2
Relative Comparisons of Decibel Levels.

Sound	Noise Level (dB)	Effect
Boom Box in Cars	140	
Jet Engines (Near)	140	
Shotgun Firing	130	
Jet Takeoff (100-200 Ft.)	130	
Rock Concerts (Varies)	110-140	Threshold of pain (125 dB)
Oxygen Torch	121	
Discotheque/Boom Box	120	Threshold of sensation (120 dB)
Thunderclap (Near)	120	
Stereos (Over 100 Watts)	110-125	
Symphony Orchestra	110	Regular exposure of more than 1 minute risks permanent hearing loss (over 100 dB)
Power Saw (Chain Saw)	110	
Jackhammer	110	
Snowmobile	105	
Jet Fly-over (1000 Ft.)	103	
Electric Furnace Area	100	No more than 15 minutes of unprotected exposure recommended (90-100 dB)
Garbage Truck/Cement Mixer	100	
Farm Tractor	98	
Newspaper Press	97	
Subway, Motorcycle (25 Ft.)	88	Very annoying
Lawnmower, Food Blender	85-90	Level at which hearing damage (8 hrs.) begins (85 dB)
Recreational Vehicles, TV	70-90	
Diesel Truck (40 Mph, 50 Ft.)	84	Annoying; interferes with conversation; constant exposure may cause damage
Average City Traffic Noise	80	
Garbage Disposal	80	
Washing Machine	78	

TABLE 4.2
Relative Comparisons of Decibel Levels.

Sound	Noise Level (dB)	Effect
Dishwasher	75	
Vacuum Cleaner	70	Intrusive; interferes with telephone conversation
Hair Dryer	70	
Normal Conversation	50-65	
Quiet Office	50-60	
Refrigerator Humming	40	Comfortable (under 60 dB)
Whisper	30	
Broadcasting Studio	30	
Rustling Leaves	20	Just audible
Normal Breathing	10	
	0	Threshold of normal hearing (1000-4000 Hz)

4.2 Biological Resources

4.2.1 Wildlife

Impacts to wildlife species occur in three general ways: by direct mortality of young or adults, by altering habitats, and by disrupting species' normal behavior. Potential wildlife impacts associated with the Proposed Action and Alternatives includes disturbance of species' behavior from noise. Noise impacts associated with the Proposed Action and Alternatives originate from jet aircraft overflights.

4.2.1.1 Alternative A—No Action Alternative

Aircraft training in the MOAs under the No Action Alternative would continue the same as at present. There would be no change from existing conditions and the USAF would continue to train within the MOA complex, as was described in Chapters 1 and 2. As a result, there would be no change in wildlife effects from noise. Effects under the No Action Alternative within the existing MOAs are likely to decrease over time as the number of aircraft operating there decreases over the long-term following BRAC implementation and bedding down of the Republic of Singapore Air Force (RSAF).

4.2.1.2 Alternative B—Proposed Action

Direct/Indirect Impacts

Effects discussed in this EA are the result of expansion of the MOA airspace only; increased sorties and/or ground disturbance are not part of the Proposed Action or other Alternatives.

The Proposed Action would lower flight restrictions from 14,500 feet MSL to 10,000 feet MSL, or to 3,000 feet AGL in the Paradise West and Paradise East MOAs. These MOAs would also expand their lateral extent to cover an additional 2,179 square nautical miles (NMs). No increase in sorties is associated with this EA analysis. The frequency of overflights at a given point within the existing MOA complex will decrease from current conditions as operations are spread further out over the MOAs. Under the Proposed Action, no increases for supersonic events would occur. In fact, sortie levels will decrease over the long-term following BRAC implementation and bedding down of the RSAF, further reducing overflight numbers from current conditions. The noise analysis assumed no decrease in sortie numbers.

Average daily *busy* hour noise levels within the expanded horizontal and vertical boundaries would increase from a baseline of 44.1 - 44.2 dB (A-weighted) to below a maximum of 51.3 dB (A-weighted) for 95 percent of the time (Appendix A, Table 5). This 7 dB increase is comparable to the noise made by normal breathing. The change in decibel level could be likened to an increase in noise from that of a refrigerator humming to the typical noise in a quiet office. A quiet office has a noise range of 50 to 60 dB and a normal conversation ranges from 50 to 66 dB. Therefore, except for periodic direct overpasses or a sonic boom, noise levels would not be expected to be uncomfortable to wildlife species as discussed below.

Day-Night Average sound levels would increase slightly or remain the same in Paradise West and Paradise East MOAs (Table 4.1, Sites 9-16). The average L_{dn} for Paradise East and West MOAs under the No Action Alternative is 44.7 dB and would change to 45.2 dB under the Proposed Action.

Large Mammals

Under the Proposed Action, lateral expansion of the Paradise East and West MOAs will overlap several polygons of big game habitat identified by the H-TNF (Wilson, pers. comm., 2007). Elk habitat and summer and winter habitat for deer have been identified within the proposed Paradise East expansion. The northern portion of this habitat extends into the current MOA boundaries south and east of the DVR. Within and in the vicinity of the Paradise West MOA, big game habitat includes deer summer and winter range. The mapped habitat occupies the southern half of the existing Paradise West MOA and extends into the proposed area of southern expansion for the Paradise West MOA.

In general, effects of aircraft noise on wild ungulates is varied depending on species, time of year, type of aircraft (fixed-wing or rotary), distance to aircraft, noise level of overflight, and previous exposure of the animals to aircraft noise. Pronghorn antelope did not show any reaction when helicopters flew at an altitude of 400 feet with a slant range of 3,000 feet (60 dBA). Mild reactions were observed as the craft increased its descent to 200 feet/minute and traveled at 40 to 50 knots. Pronghorn reacted strongly by running when the craft was at 150 feet altitude with a slant range of 500 feet (77 dBA) (Luz and Smith 1976). Weisenberger et al studied mountain the heart rates of sheep (*Ovis canadensis mexicana*) and desert mule deer (*Odocoileus hemionus crooki*) exposed to simulated aircraft noise 33-465 m (108-1,526 feet) above ground level with maximum sound levels of 92.5- 112.2 dB. Heart rates of the exposed animals increased but returned to the resting heart rates in 1 to 3 minutes. Ungulates in the study habituated rapidly to the simulated jet aircraft overflight noise. With increased exposure, response times (amount of time with an elevated heart rate) to jet noise decreased. The study concluded that "The frequency and simulated noise levels that the ungulates were exposed to in this study were not detrimental to their well-being." (Weisenberger et al. 1996)

Overflights within the Paradise West and Paradise East MOAs are anticipated to have a minimal, insignificant effect on large mammals. This assumption is based on the proposed lowered floor of the MOA to 3,000 feet AGL, which has not been shown to affect large mammals in other studies. The 3,000 foot AGL floor is expected to result in sound below 53.1 dB for 95 percent of the time (Appendix A, Table 5), which is not expected to be a significant noise impact to large mammals. The sound levels in the expansion areas will be similar to that experienced in the existing MOA complex. Large mammals within the existing MOAs are assumed to have become habituated to these noise levels, as will the animals in the expanded areas. No significant large mammal effects would be expected, due to the lack of significant effects observed in the existing MOA, as well as the infrequent nature and short duration of noise effects in the expansion area.

Bats

Noise effects on bats have not been conducted in depth. Potential impacts may include foraging disruption, physiologic stress, roost abandonment, and hibernation disturbance. Dalton and Dalton 1993 concluded that low-level overflight of military aircraft did not have a significant effect on an endangered species of bat at roosts within the Organ Pipe National Monument, Arizona. In a preliminary progress report for the Ministère des Ressources naturelles et de la Faune, Quebec, Canada, Maisonneuve et al. (2006) found that bat activity was not statistically different in areas of low-level military aircraft operations compared to control areas without low-level overflight in Quebec. Noise disturbance associated with the Proposed Action would be likely to have little, insignificant adverse effect on bats based on existing studies.

Small Mammals

Small mammals may show changes in their hearing sensitivity, which could impact small mammal populations. Small mammals rely on hearing to avoid predators and frequent exposure to high noise levels has been found to decrease hearing sensitivity temporarily (Brattstrom and Bondello 1983, Reinis 1976). Hearing physiology of desert kangaroo rats was found to be affected by a recording of off-road vehicle noise (78-110 dB) by temporarily decreasing the kangaroo rat's hearing sensitivity. Approximately 3 weeks were required for hearing thresholds to resume to normal function (Brattstrom and Bondello 1983.) Average daily *busy* hour noise levels for the Proposed Action would increase to below a maximum of 51.3 dB (A-weighted) for 95 percent of the time (Appendix A, Table 5). Expected noise values from the Proposed Action would not be high enough to affect the hearing physiology as reported in the afore-mentioned research study. No significant small mammal effects would be expected in the expansion area, due to the lack of significant effects observed in the existing MOA, as well as the infrequent nature and short duration of noise effects in the expansion area.

Upland Game Birds

Upland game birds (specifically turkeys) have not been found to vacate areas or experience reproductive losses in response to short-term exposure to aircraft noise or sonic booms. Results from Lynch and Speake (1978) and Lamp (1989) indicate that gallinaceous birds are not known to be highly sensitive to aircraft noise. Game birds residing in areas of proposed MOA lateral expansion may show a temporary response to overflights, but are expected to develop a tolerance to noise levels similar to game bird species that reside within the existing MOA complex. No significant upland game bird effects in the expansion area would be expected, due to the lack of significant effects observed in the existing MOA, as well as the infrequent nature and short duration of noise effects in the expansion area.

Water Birds

Water bird response to noise disturbance has not been definitively researched. Several studies report contradictory results on the effects of overflights on water birds (Black et al. 1984, Lamp 1989, Bunnell et al. 1981). Black et al. (1984) suggests that overflights do not negatively affect breeding success, colony establishment, or site selection. However, Lamp (1989) reported that some water bird species were sensitive to both subsonic and supersonic overflights. In this study, birds flushed and vacated feeding areas following low-level bombing runs. Bunnell et al. (1981) found that low-level aircraft overflights impacted survivorship of young and reproductive success of American white pelicans.

Water bird colonies within DVR will continue to be avoided by existing flight and supersonic restrictions. Based on existing research, overflights within the Paradise West and Paradise East MOAs are unlikely to affect water birds. The limited amount of water bird habitat results in a reduced potential for adverse interactions between waterfowl and aircraft. No significant water bird effects would be expected in the expansion area, due to the lack of significant effects observed in the existing MOA, as well as the infrequent nature and short duration of noise effects in the expansion area.

Raptors and Other Birds

In studies on low-altitude jet overflights on nesting peregrine and prairie falcons, Ellis (1981) and Ellis et al. (1991) found that responses to frequent overflight by jet aircraft were often minimal and did not result in reproductive failure. Although falcons were alarmed by the noise stimuli in this study, the negative responses were brief and they quickly resumed normal activities within a few seconds following an overflight. Flights at less than 500 feet from nests and sonic booms greater than 112 dB were most likely to elicit biologically significant responses (Ellis et al. 1991). Lamp (1989) found in a study of the impacts to wildlife of aircraft overflights at Naval Air Station Fallon in northern Nevada, that nesting raptors (golden eagle, bald eagle, prairie falcon, Swainson's hawk, and goshawk) either showed no response to low-level flights (less than 3,000 feet AGL) or only showed minor reactions.

The flight levels in the Proposed Action are much higher than those shown by research to affect raptors nesting. Noise modeling results suggest noise levels would be below 51.3 dB (A-weighted) for 95 percent of time (Appendix A, Table 5); well below the 112 dB shown to elicit significant biological responses. No long-term significant impacts are anticipated. Reduction over time in the number of overflights will further reduce the potential for impacts.

Few studies have been conducted investigating the impacts of noise on passerine birds. As a result, impacts to passerine bird species are assumed to be similar to those reported for raptors.

Amphibians and Reptiles

Although few field studies have been conducted to evaluate the impact of noise on amphibians and reptiles, Manci et al. (1998) summarized the results of several laboratory studies that demonstrate their sensitivity to sound, specifically ORV sounds. Specific results to noise exposure include hearing loss, call redistributing, and hibernation emergence. Desert iguanas (*Dipsosaurus dorsalis*) and Mojave fringe-toed sand lizards (*Uma scoparia*) showed hearing loss or decreases in hearing after exposure to off-road vehicle noise (95 to 114 dB). Spadefoot toads (*Scaphiopus sp.*) emerged from burrows out of hibernation after exposure to motorcycle sounds of 96 dB. Early emergence during dry conditions could negatively impact toad populations in arid regions (Brattstrom and Bondello 1983).

While amphibian and reptile response to noise is not well studied and aircraft noise has not specifically been shown to affect them, the noise levels expected to occur under Alternative B would fall well below the exposure times and decibel levels of disruptive noises described in the studies above, and are therefore insignificant.

Cumulative Impacts

No past, present, or future projects have been identified that would interact with the Proposed Action and Alternatives and result in cumulative effects. Given that the rural areas underlying the airspace of the MHRC are sparsely settled, and managed primarily for agricultural and outdoor recreational purposes, little noise other than wind, is present. The very large size of land areas underlying the airspace of interest, the sporadic (i.e., infrequent and irregular) nature of anticipated flight operations, and the low levels of noise generated by the Proposed Action should not result in cumulative noise impacts to wildlife.

4.2.1.3 Alternative C

Direct/Indirect Impacts

Wildlife responses to proposed lateral expansion (Alternative C) of the MOA complex is expected to have an insignificant impact on wildlife within the existing MOA complex, and within areas proposed for lateral expansion. Reduction of flight ceiling is not associated with this Alternative, but a change from current flight tracks may cause a slight increase in existing MOA footprints. Day-Night Average sound levels (L_{dn}) would increase slightly (Table 4.1, Sites 10, 12, 15, 16) compared to the No Action Alternative. No significant wildlife effects would be expected in the expansion area, due to the lack of significant effects observed in the existing MOA, as well as the infrequent nature and short duration of noise effects in the expansion area.

Cumulative Impacts

There would be no cumulative effects as described above for the Proposed Action.

4.2.1.4 Alternative D

Direct/Indirect Impacts

Wildlife response to proposed vertical expansion (Alternative D) of the MOA complex is expected to be insignificant. No impacts on wildlife are expected within the existing MOA complex. Reductions of minimum flight ceilings for Alternative D are expected to increase noise levels from 44.1 to 53 dB (A-weighted, see Appendix A, Table 5). Day-Night Average sound levels would increase slightly in Paradise West and Paradise East MOAs over the No Action Alternative (Table 4.1, Sites 9-16). The average L_{dn} for Paradise East and West MOAs under the No Action Alternative is 44.7 dB and would remain 44.7 dB under Alternative D. These noise levels are not expected to affect wildlife, as discussed for the Proposed Action. Species currently residing within the MOA complex are habituated to aircraft noise and are not expected to have increased stress from a small increase in noise level associated with proposed reductions of the flight ceiling. No significant wildlife effects would be expected in the expansion area, due to the lack of significant effects observed in the existing MOA, as well as the infrequent nature and short duration of noise effects in the expansion area.

Cumulative Impacts

There would be no cumulative effects as described above for the Proposed Action.

4.2.2 Species with Conservation Status

4.2.2.1 Alternative A—No Action Alternative

Aircraft training in the MOAs under the No Action Alternative would continue the same as at present. There would be no change from existing conditions and the USAF would continue to train within the MOA complex as was described in Chapters 1 and 2. As a result, there would be no change in wildlife effects from noise.

4.2.2.2 Alternative B—Proposed Action

Direct/Indirect Impacts

Sage Grouse

Sage grouse leks have been identified (Wilson, pers. comm., 2007) south and east of the DVR within the Paradise East MOA, and mapped leks continue to the south and east of the DVR into the lateral expansion of the Paradise East MOA. Studies on other gallinaceous birds, discussed in Section 4.2.1.2, indicate that if a response to aircraft noise occurs, it is usually temporary. No significant effects to sage grouse would be expected in the expansion area, due to the lack of significant effects observed in the existing MOA, as well as the infrequent nature and short duration of noise effects in the expansion area.

California Bighorn Sheep

California bighorn sheep numbers are increasing in western Nevada and Oregon expansion areas, but are stable or stagnating in the western Nevada expansion area. Lambing areas are expected to occur, but they have not been specifically identified.

Numerous studies have investigated aircraft noise impacts on bighorn sheep. The body of work on this subject indicates that sheep response can vary from increased heart rate to flight and avoidance. Sheep response to disturbance is influenced by type of disturbance, distance of disturbance, and size and composition of sheep groups. The range of sheep responses to noise disturbance are noted in several studies. Heart rates were unchanged when helicopters or fixed-wing aircraft did not fly closer than 1,300 feet to sheep (MacArthur et al. 1982). Bodie et al. (1995) found that 60 percent of radio-collared sheep changed location in response to aerial surveys, and suggested that frequent low-level overflights by aircraft may increase sensitivity to incidental overflights. Conversely, Weisenberger et al. (1996) suggested that bighorn sheep develop reduced sensitivity to aircraft noise with increased exposure.

Potential impact to bighorn sheep would be low and insignificant in most areas of the expanded MOA complex because the lowered flight ceiling of 3,000 feet AGL will not significantly increase aircraft sound levels—and the elevation is above that shown to affect bighorn sheep in research studies.

Cumulative Impacts

No past, present, or future projects have been identified that would interact with the Proposed Action and Alternatives and result in cumulative effects. Given that the rural areas underlying the airspace of the MHRC are sparsely settled, and managed primarily for agricultural and outdoor recreational purposes, little noise other than wind, is present. The very large size of land areas underlying the airspace of interest, the sporadic (i.e., infrequent and irregular) nature of anticipated flight operations, and the low levels of noise generated by the Proposed Action should not result in significant cumulative noise impacts to wildlife species with conservation status.

4.2.2.3 Alternative C

Direct/Indirect Impacts

In general, potential impacts from noise to species with conservation status under Alternative C would be similar to those discussed under Alternative B. The overall potential level of impacts under Alternative C is expected to be lower than Alternative B, because there is no lowering of the minimum flight ceiling and noise levels will not increase within the existing MOA complex. In addition, noise levels within the expanded lateral MOA complex are expected to increase, but only to the levels currently encountered in the existing MOA complex. Current noise levels have not been observed to cause significant impacts to species with conservation status in the existing MOA and therefore, significant impacts are not expected in the expansion area.

Cumulative Impacts

There would be no cumulative effects as described above for the Proposed Action.

4.2.2.4 Alternative D

In general, potential impacts from noise to species with conservation status under Alternative D would be similar to those discussed under Alternative B. The overall potential level of impacts under Alternative D is expected to be similar to Alternative B because the minimum flight ceiling and associated noise levels will be increased within the existing MOA complex. However, no noise level increases would occur in areas outside of the existing MOA complex.

Cumulative Impacts

There would be no cumulative effects as described above for the Proposed Action.

4.3 Airspace Management and Use

4.3.1 Alternative A—No Action Alternative

Under the No Action Alternative, no additional airspace would be provided for military training operations in MHRC. However, it is anticipated that there would be increased operational pressure within the military training environment if the aircraft fleet changes to newer, higher performance aircraft (such as the F-22 and F-35), new training scenarios are implemented, or use by “other user” traffic from the Navy, Marines, and Air Force units not assigned to MHAFB increases. The airspace does not meet all objectives for large force exercises or allow additional, simultaneous training packages the space for full performance maneuvering. Operational conditions associated with training aircraft conflicts, spillouts, interruptions, DVR avoidance, and supersonic operations would persist. Civilian aircraft operations would still operate in a similar manner in the vicinity of the MOA complex. However, the growth in civilian use of higher performance piston aircraft that operate in the “teen” altitudes (between 10,000 feet MSL and FL180) and well into the flight levels, as well as widely publicized introduction of new, very light civilian jet aircraft, would place a larger number of these aircraft at higher altitudes and higher speeds in the vicinity of the MOA complex—including more direct flights through the complex using the area navigation and glass cockpit systems in these new aircraft. The No Action Alternative would provide no additional management tools such as MOA sectoring to address these operational concerns.

4.3.2 Alternative B—Proposed Action

Direct/Indirect Impacts

The Proposed Action would result in increased lateral and vertical airspace, resulting in the improved military flight training operation characteristics described in Section 2.3. Overall, this alternative would provide the greatest potential of all of the action alternatives for flexibility in MOA complex airspace management and use. These changes would improve anticipated military flight training operations as described in Section 2.3. Regarding operational considerations, this alternative would provide the most additional room for training packages and provide the most relief to the training schedule by allowing training packages to operate simultaneously within the MOA complex compared to existing conditions, resulting in a shorter flying day. This spatial and training day relief would provide the greatest reduction in training package conflicts among the action alternatives.

As a value added component, the Proposed Action would provide the maximum reduction of spillouts among the action alternatives, by changing the overall lateral and vertical geometry to provide additional room for maneuvering at the edges of the airspace. The future, predicted reduction in airspace use for military training would further enhance this improvement by placing fewer aircraft within the MOA complex and staging smaller scale operations at the edges of the airspace. This would also move the MOA lateral boundaries further out into adjacent airspace closer to Victor airways and VORs at the west and south sides of the complex, where nonparticipating aircraft would be expected to operate.

This alternative would provide the greatest improvement in the ability to use the southeastern portion of the Paradise East MOA through lateral geographic boundary expansion—while preserving the operational restrictions at the DVR. This alternative would provide the airspace necessary to accommodate a more complete and varied training operation in the southeast portion of the Paradise East MOA and allow aircraft operations to be conducted farther away from DVR.

Alternative B would provide the greatest potential for managing supersonic operations to meet mission requirements while maximizing distances from sensitive areas. This alternative would potentially increase the overall ATCAA area available for supersonic operations, thereby dispersing these operations, by widening the overall footprint where supersonic operations could occur. This has the potential of reducing the noise footprint around the DVR through geographical separation.

This alternative would result in the greatest expansion into adjacent airspace (laterally and vertically) of the action alternatives, so it would potentially have the greatest effect on operations associated with nonparticipating aircraft. This alternative would have the greatest potential for interruptions from nonparticipating aircraft because it increases the area around which nonparticipating aircraft must navigate if they wish to avoid the MOA complex. This alternative would increase the area to potentially be used for weather diversions within the

MOA complex and the overlying ATCAA. While this is a MOA expansion action, overlying ATCAA airspace would be vital for successful mission accomplishment under this alternative, and ATCAA airspace would be sought from the FAA. VFR and IFR aircraft currently enter the MOA complex, and this activity is expected to continue with increased activity from larger numbers of future civilian operations, operating faster, more capable aircraft on direct routings. However, the larger MOA complex airspace would conversely allow greater options for moving training packages, thereby temporarily releasing airspace for interruptions and diversions, and offsetting some of the increase in potential interruptions. The lateral expansion of the MOA complex and associated ATCAA would insignificantly affect airline operations by requiring longer distance diversions (with earlier turning points) to avoid this airspace. Southeast bound flights from Seattle and Portland would at most experience an approximate 12 minute delay time by traveling an additional 80 NM to skirt around the southeast corner of the B and C alternatives. East-west tracks from cities such as Salt Lake City and Oakland would not experience any additional flight time. Lowering the MOA floor to 10,000 feet MSL would result in all off-route IFR altitudes lying within the MOA complex, so IFR traffic would likely not be approved for off-route clearances within the larger MOA footprint unless the MOA is not being used for military training operations. If the lower altitude is not available for IFR operations and the MOA is active, ATC would have to divert the IFR traffic around the MOA, take back the training airspace, or utilize the SUA sub areas as described. The predicted decline in training operations in the MOA complex over the long-term following BRAC implementation and bedding down of the RSAF will increase the ability to utilize sectorizing or scheduling to free up MOA airspace for IFR operations, short of having a dedicated ATC facility controlling the complex.

This alternative would reduce the vertical distance available for VFR passage while remaining below the Paradise East and West MOAs. VFR pilots operating above 10,000 feet in the western portion of the MOA complex would have to decide whether to accept the increased risk of operating within the MOA versus choosing a lower altitude (closer to terrain) or diverting around the MOA. This alternative would have the greatest potential effect on VFR traffic compared to other action alternatives, because of the larger footprint combined with the lower MOA floor. While VFR traffic is allowed to operate in the MOA at any time, these pilots would have greater risk management considerations, which would require them to operate at lower altitudes, to operate within the MOA, or to divert around a larger MOA footprint if they currently operate in airspace that would be redesignated as MOA airspace. The USAF coordinates with ATC and facilitates the joint use concept through its Mid-Air Collision Avoidance (MACA) program to advertise MOA activities and procedures. The USAF updates and provides-MACA guidance to general aviation pilots within the vicinity of the MOA complex.

Cumulative Impacts

No past, present, or future projects are envisioned that would result in cumulative impacts to airspace management under this alternative.

4.3.3 Alternative C

Direct/Indirect Impacts

Alternative C would result in increased lateral airspace, resulting in the improved military flight training operation characteristics described in Section 2.4. Overall, this alternative would provide additional potential, compared with the No Action Alternative, for flexibility in MOA complex airspace management and use. These changes would improve anticipated military flight training operations as described in Section 2.4, but to a lesser degree than the Proposed Action.

Regarding operational considerations, this alternative would provide additional lateral room for training packages to the south and west, providing relief to the training schedule by allowing more or larger training packages to operate within the MOA complex at the same time—compared to existing conditions. This spatial and training day relief would provide a reduction in training package conflicts, but to a lesser extent than the Proposed Action.

This alternative would provide the same value-added reduction of lateral spillouts by changing the lateral geometry to provide additional room for maneuvering at the edges of the airspace, but would not be expected to significantly affect the frequency of spillouts above or below the MOA airspace. This alternative would also move the MOA lateral boundaries further out into adjacent airspace, including closer to Victor airways and VORs at the west and south sides of the complex, where nonparticipating aircraft would be expected to operate. This alternative would improve the ability to use the southeastern portion of the MOA complex, but to a lesser degree than the Proposed Action because the added MOA area would retain the higher floor altitude. This alternative would allow larger numbers and types of training operations to occur in the southeast portion of the MOA, which may bring a similar level of other operational concerns (conflicts, lateral spillouts, etc). However, the increased potential for vertical spillouts—compared to the Proposed Action—because of the higher MOA floor would not be significant, as the overall numbers of aircraft decrease over the long-term following BRAC implementation and bedding down of the RSAF. This alternative would provide the same potential for managing supersonic operations as the Proposed Action, because this alternative would still increase the footprint of the ATCAA area, widening the overall footprint where supersonic operations could occur.

This alternative would result in the same lateral expansion into adjacent airspace as the Proposed Action, but would not lower the floor within the existing MOA footprint, so the direct effects of Alternative C would generally be limited to the footprint covered by the lateral expansion. However, the increased lateral dimensions would still increase the area around which nonparticipating aircraft must navigate if they wish to avoid the MOA complex (or IFR traffic diverted by ATC), and it would increase the area to potentially be used for weather diversions within the MOA complex and the overlying ATCAA. Again, overlying ATCAA airspace would be vital for successful mission accomplishment under this alternative, and ATCAA airspace would be sought from the FAA. VFR and IFR aircraft currently enter the complex, and this activity is expected to continue with increased activity from larger number of future civilian operations, operating faster, more capable aircraft on direct routings. The increased lateral MOA complex dimensions would allow greater options for moving training packages and for temporarily releasing airspace for interruptions and diversions, offsetting some of the increase in potential interruptions—although the additional vertical MOA airspace of the Proposed Action would not be available for relocating training packages in Alternative C. The lateral expansion of the MOA complex and associated ACTAA in Alternative C would affect airline operations to the same extent as the Proposed Action. Alternative C would require similar IFR flight rerouting as the Proposed Action if the MOA complex is not available. However, the higher MOA floor of Alternative C (compared to the Proposed Action) would allow IFR routings beneath the MOA floor while remaining above the charted, minimum, off-route altitudes.

Alternative C would provide increased options for managing training operations (moving these operations laterally) within sectors of the MOA to allow transient IFR traffic. This alternative would maintain the existing vertical distance available for VFR passage, while remaining below the Paradise East and West MOAs—thus eliminating the direct effect of the lowered MOA floor that would be experienced in the Proposed Action. However, Alternative C would still laterally expand the MOA complex and associated 14,500 feet MSL floor into airspace currently not overlain by the MOA complex, although relatively few high performance general aviation aircraft would be anticipated above 14,500 feet MSL in this area. VFR pilots would continue to be able to operate up to 14,500 feet MSL within the Paradise East and West MOA footprints while remaining clear of the MOA airspace. Overall, Alternative C would have less effect on general aviation IFR and VFR operations compared to the Proposed Action, but would have a similar level of insignificant effects on high altitude air carrier operations as the Proposed Action.

Cumulative Impacts

No past, present, or future projects are envisioned that would result in cumulative impacts to airspace management under this alternative.

4.3.4 Alternative D

Direct/Indirect Impacts

Alternative D would result in increased vertical airspace within the Paradise East and West MOAs, resulting in the improved military flight training operation characteristics described in Section 2.5. Overall, this alternative would provide the most limited potential of all of the action alternatives for flexibility in MOA complex airspace management and use. Regarding operational considerations, Alternative D would provide the least additional room for training packages (no additional lateral airspace), thereby providing the least amount of relief to the training schedule of the action alternatives. The decline in training operations over the long-term following BRAC implementation and bedding down of the RSAF would complement improvements afforded by this alternative.

This alternative would not have the value-added feature of potentially reducing lateral spillouts, which would continue at approximately the same rate of occurrence, but over time would be expected to decline somewhat as training operations slowly taper in the future due to reduced sortie levels. However, since spillouts are more a function of aircrew vigilance that training space, spillout frequency will be determined more by training opportunities than airspace. Vertical spillouts would be improved by lowering the MOA floor, and would be enhanced as training operations decrease in the future. Under Alternative D, there would be little improvement in supporting larger numbers or types of training operations in the southeast portion of the complex, although the floor would be lowered, providing some additional vertical room to maneuver. This alternative would not change management of supersonic operations because they are associated with the ACTAA footprint and volume that would be unchanged. Effects from supersonic operations would not change compared with the No Action Alternative.

Alternative D would not encroach into adjacent lateral airspace, so it would have less potential for interruptions from nonparticipating aircraft than the Proposed Action and Alternative C, but more potential than the No Action Alternative. Alternative D would not increase the area to be potentially used for weather diversions, but would lower the MOA floor, which may introduce lower altitude nonparticipating aircraft into the MOA. Because the lateral MOA boundary would not change with Alternative D, this alternative would provide the least flexibility for moving training packages to avoid interruptions.

The lowered floor of the Paradise East and West MOAs would not significantly affect the existing ACTAA, so there would be no added effects on airline operations compared with the No Action Alternative. Moreover, retaining the existing lateral boundaries would not affect IFR flights compared to the No Action Alternative, except for IFR flights operated between 10,000 and 14,500 feet MSL. In that case, IFR flights may need to be diverted around the MOA complex if the airspace is not available. Because the MOA floor would be lowered below the minimum off-route altitudes, direct IFR flights may need to be diverted around the MOA, or utilize the SUA sub areas for non-participating aircraft at a higher altitude. Because the existing lateral MOA dimensions would be retained, the distance for the diversion to avoid the MOA complex would be less than for the Proposed Action. Alternative D would also reduce the vertical distance available for VFR passage while remaining below the Paradise East and West MOAs. VFR pilots operating above 10,000 feet in the western portion of the MOA complex would have to decide whether to accept the increased risk of operating within the MOA, versus choosing a lower altitude (closer to terrain) or diverting around the MOA. However, the diversion would not be as long a distance as with the broader MOA footprint in the Proposed Action. This alternative would have the greatest potential effect on VFR traffic within the existing MOA boundary, but would not affect VFR traffic that would not have the need to navigate within the MOA boundary. While this alternative avoids the broader MOA footprint and low altitude volume of the Proposed Action, there would still be greater risk management considerations for general aviation aircraft compared with the No Action Alternative.

Overall, Alternative D would have less effect on air carrier operations compared to the Proposed Action. It would have less effect on IFR and VFR general aviation operations outside of the existing MOA boundaries compared to the Proposed Action, but the same effects on low-level general aviation aircraft within the MOA boundaries.

Cumulative Impacts

No past, present, or future projects are envisioned that would result in cumulative impacts to airspace management under this alternative.

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CHAPTER 6

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Appendix A

Predicted Effects on Aircraft Noise Levels of Airspace Modifications for the Mountain Home Range Complex

Appendix A

PREDICTED EFFECTS ON AIRCRAFT NOISE LEVELS OF AIRSPACE MODIFICATIONS FOR THE MOUNTAIN HOME RANGE COMPLEX

March 19, 2007

Prepared by:
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INTRODUCTION AND SUMMARY

This report analyzes the effects of proposed alternatives for airspace expansion at the Mountain Home Range Complex (MHRC) on distributions of aircraft noise levels in underlying land areas. These analyses consider only proposed actions to lower portions of the MHRC floor and to include newly overflown areas in the Paradise MOAs, not any potential changes in types and numbers of operations.

Rural areas underlying the airspace of the MHRC are sparsely settled, and managed primarily for agricultural and outdoor recreational purposes. As described in Section 2, the very large size of land areas underlying the airspace of interest and the sporadic (*i.e.*, infrequent and irregular) nature of anticipated flight operations preclude deterministic predictions of prospective noise exposure levels. The size of the project area and primarily non-residential land uses further complicate modeling and interpretation of noise impacts in conventional units of long-term, cumulative exposure levels such as Day-Night Average Sound Level (DNL).

The current predictions are instead based on analyses and extrapolations of prior monitoring of aircraft noise levels at sites underlying the Jarbidge and Owyhee MOAs[7]. They focus on estimating the effects of project alternatives on statistical distributions of sound levels. These analyses indicate that:

- Indigenous sound levels - those created by wind and rustling foliage – will continue to prevail most of the time throughout the land areas underlying the MHRC airspace in all of the proposed project alternatives.

- The sporadic nature of flight operations throughout the MHRC and the very large land areas underlying the MOAs limit the changes associated with any of the project alternatives to the upper centiles of hourly distributions of noise levels attributable to military aircraft operations.

- Even under busy hour conditions, no meaningful differences are expected in 95th centile aircraft noise levels among the four project alternatives.

7 . Fidell, S., White, P., and Sneddon, M. Monitoring of Aircraft Noise in the Owyhee and Jarbidge MOAs. SAIC Project 01-0203-34-2813-676. September, 2003.

BACKGROUND

Empirical Approach Adopted for MHRC

For purposes of the Settlement Agreement of 24 November 1999 between the U.S. Air Force and the Greater Owyhee Legal Defense (in Case No. CIV 92-0189 S BLW of the U.S. District Court for the District of Idaho), direct field measurements were requested to validate the noise modeling for characterizing aircraft noise impacts in the Mountain Home Range Complex. This empirical approach focused on characterizing the additional noise contributed by aircraft operations to the distribution of indigenous noise levels in the sparsely populated land area beneath the airspace.

Nearly 24,000 hours of noise monitoring was conducted over the course of 1,141 instrument-days at eight sites in the Jarbidge and Owyhee MOAs from 24 April through 16 November 2002, as shown in Figure 1. Flight tracks for 4,655 military aircraft sorties were collected for the same time period. It was found that except during a few late morning and afternoon weekday periods, operations of military aircraft in the vicinity of monitoring sites did not appreciably elevate hourly equivalent indigenous sound levels.

In other words, sound levels at the eight monitoring sites were controlled by sources other than military aircraft about 90 to 95 percent of the time. During relatively brief and infrequent intervals when military flight activity occurred near monitoring sites, average hourly noise levels could be elevated by as much as 6 to 12 decibels (dB). Even during such hours, however, average hourly aircraft sound levels remained within a range characteristic of sparsely populated rural areas, as did longer term (*e.g.*, daily), cumulative noise levels.

Adoption of Conservative Airspace Use Assumptions

Runway repairs at Mountain Home Air Force Base resulted in lower utilization of the MHRC airspace during the summer of 2002 than during the more representative months of April, May, and October of 2002. The current extrapolations of data were then normalized to an 850-sortie month. The current estimates therefore make no attempt to anticipate noise impacts associated with potential changes in range utilization in the future.

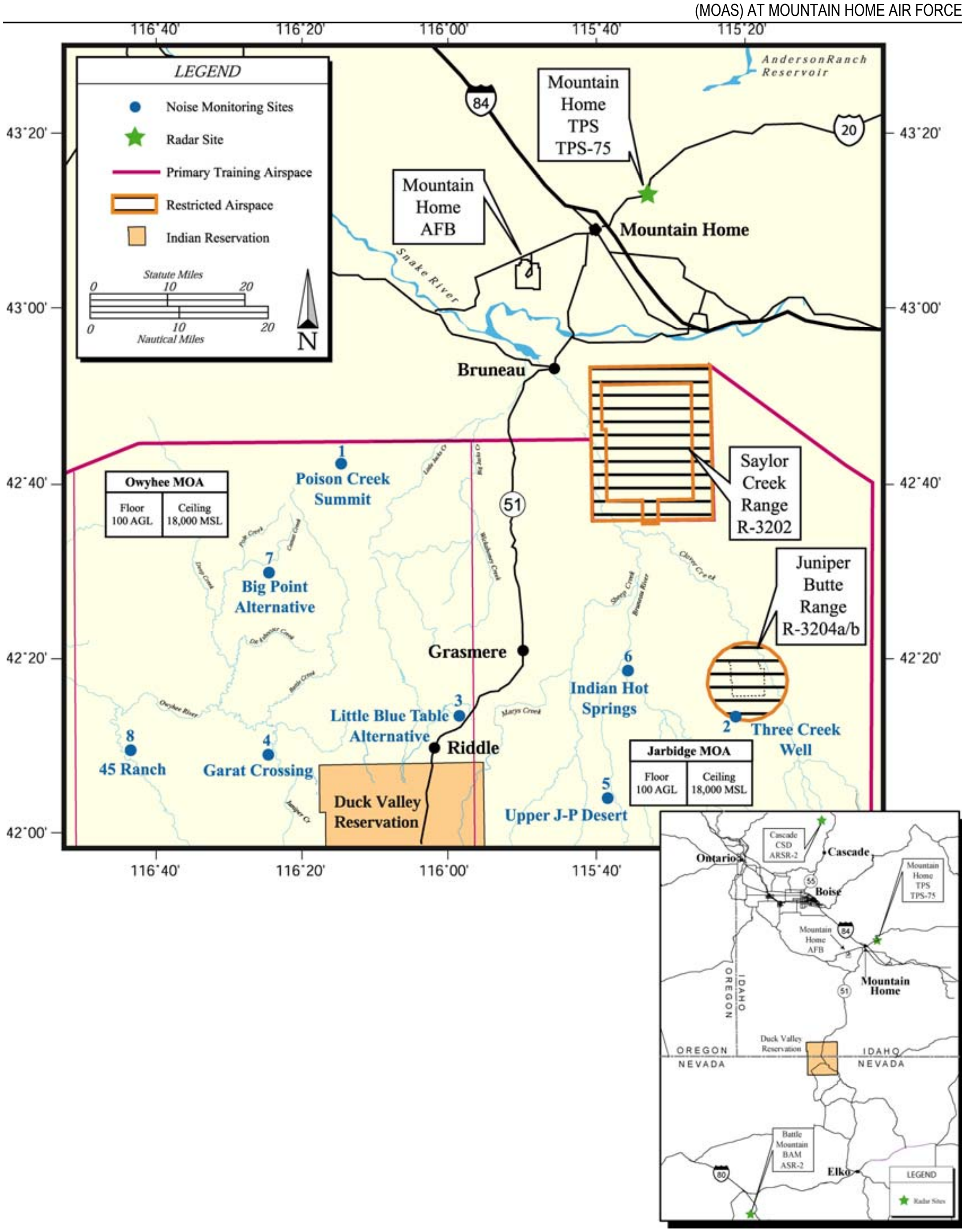

Figure 1: Locations of Noise Monitoring Sites (blue dots) in Jarbidge and Owyhee MOAs, adapted from Fidell et al., 2003.

METHOD

Field measurements and flight track data collected during 2002 were re-analyzed to support extrapolations of the prior findings to the anticipated effects of additional training operations in the MHRC airspace. Because the fleet mix (types of different aircraft expected to operate in the MHRC) does not differ systematically under project alternatives A through D from the fleet mix operating in the MHRC at the time of the prior measurements, and since the types of training missions to be conducted in the MHRC differ little from those undertaken at the time of the prior measurements, the primary differences in operations that might affect noise impacts are those associated with frequency of flight activity in the airspace. The primary differences between aircraft noise levels measured during 2002 and anticipated noise levels are expected to be directly proportional to such changes in flight activity.

Reprocessing of Prior Noise Measurement and Flight Track Data

The first step in the present noise impact analysis was to calculate centile values for hourly distributions of noise level distributions measured at all eight of the monitoring sites of Fidell et al. (2003). Table 1 summarizes the mean levels of various centiles of these distributions of hourly noise levels at each site. Since sound level measurements were made once per second for 24 hours per day, hourly statistics are based on 3600 samples. Labeling of centiles in Table 1 follows the acoustical convention, in which, for example, the 90th centile is referred to as L10. (On an hourly basis, the sound level exceeded 10 percent of the time is the value exceeded by 360 of the 3600 hourly samples, or for a total duration of six minutes per hour.)

Table 1: Centile Levels (in A-Weighted Decibels) of Distributions of Ambient Sound Levels Monitored at All Times at Eight Locations in the Jarbidge and Owyhee MOAs in 2002

SITE	HNL	Min	L25	L20	L15	L10	L05	L03	L02	L01
1	27.4	17.7	24.9	25.6	26.6	28.0	30.3	32.0	33.4	35.4
2	25.8	17.3	23.0	23.7	24.6	25.9	28.3	30.1	31.4	33.5
3	30.1	16.5	25.8	27.0	28.4	30.5	33.9	36.2	37.9	40.5
4	31.3	19.0	28.9	29.9	31.0	32.6	35.1	36.8	38.1	40.1
5	25.4	16.6	22.4	23.1	24.1	25.4	27.8	29.7	31.1	33.2
6	31.0	16.6	26.2	27.3	28.8	30.7	33.8	35.8	37.3	39.5
7	26.1	16.4	21.9	22.7	23.7	25.0	27.3	29.1	30.4	32.6
8	27.0	17.1	24.9	25.6	26.6	27.8	30.0	31.6	32.9	34.7
Weighted	28.1	17.2	25.3	26.4	27.7	29.5	32.4	34.6	36.2	38.5

Several aspects of the centile values displayed in Table 1 are noteworthy. Differences across sites in comparable centiles are minor (typically, less than ±3 dB); the absolute values of equivalent hourly noise levels (L_{eq1hr}) are very low - generally, no greater than about 30 dB; and all of the distributions are highly skewed, such that L_{eq1hr} values are in the vicinity of the 90th centile.

The next step was to calculate slant ranges at closest points of approach of each military aircraft flight track to each noise monitoring site, and to tally numbers of such operations per hour by monitoring site. The information about hourly noise levels and about closest points of approach of military aircraft to each site was then concatenated across sites. This information was consolidated in a spreadsheet associating hourly centile values for each of the roughly

24,000 hours of monitoring data with numbers of aircraft approaching any monitoring site at ranges from 5 through 100 km.

Quantification of Contribution of Aircraft Noise to Indigenous Levels

The influence on the upper centiles of hourly noise level distributions of numbers of military aircraft per hour approaching each monitoring site within slant ranges of 5 through 100 km were studied. Because the land area underlying the Jarbidge and Owyhee MOAs is so large, and numbers of military aircraft operations so small (typically, no more than ten or twenty a day at most, concentrated during weekday daylight hours), no military aircraft approached within 100 km of any noise monitoring site for most of the hours that the noise monitors operated. Analyses were therefore restricted to hours when at least one aircraft approached monitoring sites within given distances. (At most other times, measured levels were controlled by wind-driven rustling of foliage.)

Redistribution of Flight Tracks to Expanded Paradise MOA Areas

Both Alternatives B and C expand the lateral boundaries of the Paradise East and West MOAs. Alternative B lowers the floor of the operating area from 14,500’ to 10,000’ MSL or 3,000 AGL as well, while Alternative D lowers the floor only. Since the nature of the training exercises conducted in these MOAs are not expected to change in these project alternatives, the effect of increasing the area and volume of the Paradise MOAs is to redistribute noise impacts of operations over a wider range of altitudes and greater land areas.

This redistribution was accomplished for Alternatives B, C, and D by redistributing the flight tracks collected during the 2002 noise measurements into the greater airspace volumes. This was accomplished by interactive software that displayed 2002 flight tracks so that decisions could be made about their relocation. Figures 2 through 7 illustrate the manner in which such decisions were made for all of the project alternatives other than the “no action” alternative.

Flight tracks associated with use of particular MHRC facilities (such as the Saylor Creek and Juniper Butte bombing ranges and refueling tracks), as shown in Figures 2 and 3, were considered fixed. Figure 2 shows a B-1 entering the MHRC airspace, overflying monitoring site 7, and then spending more than an hour in the Saylor Creek range. Figure 3 shows a KC-135 orbiting in a refueling track. Such flight tracks remained fixed under all project alternatives.

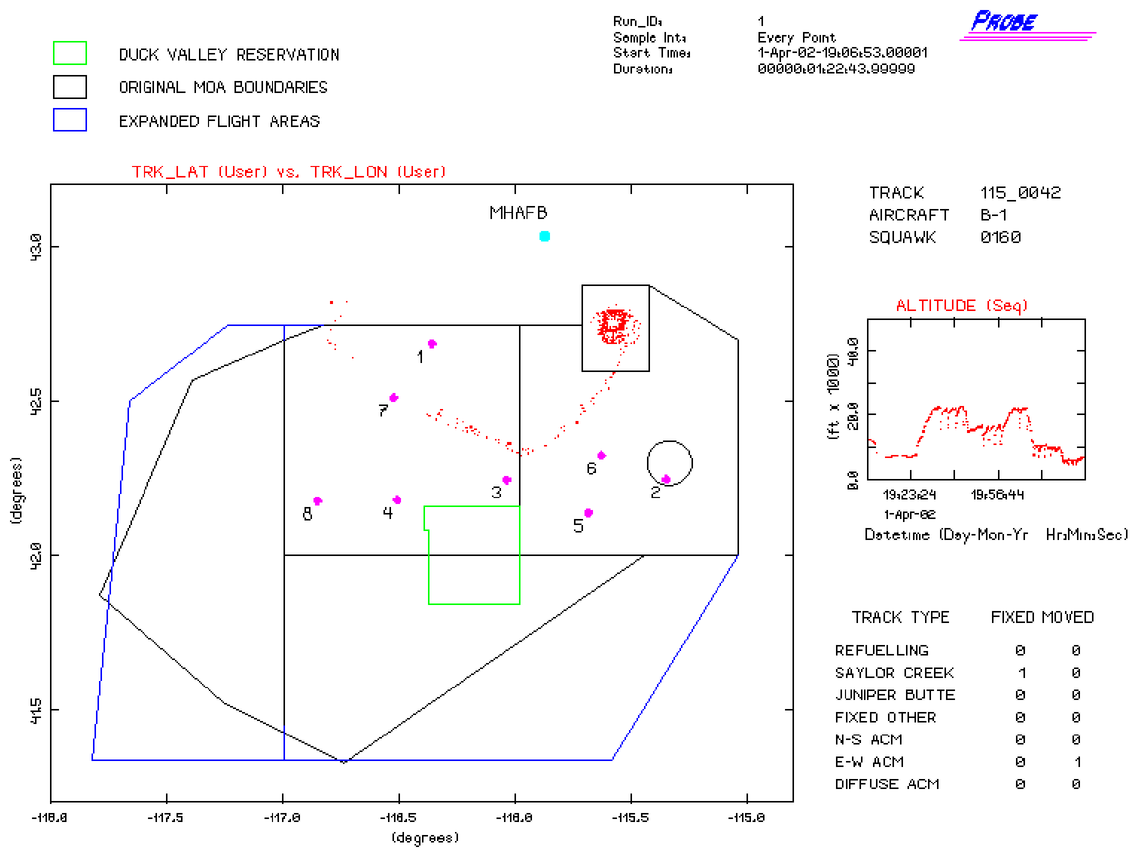

Figure 2: Example of non-relocatable flight track for a training mission using the facilities of the Saylor Creek range.

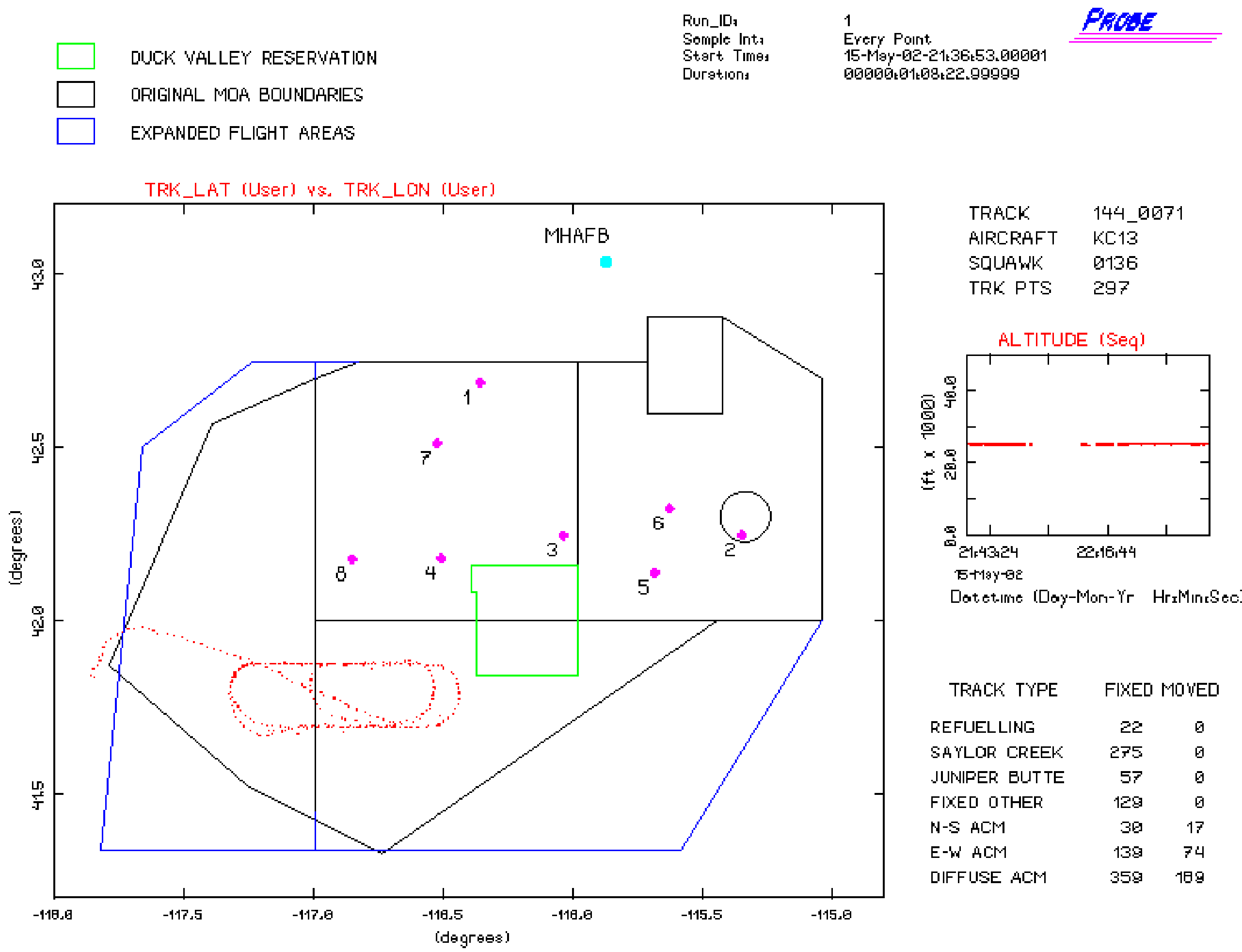

Figure 3: Example of non-relocatable refueling flight track.

Figures 4 and 5 illustrate a flight track originally flown north of the Duck Valley reservation (Figure 4) in 2002 as translated into airspace south of the Duck Valley reservation (Figure 5). Figures 6 and 7 illustrate a similar translation of a north/south flight track.

Approximately a third of the 2002 flight tracks available for aircraft that were on-range for at least 15 minutes were so translated.

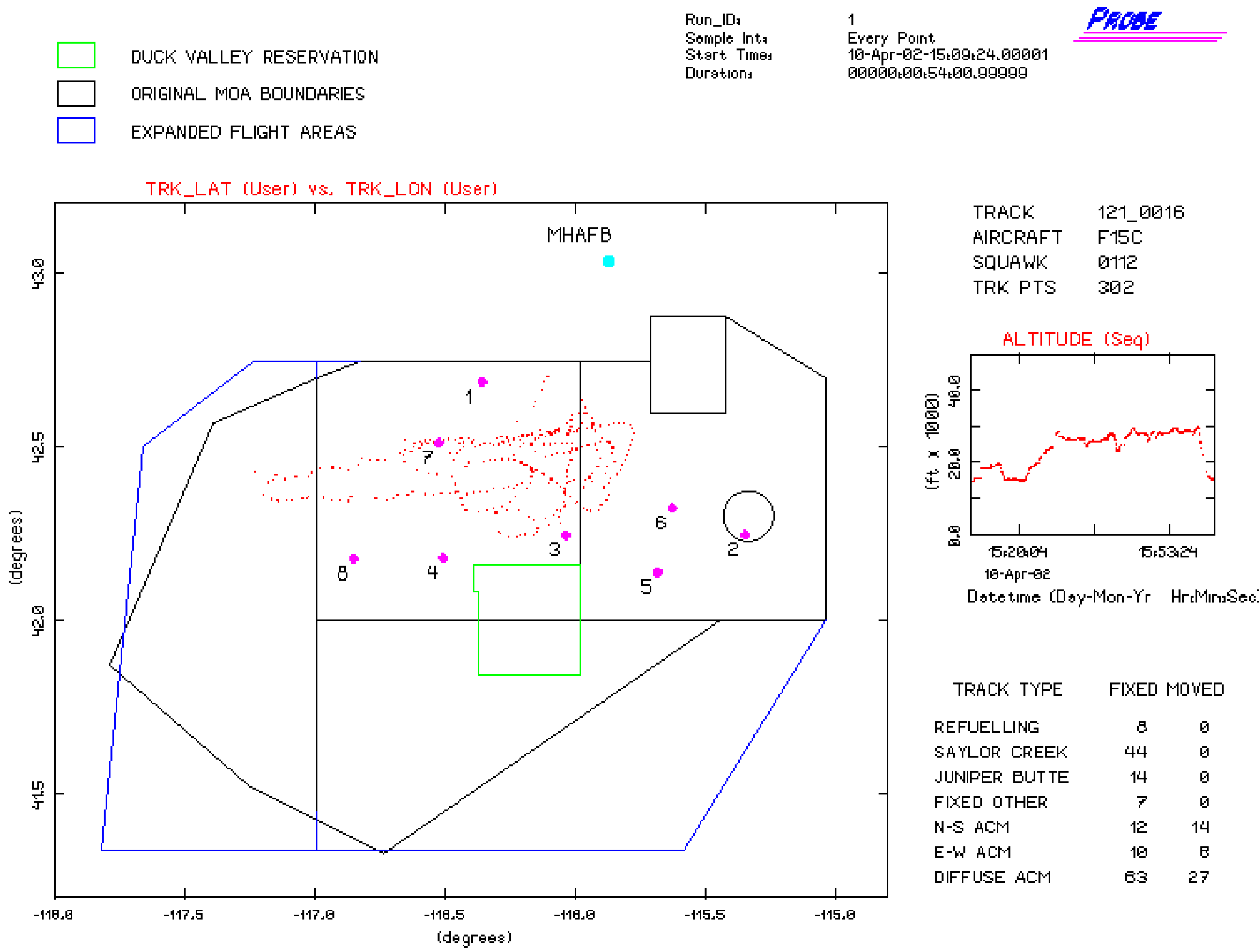

Figure 4: Example of predominantly east/west flight track actually flown north of Duck Valley reservation.

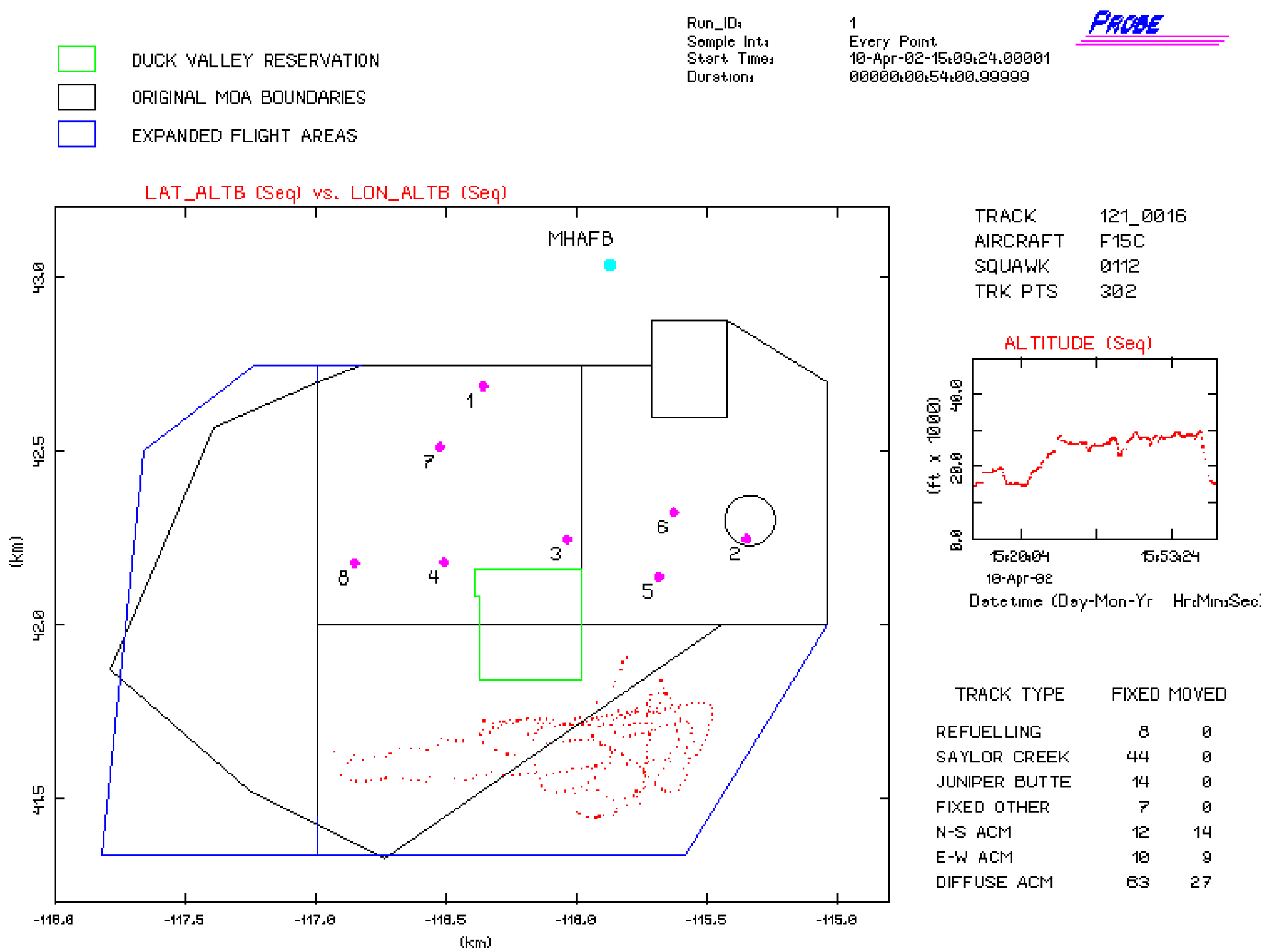

Figure 5: Example of predominantly east/west flight track translated into expanded airspace south of Duck Valley reservation.

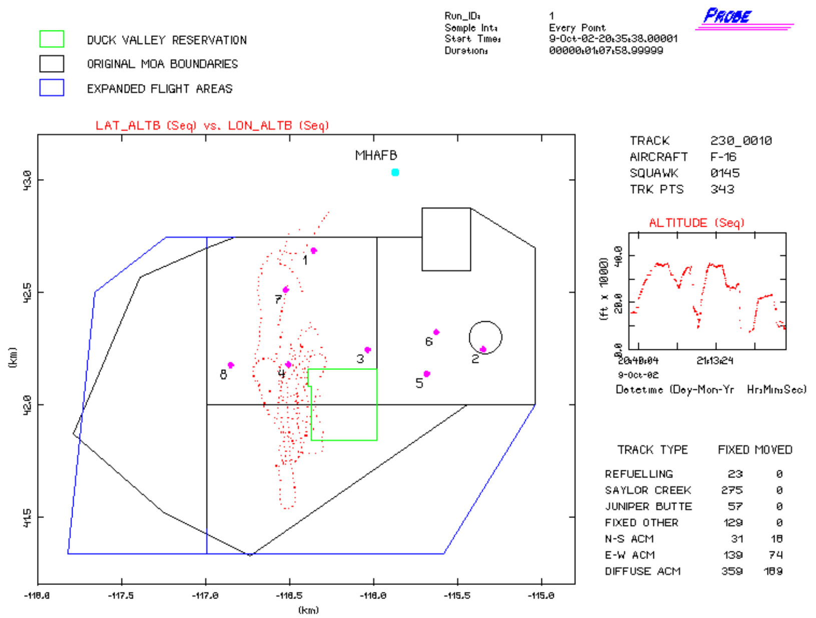

Figure 6: Example of an actually-flown north/south flight track.

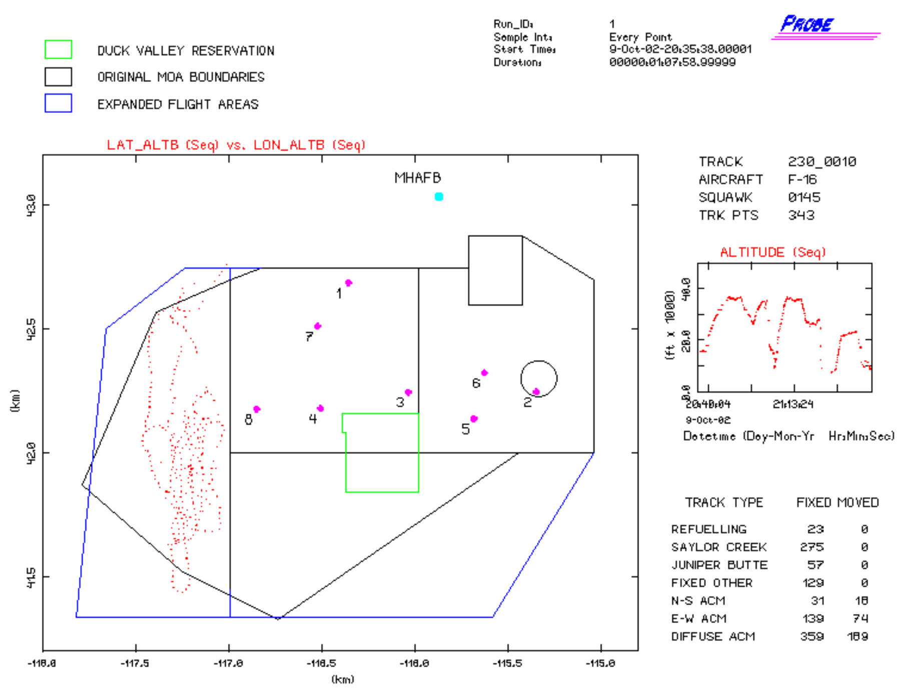

Figure 7: Example of a predominantly north/south flight track translated westward.

Recalculation of Closest Points of Approach

Closest points of approach (CPAs) of flight tracks to the 2002 measurement points and to hypothetical points underlying the expanded Paradise East and West MOAs were then re-computed for the redistributed flight tracks for each of the four project alternatives, and the statistical analyses described in Sections 3.2 and 4.1 were applied to the new sets of flight tracks to estimate noise impacts in the hypothetically-overflown areas. Figure 8 shows the locations of these points.

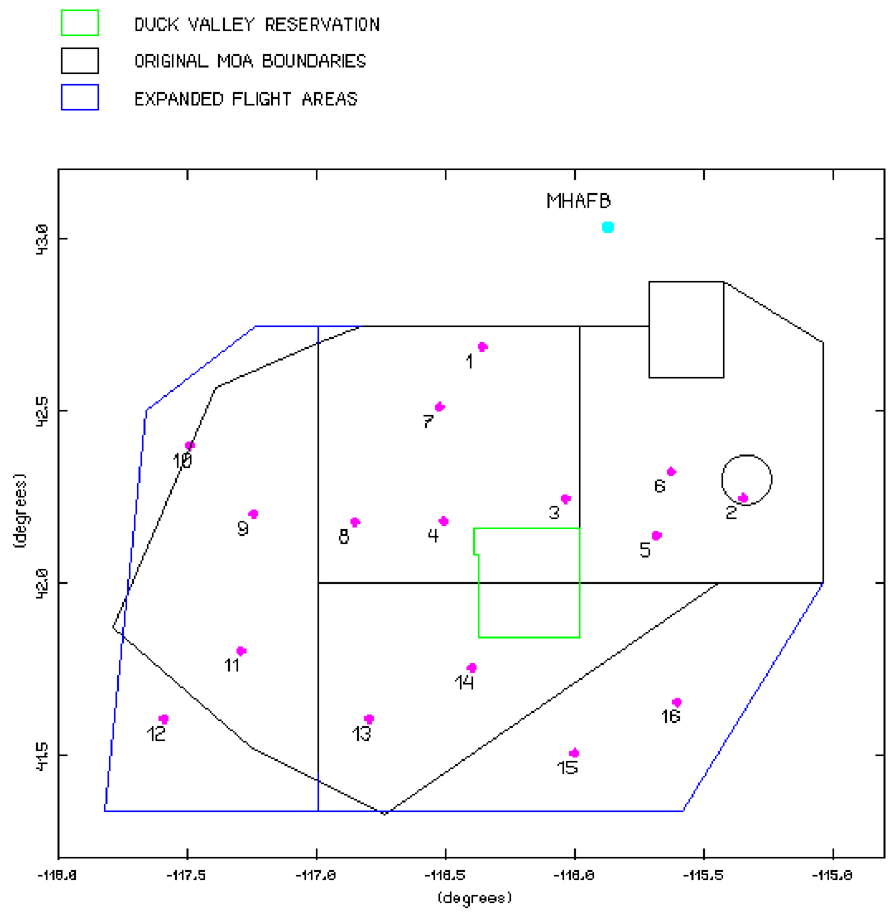

Figure 8: Locations of 16 points used for CPA calculations.

RESULTS

Predicting Centile Values from Numbers of Aircraft Approaching Measurement Sites

Linear regressions were undertaken to predict hourly equivalent noise levels (HNLs) and hourly levels exceeded 10%, 5%, and 1% of the time, for cases in which numbers of aircraft approaching a monitoring site within 5, 7.5, 10, 12.5, and 15 km. The resulting prediction equations are shown in Tables 2 and 3. The numbers of hours during which flight tracks of military aircraft approached monitoring sites within these five slant ranges were 385, 698, 892, 1048, and 1164, respectively. As percentages of the 23,800 hours of noise monitoring, these figures represent 2.4%, 2.9%, 3.7%, 4.4%, and 4.9% of all monitoring hours, respectively.

Table 2: Summary of linear least square regression prediction equations for HNL and L_{10} from numbers of aircraft approaching 2002 measurement points at slant ranges within 5, 7.5, 10, 12.5, and 15 km within the Jarbidge and Owyhee MOAs

HNL	L_{10}
2.60 (No. of A/C < 5km) + 50 dB	3.36 (No. of A/C < 5km) + 40.3 dB
2.31 (No. of A/C < 7.5km) + 46.3 dB	2.67 (No. of A/C < 7.5km) + 38.9 dB
2.12 (No. of A/C < 10km) + 44.0 dB	2.46 (No. of A/C < 10km) + 37.4 dB
1.91 (No. of A/C < 12.5km) + 42.7 dB	2.12 (No. of A/C < 12.5km) + 36.9 dB
1.91 (No. of A/C < 15 km) + 41.1 dB	2.01 (No. of A/C < 15 km) + 36.0 dB

Table 3: Summary of linear least square regression prediction equations for L_5 and L_1 from numbers of aircraft approaching 2002 measurement points at slant ranges within 5, 7.5, 10, 12.5, and 15 km within the Jarbidge and Owyhee MOAs

L_5	L_1
3.66 (No. of A/C < 5km) + 47.5 dB	3.20 (No. of A/C < 5km) + 61.2 dB
2.78 (No. of A/C < 7.5km) + 45.8 dB	2.36 (No. of A/C < 7.5km) + 58.6 dB
2.59 (No. of A/C < 10km) + 44.1 dB	2.13 (No. of A/C < 10km) + 56.4 dB
2.16 (No. of A/C < 12.5km) + 43.3 dB	2.00 (No. of A/C < 12.5km) +45.8 dB
2.09 (No. of A/C < 15 km) + 42.1 dB	2.02 (No. of A/C < 15 km) + 53.0 dB

The correlations between numbers of aircraft approaching measurement positions and centile values of noise level distributions were typically in the range of 0.30 to 0.40. The numbers of hours over which these correlations were calculated were great enough that they are all significantly different from zero, even though they do not account for large amounts of variance.

The great variability in hourly centile values associated with the vagaries of long range acoustic propagation and aircraft operational factors is apparent in Figures 8 and 9. Note, for example. The 50 dB range of 95th centile hourly noise levels in Figure 2 associated with approaches of aircraft within 10 km of measurement positions. This variability limits the variance accounted for by the fitting functions to less than 15% in the best cases. Quadratic fitting functions accounted for only marginally greater amounts of variance in these data sets.

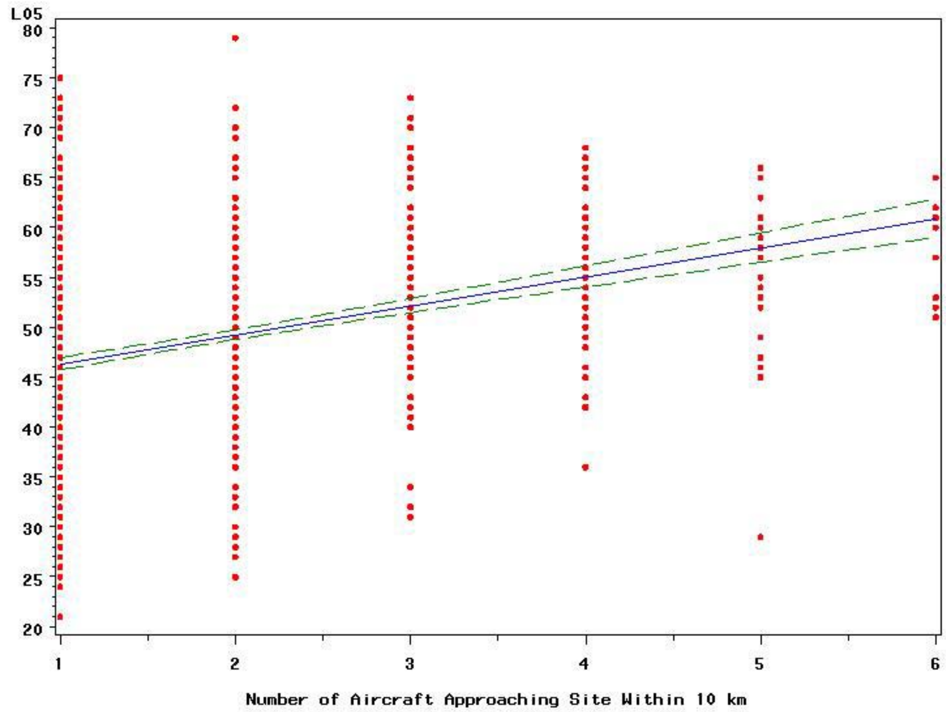

Figure 9: Linear fit of numbers of aircraft approaching measurement sites within a slant range of 10 km to 95th centile of sound level distribution at 2002 measurement sites in Jarbidge and Owyhee MOAs. Red dots are 95th centile values for hours in which aircraft were present; dashed lines show 90% confidence intervals. Total variance accounted for by relationship is 12.4%.

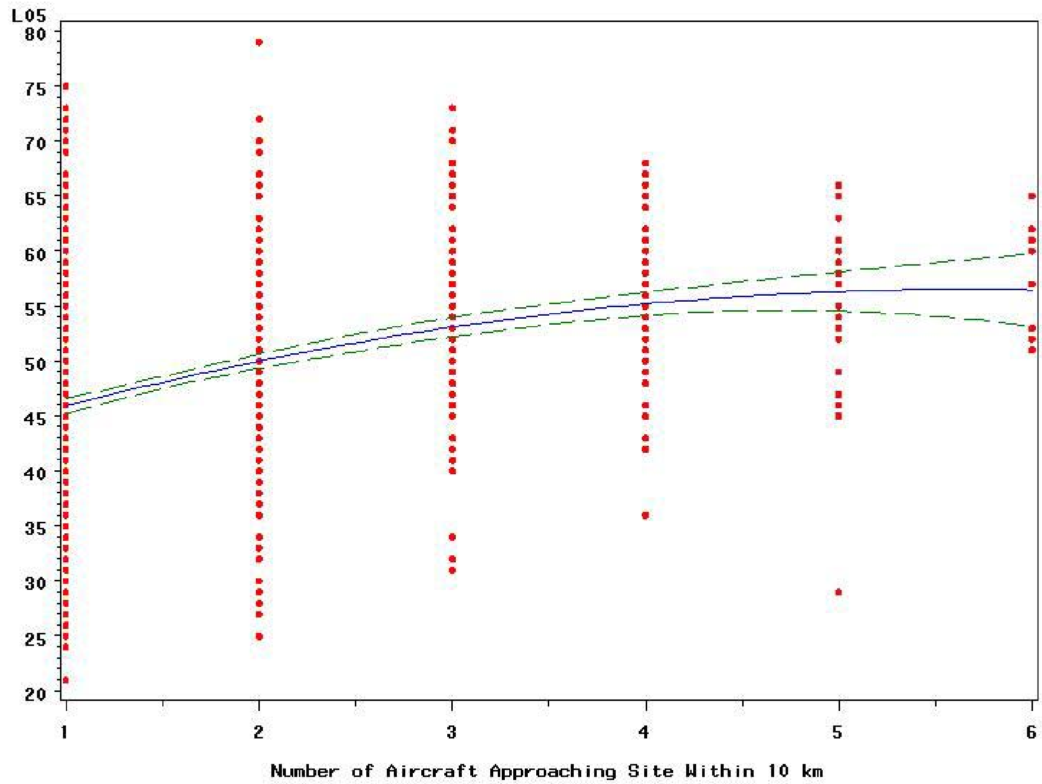

Figure 10: Quadratic fit of numbers of aircraft approaching measurement sites within a slant range of 10 km to 95th centile of sound level distribution at 2002 measurement sites in Jarbidge and Owyhee MOAs . Red dots are 95th centile values for hours in which aircraft were present; dashed lines show 90% confidence intervals. Total variance accounted for by relationship is 13.9%.

Applying Results of Regression Analyses to Proposed Project Alternatives

Application of the results of the regression analyses described above to predictions of noise levels under the various project alternatives was accomplished by comparing predicted L_5 (95th centile) values at sixteen points in the in Alternatives B, C, and D to those in the no action Alternative (A). Table 4 summarizes estimated L_5 values for each project alternative for average weekday daylight time periods. At times when the range is generally not in use (weekends, holidays, and nighttime hours), hourly L_5 values are likely to be several decibels lower than those shown in Table 4.

Table 4: Summary of estimated 95th centile values of average hourly aircraft noise levels at sixteen points underlying Mountain Home Range Complex airspace for four project alternatives, in A-weighted decibels.

POINT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
1	46.7	46.3	46.3	46.7
2	46.7	46.5	46.5	46.8
3	47.1	46.5	46.5	47.1
4	46.8	46.5	46.5	46.8
5	45.8	45.9	45.9	45.8
6	47.6	47.1	47.1	47.6
7	48.5	47.7	47.7	48.5
8	46.3	46.3	46.3	46.3
9	45.7	45.8	45.7	45.8
10	44.8	44.8	44.8	44.8
11	44.6	45.2	45.1	44.7
12	44.1	44.6	45.1	44.1
13	44.4	45.1	45.1	44.4
14	44.8	45.4	45.3	44.9
15	44.1	44.8	44.8	44.1
16	44.2	44.9	44.9	44.2

DISCUSSION

Comparison of L_5 *Values under Four Project Alternatives*

At each of the sixteen points for which L_5 values were predicted, all of the estimated L_5 values under all four project alternatives are within ± 0.5 dB of one another. Since differences of this magnitude are not meaningful, average hourly aircraft noise levels provide no practical basis for preferring one project alternative over others. As long as no changes are expected in sortie rates, types of training exercises, and types of aircraft conducting them, the contemplated changes in MOA airspace boundaries will produce no meaningful differences in the sporadic sorts of aircraft noise produced throughout the Mountain Home range complex.

Extension of Predictions to Busy Hour Conditions

The hourly L_5 values summarized in Table 4 of Section 4.2 were estimated for average daily conditions, by normalizing an average of 850 sorties per month over 210 flying hours (21 ten-hour-long weekday periods) per month. In practice, range use often peaks in late morning and mid-afternoon hours by a factor of approximately two with respect to other hours of the day. The estimated L_5 values summarized in Table 5 were therefore developed to represent weekday *busy* hour conditions.

Table 5: Summary of estimated 95th centile values of busy hour aircraft noise levels at sixteen points underlying Mountain Home Range Complex airspace for four project alternatives, in A-weighted decibels.

POINT	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
1	49.2	48.5	48.5	49.4
2	49.4	49.0	49.0	49.4
3	50.0	48.9	48.9	50.1
4	49.4	48.9	48.9	49.6
5	47.6	47.7	47.7	47.6
6	51.1	50.1	50.1	51.1
7	52.8	51.3	51.3	53.0
8	48.4	48.5	48.5	48.5
9	47.2	47.5	47.3	47.4
10	45.4	45.6	45.5	45.6
11	45.1	46.3	46.1	45.2
12	44.1	45.0	44.9	44.1
13	44.7	46.2	46.1	44.7
14	45.6	46.7	46.6	45.7
15	44.2	45.5	45.5	44.2
16	44.2	45.8	45.7	44.2

Note that L_5 sound pressure levels shown in Table 5 are as much as about 3 dB greater than those shown in Table 4. They nonetheless remain low in absolute level. For example, even in the worst case (Alternative D at Site 7), busy hour aircraft noise levels will remain below 53 dB 95% of the time.

Flight Track Density Maps

Another way to understand the net effect of reprocessing and redistributing flight tracks for the four project alternatives is by means of flight track density maps. Such maps, which represent the frequency with which aircraft operate within airspace, are produced by gridding the sky within the MHRC and contouring the numbers of radar position reports from military aircraft flying at any altitude within each cell. Figures 11 (for Alternatives A and D) and 12 (for Alternatives B and C) show the nominal flight track densities assumed for purposes of computing points of closest approach and 95th centile noise level values. The increase in density of flight tracks in the expanded airspace of the Paradise East and West MOAs under Alternatives B and C produced by re-distributing flight tracks (as described in Section 3.3) is readily apparent.

Sensitivity of Predictions to Alternate Flight Track Redistribution Assumptions

Although the re-distribution of 2002 flight tracks to permit prediction of noise impacts under the four project alternatives is somewhat arbitrary, the predicted 95th centile noise levels calculated in Sections 4.2 and 5.2 are relatively insensitive to the details of the flight track redistribution assumptions for several reasons:

- There can be little doubt that many of the training missions involving use of specialized range facilities such as the bombing ranges in the Jarbidge MOA will maintain current entry and exit routes, and otherwise change little (if at all) under any of the project alternatives.

- Given that no major changes are contemplated in fleet mix or mission types, it is similarly unlikely that the orientation or dimensions of east/west and north/south-oriented flight tracks will undergo substantial alterations other than translations to take advantage of the expanded airspace.

- The shallow slopes of the regression equations, in conjunction with the absence of any major changes in anticipated numbers of sorties flown in the airspace, imply that changes in numbers of aircraft operating in close proximity to any given point on the ground in any given hour will remain modest under all of the project alternatives.

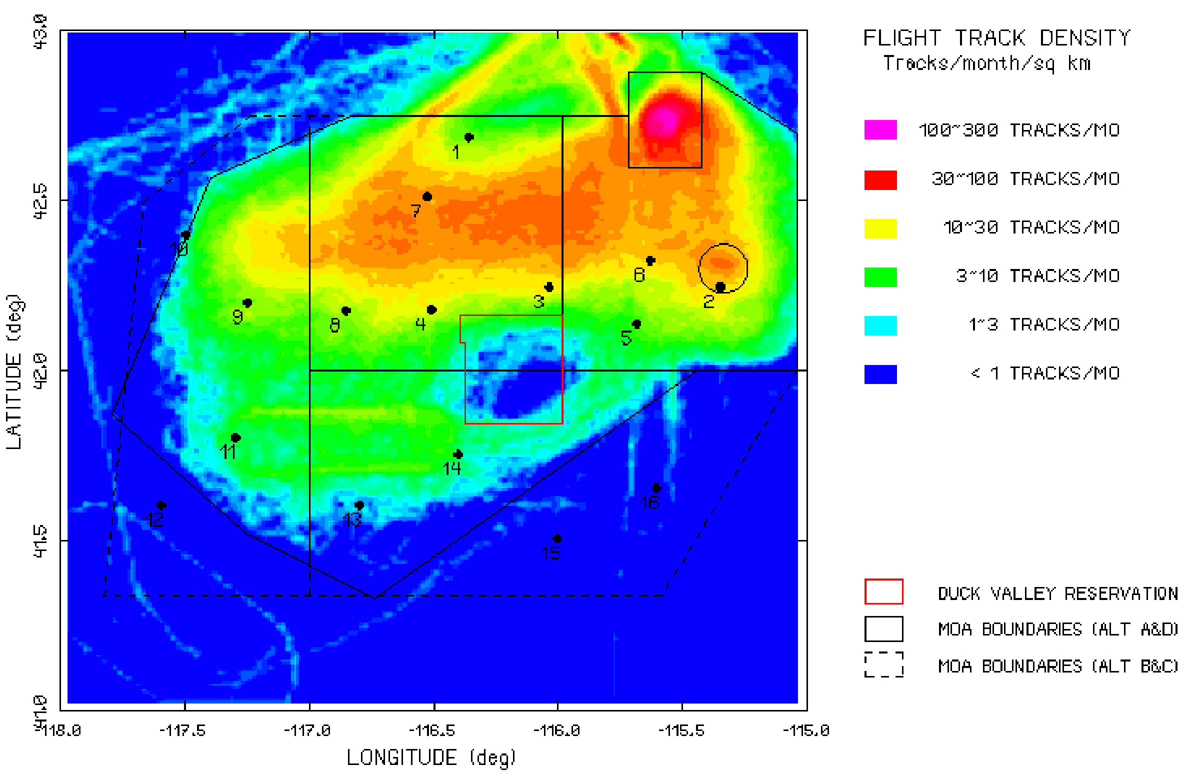

Figure 11: Flight track density map for Alternatives A and D.

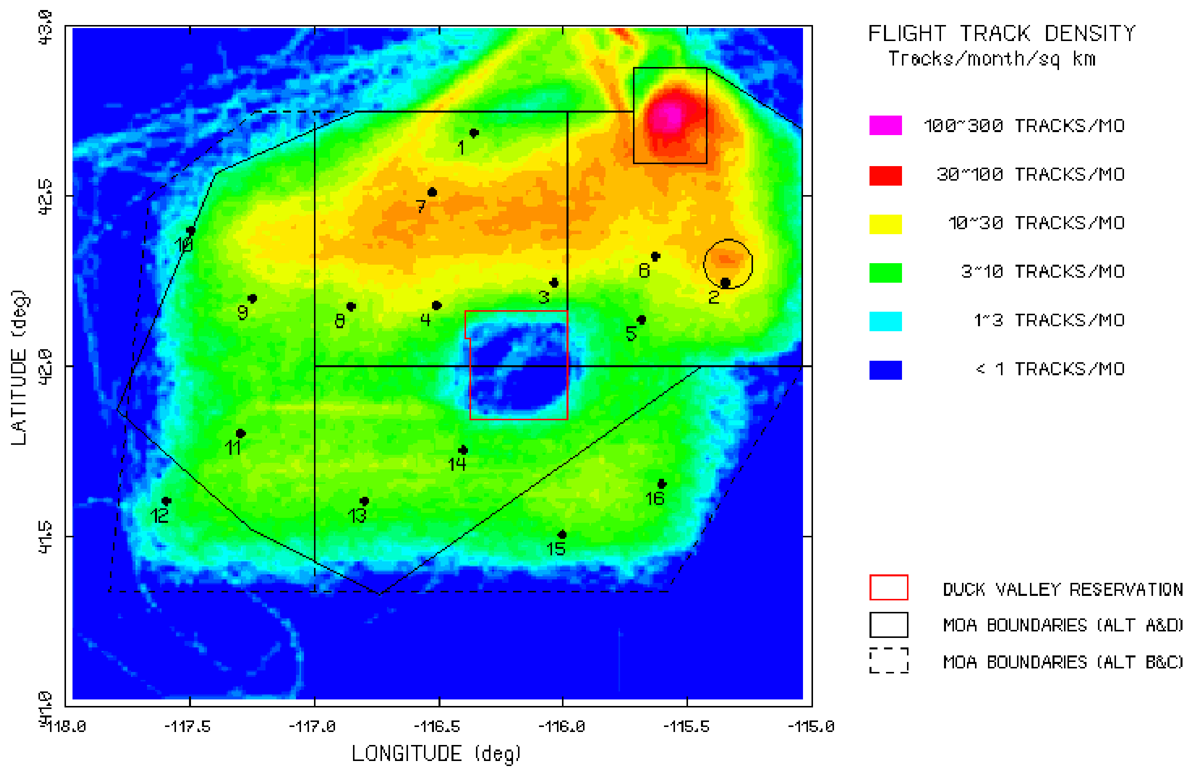

Figure 12: Flight track density map for alternatives B and C.

CONCLUSION

Barring changes in sortie rates, types of training exercises, and types of aircraft conducting them, the proposed alterations of MOA boundaries will produce no meaningful differences in the sporadic sorts of aircraft noise produced throughout the Mountain Home range complex under any of the project alternatives.

Appendix B

Supplemental Calculations of Maximum A-Weighted and Day-Night Average Sound Levels of Aircraft Noise in Areas Underlying Expanded Airspace in the Mountain Home Air Force Base Range Complex

Appendix B

SUPPLEMENTAL CALCULATIONS OF MAXIMUM A-WEIGHTED AND DAY-NIGHT AVERAGE SOUND LEVELS OF AIRCRAFT NOISE IN AREAS UNDERLYING EXPANDED AIRSPACE IN THE MOUNTAIN HOME AIR FORCE BASE RANGE COMPLEX

February 11, 2009

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INTRODUCTION AND BACKGROUND

Noise monitors at eight sites in the Mountain Home Range Complex continuously recorded A-weighted sound levels during consecutive one-second periods for 1,141 instrument-days throughout most of an eight month period from April through November of 2002. Figure 1 locates the eight monitoring sites. Fidell, White and Sneddon (2003) documented the statistical distributions of sound levels observed at each site, and concluded (*inter alia*) that "aircraft operations did not reliably elevate hourly equivalent sound levels for most of the day"; and that "indigenous sound sources generally controlled sound levels about 90 to 95% of the time."

Partial or complete radar flight tracks for 4,655 military aircraft sorties were captured during the time that the unattended monitors were recording noise levels. In a prior report, (Fidell Associates, 2007) these flight tracks were subsequently re-analyzed and redistributed geographically to simulate aircraft noise impacts resulting from the conduct of flight operations in expanded airspace volumes.

Upon review of the information developed in the 2007 Fidell Associates report, the Federal Aviation Administration requested supplemental analyses to calculate predicted values for two additional noise metrics in areas underlying the expanded airspace. The current analyses were performed to estimate values of these two noise metrics: maximum A-weighted aircraft noise levels, and monthly onset-rate adjusted Day-Night Average Sound Levels (L_{dnmr}) (Harris, 1989).

In the approximately 24,000 instrument-hours of operation at the eight monitoring sites, many millions A-weighted noise levels were recorded at a rate of 86,400 such measurements per site per day. At each monitoring site, maximum A-weighted aircraft noise levels derived from the present data set thus represent the highest single sound level during any one-second interval observed among many millions of measurements.

Day-Night Average Sound Level (EPA, 1974) is a 24-hour time weighted average sound level. Onset-Rate Adjusted Day-Night Average Sound Levels (L_{dnmr}) differ from Day Night Average Sound Levels (L_{dn}) only when the rise times of the discrete noise events that control L_{dn} values exceed 15 dB/s. This situation rarely arises when aircraft operate at altitudes greater than a few thousand feet. Even when aircraft are flying at low altitudes, range rates (that is, rates at which aircraft approach observers) of several hundred knots are typically required for onset rates of noise events to exceed 15 dB/s. For example, onset rates of noise events created by large jet transports flying at speeds of about 150 knots at altitudes of hundreds of feet AGL within a few miles of landing on airport runways do not exceed 15 dB/s.

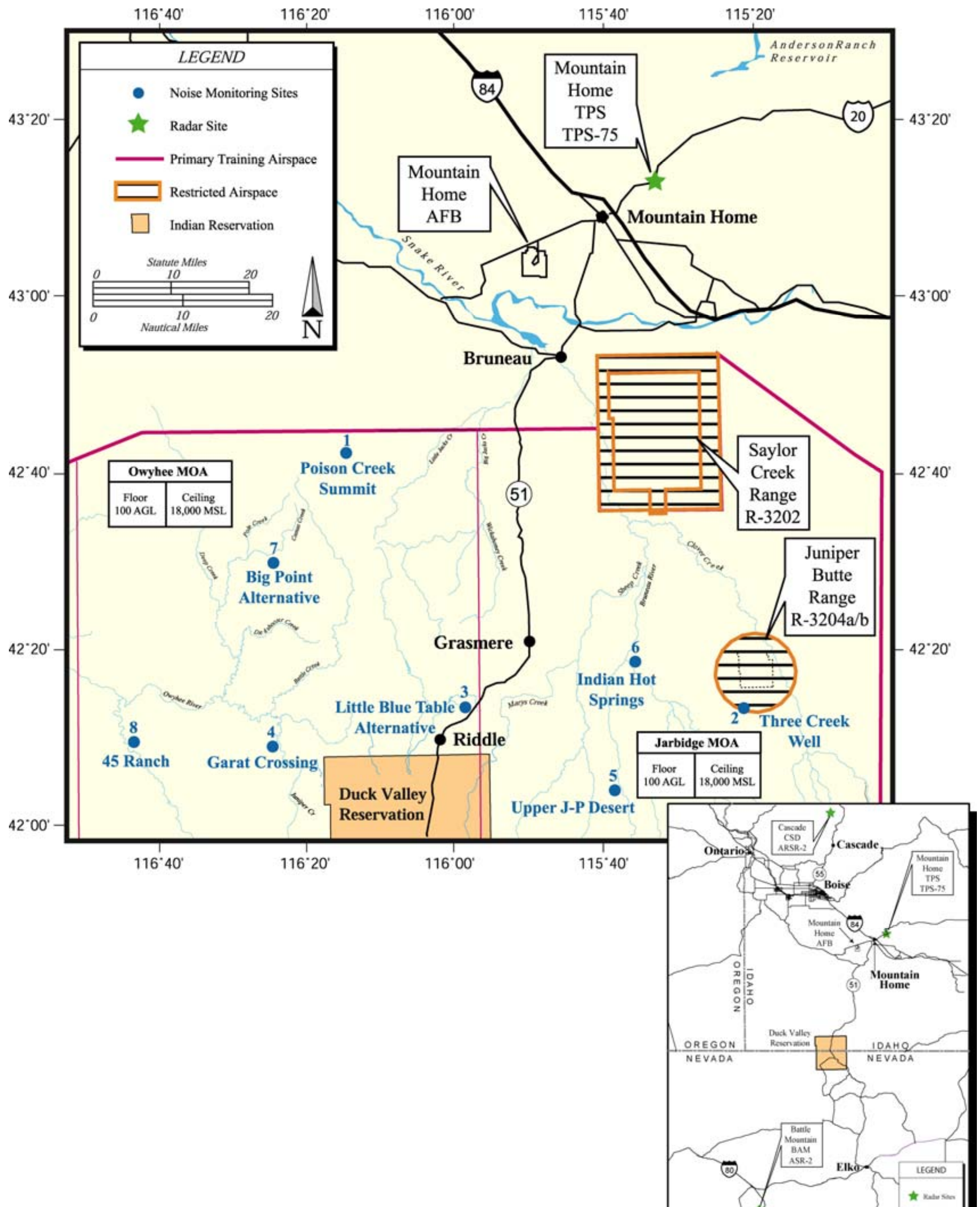

Figure 13: Locations of noise monitoring sites (blue dots) in Jarbidge and Owyhee MOAs, adapted from Fidell et al., 2003.

In military flying, onset rate corrections are required most commonly during high speed, low altitude operations on Military Training Routes (MTRs). MTRs are typically narrow corridors between successive navigation waypoints that are repeatedly flown in the same manner, often at low altitudes, by a few aircraft at most at any one time.

MTR flying does not closely resemble flying in the Mountain Home Range Complex. Multiple aircraft engaged in a variety of training missions occupy the MOAs simultaneously; altitude floors throughout most of the MOAs are 3,000 feet AGL or higher; and flight operations are not confined to well-defined routes, but rather are highly dispersed over vast volumes of airspace. Because the land area underlying the range complex is enormous, and flight activity is highly dispersed throughout much of the complex, direct overflights are extremely rare events from the perspective of an observer at any given point on the ground. Direct overflights of observers at low altitudes in this largely unpopulated area are rarer yet.[8] For all of these reasons, it is highly unlikely *a priori* that an onset rate adjustment is required for any meaningful number of flight operations within the range complex.

METHOD

2.1 Determination of Maximum A-Weighted Aircraft Noise Levels

Maximum A-weighted sound levels recorded by the noise monitors at each site represent the greatest values observed during single one second periods during the many thousands of hours of noise monitoring. Since the monitoring instruments were unattended, they did not distinguish between sounds made by indigenous sources (wind, rain, thunder, hail, insects, birds, cattle, and rustling foliage), artifactual sources (pseudo-noise created by interactions of wind gusts with the microphone diaphragm), and aircraft.

Noise created by non-aircraft sources must be excluded from consideration when identifying maximum A-weighted sound levels due to aircraft operations. Accordingly, a database of hourly noise levels at each monitoring site was screened for the presence of aircraft flight tracks within 10 km of the noise monitors. The greatest one second A-weighted sound levels at each site were then identified by sorting noise levels recorded during noise events corresponding to known flight tracks.

2.2 Determination of Day-Night Average Sound Levels (L_{dn}) and Monthly Onset-Rate Adjusted Day-Night Average Sound Levels (L_{dnmr})

Day-Night Average Sound Levels were calculated by averaging 24 individual predicted Hourly Noise Levels, with the appropriate 10 dB nighttime penalty, at each of the eight noise measurement sites. The HNL values were derived by the same means described in the 2007 Fidell Associates report for computing centile noise levels. This information was next extrapolated to eight additional hypothetical noise monitoring sites at points underlying the expanded airspace to estimate L_{dn} and L_{dnmr} values. Figure 2

[8] Note that Day-Night Average Sound Level is, by definition, a 24 hour measure of cumulative noise exposure. Except in rare cases, individual aircraft operations do not control 24-hour average levels on the ground underlying the range complex. Moreover, an observer on the ground has to remain at a single location for a full 24 hour period to directly experience the Day-Night Average Sound Level at that location.

shows the locations of the original eight monitoring sites, as well as eight additional points underlying the expanded airspace.

For the L_{dnmr} calculation, the entire database of radar flight tracks was sorted by closest points of approach to each noise monitoring site. Calculations were then performed to identify onset rates of any aircraft noise events that exceeded 15 dB/s. This was accomplished by calculating onset rates for all noise events that could be linked to flight tracks approaching within approximately 5 km of a monitoring site. Noise events with onset rates in excess of 15 dB/s could then be then be individually adjusted as specified by the L_{dnmr} calculation, and new hourly noise levels computed as warranted.

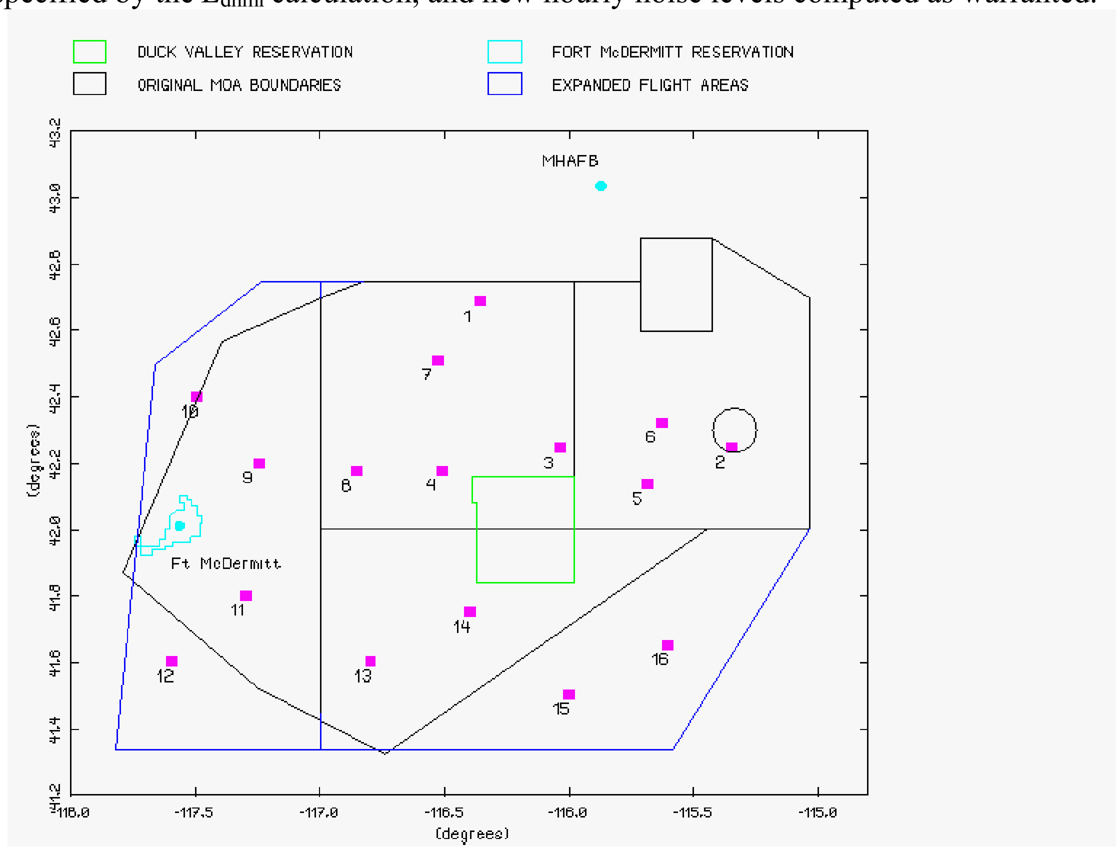

Figure 2: Locations of original noise monitoring sites (red dots numbered 1 through 8) and eight additional points in areas underlying expanded airspace.

RESULTS

Findings of Site-by-Site Screening for Maximum A-weighted Aircraft Noise Levels

Table 1 summarizes the results of screening all recorded noise levels for maximum A-weighted values associated with known radar flight tracks. The second column of Table 1 shows the highest A-weighted noise level recorded during any one second sample at each site while aircraft were known to be in the vicinity of the monitoring instruments. The third column shows the closest points of approach (CPA) of known aircraft flight tracks to the noise monitors during the hours in which the maximum A-weighted sound levels occurred.

Table 1: Maximum A-weighted sound levels during one-second periods that can be associated with known aircraft noise events

SITE	MAXIMUM A-WEIGHTED SOUND LEVELS ASSOCIATED WITH AIRCRAFT FLIGHT TRACKS WITHIN 10 KM OF NOISE MONITOR (dB)	MINIMUM CPA DURING HOUR IN WHICH MAXIMUM A-WEIGHTED NOISE LEVEL WAS MEASURED (km)
1	94	1.9
2	96	4.8
3	113	4.7
4	107	8.1
5	103	2.2
6	103	0.8
7	112	7.2
8	98	9.8

As noted in Section 2.2 of Fidell, White, and Sneddon (2003), flight activity in the airspace of the Owyhee and Jarbidge MOAs at the time of the field measurements was monitored by one Air Force and two FAA surveillance radars. Terrain shielding between these antennas and some low altitude portions (below about 3,000 feet AGL) of the MOAs limited coverage in some areas. Thus, not every monitored noise event could be directly associated with a radar-derived aircraft flight track.

Two one-hour duration periods at Site 1, four periods at Site 2, two at Site 4, and three at Site 8 contained maximum A-weighted sound levels in the absence of known aircraft flight activity within 10 km that were higher than those occurring during intervals that included known flight activity. Each of the eleven sequences of one-second samples that included these maximum levels was individually examined to determine whether the monitored noise event was likely to have been generated by an aircraft.

The examination included a comparison of the maximum noise level with the 99th centile (L_{01})[9] value, the average wind speed during the hour in which the noise level was observed, and the second-by-second sequence of recorded levels in the temporal vicinity of the observed maximum. A *bona fide* subsonic aircraft noise event exhibits relatively

---

9 Hourly L_{01} values represent the sound level present for 36 seconds per hour. The maximum level occurring for one second per hour that is generated by a rapidly moving aircraft is generally within about 20 dB of the L_{01} value for the hour.

small differences between the maximum and L_{01} values, and a characteristic "haystack" temporal pattern.

At monitoring sites 1, 2, 4, and 8, several noise events which did not coincide with known flight tracks, but which had overflight-like temporal patterns, included greater maximum A-weighted values than those shown in Table 1. The maximum A-weighted values for these sites were 104, 108, 113, and 104 dB, respectively.

It is important to recall that the maximum noise levels shown in Table 1 (or alternatively, those at each site which could plausibly have been created by undocumented aircraft activity) lasted approximately eight seconds out of more than 24,000 hours of aircraft noise monitoring. These eight seconds amount to about .0000009% (~8/86,400,000 seconds) of the total duration of noise monitoring. The likelihood that an eight-month long visit to ground locations within the range complex would expose an observer to aircraft noise at the tabulated maximum sound levels (*i.e.*, that a visitor could be in "right" place at the "right" time) is vanishingly small.

Findings of Onset Rate Screening and Calculations

A screening of noise event onset rates was performed by examining noise events where the associated flight track had a small CPA (closest point of approach) value. A total of 107 noise events with flight tracks that approached within 5 km of noise monitors was identified. Noise event onset rates were calculated for each. The mean onset rate for these noise events was 3.8 dB/sec, and the average maximum A-weighted noise level was 77.6 dB. Figure 3 shows the relationship between the maximum A-weighted sound level during noise events associated with military aircraft operations and their onset rates. Even the onset rate of a B-1 approaching monitoring site 6 at a range rate of 476 knots (producing an onset rate of 10.8 dB/sec) fell short of the 15 dB/sec criterion for calculation of an onset rate adjustment.

Figure 3 shows that only a handful of flight tracks out of the 4,600+ known flights over an eight month interval had onset times as much as *half* (7.5 dB/sec) of the threshold value for calculation of onset time corrections. It is therefore very unlikely that unobserved aircraft operations during any single 24-hour period could have been sufficiently numerous, low enough in altitude, and fast enough in airspeed to have meaningfully affected actual Day-Night Average Sound Levels at any given point on the ground underlying the range complex.

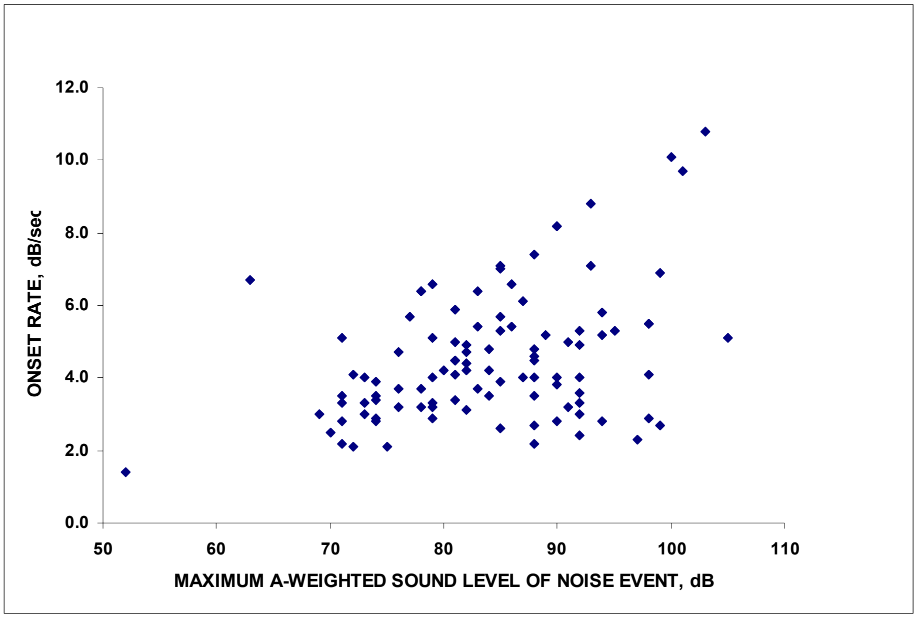

Figure 3: Relationship between maximum A-weighted noise levels and onset rates of monitored military aircraft noise events.

An additional statistical analysis of the radar data was performed to evaluate the likelihood of high-onset rate noise events. Radar flight tracks were separated by aircraft type and geographically masked to their on-range portion, in order to exclude flight activity during departure from and approach to Mountain Home AFB. The distribution of aircraft altitudes was then computed to estimate how much time aircraft spent at different altitudes while on range. The transponder altitudes from each radar track file were then corrected to AGL altitudes using a low-resolution digital elevation map of the range. Figure 4 shows the observed altitude distribution for F15 operations. The bulk (76%) of the time on-range is spent at altitudes between 5000 and 25000 ft AGL. F-15s spend about 15% of their time on range at higher altitudes, but only about 10% of their

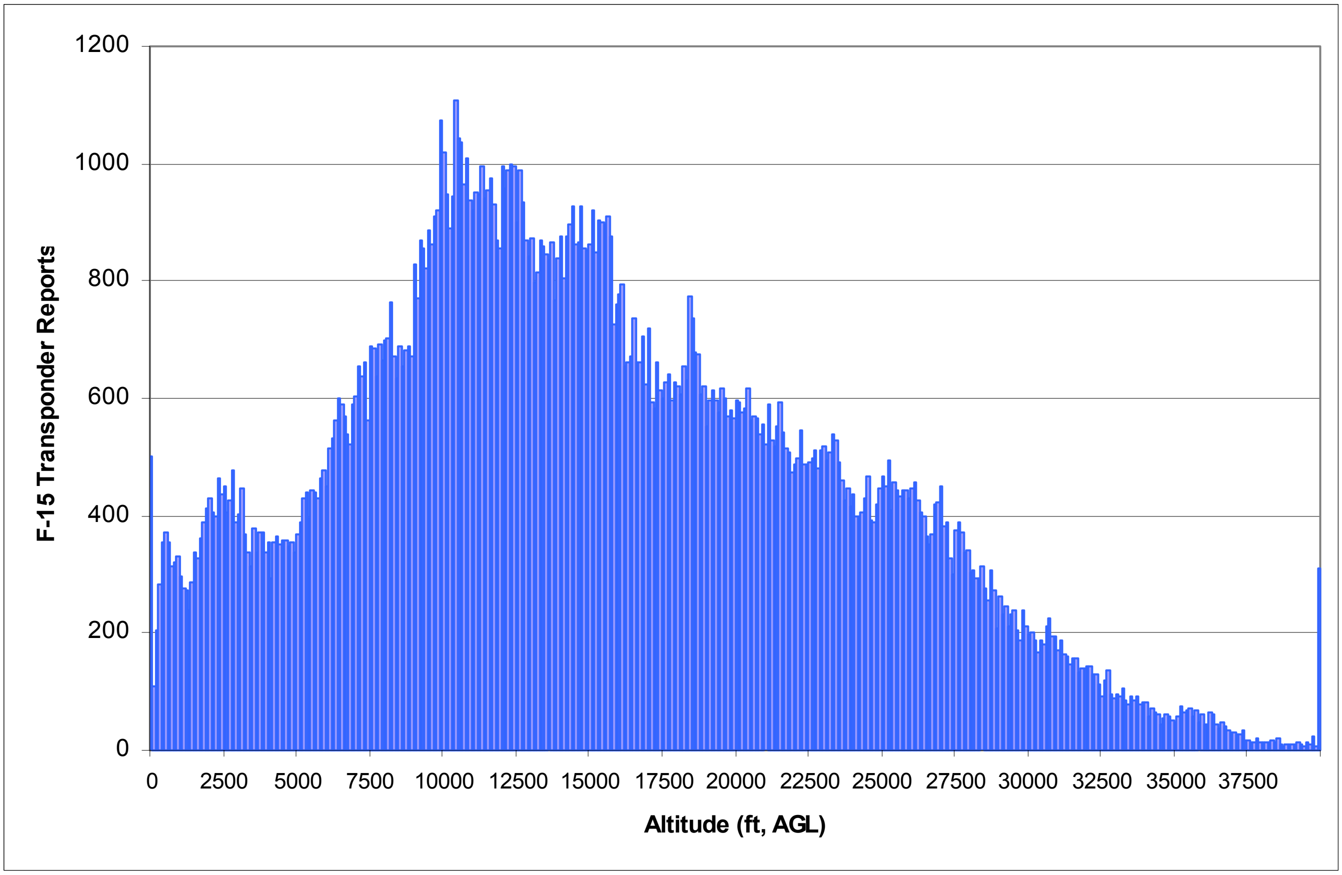

Figure 4 Histogram of F-15 operating altitudes within the Mountain Home Range Complex

time below 5000 ft AGL. Less than 5% of F-15 flight time is spent below 2500 ft AGL while on range. This finding corroborates the rarity of high-onset rate noise events as even direct, high-speed overflights must also occur at sufficiently low altitude to produce onset rates in excess of those needed to trigger onset rate corrections.

Although no aircraft noise event that could be associated with a known flight track met the criterion for calculation of an onset rate adjustment for Day-Night Average Sound levels, it is conceivable that an aircraft not visible to any of the three surveillance radars might have created a noise signature at one of the noise monitors that might have warranted an onset rate correction.

Another noise event screening was therefore conducted, this time searching for the very loudest noise events, irrespective of supporting radar data. This screening revealed only a dozen noise events without associated flight tracks over the entire eight months of noise monitoring in the range complex that 1) had onset rates greater than 15 dB/sec, and 2) could plausibly have been caused by aircraft. Because DNL is a cumulative rather than a single-event noise metric, and because DNL values in the range complex are affected by noise created by multiple aircraft operations, no single aircraft noise event controls the value of a 24-hour time-weighted average noise level, even if the maximum onset rate penalty is added to its sound exposure level.

Even in the highly unlikely event that large enough numbers of very high speed, very low altitude operations had gone unobserved, however, and that the flight tracks of all of these aircraft had managed to converge over the same point on the ground, the land area underlying the range complex is so vast that it is very unlikely that an observer on the ground could be present for a full 24 hour period beneath the hypothetical intersection point of all such flight tracks to actually experience either the L_{dn} or L_{dnmr} value at that point.

Extrapolation of Maximum A-weighted Sound Levels to Expanded Airspace

The maximum one-second duration A-weighted sound level observed at any of the eight monitoring sites operated in 2002 was 113 dB. In the eight months of noise monitoring at these sites, no noise event that could be associated with a radar flight track created any higher sound level, nor did the maximum one-second duration A-weighted sound level of any other noise event that could plausibly have been created by an aircraft unobserved by radar create any higher level. The maximum predicted A-weighted sound levels at any of the expansion sites is thus unlikely to exceed the 113 dB value observed at site 3 as well.

For reasons noted earlier, the likelihood that a visitor to the lands underlying the Mountain Home Range Complex could actually experience a direct overflight capable of creating a one-second maximum A-weighted sound level of 113 dB is vanishingly small.

Extrapolation of DNL Calculations to Expanded Airspace

The calculation of L_{dn} (and by extension, L_{dnmr}) was done in a manner very similar to that previously used to predict the 95th centile (L_{05}) levels. As described in the prior report, a regression relationship relating measured hourly noise levels (HNL) to the number of aircraft approaching within 10 km of the measurement site was served as the basis for estimating $L_{dn.}$ Because L_{dn} employs a 10 dB nighttime weighting ('penalty'), the first step in calculating L_{dn} was to determine the numbers of daytime (0700-2200 local) and nighttime (2200 – 0700 local) flight operations.

Flight track CPA statistics, including time-of-day information, were compiled from all eight measurement sites, and used to segregate the observed flight activity into day and night categories. Of those flight tracks approaching within 10 km of any receiver site, 98.6% were "daytime" operations, and 1.4% were "nighttime" operations (*i.e.*, aircraft on range after 2200 hours local time).

The Day-Night Average Sound Level was calculated by summing the predicted individual hourly levels (including the 10 dB penalty for the nighttime operations) using the same total numbers of flight operations as in the calculations described in the prior report. L_{dn} was then calculated by taking 10 times the logarithm of this day-night sound exposure, averaged over 24 hours.

Table 2 summarizes the predicted levels for each of the 16 points shown in Figure 2. The values of L_{dn} and L_{dnmr} are identical in Table 2 for lack of any evidence (per Section 3.2 of this report) to justify application of an onset rate adjustment. The range of L_{dn} values from site to site is small because aircraft noise events control noise levels at the various sites for only small proportions of the day, and differences between indigenous noise levels at the sites are minor.

Predicted L_{dn} and L_{dnmr} Values				
LOCATION	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Site 1	47.1	46.7	46.7	47.2
Site 2	47.2	47.0	47.0	47.2
Site 3	47.6	46.9	46.9	47.7
Site 4	47.2	46.9	46.9	47.3
Site 5	46.1	46.1	46.1	46.1
Site 6	48.4	47.7	47.7	48.4
Site 7	49.5	48.5	48.5	49.6
Site 8	46.6	46.7	46.7	46.6
Site 9	45.9	46.0	45.9	46.0
Site 10	44.9	44.9	44.9	44.9
Site 11	44.7	45.3	45.2	44.7
Site 12	44.2	44.6	44.6	44.2
Site 13	44.5	45.3	45.2	44.5
Site 14	44.9	45.6	45.5	45.0
Site 15	44.2	44.9	44.9	44.2
Site 16	44.2	45.1	45.0	44.2

Table 2: L_{dn} and L_{dnmr} values at the eight original noise monitoring sites and eight nominal sites in areas underlying expanded airspace.

CONCLUSIONS

The maximum A-weighted sound level associated with an aircraft noise event in land areas underlying the expanded airspace of the Mountain Home Range Complex is unlikely to exceed 113 dB – the highest one-second duration sound level recorded during eight months of noise monitoring in the existing range complex. An aircraft noise-related sound level this great will be an exceedingly rare event that is highly unlikely to be experienced by any visitor to lands underlying the range complex.

Values of both Day-Night Average Sound Levels and Monthly Onset Rate Adjusted Day-Night Average Sound Levels due to aircraft activity will be in the mid-40 dB range throughout the entire area underlying the current and expanded MOA airspace. The likelihood that an observer at any given point on the ground will experience a direct overflight during the course of any casual visit to the area will be negligible. The probability of experiencing a direct overflight at a great enough range rate and a low enough altitude to generate a noise event with a rise time greater than 15 dB/s (the threshold for calculation of an onset rate adjustment) will be vanishingly small.

REFERENCES

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ACC	Air Combat Command
ACM	Air Combat Maneuvers
ACT/TI	Air Combat Tactics/Tactical Intercept
AGL	Above Ground Level
AIM	FAA Aeronautical Information Manual
AIRFA	American Indian Religious Freedom Act
AOPA	Aircraft Owners and Pilots Association
APE	Area of Potential Effect
ARPA	Archaeological Resources Protection Act
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
ATCT	Air Traffic Control Tower
BFM	Basic Flight Maneuvers
BLM	U.S. Bureau of Land Management
BRAC	Base Realignment and Closure
CAA	Clean Air Act
CCD	Census County Divisions
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CO	Carbon Monoxide
CPA	Closest points of approach
DACT	Dissimilar Air Combat Tactics
dB	Decibel
DCA	Defensive Counter Air
DOPAA	Description of the Proposed Action and Alternatives
DVR	Duck Valley Reservation
EA	Environmental Assessment
EAA	Experimental Aircraft Association
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act (of 1973)
FAA	Federal Aviation Administration
FL	Flight Level
FLPMA	Federal Land Policy and Management Act
GA	General Aviation
GCI	Ground Controlled Intercept
GPS	Global Positioning System
H-TNF	Humboldt-Toiyabe National Forest
ICAO	International Civil Aviation Organization
IDFG	Idaho Department of Fish and Game
IFR	Instrument Flight Rules
JBR	Juniper Butte Range
Ldnmr	Onset Rate-Adjusted Monthly Day–Night Average Sound Level
LFE	Large Force Exercise

MACA	Mid-Air Collision Avoidance
MEA	Minimum Enroute Altitudes
MHAFB	Mountain Home Air Force Base
MHRC	Mountain Home Range Complex
MOA	Military Operations Area
MOU	Memorandum of Understanding
MRU	Military RADAR Unit
MSL	Mean Sea Level
MTR	Military Training Route
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NHPA	National Historical Preservation Act
NM	Nautical Miles
NO_2	Nitrogen Dioxide
NPS	National Park Service
NRHP	National Register of Historic Places
O_3	Ozone
OCA	Offensive Counter-Air
ODFW	Oregon Department of Fish and Wildlife
OSHA	Occupational Safety and Health Act
Pb	Lead
PM_{10}	Particulate Matter Equal To or Less than 10 Micrometers
PSD	Prevention of Significant Deterioration
RADAR	Radio Detection and Ranging
RCRA	Resource Conservation and Recovery Act
RNA	Research Natural Area
ROS	Resource Opportunity Spectrum
RSAF	Republic of Singapore Air Force
SAT	Surface Attack Tactics
SCR	Saylor Creek Range
SEL	Sound Exposure Level
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
TCP	Traditional Cultural Properties
TFR	Temporary Flight Restrictions
USAF	U.S. Air Force
USFWS	U.S. Fish and Wildlife Service
VFR	Visual Flight Rules
VOR	Very-High-Frequency Omni-directional Range
VRM	Visual Resource Management
WA	Wilderness Area
WSA	Wilderness Study Area