Final

ENVIRONMENTAL ASSESSMENT
FOR THE
WEST COAST COMBAT SEARCH AND RESCUE (CSAR) BEDDOWN

United States Air Force
Headquarters Air Combat Command

AIR COMBAT COMMAND

June 2002

ACRONYMS AND ABBREVIATIONS

ACAM	Air Conformity Applicability Model
ACC	Air Combat Command
AFB	Air Force Base
AFFTC	Air Force Flight Test Center
AFI	Air Force Instruction
AFRES	Air Force Reserve
AFSC	Air Force Safety Center
AGE	aerospace ground equipment
AGL	above ground level
AMARC	Aerospace Maintenance and Regeneration Center
APCD	Air Pollution Control District
APZ	Accident Potential Zone
AQCR	Air Quality Control Region
AQMD	Air Quality Management District
AR	aerial refueling
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
BAI	Backup Aircraft Inventory
BAM	Bird Avoidance Model
BASH	bird-aircraft/wildlife strike hazard
BEA	Bureau of Economic Analysis
BMGR	Barry M. Goldwater Range
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CATMS	Combat Arms Training and Maintenance Support
CCD	Coastal Consistency Determination
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNEL	Community Noise Equivalent Level
CO	carbon monoxide
CRO	Combat Rescue Officer
CSAR	Combat Search and Rescue
CWA	Clean Water Act
CZ	clear zone
CZMA	Coastal Zone Management Act
dB	decibel
dBA	A-weighted decibel
dB re 1 µPa	decibels with respect to 1 micro-Pascal
DNL	day-night average sound level
DoD	Department of Defense
DZ	drop zone
EA	environmental assessment
EC	Electronic Combat
EIS	environmental impact statement
EO	Executive Order
EOD	Explosive Ordnance Disposal
ERP	Environmental Restoration Program
ESA	Endangered Species Act
ºF	degrees Fahrenheit
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
ft	foot/feet
FY	fiscal year
g	gram
gpm	gallons per minute
IFR	instrument flight rules
IR	Instrument Route
LATN	Low Altitude Tactical Navigation
LEIS	Legislative Environmental Impact Statement
LZ	landing zone
m^3	cubic meter
MCAS	Marine Corps Air Station
mm	millimeter
MOA	Military Operations Area
MRSP	Mobility Readiness Spares Package
MSL	above mean sea level
NAAQS	National Ambient Air Quality Standards
NAS	Naval Air Station
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NM	nautical mile
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NRC	National Research Council
NRHP	National Register of Historic Places
NVG	night vision goggles
NWR	National Wildlife Refuge
O_3	ozone
OPTEMPO/PERSTEMPO	Operations Tempo/Personnel Tempo
PAG	Pima Association of Governments
PAI	Primary Aircraft Inventory
Pb	lead
PCPI	per capita personal income
PJ	Pararescue Jumper
$PM_{2.5}$	particulate matter < 2.5 micrometers in diameter
PM_{10}	particulate matter < 10 micrometers in diameter
ppm	parts per million
ppt	parts per thousand
PSD	Prevention of Significant Deterioration
R3	Range Residue Removal
RCRA	Resource Conservation and Recovery Act
ROI	region of influence
RQS	Rescue Squadron
RWY	runway
SCB	Southern California Bight
SEL	sound exposure level
SERE	Survival, Evasion, Resistance, and Escape
SIP	State Implementation Plan
SITES	Standard Information Topic Exchange Service
SO_2	sulfur dioxide
SO_x	sulfur oxides
SULMA	Special Use Land Management Area
TAC	Tactical
TACTS	Tactical Aircrew Combat Training System
TDY	termporary duty
TPI	total personal income
TRACON	Terminal Radar Approach Control
µg	microgram
$\mu g/m^3$	microgram per cubic meter
USACE	U.S. Army Corps of Engineers
USBC	U.S. Bureau of the Census
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USMC	U.S. Marine Corps
UXO	unexploded ordnance
V	Victor Route
VFR	visual flight rules
VOC	volatile organic compound
VR	Visual Route
WG	Wing
WTA	Water Training Area

FINDING OF NO SIGNIFICANT IMPACT

ENVIRONMENTAL ASSESSMENT
WEST COAST COMBAT SEARCH AND RESCUE BEDDOWN

Proposed Action: The United States Air Force (Air Force), Headquarters Air Combat Command proposes to establish a full complement of Combat Search and Rescue (CSAR) assets at Davis-Monthan Air Force Base (AFB), AZ. The proposed CSAR unit would include 3 squadrons: HC-130 fixed-wing aircraft squadron; HH-60 helicopter squadron; and a Combat-Rescue Officer (CRO)-led squadron that would include CROs, Pararescue Jumpers (PJs), and Survival, Evasion, Resistance, and Escape (SERE) specialists. The Air Force needs more CSAR assets to adequately support worldwide, deployable long-range combat search and rescue of downed aircrew members.

The proposed action would begin in the fall of 2002 and the beddown would be completed by 2007. The action would add 12 HH-60 helicopters, 10 HC-130 fixed-wing aircraft, and 1,059 personnel to Davis-Monthan AFB. Building renovations and construction would be necessary to support the beddown. Training would occur in Low Altitude Tactical Navigation (LATN) areas; portions of the Barry M. Goldwater Range (BMGR) (East Tactical [TAC] Range, North TAC Range [northeast of Crater Range]), and the Yuma Tactical Aircrew Combat Training System (TACTS) Range, and their associated restricted airspace; Jackal Low Military Operations Area (MOA); Sells Low MOA; and the Naval Air Station North Island (NASNI) Water Training Area (WTA) off the coast of San Diego, CA. No changes to airspace structure, management, or scheduling are proposed.

Alternatives Analyzed: Of the 11 alternative beddown locations considered, only 3 were carried forward for detailed analysis in this environmental assessment (EA), in addition to the No-Action Alternative; the Proposed Action, which is to beddown the CSAR unit at Davis-Monthan AFB, AZ, and 2 alternative locations for beddown (Edwards AFB, CA and Vandenberg AFB, CA). Increases in personnel and facility construction/renovation would be required in each of the alternatives other than the No-Action alternative. HC-130 and HH-60 aircraft would conduct training flights from the base, train in associated airspace (sortie operations), and deploy as required. PJs, CROs, and SERE specialists would conduct ground and parachute training at existing ranges, Drop Zones (DZs), Landing Zones (LZs), and Combat Arms Training and Maintenance Support (CATMS) areas.

Environmental Effects: This EA analyzed 15 resource areas for each alternative: airspace, noise, air quality, safety, materials management, earth resources, water resources, terrestrial biological resources, marine biological resources, cultural resources, socioeconomics, environmental justice, land use, recreation and visual resources, and transportation. The analyses conclusion was no significant impacts to any resource area for the proposed action and no action alternative. Both Edwards AFB and Vandenberg AFB alternatives could potentially impact local air quality and would require further extensive analysis to quantify level of significance.

Annual aircraft sorties at Davis-Monthan AFB would increase by 14% (2,750 sorties per year) with implementation of the Proposed Action. Both HH-60s and C-130s are currently assigned to Davis Monthan AFB and no changes to departure or approach procedures would occur. No visual or recreation impacts would be expected. There would be no measurable change in day-night average sound levels (DNL) in the vicinity of Davis Monthan AFB or any alternative and current land uses would not be affected.

The CSAR beddown at Davis-Monthan AFB would require the use of existing airspace and training ranges. Average daily sortie-operations would increase 2% (5 per day) in the BMGR East and North TAC Ranges, 4% (2 per day) in the Yuma TACTS Range, 16% (8 per day) in the Sells Low MOA, 16% (8 per day) in the Jackal Low MOA, and 19% (2 per day) in the NASNI WTA. Increases to airspace sortie-operations would not exceed airspace capacity and no changes would occur in the management, scheduling or structure of any airspace unit. With the exception of the Yuma TACTS range and the NASNI WTA, fighter-type aircraft dominate noise levels and the added operations would not significantly change the noise environment in any airspace analyzed. Existing noise levels for the Yuma TACTS Range and NASNI WTA are dominated by helicopter operations; an increase of 19% in the WTA would result in a DNL change of 1decibel (dB). No significant noise or land use impacts are expected to occur at any of the alternative sites.

Implementation of the Proposed Action at Davis-Monthan AFB would result in long-term increase in stationary and mobile source emissions; however, they would not produce long-term air quality degradation. An air emissions conformity analysis determination is not required since the Proposed Action would not exceed *de minimis* levels for National, Arizona, or California Ambient Air Quality Standards. Both Edwards and Vandenberg areas have failed to meet local air quality criteria, thus the low *de minimus* level of ozone and particulates could be exceeded with a beddown at either location.

Due to the extremely low mishap rates of HH-60s and HC-130s, the number of proposed annual sortie-operations, and implementation of Bird Aircraft Strike Hazard (BASH) reduction procedures, the Proposed Action would not result in increased flight-safety risks. The potential exists for an unexpended marine flare to reach a populated beach near the WTA; however, due to the high reliability rate (90-95 percent) for the type of flares used in association with WTA activities and the large area in which flare drops would occur, the likelihood of a person encountering an unexpended marine flare is very low. Therefore, there would be no significant increases in safety hazards with implementation of any alternative.

Although hazardous waste generated would increase at all of the alternative beddown locations; it would not affect waste generator status and no changes to existing hazardous waste disposal procedures would be required. Non-hazardous solid waste generated as a result of construction and increases in personnel would be disposed of in existing landfills or recycled. Debris from weapons training on tactical ranges will continue to be cleaned up and disposed of by explosive ordnance disposal (EOD) teams in accordance with current Air Force requirements and regulations.

No significant impacts to earth or water resources would occur as a result of the Proposed Action or alternatives. Soils would be disturbed as a result of construction activities associated with all alternatives but no significant impacts would result since construction would occur in previously disturbed areas. No unique geologic features or hazards are present at any alternative beddown location. No impacts to ground water would occur under the Proposed Action or Alternative A, and less than significant impacts would occur under Alternative B as a result of construction. No cultural resources have been identified in the vicinity of proposed construction or on any of the training ranges proposed for use under the Proposed Action or alternatives; therefore, no significant impacts to cultural resources would occur.

There would be no significant impacts to terrestrial biological resources with the implementation of the Proposed Action or alternatives. All current Air Force and U.S. Marine Corps regulations and requirements concerning sensitive biological resources within the BMGR and Yuma TACTS Range would be adhered to under the Proposed Action. Training activities associated with the Proposed Action or alternatives will, as detailed in the EA, do everything possible to avoid harassing marine mammals and sea turtles within the WTA. However, even potential indirect impacts will not significantly affect any marine biological resource. Informal consultations with the Arizona U.S. Fish and Wildlife Service, California National Marine Fisheries Service, and California Coastal Commission have been initiated; no issues have been identified that would change the findings of this analysis or require formal consultation. We await official documentation to update the original record confirming the information provided by these agencies.

With implementation of either the Proposed Action or Alternative A, the population within the region of influence (ROI) would increase by less than 1 percent. The population of the ROI of Alternative B would increase by 9%. These increases would not have a significant impact on employment, education, housing, health services, public services and utilities, or transportation under any alternative. Implementation of the Proposed Action or alternatives would not result in adverse impacts in any resource area that would, in turn, be expected to disproportionately affect minority and low-income communities or children.

The EA reviewed cumulative impacts from federal, state, and local projects, which could result from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions. Review of potential environmental impacts of these programs, combined with the Proposed Action or alternatives, indicates that no significant cumulative impacts would occur from these actions.

Findings: On the basis of the findings of the EA conducted in accordance with the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations, and Air Force Instruction (AFI) 32-7061, and after careful review of the potential impacts of the Proposed Action and alternatives, I conclude that implementation of either Alternative A (beddown at Edwards AFB, CA) or Alternative B (beddown at Vandenberg AFB, CA) would have the potential impacts to regional air quality, and additional detailed analysis would be required to determine the level of significance. I also conclude that implementation of the Proposed Action and No-Action Alternative would not result in a significant impact on the quality of the human or natural environment with respect to the level of impacts. Therefore, issuance of a FONSI is warranted, and an environmental impact statement (EIS) is not required for these options.

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27 Jun 02

Date

EXECUTIVE SUMMARY

This environmental assessment (EA) evaluates the potential environmental impacts of a proposed U.S. Department of the Air Force (Air Force) beddown of a Combat Search and Rescue (CSAR) unit in the western U.S. The Proposed Action would:

- Establish a CSAR organization composed of collocated HH-60, HC-130, and Combat Rescue Officer (CRO)-led squadrons at Davis-Monthan Air Force Base (AFB). The CRO squadron would include CROs; Pararescue Jumpers (PJs); and Survival, Evasion, Resistance, and Escape (SERE) specialists. This would add a total of 12 HH-60 helicopters, 10 HC-130 aircraft, and 1,059 manpower authorizations to Davis-Monthan AFB;
- Renovate existing facilities and construct new facilities at Davis-Monthan AFB to accommodate CSAR squadron operations and maintenance activities for HH-60 and HC-130 aircraft;
- Conduct overwater training operations at an existing Water Training Area (WTA) off the coast of San Diego, California, utilizing sea dye markers, lightsticks, and marine flares (Figure 2-3);
- Conduct sortie-operations by HH-60 and HC-130 aircraft within the Sells Low Military Operations Area (MOA), Jackal Low MOA, 305 East and West Low Altitude Tactical Navigation (LATN) areas, portions of Barry M. Goldwater Range (BMGR) and associated Restricted Areas (R-2301E, R-2305, and R-2304), and the Yuma Tactical Aircrew Combat Training System (TACTS) Range (R-2301W);
- Conduct sortie-operations within approved areas at BMGR and Yuma TACTS Range with chaff, self-protection flares, and illumination flares;
- Conduct HH-60 weapons training operations within previously approved target areas at the BMGR (the northeastern corner of North Tactical (North TAC) Range of R-2301E and the East TAC Range of R-2304) involving M-18 smoke grenades and aircraft-mounted 7.62-mm and .50-cal machine guns;
- Conduct aerial refueling operations between HH-60 and HC-130 aircraft in the Sells Low and Jackal Low MOAs; and
- Conduct ground and parachute training for CSAR personnel (i.e., PJs, CROs, and SERE specialists) within previously approved ranges, Drop Zones (DZs), Landing Zones (LZs), and Davis-Monthan AFB Combat Arms Training and Maintenance Support (CATMS) areas.

ENVIRONMENTAL IMPACT ANALYSIS PROCESS

This EA was prepared by the Air Force, Headquarters Air Combat Command (HQ ACC) in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations implementing NEPA, and Air Force Instruction (AFI) 32-7061. The environmental impact analysis process for the Proposed Action and alternatives includes the following steps:

- Collect data for the existing environment and assess the potential impacts of the Proposed Action and alternatives;
- Prepare and distribute a Draft EA for public and agency review and comment;
- Prepare and distribute a Final EA, incorporating comments received on the Draft EA; and
- Publish a Finding of No Significant Impact (FONSI), if appropriate, which summarizes the results of the EA analysis.

PURPOSE AND NEED FOR THE ACTION

The purpose of the Proposed Action is to establish within the western U.S. an active duty Air Force CSAR unit consisting of HH-60 helicopters, HC-130 refueling aircraft, and associated CSAR personnel including PJs, CROs, and SERE specialists. Currently the only active duty Air Force CSAR with a full complement of CSAR assets is located at Moody AFB, Georgia. The 66th Rescue Squadron (66 RQS) at Nellis AFB, Nevada, is the only active duty Air Force unit with CSAR assets in the western U.S. However, the squadron consists of only HH-60 helicopters and an aerial refueling support squadron of HC-130 aircraft and CSAR personnel (e.g., PJs, SERE specialists) are not associated with the 66 RQS. This limits the overall CSAR capability in the region.

The primary mission of the proposed CSAR unit is to provide worldwide, deployable long-range combat search and rescue of downed aircrew members. Secondary missions include providing air rescue capability for the installation at which the unit is located and long-range civilian search and rescue capability for the region. These complex missions require distinct tasks and skills that involve frequent, repetitive training to maintain combat proficiency. Successful combat employment of CSAR assets requires proficiency in numerous training events. For example, aerial refueling is critical to achieving the extended ranges required for combat rescue missions on today's battlefield, and water operations, whether conducted during day or night, are vital to both combat and peacetime search and rescue capabilities.

ALTERNATIVES TO THE PROPOSED ACTION

This EA analyzes the potential impacts of implementing the Proposed Action and 3 alternatives, including the No-Action Alternative:

- Alternative A: establishment of CSAR unit at Edwards AFB.
- Alternative B: establishment of CSAR unit at Vandenberg AFB.
- Alternative C (No-Action Alternative): CSAR unit is not established at an Air Force installation in the western U.S.

Alternative A: CSAR Beddown at Edwards AFB

Alternative A consists of:

- the establishment of a CSAR unit and the beddown of the associated HH-60 and HC-130 aircraft and personnel at Edwards AFB;
- conducting overwater training operations at an existing WTA off the coast of San Diego, California, utilizing sea dye markers, lightsticks, and marine flares;
- conducting sortie-operations by HH-60 and HC-130 aircraft within the Isabella and Owens MOAs, Restricted Areas associated with the Edwards Complex (R-2508 and R-2515), China Lake Ranges (R-2505 and R-2524), and Fort Irwin Range (R-2502N);
- conducting sortie-operations within approved areas at China Lake and Fort Irwin Ranges with chaff, self-protection flares, and illumination flares;
- conducting aerial refueling operations between HH-60 and HC-130 aircraft in Aerial Refueling (AR) tracks located within the Edwards Complex; and
- conducting ground and parachute training for CSAR associated personnel (i.e., PJs, CROs, and SERE specialists) within previously approved DZs, LZs, and Edwards AFB CATMS areas.

Though changes in airspace use would occur upon implementation of Alternative A, there would be no changes to the structure of any airspace or range used by Edwards AFB aircrews. As part of Alternative A, building renovations and construction at Edwards AFB would be necessary to support CSAR operations. In addition, 1,200 manpower authorizations would be added to Edwards AFB.

Alternative B: CSAR Beddown at Vandenberg AFB

Alternative B consists of:

- the establishment of a CSAR unit and the beddown of the associated HH-60 and HC-130 aircraft and personnel at Vandenberg AFB;
- conducting overwater training operations at an existing WTA off the coast of San Diego, California, utilizing sea dye markers, lightsticks, and marine flares;
- conducting sortie-operations by HH-60 and HC-130 aircraft within the Hunter MOAs, Fort Hunter Liggett Range and China Lake Electronic Combat Range and associated Restricted Areas (R-2513 and R-2524, respectively);
- conducting sortie-operations within approved areas at China Lake and Fort Hunter Liggett Ranges with chaff, self-protection flares, and illumination flares;
- conducting aerial refueling operations between HH-60 and HC-130 aircraft in AR tracks AR-242V and AR-243V; and
- conducting ground and parachute training for CSAR associated personnel (i.e., PJs, CROs, and SERE specialists) within previously approved DZs, LZs, and Vandenberg AFB CATMS areas.

Though changes in airspace use would occur upon implementation of the Alternative B, there would be no changes to the structure of any airspace or range used by Vandenberg AFB aircrews. As part of Alternative B, building renovations and construction at Vandenberg AFB would be necessary to support CSAR operations. In addition, 1,200 manpower authorizations would be added to Vandenberg AFB.

Alternative C: No-Action Alternative

Alternative C is the No-Action Alternative, under which the establishment of the CSAR unit; beddown of HH-60 and HC-130 aircraft and associated personnel; construction and renovation of facilities; and proposed changes in airspace utilization of MOAs, LATN areas, AR tracks, ranges, restricted areas, WTA, LZs, and DZs would not occur.

SUMMARY OF ENVIRONMENTAL IMPACTS

This EA provides an analysis of the potential environmental impacts resulting from implementation of the Proposed Action or 3 alternatives. Fifteen resource categories were thoroughly evaluated to identify potential environmental impacts. As shown in Table ES-1, implementation of the Proposed Action or the No-Action Alternative (Alternative C) would not result in significant impacts to any resource area. Potentially significant impacts to air quality could occur with implementation of either Alternative A or B; however, further detailed analysis would be required. For all other resource areas, implementing the Proposed Action or any alternative would not substantially change baseline environmental conditions at Davis-Monthan AFB, Edwards AFB, Vandenberg AFB, or the region of influence associated with each alternative.

Table ES-1. Potential Impacts of CSAR Beddown: Proposed Action and Alternatives

Resource	*Proposed Action: Davis-Monthan AFB*	*Alternative A: Edwards AFB*	*Alternative B: Vandenberg AFB*	*Alternative C: No-Action*
Airspace	❍	❍	❍	❍
Noise	❍	❍	❍	❍
Air Quality	❍	ω	ω	❍
Safety	❍	❍	❍	❍
Materials Management	❍	❍	❍	❍
Earth Resources	❍	❍	❍	❍
Water Resources	❍	❍	❍	❍
Terrestrial Biological Resources	❍	❍	❍	❍
Marine Biological Resources	❍	❍	❍	❍
Cultural Resources	❍	❍	❍	❍
Socioeconomics	❍	❍	❍	❍
Environmental Justice	❍	❍	❍	❍
Land Use	❍	❍	❍	❍
Recreation and Visual Resources	❍	❍	❍	❍
Transportation	❍	❍	❍	❍

Classifications: ❍ = No significant impacts; ω = Potentially significant impacts; further detailed analysis would be required;
● = Significant impacts.

Final

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June 2002

United States Air Force
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Final
CSAR – WEST BEDDOWN EA

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1.1 INTRODUCTION

This environmental assessment (EA) evaluates the potential environmental impacts of a proposed U.S. Department of the Air Force (Air Force) beddown of a Combat Search and Rescue (CSAR) unit in the western U.S. This EA has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA); Council on Environmental Quality (CEQ) regulations; and Air Force Instruction (AFI) 32-7061, *The Environmental Impact Analysis Process*, as promulgated at 32 Code of Federal Regulations (CFR) Part 989.

1.2 PURPOSE AND NEED

The purpose of the Proposed Action is to establish within the western U.S. active duty Air Force CSAR assets consisting of HH-60 helicopters, HC-130 refueling aircraft, and associated CSAR personnel. Currently the only active duty Air Force CSAR unit with a full complement of CSAR assets is located at Moody Air Force Base (AFB), Georgia. No similar CSAR assets are available within the western U.S. The 66th Rescue Squadron (66 RQS) at Nellis AFB, Nevada, is the only active duty Air Force unit with CSAR capabilities in the western U.S. However, the squadron consists of only HH-60 helicopters and an aerial refueling support squadron of HC-130 aircraft is not associated with the 66 RQS. This limits the overall CSAR capability in the region.

The primary mission of the proposed CSAR unit is to provide worldwide, deployable long-range combat search and rescue of downed aircrew members. Secondary missions include providing air rescue capability for the installation at which the unit is located and long-range civilian search and rescue capability for the region. These complex missions require distinct tasks and skills that involve frequent, repetitive training to maintain combat proficiency. Successful combat employment of CSAR assets requires proficiency in numerous training events. Aerial refueling is critical to achieving the extended ranges required for combat rescue missions on today's battlefield. Water operations, whether conducted during day or night, are vital to both combat and peacetime rescue capabilities.

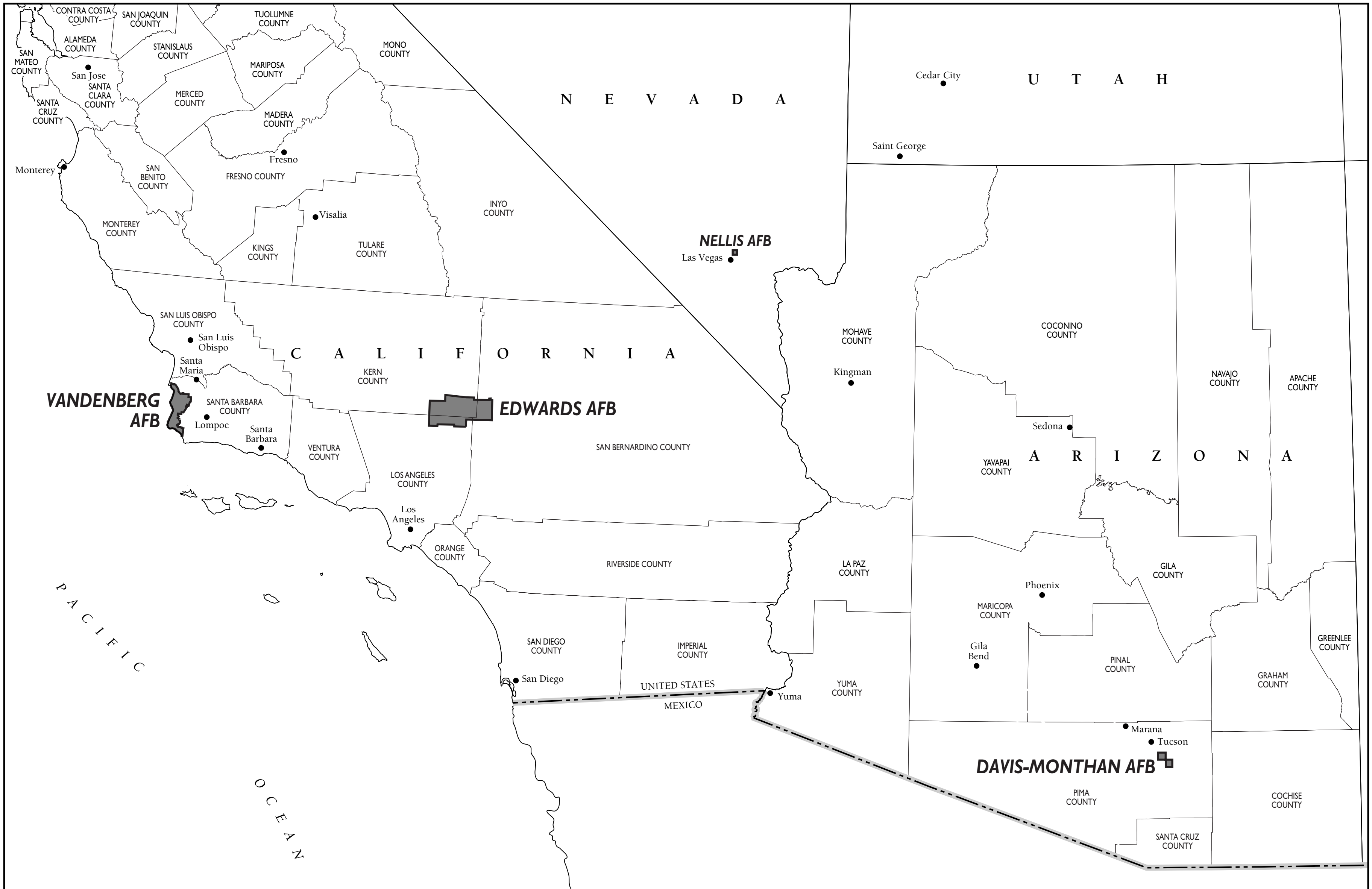
2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

This EA evaluates the potential environmental impacts of a proposed Air Force beddown of a CSAR unit in the western U.S. Three alternative basing locations for the beddown of the CSAR unit have been identified: Davis-Monthan AFB, Arizona; Edwards AFB, California; and Vandenberg AFB, California (Figure 2-1). Each of these bases meets the selection criteria (discussed below) that were applied to identify reasonable CSAR beddown alternative locations to carry forward for analysis in this EA. The No-Action Alternative, also described in this chapter, reflects the status quo, that is, not basing the CSAR assets at any of these 3 bases at this time. CEQ regulations require analysis of the No-Action Alternative (40 CFR 1502.14[d]).

2.1 SELECTION CRITERIA

The identification of suitable bases for the beddown of a CSAR organization followed a 2-step process (Air Force 2001a). In Step 1, the operational and physical elements needed to support the CSAR program were defined by the Air Force. These elements were analyzed and 6 requirements were identified for a base to be considered a viable and reasonable location for the beddown of a CSAR organization:

1. *Air Force Base in the Western U.S.* As an Air Force asset and responsibility, the CSAR assets need to be located at an active duty Air Force Base to maintain positive command and control and mission priority. In addition, they need to be in a secure location within the contiguous U.S. to provide overall command, maintenance, data collection, upgrades, and training.
2. *Existing Training Requirements*. To support effective crew training without incurring unnecessary Operations Tempo/Personnel Tempo (OPTEMPO/PERSTEMPO) burdens or temporary duty (TDY) costs, any suitable alternative base must be located such that the HC-130s can support existing helicopter aerial refueling training requirements at Nellis AFB, Las Vegas, Nevada, within their normal tactical training flight profile (Figure 2-1).
3. *Runway Capacity*. CSAR assets include pararescue personnel and specially configured HH-60 and HC-130 aircraft. A suitable installation must be able to support HH-60 and HC-130 operational, maintenance, and storage requirements. In addition, CSAR aircraft will be deployed overseas when necessary. To support these deployments, equipment, personnel, and HH-60 aircraft will need to be transported to the overseas location. This requires large cargo/transport aircraft (e.g., C-5s, C-17s) to land and takeoff from the main operating base. Therefore, any suitable beddown location must include a runway capable of handling these types of aircraft.
4. *Accommodate Initial Beddown*. Any suitable candidate base must have existing ramp space to accommodate HC-130 and HH-60 aircraft parking. Suitable bases must also have available facilities or space for temporary structures to beddown the units until permanent buildings, facilities, and infrastructure can be constructed.
5. *Accommodate Final Buildup*. To meet the beddown requirements, any suitable candidate base must have available buildings, facilities, housing, and infrastructure (or the space to expand or develop the buildings, facilities, housing, and infrastructure) needed for the CSAR aircraft, a full complement of operations and maintenance personnel, as well as equipment.



0 Statute Miles 70

0 Nautical Miles 70

Figure 2-1
Location Map
Davis-Monthan AFB, Arizona; Edwards AFB, California; and Vandenberg AFB, California

6. *Training Areas*. To support unit training requirements, any suitable candidate base must be located near training areas and ranges allowing HC-130 and HH-60 crews and Pararescue personnel to complete required training events with minimal negative impact on OPTEMPO/PERSTEMPO, and minimal TDY costs. Ideally, suitable alternative bases should be near enough to training areas and ranges to complete required training events within a normal tactical crew duty day.

In Step 2, the 6 requirements were used to assess candidate bases. A total of 11 Air Force installations were initially considered: Beale AFB, California; Vandenberg AFB, California; Edwards AFB, California; Travis AFB, California; Davis-Monthan AFB, Arizona; Luke AFB, Arizona; Hill AFB, Utah; Holloman AFB, New Mexico; Kirtland AFB, New Mexico; Mountain Home AFB, Idaho; and Nellis AFB, Nevada. Table 2.1-1 summarizes the results of this 2-step evaluation process.

Table 2.1-1. Summary of Alternative Identification Process

Requirement	*Candidates Eliminated*	*Candidates Remaining*
1. Air Force Base	0	11
2. Existing training requirements	0	11
3. Runway capacity	0	11
4. Accommodate initial beddown	8	3
5. Accommodate final buildup	0	3
6. Training areas	0	3
Total	**8**	**3**

Source: Air Force 2001a.

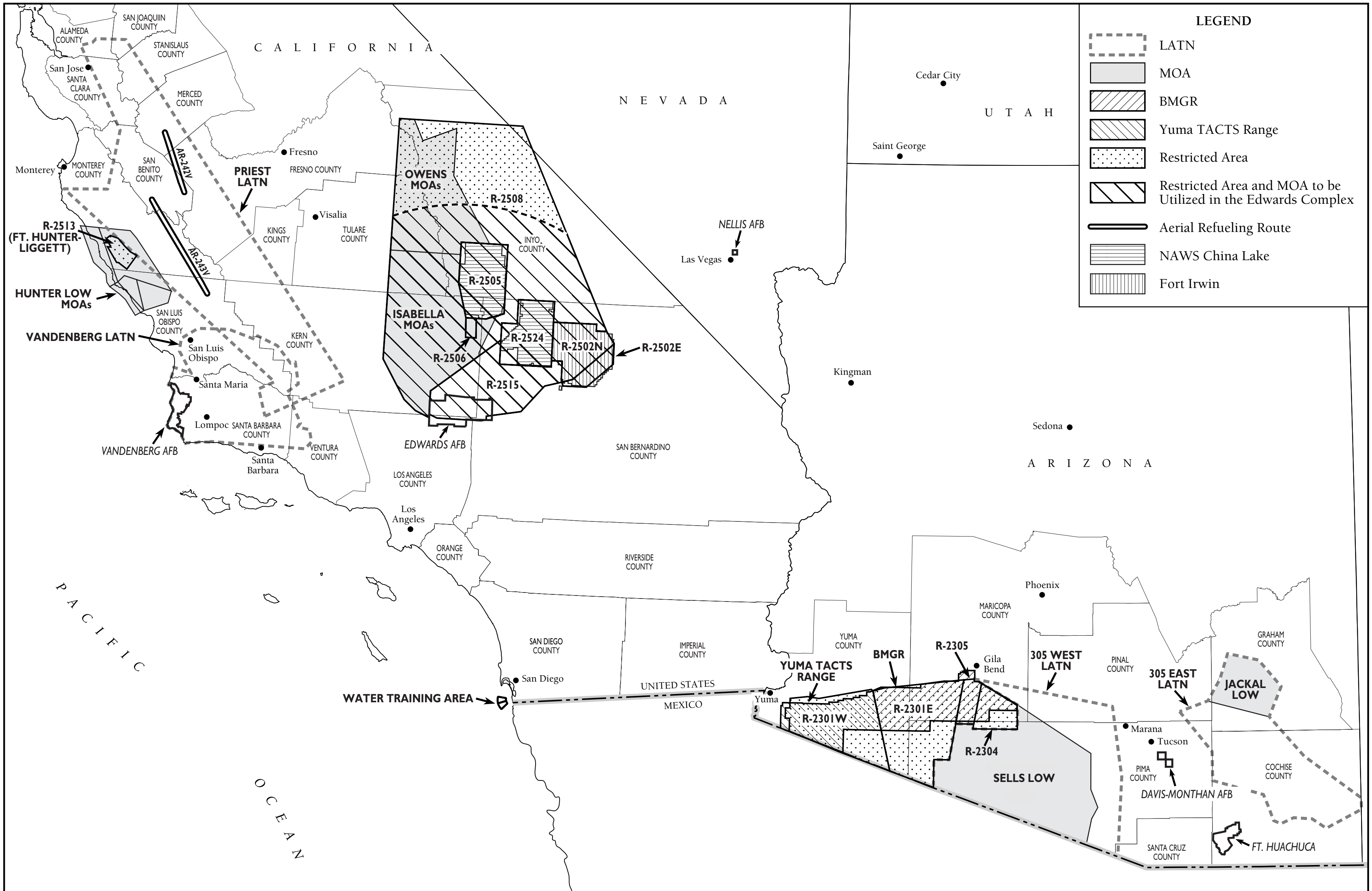
Based on this identification and evaluation process, 3 bases were identified that met the requirements and warranted full analysis in this EA: Davis-Monthan AFB, Arizona; Edwards AFB, California; and Vandenberg AFB, California (Figures 2-1 and 2-2). Sections 2.2 and 2.3 describe the Proposed Action and alternatives, including the No-Action Alternative, that were carried forward for analysis within this EA.

2.2 PROPOSED ACTION

2.2.1 CSAR BEDDOWN AT DAVIS-MONTHAN AFB

Under implementation of the Proposed Action, the Air Force proposes to:

- Establish a CSAR organization composed of collocated HH-60, HC-130, and Combat Rescue Officer (CRO)-led squadrons at Davis-Monthan AFB (Figure 2-3). The CRO squadron would include CROs; Pararescue Jumpers (PJs); and Survival, Evasion, Resistance, and Escape (SERE) specialists. This would add a total of 12 HH-60 helicopters, 10 HC-130 aircraft, and 1,059 manpower authorizations to Davis-Monthan AFB;
- Renovate existing facilities and construct new facilities at Davis-Monthan AFB to accommodate CSAR squadron operations and maintenance activities for HH-60 and HC-130 aircraft;
- Conduct overwater training operations at an existing Water Training Area (WTA) off the coast of San Diego, California, utilizing sea dye markers, lightsticks, and marine flares (Figure 2-3);



0 *Statute Miles* 70

0 *Nautical Miles* 70

Figure 2-2
Affected Airspace

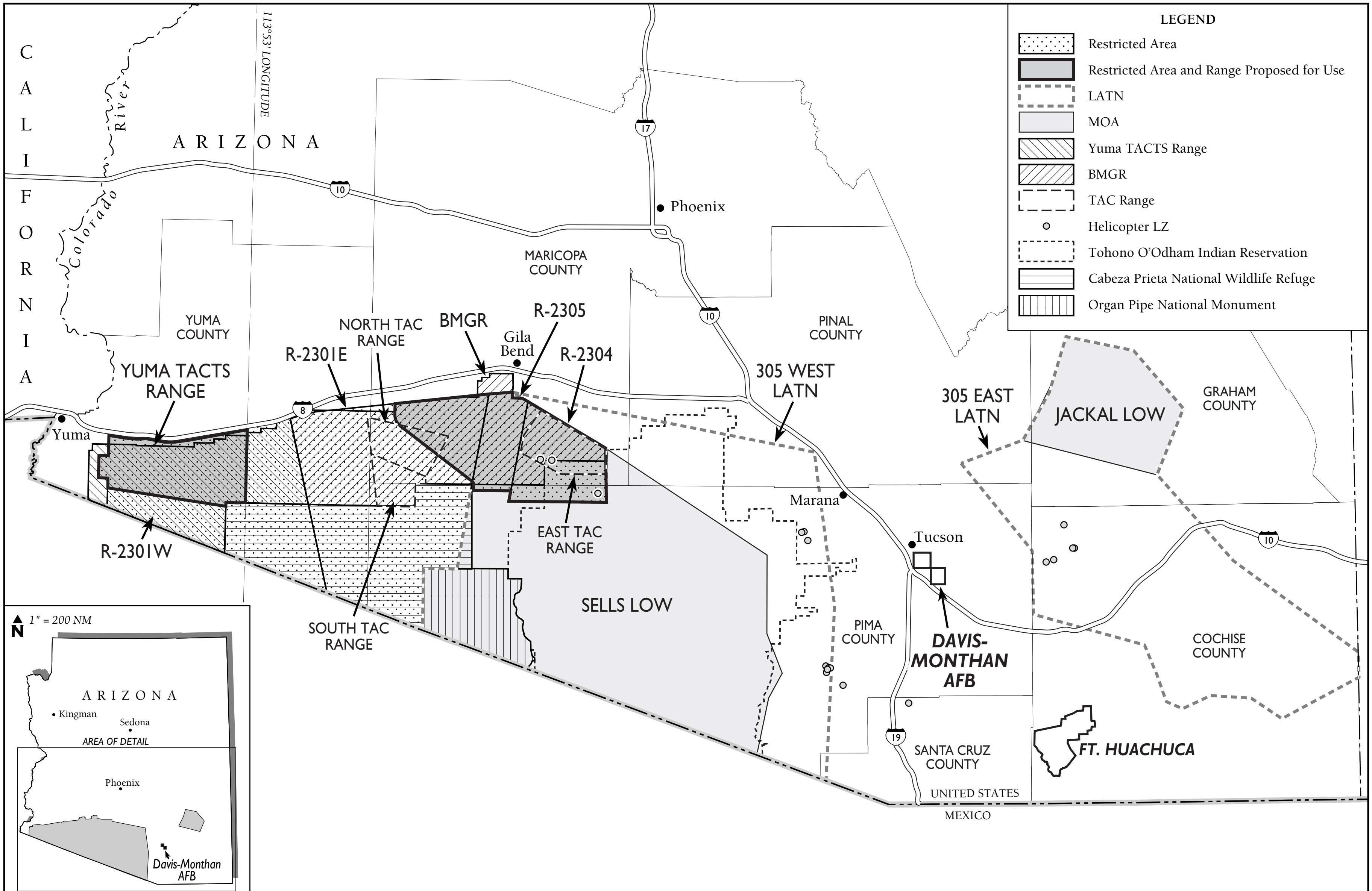


Figure 2-3
Proposed Action: CSAR Beddown at
Davis-Monthan AFB and Affected Airspace

- Conduct sortie-operations by HH-60 and HC-130 aircraft within the Sells Low Military Operations Area (MOA), Jackal Low MOA, 305 East and West Low Altitude Tactical Navigation (LATN) areas, Barry M. Goldwater Range (BMGR) and associated Restricted Areas (R-2301E, R-2305, and R-2304), and the Yuma Tactical Aircrew Combat Training System (TACTS) Range (R-2301W) (Figure 2-3);
- Conduct sortie-operations within approved areas at BMG and Yuma TACTS Ranges with chaff and self-protection flares;
- Conduct HH-60 weapons training operations within previously approved target areas at the BMGR (the northeastern corner of the North Tactical (TAC) Range of R-2301E and the East TAC Range of R-2304) involving M-18 smoke grenades and aircraft-mounted 7.62-mm and .50-cal machine guns;
- Conduct aerial refueling operations between HH-60 and HC-130 aircraft in the Sells Low and Jackal Low MOAs; and
- Conduct ground and parachute training for CSAR personnel (i.e., PJs, CROs, and SERE specialists) within previously approved ranges, Drop Zones (DZs), Landing Zones (LZs), and Davis-Monthan AFB Combat Arms Training and Maintenance Support (CATMS) areas.

Under the Proposed Action, the beddown at Davis-Monthan AFB would begin with the standup of the first CSAR units (including personnel and aircraft) in fiscal year 2003 (FY03). The proposed beddown of CSAR assets and all construction/renovation activities would be completed by FY07. The proposed changes in airspace use would not require any changes to the structure or permitted activities of any airspace or range currently used by Davis-Monthan AFB.

2.2.1.1 Davis-Monthan AFB

Davis-Monthan AFB borders the City of Tucson in Pima County, Arizona, and falls within the city limits of Tucson except for the southeastern portion of the base (Figure 2-4). The base comprises approximately 10,700 acres of federally owned land, of which 5,700 acres are developed or semi-improved, 4,700 acres are undeveloped, and 300 acres are under easement to and maintained by Pima County.

Davis-Monthan AFB is the home of the 355th Wing (355 WG) which is part of Air Combat Command (ACC). The primary mission of the 355 WG is to provide unified theatre commanders with world-wide deployable combat-ready A-10 close air support; OA-10 forward air controller support, command and control warfare capability; airborne battlefield air attack management; and early warning surveillance and radar control of combat aircraft near the forward battle area. Major associate units at Davis-Monthan AFB include Headquarters 12th Air Force, the 305 RQS of the Air Force Reserve (AFRES), the Aerospace Maintenance and Regeneration Center (AMARC), and U.S. Customs. AMARC provides a single location to process and maintain aircraft and components being stored by all services.

2.2.1.2 Personnel Changes

Davis-Monthan AFB currently supports 8,710 full-time military and civilian personnel. A total of 1,059 manpower authorizations would be added (132 officer and 927 enlisted) with the beddown of the CSAR squadrons at Davis-Monthan AFB. Therefore, implementation of the Proposed Action would result in a 12 percent increase in personnel compared to baseline conditions (Table 2.3-1).

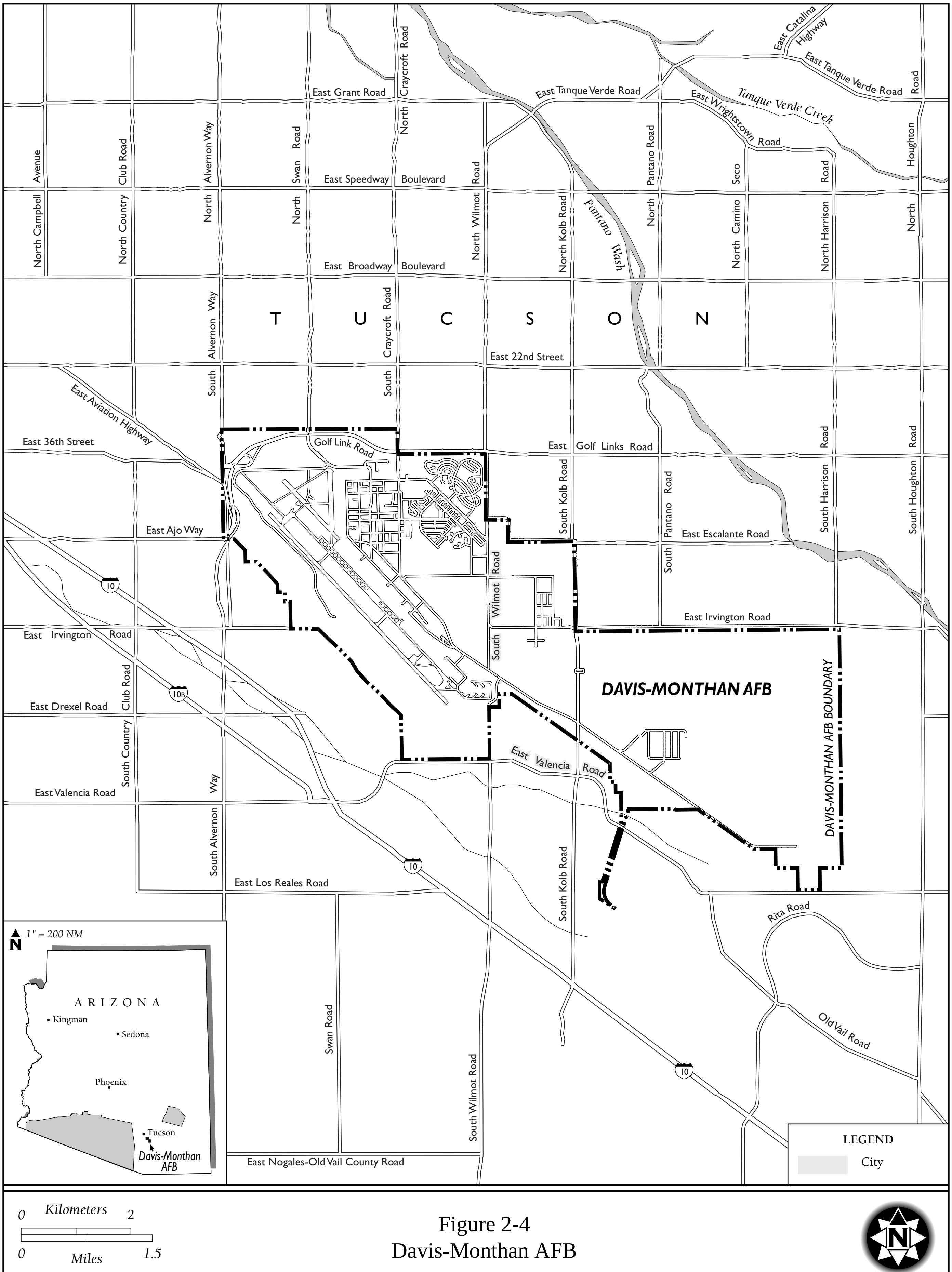


Figure 2-4
Davis-Monthan AFB

Table 2.3-1. Changes in Personnel Authorizations at Davis-Monthan AFB under the Proposed Action

Personnel	*Baseline/No-Action Alternative*	*Alternative A*	*Change due to CSAR Beddown*
Officer	863	995	132
Enlisted	5,276	6,203	927
Civilian	2,571	2,571	0
Total	**8,710**	**9,769**	**1,059**

Source: Air Force 2001a.

2.2.1.3 Construction and Renovation Projects

Implementation of the Proposed Action would require the modification and construction of several facilities in order to meet the operational and maintenance requirements for the HH-60 and HC-130 aircraft and associated CSAR personnel. Table 2.3-2 describes the proposed construction and renovation program and Figure 2-5 shows the location of the proposed projects at Davis-Monthan AFB.

Table 2.3-2. Proposed Construction and Renovation Projects at Davis-Monthan AFB under the Proposed Action

Project	*Proposed Use*	*Area (square ft)*
1. Parachute Shop addition/repair	Maintain and repair parachutes.	1,400
2. Benson Tank Storage	Storage of HC-130 removable fuel tanks.	4,000
3. HH-60 2-Bay Hangar/MX	Maintain and service HH-60 aircraft and associated weapons systems.	26,000
4. Demolition of existing building and construction of HH-60 Squadron Operations/AMU	Planning, briefing, and supporting HH-60 operations personnel, maintaining life support and mobility equipment, and provide crew rooms and locker space.	28,000
5. CRO-led Rescue Squadron Facility	Support administrative, training, and equipment maintenance and storage requirements.	50,000
6. HH-60 parking apron/taxiway shoulders	Parking for maintenance and preflight operations of HH-60 aircraft.	378,233
7. HC-130 Squadron Operations/AMU	Planning, briefing, and supporting HC-130 operations personnel, maintaining life support and mobility equipment, and provide crew rooms and locker space.	42,000
8. Mobility Readiness Spares Package (MRSP) Warehouse	Warehouse to store spare parts for CSAR-associated aircraft.	15,000
9. C-130 Hangar/MX	Maintain and service C-130 aircraft.	29,000
10. Benson Tank Test Facility	Testing and servicing Benson Tanks.	1,500
11. Rotor Fabrication Shop	Service and repair HH-60 rotors.	1,000
12. HC-130 Parking Apron	Parking for maintenance and preflight operations of HC-130 aircraft.	60,000

Notes: *Project numbers correspond to locations depicted in Figure 2-5.
Source: Air Force 2001a.

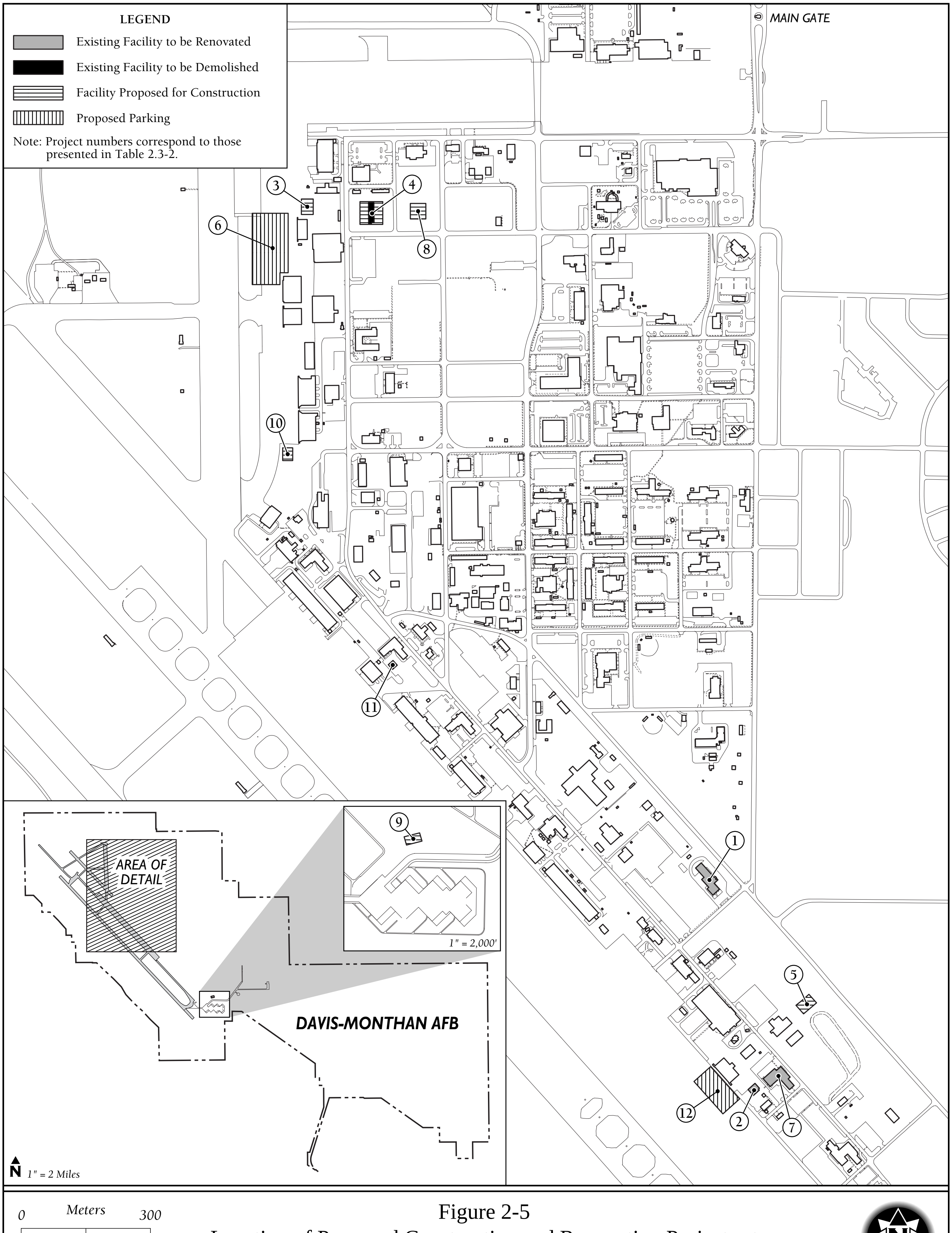


Figure 2-5
Location of Proposed Construction and Renovation Projects at Davis-Monthan AFB under the Proposed Action

2.2.1.4 Aircraft Characteristics, Inventory, and Operations

HH-60 Pave Hawk Helicopter

HH-60 Pave Hawk

The HH-60's primary wartime mission is CSAR, infiltration, exfiltration, and resupply of special operations forces in day, night, or marginal weather conditions. The secondary mission of the HH-60 is peacetime search and rescue. Peacetime search and rescue missions may include searching for downed or missing aircraft, sinking or missing ships, or missing persons. Recoveries are made by landing, rope ladder, or hoist. Low-level tactical flight profiles are used to avoid threats. Specially trained crews perform low-level night operations over land and water using Night Vision Goggles (NVG) and Forward-Looking Infrared (FLIR). The aircrew is typically comprised of 6 personnel: pilot, co-pilot, flight engineer, aerial gunner, and 2 PJs. The aircraft can also carry 8-10 troops. The HH-60 can be equipped with 2, .50-cal. machine guns mounted in the cabin doors or 2, 7.62-mm miniguns mounted in the cabin windows. The maximum speed is 193 nautical miles per hour (knots) with a cruising speed of 120-140 knots. Unrefueled range is approximately 480 nautical miles (NM), with a combat load and aircraft at maximum gross weight of 22,000 pounds. Although the combat radius is 200 NM, in-flight refueling greatly extends this range. Pave Hawks are equipped with a retractable in-flight refueling probe and internal auxiliary fuel tanks (Federation of American Scientists 2001a).

HC-130

HC-130

The HC-130 deploys worldwide to provide CSAR coverage for U.S. and allied forces. CSAR missions include flying low-level, preferably at night with NVGs, to an objective area where aerial refueling of a rescue helicopter is performed or PJs are deployed. As with the HH-60, the secondary mission of the HC-130 is peacetime search and rescue. The HC-130 can deploy PJs to a survivor, escort a helicopter to a survivor, or airdrop survival equipment. The aircrew is typically comprised of 8 personnel: pilot, co-pilot, primary navigator, secondary navigator, flight engineer, communications systems operator, and 2 loadmasters. The maximum speed of the HC-130 is 280-300 knots with a cruising speed of 210 knots with an operating range from 1,700 to 4,000 NM (Federation of American Scientists 2001b).

Aircraft Inventory

As part of the Proposed Action analyzed in this EA, Davis-Monthan AFB would gain 12 Primary Aircraft Inventory (PAI) HH-60 helicopters, 1 Backup Aircraft Inventory (BAI) HH-60, 10 PAI HC-130 aircraft, and 1 BAI HC-130 aircraft (Table 2.2-1). The standup of the CSAR units would begin with the arrival of the first personnel in FY03 and be complete with the arrival of the last aircraft in FY07.

Currently the 305 RQS, an AFRES squadron at Davis-Monthan AFB, has 5 PAI HH-60s. The proposed CSAR squadron would add 13 HH-60s for a total of 17 PAI and 1 BAI HH-60 inventory at Davis-Monthan AFB (Table 2.3-3).

Table 2.3-3. Baseline and Proposed Aircraft Inventory at Davis-Monthan AFB under the Proposed Action

Aircraft	*Baseline/No-Action Alternative*	*Proposed Action*	*Change*
A-10	30	30	0
OA-10	24	24	0
EC-130H	10	10	0
HC-130	0	11	+11[a]
HH-60	5[b]	18	+13[c]
Total	**69**	**88**	**+24**

Notes: [a]Includes 1 BAI.
[b]PAI for the 305 RQS.
[c]Includes 12 PAI and 1 BAI for the proposed CSAR squadron.
Source: Air Force 2001a.

Aircraft Operations

Throughout this EA 3 terms are used to describe aircraft operations: *sortie*, *airfield operation*, and *sortie-operation*. Each has a distinct meaning and commonly applies to a specific set of aircraft activities in particular airspace areas.

- A *sortie* consists of a single military aircraft flight from initial takeoff through final landing.
- An *airfield operation* represents the single movement or individual portion of a flight in the base airfield airspace environment, such as 1 departure or 1 arrival. An aircraft practicing multiple approaches within the airfield environment (i.e., closed patterns) accounts for at least 2 operations – 1 approach and 1 departure. However, for the purposes of air quality analysis a closed pattern is counted as 1 airfield operation.
- A *sortie-operation* is defined as the use of 1 airspace unit (e.g., a MOA) by 1 aircraft. Sortie-operations apply to flight activities outside the airfield airspace environment. Each time a single aircraft conducting a sortie flies in a different airspace unit, 1 sortie-operation is counted for that unit.

As an example, on a typical training mission an aircraft makes an initial takeoff (1 airfield operation) and flies to a MOA (1 sortie-operation at the MOA) to practice flight maneuvers. The aircraft proceeds to an AR track to refuel (1 sortie-operation at the AR track) and then returns to the airfield and practices 2 approaches (2 closed patterns within the airfield environment [4 airfield operations]) before landing (1 airfield operation). This mission generates 1 sortie, 6 airfield operations, and 2 sortie-operations.

Aircraft Sorties. Baseline and proposed annual sorties for Davis-Monthan AFB aircraft are shown in Table 2.3-4.

Table 2.3-4. Baseline and Proposed Annual Aircraft Sorties at Davis-Monthan AFB under the Proposed Action

Aircraft	Baseline/No-Action Alternative Day	Baseline/No-Action Alternative Night	Proposed Action Day	Proposed Action Night	Total Day	Total Night
A/OA-10	14,341	0	0	0	14,341	0
EC-130	2,198	118	0	0	2,198	118
HC-130	0	0	700	300	700	300
HH-60	624	156	1,400	350	2,024	506
Other[a]	2,129	0	0	0	2,129	0
Total	**19,292**	**274**	**2,100**	**650**	**21,392**	**924**

Notes: [a]Night operations occur between 10 P.M. and 7 A.M.
[b]Other aircraft = F-16, F-15, FA-18, KC-135, C-17, C-5, C-141, helicopters, and general aviation aircraft.
Source: Air Force 2001a.

Airfield Operations. Baseline and proposed airfield operations at Davis-Monthan AFB are presented in Table 2.3-5. Approaches and departures are derived from annual aircraft sorties (i.e., 1 arrival and 1 departure per sortie) (Table 2.3-3); closed patterns are estimated based on historical and proposed airfield operations at Davis-Monthan AFB.

Table 2.3-5. Baseline and Proposed Annual Airfield Operations at Davis-Monthan AFB under the Proposed Action

Aircraft	Baseline/No-Action Alternative A/D	Baseline/No-Action Alternative CP	Proposed Action A/D	Proposed Action CP	Total A/D	Total CP
A/OA-10	28,682	26,722	0	0	28,682	26,722
EC-130	4,632	9,264	0	0	4,632	9,264
HC-130	0	0	2,000	4,000	2,000	4,000
HH-60	1,560	1,560	3,500	3,500	5,060	5,060
Other[a]	4,258	0	0	0	4,258	0
Total	**39,132**	**37,546**	**5,500**	**7,500**	**44,632**	**45,046**

Notes: A/D = Arrivals and Departures, CP = Closed Patterns.
[a]Other aircraft = F-16, F-15, FA-18, F-14, KC-135, C-17, C-5, C-141, helicopters, and general aviation aircraft.
Source: Air Force 2001a.

2.2.1.5 Affected Airspace

Under the Proposed Action, HH-60 and HC-130 training operations would be conducted in the 305 East and West LATNs, at the BMGR within the portion of the North TAC Range (R-2301E) northeast of the Crater Range and within the East TAC Range (R-2304), Yuma TACTS Range (R-2301W) west of 113 degrees 53 minutes West longitude, and Sells Low and Jackal Low MOAs (see Figure 2-3). Aircraft would transit from the East TAC range or the northeastern portion of the North TAC Range to the Yuma TACTS Range by flying to the north of Interstate 8. HH-60 aircrews would also conduct approximately 48 operations/day within currently existing LZs underlying affected airspace (see Figure 2-3). Approximately 1/3 (or 16) of these operations would actually touch down or land while the remaining training operations would consist of low hovers. Approximately 120 operations/year by HH-60 and HC-130 aircraft and CSAR personnel would also be conducted at the Davis-Monthan AFB DZ (45 percent), Ft. Huachuca DZ (45 percent), and Gila Bend DZ (10 percent). In addition, over-water training operations would occur within the WTA off the coast of San Diego, California. A discussion of the proposed operations within the WTA is presented below. Baseline and proposed annual sortie-operations are summarized in Table 2.3-6.

Table 2.3-6. Baseline and Proposed HH-60 and HC-130 Annual Sortie-Operations within Affected Airspace under the Proposed Action

Airspace Unit	*Baseline/No-Action Alternative*	*Proposed Action*	*Net Increase (Day/Evening/Night)*[1]
BMGR (R-2304, R-2305, and R-2301E)	59,608	60,756	1,148 (1,058/NA/90)
Yuma TACTS Range (R-2301W)	10,975	11,380	405 (360/NA/45)
Sells Low MOA	13,164	15,285	2,121 (1,181/NA/940)
Jackal Low MOA	1,297	3,417	2,120 (1,180/NA/940)
WTA	2,964	3,539	575 (230/245/100)

Note: [1]Night = 10 P.M. – 7 A.M. NA = not applicable; evening only applies in California and the WTA.
Sources: Air Force 1999, 2001a; Arizona Air National Guard 2002, Navy 2002.

Range Operations

Proposed HH-60 and HC-130 training operations at the BMGR and Yuma TACTS Range would involve the use of 3 types of self-protection flares, 2 types of area-illumination or parachute flares, and 2 types of chaff (Table 2.3-7). Chaff and self-protection flares are used to defend the aircraft against missile threats in a hostile environment. A discussion of these materials is presented in Section 3.5, Materials Management.

Table 2.3-7. Proposed Annual Chaff and Flare Usage by HH-60 and HC-130 Aircraft at Approved Ranges under the Proposed Action

	Self-protection Flare		*Parachute Flare*		*Chaff*	
HC-130	*M206*	*MJU 7/MJU 50*	*LUU-2/B*	*LUU-19*	*R170*	*R188*
Release altitudes (ft AGL)	500-1,000		3,000		500-1,000	
No./training event	240	240	-	-	300	300
Training events/year	42	42	-	-	42	42
Subtotal	10,080	10,080	127	127	12,600	12,600
HH-60	*M206*	*MJU 50*			*R170*	*R188*
Release altitudes (ft AGL)	500-1,000	300-1,000			100-200	
No./training event	60	60			60	60
Training events/year	65	65			33	33
Subtotal	3,900	3,900			1,980	1,980
Totals	**13,980**	**13,980**	**127**	**127**	**14,580**	**14,580**

Note: AGL = above ground level.
Source: Air Force 2001a.

In addition to the chaff and flare usage, HH-60 helicopters would conduct weapons training at the BMGR at previously approved target areas within the portion of the North TAC Range (R-2301E) northeast of Crater Range and the East TAC Range (R-2304). Training would involve the use of aircraft-mounted 7.62-mm and .50-cal machine guns and M-18 smoke grenades (Table 2.3-8).

Table 2.3-8. Proposed HH-60 Munitions Usage within BMGR under the Proposed Action

	M-18 Smoke Grenades	*7.62mm rounds*	*.50 cal. rounds*
Avg. release altitude	250 ft. AGL	100-300 ft. AGL	100-300 ft. AGL
Quantity/year	225	450,000	40,500

Source: Air Force 2001a.

WTA Operations

The area proposed for use as a CSAR WTA encompasses approximately 25 square miles (17 square NM) of the Pacific Ocean extending from 3 to 7 NM offshore of San Diego, California (Figure 2-6). The WTA is comprised of 2 separate "DIP" Areas, A1 and A2, that are the 2 nearshore areas of a larger U.S. Navy administered complex extending to 24 NM offshore. The airspace surrounding the WTA is uncontrolled airspace and is located on the western edge of Imperial Beach Ground Control Radar coverage. Aircraft flying in this area follow established see-and-avoid procedures for VFR uncontrolled airspace. Imperial Beach Ground Control provides flight monitoring for military aircraft using this area via radio reporting. Military aircraft provide a radio check-in when entering the area and an operations normal radio report to Imperial Beach Ground Control every 30 minutes until they leave the area. Imperial Beach Control does not provide any other service for normal aircraft operations. There would be no impact to the work load or schedule on this facility or their current services. Although flight following and monitoring is conducted by Imperial Beach Ground Control, proposed CSAR personnel and HH-60s would be on TDY and would utilize existing facilities at Naval Air Station (NAS) North Island for ramp and fuel needs while training at the WTA. Facilities and space are available for CSAR personnel and aircraft on a TDY basis. The DIP Areas are currently used for training by a variety of government aircraft and surface vessels including U.S. Navy (Navy), U.S. Coast Guard (USCG), and the 305 RQS from Davis-Monthan AFB.

HH-60 Operations. Proposed CSAR operations within the WTA would consist of helicopters flying to the WTA and performing search and rescue training operations over a specific location within the WTA. Proposed use of the WTA by HH-60 aircrews would be an average of 10, 1-hour sortie-operations per week (approximately 40 per month, or 500 per year) (Table 2.3-9). Approximately 150 annual WTA sortie-operations would be after dark. While daytime training may involve the use of either 1 or 2 helicopters, flight operations after dark require the use of 2 helicopters to maximize flight safety. The helicopters would transit to the WTA from Davis-Monthan AFB according to normal flight operations for military and civilian aircraft (e.g., flight plan, visual flight rules [VFR]). No low-level routes would be used. Once within WTA boundaries, the helicopters would operate between 10 and 200 feet (ft) above mean sea level (MSL) during the entire search and rescue training operation. A typical HH-60 sortie-operation would last 1 hour. After entering the WTA, the HH-60 would drop to 100 ft MSL then conduct search and rescue operations at varying altitudes. On a typical mission the HH-60 would spend approximately 5 minutes at 10 ft MSL, 15 minutes at 30 to 50 ft MSL, and the remainder (40 minutes) at 150 ft MSL. Marine flares would be dropped during CSAR training exercises in the WTA. Smoke from the marine flares would be used to check wind direction. Daytime CSAR training in the WTA would involve the use of sea dye markers dropped from the helicopter to mark the location of a survivor. The markers would also provide a navigational aid for the helicopter aircrew.

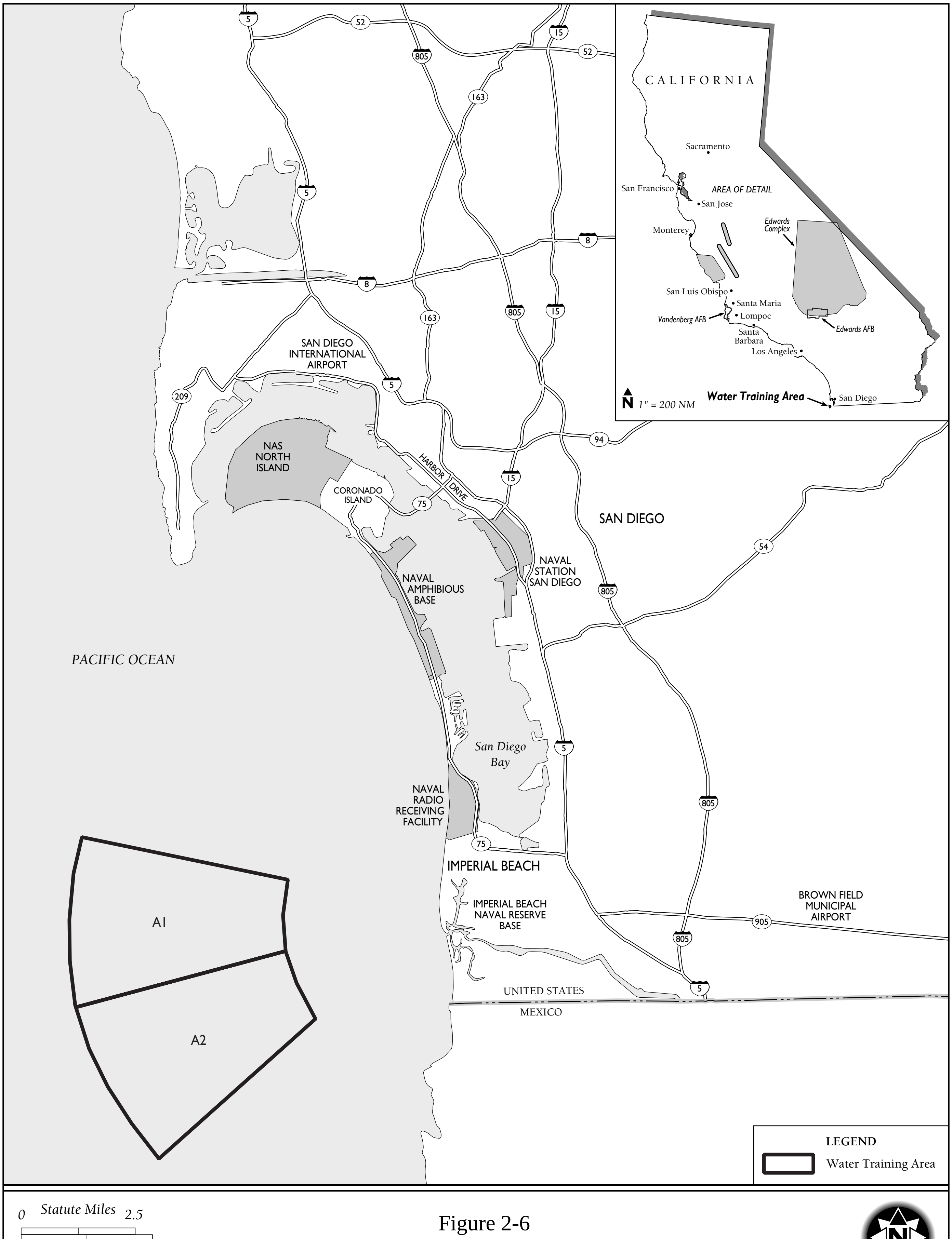


Figure 2-6
Water Training Area

Table 2.3-9. Proposed HH-60 and HC-130 Flight Profiles and Annual Sortie-Operations within the WTA

Flight Profiles	*HH-60 (Day/Evening/Night)*[1]	*HC-130 (Day/Evening/Night)*[1]
Annual Sortie-Operations	500 (200/200/100)	75 (30/45/0)
Avg. Minutes/Sortie-Operation	60	30
Avg. % Power	60	45
Avg. KIAS	90	125
% of Time at Altitudes (ft MSL)		
10 – 29	8	-
30 – 49	25	-
50 – 149	67	-
100 – 500	NA	100

Notes: KIAS = knots indicated airspeed.
[1]Day = 7 A.M. – 7 P.M., Evening = 7 P.M. – 10 P.M., Night = 10 P.M. – 7 A.M.
Source: Air Force 2001a.

Since HH-60 aircrews would train with NVG after dark, WTA training operations would also involve the use of lightsticks. Lightsticks would be dropped from the helicopter to monitor the survivor's position relative to the helicopter. Lightsticks would be used instead of flares because flares can blind pilots who are using NVG and marine flares also mark for the enemy both the survivor's and the rescuer's location in a hostile environment. Proposed use of marine flares, sea dye markers, and lightsticks is summarized below. A description of these items is provided in Section 3.5.

During some of the training operations, PJs would jump out of the helicopter to perform simulated search and rescue operations; the PJs would be dropped at an altitude of approximately 10 ft MSL. Personnel drops and pickups associated with pararescue training operations would be practiced using rope, rappel, ladders, and hoist while the helicopter hovers at 15 to 50 ft MSL. In all circumstances, HH-60 aircrews would attempt to avoid boats and other watercraft by a minimum of 1 NM. In addition, aircrews would make every reasonable effort to avoid harassing marine mammals and sea turtles in the WTA including (when practical) not flying lower than 1,000 feet while within a horizontal distance of 100 yards of a whale, as indicated in the whale watching guidelines.

HC-130 Operations. HC-130 aircraft would also use the WTA for performing search and rescue training operations. Proposed use of the WTA by HC-130s is estimated at 1.5 sortie-operations a week (6 per month, or approximately 75 per year) (see Table 2.3-9). All HC-130 sorties would be performed during the day; no operations after dark are planned. A typical HC-130 sortie-operation within the WTA would consist of 1 aircraft operating between 150 and 500 ft MSL for approximately 30 minutes. After initial entrance into the WTA, a surveillance circle would be flown at 300 to 500 ft MSL to check for vessels operating in the area. Once a clear area is identified, 1 marine flare would be dropped to mark the position of a "survivor." Subsequent drops of smaller flares would then be conducted to simulate the dropping of survivor kits to the person being rescued. Sea dye markers would also be used to serve as navigational aids during the search and rescue training operations. PJs would not be dropped from the HC-130 aircraft.

Proposed Use of Sea Dye Markers, Marine Flares, and Lightsticks in the WTA. Both HH-60 and HC-130 WTA operations would involve the use of sea dye markers and 2 types of marine flares, known as the

MK6 and MK25, as marine location markers. Typically MK25 marine flares are released at altitudes of 150-500 ft MSL and MK6 flares are released at 300-1,000 ft MSL. During operations after dark, HH-60 aircrews would also use lightsticks. These markers are described in more detail in Section 3.5 (Materials Management). Proposed annual usage rates for these items are shown in Table 2.3-10.

Table 2.3-10. Proposed Annual Lightstick, Marine Flare, and Sea Dye Marker Usage in the WTA

Aircraft	*Lightsticks*	*Marine Flares*		*Sea Dye Markers*
		MK25	*MK6*	
HH-60	10,000	160	160	690
HC-130	NA	1,500	500	500
Total	10,000	2,320		1,190

Source: Air Force 2001a.

Since lightsticks float and are not biodegradable, every practicable effort would be made to retrieve them at the completion of CSAR training operations in the WTA. While in the water and prior to being retrieved by the HH-60 helicopter, the PJs would attempt to recover to the maximum extent practicable any lightsticks within the immediate vicinity.

2.2.1.6 PJ, CRO, and SERE Specialists Training Requirements

Proposed Parachute, Weapons, and Ground Training

The primary training requirements associated with aircraft (i.e., HH-60 and HC-130) for the CROs, PJs, and SERE specialists consist of parachute training, weapons proficiency training, Self-contained Underwater Breathing Apparatus (SCUBA) training, and various land-based tactical training exercises (e.g., technical rock climbing). These activities would be carried out at Davis-Monthan AFB and vicinity, ranges, existing LZs and DZs, and the WTA.

2.3 ALTERNATIVES

In compliance with NEPA, the Air Force must consider reasonable alternatives to the Proposed Action. Only those alternatives determined reasonable relative to their ability to fulfill the need for the action warrant detailed analysis. Based on the selection criteria presented in Section 2.1, 2 alternatives were identified that met the minimum qualifications to be carried forward for further analysis in this EA. In addition, as required by NEPA, the No-Action Alternative is also carried forward for analysis within this EA.

2.3.1 ALTERNATIVE A: CSAR BEDDOWN AT EDWARDS AFB

Under Alternative A, the Air Force proposes to:

- Establish a CSAR organization composed of collocated HH-60, HC-130, and CRO-led squadrons at Edwards AFB (Figure 2-7). The CRO squadron would include CROs, PJs, and SERE specialists. This would add a total of 12 HH-60 helicopters, 10 HC-130 aircraft, and 1,200 manpower authorizations to Edwards AFB;
- Renovate existing facilities and construct new facilities at Edwards AFB to accommodate CSAR squadron operations and maintenance activities for HH-60 and HC-130 aircraft;

- Conduct overwater training operations at an existing WTA off the coast of San Diego, California, utilizing sea dye markers, lightsticks, and marine flares (Figure 2-6);
- Conduct sortie-operations by HH-60 and HC-130 aircraft within the Isabella and Owens MOAs, China Lake Electronic Combat (EC) Range, Fort Irwin Range, and associated Restricted Areas (R-2525 and R-2502, respectively) (Figure 2-7);
- Conduct sortie-operations within approved areas at China Lake EC Range and Fort Irwin Range with chaff and self-protection flares;
- Conduct HH-60 weapons training operations within previously approved target areas at the Fort Irwin Range (R-2502N and R-2502E) involving M-18 smoke grenades and aircraft-mounted 7.62-mm and .50-cal machine guns;
- Conduct aerial refueling operations between HH-60 and HC-130 aircraft in the Isabella MOAs; and
- Conduct ground and parachute training for CSAR associated personnel (i.e., PJs, CROs, and SERE specialists) within previously approved ranges, DZs, LZs, and Edwards AFB CATMS areas.

2.3.1.1 Edwards AFB

Edwards AFB is located in the Antelope Valley region of the Western Mojave Desert in Southern California, approximately 65 miles northeast of Los Angeles, California (see Figure 2-8). The base occupies an area of approximately 301,000 acres or 470 square miles portions of which lie within Kern, Los Angeles, and San Bernardino counties (Figures 2-7 and 2-8). The base is comprised of 5 areas: Main Base, South Base, North Base, National Aeronautics and Space Administration (NASA)/Dryden Flight Research Center, and the Air Force Research Lab (AFRL). Main Base has 1 runway (RWY 22/04) that is approximately 15,000 ft long by 300 ft wide. South Base has 1 runway (RWY 24/05) that is approximately 8,000 ft long and 300 ft wide. North Base has 1 runway (RWY 24/06) that is approximately 6,000 ft long and 150 ft wide. There are published instrument flight rules (IFR) and VFR approaches to all 3 runways. In addition to the hard surface runways, Edwards AFB has a unique dry lakebed runway system. Proposed project activities would be located in the North Base portion of Edwards AFB located in Kern County (Figure 2-8).

Edwards AFB is the home of the Air Force Flight Test Center (AFFTC), which is part of Air Force Materiel Command. The primary mission of the AFFTC is to conduct and support research, development, test, and evaluation of manned and unmanned aerospace systems. The AFFTC also operates the Air Force's Test Pilot School and supports non-military government agencies, commercial, and allied nations' test and evaluation needs. Major associate units at Edwards AFB include 412th Test Wing, 95th Air Base Wing, and the NASA/Dryden Flight Research Center.

2.3.1.2 Personnel Changes

Edwards AFB currently supports 11,687 full-time military and civilian personnel. A total of 1,200 manpower authorizations would be added (158 officer, 1,036 enlisted, and 6 civilian) with the beddown of the CSAR squadrons at Edwards AFB. Therefore, Alternative A would result in a 10 percent increase in personnel compared to baseline conditions (Table 2.3-11). The additional personnel required at Edwards AFB as compared to Davis-Monthan AFB is related to an ACC base (Davis-Monthan AFB) versus a non-ACC base (Edwards AFB). An ACC group and various support units will be required at non-ACC bases (i.e., Edwards and Vandenberg).

Table 2.3-11. Changes in Personnel Authorizations at Edwards AFB under Alternative A

Personnel	*Baseline/No-Action Alternative*	*Alternative A*	*Change due to CSAR*
Officer	679	837	158
Enlisted	3,174	4,210	1,036
Civilian	7,834	7,840	6
Total	**11,687**	**12,887**	**1,200**

Source: Air Force 2001a.

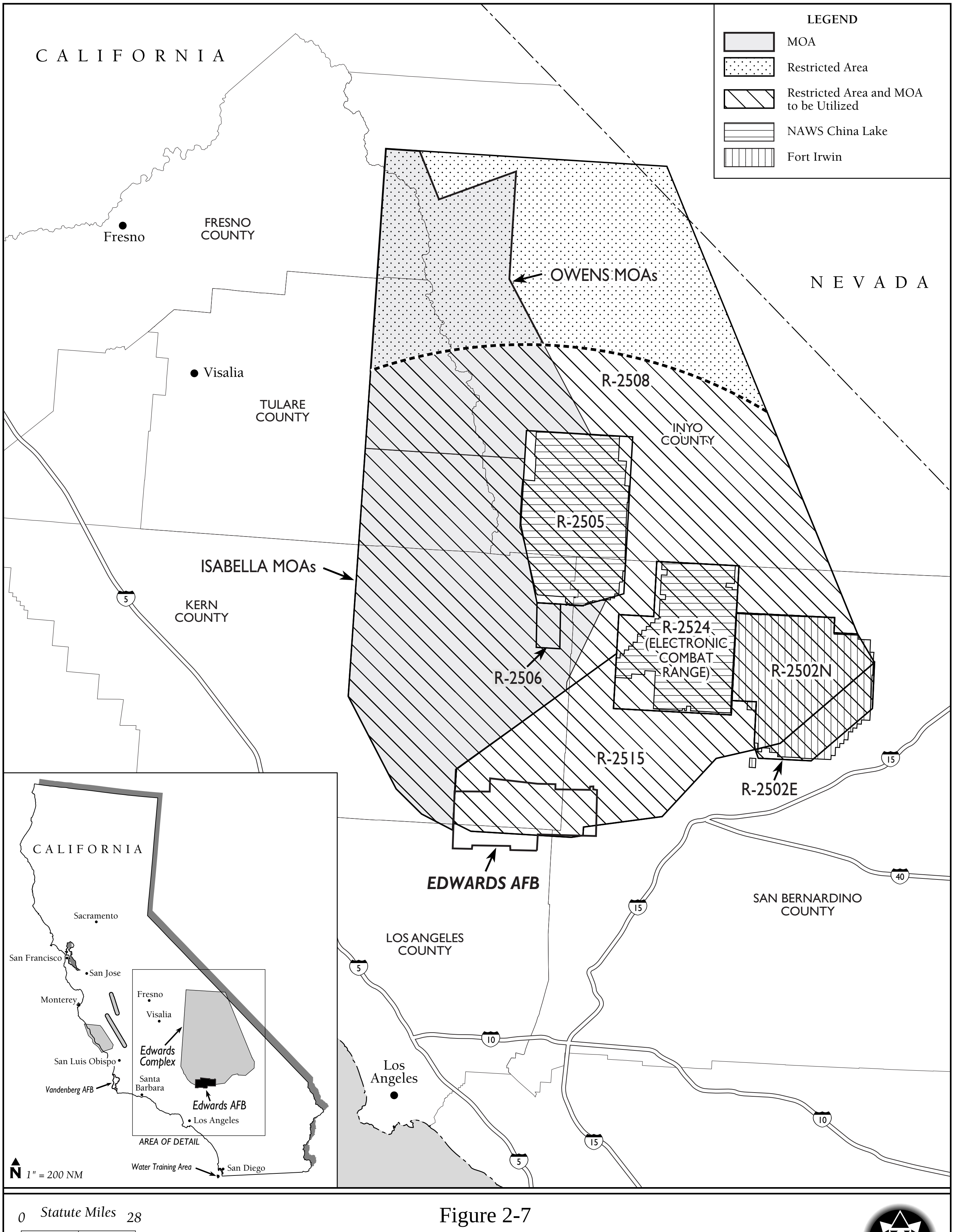


Figure 2-7
Alternative A: CSAR Beddown at Edwards AFB and Affected Airspace

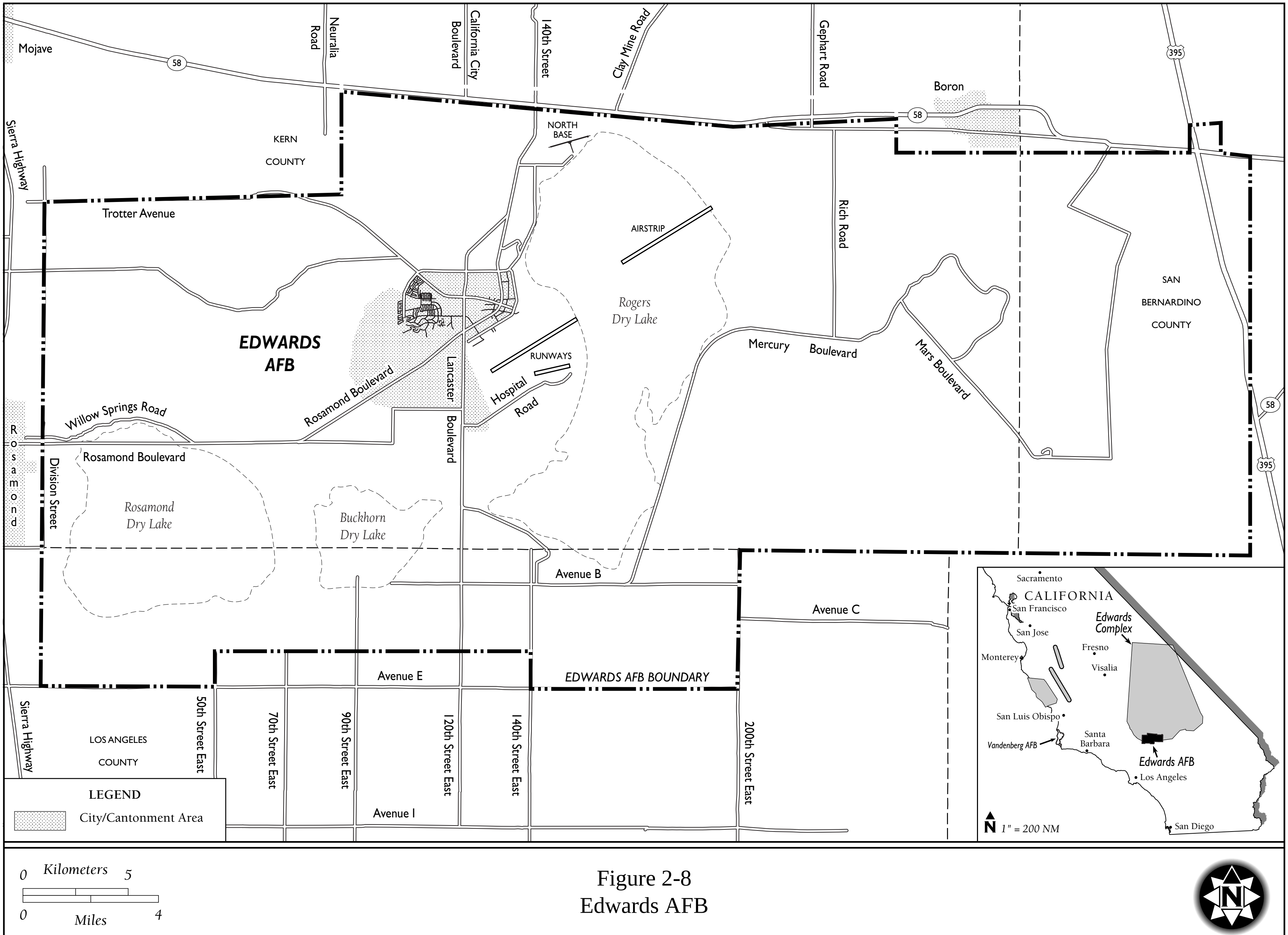


Figure 2-8
Edwards AFB

2.3.1.3 Construction and Renovation Projects

All CSAR assets and personnel would be located at North Base within Edwards AFB (Figure 2-8). Alternative A would require the modification and construction of several facilities in order to meet the operational and maintenance requirements for the HH-60 and HC-130 aircraft and associated CSAR personnel. Table 2.3-12 describes the proposed construction and renovation program, and Figure 2-9 shows the location of the proposed projects at North Base, Edwards AFB.

Table 2.3-12. Proposed Construction and Renovation Projects at North Base, Edwards AFB under Alternative A

*Project**	*Proposed Use*	*Area (square ft)*
1. Parking Apron/Taxiway Shoulders	Parking for maintenance and preflight operations of HH-60 and HC-130 aircraft.	1,030,000
2. HH-60 2-Bay Hangar/MX	Maintain and service HH-60 aircraft and associated weapons systems.	26,000
3. HC-130 Hangar/MX	Maintain and service HC-130 aircraft.	26,000
4. HH-60 Squadron Operations/AMU	Planning, briefing, and supporting HH-60 operations personnel, maintaining life support and mobility equipment, and provide crew rooms and locker space.	28,000
5. HC-130 Squadron Operations/AMU	Planning, briefing, and supporting HC-130 operations personnel, maintaining life support and mobility equipment, and provide crew rooms and locker space.	40,000
6. PJ Squadron Operations	Planning, briefing, and supporting PJ personnel and provide crew rooms and locker space.	32,000
7. Group Headquarters	Planning, briefing, and supporting CSAR operations personnel.	14,000
8. MRSP Warehouse	Warehouse to store spare parts for CSAR-associated aircraft	12,000

Notes: *Project numbers correspond to locations depicted in Figure 2-9.
Source: Air Force 2001a.

2.3.1.4 Aircraft Inventory

Under Alternative A, Edwards AFB would gain 12 PAI HH-60 helicopters, 1 BAI HH-60, 10 PAI HC-130 aircraft, and 1 BAI HC-130 aircraft (Table 2.3-13). Currently Edwards AFB has 122 aircraft assigned to the base. Most of these aircraft, in keeping with the mission of Edwards AFB as the AFFTC, are either being currently tested and evaluated (e.g., F-22), are aircraft in support of testing (e.g., T-38, F-16), or are associated with NASA's mission at Edwards AFB. In addition, the U.S. Marine Corps has CH-53 and CH-46 helicopters at Edwards AFB.

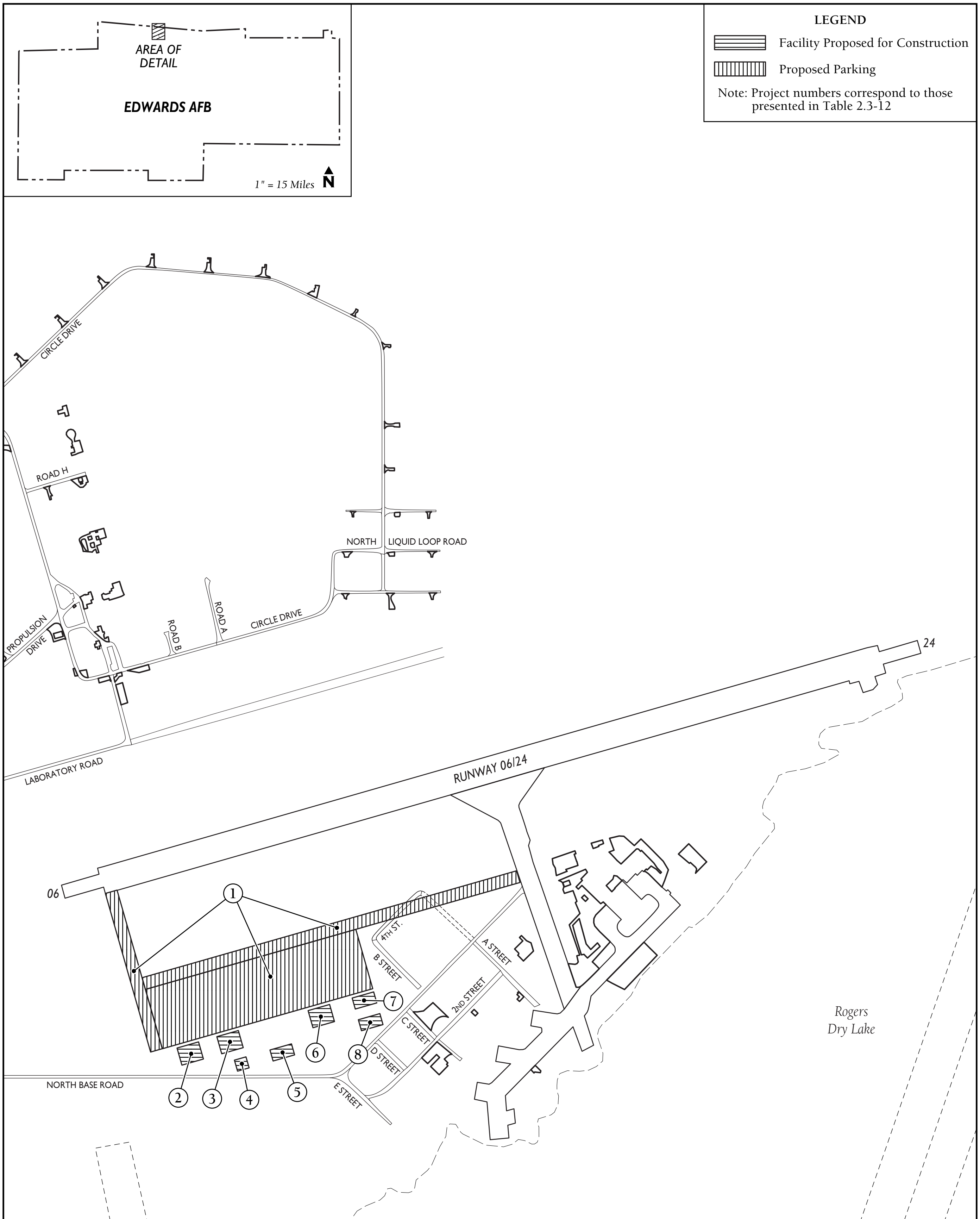


Figure 2-9
Location of Proposed Construction Projects at North Base, Edwards AFB under Alternative A

Table 2.3-13. Baseline and Proposed Aircraft Inventory at Edwards AFB under Alternative A

Aircraft	*Baseline/No-Action Alternative*	*Alternative A*	*Change*
F-16	26	26	0
F-15	10	10	0
T-38	11	11	0
F-18	8	8	0
CH-53	9	9	0
CH-46	12	12	0
Other[a]	46	46	0
HC-130	0	11	+11
HH-60	0	13	+13
Total	**122**	**146**	**+24**

Notes: [a]Includes B-1, B-52, C-17, C-12, C-135, T-39, F-117, C-18, B-747, SR-71, T-34, BE200, ER-2, DC-8, B-2, and F-22.
Source: Air Force 2001a, b.

2.3.1.5 Aircraft Sorties

Baseline and proposed annual sorties for Edwards AFB aircraft are shown in Table 2.3-14.

Table 2.3-14. Baseline and Proposed Annual Aircraft Sorties under Alternative A

	Baseline/No-Action Alternative		*Alternative A*		*Total*	
Aircraft	*Day*	*Night[1]*	*Day*	*Night[1]*	*Day*	*Night[1]*
All Edwards AFB	52,829	13	0	0	52,829	13
HC-130	0	0	700	300	700	300
HH-60	0	0	1,400	350	1,400	350
Total	**52,829**	**13**	**2,100**	**650**	**54,929**	**663**

Note: [1]Night = 10 P.M. – 7 A.M.
Source: Air Force 2001a.

2.3.1.6 Airfield Operations

Baseline and proposed airfield operations at Edwards AFB are presented in Table 2.3-15. Arrivals and departures are derived from annual aircraft sorties (i.e., 1 arrival and 1 departure per sortie) (Table 2.3-14); closed patterns are estimated based on historical and proposed airfield operations at Edwards AFB.

Table 2.3-15. Baseline and Proposed Annual Airfield Operations at Edwards AFB under Alternative A

	Baseline/No-Action Alternative		*Alternative A*		*Total*	
Aircraft	*A/D*	*CP*	*A/D*	*CP*	*A/D*	*CP*
All Edwards AFB	105,684	56,680	0	0	105,684	56,680
HC-130	0	0	2,000	4,000	2,000	4,000
HH-60	0	0	3,500	3,500	3,500	3,500
Total	**105,684**	**56,680**	**5,500**	**7,500**	**111,184**	**64,180**

Notes: A/D = Arrivals and Departures, CP = Closed Patterns.
Source: Air Force 2001a.

2.3.1.7 Affected Airspace

Under Alternative A, HH-60 and HC-130 training operations would be conducted in the Isabella and Owens MOAs, China Lake EC Range (R-2524), Fort Irwin Range (R-2502), and Restricted Areas R-2508 and R-2515 (see Figure 2-7). Sortie-operations within the affected airspace would only occur within 100 NM of Edwards AFB and only a portion of Owens A MOA and R-2508 would be utilized. Aerial refueling operations would take place in previously established AR tracks in the Isabella MOAs. In addition, over-water training operations would occur within the WTA off the coast of San Diego, California. Proposed WTA activities would be the same as those previously discussed under the Proposed Action (see Section 2.2.1.5). Baseline and proposed annual sortie-operations are summarized in Table 2.3-16.

Table 2.3-16. Baseline and Proposed Annual Sortie-Operations within Alternative A Affected Airspace

Airspace Unit	*Baseline/No-Action Alternative*	*Alternative A*	*Net Increase*
Edwards Airspace Complex (includes: China Lake EC Range (R-2524), Fort Irwin Range (R-2502N and E), Isabella MOAs, and Owens MOAs	22,329	29,254	6,925
WTA	2,964	3,539	575

Notes: [a] For the purposes of analysis, sortie-operations within the AR tracks have been included within the MOAs.
Sources: Air Force 2001a.

Due to the nature of HH-60 and HC-130 CSAR training operations, the majority of sortie-operations would be conducted below 3,000 ft AGL (refer to Appendix B, Table B-2).

Range Operations

Proposed HH-60 and HC-130 operations at the China Lake EC Range and Fort Irwin Range would involve the use of 3 types of self-protection flares, 2 types of parachute flares, and 2 types of chaff (Table 2.3-17). Chaff and self-protection flares are used to defend the aircraft against missile threats in a hostile environment. A discussion of these materials is presented in Section 3.5, Materials Management.

Table 2.3-17. Proposed Annual Chaff and Flare Usage by HH-60 and HC-130 Aircraft at Approved Ranges under Alternative A

	Self-protection Flare		*Parachute Flare*		*Chaff*	
HC-130	*M206*	*MJU 7/MJU 50*	*LUU-2/B*	*LUU-19*	*R170*	*R188*
Release altitudes (ft AGL)	500-1,000		3,000		500-1,000	
No./training event	240	240	-	-	300	300
Training events/year	42	42	-	-	42	42
Subtotal	10,080	10,080	127	127	12,600	12,600
HH-60	*M206*	*MJU 50*			*R170*	*R188*
Release altitudes (ft AGL)	500-1,000	300-1,000			100-200	
No./training event	60	60			60	60
Training events/year	65	65			33	33
Subtotal	3,900	3,900			1,980	1,980
Totals	**13,980**	**13,980**	**127**	**127**	**14,580**	**14,580**

Source: Air Force 2001a.

In addition to the chaff and self-protection flare usage, HH-60 helicopters would conduct weapons training at the Fort Irwin Range at previously approved target areas within Restricted Areas R-2502N and R-2502E. Training would involve the use of aircraft-mounted 7.62-mm and .50-cal machine guns and M-18 smoke grenades (Table 2.3-18).

Table 2.3-18. Proposed HH-60 Munitions Usage within the Fort Irwin Range under Alternative A

	M-18 Smoke Grenades	*7.62mm rounds*	*.50 cal. rounds*
Avg. release altitude	250 ft. AGL	100-300 ft. AGL	100-300 ft. AGL
Quantity/year	225	450,000	40,500

Source: Air Force 2001a.

2.3.1.8 PJ, CRO, and SERE Specialists Training Requirements

Training requirements for PJs, CROs, and SERE specialists would be the same as those previously discussed for the Proposed Action in Section 2.2.1.6 but would occur in previously approved training areas at Edwards AFB and associated airspace.

2.3.2 ALTERNATIVE B: CSAR BEDDOWN AT VANDENBERG AFB

Under Alternative B, the Air Force proposes to:

- Establish a CSAR organization composed of collocated HH-60, HC-130, and CRO-led squadrons at Vandenberg AFB (Figure 2-10). The CRO squadron would include CROs, PJs, and SERE specialists. This would add a total of 12 HH-60 helicopters, 10 HC-130 aircraft, and 1,200 manpower authorizations to Vandenberg AFB;
- Renovate existing facilities and construct new facilities at Vandenberg AFB to accommodate CSAR squadron operations and maintenance activities for HH-60 and HC-130 aircraft;
- Conduct overwater training operations at an existing WTA off the coast of San Diego, California, utilizing sea dye markers, lightsticks, and marine flares (Figure 2-6);
- Conduct sortie-operations by HH-60 and HC-130 aircraft within the Priest and Vandenberg LATNs, Isabella and Hunter Low MOAs, China Lake EC Range, Fort Hunter Liggett Range, and associated Restricted Areas (R-2525 and R-2513, respectively) (Figure 2-10);
- Conduct sortie-operations with chaff and self-protection flares within approved areas at China Lake EC Range and Fort Hunter Liggett Range;
- Conduct HH-60 weapons training operations within previously approved target areas at the Fort Hunter Liggett Range (R-2513) involving M-18 smoke grenades and aircraft-mounted 7.62-mm and .50-cal machine guns;
- Conduct aerial refueling operations between HH-60 and HC-130 aircraft in AR-242V and AR-243V (Figure 2-10); and
- Conduct ground and parachute training for CSAR associated personnel (i.e., PJs, CROs, and SERE specialists) within previously approved ranges, DZs, LZs, and Vandenberg AFB CATMS areas.

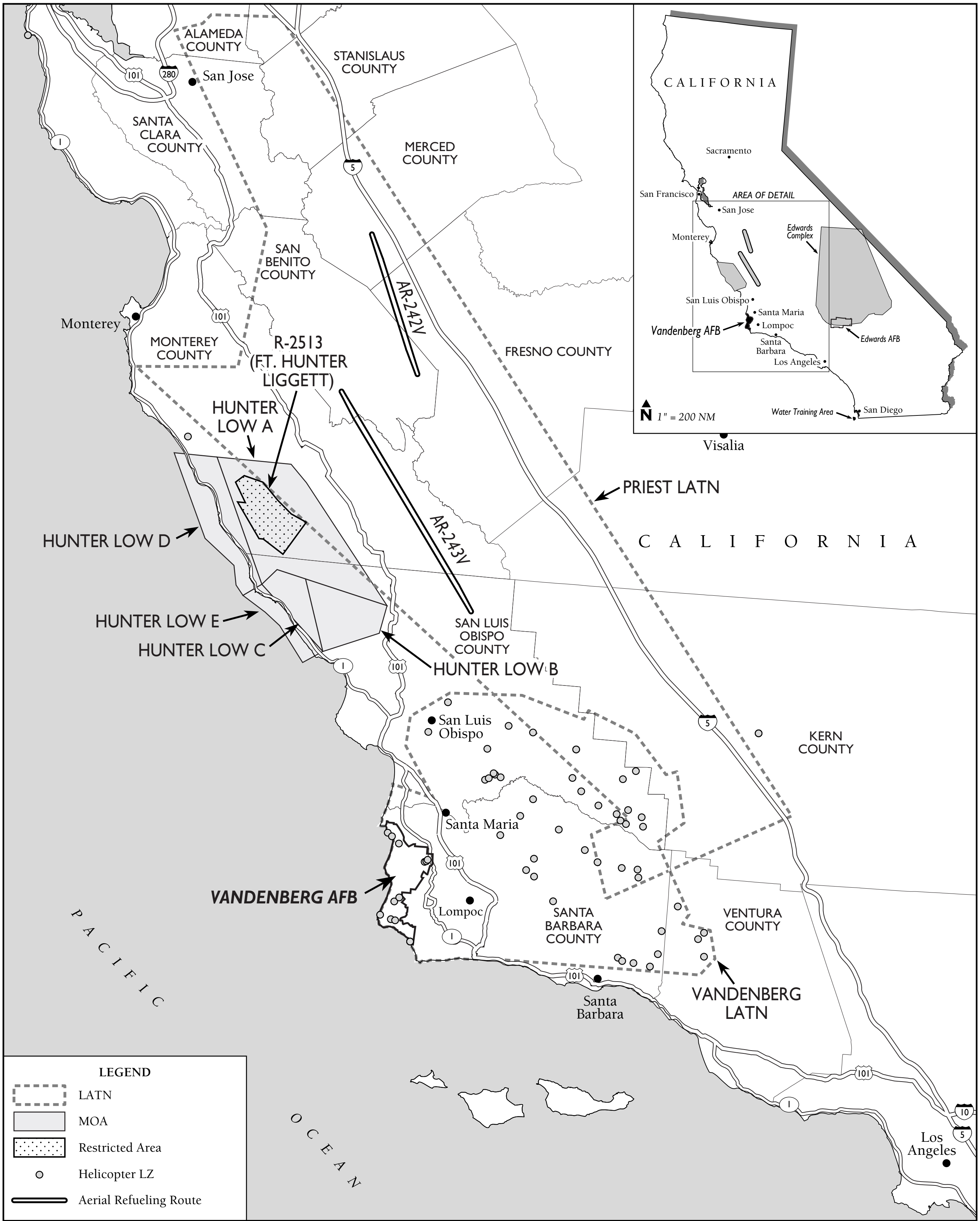


Figure 2-10
Alternative B: CSAR Beddown at Vandenberg AFB and Affected Airspace

2.3.2.1 Vandenberg AFB

Vandenberg AFB is located on the south-central coast of California, approximately halfway between San Diego and San Francisco. The base occupies approximately 98,400 acres in northwestern Santa Barbara County. Proposed project activities would be located primarily within the flightline area of Vandenberg AFB and in the cantonment area (Figure 2-11).

Vandenberg AFB is headquarters for the 30th Space Wing and 14th Air Force. The Air Force's primary mission at Vandenberg AFB is to launch and track satellites in space, test and evaluate America's intercontinental ballistic missile systems, and support aircraft operations in the Western Range. As a non-military facet of operations, Vandenberg AFB is also committed to promoting commercial space launch ventures.

2.3.2.2 Personnel Changes

Vandenberg AFB currently supports 7,579 full-time military and civilian personnel. A total of 1,200 manpower authorizations would be added (158 officer, 1,036 enlisted, and 6 civilian) with the beddown of the CSAR squadrons at Vandenberg AFB. Therefore, Alternative B would result in a 16 percent increase in personnel compared to baseline conditions (Table 2.3-19). The additional personnel required at Vandenberg AFB as compared to Davis-Monthan AFB is related to an ACC base (Davis-Monthan AFB) versus a non-ACC base (Vandenberg AFB). An ACC group and various support units will be required at non-ACC bases (i.e., Edwards and Vandenberg).

Table 2.3-19. Changes in Personnel Authorizations at Vandenberg AFB under Alternative B

Personnel	*Baseline/No-Action Alternative*	*Alternative B*	*Change due to CSAR*
Officer	748	906	158
Enlisted	2,655	3,691	1,036
Civilian	4,176	4,182	6
Total	**7,579**	**8,779**	**1,200**

Source: Air Force 2001a.

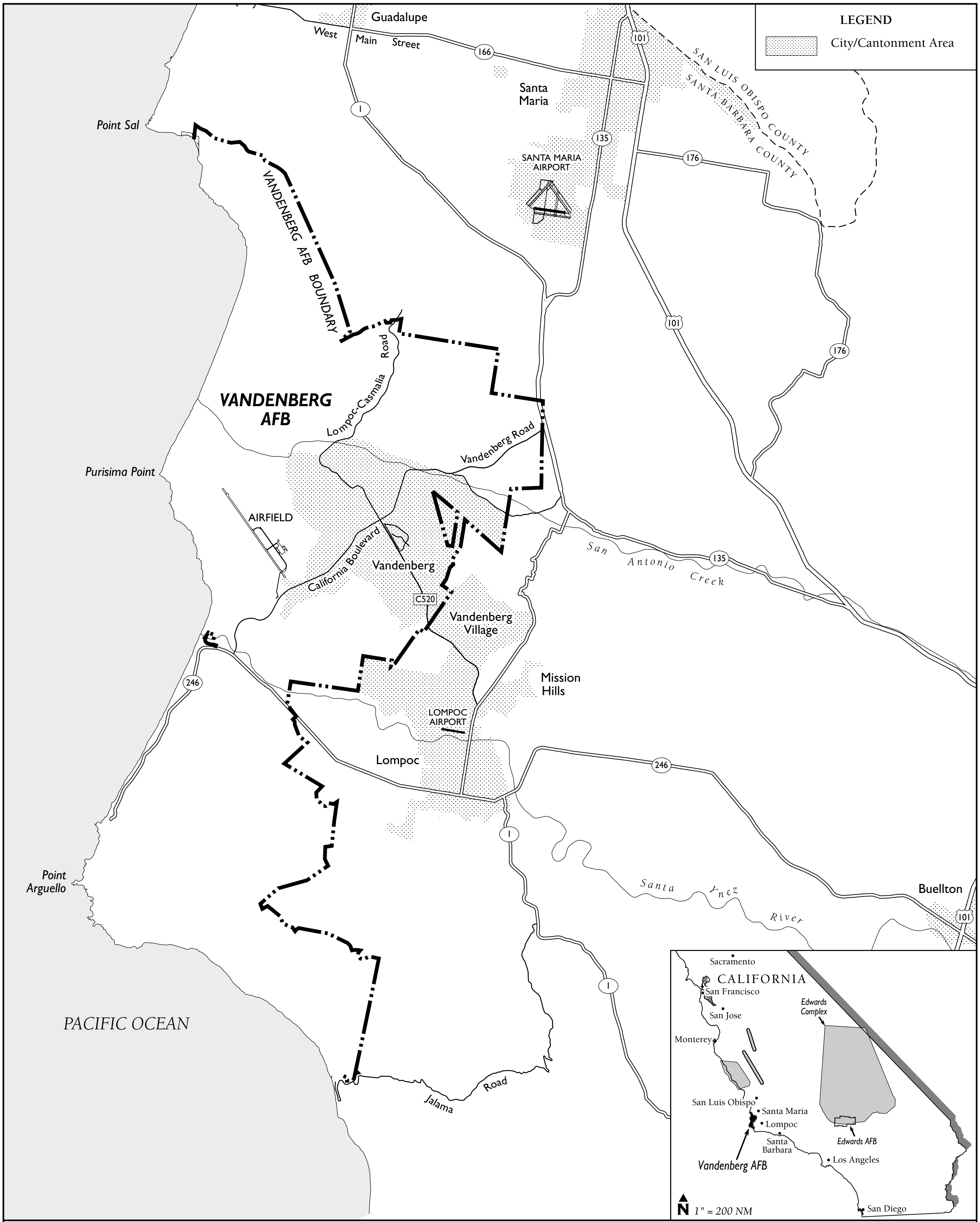


Figure 2-11
Vandenberg AFB

2.3.2.3 Construction and Renovation Projects

Alternative B would require the modification and construction of several facilities in order to meet the operational and maintenance requirements for the HH-60 and HC-130 aircraft and associated CSAR personnel. Table 2.3-20 describes the proposed construction and renovation program, and Figure 2-12 shows the location of the proposed projects at Vandenberg AFB.

Table 2.3-20. Proposed Construction and Renovation Projects at Vandenberg AFB under Alternative B

*Project**	*Proposed Use*	*Area (square ft)*
1. Parking apron/taxiway shoulders/vehicle parking	Parking for maintenance and preflight operations of HH-60 and HC-130 aircraft.	1,030,000
2. HH-60 2-bay hangar/MX	Maintain and service HH-60 aircraft and associated weapons systems.	26,000
3. HC-130 hangar/MX	Maintain and service HC-130 aircraft.	26,000
4. HH-60 Squadron Operations/AMU	Planning, briefing, and supporting HH-60 operations personnel, maintaining life support and mobility equipment, and provide crew rooms and locker space.	28,000
5. HC-130 Squadron Operations/AMU	Planning, briefing, and supporting HC-130 operations personnel, maintaining life support and mobility equipment, and provide crew rooms and locker space.	40,000
6. Renovate existing bldg. for PJ Squadron Operations and Group Headquarters	Planning, briefing, and supporting PJ operations personnel and provide crew rooms and locker space.	NA
7. Renovate existing bldg. for MRSP Warehouse	Warehouse to store spare parts for CSAR-associated aircraft	NA
8. Benson Tank storage	Storage of HC-130 removable fuel tanks.	4,000
9. HC-130 wash rack	Washing HC-130 aircraft.	19,200
10. HC-130 fuel cell hangar	Maintenance of HC-130 fuel cells.	26,000

Notes: *Project numbers correspond to locations depicted in Figure 2-12; NA = not applicable since renovations would occur only to existing buildings.
Source: Air Force 2001a.

2.3.2.4 Aircraft Inventory

Under Alternative B, Vandenberg AFB would gain 12 PAI HH-60 helicopters, 1 BAI HH-60, 10 PAI HC-130 aircraft, and 1 BAI HC-130 aircraft (Table 2.3-21). Currently Vandenberg AFB has a 5 PAI UH-1 helicopter unit assigned to the base. All other aircraft that utilize the airfield at Vandenberg AFB are transient aircraft and are generally associated with the support of commercial and polar space launches, intercontinental ballistic missile (ICBM) launches, and operations within the western range.

Table 2.3-21. Baseline and Proposed Aircraft Inventory at Vandenberg AFB under Alternative B

Aircraft	*Baseline/No-Action Alternative*	*Alternative B*	*Change*
UH-1	5	5	0
HC-130	0	11	+11
HH-60	0	13	+13
Total	**5**	**29**	**+24**

Source: Air Force 2001a.

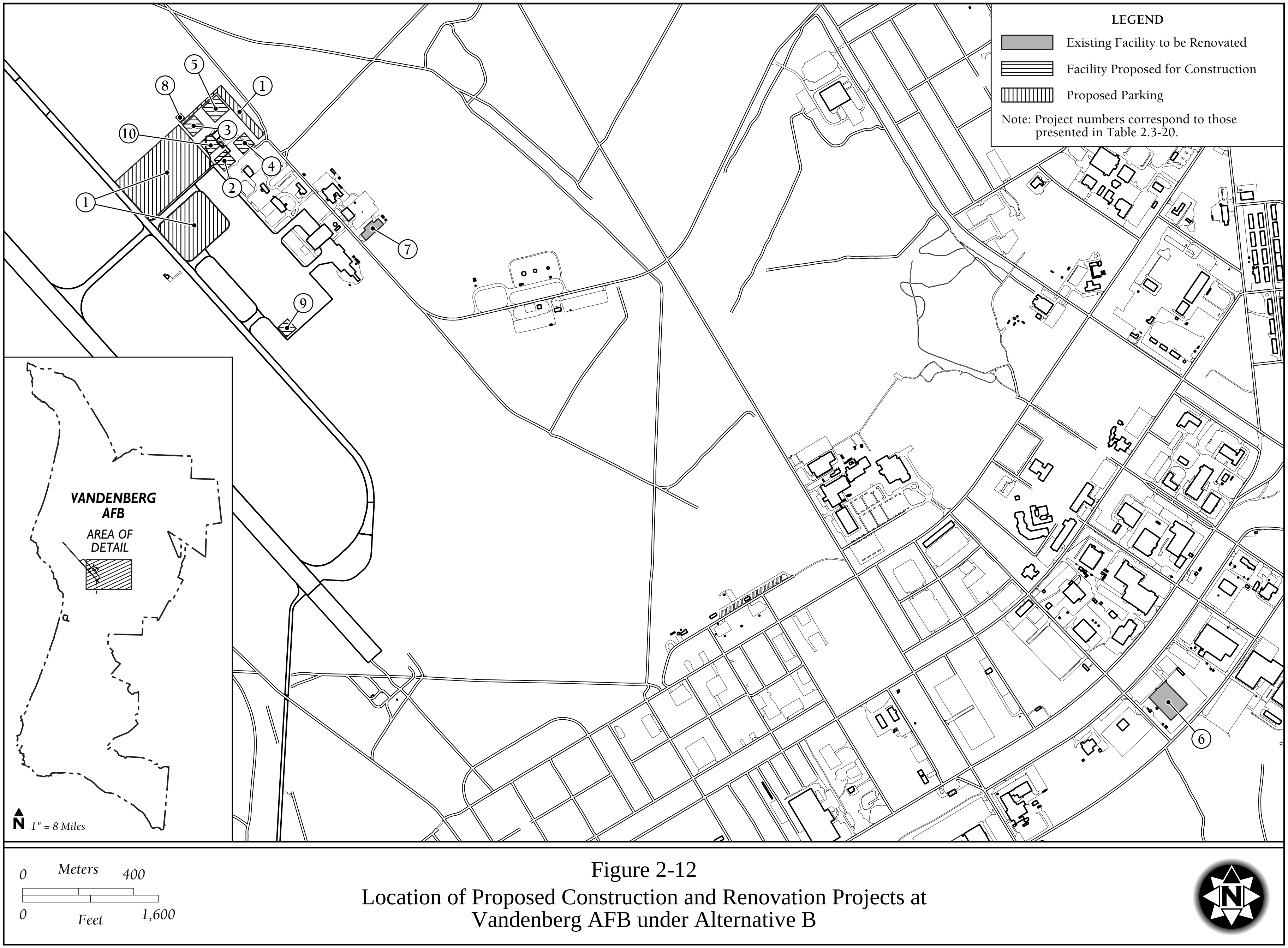


Figure 2-12
Location of Proposed Construction and Renovation Projects at Vandenberg AFB under Alternative B

2.3.2.5 Aircraft Sorties

Baseline and proposed annual sorties for Vandenberg AFB aircraft are shown in Table 2.3-22.

Table 2.3-22. Baseline and Proposed Annual Aircraft Sorties under Alternative B

	Baseline/No-Action Alternative		*Alternative B*		*Total*	
Aircraft	*Day*	*Night*[1]	*Day*	*Night*[1]	*Day*	*Night*[1]
All Vandenberg AFB[2]	8,385	66	0	0	8,385	66
HC-130	0	0	700	300	700	300
HH-60	0	0	1,400	350	1,400	350
Total	**8,385**	**66**	**2,100**	**650**	**10,485**	**716**

Notes: [1]Night = after dark. 10 P.M. – 7 A.M.
[2]Includes all Vandenberg AFB based aircraft and transient aircraft.
Source: Air Force 2001a.

2.3.2.6 Airfield Operations

Baseline and proposed airfield operations at Vandenberg AFB are presented in Table 2.3-23. Approaches and departures are derived from annual aircraft sorties (i.e., 1 approach and 1 departure per sortie) (Table 2.3-22); closed patterns are estimated based on historical and proposed airfield operations at Vandenberg AFB.

Table 2.3-23. Baseline and Proposed Annual Airfield Operations at Vandenberg AFB under Alternative B

	Baseline/No-Action Alternative		*Alternative B*		*Change*	
Aircraft	*A/D*	*CP*	*A/D*	*CP*	*A/D*	*CP*
All Vandenberg AFB[a]	16,902	31,176	16,902	31,176	0	0
HC-130	0	0	2,000	4,000	2,000	4,000
HH-60	0	0	3,500	3,500	3,500	3,500
Total	**16,902**	**31,176**	**22,402**	**38,676**	**5,500**	**7,500**

Notes: A/D = Arrivals and Departures, CP = Closed Patterns.
[a]Includes all Vandenberg AFB based aircraft and transient aircraft.
Source: Air Force 2001a.

2.3.2.7 Affected Airspace

Under Alternative B, HH-60 and HC-130 training operations would be conducted in the Hunter Low and Isabella MOAs, China Lake EC Range (R-2524), Fort Hunter Liggett Range (R-2513), and the Priest and Vandenberg LATN areas (Figure 2-10). Aerial refueling operations would take place in previously established AR tracks AR-242V and AR-243V (see Figure 2-10 and Table 2.3-24). In addition, overwater training operations would occur within the existing WTA off the coast of San Diego, California. Proposed WTA activities would be the same as those previously discussed under the Proposed Action (see Section 2.2.1.5). Due to the nature of HH-60 and HC-130 CSAR training operations, the majority of sortie-operations would be conducted below 3,000 ft above ground level (AGL) (refer to Appendix B, Table B-3).

Table 2.3-24. Baseline and Proposed Annual HH-60 and HC-130 Sortie-Operations within Alternative B Affected Airspace

Airspace Unit	*Baseline/No-Action Alternative*	*Alternative B*	*Net Increase*
Edwards Airspace Complex (includes: China Lake EC Range (R-2524) and Isabella MOAs	22,329	24,304	1,975
Fort Hunter Liggett Range (R-2513)	1,857	3,132	1,275
AR-242V	312	615	303
AR-243V	12	1,326	1,314
Hunter Low MOAs	20	520	500
WTA	2,964	3,539	575

Source: Air Force 2001a, Fort Hunter Liggett 2002c, Navy 2002.

Range Operations

Proposed HH-60 and HC-130 operations at the China Lake EC Range and Fort Hunter Liggett Range would involve the use of 3 types of self-protection flares, 2 types of parachute flares, and 2 types of chaff (Table 2.3-25). Chaff and self-protection flares are used to defend the aircraft against missile threats in a hostile environment. A discussion of these materials is presented in Section 3.5, Materials Management.

Table 2.3-25. Proposed Annual Chaff and Flare Usage by HH-60 and HC-130 Aircraft at Approved Ranges under Alternative B

	Self-protection Flare		*Parachute Flare*		*Chaff*	
HC-130	*M206*	*MJU 7/MJU 50*	*LUU-2/B*	*LUU-19*	*R170*	*R188*
Release altitudes (ft AGL)	500-1,000		3,000		500-1,000	
No./training event	240	240	-	-	300	300
Training events/year	42	42	-	-	42	42
Subtotal	10,080	10,080	127	127	12,600	12,600
HH-60	*M206*	*MJU 50*			*R170*	*R188*
Release altitudes (ft AGL)	500-1,000	300-1,000			100-200	
No./training event	60	60			60	60
Training events/year	65	65			33	33
Subtotal	3,900	3,900			1,980	1,980
Totals	**13,980**	**13,980**	**127**	**127**	**14,580**	**14,580**

Source: Air Force 2001a.

In addition to the self-protection flare and chaff usage, HH-60 helicopters would conduct weapons training at the Fort Hunter Liggett Range at previously approved target areas within Restricted Area R-2513. Training would involve the use of aircraft-mounted 7.62-mm and .50-cal machine guns and M-18 smoke grenades (Table 2.3-26).

Table 2.3-26. Proposed HH-60 Munitions Usage within the Fort Hunter Liggett Range under Alternative B

	M-18 Smoke Grenades	*7.62mm rounds*	*.50 cal. rounds*
Avg. release altitude	250 ft. AGL	100-300 ft. AGL	100-300 ft. AGL
Quantity/year	225	450,000	40,500

Source: Air Force 2001a.

2.3.2.8 PJ, CRO, and SERE Specialists Training Requirements

Training requirements for PJs, CROs, and SERE specialists would be the same as those previously discussed for Proposed Action in Section 2.2.1.6 but would occur at previously approved areas at Vandenberg AFB and associated airspace.

2.3.3 ALTERNATIVE C: NO-ACTION ALTERNATIVE

Under the No-Action Alternative the beddown of the CSAR program and associated aircraft would not occur at Davis-Monthan AFB, Edwards AFB, or Vandenberg AFB. All airfield, airspace, and range use would be the same as baseline conditions. No change in personnel authorizations would occur, and no building renovations or construction would be necessary.

3.0 AFFECTED ENVIRONMENT

This section presents information on environmental conditions for resources potentially affected by the Proposed Action and alternative described in Chapter 2.0. Under NEPA, the analysis of environmental conditions should address only those areas and environmental resources with the potential to be affected by the proposed alternatives; locations and resources with no potential to be affected need not be analyzed. The environment includes all areas and lands that might be affected, as well as the socioeconomic, cultural, and natural resources they contain or support.

In the environmental impact analysis process (EIAP), the resources analyzed are identified and the expected geographic scope of potential impacts, known as the region of influence (ROI), is defined. For the beddown of the CSAR unit and its associated ground-based and airspace-associated training activities, the Air Force analyzed environmental resources within 2 ROIs for the Proposed Action and each alternative: 1) the area in the immediate vicinity of each alternative base, and 2) the military training airspace proposed for use by HH-60 and HC-130 aircrews.

3.1 AIRSPACE

The first ROI for the Proposed Action and alternatives includes airspace in and around Davis-Monthan AFB, Arizona, and Vandenberg and Edwards AFBs, California. The second ROI includes associated military training airspace located in southwestern Arizona and southern California, including airspace associated with the WTA and NAS North Island, San Diego, California.

The Federal Aviation Administration (FAA) has overall responsibility for managing airspace through a system of flight rules and regulations, airspace management actions, and Air Traffic Control (ATC) procedures. The FAA accomplishes this through close coordination with state aviation and airport planners, military airspace managers, and other entities to determine how airspace can be used most effectively to serve all interests. All military and civilian aircraft are subject to Federal Aviation Regulations (FARs).

The FAA has designated 4 types of airspace above the U.S.: *controlled, uncontrolled, special use,* and *other*. The categories and types of airspace are dictated by the complexity or density of aircraft movements, the nature of the operations conducted within the airspace, the level of safety required, and national and public interest in the airspace. The ROI for the 3 alternative installations includes controlled airspace (Davis-Monthan, Edwards, and Vandenberg AFBs), special use airspace used for military aircrew training (e.g., MOAs), and other (e.g., controlled and uncontrolled airspace represented by LATN areas).

Controlled Airspace

Controlled airspace is a generic term that encompasses the different classifications of airspace (Class A, B, C, D, and E) and defines dimensions within which ATC service is provided for IFR and VFR conditions. VFR air traffic flies below 18,000 ft MSL using visual references such as towns and highways as a means of navigation. VFR aircraft may also follow federal airways at altitudes not used by aircraft on instrument flight. VFR conditions rely heavily on "see and avoid" procedures that require pilots to be visually alert for and maintain safe distances from other aircraft, populated areas, obstacles, or clouds. Most other air traffic (including air passenger carriers, business aircraft, and military aircraft) operate under IFR conditions that require pilots to be trained and appropriately certified in instrument navigational procedures. The respective procedures established under VFR and IFR for airspace use and flight operations help segregate aircraft operating under each set of rules. Military pilots are trained for and use both VFR and IFR conditions. Refer to Figure B-1 in Appendix B for a depiction of the various classes of airspace discussed below.

Class A Airspace. Class A airspace includes all flight levels or operating altitudes, including that airspace overlying the waters within 12 NM of the coast of the 48 contiguous states, from 18,000 to 60,000 ft MSL. Formerly referred to as a Positive Control Area, Class A airspace is dominated by commercial aircraft using routes between 18,000 and 45,000 ft MSL.

Class B Airspace. Class B airspace typically comprises that airspace from the surface to 10,000 ft MSL surrounding the nation’s busiest airports. The configuration of each Class B airspace area is individually tailored and consists of a surface area with an additional 2 or more layers; it is designed to contain all published instrument procedures once an aircraft enters the airspace. An ATC clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace. Class B airspace is typically associated with major metropolitan airports such as the San Diego International-Lindbergh Airport, California.

Class C Airspace. Airspace designated as Class C can generally be described as controlled airspace that extends from the surface up to 4,000 ft AGL. Class C airspace is designated and implemented to provide additional control into and out of primary airports that occasionally experience a large number of aircraft operations. All aircraft operating within Class C airspace are required to maintain 2-way radio communications with local ATC entities. Class C airspace is associated with city airports such as Tucson International Airport, Arizona.

Class D Airspace. Class D airspace is the area within 5 NM from an operating ATC-controlled airport, extending from the surface to 2,500 ft AGL or higher. All aircraft operating within Class D airspace must be in two-way radio communications with the ATC facility. The airspace in the immediate vicinity of Ernest A. Love Airport, Prescott, Arizona, is an example of Class D airspace.

Class E Airspace. Class E airspace is controlled airspace that is not designated as Class A, B, C, or D. It includes designated federal airways consisting of low-altitude V or “Victor” routes. Federal airways have a width of 4 statute miles on either side of the airway centerline and can occur between altitudes of 700 ft AGL and 18,000 ft MSL. These airways frequently intersect approach and departure paths from both military and civilian airfields. The majority of Class E airspace is located where more stringent airspace controls have not been established and are associated with smaller airports such as Pinal Airpark and Marana Northwest Regional Airport, Arizona.

Uncontrolled Airspace

Class G Airspace. Uncontrolled airspace, Class G, is not subject to the restrictions that apply to controlled airspace. Limits of uncontrolled airspace typically extend from the ground surface to 700 ft AGL but can extend above these altitudes to as high as 14,500 ft MSL if the FAA has designated no other types of controlled airspace. ATC does not have the authority to exercise control over aircraft operations within uncontrolled airspace. Primary users of uncontrolled airspace are general aviation aircraft operating in accordance with VFR.

Special Use Airspace

Special use airspace consists of airspace within which specific activities must be confined, or where limitations are imposed on aircraft not participating in those activities. With the exception of Controlled Firing Areas, special use airspace is depicted on sectional aeronautical charts. These charts include hours of operation, altitudes, and the agency controlling the airspace. All special use airspace descriptions are contained in FAA Order 7400.8E and published in the *Department of Defense* (DoD) *Flight Information Publication AP/1A: Special Use Airspace North and South America* and *AP/1B: Area Planning Military Training Routes North and South America.*

MOAs. MOAs are non-regulatory special use airspace areas with defined vertical and lateral limits. MOAs are designed to increase safety for IFR and VFR traffic. When a MOA is active (in use), all IFR traffic is re-routed around the area. Non-participating VFR traffic may enter the active MOA but see and avoid procedures must be used.

Refueling Tracks/Anchors (ARs). AR tracks are published routes where fuel transfer between military aircraft can take place.

Restricted Area. Airspace within which flight of aircraft, while not wholly prohibited, is subject to restriction. This is designated rulemaking airspace where restrictions are placed on all nonparticipating aircraft. This airspace is used to contain hazardous military activities and lies within the territorial airspace of the United States. The term "hazardous" implies, but is not limited to live firing of weapons, ordnance delivery, and/or aircraft testing.

Range. A range is any land mass or water body, with the associated Special Use Airspace (SUA). A range is a designated area established to conduct military operations, training, research and development, and test or evaluation of military hardware, personnel, tactics, munitions, explosives, and/or EC systems. Range capabilities and services vary are dependent upon the test and training requirements delineated by the military. Ranges can accommodate ground activity, ground-to-air activity, and/or air-to-ground activity. Both ground-to-air and air-to ground activity requires SUA above range parameters.

Other

LATN Area. Airspace associated with low-speed and low-altitude training conducted by military aircrews is commonly identified as a LATN area. LATN areas generally have an altitude structure between 100 and 1,500 ft AGL and an airspeed restriction not to exceed 250 knots indicated airspeed (KIAS). A LATN area covers large areas of uncontrolled airspace and facilitates operational flexibility (e.g., flight patterns are not confined to narrow flight corridors and the direction of flight is not restricted). The purpose of LATN areas is to conduct random VFR low-altitude navigation training in an area that is defined by local military operations. Military aircraft are required to follow all existing FARs while flying within a LATN area. Other nonparticipating civil and military aircraft may fly within a designated LATN area but are required to maintain visual separation from other aircraft in visual meteorological conditions. Military and civilian pilots are responsible to "see and avoid" each other while operating in a LATN area. Since the FAA does not consider a LATN area special use airspace, formal airspace designation is not required. For the same reason, LATN areas are not included on FAA charts or publications.

Landing Zone (LZ). A landing area that has been identified for short field landing, hovering, and take-off training for aircraft and helicopters. LZs can be established at local public-use airports, military airfields, or other areas that have prior approval for activity.

Air Traffic Control Assigned Airspace (ATCAA). An ATCAA is defined airspace normally above 18,000 ft MSL and established by a letter of agreement with the ATC facility having responsibility for the airspace. Nonparticipating aircraft are separated from the military activity being conducted within the ATCAA by ATC. ATCAAs are not published on aeronautical charts and in some cases the location can be moved depending on aircraft traffic.

3.1.1 Davis-Monthan AFB, Ranges, Airspace, and WTA

3.1.1.1 Davis-Monthan AFB and Vicinity

Davis-Monthan AFB is located approximately 6 miles southeast of downtown Tucson, Arizona (see Figure 2-4). Davis-Monthan AFB has 1 northwest and southeast oriented runway (RWY 12/30) that is 13,643 ft long by 200 ft wide. RWY 12 is the primary runway for noise abatement. Tucson Terminal Radar Approach Control (TRACON) controls IFR traffic within approximately 40 NM of Davis-Monthan AFB below 17,000 ft MSL. Davis-Monthan AFB and Tucson International Airport (5 NM to the west) are designated Class C airspace that overlaps and encircles both Tucson International Airport and Davis-Monthan AFB from the surface to 6,600 ft MSL and from 5 NM to 10 NM from 4,200 ft MSL to 6,600 ft MSL. The Davis-Monthan AFB tower is responsible for all air traffic northeast of Interstate 10 within 5 NM of the airport from the surface up to 5,500 ft MSL. Davis-Monthan AFB has 3 published instrument approaches and 3 published departures for RWY 12/30. Davis-Monthan AFB supports both VFR and IFR flight operations. There are 33 public use civil airports (including 6 charted private airfields) within 100 NM of Davis-Monthan AFB. The largest, Phoenix Sky Harbor International Airport has designated Class B airspace. There are numerous airports within the local flying area that contain Class C and D airspace.

Currently there are approximately 77,000 annual airfield operations conducted at Davis-Monthan AFB. These airfield operations reflect a mixture of aircraft, primarily A/OA-10, EC-130, with F-16, F-15, FA-18, F-14 AV-8, KC-135, KC-10, B-1, C-17, C-5, C-141 aircraft, and multiple types of helicopter and general aviation aircraft also using the airfield (See Table 2.3-5).

3.1.1.2 Ranges and Airspace

Albuquerque Air Route Traffic Control Center (ARTCC) controls airspace in the ROI. Jet routes are 8 NM wide corridors designated to serve aircraft operations in the high altitude airspace structure from 18,000 ft MSL up to and including 45,000 ft MSL. An extensive network of radio navigation aids defines the route centerlines. The jet route system is designed to facilitate efficient cross-country travel and provide linkages to major air terminals. There are 16 high altitude jet routes located in the vicinity of Davis-Monthan AFB. Most link east-west jet routes from southern California with Arizona and the rest of the country and at 18,000 ft MSL and above, are higher than most airspace that HH-60 and HC-130 aircraft will use on normal training flights. There are also low-altitude Victor Routes that serve general and commercial aviation below 18,000 ft MSL. The low-altitude system is defined by the same radio navigation aids that establish the jet route system. The individual routes are 8 NM wide. The floors of these routes vary from segment to segment depending on the altitudes necessary to provide clear reception of the navigation signals and safe overflight clearance above the underlying terrain. Low-altitude Victor Routes do not penetrate restricted airspace and generally do not penetrate MOAs. Those that do pass through MOAs cannot carry IFR traffic when the MOA is active. There are 15 Victor Routes within 100 NM of Davis-Monthan AFB.

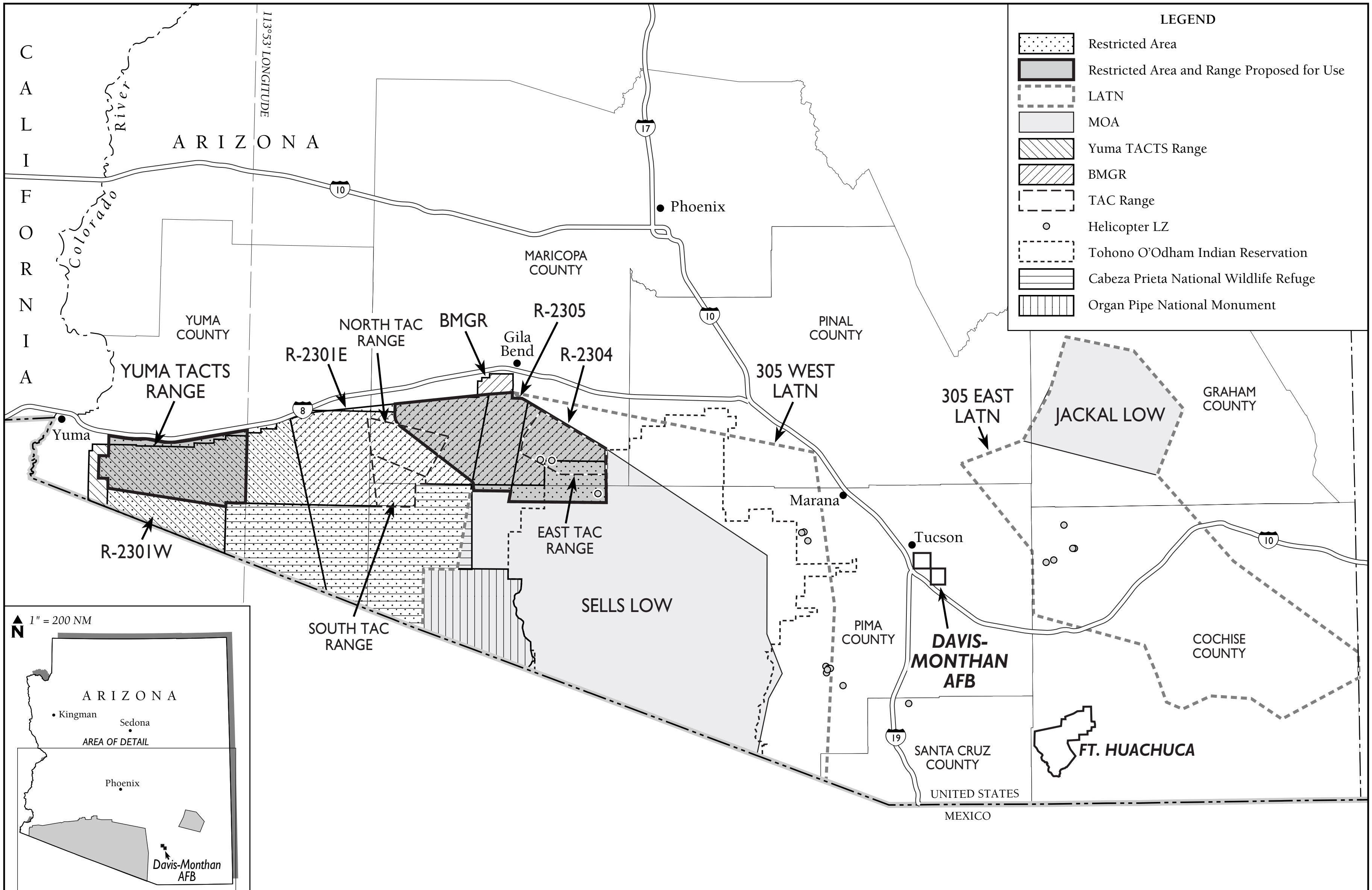
There are 11 low-level military training visual routes (VRs) that transit the Davis-Monthan AFB airspace: VRs 223, 239, 241, 242, 244, 259, 260, 263, 267, 268, and 269. These VRs are primarily used for flight training and entry into the many MOAs in the region including Ruby 1, Fuzzy, Sells 1, Sells Low, Jackal 1, Jackal Low, Outlaw, Morenci, Reserve, and Tombstone and Restricted Areas R-2301E/W, R-2305, R-2304, R-2310A/B/C, and R-2312. Figures 3.1-1, 3.1-2, 3.1-3, and 3.1-4 depict those airspace units proposed for use under the Proposed Action. There are no Instrument Routes (IRs) or Slow Routes (SRs) within 100 NM of Davis-Monthan AFB.

There are 2 LATN areas to the northwest and southwest of the base defined from 100 ft AGL to 3,000 ft AGL (to 1,000 ft AGL in the northwestern part of the LATN that falls under Sells MOA) for A/OA-10 aircraft assigned to Davis-Monthan AFB. The 305 RQS has also established 2 LATN areas designated for HH-60 helicopters to the west (which overlaps the A/OA-10 LATN areas) and east of the base from 100 ft AGL to 1,500 ft AGL.

Currently, the 305 RQS uses the BMGR, primarily R-2304 and R-2305, and Sells MOA for HH-60 training. The BMGR (including the Marine Corps Air Station [MCAS] Yuma portion or R-2301W) contains 56 areas of Special Use Airspace and ATCAAs, where 72,870 aircraft sorties were flown by 44 different aircraft types (Air Force 1999). Within the 305 RQS LATN areas and the BMGR, there are 19 identified LZs for HH-60 helicopters (Figure 3.1-1). HH-60 air refueling training is accomplished in the MOAs and the 305 West and East LATN areas. The Tucson Medical Center Heliport is also used by the HH-60's for local support and flight training with flight procedures established in the 305 RQS Inflight Guide.

3.1.1.3 WTA

The existing WTA (referred to as Navy DIP areas A1 and A2) is located over water and begins 4 NM southwest of Imperial Beach-Ream Field Naval Reserve Station, California (see Figure 2-6). DIP Areas A1 and A2 are between 3 NM and 7 NM and are currently used by the 305 RQS from Davis-Monthan AFB. Airspace located off the coast of San Diego is under the control of Los Angeles ARTCC. Low-altitude flights within the DIP Areas are VFR and are monitored by Imperial Beach Ground Control, which is manned from 7:30 A.M. until 10:30 P.M. (11:00 P.M. during Daylight Savings Time). The DIP areas may be used when the Imperial Beach Control is closed, but operations normal reports must be made to NAS North Island Tower. All flights in the Dip areas are VFR, see and avoid, and have an altitude of 1,000 ft MSL and below. The Dip areas are next to the Class D airspace under the control of Imperial Beach Control. There are numerous low-level Victor Routes in the area; all are located to the north and east of the WTA. There are 4 high altitude Jet Routes that handle transiting traffic in and around San Diego and southern California. In addition to Navy Warning Area 291 to the west of the WTA, there are 4 low-level VR routes (VR 1266, 1257, 288, and 289) and 1 Instrument Route (IR- 217) within 60 NM to the north and east of the WTA. The closest restricted areas are R 2503C to the north and R 2510B to the east.



0 Statute Miles 32

0 Nautical Miles 32

Figure 3.1-1
Proposed Action: CSAR Beddown at
Davis-Monthan AFB and Affected Airspace

Figure 3.1-2
Jackal Low MOA

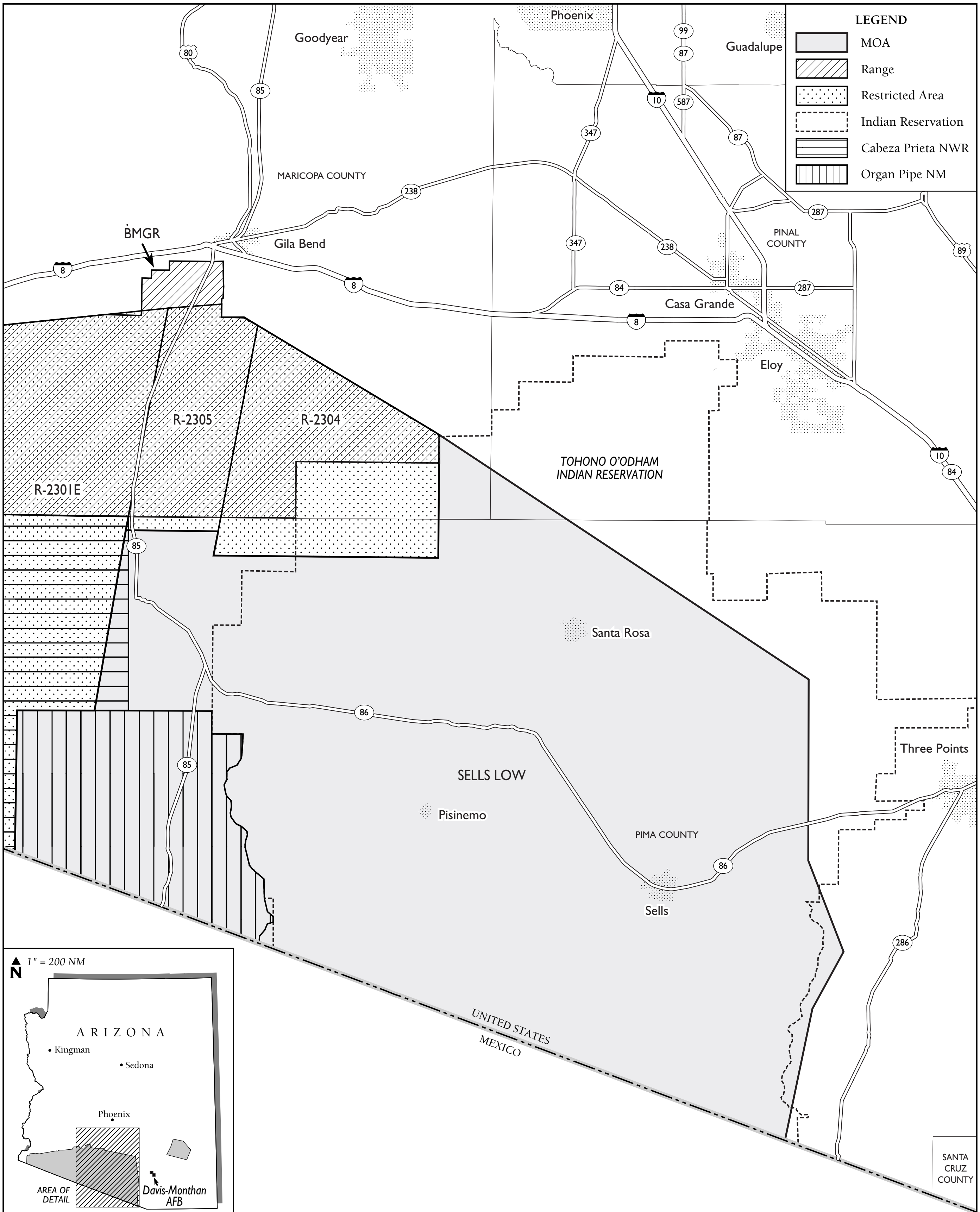


Figure 3.1-3
Sells Low MOA, Barry M. Goldwater Range, and Associated Restricted Areas

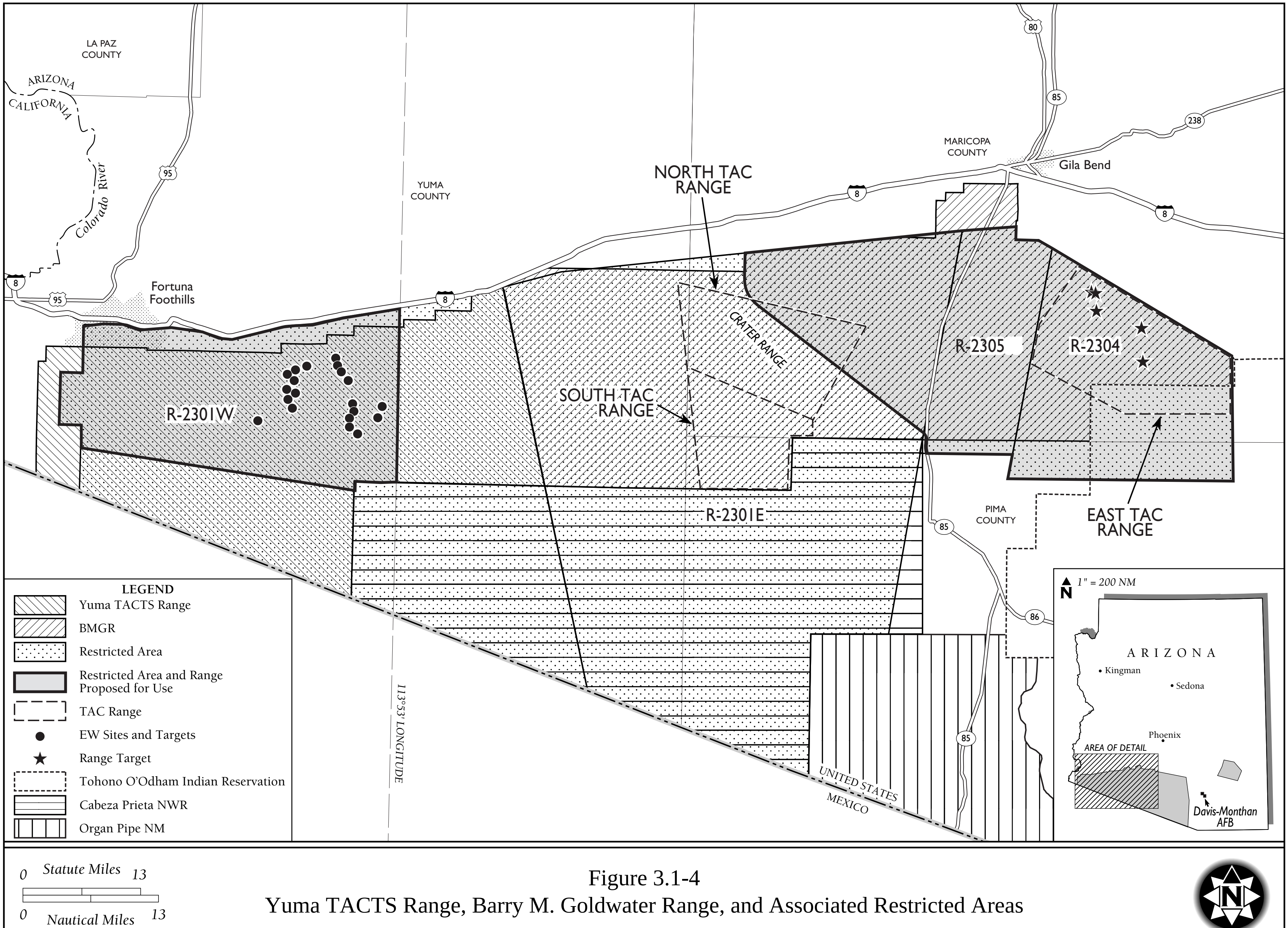


Figure 3.1-4
Yuma TACTS Range, Barry M. Goldwater Range, and Associated Restricted Areas

3.1.2 EDWARDS AFB, RANGES, AIRSPACE, AND WTA

3.1.2.1 Edwards AFB and Vicinity

Edwards AFB is located in the Antelope Valley region of the Western Mojave Desert in Southern California, approximately 65 miles northeast of Los Angeles (see Figure 2-8). The base is comprised of 5 areas: Main Base, South Base, North Base, NASA/Dryden, and the Air Force Research Lab. Main Base has 1 runway (RWY 22/04) that is approximately 15,000 ft long by 300 ft wide. South Base has 1 runway (RWY 24/05) that is approximately 8,000 ft long and 300 ft wide. North Base has 1 runway (RWY 24/06) that is approximately 6,000 ft long and 150 ft wide. There are published IFR and VFR approaches to all 3 runways.

In addition to the hard surface runways, Edwards AFB has a unique dry lakebed runway system. Rogers and Rosamond Dry Lakes (65 square miles total) are unique, natural resources that provide many miles of marked and maintained emergency landing runways. Rogers Dry Lake is the larger of the 2 lakebeds and has been used since 1977 as the landing site for many space shuttle test and operational flights. Rogers Dry Lake has a surface of about 44 square miles and is the lakebed next to which Main Base has been developed. There are 7 marked runways crisscrossing the surface of this lakebed, with the longest being Runway 17/35, which extends 7.5 miles. Rosamond Dry Lake, several miles southwest of Rogers Dry Lake, offers 21 square miles of smooth flat surface that is also used for routine flight test and research operations and for emergency landings. There are 2 marked runways on Rosamond Dry Lake.

Currently there are 122 aircraft assigned to Edwards AFB (Table 2.3-13). There were approximately 162,300 airfield operations during 2000 (Table 2.3-15).

Low altitude airspace into Edwards AFB is under the Joshua Approach Control and Sports Control (for R-2515). Edwards AFB is within Class D airspace that is within a 7 NM-radius circle from the center RWY 04/22 and whose altitude extends to 4,800 ft MSL. Flight within the Class D airspace is controlled by the ATC tower at Edwards AFB main base runway. Edwards AFB is located under Restricted Area R-2515 found within the R-2508 Complex that separates general and commercial aircraft traffic from the general area (Figure 3.1-5). There are very few civilian or private airfields in the vicinity due to the restricted nature of the surrounding airspace. There are 2 private airfields (Borax and Boron) that are within 15 NM of Edwards AFB, under R-2525. The R2508 Complex contains 14 charted public airports and 9 charted private airports. Palmdale, Rosamond, Mojave, and California City Airports are located to the west of Edwards AFB. There are also 14 private airfields that are outside to the west of R-2515. Civilian airports are near the southwest corner of the R-2508 Complex There are 6 low-level federal Victor Airways (V 197, V 137, V 12, V 386, V 518, and V 201) that are to the south and west of the Edwards AFB complex. There are 4 high-altitude Jet Routes (J 5, 50, 65 and 6) to the south and west, and 1 (J 110 to the north) of Edwards AFB.

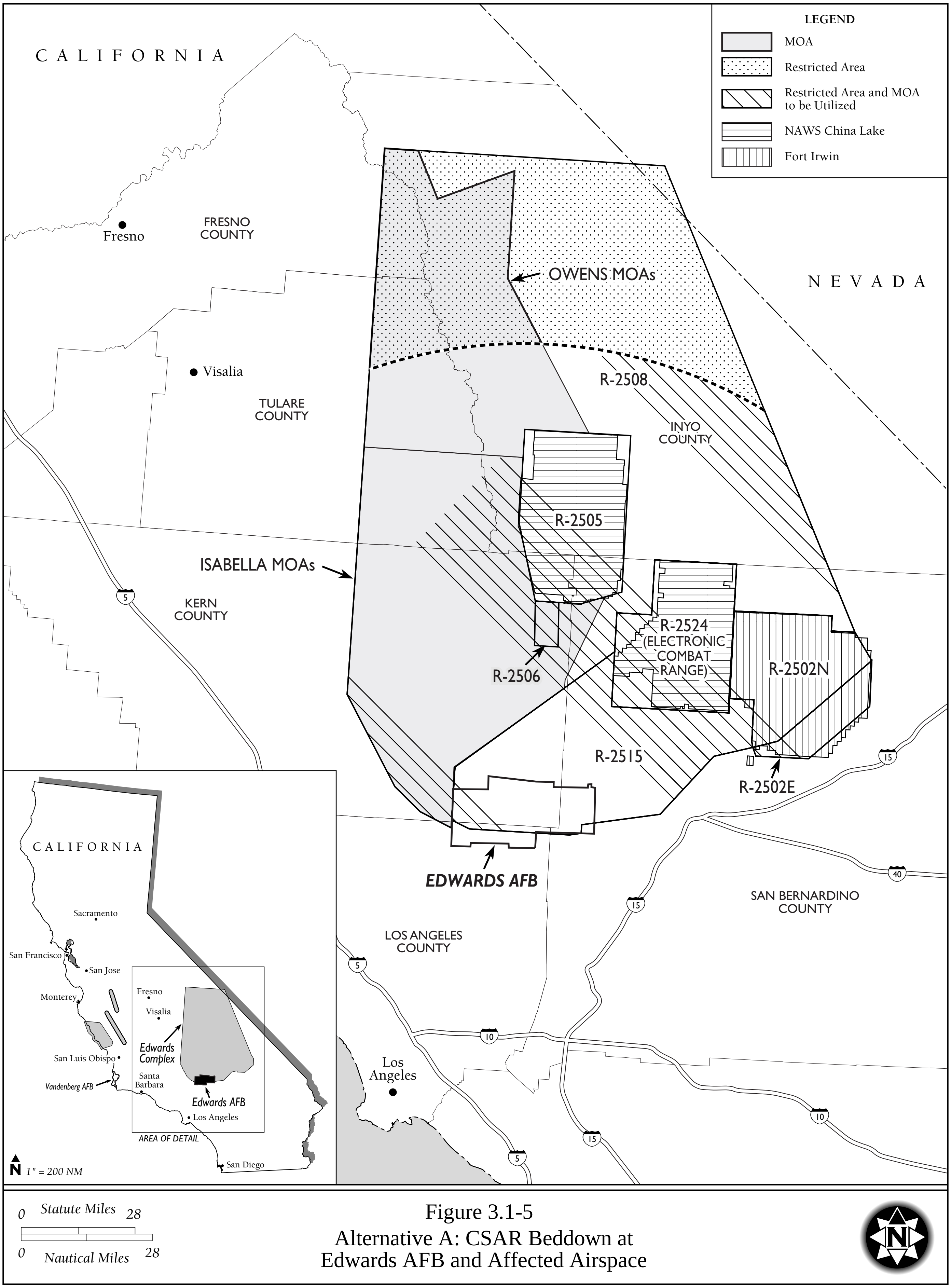


Figure 3.1-5
Alternative A: CSAR Beddown at Edwards AFB and Affected Airspace

3.1.2.2 Ranges and Airspace

The R-2508 Complex airspace consists of 7 restricted areas, 10 MOAs, and 14 ATCAAs. There are 5 restricted areas within R-2508 that extend from the surface to unlimited altitude (R-2502E, R-2502N, R-2505, R-2515, and R-2524) (Figure 3.1-6); 1 restricted area (R-2506) that extends from the surface to 6,000 ft MSL; and 1 restricted area (R-2508) that extends from 20,000 ft MSL to unlimited and consists of the airspace found within the Isabella, Panamint, Saline, and Owens ATCAAs. Airspace within the complex is activated via schedules to support the various users. When not needed for mission support, the airspace is released to the FAA for joint block altitudes or in its entirety. Airspace in this area falls under the Los Angeles ARTCC, with the High Desert TRACON and co-located FAA facility at Edwards AFB controlling the airspace use within R-2508. Management of the R-2508 Complex is the responsibility of the R-2508 Joint Policy Planning Board (JPPB) made up of the commanders of the Naval Air Warfare Center Weapons Division (NAWCWD)-China Lake, AFFTC-Edwards AFB, and the National Training Center (NTC)-Fort Irwin, California. The R-2805 Complex is managed in accordance with a shared-use agreement between the AFFTC, NAWCWD, and NTC. The R-2508 Complex Control Board (CCB) conducts day-to-day management of the R-2508 Complex.

Airspace use within the R-2508 Complex is monitored and controlled by the High Desert TRACON and the FAA facility at Edwards AFB, to ensure that operations are contained within the designated airspace, and that operations are carried out in accordance with published procedures. These are spelled out in Letters of Agreement between the FAA and the CCB and/or other using agencies. In addition to the restricted areas, there are 10 MOAs: Isabella, Owens, Saline, Panamint, Bishop, Porterville, Bakersfield, Buckhorn, Barstow, and Shoshone. In general, the MOA airspace is from 200 ft AGL up to but not including 18,000 ft MSL. Two exceptions to this are the Porterville and Bakersfield MOAs, which begin at 2,000 ft AGL. Numerous Military Training Routes in the vicinity provide access into the R-2508 Complex including 8 VRs and 6 IRs. There is one Slow Route (SR 390) that provides routing into the Buckhorn MOA. There are 2 air refueling routes, AR-230V and AR-231V to the west of the R-2508 Complex controlled by the 66th Air Refueling Squadron at Nellis AFB, Nevada. Other air refueling training takes place in the Saline Valley Edwards Complex in the Saline MOA.

During the 1980s and early 1990s, there were between 70,000 and 90,000 sortie-operations. There were 8,043 sorties scheduled into R-2508 Complex MOAs during 2000 and 10,452 sorties scheduled into R-2515 during 2000 (AFFTC 1999, Air Force 2001a).

3.1.2.3 WTA

See Section 3.1.1.3 for a discussion of the WTA.

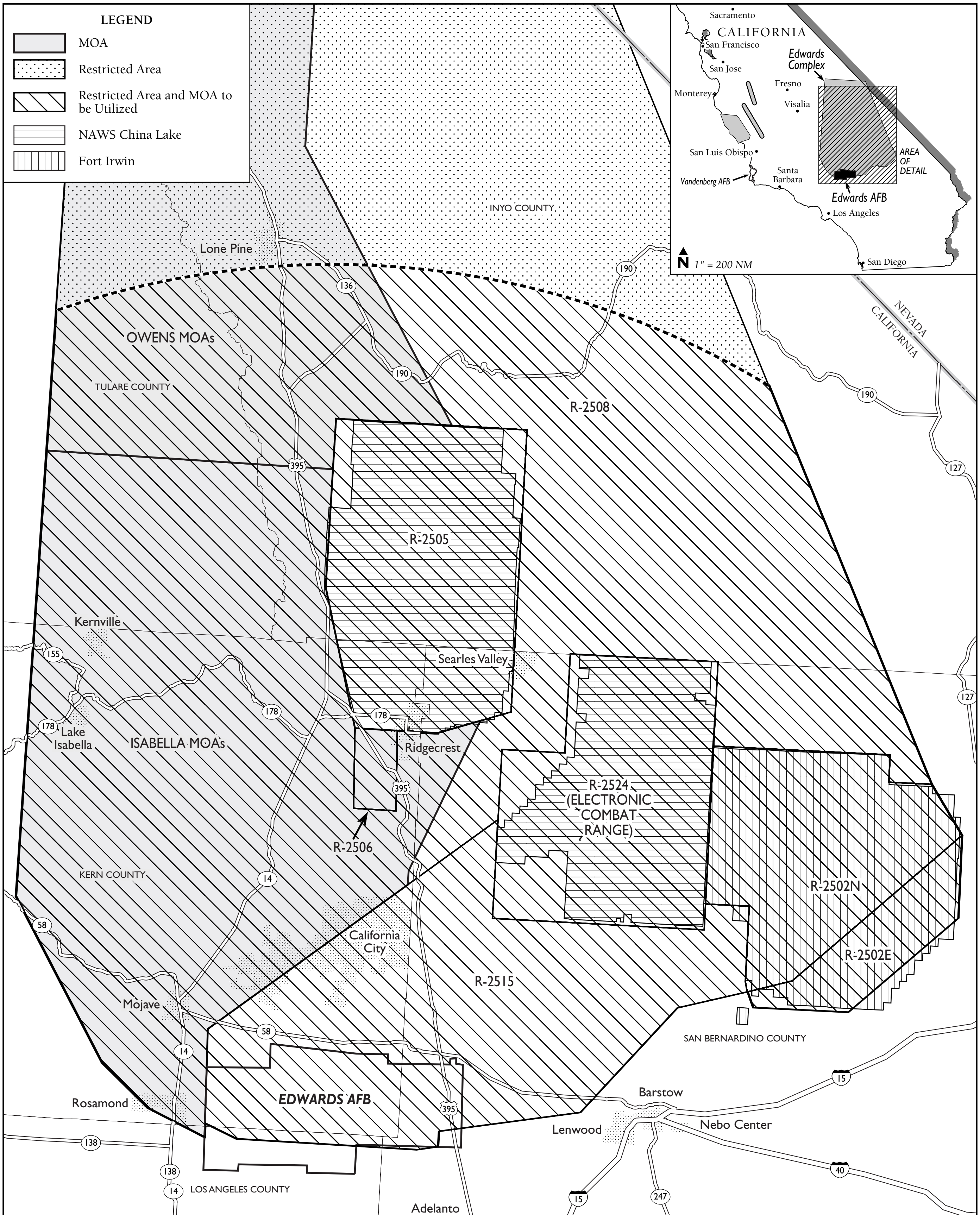


Figure 3.1-6
Edwards Airspace Complex: MOAs, Ranges, and Restricted Areas Proposed for Use under Alternative A

3.1.3 VANDENBERG AFB, RANGES, AIRSPACE, AND WTA

3.1.3.1 Vandenberg AFB and Vicinity

Vandenberg AFB is located approximately 150 miles northwest of Los Angeles, California on the coast of the Pacific Ocean (see Figure 2-11). Vandenberg AFB has 1 northwest and southwest oriented runway (RWY 30/12) that is 15,000 ft long and 200 ft wide. It is surrounded by Class D airspace that radiates out 4.5 NM from the airfield. It is approximately 7 NM northwest from the Lompoc Airport, which has a circle of Class E airspace from the surface that extends out 4.5 NM to meet the Vandenberg AFB Class D airspace. Vandenberg AFB has 3 IFR published instrument approaches to RWY 12/30 and accommodates both IFR and VFR traffic. There are 26 airports within the Vandenberg AFB flying environment including 4 private airfields. There are 6 airports surrounded with Class D airspace, and 1, Santa Barbara Municipal, with Class C airspace from 6:00 A.M. until 11:00 P.M. (other times Class E airspace). Currently there are approximately 48,000 annual airfield operations conducted at Vandenberg AFB (see Table 2.3-23). These airfield operations reflect a mixture of aircraft, including UH-1, P-3, C-130, KC-135, T-38, C-12, C-5, C-141, F-18, DC-9, LR-35, E-2, SW-3, C-21, BE-40, B-727, and C-17 (Air Force 2001a).

3.1.3.2 Ranges and Airspace

There is uncontrolled airspace below 14,500 ft MSL off the coast of Vandenberg AFB. There are 19 federal low-level Victor Routes that provide navigation tracks for primarily north and south general aviation aircraft. To the east are 11 high altitude Jet Routes that provide navigation for general and commercial aircraft flying north and south. These routes provide the main north-south routes into and out of Los Angeles and southern California. Los Angeles ARTCC controls aircraft in the vicinity of Vandenberg AFB up to 55 NM north of the base, where Oakland ARTCC is responsible for airspace. There are 7 Restricted Areas within 100 NM of Vandenberg AFB and 5 Warning Areas off the coast. Other military airspace within 100 NM of Vandenberg consists of 4 IRs, 8 VRs, and 1 SR, all to the east of Vandenberg AFB. There are also 2 published helicopter AR tracks (AR-243V North and AR-243V South) to the northeast. Currently, the 76th Helicopter Flight (the only flying unit stationed at Vandenberg AFB) utilizes the Vandenberg LATN to the north and east of the airfield, with the coastline forming the western boundary. In addition, the Priest LATN covers a large area from Ventura County in the south to Alameda County in the north (Figures 3.1-7, 3.1-8, and 3.1-9).

Restricted Area R-2513 is surrounded by the Hunter High MOA and is adjacent to Hunter Low A MOA. Hunter High MOA extends from 11,000 ft MSL to, but not including, 18,000 ft MSL. Hunter Low A MOA extends from 200 ft AGL to, but not including, 11,000 ft MSL. The controlling FAA facility is Oakland ARTCC. The scheduling and reporting unit is Fort Hunter-Liggett. There are no ATCAAs associated with the surrounding MOAs. R-2513 has a continuous effective altitude from the surface to 24,000 ft MSL. There are multiple fixed- and rotary-wing aircraft types that use the range from various DoD services and other federal and state agencies. The types of activities conducted include parachute operations, heavy cargo and container drops, live fire exercises, search and rescue, and close air support operations. State and federal fire fighting training operations are also conducted in this airspace. There were 1,857 sortie-operations scheduled for FY01 (Fort Hunter Liggett 2002c) (see Table 2.3-24).

3.1.3.3 WTA

See Section 3.1.1.3 for a discussion of the WTA.

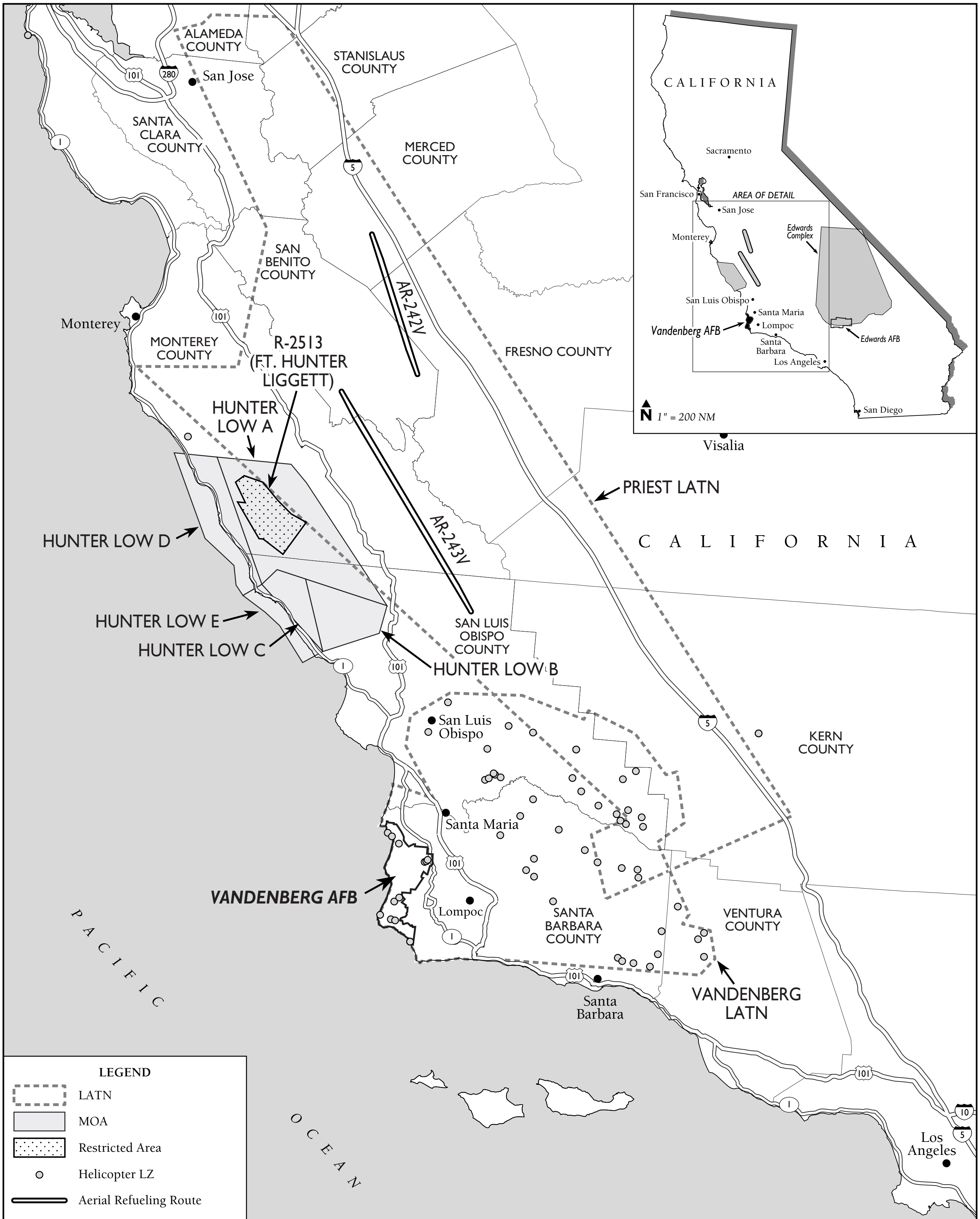


Figure 3.1-7
Alternative B: CSAR Beddown at
Vandenberg AFB and Affected Airspace

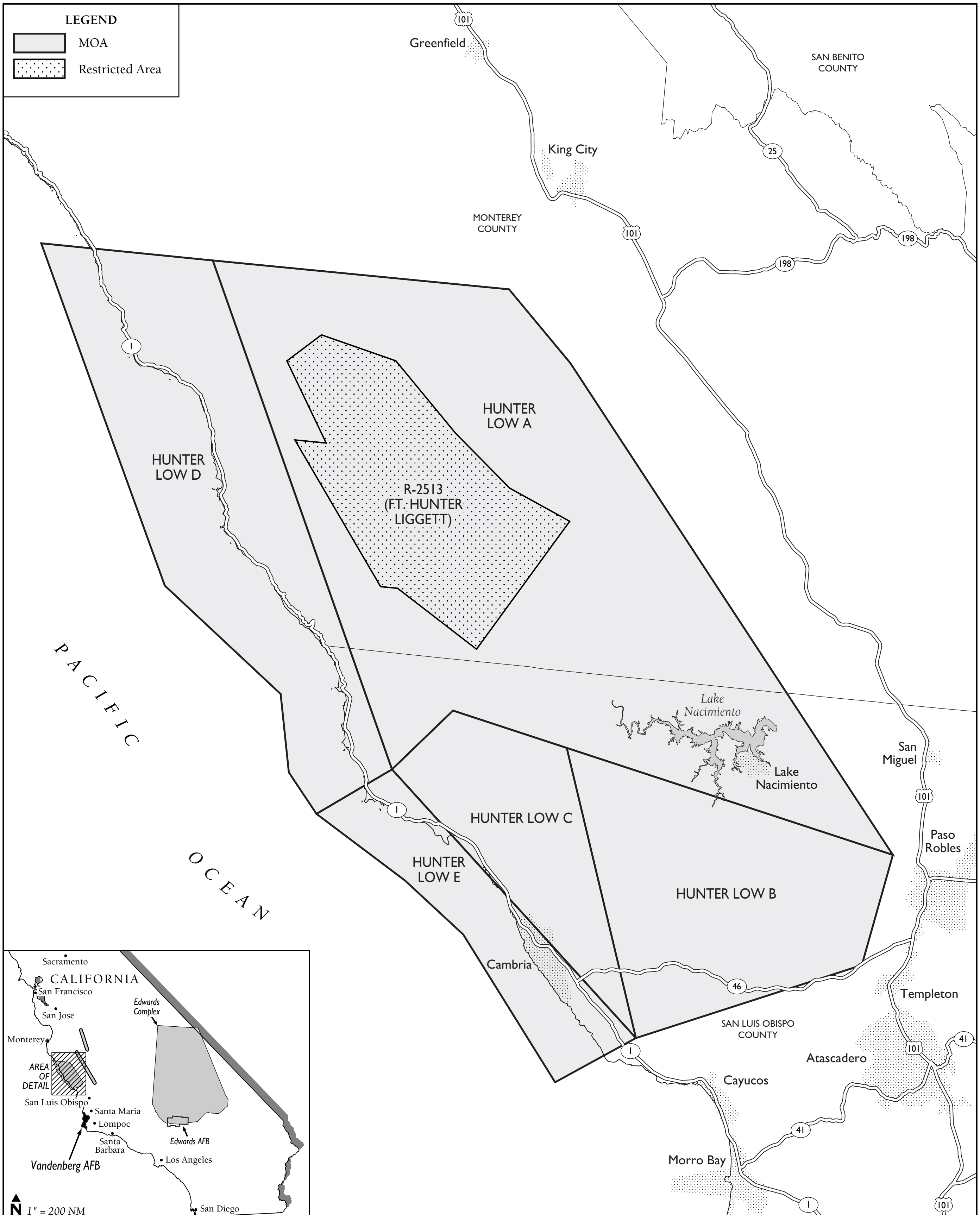


Figure 3.1-8
Hunter MOAs and Fort Hunter Liggett Range

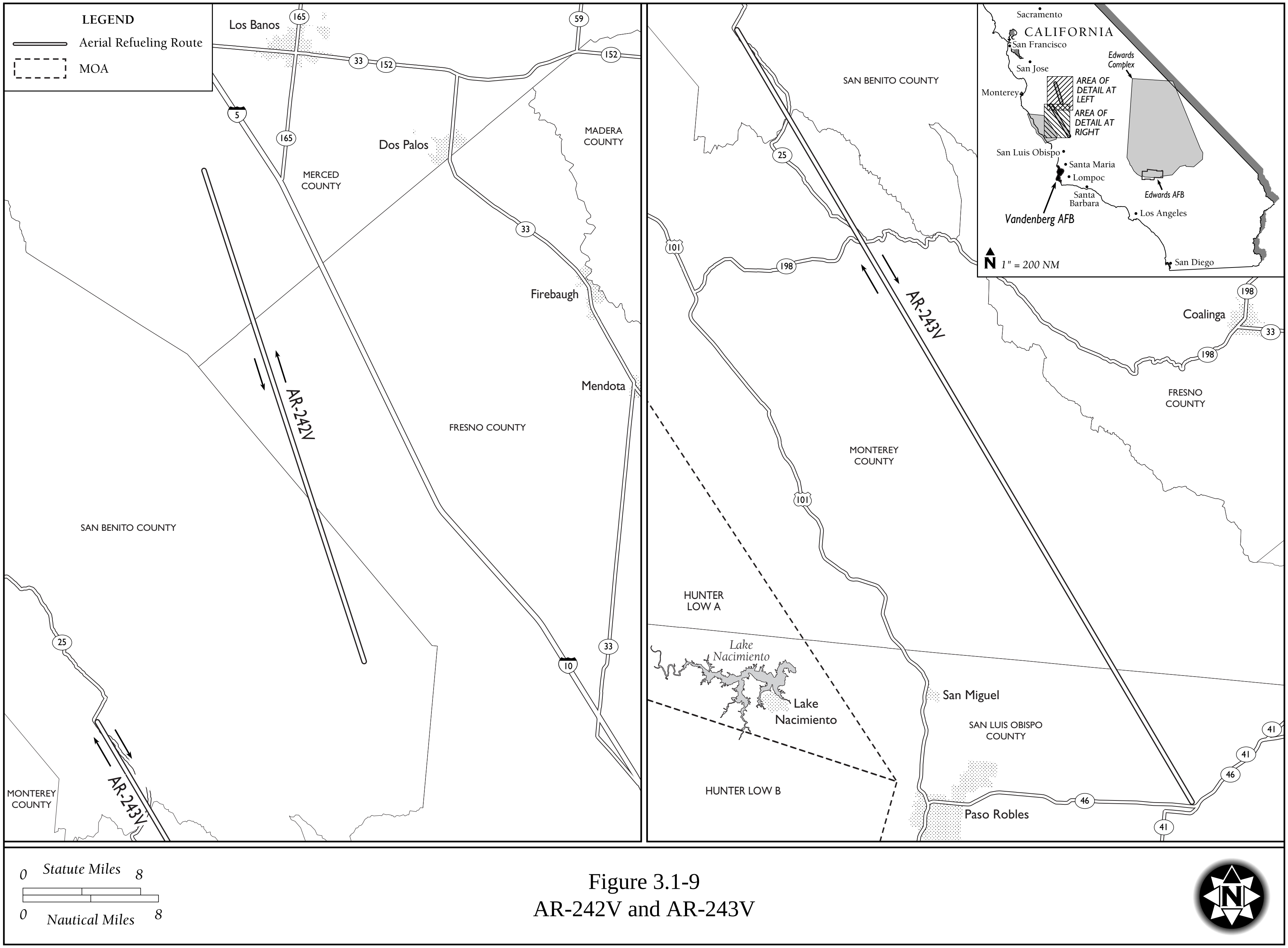


Figure 3.1-9
AR-242V and AR-243V

3.2 NOISE

Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying (Federal Interagency Committee on Noise [FICON] 1992). Human response to noise can vary according to the type and characteristic of the noise source, the distance between the noise source and the receptor, the sensitivity of the receptor, and the time of day.

Due to the wide variations in sound levels, sound levels are measured using a logarithmic scale expressed in decibels (dB). Thus, a 10-dB increase in noise corresponds to a 100-percent increase in the perceived sound. Under most conditions, a 5-dB change is necessary for noise increase to be noticeable (U.S. Environmental Protection Agency [USEPA] 1972b). Sound measurement is further refined by using an A-weighted decibel (dBA) scale that emphasizes the range of sound frequencies that are most audible to humans (between 1,000 and 8,000 cycles per second). A-weighted sound measurements de-emphasize low and high frequencies and emphasize mid-range frequencies. Various other weighting protocols may be more appropriate when assessing potential effects on marine mammals since they are sensitive to a different range of frequencies. Alternative measurement procedures such as C-weighting or flat-weighting (unweighted) are typically used for marine mammals. The assessment of potential noise effects on marine mammals, discussed in Section 4.9, Marine Biological Resources, uses alternative measures to characterize sound levels. However, for the purpose of assessing potential noise effects on humans and terrestrial wildlife, A-weighted sound level measures are used. All sound levels analyzed in this EA are A-weighted; the term dB implies dBA unless otherwise noted (refer to Appendix A, Aircraft Noise Analysis for a more detailed discussion of noise).

In this EA, a single-event noise such as an overflight is described by the sound exposure level (SEL). Although California uses the Community Noise Equivalent Level (CNEL) for land-use planning decisions, for the purpose of this analysis, noise levels are represented as day-night average sound level (DNL). The DNL noise metric incorporates a "penalty" for nighttime noise events occurring between the hours of 10:00 P.M. and 7:00 A.M. to account for increased annoyance. The CNEL metric is identical to the DNL value but incorporates an additional evening penalty of 5 dB for noise events between 7 P.M. and 10 P.M. A more thorough description of these noise metrics is provided below.

The 2 ROIs for the alternatives includes: 1) Davis-Monthan AFB and vicinity, Edwards AFB and vicinity, Vandenberg AFB and vicinity, and 2) all affected airspace units proposed for use during CSAR-associated training activities.

Sound Exposure Level (SEL)

The SEL measurement is used to describe such noise events as overflying aircraft. The SEL is a measurement that takes into account both the intensity and the duration of a noise event. The SEL measurement is comprised of the following components: 1) a period of time when an aircraft is approaching a receptor and noise levels are increasing; 2) the instant when the aircraft is closest to the receptor and the maximum noise level is experienced; and 3) the period of time when the aircraft moves away from the receptor resulting in decreased noise levels.

Noise generated by aircraft is often assessed in terms of a single event, which is incorporated into SEL measurements. The frequency, magnitude, and duration of single noise events vary according to aircraft type, engine type, power setting, and airspeed. Therefore, individual aircraft noise data are collected for various types of aircraft and engines at different power settings at various phases of flight. These values form the basis for the individual-event noise descriptors at any location and are adjusted to the location by applying appropriate data for temperature, humidity, altitude, and aircraft operating profiles and power settings.

DNL and CNEL Levels

The DNL is the energy-averaged sound level measured over a 24-hour period, with a 10-dB penalty assigned to noise events occurring between 10:00 P.M. and 7:00 A.M. The CNEL metric is identical to the DNL but has an additional 5-dB penalty assessed for evening events between the 7 P.M. and 10 P.M. DNL is the preferred noise metric of the U.S. Department of Housing and Urban Development, FAA, USEPA, and DoD and the average annual CNEL is the preferred noise metric in the State of California for describing the noise impacts of airports.

Studies of community annoyance in response to numerous types of environmental noise show that DNL correlates well with impact assessments; there is a consistent relationship between DNL and the level of annoyance. The "Schultz Curve" (refer to figure A-2 in Appendix A) shows the relationship between DNL noise levels and the percentage of population predicted to be highly annoyed. Most people are exposed to sound levels of 50 to 55 dB (DNL) or higher on a daily basis. Research has indicated that about 87 percent of the population is not highly annoyed by outdoor sound levels below 65 dB (DNL) (FICON 1992). Therefore, the 65 dB (DNL) noise contour is typically used to help determine compatibility of military operations with local land use. For comparison purposes, normal conversation (at a distance of 3 ft) is approximately 60 dB, loud speech is approximately 70 dB, and the sound of a train approaching a subway platform is approximately 90 dB. At approximately 120 dB, sound can be intense enough to induce pain, while at 130 dB, immediate and permanent hearing damage can result (National Park Service 1997).

Noise Modeling

Noise contributions from aircraft operations and ground engine run-ups at each AFB were calculated using the NOISEMAP (NMAP) computer model, the standard noise estimation methodology used for military airfields. NMAP uses the following data to develop noise profiles: aircraft types, runway utilization patterns, engine power settings, airspeeds, altitude profiles, flight track locations, number of operations per flight track, engine run-ups, and time of day.

One limitation of NOISEMAP is its modeling of rotorcraft (helicopters and tilt-rotor aircraft). NOISEMAP does not model the types of flight operations common to rotorcraft operations in the airspace environment such as hover, vertical ascents, and sharp turns. Also, the noise generated by rotorcraft vehicles is more complex than noise generated by fixed-winged aircraft. Rotorcraft noise is highly dependent on the direction from which it propagates away from the aircraft to the receiver, and it depends on the actual flight airspeed and flight path angle. This directionality and operational dependence is not properly modeled by fixed-wing based prediction models such as NOISEMAP. To improve noise prediction capability of rotorcraft, NASA's Langley Research Center developed the Rotorcraft Noise Model (RNM) (Lucas 1998). Noise modeling for operations within the WTA was conducted using the RNM. For a more detailed discussion of the RNM refer to Appendix A.

3.2.1 DAVIS-MONTHAN AFB, RANGES, AIRSPACE, AND WTA

3.2.1.1 Davis-Monthan AFB and Vicinity

Aircraft flying in airfield airspace generally adhere to established flight paths and overfly the same areas surrounding the airfield on a consistent basis. At Davis-Monthan AFB, noise from flight operations typically occurs beneath main approach and departure corridors and in areas immediately adjacent to parking ramps and aircraft staging areas. As aircraft takeoff and gain altitude, their contribution to the noise environment drops to levels indistinguishable from existing background noise.

Land use guidelines identified by the Federal Interagency Committee on Urban Noise (FICUN) are used to determined compatible levels of noise exposure for various types of land use surrounding airports (FICUN 1980); 65 to 85+ dB (DNL) noise contours are frequently used to help determine compatibility of aircraft operations with local land use. These guidelines are included in Table A-1 in Appendix A. Figure 3.2-1 presents the baseline DNL 65 to 85 dB noise contours in 5 dB increments surrounding the Davis-Monthan AFB airfield. Table 3.2-1 presents the baseline land acreage exposed to noise levels greater than 65 dB (DNL) based on yearly aircraft operations shown in Table 2.3-5.

Table 3.2-1. Noise Contour Acreage in the Vicinity of Davis-Monthan AFB

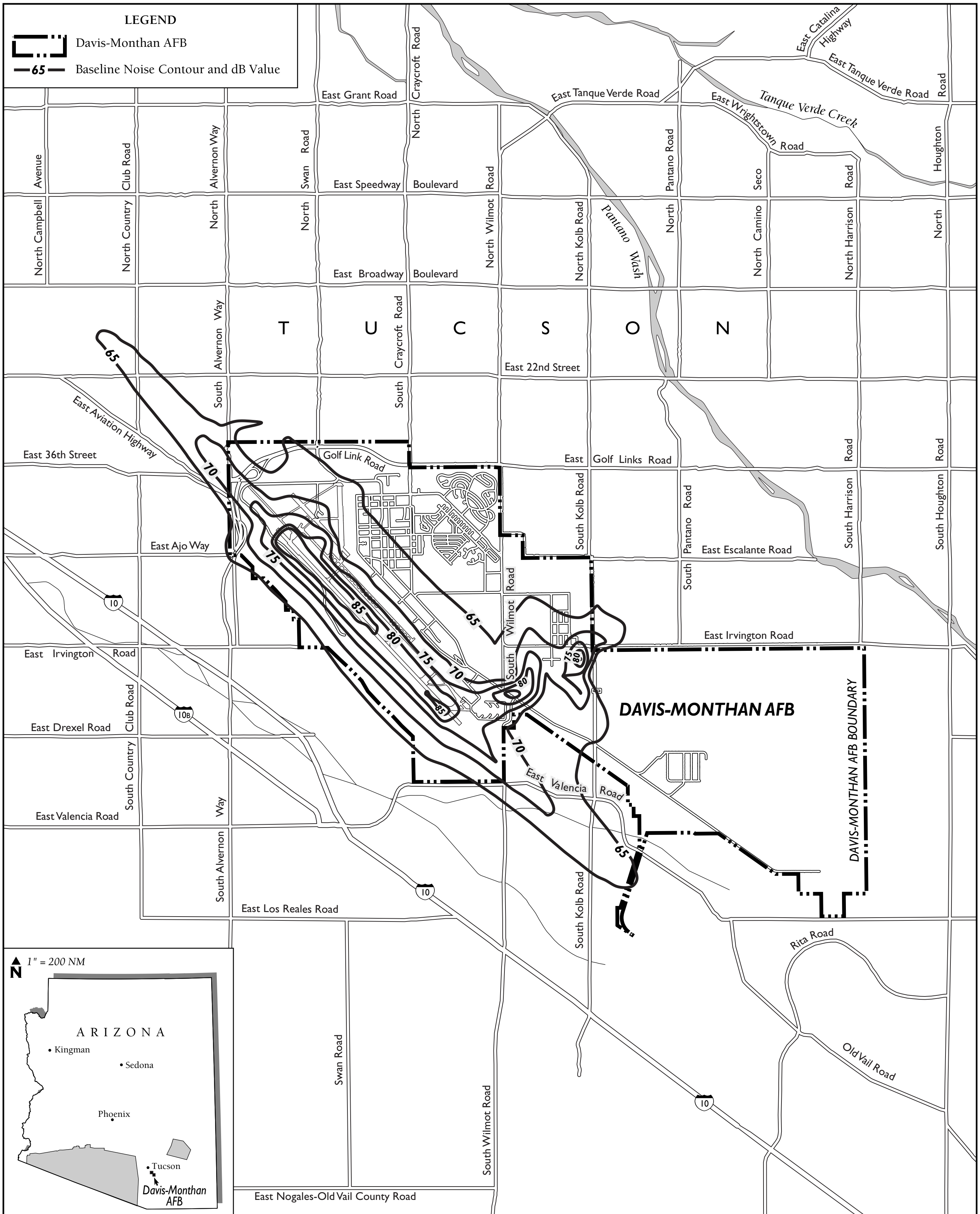
Noise Contour (DNL)	*Baseline*
65-70 dB	3,457
70-75 dB	1,279
75-80 dB	636
80-85 dB	383
85+ dB	168
Total	5,923

As indicated earlier, DNL correlates well with human annoyance. As DNL values increase the number of people expected to be annoyed also increases. There are approximately 2,200 residences and 1 elementary school affected by a DNL of 65 dB or louder.

3.2.1.2 Ranges and Airspace

Noise levels within the BMGR affected airspace are expected to be similar to those analyzed in the Final Legislative Environmental Impact Statement (LEIS) for the Renewal of the BMGR Land Withdrawal (Air Force 1999). The highest DNL on BMGR was reported as 62 dB on the East TAC Range. Based on sortie-operation levels reported in the LEIS (with the exception of R-3201W [MCAS Yuma]) noise levels in the BMGR are dominated by F-16 and A-10 aircraft although EC-130s, various helicopters, and other aircraft also operate at these ranges.

Using the OMEGA Version 11.3 computer model (University of Dayton Research Institute 1999), SEL values were calculated for various altitudes for baseline aircraft at Davis-Monthan AFB (Table 3.2-2).



0 Kilometers 2

0 Miles 1.5

Figure 3.2-1
Baseline Noise Contours for Davis-Monthan AFB

Table 3.2-2. SELs (dB) for Aircraft Based at Davis-Monthan AFB

Distance	*HH-60*	*EC-130*	*A-10*	*F-16*
500 ft	90.9	96.4	106.8	118.3
1,000 ft	86.6	91.3	100.9	112.6
2,000 ft	81.2	85.8	94.1	106.3
2,500 ft	79.3	83.8	91.7	104.1
Power Setting	LFO Lite	970 CTIT	5225 NF	93% NC

Notes: SEL values calculated under standard atmospheric conditions. Due to the varying power settings and airspeeds of aircraft, power settings and airspeeds presented in this table were normalized to 140 KIAS and max power for comparison purposes. Power setting not used to calculate SEL values for helicopters; values are based on air speed. LFO = level flight operation; NF = Fan Speed; CTIT = turbine inlet temperature (degrees centigrade), NC = % In Core.

3.2.1.3 WTA

In the area of the WTA, there are currently numerous commercial, civilian, and government (military [e.g., Navy] and non-military [e.g., USCG]) aircraft operations within or around the airspace and surface vessel operations (e.g., commercial and recreational boating and fishing, Navy and USCG vessels) within the WTA. Therefore, the WTA does experience aircraft and surface vessel noise on a regular basis. Representative noise levels for offshore areas with low sea states are estimated at 40-45 dB, with occasional higher events due to natural and aircraft noise (USCG 1960). The ambient noise background in coastal areas is influenced strongly by surf noise. Sound levels of 60-70 dB are considered representative of beaches with surf (USCG 1960). Since the WTA is approximately 3 NM offshore of San Diego it is subject to regular aircraft and surface vessel activity and is characterized by moderate sea states, background noise levels would be approximately 50 dB with occasional higher events due to natural sounds and military and civilian aviation and surface vessel activities.

3.2.2 EDWARDS AFB, RANGES, AIRSPACE, AND WTA

3.2.2.1 Edwards AFB and Vicinity

The primary noise sources on Edwards AFB are from aircraft operations. Noise contours associated with airfield flight operations are completely contained within the boundaries of Edwards AFB (Figure 3.2-2), and no off-base land use or residences or sensitive receptors are affected by noise levels greater than 65 dB (DNL).

3.2.2.2 Ranges and Airspace

Noise in the Edwards Airspace Complex is dominated by fighter-type aircraft such as the F-16s, F-15s, and F-18s although other aircraft types including helicopters currently use the area. There were 22,329 sortie-operations in the Edwards Airspace Complex in FY00 (Air Force 2001a). SEL levels for representative aircraft are presented in Table 3.2.2. Due to the random manner in which aircraft operate over the relatively large area, noise levels are expected to be below a 65 dB (DNL), the threshold for incompatible land uses.

3.2.2.3 WTA

The noise environment of the WTA would be the same as previously discussed in Section 3.2.1.3.

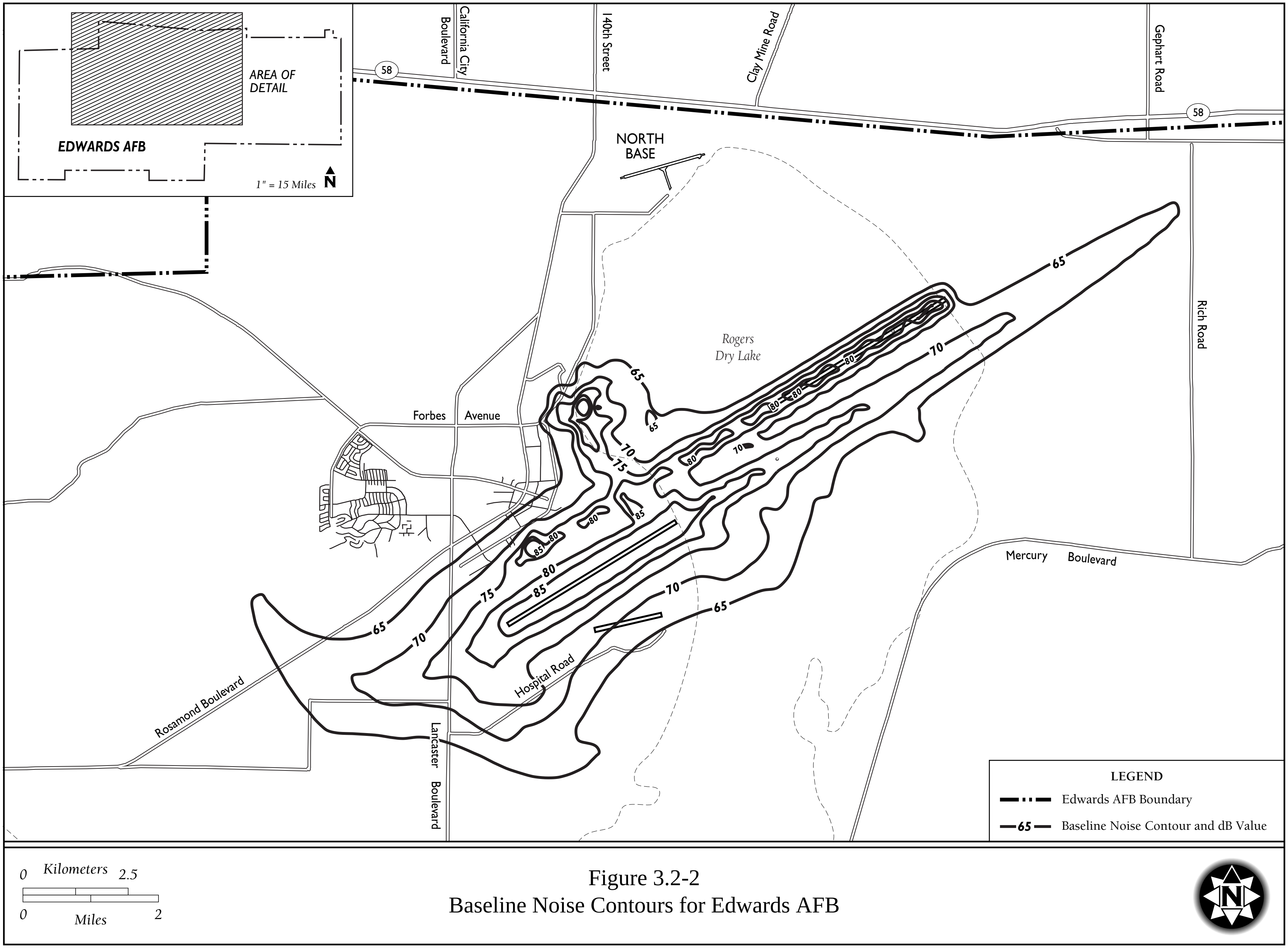


Figure 3.2-2
Baseline Noise Contours for Edwards AFB

3.2.3 Vandenberg AFB, Ranges, Airspace, and WTA

3.2.3.1 Vandenberg AFB and Vicinity

The primary noise sources on Vandenberg AFB are subsonic aircraft operations. Secondary sources include surface traffic, rail service operations, and equipment required for ground facility operations. In addition, Vandenberg AFB conducts numerous missile launches throughout the year resulting in periodic subsonic and supersonic noise events. Noise contours associated with airfield flight operations are completely contained within the boundaries of Vandenberg AFB (Figure 3.2-3), and no off-base land use or residences or sensitive receptors are affected by noise levels greater than 65 dB (DNL).

3.2.3.2 Ranges and Airspace

Noise in the Fort Hunter Liggett airspace is dominated by helicopter operations although fighter-type aircraft such as the F-16 and F-18 are occasional users of the range. There were 1,857 sortie-operations in the Fort Hunter Liggett Range in FY01 (Fort Hunter Liggett 2002c). SEL levels for representative aircraft are presented in Table 3.2.2. Due to the random manner in which aircraft operate over the relatively large area, noise levels are expected to be below a DNL of 65 dB, the threshold for incompatible land uses.

3.2.3.3 WTA

The noise environment of the WTA would be the same as previously discussed in Section 3.2.1.3.

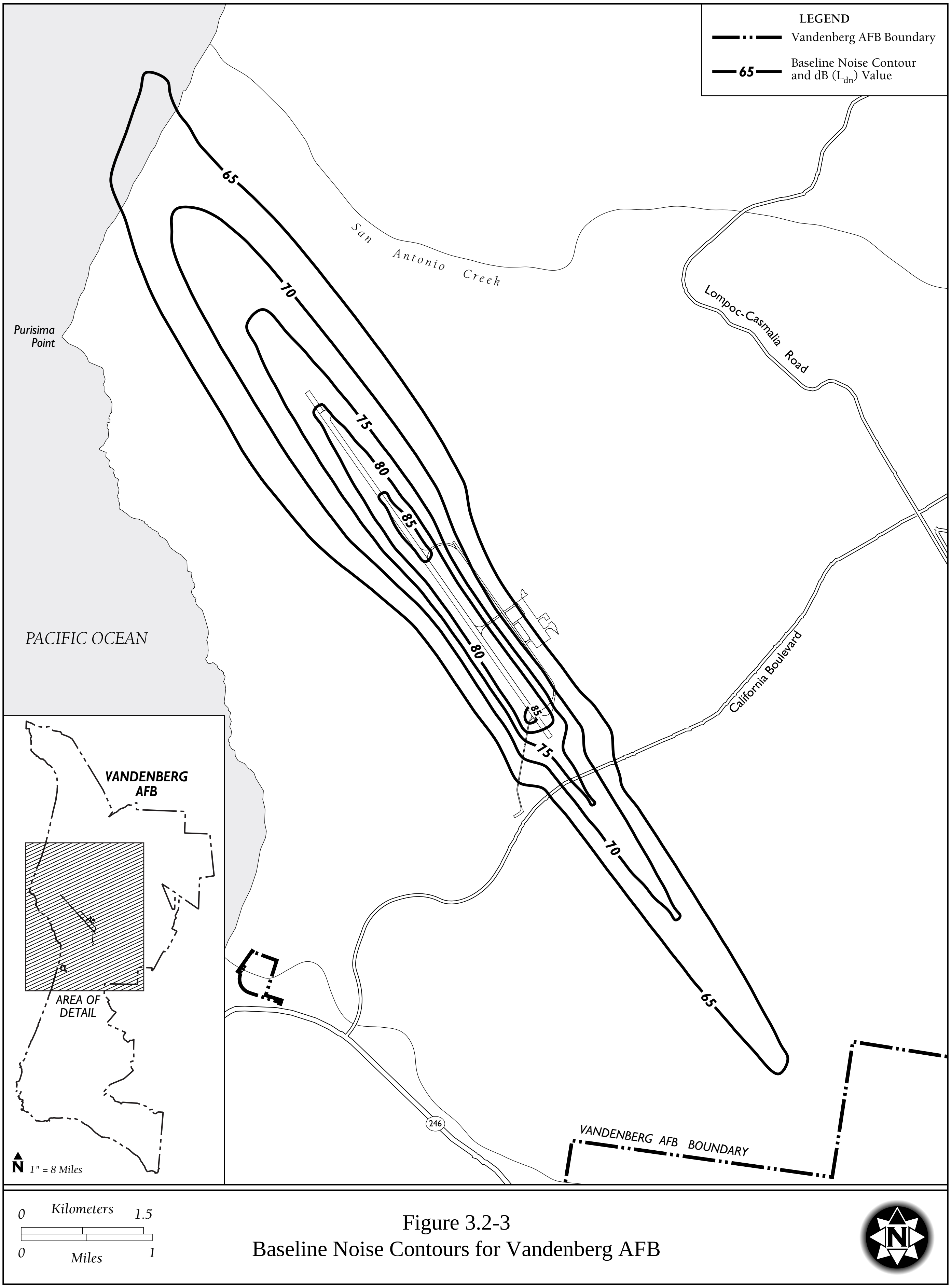


Figure 3.2-3
Baseline Noise Contours for Vandenberg AFB

3.3 AIR QUALITY

Air quality in a given location is described by the concentrations of various pollutants in the atmosphere. National Ambient Air Quality Standards (NAAQS) have been established by the USEPA for criteria pollutants including carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter equal to or less than 10 micrometers in diameter (PM_{10}), particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$), ozone (O_3), and lead (Pb). The NAAQS represent the maximum levels of pollutants that are considered safe, with an additional margin of safety to protect public health and welfare. Short-term standards (1-, 3-, 8-, and 24-hour periods) have been established for pollutants contributing to acute health effects, while long-term standards (annual averages) are established for pollutants contributing to chronic health effects.

The 1990 amendments to the Clean Air Act (CAA) place responsibility on individual states to achieve and maintain the NAAQS. The primary mechanism for states to achieve and maintain the NAAQS is the USEPA-required State Implementation Plan (SIP). The SIP identifies goals, strategies, schedules, and enforcement actions that are designed to reduce the level of pollutants in the air and bring the state into compliance with the NAAQS. Each state has the authority to adopt standards stricter than those established under the federal program.

The USEPA designates all areas of the U.S. either as having air quality better than (attainment) or worse than (non-attainment) the NAAQS. If there is insufficient air quality data for the USEPA to form a basis for attainment status, the area is then given an unclassified status. The criteria for non-attainment designation varies by pollutant: 1) an area is in non-attainment for ozone if NAAQS have been exceeded more than 3 discontinuous times in 3 years, and 2) an area is in non-attainment for any other pollutant if NAAQS have been exceeded more than once per year.

Chemical pollutants include hazardous air pollutants (HAPs) and toxic chemical air pollutants for which occupational exposure limits have been established. Included in this definition are volatile organic compounds (VOCs) which include any organic compound involved in atmospheric photochemical reactions except those designated by an USEPA administrator as having negligible photochemical reactivity. VOCs are considered to be precursors to O_3 formation. HAPs are not covered by ambient air quality standards but may present a threat of adverse human health effects or adverse environmental effects under certain conditions.

In addition to the NAAQS, the CAA established 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 has been assigned by Congress to national wilderness areas, national parks larger than 6,000 acres, and all international parks. Class III status is assigned to attainment areas to allow maximum growth while maintaining compliance with the 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 within a PSD Class I area is typically associated with stationary emission sources.

Federal regulations (40 CFR 81) have created defined air quality control regions (AQCRs) for the entire U.S. AQCRs are based on population and topographic criteria for groups of counties within a state, or counties from multiple states that share a common geographical or pollutant concentration characteristic. The AQCRs within the ROIs of the Proposed Action and alternatives are shown in Figure 3.3-1.

Within California, the authority to regulate sources of air emissions is with the California Air Resources Board (CARB) and is relegated by local Air Pollution Control Districts (APCDs) and Air Quality Management Districts (AQMDs) (Figure 3.3-2). Local APCDs and AQMDs enact rules and regulations to achieve SIP requirements. To ensure compliance with all relevant federal and state air quality laws, each district enacts its own rules and regulations. For the purposes of this analysis, AQCRs have been chosen as the level of air quality analysis. This level of analysis will enable a comparison between the proposed action site in Arizona (where AQCRs are used to monitor air quality) with the 2 alternatives in California. Should one of the California alternatives be selected as the beddown location, a more detailed analysis at the APCD level would be required to determine the level of impact to this resource area and the requirement for a full conformity analysis.

The CAA Section 176(c), General Conformity, establishes certain statutory requirements for federal agencies with proposed federal activities to demonstrate conformity of the proposed activities with the SIP for attainment of the NAAQS. In 1993, the USEPA issued the final rules for determining air quality conformity. Federal facilities located in NAAQS nonattainment areas (Table 3.3-1) must comply with federal General Air Conformity rules and regulations of 40 CFR 51. Under Air Conformity, a facility that initiates a new action (such as this proposed action) must quantify air emissions from stationary and mobile sources associated with the action. Calculated emissions are first compared with established *de minimis* emission levels (based on the attainment status for each applicable criteria pollutant in the ROI) to determine the relevant compliance requirements. In addition, the action's emissions must be compared with the regional inventory to determine whether the emissions are regionally significant. A project is considered regionally significant if the total of direct and indirect emissions of any pollutant from the proposed action exceeds 10 percent of a nonattainment area's total emissions of that pollutant. If the calculated emissions are equal to or less than *de minimis* levels, a formal conformity determination to show accordance with the SIP in accordance with 40 CFR 91.153(c)(1) is not required. Any new project that may lead to nonconformance or contribute to an exceedance of the NAAQS requires a conformity analysis before initiating the action. The Air Force has published its own guidance, the *U.S. Air Force Conformity Guide* (Air Force 1995), to implement the conformity requirement. The general conformity requirements apply only to non-attainment and maintenance areas.

Table 3.3-1. Criteria Pollutant *de minimis* Levels (tons/year)

Pollutant	*Nonattainment Status*	*De minimis Level*
O_3 ($VOCs$ or NO_x)[1]	Serious	50
	Severe	25
	Extreme	10
	Other areas outside of an O_3 transport region	100
	Marginal and moderate area inside of an O_3 transport region	50/100[2]
CO	All	100
SO_2	All	100
PM_{10}	Moderate	100
	Serious	70
Lead	All	25

Notes: [1] VOCs and NO_x are precursors to the formation of O_3.
[2] For VOCs and NO_x, respectively.
NO_x = oxides of nitrogen.
Source: 40 CFR 93.153(b).

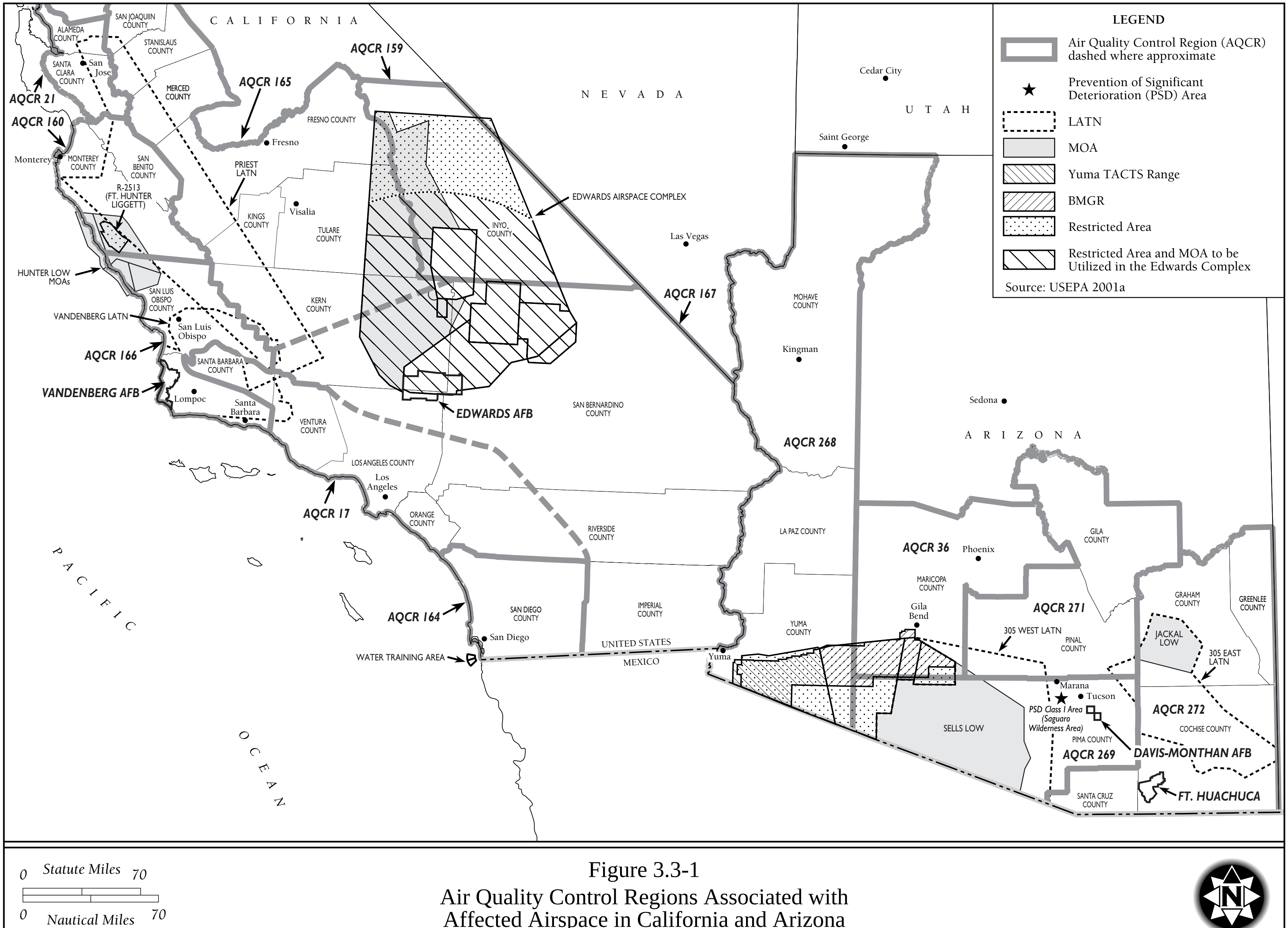


Figure 3.3-1
Air Quality Control Regions Associated with Affected Airspace in California and Arizona

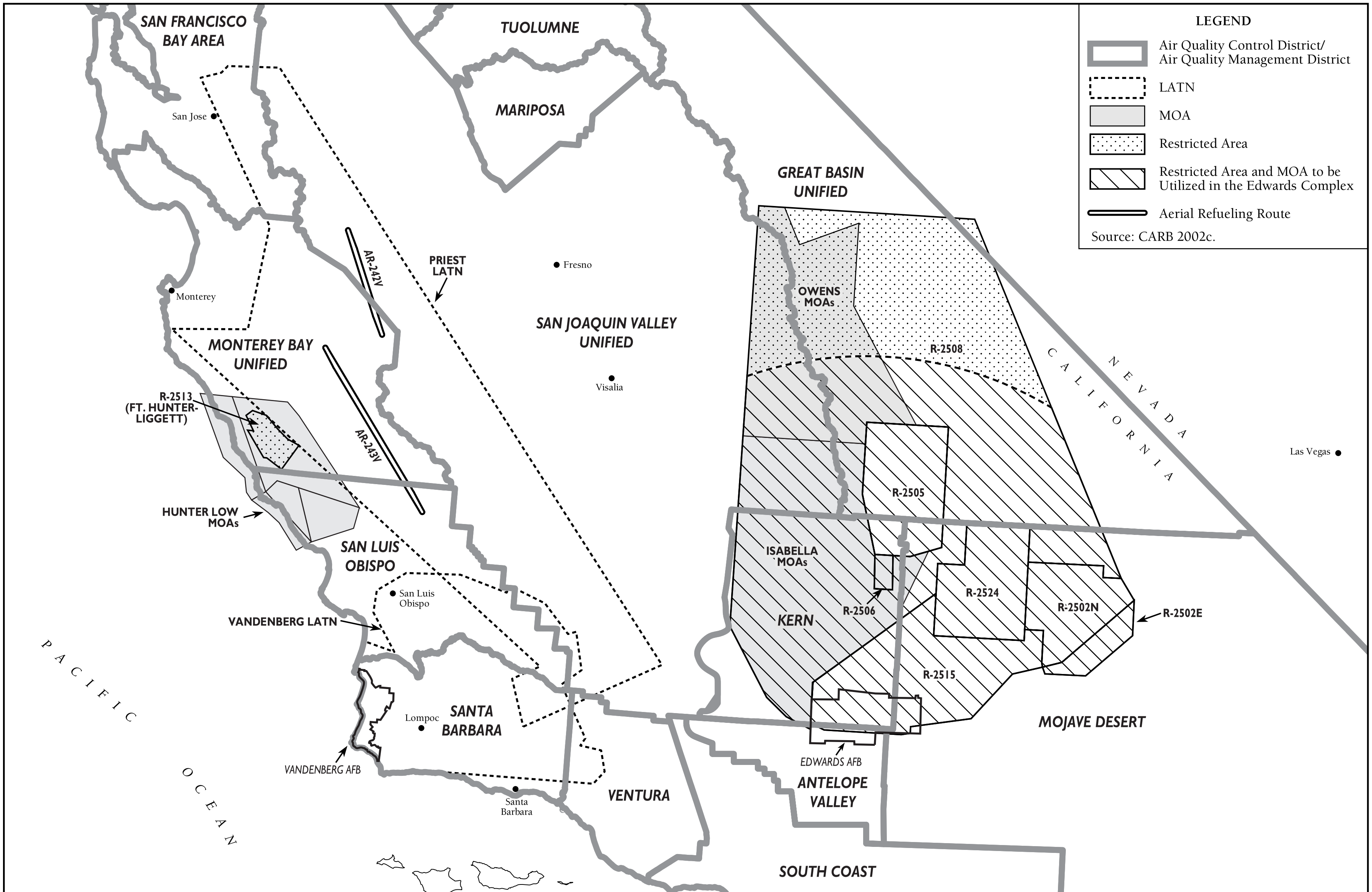


Figure 3.3-2
Air Pollution Control and Air Quality Management Districts
within Affected Airspace in California

POLLUTANT	AVERAGING TIME	CALIFORNIA STANDARDS[1]	NATIONAL STANDARDS[2],[3]	
			Primary	Secondary
Ozone (O_3)	8 Hour[4]	•	0.08 ppm (157 $\mu g/m^3$)	Same as Primary Standards
	1 Hour	0.09 ppm (180 $\mu g/m^3$)	0.12 ppm (235 $\mu g/m^3$)	
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10 mg/m^3)	9.0 ppm (10 mg/m^3)	•
	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	
Nitrogen Dioxide (NO_2)	Annual Average	•	0.053 ppm (100 $\mu g/m^3$)	Same as Primary Standard
	1 Hour	0.25 ppm (470 $\mu g/m^3$)	•	
Sulfur Dioxide (SO_2)	Annual Average	•	0.030 ppm (80 $\mu g/m^3$)	•
	24 Hour	0.04 ppm (105 $\mu g/m^3$)	0.14 ppm (365 $\mu g/m^3$)	•
	3 Hour	•	•	0.50 ppm (1300 $\mu g/m^3$)
	1 Hour	0.25 ppm (655 $\mu g/m^3$)	•	•
Respirable Particulate Matter Less than or Equal to 10 Microns in Diameter (PM_{10})	Annual Arithmetic Mean	30 $\mu g/m^3$	50 $\mu g/m^3$	Same as Primary Standards
	24 Hour	50 $\mu g/m^3$	150 $\mu g/m^3$	
Respirable Particulate Matter Less than 2.5 Microns in Diameter ($PM_{2.5}$)[4]	Annual Arithmetic Mean	No Separate Standard	15 $\mu g/m^3$	Same as Primary Standards
	24 Hour		65 $\mu g/m^3$	
Sulfates	24 Hour	25 $\mu g/m^3$	•	•
Lead (Pb)	30 Day Average	1.5 $\mu g/m^3$	•	•
	Calendar Quarter	•	1.5 $\mu g/m^3$	Same as Primary Standard
Hydrogen Sulfide (H_2S)	1 Hour	0.03 ppm (42 $\mu g/m^3$)	•	•
Vinyl Chloride (chloroethene)	24 Hour	0.010 ppm (26 $\mu g/m^3$)	•	•
Visibility Reducing Particles	8 Hour (10:00 A.M. to 6:00 P.M.)	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent. Measurement in accordance with California Air Resources Board (CARB) Method V.	•	•

ppm – parts per million $\mu g/m^3$ – micrograms per cubic meter mg/m^3 – milligrams per cubic meter   • – no standard established

(1) CO, SO_2 (1- and 24-hour), NO_2, O_3, PM_{10}, and visibility reducing particles standards are not to be exceeded. All other California Standards are not to be equaled or exceeded.

(2) Not to be exceeded more than once a year except for annual standards.

(3) The State of Arizona has adopted the primary and secondary NAAQS for all criteria pollutants.

(4) The O_3 8-hour standard and the $PM_{2.5}$ standards are included for informational purposes only. Although the USEPA has been authorized to implement these standards, they are not final due to current litigations. In November 2001, the USEPA proposed a response to authorize the implementation of these standards (66 Federal Register 57267). Final implementation of these standards is still pending.

Sources: CARB 2002a; USEPA 2002b.

Figure 3.3-3
California, Arizona, and National Ambient Air Quality Standards

Mixing Layer

The mixing layer (or mixing height) is defined as the altitude below which the most vigorous initial mixing of air takes place. The mixing height can fluctuate, and is generally a function of weather, seasonal variation, and topography present within a parcel of air. Mixing heights within the ROI can fluctuate throughout the day and throughout the season. However, the commonly accepted mixing height is 3,000 ft AGL. Emissions released above this altitude can be inhibited and effectively blocked from mixing beneath a surface-based temperature inversion. Therefore, aircraft emissions above 3,000 ft AGL are unlikely to contribute to ground-level pollutant concentrations (USEPA 1992).

Regional Air Quality

Under the CAA, the USEPA has delegated authority for regulating pollution sources to each state. The State of Arizona has adopted the primary and secondary NAAQS for all criteria pollutants. The State of California has established its own air quality standards, the California Ambient Air Quality Standards (CAAQS), which are generally more stringent than the NAAQS (Figure 3.3-3).

3.3.1 DAVIS-MONTHAN AFB, RANGES, AIRSPACE, AND WTA

Region of Influence

The ROI for air quality under the Proposed Action includes the airspace surrounding Davis-Monthan AFB and the airspace proposed for use under the Proposed Action. Under the Proposed Action, HH-60 and HC-130 aircraft would operate in AQCRs 36, 268, 269, 271, and 272 in Arizona, and AQCR 164 in California (see Figure 3.3-1). While aircraft would fly through other AQCRs en route to the WTA, emissions as a result of time spent flying in these AQCRs have not been analyzed as operations in the AQCRs would be transitory and short-term in nature.

Regional Climate

Climate within the southwestern region of Arizona (representative of Davis-Monthan AFB and associated airspace) is characterized as a typical desert climate with an abundance of sunshine. Winters are usually mild, and summers are typically warm and humid. Average summer high temperatures are usually around the high 90s degrees Fahrenheit (ºF). Average winter low temperatures range in the low-to-mid 60s ºF, with a few days below 40 ºF. Annual rainfall averages approximately 11 inches, the majority of which falls in July and August during thunderstorms, which also can contain strong, gusty winds and high rainfall intensities for short periods.

3.3.1.1 Davis-Monthan AFB and Vicinity

Davis-Monthan AFB is located within Pima County (see Figure 3.3-1). The communities of Ajo and Rillito and areas immediately adjacent to these communities are in nonattainment (moderate) of the federal PM_{10} standard. In addition, Ajo is in nonattainment of the federal SO_2 standard. Ajo and Rillito are located approximately 100 and 30 miles, respectively, west of Davis-Monthan AFB. Portions of the Tucson urban area in Pima County are in "maintenance" status for CO (USEPA 2002c). The remainder of Pima County is in attainment or unclassified for all other pollutant standards (USEPA 2002c). The nearest PSD Class I Area is the Saguaro Wilderness Area, located approximately 40 miles northwest of Davis-Monthan AFB (see Figure 3.3-1).

The following sources contribute to baseline emissions at Davis-Monthan AFB: stationary sources, personal and government vehicles, and airfield operations. Based on the air emissions inventory, approximately 70 percent of the total air pollutants within eastern Pima County derive from transportation-related sources. For Davis-Monthan AFB, 1996 and 2000 air quality data have been used to characterize baseline conditions (Table 3.3-2) (Air Force 1998b, Davis-Monthan AFB 2001).

Table 3.3-2. Baseline Airfield Operations (1996) and Stationary-Source (2000) Emissions at Davis-Monthan AFB

	Pollutant (tons/year)				
Source	*CO*	*VOCs*	NO_X	SO_X	PM_{10}
Airfield Operations	338.2	121.8	77.0	16.8	2.9
Stationary Sources	31.2	26.6	45.0	3.6	14.0

Sources: Air Force AFB 1998b, Davis-Monthan AFB 2001.

3.3.1.2 Ranges and Airspace

Ranges and Associated Restricted Areas

The BMGR and associated Restricted Areas occur within portions of Yuma, Maricopa, and Pima counties in southwestern Arizona (see Figure 3.3-1). A portion of Yuma County (the Yuma Planning Area, located approximately 30 miles west of the ranges and airspace) is in nonattainment for the federal PM_{10} standard. A portion of Maricopa County is in nonattainment (serious) for the federal CO, O_3, and PM_{10} standards. Portions of Pima County are in nonattainment (moderate) for the federal SO_2 and PM_{10} standards. The counties are in attainment or unclassified for all other federal air quality standards (USEPA 2002c).

The Yuma TACTS Range (R-2301W) overlies portions of Yuma County in extreme southwestern Arizona (see Figure 3.3-1). A portion of Yuma County (the Yuma Planning Area, located approximately 10 miles west of the ranges and airspace) is in nonattainment (moderate) for the federal PM_{10} standard. The remainder of Yuma County is in attainment or unclassified for all other federal air quality standards (USEPA 2002c).

Airspace

The 305 West LATN overlies portions of Maricopa, Pinal, and Pima counties in southwestern Arizona. A portion of Maricopa County is in nonattainment (serious) for the federal CO, O_3, and PM_{10} standards. Portions of Pima County are in nonattainment (moderate) for the federal SO_2 and PM_{10} standards. A portion of Pinal County is in nonattainment (moderate) for the federal PM_{10} and SO_2 standards. Maricopa, Pinal, and Pima counties are in attainment or unclassified for all other federal air quality standards (USEPA 2002c).

The 305 East LATN overlies portions of Cochise, Graham, Pima, and Pinal counties in southwestern Arizona. A portion of Cochise County is in nonattainment (moderate) for the federal SO_2 and PM_{10} standards. Graham County is in attainment or unclassified for all federal air quality standards. Portions of Pima County are in nonattainment (moderate) for the federal SO_2 and PM_{10} standards. A portion of Pinal County is in nonattainment (moderate) for the federal PM_{10} and SO_2 standards. Cochise, Graham, Pima and Pinal counties are in attainment or unclassified for all other federal air quality standards (USEPA 2002c).

The Sells Low MOA overlies Pima County in southwestern Arizona. Portions of Pima County are in nonattainment (moderate) for the federal SO_2 and PM_{10} standards. The remainder of Pima County is in attainment or unclassified for all other federal air quality standards (USEPA 2002c). The Jackal Low MOA overlies Graham County in southwestern Arizona. Graham County is in attainment or unclassified for all federal air quality standards (USEPA 2002c).

3.3.1.3 WTA

The NAS North Island WTA overlies the Pacific Ocean and is adjacent to San Diego County. A portion of San Diego County is in nonattainment (serious) for the federal O_3 standard. All of San Diego County is in nonattainment for the California O_3 (serious) and PM_{10} (moderate) standards. San Diego County is in attainment or unclassified for all other federal and California air quality standards (CARB 2002b, USEPA 2002c). While the eastern boundary of the WTA is located approximately 3 NM offshore from San Diego County, for the purposes of this analysis, the WTA is considered to be in nonattainment (serious) for the federal O_3 standard and in nonattainment for the California O_3 (serious) and PM_{10} (moderate) standards.

3.3.2 EDWARDS AFB, RANGES, AIRSPACE, AND WTA

Region of Influence

The ROI for air quality under Alternative A includes the airspace surrounding Edwards AFB and the airspace proposed for use. Under Alternative A, HH-60 and HC-130 aircraft would operate in AQCRs 159, 164, 165, and 167 in California (see Figure 3.3-1).

Regional Climate

The climate of the inland areas of Southern California (representative of Edwards AFB and associated airspace) is classified as arid, upland desert climate. High temperatures, low humidity, and clear, sunny days characterize summer months. While the average annual temperature is approximately 67 ºF, temperatures can range between 120 ºF in the summer and 15 ºF on the coldest winter mornings. For most of the year, winds are generally from the west to southwest and average 10 to 15 miles per hour (mph). However, strong northwesterly winds associated with frontal systems can expose the area to gusts up to 75 mph during the fall.

3.3.2.1 Edwards AFB and Vicinity

The majority of Edwards AFB is located within eastern Kern County; however, portions are also located within northern Los Angeles County and western San Bernardino County (see Figure 3.3-1). Eastern Kern County is in nonattainment (serious) for the federal and California O_3 standards, the federal and California PM_{10} standards (moderate), and is in attainment or unclassified for all other pollutant standards (CARB 2002b, USEPA 2002d). Los Angeles County is in nonattainment (severe) for the federal and California O_3 standards, the federal and California CO standards (serious), the federal and California PM_{10} standards (serious), and is in attainment or unclassified for all other pollutant standards (CARB 2002b, USEPA 2002d). San Bernardino County is in nonattainment (severe) for the federal and California O_3 standards, and the federal and California PM_{10} (moderate) standards (CARB 2002b, USEPA 2002d).

Baseline air quality data from aircraft emissions at Edwards AFB are presented in Table 3.3-3. As VOCs and NOx are precursors to the formation of O_3 in the lower atmosphere and Edwards AFB is part of the eastern Kern County federal nonattainment area, only VOCs and NO_x emissions data have been estimated for aircraft operations.

Table 3.3-3. Baseline Emissions from Airfield Operations at Edwards AFB

Pollutant (tons/year)				
CO	*VOCs*	*NO_X*	*SO_X*	*PM_{10}*
1,519.7	393.0	377.0	37.9	18.9

Source: Air Force 2001d.

3.3.2.2 Ranges and Airspace

The Edwards Range Complex (comprised of the Isabella and Owens MOAs, R-2508, R-2505, R-2506, R-2524, R-2502N and E, and R-2515) overlies portions of Inyo, Tulare, Kern, and San Bernardino counties in the interior of central California (see Figure 3.3-1). Portions of Inyo County are in nonattainment for the federal and California PM_{10} (moderate and serious) standards. Inyo County is in attainment or unclassified for all other pollutant standards (CARB 2002b, USEPA 2002d). Tulare County is in nonattainment for the federal and California O_3 (severe) standards and the federal and California PM_{10} (serious) standards and is in attainment or unclassified for all other pollutant standards (USEPA 2002d, CARB 2002b). Eastern Kern County is in nonattainment (serious) for the federal and California O_3 standards, the federal and California PM_{10} standards (moderate), and is in attainment or unclassified for all other pollutant standards (CARB 2002b, USEPA 2002d). All of San Bernardino County is in nonattainment (severe) for the federal and California O_3 standards, the federal and California PM_{10} (moderate) standards and is in attainment or unclassified for all other pollutant standards (CARB 2002b, USEPA 2002d).

3.3.2.3 WTA

See Section 3.3.1.3 for a discussion of the WTA.

3.3.3 VANDENBERG AFB, RANGES, AIRSPACE, AND WTA

Region of Influence

The ROI for air quality under Alternative B includes the airspace surrounding Vandenberg AFB and the airspace proposed for use. Under Alternative B, HH-60 and HC-130 aircraft would operate in AQCRs 17, 21, 160, 164, 165, and 166 in California (see Figure 3.3-1). While aircraft would fly through other AQCRs en route to the WTA, emissions as a result of time spent flying in these AQCRs have not been analyzed as operations in the AQCRs would be transitory and short-term in nature.

Regional Climate

The climate of coastal Southern California (representative of Vandenberg AFB and associated airspace) is classified as Mediterranean, characterized by dry summers and mild, wet winters. The major influences on the regional climate are the Eastern Pacific High, topography, and the moderating effects of the Pacific Ocean. Maximum temperatures during the summer months average in the 70s ºF, and minimum summer temperatures average in the low 60s ºF. Maximum temperatures during winter months average in the

60s ºF, and minimum winter temperatures are usually in the upper 40s °F. Annual precipitation in the project area averages 10 inches. Prevailing winds are from the west-northwest for most of the year.

3.3.3.1 Vandenberg AFB and Vicinity

Vandenberg AFB is located within Santa Barbara County (see Figure 3.3-1), which is in nonattainment (serious) for the federal O_3 standard. All of Santa Barbara County is in nonattainment for the California O_3 (serious) and PM_{10} (moderate) standards and is in attainment or unclassified for all other pollutant standards (CARB 2002b, USEPA 2002c). The closest PSD Class I Area is the San Rafael Wilderness Area, located approximately 50 miles east of Vandenberg AFB.

Table 3.3-4 summarizes baseline air quality data for Vandenberg AFB based on 2000 data for all stationary and mobile sources (Vandenberg AFB 2002d).

Table 3.3-4. Baseline Airfield and Stationary-Source Emissions at Vandenberg AFB (2000)

Pollutant (tons/year)				
CO	*VOCs*	*NO_X*	*SO_X*	*PM_{10}*
237.7	54.9	68.6	1.0	158.8

Source: Vandenberg AFB 2002d.

3.3.3.2 Ranges and Airspace

Ranges and Associated Restricted Areas

The Fort Hunter Liggett Range and associated R-2513 airspace occur in Monterey County in coastal central California (see Figure 3.3-1). Monterey County is in nonattainment (serious) for the California O_3 and PM_{10} (moderate) standards and is in attainment or unclassified for all other federal and California air quality standards (CARB 2002b, USEPA 2002c).

Airspace

AR-242V overlies portions of Fresno, Merced, and San Benito counties in central California (see Figure 3.3-1). Portions of Fresno and Merced counties are in nonattainment (severe) for the federal O_3 and PM_{10} standards, and all of Fresno and Merced counties are in nonattainment for the California O_3 (serious) and PM_{10} (moderate) standards. San Benito County is in nonattainment for the California O_3 (serious) and PM_{10} (moderate) standards. Fresno, Merced, and San Benito counties are in attainment or unclassified for all other federal and California air quality standards (CARB 2002b, USEPA 2002c).

AR-243V overlies portions of Monterey, San Benito, and San Luis Obispo counties in central California. Monterey, San Luis Obispo, and San Benito counties are in nonattainment (moderate) for the California O_3 and PM_{10} standards and are federal O_3 maintenance areas. Monterey, San Benito, and San Luis Obispo counties are in attainment or unclassified for all other federal and California air quality standards (CARB 2002b, USEPA 2002c).

The Hunter Low MOAs overlie portions of Monterey and San Luis Obispo counties in coastal central California. Monterey and San Luis Obispo counties are in nonattainment (moderate) for the California O_3 and PM_{10} standards and are in attainment or unclassified for the federal and all other California air quality standards (CARB 2002b, USEPA 2002c).

The Vandenberg LATN overlies portions of San Luis Obispo, Santa Barbara, Ventura, and Kern counties in central California. San Luis Obispo County is in nonattainment (serious) for the California O_3 and PM_{10} (moderate) standards. All of Santa Barbara and portions of Ventura, and Kern counties are in nonattainment (serious) for the federal O_3 standard and all of the counties are in nonattainment for the California O_3 (serious) and PM_{10} (moderate) standards. San Luis Obispo, Santa Barbara, Ventura, and Kern counties are in attainment or unclassified for the federal and all other California air quality standards (CARB 2002b, USEPA 2002c).

Priest LATN overlies portions of San Joaquin, Alameda, Stanislaus, Santa Clara, Merced, San Benito, Fresno, Monterey, Kings, San Luis Obispo, Santa Barbara, and Kern counties in central California. Portions of San Joaquin, Stanislaus, and Kings counties are in nonattainment (severe) for the federal O_3 standard and in nonattainment (moderate) for the federal PM_{10} standard. San Joaquin, Stanislaus, and Kings counties are in nonattainment for the California O_3 (serious) standard and the California PM_{10} (moderate) standard. Portions of Alameda, Santa Clara, Merced, Fresno, Kern, and all of Santa Barbara counties are in nonattainment (serious) for the federal O_3 standard and all of the counties are in nonattainment for the California O_3 (serious) and PM_{10} (moderate) standards. All of Monterey, San Benito, and San Luis Obispo counties are in nonattainment (serious) for the California O_3 and PM_{10} (moderate) standards. San Joaquin, Alameda, Stanislaus, Santa Clara, Merced, San Benito, Fresno, Monterey, Kings, San Luis Obispo, Santa Barbara, and Kern counties are all in attainment or unclassified for all other federal and California air quality standards (CARB 2002b, USEPA 2002c).

3.3.3.3 WTA

See Section 3.3.1.3 for a discussion of the WTA.

3.4 SAFETY

The primary safety topics considered in this EA include safety risks associated with military flight operations, materials used during training within the WTA, and potential fuel spills resulting from in-flight refueling operations. Issues associated with materials used during WTA operations are discussed in Section 3.5, Materials Management. Flight risks apply to all aircraft; they are not limited to the military. Flight safety is summarized in the context of aircraft mishaps, bird-aircraft strike hazard (BASH) potential, and in-flight refueling.

For Davis-Monthan, Edwards, and Vandenberg AFBs the ROI for safety includes the runways, base, and the area defined by airfield approach and departure paths. Within this ROI, safety topics include fire and crash response, flight risks associated with bird-aircraft strikes and aircraft mishaps, and Accident Potential Zones (APZs). Safety risks within ranges and the associated airspace involve flight risks, fire, dropped objects, crash safety, and ordnance use. Safety issues within other airspace (i.e., MOAs, LATNs, WTA, and AR Tracks) consist primarily of flight risks.

Aircraft Mishaps

The Air Force defines four categories of aircraft mishaps: Classes A, B, and C, and High Accident Potential. Class A mishaps are those that result in either loss of life or permanent total disability, a total cost in excess of $1 million, destruction of an aircraft, or damage to an aircraft beyond economical repair. Class B mishaps do not result in fatalities but result in total costs of $200,000 or more but less than $1 million or that result in permanent, partial disability. Class C mishaps involve costs of $10,000 to $200,000 or the loss of worker productivity of more than 8 hours. High Accident Potential mishaps represent minor incidents not meeting any of the criteria for Classes A, B, or C; they involve minor damage, minor injuries, and little or no property or public interactions. AFI 91-202, *The U.S. Air Force Mishap Prevention Program*, implements the Air Force Policy Directive 91-2, *Safety Programs*. It also establishes mishap prevention program requirements, responsible organizations, and general information including the BASH program.

Bird-Aircraft Strike Hazard (BASH)

A major concern with regard to flight safety is BASH. Aircraft may encounter birds at altitudes up to 30,000 ft. However, most birds fly close to the ground; over half of all reported bird-strikes occur below 500 ft AGL, and over 75 percent occur below 2,000 ft AGL (U.S. Air Force Safety Center [AFSC] 2002). Of these strikes, approximately 50 percent occur in the airfield environment, and 25 percent occur during low altitude training. The Air Force BASH program was established to minimize the risk for collisions of birds and aircraft and the subsequent loss of life and property. The AFSC BASH team has developed a Bird Avoidance Model (BAM) that qualifies risk levels for bird-aircraft strike potential. Based on the BAM, 3 BASH levels have been identified: low, moderate, and severe. HH-60 and HC-130 aircraft commonly train at lower altitudes, which makes them more likely to experience bird-aircraft strikes (AFSC 2002).

In-Flight Refueling

In-flight refueling is not considered to be a high-risk flying activity. In-flight refueling activities and associated flight risks would primarily be associated with two or more aircraft flying in proximity to each other. There are minimum separation requirements for flying VFR in uncontrolled airspace. Since helicopter AR training distances are less than these requirements, the military assumes responsibility for separation of aircraft (MARSA) flying closer than what the FAA would approve. The Air Force has established helicopter AR procedures that provide guidance and direction for these situations. Air Force procedures are contained in Technical Order 1-1C-1-20, Section III, Rendezvous and Join-Up Procedures. This technical order dictates closure rates, visual conditions, and other restrictions to ensure safety.

Fuel spills can potentially occur during in-flight refueling. Such an event could affect public safety if large enough amounts of fuel reached the ground. The Air Force has conducted in-flight refueling of helicopters for many years, and no documented fuel spills have occurred. There has been only 1 documented case of an air refueling hose being severed during a refueling. No fuel was spilled and the severed piece caused minor damage to a structure on the ground.

Currently all HH-60 and HC-130 aircrews follow all established procedures for in-flight refueling operations, and separation is maintained between aircraft to minimize flight risks. In addition, the number of HH-60 and HC-130 refueling operations is minimal, with associated low safety risks resulting from fuel spills. Since baseline in-flight refueling conditions are the same for each of the alternatives described below, no additional discussion of these safety issues is presented in this section.

Accident Potential Zones

Urban areas around military airfields are exposed to the possibility of aircraft accidents even with well-maintained aircraft and highly trained aircraft crews. Despite stringent maintenance requirements and countless hours of training, past history makes it clear that accidents are going to occur. Three zones were established based on past accident data: the clear zone (CZ), accident potential zone (APZ) I, and APZ II. The CZ starts at the end of the runway and extends outward 3,000 ft. It has the highest accident potential of the 3 zones. APZ I extends from the clear zone an additional 5,000 ft. It includes an area of reduced accident potential. APZ II extends from APZ I an additional 7,000 ft in an area of further reduced accident potential. The risk to people on the ground of being killed or injured by aircraft accidents is small. However, an aircraft accident is a high consequence event and when a crash does occur, the result is often catastrophic. Because of this, the Air Force does not attempt to base its safety standards on accident probabilities. Instead the Air Force approaches this safety issue from a land use planning perspective. Land uses in APZ I are usually limited to light industrial, manufacturing, transportation, communications, open space, and agricultural uses. Land uses within APZ II include all those considered compatible with APZ I, as well as low-density residential, service, and retail trade. However, uses that concentrate high densities of people in small areas are not considered appropriate for both APZs.

Fire and Crash Safety

Air Force standards specify fire and crash emergency service requirements for the amount and type of fire and crash equipment and for the number of personnel necessary to handle an aircraft mishap. These standards are based on the number and type of aircraft, type of flying missions, and size of the buildings at the installation.

3.4.1 DAVIS-MONTHAN AFB, RANGES, AIRSPACE, AND WTA

3.4.1.1 Davis-Monthan AFB Airspace Environment

Aircraft Mishaps

Based on historical data of mishaps at all installations, and under all conditions of flight, the military services calculate a Class A mishap rate for each type of aircraft in the inventory. The lifetime Class A mishap rates for the HH-60 and EC-130 aircraft are 2.85 and 0.73 mishaps per 100,000 flying hours, respectively. During the last 3 years, 1 Class A mishap occurred at the base involving an A/OA-10 aircraft and 2 Class A mishaps involving Davis-Monthan AFB A-10s occurred in the past year in airspace scheduled by the 355 WG. No Class A mishaps have occurred involving HH-60 helicopters or EC-130 aircraft from Davis-Monthan AFB.

BASH

Mourning doves (*Zenaida macroura*) provide the greatest BASH potential to flight operations in the airfield area of Davis-Monthan AFB. Raptors and other soaring birds found in the area do not present a serious nor constant hazard to aircraft at the airfield; however, they can be found in the general area at altitudes below 1,500 ft AGL. Davis-Monthan AFB lies under the extreme eastern edge of the Pacific Migratory Flyway, which contains large seasonal influxes of waterfowl.

For airspace used by Davis-Monthan AFB aircrews, the risk of bird-aircraft strikes varies throughout the year. As a result, pilots and safety officers continually evaluate BASH potential. Davis-Monthan AFB Base Instruction 11-250, *Flying Operations* (355 WG 1999), and the Davis-Monthan AFB BASH Plan (Davis-Monthan AFB 1999) address measures that must be followed when Bird-Watch conditions are moderate or severe. During moderate conditions, BASH reduction measures include no formation takeoffs, approaches or landings; no touch-and-gos; and aircraft on low approaches must remain 200 ft above bird concentrations as determined by the Supervisor of Flying (SOF), or tower watch supervisor if no SOF is on duty. Under those times that the Bird-Watch condition is severe, no takeoffs (unless for scrambled alert aircraft) or low approaches are permitted, full stop landings only are allowed, and warnings are broadcast on the Automatic Terminal Information System (ATIS).

Aircraft from Davis-Monthan AFB have been involved in 228 recorded bird strikes from 1998 to 2000 or an average of 76 bird strikes per year. Most of the BASH incidents involved A-10 aircraft. Aircrews based at Davis-Monthan AFB have historically experienced bird-strike incidents ranging from 50 to 100 per year for the past 10 years. There have been 2 Class C reports for A-10s due to bird strikes during the 1998-2000 time period.

Fire and Crash Safety

Davis-Monthan AFB's fire and crash emergency services meet current Air Force standards. In addition, the base fire department has mutual support agreements with nearby communities in case an exceptionally severe aircraft mishap occurs.

3.4.1.2 Ranges and Airspace

BMGR and Yuma TACTS Range

The Luke AFB Supplement to AFI 13-212 provides specific safety instructions to users and operators for the eastern sections of the BMGR Complex, including Sells Low MOA. The Range Management Office at Luke AFB is responsible for scheduling, authorizing, and coordinating all military and non-military air operations and activities on the eastern section of the range. Since 1988, there have been 8 aircraft mishaps or incidents within the Gila Bend segment of the BMGR. Sells Low MOA and the 305 West LATN make up a portion of this area. Gila Bend Air Force Auxiliary Field staffs a fire and crash rescue capability that responds to aircraft incidents at the auxiliary field and the ranges.

BAM information is available to schedulers and flight crews prior to flights along low-level routes and within the MOAs. Three hazard categories are depicted, Low, Moderate, and Severe, and the hazard level of an area varies with time of day and time of year. Copies of the BAM graphics are provided as part of the scheduling and flight planning process.

Five types of flares are proposed for use in approved areas of the BMGR and Yuma TACTS Range: 2 types of illumination flares and 3 types of self-protection flares. Illumination or parachute flares (LUU2/B and LUU-19) are used to illuminate targets for nighttime training. Parachute flares are normally released from an altitude with a parachute slowing the decent in order to provide prolonged illumination of a target area. Ignition of the flares is controlled by a preset altimeter to an altitude pre-determined for each training mission. Parachute flares can burn for several minutes but are dropped from an altitude sufficient to allow them to burn out prior to hitting the ground. They are only used in accordance with Air Force Instructions that provide a safe altitude for flare burn out prior to reaching the ground; therefore, fire safety concerns are minimized. Air Force Instructions take into account the changes in the spatial and temporal fire danger potential in all areas of the ranges in which flares are used. In addition, the BMGR Range Management Office has existing procedures and requirements for addressing range fire safety within the BMGR complex.

3.4.1.3 WTA

The only aircraft-related safety concern associated with the WTA is BASH potential within the WTA and in transiting to and from the WTA from NAS North Island. NAS North Island conducts approximately 150,000 aircraft operations per year. From 1981 to 2001 there have been 156 recorded bird strikes, or an average of 8 per year, in the vicinity of NAS North Island, 12 NM north of the WTA. Approximately 65 percent of the recorded bird strikes involved rotary-winged aircraft while on approach to or departure from NAS North Island. The majority of the reports did not record any damage to the aircraft. NAS North Island has a comprehensive BASH program to identify and reduce potential bird hazards in the vicinity of NAS North Island and nearby associated training areas (NAS North Island 2000).

Various types of materials (including marine flares) are expended into the marine environment as a result of military, commercial, and recreational activities. During the course of training and rescue operations, military operating groups (Navy and Air Force), USCG, and mariners use marine flares. When deployed, the materials within the flare ignite and burn, emitting smoke and thereby marking the desired location. The MK6 marine flare is designed to completely incinerate its wooden housing and internal contents. The MK25 marine flare is composed of an aluminum housing containing the flare materials. Upon combustion of the internal flare materials, the aluminum housing would sink.

In the instances when marine flares fail to ignite or do not completely burn, they can float on the ocean surface and eventually get washed onshore. They can then present a hazard to humans due to their explosive components. Therefore, marine flares used by the Air Force and the Navy are marked with warning language and instructions to contact an appropriate safety officer.

3.4.2 EDWARDS AFB, RANGES, AIRSPACE, AND WTA

3.4.2.1 Edwards AFB

Aircraft Mishaps

There were 2 Class A accidents in October, 1997 involving an F-16 and T-38 midair collision, 1 Class A in July, 2000 involving a single F-16, and 2 unmanned vehicle Class A accidents in 2001. All Class A accidents occurred in the surrounding airspace away from the airfield (AFFTC 2002). Edwards AFB has established procedures in AFFTC Instruction 11-1, *Aircrew Operations*, to reduce the potential for accidents and to promote safety. These procedures include minimum altitudes over specified locations, and maximum crosswind limits for formation takeoffs and landings on the lakebed.

BASH

Edwards AFB has an active BASH program to assist pilots in preventing bird strikes. The program calls for modifications to operations according to birdwatch threat conditions. During low threat conditions, normal operations prevail. Under moderate threat conditions, some restrictions limiting takeoffs, increasing altitudes, and decreasing speed on MTRs apply. During severe bird-strike threat conditions, all flight activity is either stopped, or greatly curtailed until the threat is reduced.

Edwards AFB records bird strikes that occur along the flightline as well as other areas involving aircraft operations. From 1985-1995, approximately 128 bird-aircraft strikes were recorded at Edwards AFB. Most of the birds-aircraft strikes occurred along the main runways and the majority of the birds were identified as horned larks (*Eremophila alpestris*). During spring (March and April), Piute Ponds, Buckhorn, and Rogers Dry Lakes usually contain water. Large number of migratory waterfowl and wading birds use portions of these aquatic areas for feeding during their migration. Piute Ponds located in the southwestern portion of the base, serves as a nesting area for some of these birds. Edwards AFB has in place a BASH Plan 91-202 dated July 1998. The AFFTC Flight Safety provides specific information on BASH and BAM as they pertain to Edwards AFB.

Fire and Crash Safety

Edwards AFB's fire and crash emergency services meet current Air Force standards for all active runways, including North Base. In addition, the base fire department has mutual support agreements with nearby communities in case an exceptionally severe aircraft mishap occurs.

3.4.2.2 Ranges and Airspace

Flight safety is greatly enhanced in the ranges and airspace surrounding Edwards AFB and the R-2515 restricted area airspace. No aircraft, civilian or military, is allowed in the airspace without permission from the controlling agency. Intrusion into the airspace without permission is a violation of FAA regulations and violators are subject to discipline by the FAA. The R-2515 controlling agency is the FAA Hi-Desert Terminal Radar Approach Control Facility located at Edwards AFB and operates 24 hours a day. By limiting the number and types of aircraft entering the airspace, and providing restrictions and controls on those aircraft that do fly there, safety for all aircraft and pilots is increased. Edwards AFB has over 50 letters of agreement that allow aircraft, including civilian aircraft to use the airspace. These letters of agreement establish radio and control procedures to help protect all users of the airspace. Reduced visibility due to blowing dust and sand originating off the dry lakebeds also pose a hazard to aircraft operations. There have been 5 Class A accidents (2 T-38 aircraft, 1 F-16 aircraft, and 2 unmanned aircraft) within the Edwards Complex in the past 10 years (412th TW/SE 2002).

Based on the BAM predictions for R-2508, Edwards Complex, there is a period of moderate bird activity and moderate threat of bird strikes 1 hour before and 1 hour after sunset, from October through March. Edwards AFB does not normally schedule low-level training during these times and only schedules required flights to meet test objectives.

3.4.2.3 WTA

The WTA for Alternative A is the same as that of the Proposed Action; therefore, safety conditions would be the same as those discussed in Section 3.4.1.3.

3.4.3 VANDENBERG AFB, RANGES, AIRSPACE, AND WTA

3.4.3.1 Vandenberg AFB

Aircraft Mishaps

The lifetime Class A mishap rates for the only aircraft assigned to Vandenberg AFB, the UH-1 helicopter, is 2.63 mishaps per 100,000 flying hours. The last Class A accident reported at Vandenberg AFB was in 1978 and involved a transient aircraft not assigned to the base.

BASH

For airspace used by Vandenberg AFB aircrews, the risk of bird-aircraft strikes varies throughout the year. As a result, pilots and safety officers continually evaluate BASH potential. The Vandenberg AFB BASH Plan identifies procedures to reduce BASH potential (Vandenberg AFB 1999). According to the Air Force's BAM, the airfield and affected airspace under the Vandenberg AFB beddown alternative have a moderate BASH potential.

Fire and Crash Safety

Vandenberg AFB's fire and crash emergency services meet current Air Force standards. In addition, the base fire department has mutual support agreements with nearby communities in case an exceptionally severe aircraft mishap occurs.

3.4.3.2 Ranges and Airspace

Fort Hunter Liggett Range, Associated Restricted Area (R-2513), and Hunter Low MOAs

Flight safety for R-2513 is enhanced in the range due to established military Special Use Airspace. No aircraft, civilian or military, is allowed in the airspace without permission from the controlling agency. By limiting the number and types of aircraft entering the airspace, and providing restrictions and controls for aircraft flying there, safety for all aircraft and pilots is increased. Based on BAM predictions for

R-2513 and the Hunter Low MOAs, there is a moderate BASH potential for this area. Although there are no BASH plans in effect at Fort Hunter-Liggett and R-2513, pilots flying in this vicinity would follow local BASH procedures for Vandenberg AFB. There have been no documented cases of any Class A accidents within this airspace or range (Fort Hunter-Liggett 2002b).

China Lake EC Range and Associated Restricted Area (R-2524)

The China Lake EC Range is located within the Edwards Complex that was discussed previously; see Section 3.4.2.2 for a discussion of safety issues.

3.4.3.3 WTA

The WTA for Alternative B is the same as that of the Proposed Action; therefore, safety conditions would be the same as those discussed in Section 3.4.1.3.

3.5 MATERIALS MANAGEMENT

The ROI for hazardous materials and wastes are Davis-Monthan AFB, Vandenberg AFB, Edwards AFB, areas immediately surrounding the 3 bases, associated ranges, airspace, and WTA. This section includes a discussion of hazardous materials, hazardous wastes, Environmental Restoration Program (ERP) (previously known as Installation Restoration Program or IRP) sites in the ROI, asbestos-containing materials, and lead-based paint.

Hazardous Materials. Hazardous materials are identified and regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the Occupational Safety and Health Act; and the Emergency Planning and Community Right-to-Know Act. Hazardous materials have been defined in AFI 32-7086, *Hazardous Materials Management*, to include any substance with special characteristics that could harm people, plants, or animals.

Hazardous Wastes. Hazardous waste is defined in the Resource Conservation and Recovery Act (RCRA) 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 corrosivity. In addition, certain types of waste are "listed" or identified as hazardous in 40 CFR 263.

Environmental Restoration Program (ERP). Previously known as the Installation Restoration Program or IRP, the ERP is the process by which contaminated sites and facilities are identified and characterized, and existing contamination is contained, removed, and disposed of to allow for beneficial reuse of the property. ERP sites include landfills, underground waste fuel storage areas, and maintenance-generated wastes. This program establishes a process to evaluate past disposal sites, control mitigation of contaminants, and control potential hazards to human health and the environment.

Asbestos-Containing Material. Asbestos-containing material is any material containing more than 1 percent asbestos. Asbestos is made up of microscopic bundles of fibers that may become airborne when distributed or damaged. These fibers get into the air and may be inhaled into the lungs, where they may cause significant health problems. Due to its ability to withstand heat, fire, and chemicals, asbestos was historically used in construction materials, and is typically found in ceiling tiles, pipe and vessel insulation, floor tile, linoleum, mastic, and on structural beams and ceilings. Federal and state laws address the health risks of exposure to asbestos and asbestos-containing materials. Asbestos-containing material must be handled in accordance with procedures outlined in 40 CFR 61, Subpart M. Asbestos-containing material is considered a California Hazardous Waste that must be disposed of in a USEPA-approved Class I landfill.

Lead-Based Paints. Lead-based paints have been commonly used since the 1940's for exterior and interior painted surfaces. In 1978 the U.S. Consumer Product Safety Commission lowered the legal maximum lead content in most kinds of paint to trace amounts (0.06%); therefore, buildings constructed after 1978 are presumed not to contain lead-based paint. The use and management of lead-based paint is regulated under Section 1017 of the Residential Lead-Based Paint Hazard Reduction Act of 1992. Section 1017 requires the Secretary of the U.S. Department of Housing and Urban Development (HUD) to issue guidelines for the implementation of federally supported work involving risk assessments, inspection, interim controls, and abatement of lead-based paint hazards.

To satisfy the requirements of applicable state and federal regulations concerning hazardous materials and waste management, Davis-Monthan AFB, Vandenberg AFB, and Edwards AFB have developed and implemented basewide Spill Prevention Control and Countermeasure Plans, Pollution Prevention Plans, and Hazardous Waste Management Plans.

Spill Prevention Control and Countermeasure (SPCC) Plan. Guidelines for the preparation and implementation of SPCC Plans (also referred to as Spill Prevention and Response Plans) are outlined in *Guidelines to SPCC* (40 CFR 112.7), which specify protocols for responding to releases, accidents, and spills involving petroleum, oils, and lubricants (POL) or hazardous substances. Protocols described in the SPCC Plan include spill detection, spill reporting, spill containment, and proper cleanup and disposal methods.

Pollution Prevention Plans. The Hazardous Waste Source Reduction and Management Review Act of 1989 requires facilities that generate hazardous waste to prepare a *Pollution Prevention Plan* (40 CFR, Parts 260-270). Within California, Section 13263.3 of the California Water Code (CWC) authorizes the State Water Resources Control Board (SWRCB), a Regional Water Quality Control Board (RWQCB), or a publicly owned treatment works to require a discharger to prepare and implement a Pollution Prevention Plan. Protocols described in the *Pollution Prevention Plan* include identifying pollutants of concern and their sources, analyzing select methods for reducing the introduction of these pollutants into a facilities' wastewater, and developing a plan for implementing the selected methods.

Hazardous Waste Management Plans. *Hazardous Waste Management Plans* were established to satisfy the requirements established in 40 CFR, Parts 260-270 (Protection of Environment). The primary focus of the plan is to encourage the reduction of hazardous waste that is generated at a facility. The goals of *Hazardous Waste Management Plans* are to protect public health and safety and the environment by eliminating land disposal of untreated hazardous wastes, to reduce production of hazardous wastes, and manage remaining wastes effectively. The plan sets forth procedures to achieve and maintain regulatory compliance for the accumulation, transportation, and disposal of hazardous materials and wastes.

Chaff and Flares. Chaff and flares are the principal defensive mechanism dispensed from military aircraft to avoid detection and/or attack by adversary air defense systems. The effective use of chaff and flares in combat requires training and frequent use by aircrews to master the timing of deployment, the capabilities of the devices, and to ensure safe and efficient handling by ground crews.

<u>Chaff</u>. Chaff consists of very small strips of silica coated with aluminum and stearic acid (fat) designed to reflect radio waves from radar systems. Chaff fibers are approximately the thickness of a thin human hair and vary in length up to 1.0 inch. Approximately 5 million chaff strands are dispensed in each bundle of chaff. Aircrews eject bundles of chaff from their aircraft when they receive an audio signal from their radar threat receiver. Although the chaff is ejected from an aircraft using a small pyrotechnic charge, the chaff itself is not explosive; the chaff dispenser remains in the aircraft. Two 1-inch square by 1/8-inch thick plastic end caps and a felt spacer are ejected with the chaff. On very rare occasions, the chaff may not wholly separate and may fall to earth as a clump.

<u>Parachute and Self-protection Flares</u>. Defensive training flares are magnesium pellets that when ignited burn for 3-5 seconds at approximately 2,000 ^{o}F. These flares are ejected from an aircraft by the aircrew when they believe they are under attack. The purpose of the flares is to provide a heat source other than the aircraft's engine exhaust as a target for a threatening heat-seeking missile. The flares are wrapped with aluminum-filament reinforced tape and inserted into an aluminum case closed with a felt spacer and

plastic end cap. As with the dispensing of chaff, flares are ejected from the aircraft using a small pyrotechnic charge. The flare material and a 1-inch square by ¼-inch thick plastic end cap are ejected.

A second type of flare, the illumination or parachute flare, is used to illuminate targets or ground areas during night training. Parachute flares are normally released from aircraft at altitudes above 2,500 ft AGL. A parachute slows the descent of the flare in order to provide prolonged illumination of the ground area or target. Parachute flares can burn for several minutes but are dropped from an altitude sufficient to allow them to burn out prior to hitting the ground.

Chaff and flare use throughout military ranges are generally governed by regulations based on safety and environmental considerations and limitations. For example, flare use is usually restricted to minimum release altitudes, which vary depending on the potential for fire hazard on the range at a given time. To prevent potential fires caused by flare use, when fire hazards are present during parts of the year, minimum release altitudes are generally greater to allow for flares to burn out completely before reaching the ground.

3.5.1 DAVIS-MONTHAN AFB, RANGES, AIRSPACE, AND WTA

3.5.1.1 Davis-Monthan AFB

Hazardous Materials

Operations at Davis-Monthan AFB require the use and storage of many hazardous materials. Hazardous materials are used for aircraft repair and maintenance, aircraft launch and recovery, aerospace ground equipment repair and maintenance, building remodeling, and construction (Davis-Monthan 1998). Hazardous materials are managed by Davis-Monthan AFB's Hazmart Pharmacy, operated by the 355th Logistics Group. In the effort to consolidate and minimize hazardous materials, hazardous materials such as adhesives, paint, and lubrication oils are available from the Hazmart facility (Davis-Monthan AFB 2000).

ERP. Of the 49 ERP sites located at Davis-Monthan AFB, 43 require No Further Action, 4 require Long-Term Monitoring, 1 requires Interim Removal, and 1 requires Long-Term Operation (Davis-Monthan 2000).

Asbestos-Containing Material. Many of the buildings constructed at Davis-Monthan AFB date back to the 1940's when use of asbestos in construction materials was common. Based on the date of construction and the materials used for buildings and insulation, it is likely that a moderate percentage of the buildings at Davis-Monthan AFB may have asbestos-containing materials. Proper disposal procedures for asbestos-containing materials are followed by Davis-Monthan AFB. In the design stage (prior to job order signatures) of any new renovation/demolition project conducted at Davis-Monthan AFB, asbestos surveys must be conducted (Davis-Monthan 2000). Guidance regarding asbestos-related issues are provided in Davis-Monthan AFB's Asbestos Management Plan and Asbestos Operations Plan.

Lead-Based Paint. Many of the buildings constructed at Davis-Monthan AFB date back to the 1940's when use of lead-based paint in building construction was common. Based on the date of construction, it is likely that a moderate percentage of buildings at Davis-Monthan AFB may have lead-based paint.

Munitions. Davis-Monthan AFB has adequate and Air Force qualified facilities for the storage of all munitions used by Davis-Monthan AFB assigned aircraft during training operations at remote ranges (e.g., BMGR).

Hazardous Waste

Aircraft units at Davis-Monthan AFB typically generate paints, solvents, oils, stripping mixtures, waste rags, and hydraulic fluid. Hazardous wastes are initially collected at 1 of 75 satellite accumulation points (SAPs) that have been established at Davis-Monthan AFB. Wastes are then transferred to the base's 90-Day Hazardous Waste Storage Area. Materials gathered at this area are analyzed, characterized, prepared for shipment, and forwarded to the Defense Reutilization and Management Office (DRMO) for final disposal (Davis-Monthan 2000).

Davis-Monthan AFB generates approximately 88 tons of hazardous waste per year, or 7 tons per month (Table 3.5-1) (Davis-Monthan AFB 2002). The USEPA designates facilities as being a large quantity generator of hazardous waste if, for any month during the year, hazardous waste generation exceeds approximately 2,200 pounds or 1.1 tons. Therefore, Davis-Monthan AFB is designated as a large quantity generator of hazardous waste

Table 3.5-1. Baseline Hazardous Waste Generation at Davis-Monthan AFB

Hazardous Waste Source	*Amount (pounds/year)*
Aircraft (1)	28,668
Aircraft Support Functions	61,403
All Other Functions (2)	86,042
Total	**176,113**

Note: (1) Includes Air Force (A-10s and C-130s), U.S. Customs (fixed wing, helicopters, and motor vehicles), AMARC (stored aircraft), and 305 RQS (HH-60s).
(2) Includes facility maintenance, hospital, firing range, motor vehicles, etc.
Source: Davis-Monthan AFB 2002.

Davis-Monthan AFB has updated its *Waste Minimization Guide* which provides information and procedures for reducing hazardous waste generated on-base (Davis-Monthan 1998). The waste minimization methods include hazardous materials control (i.e., elimination of unnecessary water-producing operations), substituting hazardous materials for less toxic materials, process changes, recycling, and treatment (Davis-Monthan 1998).

Non-Hazardous Waste

Davis-Monthan AFB does not currently operate its own on-base landfill, instead all non-hazardous solid waste is collected on-base and transported by a licensed contractor to either the City of Tucson landfill or the Pima County landfill (Davis-Monthan 2000). As of 1997, Davis-Monthan AFB had successfully achieved a 35-percent reduction in solid waste generation and had achieved a waste recycling rate of 48 percent (Davis-Monthan 2000).

Davis-Monthan AFB actively participates in a recycling program that includes free curbside pickup in the military family housing areas, recycling stations in most offices, recyclable pickup by the Arizona Training Program at most offices, and a turn in of all types of recyclables at a recycling center (Davis-Monthan 2000). In addition, the DRMO manages recycling contracts for scrap aluminum and steel, cardboard, tires, off-spec oil, and spent brass shell casings. Over 4,000 tons of waste is diverted from landfill disposal and recycled (Davis-Monthan 2000).

3.5.1.2 Ranges and Airspace

Aircrews utilizing BMGR may employ a wide range of munitions to conduct authorized training. Munitions which have been employed on the range for their intended purpose are assessed during scheduled clearing and maintenance activities as required by DoD Instructions and applicable military service regulations and instructions. EOD personnel inspect these munitions then destroy any UXO. Recoverable metals from training operations are held at secure Range Consolidation Points or Holding Areas until they are demilitarized and recycled during the Range Residue Removal (R3) cycle. Scrap metal generated by range operations is a valuable commodity available for release only after it has been demilitarized and certified safe. The USEPA's Military Munition Rule clearly directs that munitions used for their intended purpose are not wastes that must be managed under RCRA.

3.5.1.3 WTA

Marine debris in the San Diego Bay and the Pacific Ocean is generated by a variety of sources. Depending on local marine and atmospheric conditions, debris generated outside the ROI move through the area via ocean currents or wind. The eventual fate of the items depends on oceanographic conditions, the physical properties of the items, and the state of the items in the marine environment at a given time. This discussion focuses on those materials that would be generated by proposed CSAR training activities including the use of marine location dye markers [sea dye packs], marine flares, and lightsticks. Sea dye packs, marine flares, and lightsticks are currently used by regional military operating groups (Navy and Air Force), USCG, and civilians within the San Diego Bay and Pacific Ocean for training, rescue, recreational, or commercial activities. These training materials are not considered hazardous wastes but in sufficient numbers, they can present a marine debris issue. While these materials are not considered to be hazardous to humans, sea dye packs have the potential to affect some marine organisms (refer to Section 4.9, Marine Biological Resources).

Sea Dye Packs. The M59 is a marine location dye marker consisting of a letter paper-size, heat-sealed plastic laminate bag filled with 22 ounces of uranine, a non-hazardous liquid dye composed of soluble sodium salt of fluorescein. The dye, which is not toxic or hazardous, is designed to mark the location of objects in the water. The plastic bag is dropped into the water from a minimum height of 50 ft at static or moving speeds. Upon hitting the water, the bag ruptures, scattering the enclosed dye to form a brilliant, fluorescent emerald green slick approximately 20 ft in diameter. The slick is visible within a 10-mile radius at an altitude of 3,000 ft MSL for an average of 2 hours. While the dye disappears within 2 hours, the plastic bag or pieces thereof, could remain suspended in the water column, sink to the bottom, or wash onshore.

Marine Flares. The MK6 marine flare consists of four pyrotechnic candles contained in a square wooden block (about 18 inches x 17 inches x 26 inches) with a flat metal nose plate attached. There are 4 flame and smoke escape holes in the forward end of the signal; each hole is capped and sealed with tape. The MK6 uses a pull friction igniter, covered by adhesive tape, and is located in the center of the tail end of the body. The friction and igniter are launched by a sharp pull, either by hand or by a lanyard attached to the structure of the aircraft. The igniter charge initiates a delay fuse, which, after a 90-second interval, ignites the first candle. When the candle begins to burn, the resulting gas pressure forces the metal cap out of the escape hole and breaks the adhesive tape seal, allowing gases to escape and burn. As the first candle burns out, a fuse is ignited which ignites the next candle unit. The successive ignition is repeated until all 4 candle-units have burned out. The total burning time is approximately 40 minutes. The MK6 is designed to completely incinerate its wooden housing and internal contents. Small amounts of uncombusted wood may float and wash ashore.

The MK25 marine flare consists of an aluminum body (about 55 inches X 55 inches X 41 inches) containing a pyrotechnic composition, an electric squib, and a saltwater-activated battery. The base of the flare contains a battery, a safety arm feature that seals the battery cavity, and battery cavity ports. The MK25 is launched by rotating base plates from the "safe" to the "armed" position to expose the battery cavity ports. When saltwater enters the battery cavity through the ports, water acts as an electrolyte, activating the saltwater battery. The battery develops sufficient current to initiate an electric squib. The squib ignites a starter mix, which in turn ignites the pyrotechnic composition. Gas pressure forces a valve from the nose of the marker and emits a yellow flame and white smoke for 13 to 18 minutes. Upon combustion of the internal flare materials, the aluminum housing would sink.

Lightsticks. Lightsticks are approximately 6 inches long by 1 inch in diameter (about the size of a cigar) and are constructed of a casing of hard yet malleable plastic. They contain 2 solutions which, when mixed together by breaking 2 small glass ampoules within the plastic casing, produce a light with little or no heat by-product. The constituents of these solutions do not meet the criteria for a listed hazardous waste, although hydrogen peroxide, one of the constituents, is an irritant to mammalian skin and mucous membranes at high concentrations. Military (Navy and Air Force) and USCG groups within the San Diego Bay and Pacific Ocean use lightsticks and their derivatives (chemlights, cyalumes) at times during the course of training and rescue operations. Fishermen use lightsticks for attracting fish (lightsticks are attached to nets and lines), and recreational divers use lightsticks for illumination and safety purposes. Where feasible, some users attempt to recover used lightsticks. Currently, the 305 RQS from Davis-Monthan AFB expends approximately 720 lightsticks per year during search and rescue training operations in the WTA. The numbers of lightsticks that other groups or individuals may expend per year in the WTA or vicinity is not known.

Cleanups are periodically sponsored by various organizations to clean up marine debris (including lightsticks) that washes up on beaches. Marine debris collection data from 1998-2001 for 6 Southern California beaches consisted of over 1,500 balloons, 700 plastic bags less than a meter in size, and 10 lightsticks in addition to thousands of other plastic, glass, wood, and metal items (Ocean Conservancy 2002). For the years 1999-2001, approximately 484,000 pounds of marine debris was collected during Coastal Cleanup Days along Los Angeles, Orange, and San Diego counties (California Coastal Commission 2002).

3.5.2 EDWARDS AFB, RANGES, AIRSPACE, AND WTA

3.5.2.1 Edwards AFB

Hazardous Materials

Operations at Edwards AFB require the use and storage of many hazardous materials in support of research activities and mission requirements. Hazardous materials are used for aircraft repair and maintenance, aircraft launch and recovery, aerospace ground equipment (AGE) repair and maintenance, building, remodeling, and construction. Hazardous materials are managed by Edwards AFB's Hazardous Materials Pharmacy (HMP). The HMP concept has improved hazardous material management by reducing the volume of hazardous materials purchased and hazardous wastes generated. The HMP inventories all hazardous materials on base, monitors their shelf life, and tracks hazardous material usage throughout the base (Edwards AFB 1999).

Prior to implementation of any project (including construction, test and evaluation, or mission changes) at Edwards AFB, the Bioenvironmental Engineering and Environment Management departments review program support documentation to identify any hazardous material/waste concerns associated with the proposed project. A master Hazardous Material Inventory list and all listed Material Safety Data Sheets (MSDSs) are maintained through the Bioenvironmental Engineering Department.

Edward's AFB's *Pollution Prevention Plan* contains eight program elements, six of which are required under the AFI 32-7080, *Pollution Prevention Plan*. The eight *Pollution Prevention Program* elements include ozone depleting chemicals, USEPA-17 Industrial Toxic Project Chemical, hazardous waste generation, municipal solid waste minimization, affirmative procurements, energy conservation, VOC air emission reductions, and toxic release inventory (Edwards AFB 1999).

ERP. Of the 471 ERP sites located at Edwards AFB, 127 sites are in an Active Phase and 344 have been designated No Further Investigation (NFI). The remaining sites are in various stages of investigation (Edwards AFB 2002). North Base has approximately 60 ERP sites (Figure 3.5-1).

Asbestos-Containing Material. Many of the buildings constructed at Edwards AFB date back to the 1940's when use of asbestos in construction materials was common. Based on the date of construction and the materials used for buildings and insulation, it is likely that a moderate percentage of the buildings at Edwards AFB may have asbestos-containing materials. Proper disposal procedures for asbestos-containing materials are followed by Edwards AFB.

Lead-Based Paints. Many of the buildings constructed at Edwards AFB date back to the 1940's when use of lead-based paint in building construction was common. Based on the date of construction it is likely that a moderate percentage of buildings at Edwards AFB may have lead-based paint. Edwards AFB Bioenvironmental and Environmental Management departments manage the handling of existing lead-based paint (Edwards AFB 1997).

Munitions. Edwards AFB has adequate and Air Force qualified facilities for the storage of all munitions used by Edwards AFB.

Hazardous Waste

Aircraft units at Edwards AFB typically generate paints, solvents, oils, stripping mixtures, waste rags, and hydraulic fluid. Hazardous wastes are initially collected at 1 of 42 SAPs that have been established at Edwards AFB. Wastes are then transferred to 1 of the 35 90-Day Hazardous Waste Storage Areas or to the Conforming Storage Facility (CSF) (a facility permitted to store hazardous wastes for up to 1 year). The CSF is the last stage for on-base hazardous waste management, and receives wastes from satellite or 90-day accumulation points. The CSF is managed by Edwards AFB Environmental Management Division. Materials gathered at this area are analyzed, characterized, and prepared for shipment off base for treatment, storage, or disposal (Edwards AFB 1999).

Edwards AFB generates approximately 302 tons of hazardous waste per year, or approximately 25 tons per month (Table 3.5-2). Therefore, Edwards AFB is designated as a large quantity generator of hazardous waste.

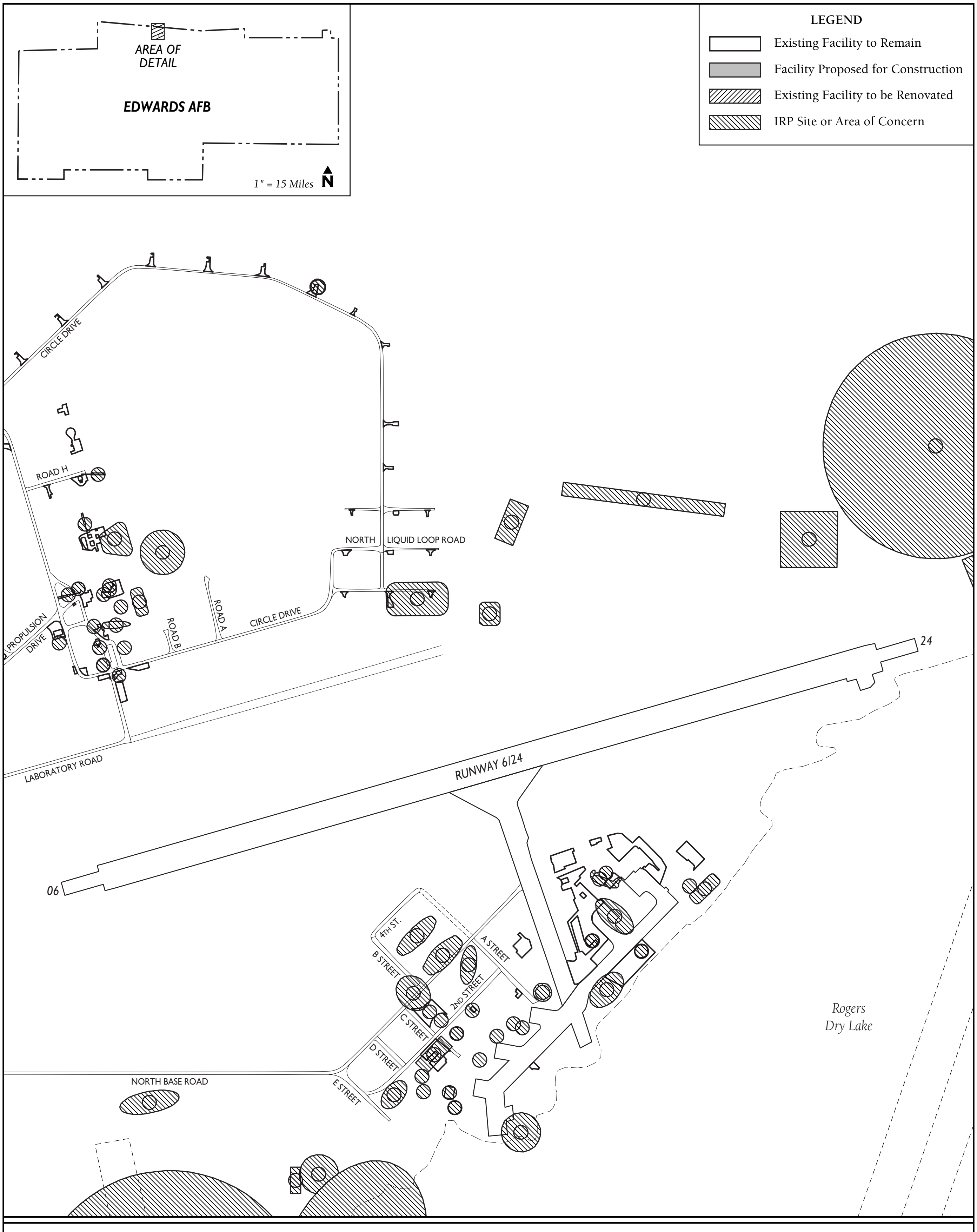


Figure 3.5-1
Location of IRP Sites and Areas of Concern at North Base, Edwards AFB

Table 3.5-2. Baseline Hazardous Waste Generation at Edwards AFB

Hazardous Waste Source	*Amount (pounds/year)*
Aircraft [1]	242,435
Aircraft Support Functions [2]	312,643
Subtotal – Aircraft-related functions	555,078
All Other Functions	48,936
Total	**604,014**

Note: [1] Includes U.S. Marine Corps aircraft (CH-53 helicopters), Air Force aircraft (B-1, B-2, B-52, Global Hawk, F-16, F-15, CV-22, V-22).
[2] Includes facility maintenance, 412 LSS/LGLXF Pharmacy, 412 MXS/LGMGP, corrosion control, test cells, and 412 MXS/LGMP (Propulsion Flight).
Sources: Air Force 2001, Edwards AFB 2002b.

Non-Hazardous Waste

Edwards AFB currently operates 1 Class III landfill located within the main base area. At current disposal rates the landfill is projected to remain available for waste disposal through 2019. Due to the large volume of construction/demolition waste generated on base, the majority of the current construction contracts require the contractor to dispose of construction/demolition wastes at an approved off-base landfill to reduce the impact to the main base landfill.

Edwards AFB operates a composting facility at the Main Base Landfill for converting green waste (i.e., grass clippings, leaves, shrubbery trimmings, tree prunings, home garden refuse, and non-treated wood products) into a compost product. In addition, Edwards AFB actively participates in a recycling program. Typical materials recycled include some waste metals, tires, concrete, and asphalt.

3.5.2.2 Ranges and Airspace

Aircrews utilizing the China Lake EC and Fort Irwin Ranges may employ a wide range of munitions to conduct authorized training. Munitions which have been employed on the range for their intended purpose are assessed during scheduled clearing and maintenance activities as required by DoD Instructions and applicable military service regulations and instructions. EOD personnel inspect these munitions then destroy any UXO. Recoverable metals from training operations are held at secure Range Consolidation Points or Holding Areas until they are demilitarized and recycled during the R3 cycle. Scrap metal generated by range operations is a valuable commodity available for release only after it has been demilitarized and certified safe. The USEPA's Military Munition Rule clearly directs that munitions used for their intended purpose are not wastes that must be managed under RCRA.

3.5.2.3 WTA

Baseline waste generation conditions would be the same as those described in Section 3.5.1.3.

3.5.3 VANDENBERG AFB, RANGES, AIRSPACE, AND WTA

3.5.3.1 Vandenberg AFB

Hazardous Materials

Operations at Vandenberg AFB require the use and storage of many hazardous materials in support of its mission. Hazardous materials are used for aircraft repair and maintenance, aircraft launch and recovery, aerospace ground equipment repair and maintenance, building remodeling, and construction. These materials range from highly explosive and toxic rocket fuels to more comment and less toxic materials such as latex paint (Vandenberg AFB 2001).

Hazardous materials purchased from off-base suppliers are managed by Vandenberg AFB's Hazmart Pharmacy. The Hazmart Pharmacy inventories all hazardous materials on base and provides handling and use information to prevent misuse of hazardous materials, and to minimize waste from the user. Implementation of Vandenberg's Pollution Prevention Program components and the Hazmart Pharmacy hazardous materials inventory has significantly reduced hazardous waste generation on base (Vandenberg AFB 2001).

Vandenberg's *Pollution Prevention Plan* was enacted in response to the Pollution Prevention Act of 1990 and focuses on hazardous waste generation, source reduction, recycling, material acquisition, handling and use, production and operational activities, management, and disposal (Vandenberg AFB 2000). Responsibility and guidance for achieving Vandenberg AFB's *Pollution Prevention Plan* goals are listed in the *Pollution Prevention Management Plan* (PPMP) and apply to Vandenberg AFB and associated remote facilities (Vandenberg AFB 2000).

ERP. Of the 59 ERP sites located at Vandenberg AFB, 1 has been approved for No Further Action and 1 has had a No Further Action Decision Document submitted for CDNR review. The remaining sites are in various stages of investigation. In addition, 4 Areas of Concern are located near the area proposed for construction of CSAR facilities. These areas are associated with various flightline facilities such as maintenance hangars and an aircraft wash rack.

Asbestos-Containing Material. Many of the buildings constructed at Vandenberg AFB date back to the 1940s when use of asbestos in construction materials was common. Based on the date of construction and the materials used for buildings and insulation, it is likely that a moderate percentage of the buildings at Vandenberg AFB may have asbestos-containing materials.

Lead-Based Paints. Many of the buildings constructed at Vandenberg AFB date back to the 1940s when use of lead-based paint in building construction was common. Based on the date of construction, it is likely that a moderate percentage of the buildings at Vandenberg AFB may have lead-based paint.

Munitions. Vandenberg AFB has adequate and Air Force qualified facilities for the storage of all munitions used by Vandenberg AFB.

Hazardous Waste

Hazardous wastes are initially accumulated at 1 of approximately 40 (55-gal/270-day) SAPs that have been established at Vandenberg AFB. Wastes are then either transferred to 1 of 45 collection accumulation areas (CAAs) or directly to the 90-day Consolidated Collection Accumulation Point (CCAP). The CCAP is responsible for receiving wastes from generation points (daily), the 40 SAPs (at 55-gal or 270 days, whichever occurs first), and the 45 (45-day) CAAs. Hazardous wastes gathered at the CCAP are profiled and paperwork prepared for shipment to an authorized off-base treatment, storage, disposal, or recycling facility (TSDF) for final disposition.

Vandenberg AFB generates approximately 170 tons of hazardous waste per year, or approximately 14 tons per month (Vandenberg AFB 2000b). Therefore, Vandenberg AFB is not designated as a large quantity generator of hazardous waste.

Non-Hazardous Waste

Vandenberg AFB currently operates one Class III landfill that occupies 172 acres. Under the Solid Waste Facility Permit issued by the Environmental Health Service Department, Vandenberg AFB landfill can accept a maximum of 400 tons of non-hazardous waste per day (Vandenberg AFB 2001). On average, the Vandenberg AFB landfill receives 30 to 60 tons of waste per day (Vandenberg AFB 2001). In order to meet the California Integrate Waste Management Act of 1989 waste reduction goals, Vandenberg AFB would need to reduce waste disposal to the landfill by 24.5 percent every year from 1997 through 2000 (Vandenberg AFB 2001). Based on 1997 calculations, the landfill would remain viable for waste disposal through 2084 if waste reduction goals are met. However, if the 1997 waste disposal rate remains constant, the landfill would be viable through 2034 (Vandenberg AFB 2000).

The Vandenberg AFB landfill accepts municipal and commercial solid waste, including construction debris, green waste, and used tires. Recyclable materials such as scrap metal, concrete and asphalt are separated and recycled. Vandenberg's *Solid Waste Management Plan* (SWMP) describes the solid waste management programs at Vandenberg AFB and apply to all Vandenberg AFB solid waste generators and handlers (Vandenberg AFB 2000).

3.5.3.2 Ranges and Airspace

Aircrews utilizing the China Lake EC and Fort Hunter Liggett Ranges may employ a wide range of munitions to conduct authorized training. Munitions which have been employed on the range for their intended purpose are assessed during scheduled clearing and maintenance activities as required by DoD Instructions and applicable military service regulations and instructions. EOD personnel inspect these munitions then destroy any UXO. Recoverable metals from training operations are held at secure Range Consolidation Points or Holding Areas until they are demilitarized and recycled during the R3 cycle. Scrap metal generated by range operations is a valuable commodity available for release only after it has been demilitarized and certified safe. The USEPA's Military Munition Rule clearly directs that munitions used for their intended purpose are not wastes that must be managed under RCRA.

3.5.3.3 WTA

Baseline waste generation conditions would be the same as those described in Section 3.5.1.3.

3.6 EARTH RESOURCES

Earth resources are defined as the geology, topography, and soils of a given area. The geology of an area includes bedrock materials, mineral deposits, and fossil remains. Topography refers to terrain, dominant landforms, and other visible features. Soils are unconsolidated materials on or near the surface and are defined by classifications and associations. A soil classification is a broad term for the general type of soil found in a larger area (e.g., hydric, alluvial, or clay soils). Soil associations are site-specific based on the particular soil type or complex found at that location.

The ROI for the Proposed Action consists of the AFBs where proposed construction and ground-disturbing activities would occur. Geology and topography underlying airspace are not discussed since such lands would not be subject to ground-disturbing activities. Since there would be no construction activities for any of the ranges and the only proposed ground-disturbing activities include weapons firing, only soils are discussed for each of the ranges.

3.6.1 DAVIS-MONTHAN AFB AND RANGES

3.6.1.1 Davis-Monthan AFB

Geology

Situated in the Tucson Basin, Davis-Monthan AFB lies within the Sonoran Desert. The basin is a trough bordered by the Tucson, Rincon, and Santa Catalina Mountains. Terraces, desert plains, and alluvial fans are the most common landforms in the Sonoran Desert. Rocks of the surrounding mountains consist of granites, gneisses, volcanics, basalts, and various sedimentaries. Located in a Seismic Zone II, Davis-Monthan AFB is classified as being prone to moderate earthquake intensity at intermediate frequency. Over the past 100 years, there have been no significant earthquakes (Davis-Monthan AFB 1998).

Topography

Davis-Monthan AFB’s terrain is mostly flat with a general slope from the southeast with a low point of 2,550 ft and to a high point of 2,950 ft in elevation to the northwest. Two slopes on Davis-Monthan AFB are potentially susceptible to development-induced erosion: the highway cut on Kolb Road and Atterbury Wash in the base’s eastern section (Davis-Monthan AFB 1998).

Soils

Davis-Monthan AFB’s desert topsoils are characteristic of flat, alluvial fans (bajadas). Area topsoils consist of silts, clays, sands, and gravels (approximately 24 inches deep). Rock, clay, and caliche material compose the bajada subsoil strata. The majority of base terrain is gravel and sandy loam about 36 inches deep, low in fertility and potentially erodable by wind and water forces. Under the sandy loam is a layer of calcareous material approximately 48 inches deep. Base soils are classified as low-to-moderately permeable to 60 inches deep. The majority of Davis-Monthan AFB’s developed areas lie on Mojave soils and urban lands sloping 1 to 8 percent. The loamy soils are at least 60 inches deep and are moderately low in permeability, runoff, and erodability by water and wind (U.S. Department of Agriculture [USDA] 1974).

3.6.1.2 Barry M. Goldwater Range (BMGR)

Soils

The BMGR is located in the Basin and Range physiographic province. The province is characterized by generally steep, discontinuous mountainous ranges which trend northwest to southeast separated by broad, gently sloping to nearly flat, deep alluvial basins. The mountain ranges are composed of igneous, metamorphic, and sedimentary rocks. The valleys or basins consist of thick, unconsolidated to weakly consolidated silts, sands, clays, and gravels. Alluvial and colluvial deposits form alluvial fans along the bases of the mountains. Fine sands in some valleys form large dune fields. The majority of the soils are considered to have slight to moderate water erosion potential although dune areas are considered to have a high wind erosion potential (USMC 1997, Air Force 1999).

3.6.2 EDWARDS AFB AND RANGES

3.6.2.1 Edwards AFB

Geology and Topography

Edwards AFB is located in the western Mojave Desert region within the Antelope Valley, a broad alluvial plain lying southwest of the Tehachapi Mountains and north of the San Gabriel Mountains. Low domes and hills occasionally interrupt the valley's generally flat-to-gently-sloping terrain. The base includes 3 dry lakebeds: Rogers, Rosamond and Buckhorn (Edwards AFB 2001a).

Although Edwards AFB is located in a seismically active region of California, no recently active earthquake faults are located within the base area. There are 2 major faults in the region: the northeast trending Garlock Fault to the northwest of Edwards AFB and the northwest trending San Andreas Fault to the south. At least 8 minor faults are known, or are suspected because of their trends, to be present within the boundaries of Edwards AFB; however, no faults have been active in the last 11,000 years (USGS 1988).

Soils

Soils on Edwards AFB are characterized highly alkaline loams, sandy loams, and loamy sands. Soils on Edwards AFB are generally moderately to highly susceptible to wind erosion, especially if disturbed by vehicular or traffic. Water erosion potential ranges from slight to moderate, depending on slope and soil composition. Slopes in the North Base area are generally less than 1 percent (Edwards AFB 2001a).

3.6.2.2 Edwards Complex Ranges

Soils on the Ft. Irwin Range are typical of Mojave Desert soils and are similar to those previously discussed for Edwards AFB.

3.6.3 VANDENBERG AFB AND RANGES

3.6.3.1 Vandenberg AFB

Geology

Vandenberg AFB is in a geologically diverse area, partly due to its location between the Western Transverse and Southern Coast Ranges. Below the base lies mostly Late Mesozoic (140 to 70 million years ago) and Cenozoic (70 million year ago to present) marine sedimentary rocks. Below this layer is the Franciscan Formation of the upper Jurassic age. The Formation is composed of sedimentary and volcanic rocks with serpentine intrusions (Vandenberg AFB 1996).

Although Vandenberg AFB is located in a seismically active region of California, no recently active earthquake faults are located within the base area. Faults in the area include the Hosgri Fault Zone to the west, the Lion's Head Fault Zone to the northeast, the Santa Ynez Fault Zone to the southeast, and the Los Alamos-Baseline Fault Zone to the east. The Los Alamos-Baseline Fault Zone experienced moderate earthquake activity in the early 1900s (Vandenberg AFB 1996).

Topography

The developed area of Vandenberg AFB is on Burton Mesa. The mesa lies at an elevation of approximately 400 ft above sea level and is bisected by several canyons. Along the coastal section of Burton Mesa are sand dunes. Inland, the topography is generally irregular and hummocky. Major drainages in the area include the San Antonio River to the north and the Santa Ynez River to the south. Several smaller drainages, including Canada Tortuga, surround the developed portion of the base (Vandenberg AFB 1996).

Soils

There are 2 dominant soil types in the Burton Mesa of Vandenberg AFB. The Tangair-Nelson association is found on varying slopes and is composed of poorly drained and moderately well drained sands and loamy sands located on terraces. The Marina-Oceano association is made up of drained sands on mesas and dunes (Vandenberg AFB 1996).

3.6.3.2 Ranges

More than 130 soil types occur in 57 soil series on Fort Hunter-Liggett (R-2513) and are typical of soils of the Central California coast zone. Shallow soils and rock outcrops dominate steep highlands; deeper soils from alluvial terraces or underlying parent material dominate on the rolling hills; and alluvial deposits occur in river valleys. Soils on Fort Hunter Liggett are moderately to highly erodible; as the topography becomes more pronounced (e.g., mountain slopes), erosion potential is severe (Fort Hunter Liggett 2002).

3.7 WATER RESOURCES

Water resources include both surface and subsurface water. Surface water includes all lakes, ponds, rivers, streams, impoundments, and wetlands within a defined area or watershed. Subsurface water, commonly referred to as groundwater, is typically found in certain areas known as aquifers. Aquifers are areas of mostly high porosity soil where water can be stored between soil particles and within soil pore spaces. Groundwater is usually recharged during rain events and is withdrawn for domestic, agricultural, and industrial purposes.

The Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA) are the primary federal laws that protect the nation's waters, including lakes, rivers, aquifers, and coastal areas. The primary objective of the CWA is to restore and maintain the integrity of the nation's navigable waters while the SDWA is focused on the quality and safety of public water systems from both surface and groundwater supplies.

This section also addresses wetlands. Wetlands are considered sensitive habitats and are subject to federal regulatory authority under Section 404 of the CWA and Executive Order (EO) 11990, *Protection of Wetlands*. Jurisdictional wetlands are defined by the U.S. Army Corps of Engineers (USACOE) as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (U.S. Department of the Army 1987). Areas meeting the federal wetland definition are under the jurisdiction of the USACOE.

Flood hazards associated with the 100-year floodplain (areas generally subject to major flooding once every 100 years) are also addressed in this section. EO 11988, *Floodplains Management*, directs government agencies to avoid adverse effects and incompatible development in floodplains. If construction is unavoidable, then the agencies must ensure the action conforms to applicable floodplain protection standards, and that accepted flood-proofing and other flood protection measures are applied to the construction (Federal Emergency Management Agency 1982).

The ROI for water resources includes the area encompassed by each alternative installation, particularly areas subject to ground-disturbing activities (e.g., construction), target areas within the BMG, Ft. Hunter Liggett, and Ft. Irwin ranges, and areas on the ranges. Since no construction activities are proposed in the ranges or on land underlying the airspace, floodplains are only addressed in association with the installations. Marine water issues associated with the WTA are discussed in Section 3.9, Marine Biological Resources.

3.7.1 DAVIS-MONTHAN AFB AND RANGES

3.7.1.1 Davis-Monthan AFB

Surface Water

Davis-Monthan AFB lies in the Tucson Basin, drained by the north-running Santa Cruz River which is 2 miles west of the base. Santa Cruz River tributaries include the west-flowing Rillito River about 4 miles from the base, the northwest-flowing Julian Wash about 1 mile southwest of the base, and northwest flowing Pantano Wash about a half mile northeast of the base (Davis-Monthan AFB 1998).

There are no permanent streams or rivers on Davis-Monthan AFB. Seasonal runoff in the northwestern section of the base flows into Santa Cruz River through ditches. On the eastern section of the base, drainages systems of Atterbury Wash flow into a retention pond north of the base at Lakeside Park, where excess water flows into Pantano Wash. Atterbury Wash is the main drainage on Davis-Monthan AFB. Mostly undeveloped, Atterbury Wash's streamcourse changes frequently as a result of erosion during floods (Davis-Monthan AFB 1998).

Groundwater

The base operates 11 wells that pump groundwater from the Tinaja Beds and the Fort Lowell Formation of the Tucson Basin aquifer. The local aquifer is recharged by precipitation in ephemeral streams, groundwater inflow, and runoff from surrounding mountains. Agricultural runoff and sewage effluent discharge into the Santa Cruz River account for a small amount of groundwater recharge. Unused Tucson Basin groundwater outflows in the northwestern portion of the basin (Davis-Monthan AFB 1998).

Groundwater levels at Davis-Monthan AFB are generally between 250 and 300 ft below the surface. Groundwater quality in the Tucson Basin is within USEPA guidelines, though locally elevated-levels of total dissolved solids are in excess of USEPA standards (Davis-Monthan AFB 1998).

Floodplains

No portion of Davis-Monthan AFB (or the cantonment area) is within a known 100-year floodplain (Federal Emergency Management Agency 1996). Peak discharge of Atterbury Wash for a 100-year flood was estimated at 2,906 cubic ft per second (cfs), and the width of the 100-year floodplain was found to vary between 69 and 1,154 ft due to variations in streambank height (Air Force 1998a).

Wetlands

A wetlands inventory for Davis-Monthan AFB was conducted in 1996 and no jurisdictional wetlands were found on base (Davis-Monthan AFB 1998).

3.7.1.2 Barry M. Goldwater Range (BMGR)

As with most desert environments, sources of surface water in the Sonoran Desert are rare. Most surface water sources on the BMGR are ephemeral water catchments such as springs, playa lakes, and tinajas (cavities or depressions in rock filled occasionally by rain or floodwaters). A 1996 survey was conducted of BMGR wetlands subject to direct or indirect effects of ordnance delivery, construction and other range activities. The survey identified 19 sites on BMGR classified as wetlands. No surface water or groundwater resources on the BMGR are used for military purposes (Air Force 1999).

3.7.2 EDWARDS AFB AND RANGES

3.7.2.1 Edwards AFB

Surface Water

Surface water on Edwards AFB is limited to ephemeral lakes, streams, and artificial sources; there are no perennial streams on base. Dry lakebeds, including Rogers Dry Lake, which adjoins North Base, flood during most winters and remain inundated for the winter season. Mojave Creek, on the southern end of

Rogers Dry Lake, does not flood seasonally and the streambed is usually dry. Sources of artificial surface water on the base include Piute Ponds, in the southwestern corner of the base, and Branch Memorial Park Pond, in the south-central section of the base (Edwards AFB 2001a). Stormwater runoff in the area is directed toward Rogers, Rosamond, and Buckhorn Dry Lakes (USGS 1998).

Groundwater

Edwards AFB uses 12 groundwater wells, of which 10 are used for drinking water purposes. Eight of the groundwater wells are located within the South Track Wells at South Base. North Base has one groundwater well (identified as N-2) that pumps into a 100,000-gallon storage tank, which has a production capability of 2.5 million gallons per day (mgd). The North Base Booster Station treats the water and distributes it from a 100,000-gallon tank to a 1-million-gallon storage tank and a 750,000-gallon storage tank. These 2 storage tanks supply water to the North and Main Base areas, including the flightline. In 1998, Edwards AFB groundwater wells produced a total of 787.9 million gallons of drinking water from 8 wells and 13.5 million gallons of nonpotable water from 3 wells (Edwards AFB 2001a).

Floodplains

In 1993, a flood study of the base was conducted to determine floodplain constraints (AFFTC 1993d). Flood-prone areas that were identified include Rogers Dry Lake, Rosamond Dry Lake, and Mojave Creek. Mojave Creek empties into Rogers Dry Lake. Although a small portion of North Base borders Rogers Dry Lake and is potentially impacted by the floodplain, relatively high flooding in 1993 remained more than 3 ft below the estimated flood of record level (Edwards AFB 2001a).

Wetlands

There are no wetlands in the North Base area of Edwards AFB (Edwards AFB 2001a).

3.7.2.2 Ranges

The Fort Irwin and China Lake EC Ranges are within the Mojave Desert and no significant permanent surface water sources are on the ranges or in the vicinity. Surface water sources are limited to ephemeral dry ponds and washes that run only during flood or rain events (Fort Irwin 2001, Naval Air Weapons Station China Lake and Bureau of Land Management 2001).

3.7.3 VANDENBERG AFB AND RANGES

3.7.3.1 Vandenberg AFB

Surface Water

Major freshwater drainages on Vandenberg AFB include San Antonio Creek and the Santa Ynez River. Minor drainages include Canada Tortuga, Shuman, Canada Honda, Bear and Jalama Creeks (Vandenberg AFB 1996).

Groundwater

Vandenberg AFB encompasses 2 large groundwater basins: San Antonio Creek Basin in the northern part of the base and the Santa Ynez River Basin in the southern part of the base. The San Antonio Basin is approximately 25 miles in length and up to 1 mile wide, running from east to west (to the Pacific Ocean). Irrigation is the main use of groundwater in this basin. The Santa Ynez Basin is approximately 70 miles long and up to 15 miles wide. It also runs from east to west (Vandenberg AFB 1996).

Floodplains

Known 100-year floodplains border low areas along several drainages of Vandenberg AFB including Shuman Creek, San Antonio Creek, Santa Ynez River, and Canada Honda Creek. The cantonment area and flightline are not within these floodplain areas (Vandenberg AFB 1996).

Wetlands

There are approximately 5,100 acres of wetlands on Vandenberg AFB, comprising 5 percent of its total area (98,400 acres). The majority of the seasonal wetlands and vernal pools occur on Burton Mesa near 13th and 35th streets, but none occur near the cantonment area or flightline (Vandenberg AFB 1996).

3.7.3.2 Fort Hunter Liggett Range

Surface water resources on the Fort Hunter Liggett Range are limited to creeks and streams. Runoff is rapid in this area and all but the larger streams are generally dry during the summer months. Vernal pools and other seasonal wetlands are present on Fort Hunter Liggett but not where ground-disturbing activities occur (Fort Hunter Liggett 2002).

3.8 TERRESTRIAL BIOLOGICAL RESOURCES

Biological resources include living, native, or naturalized plant and animal species and the habitats within which they occur. Plant associations are referred to as vegetation and animal species are referred to as wildlife. Habitat can be defined as the resources and conditions present in an area that produces occupancy of a plant or animal (Hall et al. 1997). Although the existence and preservation of biological resources are intrinsically valuable, these resources also provide aesthetic, recreational, and socioeconomic values to society. This analysis focuses on species or vegetation types that are important to the function of the ecosystem, of special societal importance, or are protected under federal or state law. For purposes of the EA, these resources are divided into 3 major categories: vegetation; wildlife; and special-status species.

Vegetation includes all existing terrestrial plant communities with the exception of wetlands or special-status plant species. For a discussion of wetlands see Section 3.7, Water Resources. The affected environment for vegetation includes only those areas potentially subject to ground disturbance.

Wildlife includes all vertebrate animals with the exception of those identified as special-status species. Wildlife includes fish, amphibians, reptiles, birds, and mammals. Wildlife also includes those bird species protected under the Migratory Bird Treaty Act. Assessment of a project's effects on migratory birds places emphasis on species of concern as defined by EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*.

Special-status species are defined as those plant and animal species listed as threatened, endangered, or proposed as such, by the U.S. Fish and Wildlife Service (USFWS) or state fish and wildlife agencies. The federal Endangered Species Act (ESA) protects federally listed threatened and endangered plant and animal species.

The Arizona Game and Fish Department (AGFD) uses the designation Wildlife of Special Concern, which are species "whose occurrence in Arizona is or may be in jeopardy, or which have known or perceived threats or population declines" (AGFD 2001). Also, the Arizona State Department of Agriculture maintains lists of plants in compliance with the 1993 Arizona Native Plant Law. The State of California utilizes a classification system similar to the ESA for protected species. Species may be state listed by the California Department of Fish and Game (CDFG) as endangered, threatened, or rare under the California ESA. .

The ROI for biological resources consists of the cantonment areas of Davis-Monthan, Edwards, and Vandenberg AFBs; ranges and associated Restricted Areas; and the affected airspace (i.e., MOAs, ARs, and LATNs). Biological resources associated with the WTA are discussed in Section 3.9, Marine Biological Resources.

3.8.1 DAVIS-MONTHAN AFB, RANGES, AND AIRSPACE

3.8.1.1 Davis-Monthan AFB

Vegetation

Davis-Monthan AFB is situated entirely within the Sonoran Desert, in the Tropical-Subtropical desertlands climatic zone. Specifically, Davis-Monthan AFB lies in the Arizona Upland Subdivision of the Sonoran desertscrub biotic community, characterized by flat terrain and low precipitation levels occurring sporadically in the summer and winter. The vegetation in the area is adapted to xeric (low moisture) conditions (Davis-Monthan AFB 1998).

The cantonment area of Davis-Monthan AFB is actively landscaped with a variety of native and non-native grasses, shrubs and trees. Undeveloped areas of Davis-Monthan AFB include the following natural plant communities: semi-desert grassland, Sonoran desertscrub, and Sonoran desert riparian. Approximately 40 percent of the vegetation on the base is native (Davis-Monthan AFB 1998).

Dominant grass species in the semi-desert grassland include grama (*Bouteloua* spp.), three-awns (*Aristida* spp.), and windmill grass (*Chloris* spp.). Dominant species in the mesic drainage areas of the Sonoran desertscrub community include velvet mesquite (*Prosopis velutina*), catclaw (*Acacia greggii*), seep willow (*Baccharis glutinosa*), and paloverdes (*Parkinsonia microphylla* and *Parkinsonia aculeata*) (Davis-Monthan AFB 1998).

Upland, drier areas of the Sonoran desertscrub community include creosote bush (*Larrea tridentata*), white bursage (*Ambrosia dumosa*), burrobrush (*Hymenoclea monogyra*), saguaro cactus (*Carnegiea gigantea*), and several smaller cacti (*Opuntia* spp.) (Davis-Monthan AFB 1998).

The Sonoran Desert riparian community is relatively rare on Davis-Monthan AFB, occurring only along Atterbury Wash. However, this community is dense and serves as an important habitat for numerous wildlife species. Plants of the Sonoran Desert riparian community include tomatillo (*Lycium brevipes*), catclaw, desert hackberry (*Celtis pallida*), mesquite, desert broom (*Baccharis salicifolia*), seep willow and mule fat (*Baccharis viminea*) (Davis-Monthan AFB 1998).

Wildlife

The developed portion of the base (the cantonment area) contains habitats and species more typical of rural and agricultural areas where disturbance has previously occurred. Grassy and landscaped areas are often watered, attracting a wide variety of wildlife species, particularly birds. Base structures can be attractive to bats and birds as roosting and nesting areas. Common mammal species on Davis-Monthan AFB include coyote (*Canis latrans*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), and numerous rodent species. At least 120 bird species are known to occur on Davis-Monthan AFB. The more common species include cactus wren (*Campylorhynchus brunneicapillus*), curve-billed thrasher (*Toxostoma curvirostre*), Gambel’s quail (*Callipepla gambelii*), Inca dove (*Columbina inca*), raven (*Corvus corax*) and various hawks, owls, buntings, sparrows, and warblers common to the Sonoran Desert (Davis-Monthan AFB 1998).

Common reptiles of Davis-Monthan AFB include the regal horned lizard (*Phrynosoma solare*), eastern fence lizard (*Sceleporus undulatus*), gopher snake (*Pituophis melanoleucus*) and western diamondback rattlesnake (*Crotalus atrox*) (Davis-Monthan AFB 1998).

Special-Status Species

No federally listed species are known to occur on Davis-Monthan AFB (Davis-Monthan AFB 1998).

3.8.1.2 Ranges and Airspace

Vegetation

Vegetation on the BMG and Yuma TACTS Ranges is typical of Sonoran desertscrub and semi-desert grasslands. Dominant species of the Sonoran desertscrub community include velvet mesquite, catclaw, seep willow, paloverde, creosote bush, white bursage, burrobrush, saguaro cactus, and several smaller cacti (*Opuntia* spp.). Dominant species in the semi-desert grassland include grama, three-awns, and windmill grass (USMC 1997).

Wildlife

Wildlife commonly occurring in the associated ranges and on lands underlying affected airspace are typical of the Sonoran Desert ecosystem. Common mammal species include coyote, black-tailed jackrabbit, desert cottontail, desert bighorn (*Ovis canadensis nelsoni*), collared peccary or javelina (*Pecari tajacu*), and white-nosed coati or coatimundi (*Nasua narica*). Common Sonoran bird species include cactus wren, curve-billed thrasher, Gambel's quail, Inca dove, Harris' hawk, and roadrunner (*Geococcyx californianus*). Reptiles of the Sonoran desert include the gila monster (*Heloderma suspectum*), Sonoran population of the desert tortoise (*Gopherus agassizii*), Sonoran collared lizard (*Crotaphytus nebrius*), western whiptail (*Cnemidophorus tigris*), gopher snake, and sidewinder (*Crotalus cerastes*) (USMC 1997).

Special-Status Species

There are 5 federally listed threatened and endangered species potentially occurring on the BMGR and Yuma TACTS Range or under affected airspace: 2 birds and 3 mammals (Table 3.8-2). All of these species are also considered Wildlife of Special Concern to the State of Arizona (AGFD 2001).

Table 3.8-2. Special-Status Species Potentially Occurring on Ranges and under Affected Airspace Associated with the Proposed Action

Common Name *Scientific Name*	*Status* *Fed/State*	*Airspace Unit* *Ranges and Restricted Areas*	*305 West LATN*	*Sells Low MOA*	*Jackal Low MOA*
Birds					
Cactus ferruginous pygmy-owl *Glaucidium brasilianum cactorum*	E/WSC	X	X	X	
Mexican spotted owl *Strix occidentalis lucida*	T/WSC				X
Mammals					
Lesser long-nosed bat *Leptonycteris curasoae yerbabuenae*	E/WSC	X	X	X	
Mt. Graham red squirrel *Tamiasciurus hudsonicus grahamensis*	E/WSC				X
Sonoran pronghorn *Antilocapra americana sonoriensis*	E/WSC	X			

Notes: E = Endangered, T = Threatened, WSC = Wildlife of Special Concern.
Sources: USMC 1997, AGFD 2001.

Cactus ferruginous pygmy owl

The cactus ferruginous pygmy owl (pygmy owl) was listed as endangered in Arizona in March 1997 and critical habitat was designated in July 1999. Historically it was a resident of cottonwood forests, mesquite-cottonwood woodlands, and mesquite bosques associated with the major river drainages including the Gila, Salt, Verde, San Pedro, and Santa Cruz Rivers. In addition, they were found in very dense thickets bordering dry desert washes. The common characteristic across these different habitat types is the presence of fairly dense woody thickets or woodlands, with trees and/or cacti large enough to provide nesting cavities. Currently, the pygmy owl's primary habitats are riparian deciduous forests and woodlands, mesquite bosques, Sonoran desertscrub, and semidesert and Sonoran savanna grasslands with drainages lined with mesquite. Declines in Arizona have been attributed to loss of riparian forests and woodlands. Primary prey include insects, reptiles, birds, and small mammals. The pygmy owl is considered non-migratory and can be found in Arizona throughout the year (USFWS 1999). Based on the known distribution of this species and habitats on lands underlying the affected airspace, this species may potentially occur on lands underlying Sells Low MOA and the 305 West LATN area. It is not expected to occur within the affected areas of BMGR under this proposal. There is 1 historical observation of the owl at Cabeza Prieta Tanks on the Cabeza Prieta NWR south of the BMGR. No owls were detected during owl surveys conducted on the range between 1992 and 1996 (Air Force 1999).

Mexican spotted owl

The Mexican spotted owl is 1 of 3 known subspecies of spotted owls found in the United States. The others are the northern spotted owl and the California spotted owl. The Mexican subspecies is geographically isolated from both the northern and California subspecies. Mexican spotted owls nest, roost, forage, and disperse in a diverse array of biotic communities. Nests and roosts are primarily found in closed-canopy forests or rocky canyons. Forests used for roosting and nesting often contain mature or old-growth stands with Douglas-fir the most commonly used tree species. Threats to this species are primarily due to habitat loss, alteration, and fragmentation. Mexican spotted owls consume a variety of prey throughout their range but commonly eat small and medium sized rodents such as woodrats, mice, and voles. They may also eat bats, birds, reptiles, and insects (USFS 2001). The spotted owl is known to occur only under the Jackal Low MOA in the Pinaleno Mountains (USFS 2002).

Lesser long-nosed bat

Formerly known as Sanborn's long-nosed bat (*Leptonycteris sanborni*), the lesser long-nosed bat was federally listed as endangered in 1988. Their range extends from extreme southwestern New Mexico and southeastern Arizona north to Phoenix, west to the Agua Dulce Mountains in the Cabeza Prieta NWR, and south through western Mexico. They are present in Arizona from April through October and migrate to Mexico in the winter. Long-nosed bats are nectar and pollen feeders and forage at night in areas of saguaro, agave, ocotillo, paloverde, prickly pear, and organ pipe cactus. They roost in mines and natural caves during the day. Threats to the species include loss or disturbance of roost and maternity sites and loss of agave populations (USMC 1997). No lesser long-nosed bat roosts have been documented on the BMGR within areas affected by the proposal analyzed in this EA. The closest documented occurrences are from the Cabeza Prieta NWR to the south of the BMGR (Air Force 1999).

Mt. Graham red squirrel

The Mt. Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*) is one of 25 subspecies of red squirrels found throughout North America. Red squirrels are arboreal species inhabiting boreal, mixed conifer, and deciduous forests. The Mt. Graham red squirrel is 1 of 2 subspecies found in Arizona, the southernmost portion of the species' range, and is restricted to the montane forests of the Pinaleno (Graham) Mountains of southeastern Arizona from elevations of about 7,800 ft to 11,000 ft. The subspecies was added to the federal endangered species list in 1987. Their diet consists primarily of conifer seeds with mushrooms, pollen, and buds added seasonally. Mt/ Graham red squirrels are known to occur only under Jackal Low MOA airspace.

Sonoran pronghorn

Listed by the USFWS as endangered in 1967, the Sonoran pronghorn (*Antilocapra americana sonoriensis*) is 1 of 5 recognized subspecies of pronghorn antelope found in North America. The historic distribution of the Sonoran pronghorn is not definitively known because the population and range of the species had already suffered significant declines before it was described as a subspecies in 1945. The decline was the result of a number of factors, primarily relating to the loss, degradation, or fragmentation of habitat. Causes of this fragmentation include farming, irrigation, grazing practices, development of towns, loss of riparian corridors (particularly those associated with the Gila River and Rio Sonoyta), development of surface transportation systems (i.e., highways and roads) and utilities (USMC 2001). The present distribution of the Sonoran pronghorn is south of the Gila River, east of the Copper and Cabeza Prieta Mountains, west of Highway 85, and extending south into Sonora, Mexico (Figure 3.8-1). Although this area encompasses portions of the BMGR and Yuma TACTS Range, the Sonoran pronghorn is not known to occur under any airspace unit or on any range proposed for use under the Proposed Action analyzed in this EA (compare Figures 3.1-1 and 3.8-1).

3.8.2 EDWARDS AFB, RANGES, AND AIRSPACE

3.8.2.1 Edwards AFB

Vegetation

Edwards AFB comprises approximately 301,000 acres in the Antelope Valley in western Mojave Desert of Southern California. Over 85 percent of the base is considered undeveloped. The undeveloped portions of Edwards AFB are typically described in terms of 5 major zonal habitats: creosote bush scrub, Joshua tree woodland, arid-phase saltbush scrub, halophytic-phase saltbush scrub, and lakebeds/playas/claypans/dunes. In addition, a number of azonal or isolated habitats are found on base. These azonal habitats are those natural and human-influenced plant and wildlife associations that are not restricted by elevation, but by other factors such as the presence of water or human disturbance (Edwards AFB 2001a).

The developed or cantonment area of Edwards AFB contains habitats typically found in urbanized desert landscapes of Southern California and is dominated by nonnative plantings of eucalyptus (*Eucalyptus* spp.), pine (*Pinus* spp.), and other landscaping ornamentals (Edwards AFB 2001a).

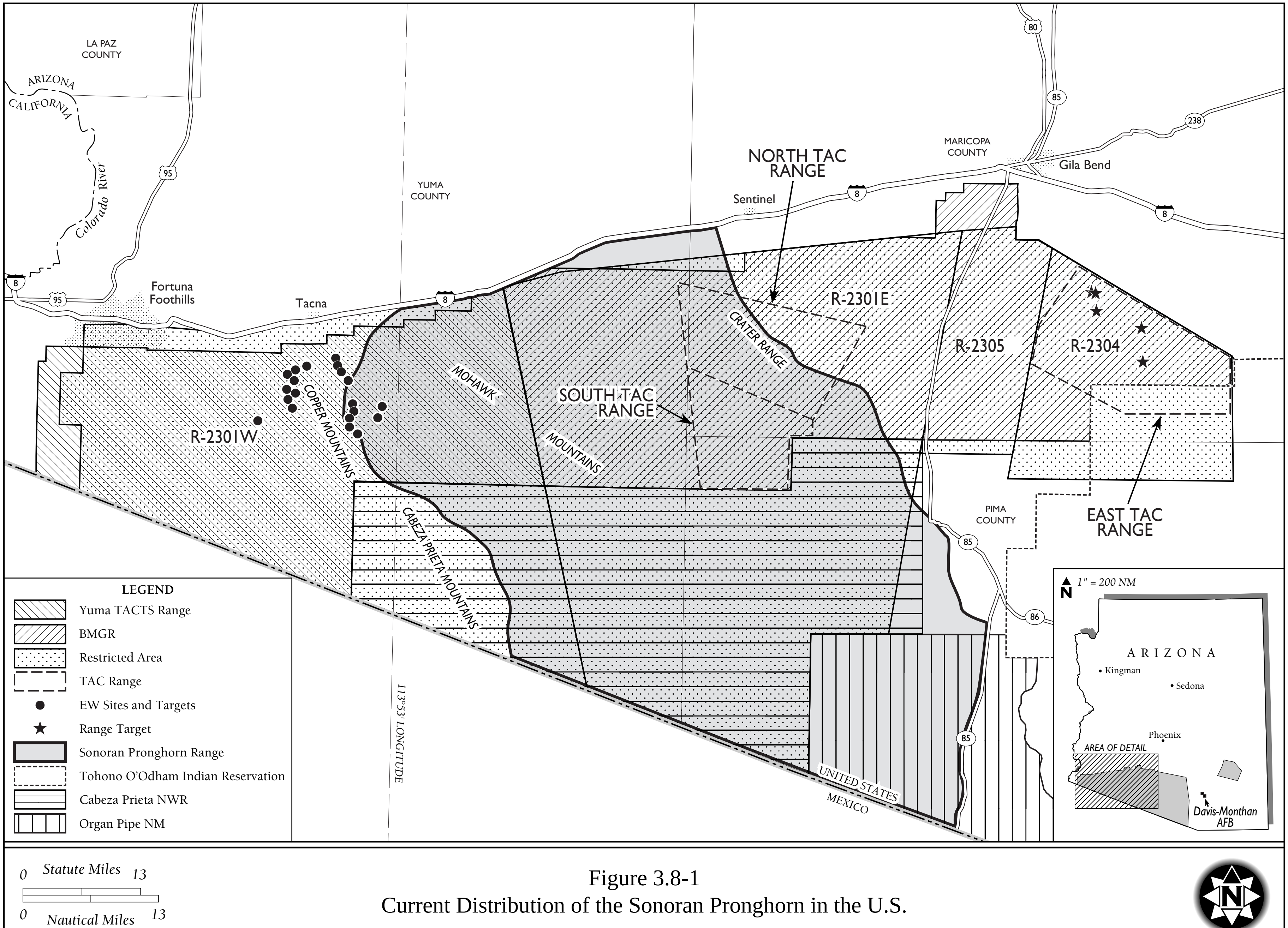


Figure 3.8-1
Current Distribution of the Sonoran Pronghorn in the U.S.

Wildlife

Common mammals on Edwards AFB include the black-tailed jackrabbit, desert cottontail, coyote, deer mouse (*Peromyscus maniculatus*), Merriam's kangaroo rat (*Dipodymys merriami*), western pipistrelle (*Pipistrellus hesperus*), little brown bat (*Myotis lucifugus*), and desert woodrat (*Neotoma lepida*). Common and widespread birds of Edwards AFB include the turkey vulture (*Cathartes aura*), common raven, sage sparrow (*Amphispiza belli*), cactus wren, and ladder-backed woodpecker (*Picoides scalaris*). Amphibians found on base include western toad (*Bufo boreas*), Pacific tree frog (*Hyla regilla*), red-spotted toad (*Bufo punctatus*), and the non-native African clawed frog (*Xenopus laevis*). Reptiles common to most habitats on base include the desert spiny lizard (*Sceloporus magister*), side-blotched lizard (*Uta stansburiana*), western whiptail, zebra-tailed lizard (*Callisaurus draconoides*), glossy snake (*Arizona elegans*), coachwhip (*Masticophis flagellum*), gopher snake, and Mojave green rattlesnake (*Crotalus scutulatus*) (Edwards AFB 2001a).

Special-Status Species

Four federally or state-listed special-status species potentially occur on Edwards AFB: 1 reptile, 2 birds, and 1 mammal (Table 3.8-3). In addition, the golden eagle (*Aquila chrysaetos*), which is protected by the federal Bald and Golden Eagle Protection Act, is a common resident of Edwards AFB (Edwards AFB 2001a).

The federally and state-listed threatened desert tortoise (*Gopherus agassizii*) is an herbivorous reptile whose native range includes the Sonoran and Mojave Deserts of southern California, southern Nevada, Arizona, extreme southwestern Utah, and Sonora and northern Sinaloa, Mexico. In 1994, the USFWS designated approximately 61,000 acres of the eastern and southeastern portions of Edwards AFB as desert tortoise critical habitat (USFWS 1996). The desert tortoise or its critical habitat does not occur within the proposed project area at North Base.

Table 3.8-3. Special-Status Species Occurring on Edwards AFB, California

Common Name/Scientific Name	*Status* *Fed/State*
Desert tortoise/*Gopherus agassizii*	T/T
Bald eagle/*Haliaeetus leucocephalus*	T, BGEPA/E
Golden eagle/*Aquila chrysaetos*	BGEPA/SOC
Peregrine falcon/*Falco peregrinus*	- /E
Mojave ground squirrel/*Spermophilus mohavensis*	- /T

Notes: BGEPA = Bald and Golden Eagle Protection Act, E = Endangered, SOC = Species of Concern, T = Threatened.
Source: Edwards AFB 2001a.

Due to the absence of significant water bodies on Edwards AFB, the bald eagle (*Haliaeetus leucocephalus*) is considered a rare transient and has been rarely observed. The golden eagle (*Aquila chrysaetos*) is known to forage on base in winter and potentially nests in the rocky ridges in the northern portions of the base. The peregrine falcon (*Falco peregrinus*) is considered an uncommon transient and is not known to nest on base.

The state-listed threatened Mojave ground squirrel (*Spermophilus mohavensis*) occurs in desert scrub habitat and populations are known from north and south of Rogers Dry Lake and the eastern portions of Edwards AFB. It does not occur within the proposed project area at North Base (Edwards AFB 2001a).

3.8.2.2 Ranges and Airspace

Vegetation

The ranges associated with this alternative are predominantly located in and over the Mojave Desert. Characteristic vegetation of the Mojave Desert includes creosote brush, cholla *(Opuntia* spp.*)*, Mohave yucca *(Yucca schidigera*), and Mohave aster *(Xylorhiza tortifolia).*

Wildlife

The ranges and airspaces associated with this alternative are predominantly located in and over the Mojave Desert. Characteristic wildlife species include coyote, black-tailed jack rabbit, kangaroo rat (*Dipodomys* spp.), red-tailed hawk (*Buteo jamaicensis*), turkey vulture, sage sparrow, common raven, desert spiny lizard, side-blotched lizard, western whiptail, gopher snake, and Mojave green rattlesnake.

Special-Status Species

A total of 11 special-status wildlife species potentially occur on ranges and beneath affected airspace associated with the Edwards AFB Alternative: 8 birds and 3 mammals (Table 3.8-4). All bird species with the exception of the golden eagle and Swainson's hawk are expected to occur within riparian or lacustrine areas under the affected airspace. The Inyo California towhee and its designated critical habitat occurs only in the northeastern portion of R-2505 within riparian habitats. The golden eagle and Swainson's hawk would be expected to occur throughout affected airspace. All the mammals are restricted to the Sierra Nevada Mountains underlying Owens A MOA.

Table 3.8-4. Special-Status Species Potentially Occurring on Ranges and under Affected Airspace Associated with Alternative A

Common Name *Scientific Name*	*Status* *Fed/State*	*Owens* *MOAs*	*Isabella* *MOAs*	*Restricted Area* *2505*	*2508*	*2502*	*2524*	*2506*	*2515*
Birds									
Bald eagle *Haliaeetus leucocephalus*	T/E					X	X		X
Bank swallow *Riparia riparia*	- /T	X		X	X				
Golden eagle *Aquila chrysaetos*	BGEPA/SOC		X	X		X	X	X	X
Inyo California towhee *Pipilo crissalis eremophilus*	T/E			X					
Least Bell's vireo *Vireo bellii pusillus*	E/E	X		X	X	X	X		X
Southwestern willow flycatcher *Empidonax traillii extimus*	E/ -		X	X	X	X	X	X	X
Swainson's hawk *Buteo swainsoni*	- /T	X	X	X	X	X	X	X	X
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	- /E	X	X	X	X			X	X
Mammals									
California bighorn sheep *Ovis canadensis californiana*	SOC/T	X	X	X	X				
California wolverine *Gulo gulo luteus*	SOC/T	X	X	X	X			X	X
Sierra Nevada red fox *Vulpes vulpes necator*	SOC/E	X	X	X					

Notes: BGEPA = Bald and Golden Eagle Protection Act, E = Endangered, SOC = Species of Concern, T = Threatened.
Source: CDFG 1999.

3.8.3 VANDENBERG AFB, RANGES, AND AIRSPACE

3.8.3.1 Vandenberg AFB

Vegetation

Developed areas of Vandenberg AFB are surrounded by a mixture of vegetation types, including chaparral, grassland, coastal sage scrub, and exotic vegetation. Within the cantonment area of the base, exotic vegetation is the dominant plant community. Lawns, a golf course, and other small landscaped areas are dominated by introduced coniferous and broadleaf trees [including Monterey pine (*Pinus radiata*) and eucalyptus, lawn grasses, shrubs, and vines (Vandenberg AFB 1996).

Native vegetation around the cantonment area includes chaparral, a dense, evergreen form of shrubby native vegetation dominated by manzanitas (*Arctostaphylos* spp.), interior live oak (*Quercus wislizenii*), California lilacs (*Ceanothus* spp.), and chamise (*Adenostoma fasciculatum*). Nonnative grasslands are also found around the cantonment area and are dominated by bromes (*Bromus* spp.), wild oats (*Avena* spp.), wall barley (*Hordeum murinum*), ryegrass (*Elymus* spp.), and fescues (*Vulpia* spp.) (Vandenberg AFB 1996).

Wildlife

The cantonment area of Vandenberg AFB supports a low diversity of wildlife species. Common mammal species found in habitats surrounding the cantonment area include coyote, desert cottontail, common opossum (*Didelphis marsupialis*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), deer mouse, and California ground squirrel (*Spermophilus beecheyi*). Common birds include red-winged blackbird (*Agelaius phoeniceus*), American crow (*Corvus brachyrhynchos*), European starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), house finch (*Carpodacus mexicanus*), and red-tailed hawk. Monarch butterfly (*Danaus plexippus*) roosting sites as well as great blue heron (*Ardea herodias*) and raptor nests may be present in eucalyptus trees (Vandenberg AFB 1996).

Special-Status Species

Although Vandenberg AFB supports 13 federally listed and 1 proposed threatened species (5 birds, 1 amphibian, 3 fish, and 3 plants), only 4 bird species potentially occur within the ROI of the proposed project (i.e., either in the vicinity of proposed construction projects at the airfield or underlying airfield approach/departure corridors) (Table 3.8-5). Only 1 of these species is known to occur in the vicinity of the project area, near the airfield, the federally proposed threatened mountain plover (*Charadrius montanus*). The mountain plover is known to winter at Vandenberg AFB in small numbers. The other 3 species are found predominantly along coastal beach areas of the base (Vandenberg AFB 1996).

Table 3.8-5. Special-Status Species Occurring within the ROI, Vandenberg AFB, California

Common Name/Scientific Name	*Status* *Fed/State*
California brown pelican/*Pelecanus occidentalis californicus*	E/E
California least tern/*Sterna antillarum browni*	E/E
Mountain plover/*Charadrius montanus*	PT/SOC
Western snowy plover/*Charadrius alexandrinus nivosus*	T/SOC

Notes: *Notes*: E = Endangered, PT = Proposed Threatened, R = Rare, SOC = Species of Concern.
Source: Vandenberg AFB 1996, CDFG 2001.

3.8.3.2 Ranges and Airspace

Vegetation

Fort Hunter Liggett is located in a region of California with a high diversity of plant communities. Plant communities on the range include grasslands dominated by exotic species including various brome species, wild oats, and fescue. The oak woodland plant community on Fort Hunter Liggett is characterized by valley oak (*Quercus lobata*), blue oak (*Q. douglasii*) and coast live oak (*Q. agrifolia*). The chaparral, community is dominated by evergreen shrubs and dwarf trees such as chamise, manzanita, and leather oak (*Q. durata*). Riparian plant communities on Fort Hunter Liggett include sycamore (*Platanus racemosa*), cottonwood (*Populus fremontii*) and various species of willow (*Salix* spp.). Developed areas on the range include lawn grasses and various exotic shrubs (U. S. Army Reserve 2001).

Wildlife

Although much of the natural habitat beneath affected airspace has been converted to agricultural lands, these lands still provide important feeding and resting areas for both migratory and resident waterfowl. Common mammals found in this area are primarily ruderal species (found in disturbed areas), including mule deer, coyote, ground squirrel (*Spermophilus* spp.), desert cottontail, black-tailed jackrabbit, and kangaroo rat. Additional common wildlife in this area include various waterfowl, Passerine birds, tree frogs, toads, salamanders, snakes and lizards associated with agricultural lands on the western edge of California's San Joaquin Valley (USDA 2001). For a discussion of biological resources associated with China Lake RC Range and associated Restricted Area, refer to Section 3.8.2.2.

Common mammals on Fort Hunter Liggett include mule deer (*Odocoileus hemionus*), coyote, feral pig (*Sus scrofa domestica*), raccoon, and Western gray squirrel (*Sciurus griseus*). Common birds include California quail (*Callipepla californica*), red-tailed hawk, mourning dove (*Zenaida macroura*), and brown-headed cowbird (*Molothrus ater*) (U. S. Army Reserve 2001).

Special-Status Species

A total of 7 special-status wildlife species potentially occur on ranges and beneath affected airspace associated with the Vandenberg AFB Alternative: 9 birds and 1 mammal (Table 3.8-6). Two bird species are not listed federally but are listed by the State of California (U. S. Army Reserve 2001).

The special-status bird species potentially occurring under affected AR tracks and MOAs are all associated with riparian or coastal areas. Although there have been only 2 known occurrences of least Bell's vireos at Fort Hunter Liggett, breeding populations are found at the Salinas River east of Fort Hunter Liggett and suitable riparian habitat occurs on the installation. Peregrine falcons only occur at Fort Hunter Liggett as transitory or wintering migrants. They are known to nest throughout the region in suitable cliff areas, especially along the Pacific Coast.

Table 3.8-6. Special-Status Species Potentially Occurring on Ranges and under Affected Airspace Associated with Alternative B

Common Name *Scientific Name*	<u>*Status*</u> *Fed/State*	*AR-243V*	*AR-242V*	*Hunter Low MOAs*	*Ft. Hunter Liggett Range/Restricted Area*
Bald eagle *Haliaeetus leucocephalus*	T/E				X
California black rail *Laterallus jamaicensis coturniculus*	SOC/T			X	
California brown pelican *Pelecanus occidentalis californicus*	E/E			X	
California clapper rail *Rallus longirostris obsoletus*	E/E			X	
California least tern *Sterna antillarum browni*	E/E			X	
Least Bell's vireo *Vireo bellii pusillus* (nesting)	E/E			X	X
Peregrine falcon *Falco peregrinus*	- /E			X	X
Western snowy plover *Charadrius alexandrinus nivosus*	T/SOC			X	
San Joaquin kit fox *Vulpes macrotis mutica*	E/T	X	X	X	X

Notes: E = Endangered, SOC = Species of Concern, T = Threatened.
Source: CDFG 1999, Fort Hunter Liggett 2002.

Bald Eagle

Bald eagles are usually associated with rivers, reservoirs, lakes, and coastal areas where they feed primarily on fish. They nest in large, open trees along shorelines in remote areas free of disturbance. Bald eagles also congregate at specific wintering areas that are close to water and offer perch trees and night roost sites. The bald eagle is currently under review by the USFWS for possible delisting.

In the vicinity of Fort Hunter Liggett and under the associated airspace, bald eagles are primarily found associated with the San Antonio and Nacimiento Reservoirs. There are 10-12 reservoirs on Fort Hunter Liggett that offer suitable bald eagle foraging areas. A total of 5 nests are in the San Antonio-Nacimiento area including 1 nest on Fort Hunter Liggett. Areas used by bald eagles at Fort Hunter Liggett are located primarily in the central and northeastern portions of the installation. Small groups of wintering bald eagles may occur at Fort Hunter Liggett and under affected airspace from November through March, primarily along the San Antonio and Nacimiento Rivers as well as the large ponds and reservoirs throughout the area. Fort Hunter Liggett currently has a bald eagle management plan (U.S. Department of the Army 1995, Fort Hunter Liggett 2002).

San Joaquin Kit Fox

San Joaquin kit foxes inhabit California's Central Valley and valleys of the interior coastal ranges. They use subterranean dens throughout the year and feed primarily on California ground squirrels. Although population densities are extremely low, kit foxes are found primarily in the northern portions of Fort Hunter Liggett, away from active firing ranges. As part of Fort Hunter Liggett's San Joaquin kit fox management plan, a kit fox management area was established in which activities that have the potential to disturb kit foxes are prohibited (U.S. Department of the Army 1995, Fort Hunter Liggett 2002).

3.9 MARINE BIOLOGICAL RESOURCES

The purpose of this section is to describe the marine environment and marine biological resources associated with the WTA. This section is comprised of three major subsections: 1) characterization of the marine environment; 2) invertebrates, fish, and sea turtles; and 3) marine mammals. The description of marine biological resources is based on a review of the available scientific literature.

3.9.1 MARINE ENVIRONMENT

The marine environment can be described in terms of physical and chemical marine water characteristics, including physical oceanography and marine sediments and bathymetry. A general description of the marine environment in the WTA is provided in this section. The WTA encompasses approximately 25 square miles (17 square NM) of the Pacific Ocean extending from 3 to 7 NM offshore of San Diego (Figure 3.9-1). The WTA is located within the Southern California Bight (SCB), the ocean area that extends south from Point Conception to the U.S. – Mexican border.

3.9.1.1 Oceanographic Conditions

Currents

The California Current is the dominant hydrographic feature along the California coast, including the WTA. This current controls the general water characteristics and circulation of the area. The California Current originates in colder northern waters and flows southward along the west coast of North America. On the coast of southern California, the current is part of the large semi-permanent southern California eddy.

The waters of coastal California follow a distinct seasonal pattern. From December to February, the California Current migrates offshore in a westerly direction, and the southern California eddy is weak. From March to June, along-shore winds strengthen and drive surface waters offshore. From July to November, the southward flowing California Current dominates the nearshore current patterns and the southern California eddy is well developed (Hickey 1993).

Depth

The ocean floor off San Diego has a complex bathymetry and does not have a continuously deepening slope from shore to the San Diego Trough, a 3,600-ft deep sea basin located approximately 25 miles offshore. Instead, a portion of the intervening ocean floor rises 390 ft to form the Coronado Bank. On the western side of the Coronado Bank, the Coronado Escarpment descends steeply into the San Diego Trough (U.S. Department of Commerce 1980).

Temperature and Salinity

Surface water temperatures along the southern coast of California can show seasonal variation in association with upwelling, climatic conditions, and latitude. Surface water temperatures in this area normally range between 54 ºF in the winter to 70 ºF in the summer (Dailey et al. 1993).

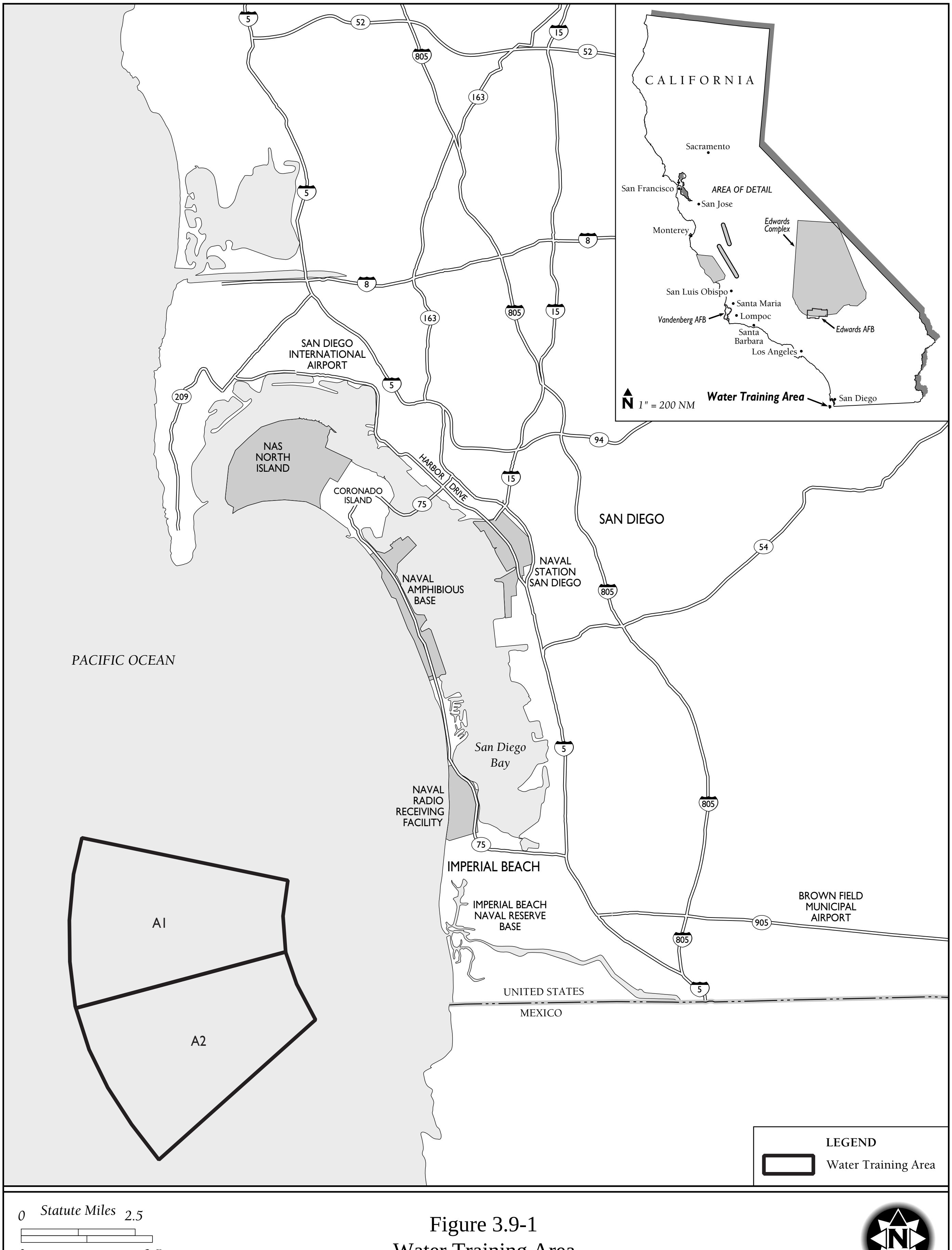


Figure 3.9-1
Water Training Area

Salinity levels in the WTA are relatively constant with slight seasonal variations. Variations in salinity measurements are generally small, ranging between 32.9 and 34.5 parts per thousands (ppt). Minimum and maximum salinities typically occur in December and May, respectively (Allan Hancock Foundation 1965).

Water Quality

The State Water Resources Control Board (SWRCB) adopted the Water Quality Control Plan for ocean waters of California in 1974; amendments were made to the plan in 1988, 1990, and 1997 (SWRCB and California EPA 1997). Ocean water quality is generally high, and meets criteria set forth by the Ocean Plan and/or National Ambient Water Quality Criteria (NAWQC) (USEPA 1986). The amended plan (The Ocean Plan) establishes beneficial uses and water quality objectives for waters of the Pacific Ocean adjacent to the California coast outside of enclosed bays, estuaries, and coastal lagoons.

The Ocean Plan, in 1972, established the concept of Areas of Special Biological Significance (ASBS) to preserve the natural water quality conditions of certain valuable or fragile biological communities (Chapter III. D. 2., V. B., and VI. E.). In 1974 and 1975, the State Water Board designated 34 ASBS's along the California coast and island shores, ranging from the Redwood National Park, Del Norte County, in the north, to La Jolla, San Diego County, in the south. There are 2 ASBSs in the San Diego area, the San Diego-La Jolla Ecological Reserve and the San Diego Marine Life Refuge (SWRCB 1992). Both areas are located approximately 25 miles to the north of the WTA.

3.9.1.2 Marine Flora

Marine plants within the WTA range in size from microscopic one-celled organisms living in bottom sediments or drifting with currents, to large, canopy-forming kelps. The majority of marine plants exist in the photic zone of the ocean (the area where light penetrates the water). In general, proportionally fewer marine plants are found at greater depths or distances from land.

Approximately 280 species of phytoplankton and 670 species of macroalgae are known to occur in California waters (Abbott and Hollenberg 1976). The mixing of waters from northern and southern currents influences the species diversity and abundance of small planktonic organisms in the WTA. Plankton productivity is generally highest during the summer (July to September) and lowest during the winter months (October to December) (USEPA 1988a, b). Due to the water depth and bottom characteristics of the WTA, there are no kelp forest ecosystems within the WTA.

3.9.2 INVERTEBRATES, FISH, AND SEA TURTLES

3.9.2.1 Invertebrates

Benthic, or bottom dwelling, organisms are separated into 2 groups based on where they reside. Infauna are organisms such as worms, mollusks, and crustaceans that live buried in ocean sediments. Epifauna are organisms that live and move over the surface of the ocean bottom. Many species occupy the bottom sediments of the Pacific coast; however, polychaete worms and bivalve molluscs are the most common benthic species in sandy sediments. Common epifauna include echinoderms (e.g., starfish) and crustaceans (e.g., crabs and lobster).

Several clam species are common or abundant on the nearshore continental shelf of the WTA. Abundant clams include species of the genera *Tellina*, *Macoma*, and *Spisula*. Assemblages on the shallower portions of the shelf are frequently dominated by sand dollars and tubicolous polychaetes of the genera *Diopatra*, *Nothria*, *Onuphis*, *Owenia*, and *Pista*. In mid-depth portions of the shelf, patches of the geoduck (*Panopea generosa*) are common. In deeper portions of the shelf, deposit feeders are more common. These include tubicolous polychaetes such as maldanids, the burrowing echiuroid (*Listriolobus pelodes*), sea cucumbers, and several species of small deposit-feeding bivalves. The small clam (*Cardita ventricosa*) is one of the more common clams in deeper portions of the shelf (Jones 1969). In addition, numerous predatory and opportunistic invertebrates (i.e., scavengers) are common in these assemblages (e.g., various crabs, hermit crabs, starfish, and snails).

3.9.2.2 Fish

About 480 species of fish inhabit the SCB (Cross and Allen 1993). The entire WTA is within the extreme southern end of the SCB. The great diversity of species in the area occurs for several reasons: (1) the ranges of many temperate and tropical species extend into and terminate in the SCB; (2) the complex bottom topography and complex physical oceanographic regime includes several water masses and a changeable marine climate; and (3) the islands and nearshore areas provide a diversity of habitats that include soft bottom; rock reefs; extensive kelp beds; and estuaries, bays, and lagoons (Horn and Allen 1978, Cross and Allen 1993).

Point Conception is recognized as a boundary for certain fish species. South of Point Conception, northern species tend to move into deep, colder water or upwelling areas. There are also seasonal migrations of temperate and subtropical species into the SCB and invasions of tropical species during warm water years and northern species during cold water years (Cross and Allen 1993).

The most abundant commercially fished species in the SCB are Pacific sardine (*Sardinops sagax caeraleus*), Pacific mackerel (*Scomber japonicus*), jackmackerel (*Trachurus symmetricus*), skipjack tuna (*Katsuwonus pelamis*), northern anchovy (*Engraulis mordax*), Pacific bonito (*Sardo chiliensis*), thresher shark (*Alopias volpinus*), Dover sole (*Microstomus pacificus*), California halibut (*Paralichthys californicus*), and rockfish (*Sebastes* spp.).

The southern California Evolutionary Significant Unit (ESU) of westcoast steelhead (*Oncorhynchus mykiss*) has been listed by the USFWS as endangered (USFWS 1996a) (Table 3.9-1). An ESU is a population of a species that is reproductively isolated from other populations of the same species and is an important component in the evolutionary history of the species. Westcoast steelhead ESU populations have been designated north of the WTA (north of Los Angeles). Although steelhead are a migratory species that return to their natal stream, they typically spend 2-3 years in marine waters and there is a possibility that steelhead occasionally enter the WTA.

Table 3.9-1. Special-Status Species Potentially Occurring within the WTA

Common Name (Scientific Name)	*Federal Status*
Fish	
Westcoast steelhead (*Oncorhynchus mykiss*)	Endangered
Reptiles	
Green turtle (*Chelonia mydas*)	Threatened
Leatherback turtle (*Dermochelys coriacea*)	Endangered
Loggerhead turtle (*Caretta caretta*)	Threatened

Essential Fish Habitat. Recognizing the importance of fish habitat to the productivity and sustainability of U.S. marine fisheries, in 1996 Congress added new habitat conservation provisions to the Magnuson-Stevens Fishery Conservation and Management Act, the federal law that governs U.S. marine fisheries management. The re-named Magnuson-Stevens Act mandated the identification of Essential Fish Habitat (EFH) for managed species as well as measures to conserve and enhance the habitat necessary to fish to carry out their life cycles. The Magnuson-Stevens Act requires cooperation among fishing participants, various federal and state agencies, and others in achieving EFH protection, conservation, and enhancement.

The WTA is located within 2 designated EFH zones established to protect coastal pelagic and groundfish species. Both the Coastal Pelagic and Groundfish EFH zones extend from the coastline out to 200 miles offshore and cover the entire west coast of the U.S. from the Mexican to the Canadian border, including the WTA. The National Marine Fisheries Service (NMFS) and the Pacific Fishery Management Council have developed Fishery Management Plans to manage the fisheries and address fish habitat issues (NMFS 1999).

3.9.2.3 Sea Turtles

Four species of sea turtles found in southern California waters are currently listed as either endangered or threatened under the ESA of 1973 as amended (NMFS and USFWS 1995) (see Table 3.9-1). These include loggerhead (*Caretta caretta*), leatherback (*Dermochelys coriacea*), eastern Pacific green (*Chelonia mydas*), and olive ridley (*Lepidochelys olivacea*). However, none of these species are known to nest on beaches in southern California.

Few specific data are available on the use of the SCB by sea turtles, and no data are available on actual numbers of turtles occurring there. Sea turtles may be encountered year-round in the SCB with the highest concentrations during the warmer summer months (July-September) and during abnormally warm water years (e.g., El Niño years). Only 3 species are likely to be encountered in the SCB and WTA: juvenile loggerhead, leatherback, and green. Olive ridley turtles are present but rarely encountered north of Baja California, Mexico (NMFS and USFWS 1998a).

Although the green sea turtle is the most commonly sighted hard-shelled sea turtle along the U.S. Pacific coast, it is still uncommon and sightings are probably vagrants from, or migrants to, breeding areas in Baja California, Mexico (NMFS and USFWS 1998b). The northernmost reported resident population of green turtles occurs in San Diego Bay, where about 50-60 mature and immature turtles congregate in the warm water effluent discharged by a power plant (McDonald et al. 1994). These turtles appear to have originated from east Pacific nesting beaches and the Revillagigedo Islands (west of Baja California), based on morphology, genetics, and tagging data; however, the possibility exists that some are from Hawaii.

Most sightings of loggerheads are of juveniles which have moved into southern California waters while visiting important foraging areas off the coast of Baja California; adults are rarely seen (NMFS and USFWS 1998c). The leatherback is commonly sighted along the west coast of the U.S. as it disperses from breeding grounds in the eastern (e.g., Mexico and Costa Rica) and western (e.g., Indonesia) Pacific (NMFS and USFWS 1998d). In general, green and olive ridley turtles occupy shallow, nearshore zones and leatherbacks and juvenile loggerheads may be found over all water depths.

A rough index of abundance and occurrence can be inferred based on sea turtle stranding records from Southern California. From 1992 to 2001, 72 sea turtles comprising 4 species were found stranded along the 4 Southern California counties: San Diego, Orange, Los Angeles, and Ventura (Table 3.9-2); or an average of approximately 7 sea turtle strandings per year. The majority of these (49 percent) were green sea turtles and most found along the coast of San Diego County. The second most common stranded species (26 percent) was the loggerhead and it was found stranded primarily along Orange County. Although the cause of death or stranding was not readily discernible for the majority of the strandings (38, or 53 percent), 22 (31 percent) of the strandings involved sea turtles becoming trapped in power plant intakes. An additional 6 sea turtles (1 percent) showed signs of potential boat collisions. Marine debris entanglement accounted for only 3 strandings and based on the necropsies of only 3 turtles, 1 was found to have a blocked intestine resulting from the ingestion of marine debris (plastic, wood, and paper) (NMFS 2002).

Fifty percent (36) of the total sea turtle strandings reported for Southern California from 1992-2001 were from San Diego County and were comprised primarily of greens. For San Diego County, 19 of the reported 24 green sea turtle strandings were the result of entrainment in power plant intakes. The remaining 5 strandings were attributable to boat collisions (3), unknown causes, and marine debris ingestion. Of the 11 loggerhead and leatherback strandings along San Diego County, 4 were attributable to entrainment in power plant intakes and the remaining were unknown.

Table 3.9-2. Sea Turtle Strandings along Southern California Counties (1992-2001)

		Year										*Totals*	
Species	*County*	*92*	*93*	*94*	*95*	*96*	*97*	*98*	*99*	*00*	*01*	*County*	*Species*
Green	San Diego	9		2	1	3	1	1	2	4	1	24	35
	Orange			1	2		1			1		5	
	Los Angeles					1	2			1	1	5	
	Ventura							1				1	
Loggerhead	San Diego		1			1	1	2				5	19
	Orange	1	3	1			1			1	3	10	
	Los Angeles				1	1		1				3	
	Ventura	1										1	
Leatherback	San Diego		1	1					3		1	6	10
	Orange		1									1	
	Los Angeles									1	1	2	
	Ventura				1							1	
Olive ridley	San Diego										1	1	6
	Orange	1								2		3	
	Los Angeles		1							1		2	
	Ventura												
Unknown	San Diego												2
	Orange									1		1	
	Los Angeles						1					1	
	Ventura												
		12	7	5	5	6	7	5	5	12	8	72	

Source: NMFS 2002.

3.9.3 MARINE MAMMALS

Marine mammals include a diverse assemblage of animals uniquely adapted for life in the sea. Cetaceans (whales, dolphins, and porpoises) are commonly divided into two groups: those with teeth for grasping prey (odontocetes) and those that use baleen to filter prey from sea water (mysticetes). Pinnipeds (seals, sea lions, and walruses) are somewhat less marine-adapted in that they routinely haul out on land to breed and molt. Mustelids (sea otters), sirenians (manatees and dugongs), and ursids (polar bears) complete the list of mammals that have adapted to the marine environment. All marine mammals are protected under the Marine Mammal Protection Act, and some are further protected by the Endangered Species Act.

Marine mammals are abundant in waters offshore of the U.S. west coast, with a strong seasonal occurrence for some species (Barlow 1995, Forney et al. 1995). Continental slope and shelf waters are modified by upwelling each winter and spring, followed by a period of relatively warm stratified conditions during summer and autumn. While the occurrence and migrations of some mysticete species are comparatively well documented (e.g., blue and gray whales), abundance and distribution patterns are not well described for most odontocete species.

NMFS provides a comprehensive assessment of all marine mammal populations of the U.S. west coast and furnishes descriptions of their geographic range and estimates of abundance for each stock (Forney et al. 2000). In addition, Barlow (1997) updated abundance estimates for waters to 300 NM offshore of California, Oregon, and Washington, based upon a large-scale ship survey conducted during the summer-autumn of 1996. The following description of marine mammal abundance and distribution for the WTA location relies on information contained in these documents, augmented by additional references as required.

Although more than 30 cetacean species and 6 pinniped species are known to occur in the SCB, few of these are expected to be common in the nearshore region of the WTA (Table 3.9-3). The odontocete species most likely to be encountered close to shore is bottlenose dolphin (*Tursiops truncatus).* Short-beaked common dolphin (*Delphinus delphis*) is the most ubiquitous odontocete in southern California waters, and may occur in the proposed project area. Long-beaked common dolphin (*Delphinus capensis*) may also be found in the area. While common in the SCB before the El Niño of 1982, short-finned pilot whale (*Globicephala macrorhynchus*) is now sighted only occasionally, and is not expected to be common near the WTA. Risso's dolphin (*Grampus griseus*), northern right whale dolphin (*Lissodelphis borealis*), Pacific white-sided dolphin (*Lagenorynchus obliquidens*), Dall's porpoise (*Phocoenoides dalli*) and Orca (*Orcinas orca*) are all considered uncommon visitors, due to their apparent preference for waters further offshore.

Among the mysticetes, the gray whale (*Eschrichtius robustus*) is expected to be common in the WTA during its southward and northward migrations in winter and spring, respectively (Figure 3.9-2). The federally endangered humpback whale (*Megaptera novaeangliae*) is occasionally sighted in fall and summer in the SCB and may be encountered seasonally in the WTA. Minke whale (*Balaenoptera acutorostrata*) is an uncommon visitor to the SCB throughout the year (Koski et. al. 1998, Forney et. al. 2000).

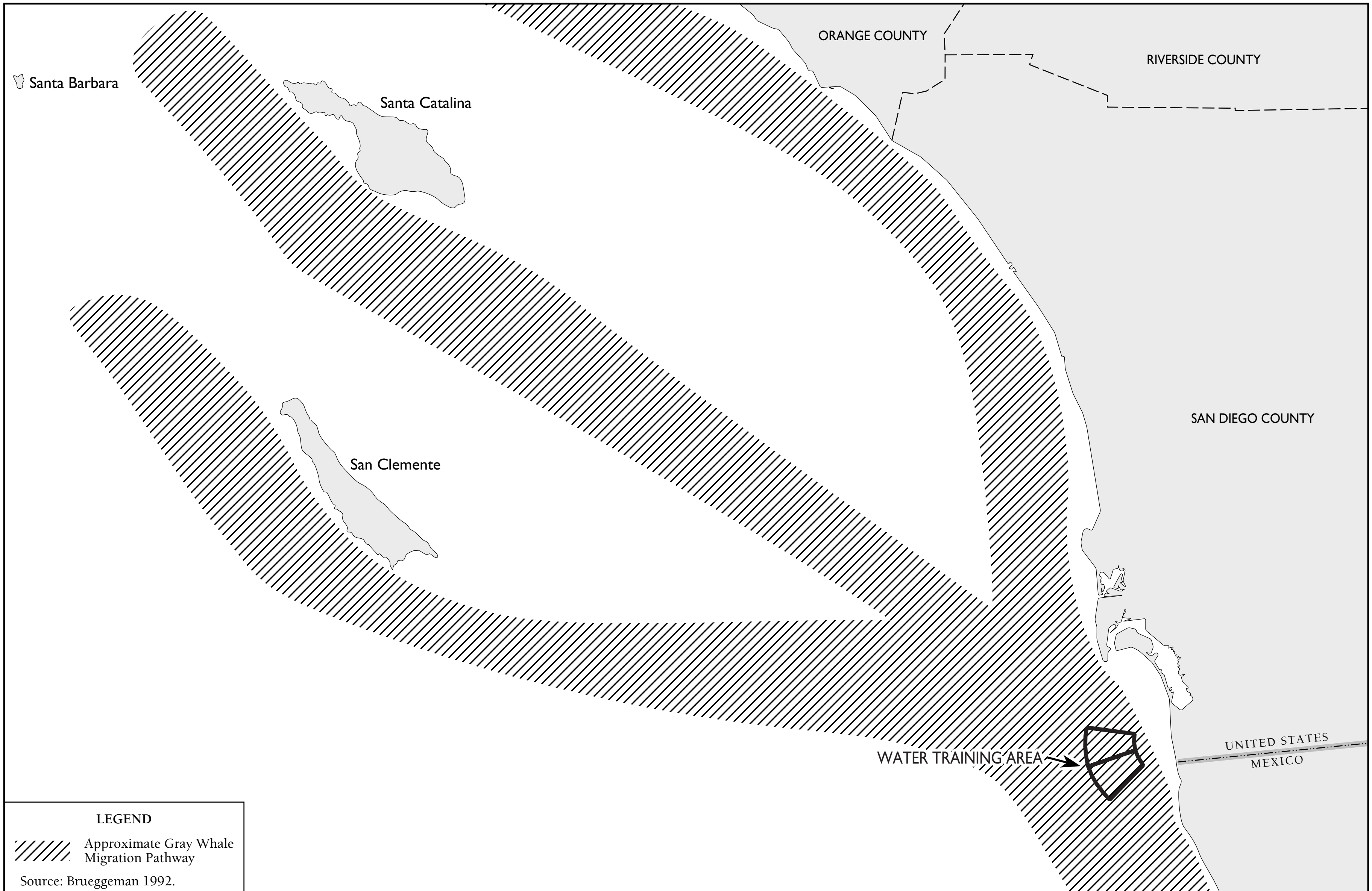
Two species of pinniped can be found in the area: harbor seals (*Phoca vitulina*) and California sea lion *(Zalophus californianus).* Although both species are regularly sighted in the area, their presence and abundance vary significantly from season to season. When not involved in pupping, mating, or molting activities, pinnipeds spend the majority of time at sea, occasionally hauling out on rocks or beaches (Reeves et al. 1992).

Table 3.9-3. Marine Mammals Potentially Occurring within the WTA

Common Name (Scientific Name)	*Federal Status*
Pinnipeds	
California sea lion (*Zalophus californianus*)	MMPA
Harbor seal (*Phoca vitulina*)	MMPA
Cetaceans	
Blue whale (*Balaenoptra musculus*)	E, MMPA
Bottlenose dolphin (*Tursiops truncatus*)	MMPA
Dall's porpoise (*Phocoenoides dalli*)	MMPA
Fin whale (*Balaenoptra physalus*)	E, MMPA
Gray whale (*Eschrichtius robustus*)	MMPA
Humpback whale (*Megaptera novaeangliae*)	E, MMPA
Long-beaked common dolphin (*Delphinus capensis*)	MMPA
Minke whale (*Balenoptera acutorostrata*)	MMPA
Northern right whale dolphin (*Lissodelphis borealis*)	MMPA
Orca (*Orcinas orca*)	MMPA
Pacific white-sided dolphin (*Lagenorynchus obliquidens*)	MMPA
Risso's dolphin (*Grampus griseus*)	MMPA
Short-beaked common dolphin (*Delphinus delphis*)	MMPA
Short-finned pilot whale (*Globicephala macrorhynchus*)	MMPA

Notes: E = Endangered under the Endangered Species Act; MMPA = protected under the Marine Mammal Protection Act, (1972, amended 1994 – 16 CFR 1431, et seq.)

Sources: Koski et al. 1998, Forney et al. 2000.



0 *Statute Miles* 12

0 *Nautical Miles* 12

Figure 3.9-2
Gray Whale Main Winter/Spring Migration Pathways

3.10 CULTURAL RESOURCES

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources can be divided into three major categories: archaeological resources (prehistoric and historic), architectural resources, and traditional cultural resources.

Archaeological resources are locations where human activity measurably altered the earth or left deposits of physical remains (e.g., tools, arrowheads, or bottles). "Prehistoric" refers to resources that predate the advent of written records in a region. These resources can range from a scatter composed of a few artifacts to village sites and rock art. "Historic" refers to resources that postdate the advent of written records in a region. Archaeological resources can include campsites, roads, fences, trails, dumps, battlegrounds, mines, and a variety of other features. *Architectural resources* include standing buildings, dams, canals, bridges, and other structures of historic or aesthetic significance. Architectural resources generally must be more than 50 years old to be considered for protection under existing cultural resource laws. More recent structures, such as Cold War era military buildings, may warrant protection if they have the potential to be historically significant structures. Architectural resources must also possess integrity (its important historic features must be present and recognizable). *Traditional cultural resources* can include archaeological resources, buildings, neighborhoods, prominent topographic features, habitats, plants, animals, and minerals that Native Americans or other groups consider essential for the continuance of traditional cultures.

Only significant cultural resources, known or unknown, warrant consideration with regard to potentially adverse impacts resulting from a proposed action. To be considered significant, archaeological or architectural resources must meet one or more criteria, as defined in 36 CFR 60.4, for inclusion in the National Register of Historic Places (NRHP).

There are no legally established criteria for assessing the importance of a traditional cultural resource. These criteria must be established primarily through consultation with Native Americans, in accordance with the requirements of the National Historic Preservation Act (1966). When applicable, consultation with other affected groups provides the means to establish the importance of their traditional resources. This can also be accomplished under 36 CFR 60.4 and through Advisory Council on Historic Preservation Guidelines. The Native American Graves Protection and Repatriation Act (1990) defines the procedures for consultation and treatment concerning Native American human remains and other cultural items.

Resources addressed at each of the alternative AFB beddown locations include archaeological, architectural, and traditional cultural resources. This EA examines those resources potentially subject to ground-disturbing or construction activities at each of the alternative AFB locations, including NRHP-listed or eligible archaeological and architectural resources (e.g., historic structures). The ROI for cultural resources includes those areas on base proposed for construction or renovation of facilities. No new areas would be overflown, only existing ranges would be used, and aircraft activity would increase only slightly from current conditions. Therefore, no further discussion of cultural resources at the affected ranges and beneath affected airspace is provided except for traditional cultural properties beneath the airspace (e.g., reservations). Additionally, activities performed at the NAS North Island WTA would not result in impacts to cultural resources since training exercises would be restricted to the water surface only and potential submerged cultural resources would not be affected.

3.10.1 DAVIS-MONTHAN AFB AND VICINITY

Archaeological Resources. Eight archaeological sites and 105 isolated finds are located in the eastern portion of the base (U.S. Army Corps of Engineers [USACE] 1993). These resources consist primarily of lower bajada ceramic scatters, rock feature sites, habitation sites, and limited activity sites. Each of these sites have been tested and determined not eligible for inclusion in the NRHP (USACE 1998). In addition, 34 isolated finds (50 artifacts) are located in the western portion of the base. Most of these isolated finds are concentrated in areas which have been previously disturbed. None are located in the vicinity of the project area.

Architectural Resources. Only 1 structure at Davis-Monthan AFB is eligible for nomination to the NRHP. This structure, Building 8030, is a pre-World War II hangar and is located at the northern end of the runway. An additional 16 structures at Davis-Monthan AFB qualify as World War II historical buildings and 3 structures qualify as Cold War Era historical buildings. None of these buildings are eligible for nomination to the NRHP and none are located in the vicinity of the project area (Davis-Monthan AFB 2002e).

Traditional Cultural Resources. No traditional cultural properties exist on Davis-Monthan AFB (USACE 1993). The Tohono O'Odham Indian Reservation underlies the Sells Low MOA airspace (see Figure 3.13-4).

3.10.2 EDWARDS AFB AND VICINITY

Archaeological Resources. Based on archaeological surveys performed as of April 1999, over 2,700 archaeological sites have been located on Edwards AFB (Edwards AFB 2000a). Of these sites, 109 have been evaluated for listing on the NRHP and over 50 have been found eligible or potentially eligible for listing. Two prehistoric districts exist within the North Base and South Base Sled Track portions of Edwards AFB (Sands 2002). Located within base boundaries, the northern half of Rogers Dry Lake was designated a National Historic Landmark in 1985. None are located in the vicinity of the project area.

Architectural Resources. Based on resource surveys, 58 historic period objects have been recorded on Edwards AFB. Most of these objects are aircraft and structures associated with the military occupation of the area and, thus, generally depict 1 of 3 historic themes: 1) World War II, 2) the Cold War, and 3) Man in Space. Six potential historic districts exist within the northern portion of Edwards AFB. These districts include the Muroc Flight Test base, the Jet Propulsion Laboratory (JPL) Edwards Test Station, Phillips Laboratory, south base Sled Track, X-15 Engine Test Complex, and the Kramer Mining District (Edwards AFB 2002b). Only the Muroc Flight Test Base at North Base is in the vicinity of the project area.

Traditional Cultural Resources. No identified traditional cultural properties exist on Edwards AFB (Edwards AFB 2000a). Indian reservations and tribal lands beneath the airspace units associated with the Edwards AFB alternative (Edwards Complex) include the Tule River Indian Reservation, Lone Pine Rancheria, Fort Independence Indian Reservation, Big Pine Rancheria, and Bishop Rancheria.

3.10.3 VANDENBERG AFB AND VICINITY

Archaeological Resources. Between 1994 and 1996, approximately 63,000 acres of Vandenberg AFB were surveyed for cultural resources. During these surveys, over 2,125 archaeological sites and isolated finds were located (Vandenberg AFB 2001). None are located in the vicinity of the project area.

Architectural Resources. Of the 182 architectural resources on Vandenberg AFB, 72 have been determined eligible for listing on the NRHP. However, none of these structures are located in the vicinity of the project area.

Traditional Cultural Resources. There are 141 Native American Traditional Cultural Properties on Vandenberg AFB. The Santa Ynez Band of Chumash Indians is located under Vandenberg AFB airspace. In addition, there are 18 historic roads, trails and landscapes on Vandenberg AFB; none of these are located in the vicinity of the project area.

3.11 SOCIOECONOMICS

Socioeconomics comprise the basic attributes of population and economic activity within a particular area or ROI and typically encompasses population, employment and income, and industrial/commercial growth. To illustrate local baseline conditions, socioeconomic data provided in this section consist primarily of data for Davis-Monthan AFB and vicinity (Pima County), Edwards AFB and vicinity (Kern, Los Angeles, and San Bernardino counties), and Vandenberg AFB and vicinity (City of Lompoc). Baseline information is based on 1999 and 2000 state, county, and city level data, 2000 census data, and 2005 population estimates. This section also presents the most current information available for education, housing, health services, municipal services, and utilities for each of the bases and their associated ROI. The ROI does not include areas in the vicinity of affected airspace, including the WTA, because no change to existing socioeconomic conditions would occur in these areas as a result of implementation of any of the alternatives.

3.11.1 DAVIS-MONTHAN AFB AND VICINITY

3.11.1.1 Population

Population within the Davis-Monthan AFB ROI (Pima County) experienced a 25.8 percent increase (167,922 people) between 1990 and 2000 (Table 3.11-1). In-migration and out-migration are factors that greatly influence Pima County demographics. For example, approximately 56,500 people moved into Pima County and over 42,650 moved out during the year 2000 (Pima Association of Governments [PAG] 2000). Population growth rates in Pima County are expected to increase rapidly if this trend continues.

Table 3.11-1. Population Trends within the Davis-Monthan AFB ROI

Area	*1990 Census*	*2000 Census*	*% Change*	*2005 Estimate*	*% Change*
ROI	650,384	818,306	25.8	943,795	15

Sources: U.S. Bureau of the Census (USBC) 1990, 2000a; Arizona Department of Economic Security 2001.

Davis-Monthan AFB is comprised of 8,710 active duty military personnel and civilian employees (Table 3.11-2). Of the military personnel, 67 percent live off base and 33 percent reside on base (Davis-Monthan AFB 2002d).

Table 3.11-2. Baseline Manpower Summary for Davis-Monthan AFB (2001)

Personnel	*Baseline/No-Action Alternative*
Active-Duty Officer	863
Active-Duty Enlisted	5,276
Civilian Employees	2,571
Total	**8,710**

Source: Davis-Monthan AFB 2002d.

3.11.1.2 Employment

As of January 2001, the total labor force within the ROI numbered 388,052 (Bureau of Labor Statistics [BLS] 2002). The civilian labor force in Pima County consisted of approximately 387,600 people. Pima County's employment profile portrays a higher than average percentage of jobs in services, retail trade, and government. This trend depicts the strong influences of tourism, education, and retirement in Pima

County. Consequently, the number of persons employed in manufacturing, wholesale trade, and finance/insurance/real estate is lower than the national average. The University of Arizona is currently the largest employer in the region, providing more than 10,000 jobs. Federal, state, and local governments in Pima County employ more than 64,000 people.

The unemployment rate within the ROI in January 2001 was 2.9 percent. Specifically, 376,651 people held jobs while 11,401 persons were unemployed (BLS 2002). The unemployment rate within the ROI has fluctuated greatly in the last decade; however, it has never exceeded 6.0 percent.

Table 3.11-3. Unemployment Rates within the Davis-Monthan AFB ROI (January 2001)

Area	*Labor Force*	*Employment*	*Unemployment*	*Unemployment Rate January 1991 (%)*	*Unemployment Rate January 2001 (%)*
ROI	388,052	376,651	11,401	3.8	2.9

Source: BLS 2002

Indirect employment associated with base operations includes jobs generated in surrounding communities to support the needs of base personnel and their dependents. Multipliers have been established that can be applied to staffing levels at military installations to estimate the total number of jobs created by continuing base operations (Logistics Management Institute 1995). Different personnel categories are assigned different multipliers: 0.29 for officers, 0.13 for enlisted personnel, and 0.43 for civilian (including contractor) staffing. Applying these multipliers to baseline staffing at Davis-Monthan AFB (see Table 3.11-2), it is estimated that approximately 2,042 jobs in the region are indirectly associated with the base.

3.11.1.3 Earnings

Average annual earnings per employee within the ROI has steadily increased between 1990 and 1999. In 1990, the average yearly salary in Pima County was approximately $20,500; in 1999, the average yearly salary had increased to approximately $28,075 (University of Arizona 2002). The greatest total earnings were obtained from the service sector, while the least earnings were obtained through the mining industry. Without adjusting for inflation, this average earnings level can be applied to the number of Davis-Monthan AFB personnel (8,710) to derive a total baseline payroll disbursement estimate of $244 million.

In 1999, the ROI had a per capita personal income (PCPI) of $23,111 (Table 3.11-4). This was 92 percent of the state average ($24,991), and 81 percent of the national average ($28,546). In 1989, the PCPI for the ROI was $15,742. This represents a 10-year increase of 52 percent.

Table 3.11-4. Per Capita Personal Income and Total Personal Income within the Davis-Monthan AFB ROI

	PCPI			*TPI (in billions)*		
Region	*1989*	*1999*	*% Change (1989-1999)*	*1989*	*1999*	*% Change (1989-1999)*
ROI	15,742	23,911	51.9	10.5	19.2	82.9

Source: Bureau of Economic Analysis (BEA) 2002

In 1999, the total personal income (TPI) in the ROI was approximately $19 billion. This accounted for 16 percent of the state total. The change in the TPI for the same period at the state and national level was 6.8

and 5.4, respectively. In 1989, the TPI in the ROI was approximately 10.5 billion, representing a 10-year growth of 83 percent (Bureau of Economic Analysis [BEA] 2002). The median household income in the ROI in 2000 was estimated to be $35,478 (U.S. Bureau of the Census [USBC] 2000).

3.11.1.4 Education

Student enrollment and student/teacher ratios within the ROI are shown in Table 3.11-5. In October 2001, school enrollment numbered 132,924 students (Arizona Department of Education 2002). The Tucson Unified School District had the greatest enrollment and accounted for nearly 51 percent of total enrollments (Arizona Department of Commerce, undated). As of 1998, Pima County had 119 elementary schools, 34 junior high schools, 20 high schools, 27 parochial schools, and 103 private schools. There are also several institutions of higher learning, including the University of Arizona, Pima Community College, the University of Phoenix, Prescott College, and the Davis-Monthan AFB Education Center.

Table 3.11-5. Estimated Baseline School District Characteristics within the Davis-Monthan AFB ROI

	Total Students	*Total Teachers*	*Student/Teacher Ratio*
ROI	132,924	26,112	5.1:1

Source: Office of the Pima County Superintendent 2002.

The state of Arizona allocated approximately $6.0 billion in local, state, and federal funds in fiscal year 1999-2000, and had approximately 850,000 students (Arizona Department of Education 2002a). This equates to approximately $7,058 per student in combined funding. Multiplying this amount by the number of enrolled students in the ROI results in an annual allocation of approximately $938 million.

3.11.1.5 Housing

Table 3.11-6 shows the distribution of housing in the ROI. The percentages of units occupied by owners and renters, as well as the percent vacant, are also shown. In 1999, there were 366,737 housing units in Pima County, 90.6 percent of which were occupied. The occupied units consisted of 64 percent owner-occupied and 36 percent renter-occupied (USBC 2000). Davis-Monthan AFB has 1,256 military family housing units (Air Force 2000).

Table 3.11-6. Housing Units within the ROI (1999)

		Occupied Units		
Region	*Total Units*	*% Owner-Occupied*	*% Renter-Occupied*	*% Vacant*
ROI	366,737	64.3	35.7	9.4

Source: USBC 2002.

3.11.1.6 Health Services

The Davis-Monthan Medical Facility currently has a 525-member staff that services Davis-Monthan AFB. The greater Tucson area contains approximately 15 hospitals and a wide variety of Health Maintenance Organizations (HMOs) (SITES 2001a).

3.11.1.7 Public Services and Utilities

Fire Protection

Davis-Monthan AFB operates and maintains two fire stations, both located on the flightline. The Main Station, located adjacent to Base Operations, contains the majority of the Base's fire-fighting equipment. A mutual agreement between Davis-Monthan AFB and the City of Tucson serves to provide city aid in Base fire-protection matters.

Electricity

Tucson Electric Power provides electrical services to Davis-Monthan AFB. Services include two 46-kilovolt (Kv) power lines that enter the Base along Wilmot Road and additional lines that enter the Base from the southwest. Average electrical consumption from the main base substation amounts to 90,000 Megawatt Hours (MWH). Power consumption west of the airfield averages 600,000 Kilowatt Hours (KWH) (Air Force 2000).

Natural Gas

Southwest Gas Company provides natural gas services to Davis-Monthan AFB. A commercial line entering Davis-Monthan AFB at the northwest corner supplies Davis-Monthan AFB with its primary source of fuel. The maximum monthly consumption rate, which occurs during the winter months, is approximately 40 million cubic ft (MCF). Currently, Davis-Monthan AFB is at approximately 74 percent of its capacity (Air Force 2000).

Water Service

Davis-Monthan AFB receives the entirety of its potable and fire service water from the local subsurface aquifer. There are a total of 17 drilled wells, 11 of which are operational. These wells are capable of supplying 5.8 million gallons per day (mgd). Eight storage tanks with a total capacity of 2.71 million gallons and a tank capacity range of 15,000-500,000 gallons are located throughout the base. The average daily consumption rate of water in the peak months (summer) is 2.37 million gallons (Air Force 2000). Davis-Monthan AFB uses approximately 464 million gallons per year, while its current allotment totals 994 million gallons per year (Davis-Monthan AFB 2002). The largest consumers of water on base are military family housing and the golf course.

Stormwater

Stormwater runoff is directed primarily by surface drainage and collected by three large underground collector pipes. The collector pipes are located along Fifth Street, within the runway and apron areas, and beneath the northern airfield apron. Two retention ponds are located on Davis-Monthan AFB and help accommodate rapid flow rates during heavy thunderstorms. Generally, stormwater runoff trends to the northeast (Air Force 2000).

Sewer Service

All wastewater collected on Davis-Monthan AFB is transported to the Pima County Sanitary Sewer System. The system's handling capacity is approximately 85 mgd. The facility treats approximately 70 mgd (Air Force 2000). There are 3 areas on Davis-Monthan AFB that rely on septic systems to treat wastewater: the munitions storage area, the small-arms training ranges, and the control tower. The current annual production of wastewater at Davis-Monthan AFB is approximately 1 million gallons (Air Force 2000).

Solid Waste

Solid waste at Davis-Monthan AFB is collected by a Base contractor. The solid waste is transported to the Las Reales Landfill within Tucson city limits.

3.11.2 EDWARDS AFB AND VICINITY

3.11.2.1 Population

Population within the Edwards AFB ROI (Kern County, Los Angeles County, and San Bernardino County) experienced a 9.8 percent increase (1,065,396 people) between 1990 and 2000 (Table 3.11-7). Population growth within each ROI (county level) has varied from moderate to substantial growth rates (Table 3.11-7).

Table 3.11-7. Population Trends within the Edwards AFB ROI

Area	*1990 Census*	*2000 Census*	*% Change*	*2005 Estimate*	*% Change*
ROI					
Kern	543,477	661,645	21.7	771,300	16.6
Los Angeles	8,863,164	9,519,338	7.4	10,169,100	6.8
San Bernardino	1,418,380	1,709,434	20.5	1,980,000	15.8
Total	**10,825,021**	**11,890,417**	**9.8**	**12,920,400**	**8.7**

Sources: DOF 2000; USBC 2000.

Edwards AFB is comprised of 11,687 active duty military personnel and civilian employees (Table 3.11-8).

Table 3.11-8. Baseline Manpower Summary for Edwards AFB

Personnel	*Baseline/No-Action Alternative*
Active-Duty Officer	679
Active-Duty Enlisted	3,174
Civilian Employees	7,834
Total	**11,687**

Source: Air Force 2001a.

3.11.2.2 Employment

In December 2001, the labor force within the ROI totaled 6,024,500 persons and the unemployment rate averaged about 7 percent (Table 3.11-9). Kern County has a predominant, non-farm work force that is composed of the following industry sectors identified here in decreasing dominance: government, services, trade, and transportation and utilities. Los Angeles County has a predominant, non-farm work force that is composed of the following industry sectors identified here in decreasing dominance: services, trade, manufacturing, and government. San Bernardino County has a predominant, non-farm work force that is composed of the following industry sectors identified here in decreasing dominance: services, trade, government, and manufacturing (USBC 2000).

Table 3.11-9. Unemployment Rates within the Edwards AFB ROI

Area	*Labor Force*	*Employment*	*Unemployment*	*Unemployment Rate April 1990 (%)*	*Unemployment Rate May 2001 (%)*
ROI					
Kern	291,700	259,600	32,100	12.0	11.0
Los Angeles	4,915,600	4,634,200	281,400	6.3	5.7
San Bernardino	818,100	781,600	36,600	5.8	4.5
Total	**6,025,400**	**5,956,800**	**350,100**	**6.5**	**7.1**

Source: EDD 2002.

Indirect employment associated with base operations includes jobs generated in surrounding communities to support the needs of base personnel and their dependents. By applying established multipliers (0.29 for officers, 0.13 for enlisted personnel, and 0.43 for civilians) to baseline staffing at Edwards AFB, it is estimated that approximately 5,424 jobs in the region are indirectly associated with the base (see Table 3.11-8).

3.11.2.3 Earnings

In 1999, the average annual earnings per employee within the ROI was approximately $33,118 (Bureau of Economic Analysis 1999). Without adjusting for inflation, this average earnings level can be applied to the number of Edwards AFB personnel (11,687) to derive a total baseline payroll disbursement estimate of $387 million.

In 1999, the ROI had a total PCPI of $69,111, with an averaged PCPI for all 3 counties equal to $23,037. Each county's respective PCPI within the ROI is shown in Table 3.11-10. In 1989, the ROI had an average PCPI of $17,417. This represents a 10-year increase of 32 percent.

Table 3.11-10. Per Capita Personal Income and Total Personal Income within the Edwards AFB ROI

	PCPI			*TPI (in billions)*		
Region	*1989*	*1999*	*% Change (89-99)*	*1989*	*1999*	*% Change (89-99)*
ROI						
Kern	15,154	19,886	31.2	8.3	12.8	54.2
Los Angeles	20,527	28,276	37.8	180.5	263.8	46.1
San Bernardino	16,571	20,949	26.4	22.4	35.0	56.2
Total	**52,252**	**69,111**	**32.2**	**211.3**	**311.6**	**47.4**

Source: BEA 2002.

In 1999, the averaged total TPI in the ROI was approximately $104 billion. This accounted for 17 percent of the state total. Each county's respective TPI within the ROI is shown in Table 3.11-10. In 1989, the averaged TPI within the ROI was approximately 70.4 billion, representing a 10-year growth of 48 percent. The median household income in the ROI is estimated to be $33,912.

3.11.2.4 Education

Within the ROI, 76 percent of the student population is located within Los Angeles County, 17 percent is within San Bernardino County, and the remaining 7 percent is within Kern County. The average student/teacher ratio is 22.6:1 for the ROI (Ed-DATA 2002). Each county's respective student/teacher ratio is listed in Table 3.11-11.

Table 3.11-11. Estimated Baseline School District Characteristics within the Edwards AFB ROI

Area	*Total Students*	*Total Teachers*	*Student/Teacher Ratio*
ROI			
Kern	146,097	6,913	21.1:1
Los Angeles	1,650,948	77,054	21.4:1
San Bernardino	373,896	17,128	21.8:1
Total	**2,170,941**	**101,095**	**22.6:1**

Source: Ed-DATA 2002.

Edwards AFB has 3 elementary schools (Bailey Elementary, Branch Elementary, and Forbes Elementary) and 1 junior/senior high school (Desert Junior-Senior High), all under the jurisdiction of the Muroc Unified School District. The 1999-2000 school year enrollment for these schools was 460, 550, 250, and 600 students, respectively (Ed-DATA 2002). In addition, a number of satellite colleges provide on-Base classes including: Cerro Coso Community College; California State Universities Bakersfield, Fresno, and Northridge; Chapman University; Embry Riddle Aeronautical University; Southern Illinois University; University of Phoenix; and University of Southern California.

The state of California allocated approximately $35.3 billion in local, state, and federal funds in fiscal year 1999-2000 and had an enrollment of 5,951,612 students (Ed-DATA 2002). This equates to approximately $5,931 per student in combined funding. Specific county appropriations are listed in Table 3.11-12.

Table 3.11-12. Revenues for Education within the Edwards AFB ROI Public Schools for FY 99-00 (in millions)

Area	*Local*	*State*	*Federal*	*Total*
ROI				
Kern	36.2	38.8	14.7	89.7
Los Angeles	133.7	197.7	232.1	536.5
San Bernardino	39.3	141.8	26.5	207.6
Total	**209.1**	**378.3**	**273.3**	**860.7**

Source: Ed-DATA 2002.

3.11.2.5 Housing

The 1990 census identified 3,904,311 housing units within the ROI, resulting in a 5.1 percent growth in housing identified by the 2000 census (USBC 1990, 2000). Housing summaries for each county within the ROI are listed in Table 3.11-13. Edwards AFB has a total of 1,715 housing units with an occupancy rate goal of 98 percent (SITES 2000). Edwards AFB also maintains a 188-space mobile home park for privately owned mobile homes.

Table 3.11-13. Housing Units within the Edwards AFB ROI (2000)

Area	*Total Units*	*Total Households*	*Household Tenure*	
			% Owner-Occupied	*% Renter-Occupied*
ROI				
Kern	231,564	208,652	62.1	37.9
Los Angeles	3,270,909	3,133,774	47.9	52.1
San Bernardino	601,369	528,594	64.5	35.5
Total	**4,103,842**	**3,871,020**	**58.2**	**41.8**

Source: USBC 2000.

3.11.2.6 Health Services

The Base Hospital, 95th Medical Group, provides primary and special preventative care services to military active duty personnel, retirees, and dependents. General medical clinics, as well as Pediatric and Family Practice Clinics, are available on base. In addition, two ambulance crews are on duty at Edwards AFB at all times. The greater Antelope Valley contains a number of health care and social services agencies, including the Antelope Valley Hospital Medical Center and the Lancaster Community Hospital (SITES 2000).

3.11.2.7 Public Services and Utilities

Fire Protection

Fire Protection on base is comprised of a network of five fire stations located across Edwards AFB. Fire Station 1 provides service to the on base; Station 2 provides service to the base housing area; Station 3 services the southern portion of the base; Station 4 services the Air Force Research Lab, Propulsion Directorate; and Station 5 provides service to the northern portion of the base (Edwards AFB 2002).

Electricity

Edwards AFB receives electrical services from Southern California Edison’s. Power is provided to Edwards AFB via the 115-kV line with maximum on-base demand being no more than 44 megawatts (MW) (Edwards AFB 2002).

Natural Gas

Natural gas is supplied to Edwards AFB by Pacific Gas and Electric (PG&E). Natural gas pipelines operate at a pressure of approximately 800 pounds per square inch (psi). A 6-inch pipeline branches off from this line into the Base. This 6-inch supply line is the backbone of the Base supply network, operating at a pressure that is regulated to 150 psi (Edwards AFB 2002).

Water Service

Edwards AFB purchases potable water from the Antelope Valley East Kern (AVEK) Water Agency through a water distribution system located in Boron. Water is distributed to a one million-gallon storage tank and a 750,000-gallon storage tank. These tanks supply the water to the North and Main Base areas, including the flightline. In 1999, Edwards AFB contracted with AVEK to purchase approximately 2,606,630.4 gallons per day (gpd) (Speaks 1999).

The water distribution system for Edwards AFB consists of a series of pipes ranging in size from 4 to 24 inches in diameter, booster pump stations, and storage tanks. Five storage tanks on base provide potable water storage and have a total capacity of 4.3 million gallons. Additional storage tanks dedicated to fire suppression are located throughout the Base (AFFTC 1997d).

Stormwater

Stormwater drainage at Edwards AFB flows along washes towards the nearest of three dry lakebeds – Rogers Dry Lake, Rosamond Dry Lake, and Buckhorn Dry Lake. Stormwater entering the Rosamond and Buckhorn Dry Lakes also flows into Rogers Dry Lake. Water reaching dry lakebeds is primarily lost to evaporation. To prevent pollution of the dry lakebeds, stormwater runoff from developed areas of the Base is directed into industrial evaporation ponds (Akravian 2002).

Sewer Service

There are two operating sewage treatment plants (STPs) on Edwards AFB. These two plants collect and treat wastewater for specific areas on base: Main Base, South Base, North Base, and the AFRL. The Main Base STP treats 100 percent of the wastewater from the sanitary sewer systems on Main, North, and South bases. The plant is designed to collect, treat, and dispose of an average flow of 2.5 mgd of influent and has a design peak of 4 mgd. The receiving waters are the groundwaters of the Lancaster Subarea of the Antelope Hydrologic Unit (Edwards AFB 2002).

Solid Waste

Edwards AFB operates a municipal solid waste landfill (nonhazardous) within the Main Base area. At current disposal rates, the landfill is expected to reach permitted capacity in the year 2019. Some waste (specifically metals) generated during construction and demolition projects, as well as the routine operations of various Base organizations, are diverted to the Defense Reutilization Marketing Office (DRMO) for resale. In addition, tires are diverted from the landfill to DRMO for recycling or proper disposal (Edwards AFB 2002).

3.11.3 VANDENBERG AFB AND VICINITY

The population within the ROI experienced a 9.2 percent increase (3,454) between 1990 and 2000 (Table 3.11-14). Growth within the ROI for the previous decade of 1980-1990 experienced a population increase of 36.9 percent, a substantial difference from 1990 to 2000 (University of California, Santa Barbara [UCSB] Economic Outlook 2001).

Table 3.11-14. Population Trends within the Vandenberg AFB ROI

Area	*1990 Census*	*2000 Census*	*% Change*	*2005 Estimate*	*% Change*
ROI	37,649	41,103	9.2	43,680	6.3

Sources: USBC 1990, 2000.

Vandenberg AFB is comprised of 8,658 active duty military personnel and civilians (Table 3.11-15). Currently, there is a resident population of 9,846 (SITES 2001b).

Table 3.11-15. Baseline Manpower Summary for Vandenberg AFB (2000)

Personnel	*Baseline/No-Action Alternative*
Active-Duty Officer	748
Active-Duty Enlisted	2,655
Civilian Employees	4,176
Total	**7,579**

Source: SITES 2001b.

3.11.3.1 Employment

The civilian labor force within the ROI totaled 18,310 as of December 2001, a growth of 5.2 percent from the 1990 (Table 3.11-16). Over the past decade, unemployment rates within the ROI have decreased by approximately 1.1 percent (BLS 2002). In 2001, the ROI had a labor force of 17,280 with an unemployment rate of 5.6 percent (BLS 2002).

The ROI contains a labor market profile that is dominated by the services industry sector, followed by the sectors of government, manufacturing, and retail trade. The agricultural industry is also prevalent in the ROI; however, the largest projected growth sector is construction (Sites 2001b).

Table 3.11-16. Unemployment Rates within the Vandenberg AFB ROI

Area	*Labor Force*	*Employment*	*Unemployment*	*Unemployment Rate April 1990 (%)*	*Unemployment Rate May 2001 (%)*
ROI	18,310	17,280	1,030	6.7	5.6

Source: BLS 2002.

Indirect employment associated with base operations includes jobs generated in surrounding communities to support the needs of base personnel and their dependents. By applying established multipliers to baseline staffing at Vandenberg AFB (see Table 3.11-15), it is estimated that approximately 2,500 jobs in the region are indirectly associated with the base.

3.11.3.2 Earnings

In 1999, the average annual earnings per employee within the ROI was approximately $25,433 (City of Lompoc 1999). Without adjusting for inflation, this average earnings level can be applied to the number of baseline Vandenberg AFB personnel (8,658) to derive a total baseline payroll disbursement estimate of $220 million.

Economic growth with the ROI has experienced a substantial increase within all industry sectors over the past decade. The economy has developed over the years, mostly in part due to the manufacturing of durable goods and the services associated in support of the goods. In 1999, the ROI had a PCPI of $20,128 (Table 3.11-17). In 1989, the ROI had an average PCPI of $13,384 (USBC 2002). This represents a 10-year increase of 50.4 percent (BEA 2002). In 1999, the averaged TPI in the ROI was approximately 827.3 million (Table 3.11-17). The 2000 median household income for the ROI was $45,381 (USBC 2000).

Table 3.11-17. Per Capita Personal Income and Total Personal Income within the Vandenberg AFB ROI

	PCPI			*TPI (in millions)*		
Region	*1989*	*1999*	*% Change (89-99)*	*1989*	*1999*	*% Change (89-99)*
ROI	13,384	20,128	50.4	503.9	827.3	64.2

Source: BEA 2002.

3.11.3.3 Education

Within the ROI, the Lompoc Unified School District had a total enrollment of 11,384 students (Ed-DATA 2002). In the fiscal year of 1999-2000, the district had a student-pupil ratio of 18.2:1 (Table 3.11-18). A total of 18 elementary, middle, and high schools are located within the district (Ed-DATA 2002). An additional three private schools are located within the ROI offering education through the high school level. In addition, three schools (Crestview Elementary, Los Padres Elementary, and Vandenberg Middle School) are located directly at Vandenberg AFB. There are no post-secondary schools located within the ROI; however the Base Education Center provides guidance to those students who desire the opportunity to obtain an undergraduate or graduate degree.

Table 3.11-18. Estimated Baseline School District Characteristics within the Vandenberg AFB ROI

Area	*Total Students*	*Total Teachers*	*Student/Teacher Ratio*
ROI	11,384	624	18.2

Source: Ed-DATA 2002.

The state of California allocated approximately $35.3 billion in local, state, and federal funds in fiscal year 1999-2000 and had an enrollment of 5,951,612 students (Ed-DATA 2002). This equates to approximately $5,931 per student in combined funding. Revenues appropriated for the ROI were $65.1 million and $35.3 billion for the state (Ed-DATA 2002). Specific appropriations are listed in Table 3.11-19.

Table 3.11-19. Revenues for Education within the Vandenberg AFB ROI for FY 99-00 (in millions)

Area	*Local*	*State*	*Federal*	*Total*
ROI	17.4	41.9	5.8	65.1

Source: Ed-DATA 2002.

3.11.3.4 Housing

The 1990 census identified 13,261 housing units within the ROI, resulting in a 2.7 percent growth in housing identified by the 2000 census (USBC 2002). A housing summary for the ROI is listed in Table 3.11-20. In 2000, available rental units throughout the ROI could be obtained for an average rent of $575 per month, with an average purchase price of a home for $275,000 (SITES 2001).

Table 3.11-20. Housing Units within California and the Vandenberg AFB ROI (2000)

Area	*Total Units*	*Total Households*	*Household Tenure* % Owner-Occupied	*Household Tenure* % Renter-Occupied
ROI	13,621	13,059	51.6	48.4
California	12,214,549	11,502,870	56.9	43.1

Source: USBC 2002.

Vandenberg AFB provides permanent party housing for military members in the form of dormitories, military family housing, and mobile home park spaces. Housing assignments are subject to availability and in accordance with AFI 32-6001, AFI 32-6005, and AFH 32-6009.

Vandenberg AFB has a total of approximately 1,924 family housing units comprised of 1,651 single units and 273 duplexes, quadraplexes, and multiplexes. The number of housing units fluctuates due to the demolition of older units and construction of new family housing units. Vandenberg AFB also maintains a 9-space mobile home park for privately owned mobile homes. It is expected that the park will close due the infrequency of its use (SITES 2001).

Unaccompanied enlisted members (E-1 through E-4) and designated key and essential personnel are required to live on Base. Vandenberg AFB has 3 types of unaccompanied housing: the Modules, Atlases, and Titan dormitories. The dormitories on Vandenberg offer single occupancy housing to personnel and are fully furnished with laundry and storage.

3.11.3.5 Health Services

Vandenberg AFB provides medical care for military personnel, retirees, and dependents. The 30th Medical Group provides comprehensive health care and serves a patient population of approximately 18,000 (SITES 2001b). Emergency ambulance service is available within Base boundaries only. A variety of health care centers, hospitals, and social services agencies exist within the City of Lompoc.

3.11.3.6 Public Services and Utilities

Fire Protection

Vandenberg AFB operates and maintains five fully equipped fire stations and one US Forest Service fire station. Station 1 is located closest to the flightline area of the Base. Fire prevention personnel at Vandenberg AFB are trained and equipped to handle hazardous material issues (Nixon 2002). Vandenberg AFB has mutual aid agreements with the City of Lompoc, Santa Maria, and the US Forest Service.

Electricity

Electricity is provided to Vandenberg AFB by PG&E based out of San Luis Obispo, California. The average electrical consumption for Vandenberg AFB in 2001 was 15,435,808 KWH. The peak monthly demand in 2001 was 26,495 KW (Vandenberg 2002e).

Natural Gas

Vandenberg AFB utilizes two suppliers for natural gas: the Defense Energy Support Center and Southern California Gas Company. An extensive distribution system, consisting of 85 miles of supply lines, provides natural gas throughout the Base. In 2001, the total annual consumption rate at Vandenberg AFB was 569,949 thousand cubic ft (KCF), with an average of 3,458 KCF used each day (Vandenberg 2002e). Vandenberg AFB is currently operating at approximately 28 percent of its system capacity.

Water Service

Vandenberg AFB purchases the majority of its water supply from the State Water Project. This water is imported from the San Luis Reservoir that feeds off the Upper Feather River in Sacramento, California. In addition to purchased water, Vandenberg AFB utilizes four drilled wells located in the San Antonio Basin of the Base. These wells are capable of supplying 3.6 gallons per minute. The annual demand for water at Vandenberg AFB is approximately 1.4 million gallons per year (Baure 2002). The largest consumers of water on base are military family housing and large fire deluge demands at launch complexes.

Stormwater

Stormwater at Vandenberg AFB is conveyed toward two water bodies located on the base: the San Antonio Creek and the Santa Ynez River. The San Antonio Creek is located in the northern portion of the Base and is closest to the flightline. The Santa Ynez River separates the northern portion of the base from the southern. Secondary containment is utilized for stormwater that has been polluted (Baure 2002).

Sewer Service

Wastewater from the main area of the base is conveyed and treated at the City of Lompoc Wastewater Treatment Plant. The average sewage flow to the treatment plant is approximately 1.32 mgd (Baure 2002). In remote areas, septic tanks are used for onsite wastewater disposal.

3.12 ENVIRONMENTAL JUSTICE

In 1994, EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* (Environmental Justice), was issued to focus the attention of federal agencies on human health and environmental conditions in minority and low-income communities. This EO was also established to ensure that disproportionately high and adverse human health or environmental effects on these communities are identified and addressed. In accordance with the *Interim Guide for Environmental Justice Analysis with the Environmental Impact Analysis Process* (Air Force 1997b), the Environmental Justice analysis focuses on the distribution of race and poverty status in areas potentially affected by implementation of a proposed action.

For the purpose of this analysis, minority and low-income populations are defined as:

- *Minority Populations*: Persons of Hispanic origin of any race, Blacks, American Indians, Eskimos, Aleuts, Asians, or Pacific Islanders.
- *Low-Income Populations*: Persons living below the poverty level, based on a total annual income of $17,603 for a family of 4 persons as reported in the 2000 census.

Estimates of these 2 population categories were developed based on data from the *2000 Census of Population and Housing* (U.S. Bureau of the Census [USBC] 2000).

In 1997, EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (Protection of Children), was issued to identify and address issues that effect the protection of children. Socioeconomic data specific to the distribution of population by age and the proximity of youth-related facilities (e.g., day care centers and schools) are used to analyze potentially incompatible activities associated with a proposed action. Data generally used for the Protection of Children analysis are collected from the *2000 Census of Population and Housing* (USBC 2000).

For the purposes of analysis in this EA, there are 3 ROIs: Davis-Monthan AFB and vicinity, Edwards AFB and vicinity, and Vandenberg AFB and vicinity. The airspace associated with the proposal addressed in this EA has been in existence for many years. While there would be a small percentage increase in aircraft overflights, the changes being proposed would not alter the current configuration or create any new airspace. None of the proposed changes would lead to any disproportionate or adverse effects to low-income or minority populations living beneath the proposed airspace. Therefore, no disproportionate impacts would occur from operations in the LATNs, MOAs, ARs, and restricted areas and these airspace units are not discussed further in this section.

3.12.1 DAVIS-MONTHAN AFB AND VICINITY

The Davis-Monthan AFB ROI consists of the City of Tucson, Arizona. Approximately 26 percent of the total population in the Davis-Monthan AFB ROI is composed of minorities (Table 3.12-1). The percent of population in the ROI living below the poverty level is about 18 percent (USBC 2000).

As of 2000, the total number of children under the age of 18 living in the Davis-Monthan AFB ROI was 119,617, or approximately 25 percent of the total population (Table 3.12-1). Although 2 elementary schools and 1 child care center are located within base boundaries, each of these facilities are located within residential zones situated away from the proposed project area (Davis-Monthan AFB 2002).

Table 3.12-1. Environmental Justice Data for the Davis-Monthan AFB ROI (2000)

Geographic Area	*Total Population*	*Minority Populations*		*Low-Income Populations*		*Number of Children*	
		Total Number	*% of Total Population*	*Total Number*	*% of Total Population*	*Total Number*	*% of Total Population*
City of Tucson	486,699	128,174	26.3	88,608	18.2	119,617	24.6

Source: USBC 2000.
Note: The Hispanic population is not a racial category, and includes components in each of the 5 racial categories. Hispanic figures cannot be added to racial categories to reach total population figure; double counting would result.

Julia Keen Elementary School is located just outside base boundaries, near the centerline of the northwest end of the runway. This location falls just within APZ 2 of the base. No other schools or youth-related facilities are located under flight tracks or within APZs associated with Davis-Monthan AFB (Davis-Monthan AFB 2002f).

3.12.2 Edwards AFB and Vicinity

For purpose of evaluating environmental justice, the Edwards AFB ROI consists of those communities located within the immediate vicinity, including Boron, California City, Mojave, North Edwards, and Rosamond. Each of these communities is located within Kern County. Since updated data regarding minority populations and the number of persons living below poverty level in each of these communities is unavailable, this section provides environmental justice data for Kern County in its entirety. Approximately 34 percent of the total population in the Edwards AFB ROI is composed of minorities (Table 3.12-2). Within Kern County, approximately 17 percent of the population lives below the poverty level (USBC 2002).

Table 3.12-2. Environmental Justice Data for the Edwards AFB ROI (2000)

Geographic Area	*Total Population*	*Minority Populations*		*Low-Income Populations*	
		Total Number	*% of Total Population*	*Total Number*	*% of Total Population*
Kern County	661,645	226,647	34.2	111,156	16.8

Source: USBC 2000.
Notes: The Hispanic population is not a racial category, and includes components in each of the 5 racial categories. Hispanic figures cannot be added to racial categories to reach total population figure; double counting would result.

As of 2000, the total number of children under the age of 18 living in the Edwards AFB ROI was 9,436, or approximately 30 percent of the total population (Table 3.12-3). Although 3 elementary schools and 1 junior/senior high school are located within base boundaries, none are in the vicinity of the proposed project area. There are no known schools or youth-related facilities located under the flight tracks or within APZs associated with Edwards AFB.

Table 3.12-3. Number of Children in the Edwards AFB ROI (2000)

Geographic Area	*Total Population*	*Number of Children*	*% of Total Population*
Boron	2,025	568	28.0
California City	8,385	2,578	30.7
Mojave	3,836	1,245	32.5
North Edwards	1,227	329	26.8
Rosamond	14,349	4,716	32.9
ROI Total	**29,822**	**9,436**	**30.2**

Source: USBC 2000.

3.12.3 VANDENBERG AFB AND VICINITY

The Vandenberg AFB ROI consists of the City of Lompoc. Approximately 29 percent of the total population in the Vandenberg AFB ROI is composed of minorities (Table 3.12-4). Additionally, about 37 percent of the population is of Hispanic origin. The percent of population within the ROI living below the poverty level is about 31 percent. This is more than double the State of California rate of 14 percent and the national rate of 13 percent (USBC 2002).

Table 3.12-4. Environmental Justice Data for the Vandenberg AFB ROI (2000)

Geographic Area	*Total Population*	*Minority Populations*		*Low-Income Populations*		*Number of Children*	
		Total Number	*% of Total Population*	*Total Number*	*% of Total Population*	*Total Number*	*% of Total Population*
City of Lompoc	41,103	11,852	28.8	12,590	30.6	12,310	29.9

Sources: City of Lompoc 2002; USBC 2000.
Note: The Hispanic population is not a racial category, and includes components in each of the 5 racial categories. Hispanic figures cannot be added to racial categories to reach total population figure; double counting would result.

As of 2000, the total number of children under the age of 18 living in the Vandenberg AFB ROI was 12,310, or approximately 30 percent of the total population (Table 3.12-4). One child care center, one youth center, and one elementary school exist within base boundaries; however, each of these facilities are located away from the proposed project area (Vandenberg AFB 2002). There are no known schools or youth-related facilities located under the flight tracks or within APZs associated with Vandenberg AFB.

3.13 LAND USE

Land use generally refers to human modification of land, often for residential or economic purposes. It also refers to the use of land for preservation or protection of natural resources such as wildlife habitat, vegetation, or unique features. Human land uses include residential, commercial, industrial, agricultural, and recreation. Unique natural features are often designated as national or state parks, forests, wilderness areas, or wildlife refuges.

Attributes of land use include general land use and ownership, land management plans, and special use areas. Land ownership is a categorization of land according to type of owner. The major land ownership categories include federal, state, American Indian, and private. Federal lands are further described by the managing agency, which may include the USFWS, U.S. Forest Service, Bureau of Land Management, or the DoD. Land uses are frequently regulated by management plans, policies, ordinances, and regulations that determine the types of activities that are allowed or that protect specially designated or environmentally sensitive uses. Special use land management areas (SULMAs) are identified by federal and state agencies as being worthy of more rigorous management.

Air Installation Compatible Use Zone (AICUZ) Program

The Air Force provides land use recommendations to local jurisdictions through the AICUZ program. The purpose of the program is to promote compatible land use development in areas subject to aircraft noise and accident potential. These guidelines have been established on the basis of studies prepared and sponsored by several federal agencies, including the DoD. The guidelines recommend land uses that are compatible with airfield operations while allowing maximum beneficial use of adjacent properties.

3.13.1 DAVIS-MONTHAN AFB, RANGES, AIRSPACE, AND WTA

3.13.1.1 Davis-Monthan AFB and Vicinity

Davis-Monthan AFB is located at the southeastern edge of Tucson in Pima County, Arizona. The areas north, south, and west of the base are urbanized; the areas to the east and southeast are more sparsely developed (Figure 3.13-1). The base is within the boundaries of the City of Tucson with the exception of the southern portion, which borders unincorporated portions of Pima County. Davis-Monthan AFB occupies 10,633 acres, of which 2,209 are developed or otherwise improved, 3,539 acres are semi-improved, and 4,741 acres are unimproved. An additional 274 acres are under easement to, and maintained by, Pima County (Davis-Monthan AFB 2000).

Improved lands include landscaped grounds in administrative, recreational and housing areas, and buildings, roads, parking lots, and airfield pavements. Semi-improved grounds are primarily vacant land that is mowed but otherwise unimproved (e.g., industrial areas and areas next to the flightline). Unimproved lands consist of areas in native vegetation and water bodies (Davis-Monthan AFB 2000).

Land use at Davis-Monthan AFB is divided into 12 categories and is based on the predominant facility types located in each area. The categories are airfield, aircraft operations and maintenance, industrial, administrative, community commercial, community services, medical, accompanied housing, unaccompanied housing, outdoor recreation, open space, and water. Open space and industrial land use are the largest of these. Some of the present on-base land use patterns evolved in association with World War II and before present day guidelines were implemented (Davis-Monthan AFB 2000).

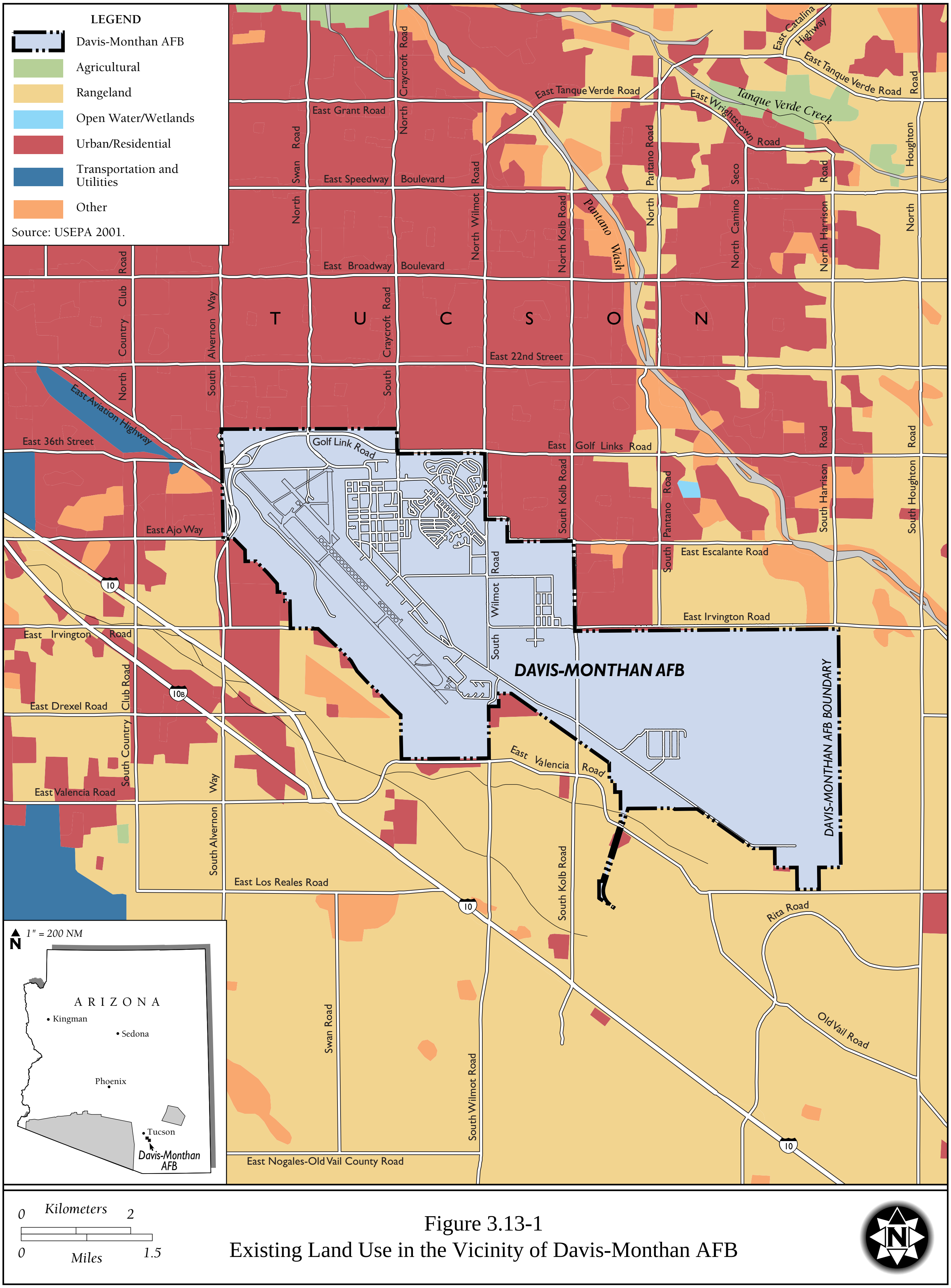


Figure 3.13-1
Existing Land Use in the Vicinity of Davis-Monthan AFB

When the Davis-Monthan Airfield was originally constructed, it was located several miles outside Tucson. The city subsequently grew to surround all but the southern edge of the installation. Today, encroachment is an ongoing land use concern and 3,139 acres outside the base boundaries are affected by Davis-Monthan AFB operations. Approximately 471 acres of off-base land are considered incompatible with aircraft operations. This area includes 2,100 residences and 1 elementary school (Davis-Monthan AFB 2000).

3.13.1.2 Ranges and Airspace

BMGR, Yuma TACTS Range, and Associated Restricted Areas

The BMGR is approximately 1.9 million acres. Lands along the perimeter of the eastern portion of BMGR are under various jurisdictions, including the U.S. Navy/Marine Corps, USFWS, BLM, Arizona State Land Department, Native American lands, and the private sector. The Air Force manages the eastern section of BMGR and the U.S. Navy/Marine Corps manages the western section of the BMGR, which includes the Yuma TACTS Range.

The Cabeza Prieta National Wildlife Refuge (NWR) is located along the southwestern portion of the BMGR and is administered by the USFWS. Cabeza Prieta NWR totals about 860,010 acres of land. The airspace above it is used for military training activities related to the BMGR. The refuge was created for the conservation and development of natural wildlife and plant resources. In 1990, the passage of the Arizona Desert Wilderness Act designated 803,418 acres of the Cabeza Prieta NWR as federal wilderness. The northern perimeter of the BMGR is predominately rangeland administered by BLM and the Arizona State Land Department. Nearby communities include Sentinel, Ajo, and Gila Bend. Native American lands located east of the study area include the Tohono O'Odham Nation. Privately owned lands are scattered throughout the perimeter and are predominately used for agricultural or rangeland purposes (Air Force 1999).

MOAs

The Jackal Low MOA is located about 40 NM northeast of Davis-Monthan AFB (Arizona Air National Guard 1998). Jackal Low MOA encompasses approximately 895 square miles. Over 77 percent (689 square miles) of the land underneath the MOA is rangeland (Table 3.13-1 and Figure 3.13-2). Other land uses beneath the airspace include agriculture (5 square miles), forest land (189 square miles), open water/wetlands (2 square miles), and urban (less than 1 square mile). The towns of Pima and Thatcher are underneath the northeastern boundary of the MOA. Known SULMAs underlying and in the vicinity of the Jackal MOA include 3 non-contiguous portions of the Coronado National Forest (Figure 3.13-3).

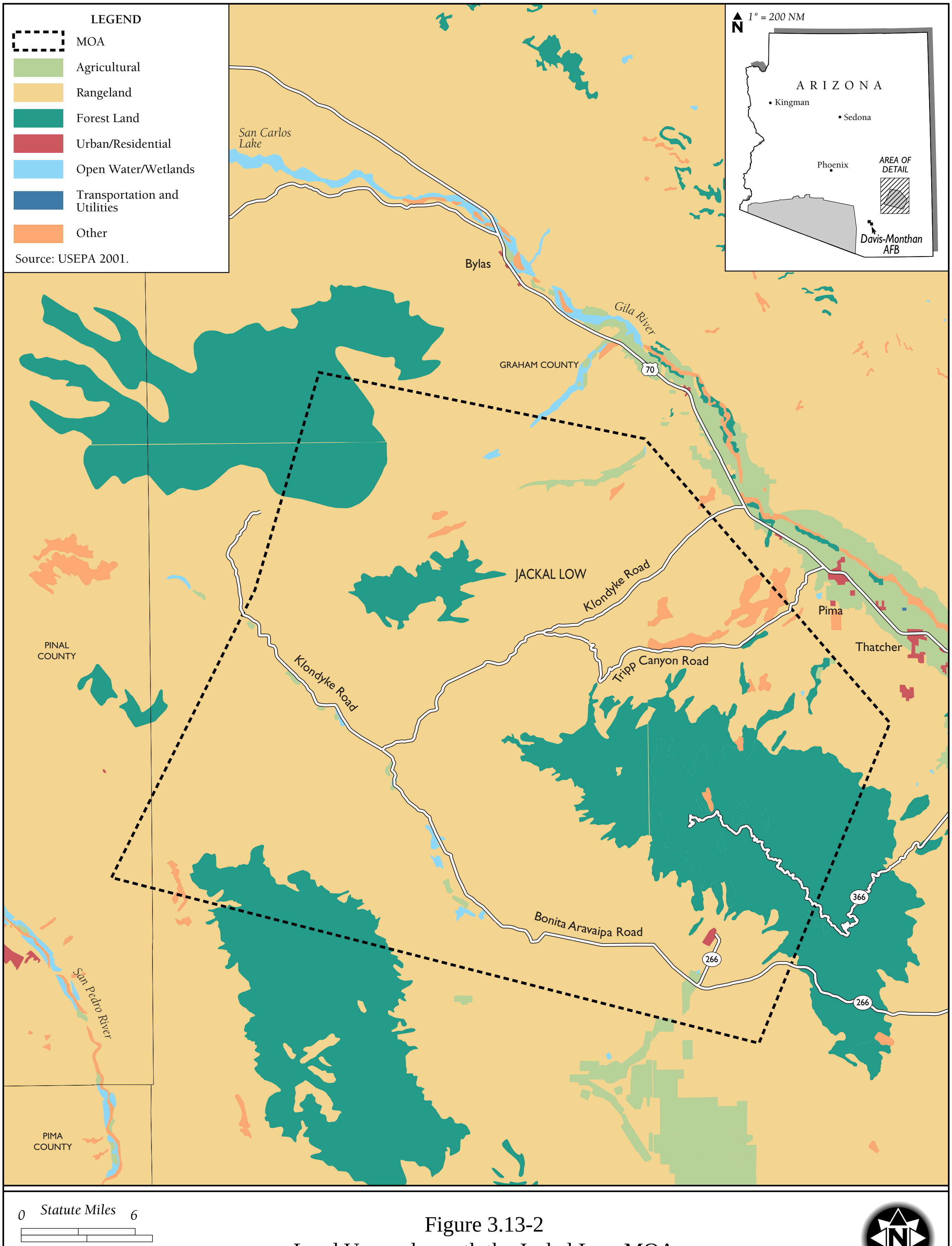


Figure 3.13-2
Land Use underneath the Jackal Low MOA

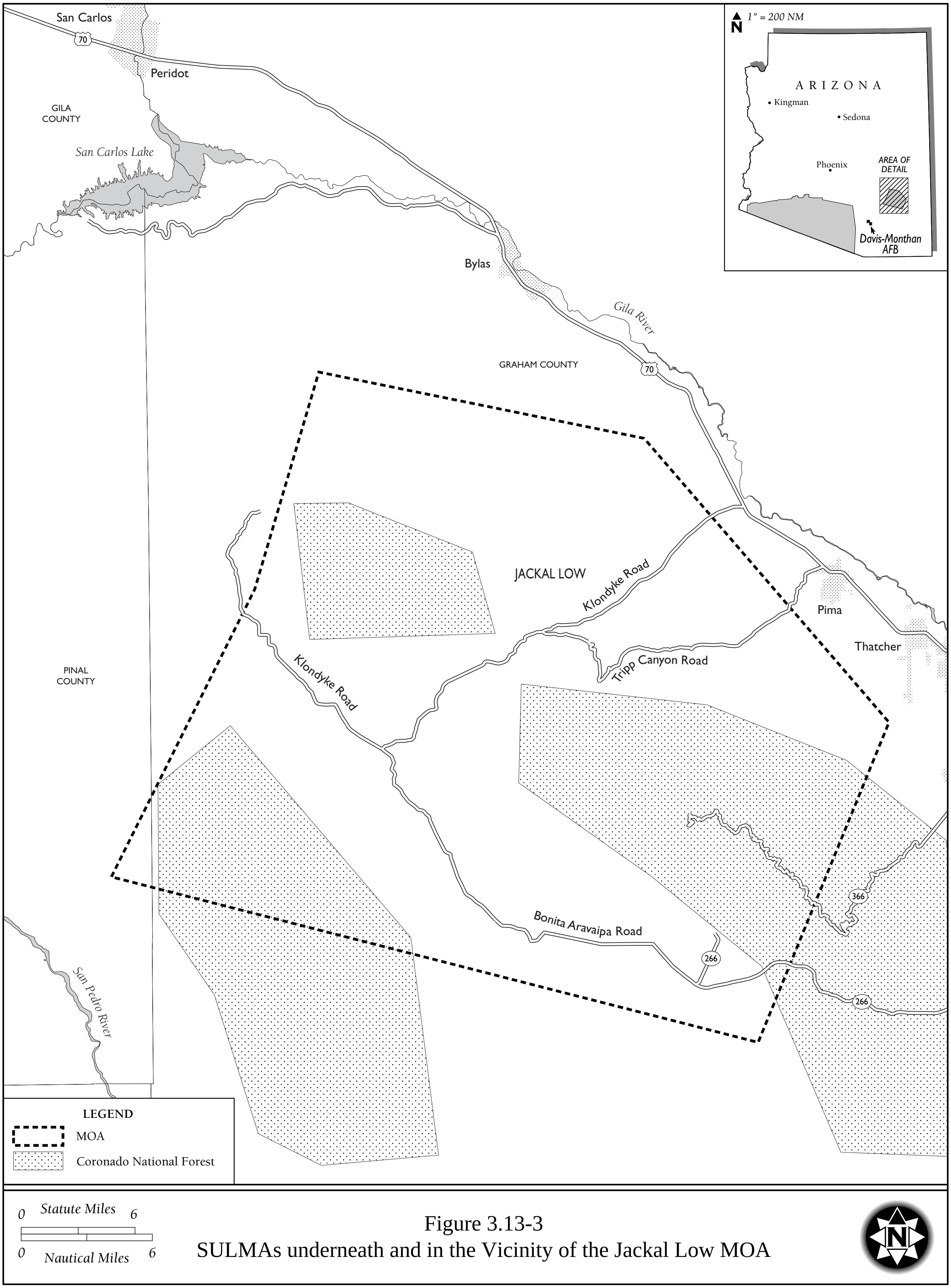


Figure 3.13-3
SULMAs underneath and in the Vicinity of the Jackal Low MOA

The portion of the Sells MOA complex located nearest Davis-Monthan AFB is approximately 40 NM west of Tucson, over southwestern Arizona and the Luke AFB Tactical Range Complex. Sells MOA encompasses approximately 4,162 square miles. Almost 97 percent (4,032 square miles) of the land under the MOA is rangeland (Table 3.13-1 and Figure 3.13-4). Other land uses beneath the airspace include agriculture (11 square miles), forest land (44 square miles), open water/wetlands (52 square miles), transportation and utilities (1 square mile), and urban/residential (16 square miles). The towns of Pisinemo, Sells, and Santa Rosa are all located under MOA airspace. Known SULMAs underlying and in the vicinity of the Sells MOA include the Cabeza Prieta NWR, Buenos Aires NWR, Organ Pipe National Monument, and the Tohono O'Odham Indian Reservation (Figure 3.13-5). The Cabeza Prieta NWR underlies the western boundary of the MOA and the Buenos Aires NWR is just to the east. The Organ Pipe National Monument is underneath the southwestern corner of the MOA and a large portion of the Tohono O'Odham Indian Reservation underlies the MOA.

Table 3.13-1. Land Use under Sells Low and Jackal Low MOAs

Airspace	*Category*	*Square Miles*	*Acres*	*% of Total*
Sells Low MOA	Agriculture	11	7,355	< 1
	Forest Land	44	28,469	1
	Other	6	3,692	< 1
	Open Water/Wetlands	52	33,238	1
	Rangeland	4,032	2,580,794	97
	Transportation, Utilities	1	586	< 1.0
	Urban/Residential	16	10,021	< 1.0
	Total	**4,162**	**2,664,155**	**100**
Jackal Low MOA	Agriculture	5	3,099	< 1
	Forest Land	189	121,097	21
	Open Water/Wetlands	2	1,262	< 1
	Other	10	6,223	1
	Rangeland	689	441,260	77
	Urban	< 1	252	< 1
	Total	**895**	**572,798**	**100**

Source: USEPA 2001b.

3.13.1.3 Water Training Area

Use of the NAS North Island WTA includes military, commercial, and recreational activities. Although the FAA has established warning areas associated with military operations, most of the area (airspace and WTA included) is available for co-use the majority of the time. Commercial fishing is an important use of offshore waters, and maritime traffic routes are common. Typical offshore recreational activities include sport fishing, sailing, boating, tourist-related activities, diving, and swimming (U.S. Navy 1999).

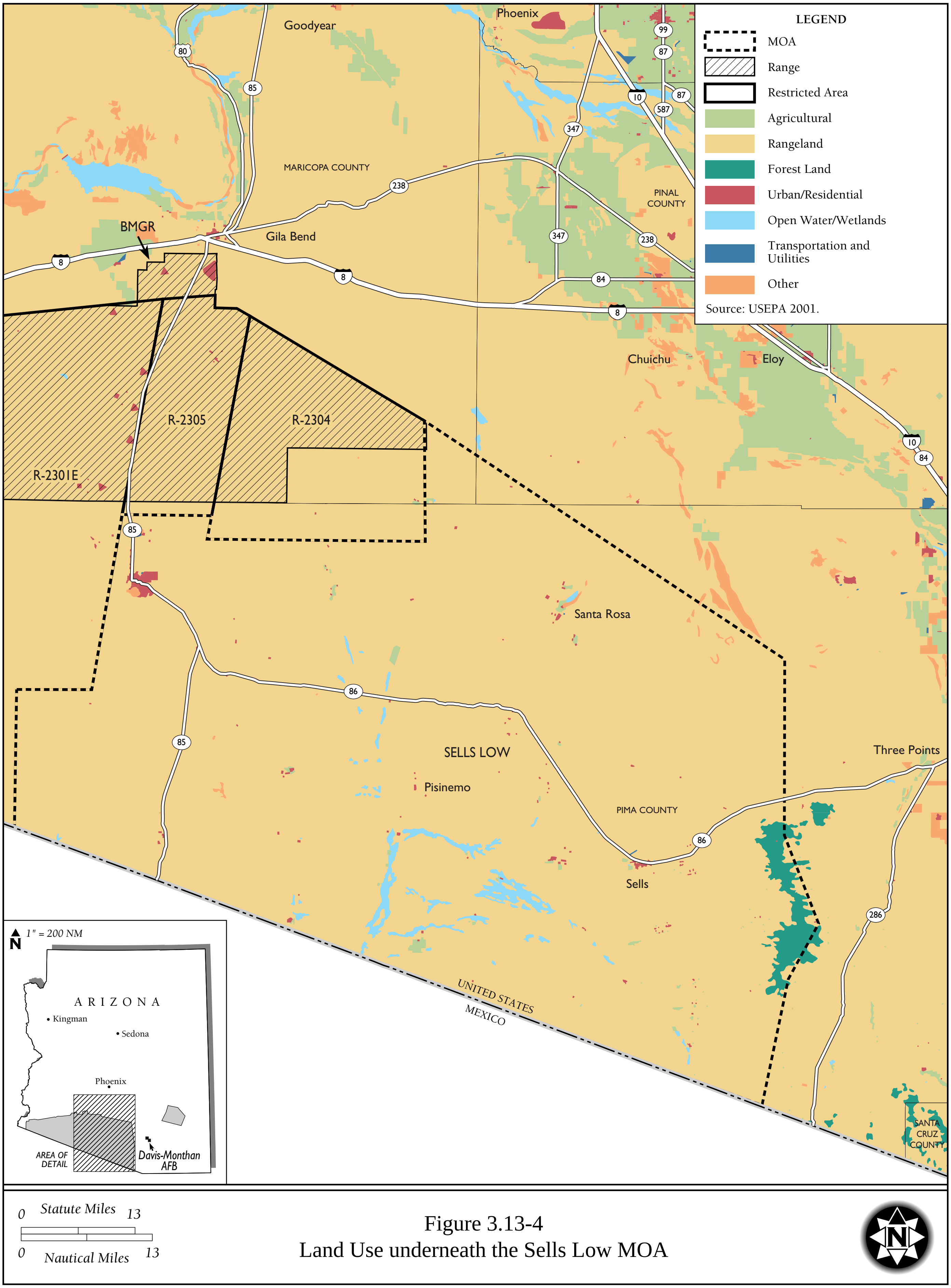


Figure 3.13-4
Land Use underneath the Sells Low MOA

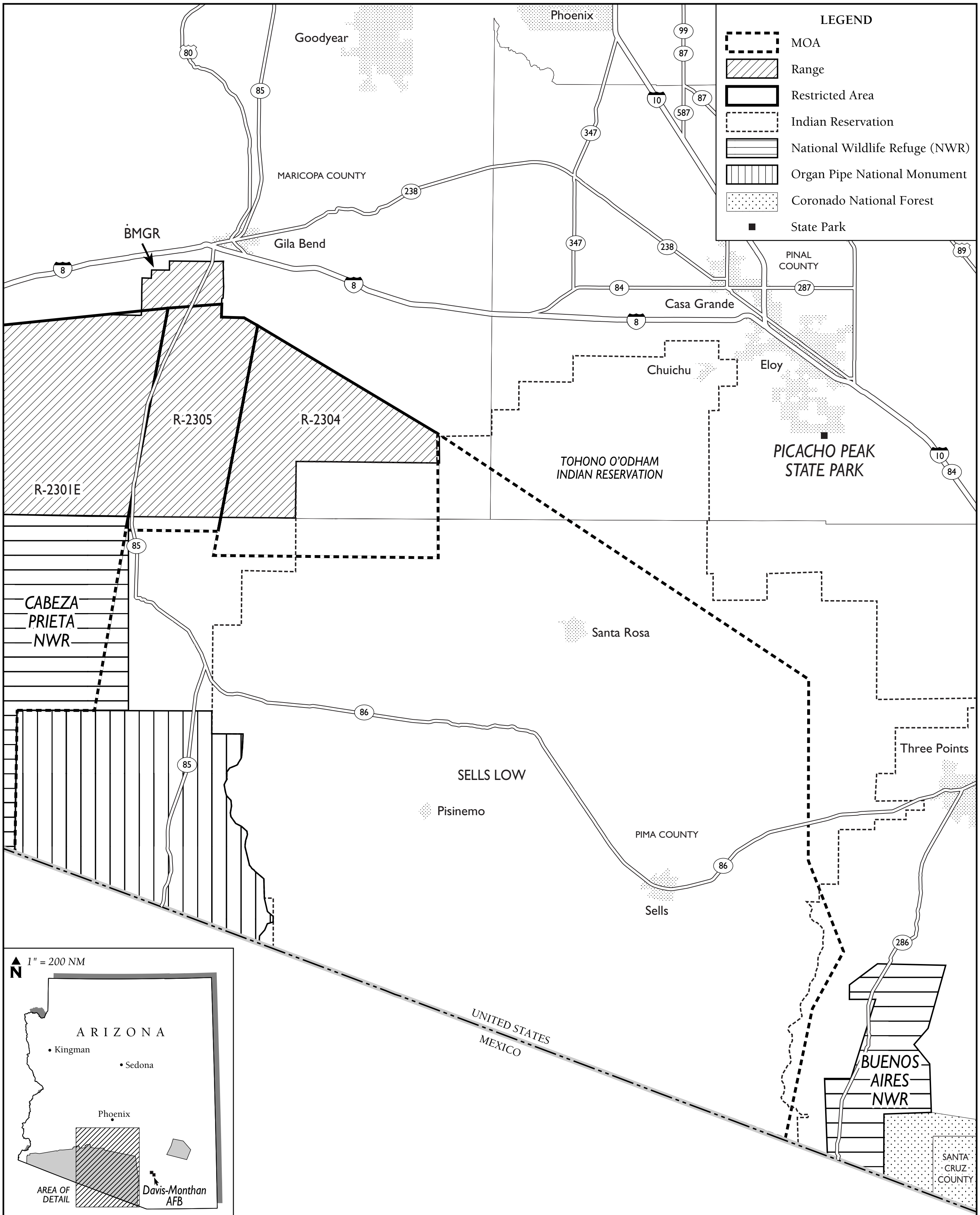


Figure 3.13-5
SULMAs underneath and in the Vicinity of the Sells Low MOA

3.13.2 EDWARDS AFB, RANGES, AIRSPACE, AND WTA

3.13.2.1 Edwards AFB and Vicinity

Edwards AFB encompasses approximately 301,000 acres of the Antelope Valley within the western Mojave Desert and in portions of Kern, Los Angeles, and San Bernardino counties. The base is approximately 100 miles northeast of Los Angeles, 90 miles northwest of San Bernardino, and 80 miles southeast of Bakersfield (see Figure 2-7).

The base contains large areas of developed and undeveloped land that is used to support the flight-testing of a wide variety of military, civilian, and experimental aircraft. The developed areas, approximately 5 percent of the total base area, consist of urbanized areas extending from the South Base to the edge of Rogers Dry Lake. This area includes the Main Base, South Base, North Base, and National Aeronautics and Space Administration (NASA) areas and contains the administrative facilities, housing, medical and community services, and aircraft operations and maintenance facilities. Over 95 percent of the base is considered undeveloped and is utilized to perform the base's overall mission of conducting and supporting research, development, and to test and evaluate manned and unmanned aerospace systems.

Seven land use management areas are currently used at Edwards AFB. The management areas have been established to facilitate oversight of activities and to manage the base's natural and man-made resources. These areas include aircraft overflight test area, Precision Impact Range Area (PIRA), developed areas, combat arms range, dry lakebeds and flight test/runways, military exercise/test area, and Air Force research laboratory.

Land surrounding Edwards AFB is predominantly arid desert with sparsely populated communities adjacent to the base's boundaries including Boron, Kramer Junction, Mojave, Lancaster, and Rosamond. Several federal, regional, and locally managed areas also surround the base. These include National Forests (Inyo and Sequoia), National Parks (Sequoia, Kings Canyon, and Death Valley), BLM lands, wilderness areas, Wild and Scenic Rivers (North and South Fork Kern River and Kings River), National Trails (Pacific Crest National Scenic Trail, John Muir National Recreation Trail, and Whitney Portal National Recreation Trail), State Parks (Red Rock Canyon and Tomo Kahini), and privately owned lands.

3.13.2.2 Ranges and Airspace

Edwards Airspace Complex

The Edwards Complex is comprised of restricted airspace areas R-2508, R-2502E, R-2502N, R-2505, R-2525, R-2515, and the Isabella and Owens MOAs. The Edwards Complex also overlies the China Lake EC Range (R-2524), Edwards AFB, and the Army's National Training Center at Fort Irwin (R-2502N). Test and training operations are routinely conducted throughout this restricted airspace (U.S. Navy 2001). The Edwards Complex encompasses approximately 12,198 square miles. Approximately 77 percent (9,373 square miles) of the land under the complex is rangeland (Table 3.13-2 and Figure 3.13-6). Other land uses beneath the complex include agriculture (71 square miles), forest land (2,116 square miles), open water/wetlands (35 square miles), transportation and utilities (9 square miles), and urban/residential (62 square miles). Other land uses account for the remaining 532 square miles. The towns of Ridgecrest, California City, Mojave, Rosamond, Lake Isabella, Kernville, and Searles Valley are all located underneath the complex; the towns of Lone Pine, Lenwood, Barstow, and Nebo Center are located adjacent to the complex.

Known SULMAs underlying and in the vicinity of the Edwards Complex include portions of several National Parks, National Forests, State Parks, and BLM Wilderness areas including Kings Canyon National Park, Sequoia National Park, Inyo National Forest, Sequoia National Forest, Death Valley National Park and Red Rock Canyon State Park (Figure 3.13-7). Military aircrews are instructed to maintain a minimum altitude of 3,000 ft AGL over the Death Valley National Monument and the Sequoia and Kings Canyon National Parks. In addition, operations over Sequoia National Forest, south of Sequoia National Park, are restricted after 8:00 P.M. on Friday, Saturday, and certain Sunday nights. At all times aircrews are instructed to avoid low-level overflight of any obviously inhabited area, and should maintain at least 3,000 ft AGL above the communities of Ridgecrest, Lake Isabella, Kernville, Lone Pine and other area communities.

Table 3.13-2. Land Use under Edwards Complex Airspace

Airspace	*Category*	*Square Miles*	*Acres*	*% of Total*
Edwards Complex	Agriculture	71	45,442	< 1
	Forest Land	2,116	1,354,296	17
	Open Water/Wetlands	35	22,434	< 1
	Other	532	340,483	4
	Rangeland	9,373	5,998,860	77
	Transportation, Utilities	9	5,495	< 1
	Urban/Residential	62	39,978	< 1
	Total	**12,198**	**7,806,988**	**100**

Source: USEPA 2001b.

3.13.2.3 WTA

Since the WTA proposed for use is the same across all alternatives, baseline land use conditions would be the same as those described in Section 3.13.1.3

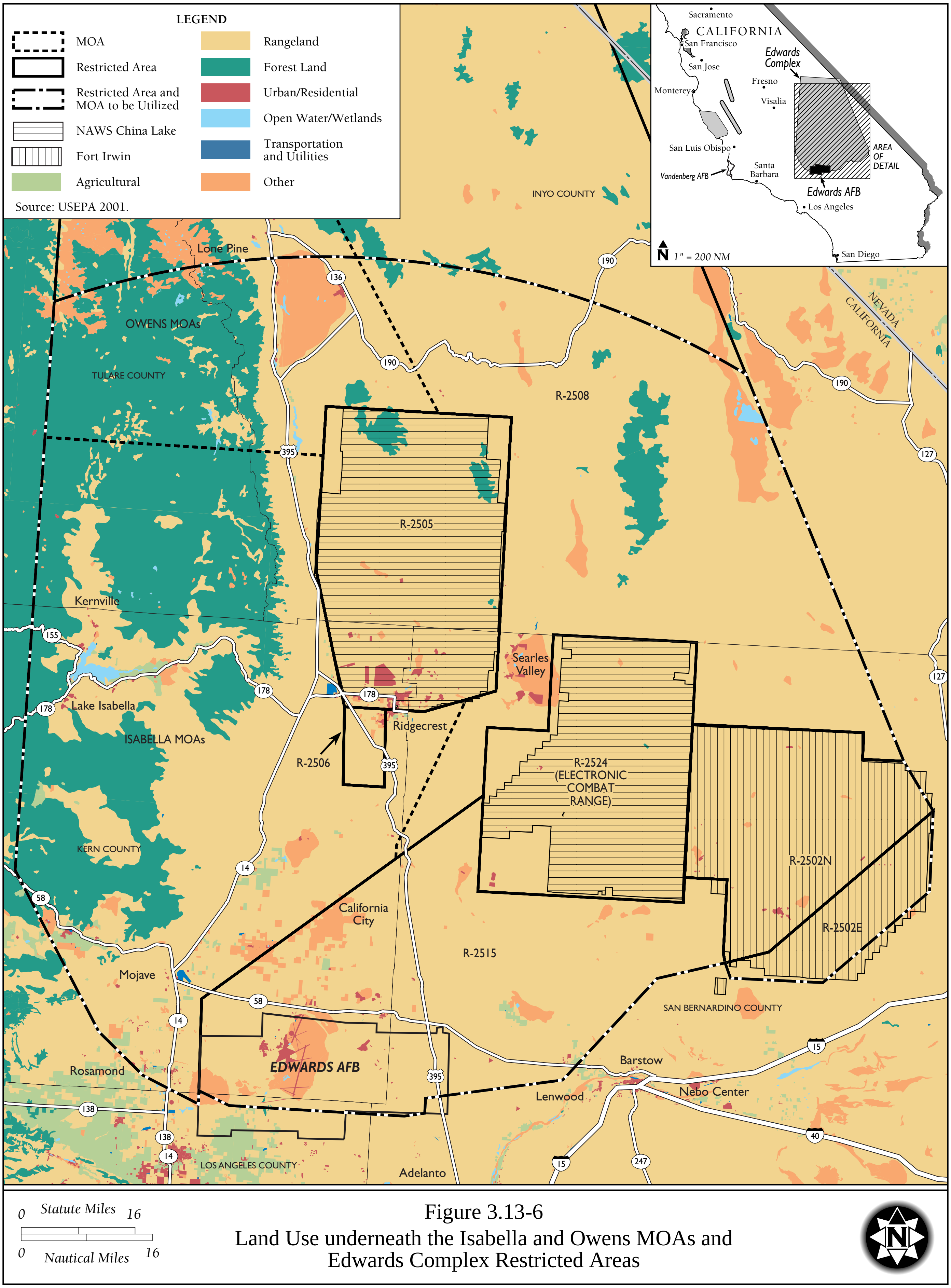


Figure 3.13-6
Land Use underneath the Isabella and Owens MOAs and Edwards Complex Restricted Areas

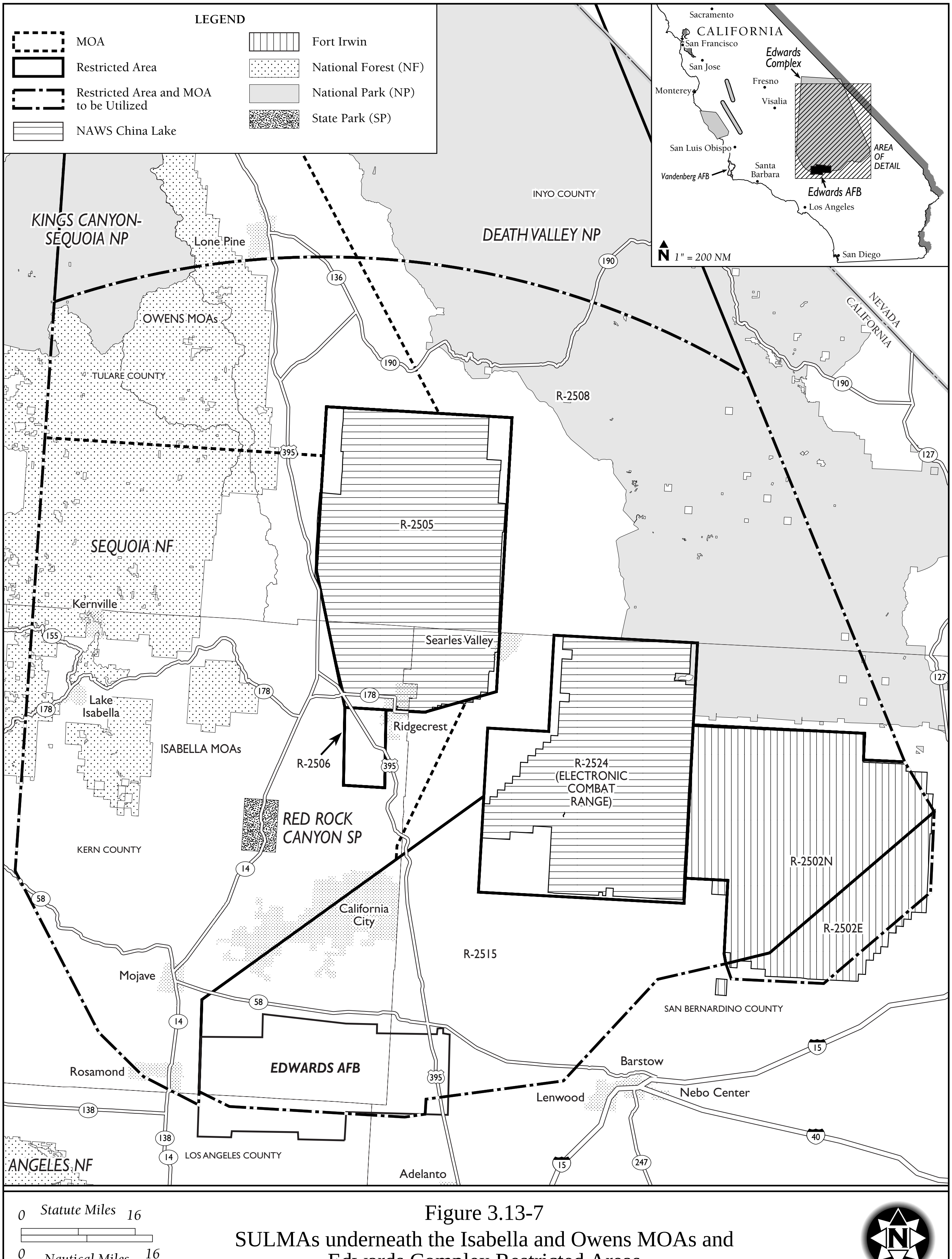


Figure 3.13-7
SULMAs underneath the Isabella and Owens MOAs and Edwards Complex Restricted Areas

3.13.3 VANDENBERG AFB, RANGES, AIRSPACE, AND WTA

3.13.3.1 Vandenberg AFB and Vicinity

Mission requirements at Vandenberg AFB have resulted in the development of widely dispersed facility groupings throughout the base's 154 square miles of land area. The dominant land feature at Vandenberg AFB is the natural environment, which is characterized by varied topography and vegetation typical of the California coastline. Vandenberg AFB occupies 98,400 acres, of which 90 percent is designated open space (88,260 acres). Within the cantonment area, open space accounts for a large part of the land use (over 60 percent). There are approximately 1,104 acres of cropland on base (Vandenberg AFB 2000).

Land use at Vandenberg AFB is divided into 12 categories. Land use categories indicate the predominant facility types present in each area. The categories include administrative, Air Education and Training Command (AETC), agriculture/grazing, airfield, community, housing, industrial, launch operations, medical, open space, outdoor recreation, and water/coastal. These categories are primarily functional in nature and are comprised of activities that have a common general purpose. For example, all of the facilities, equipment, and structures found under the airfield classification are used to perform the base's flying mission (Vandenberg AFB 2000).

There are relatively large areas of vacant land bordering Vandenberg AFB, most of which is zoned for agriculture. Commercial, residential, and industrial activities occur in the Lompoc central business district and in Santa Maria, northeast of the base. Encroachment issues relative to the base boundary are minimal (Vandenberg AFB 2000).

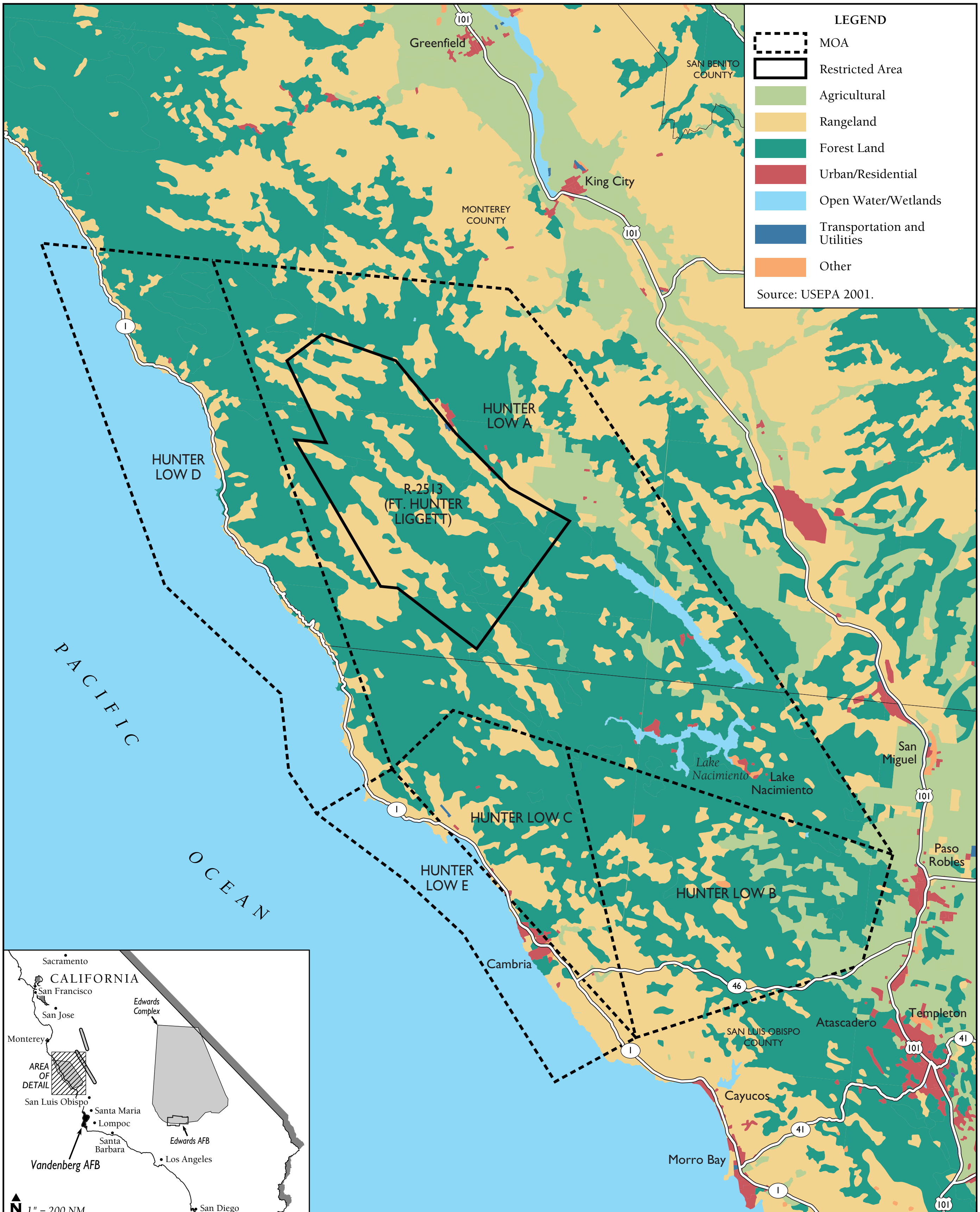
3.13.3.2 Ranges and Airspace

Edwards Airspace Complex

Baseline land use conditions would be the same as those described in Section 3.13.2.2, since proposed airspace under this alternative would consist of the same area.

Hunter Liggett Range and R-2513

Overlying the U.S. Army Reserve Training Center Fort Hunter Liggett, California, R-2513 covers approximately 260 square miles. General land uses at the range include military training and testing, administration, residential, and recreation. Fort Hunter Liggett is divided into 29 training areas, a cantonment area, and an ammunition supply point, and is characterized by steep, rugged terrain and rolling hills and plains. Over 165,000 acres of the Fort are used to support live fire and maneuver training, and the Fort's 33 DZs are capable of battalion-sized mass attacks. The cantonment area contains 87 units of family housing, unaccompanied personnel housing, classrooms and the historic Hearst Ranch House, used by the Army for administrative purposes. Adjacent to the cantonment area is the historic Mission San Antonio de Padua. The installation is bordered by the Los Padres National Forest to the north and west (Figures 3.13-8 and 3.13-9).



0 Statute Miles 7

0 Nautical Miles 7

Figure 3.13-8
Land Use underneath the Hunter MOAs

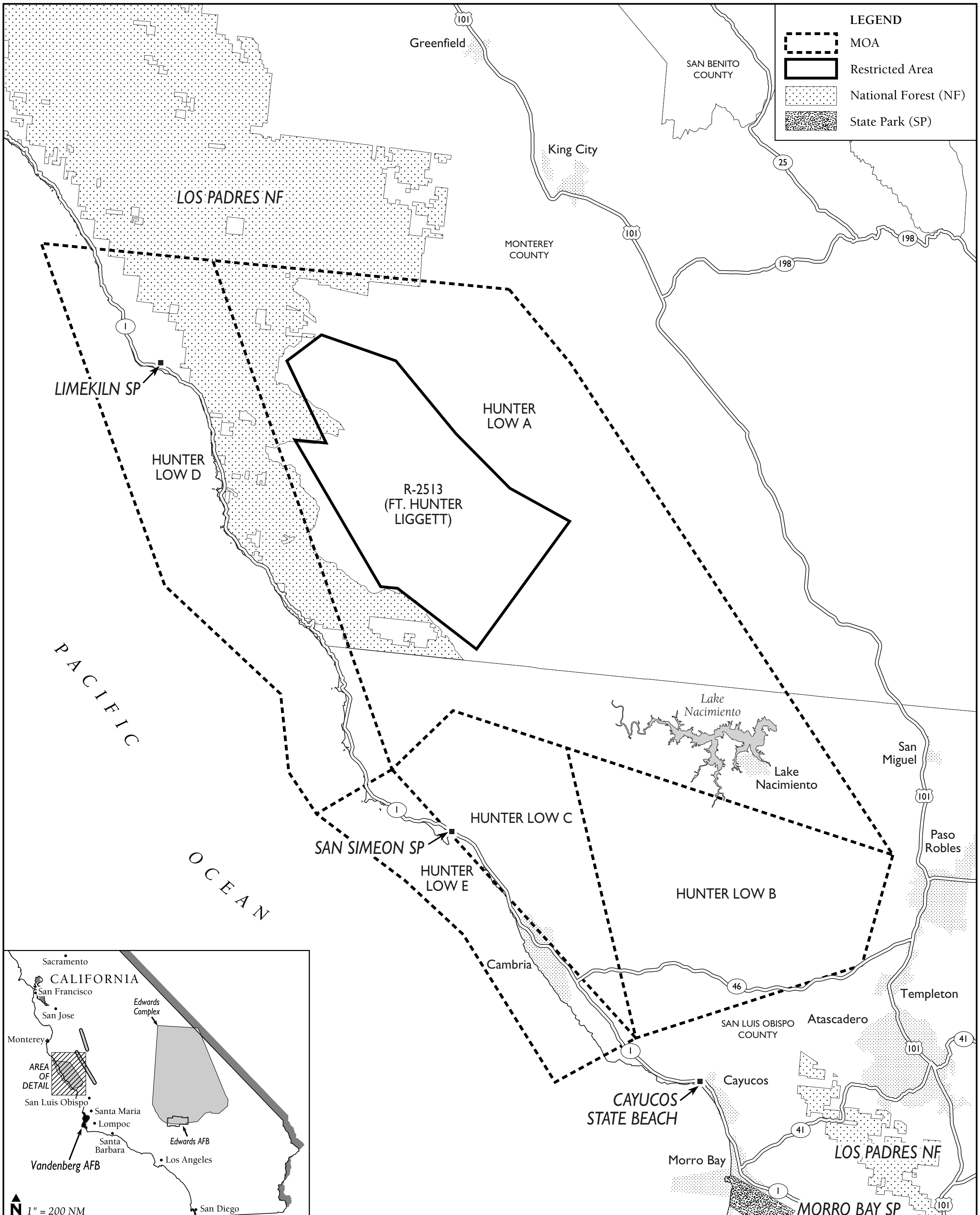


Figure 3.13-9
SULMAs underneath and in the Vicinity of the
Hunter MOAs and Fort Hunter Liggett Range

Hunter Low MOAs

The Hunter Low MOAs encompass approximately 1,198 square miles. About 61 percent (729 square miles) of the land under the MOAs is forest land (Table 3.12-3 and Figure 3.13-9). Other land uses include agriculture (151 square miles), open water/wetlands (13 square miles), rangeland (297 square miles), transportation and utilities (1 square mile), and urban residential (5 square miles). The towns of Lake Nacimiento and Cambria are located under the MOA. Known SULMAs underlying and in the vicinity of the Hunter Low MOA include San Simeon State Park and a portion of the Los Padres National Forest (Figure 3.13-8).

Table 3.12-3. Land Use under the Hunter Low MOAs, AR-242V, and AR-243V

Airspace	*Category*	*Square Miles*	*Acres*	*% of Total*
AR-242V	Agriculture	3	1,971	2
	Forest Land	2	1,042	1
	Open Water/Wetlands	< 1	62	< 1
	Other	< 1	79	< 1
	Rangeland	157	100,287	97
	Total	**162**	**103,441**	**100**
AR-243V	Agriculture	56	35,640	20
	Forest Land	125	79,965	45
	Other	< 1	3	< 1
	Rangeland	99	63,577	35
	Transportation, Utilities	< 1	30	< 1
	Urban/Residential	< 1	17	< 1
	Total	**280**	**179,232**	**100**
Hunter Low MOAs	Agriculture	151	96,872	13
	Forest Land	729	466,312	61
	Open Water/Wetlands	13	8,442	1
	Other	2	983	< 1
	Rangeland	297	190,366	25
	Transportation, Utilities	< 1	151	< 1
	Urban/Residential	5	3,340	< 1
	Total	**1,198**	**766,466**	**100**

Source: USEPA 2001b.

AR-242V and AR-243V

AR-242V encompasses approximately 162 square miles. Almost 97 percent (157 square miles) of the land under AR-242V is rangeland (Table 3.12-3 and Figure 3.13-10). Other land uses beneath AR-242V are agriculture (3 square miles), forest land (2 square miles), and open water and wetlands (1 square mile). AR-243V encompasses approximately 280 square miles. The largest single land use underneath AR-243V is forest land (125 square miles) (Table 3.12-3 and Figure 3.13-11). Other land uses beneath AR-242V are agriculture (56 square miles), rangeland (99 square miles), and transportation and utilities, and urban/residential (each at less than 1 square mile).

3.13.3.3 WTA

Baseline land use conditions would be the same as those described in Section 3.13.1.3, since the WTA under this alternative would be located in the same area.

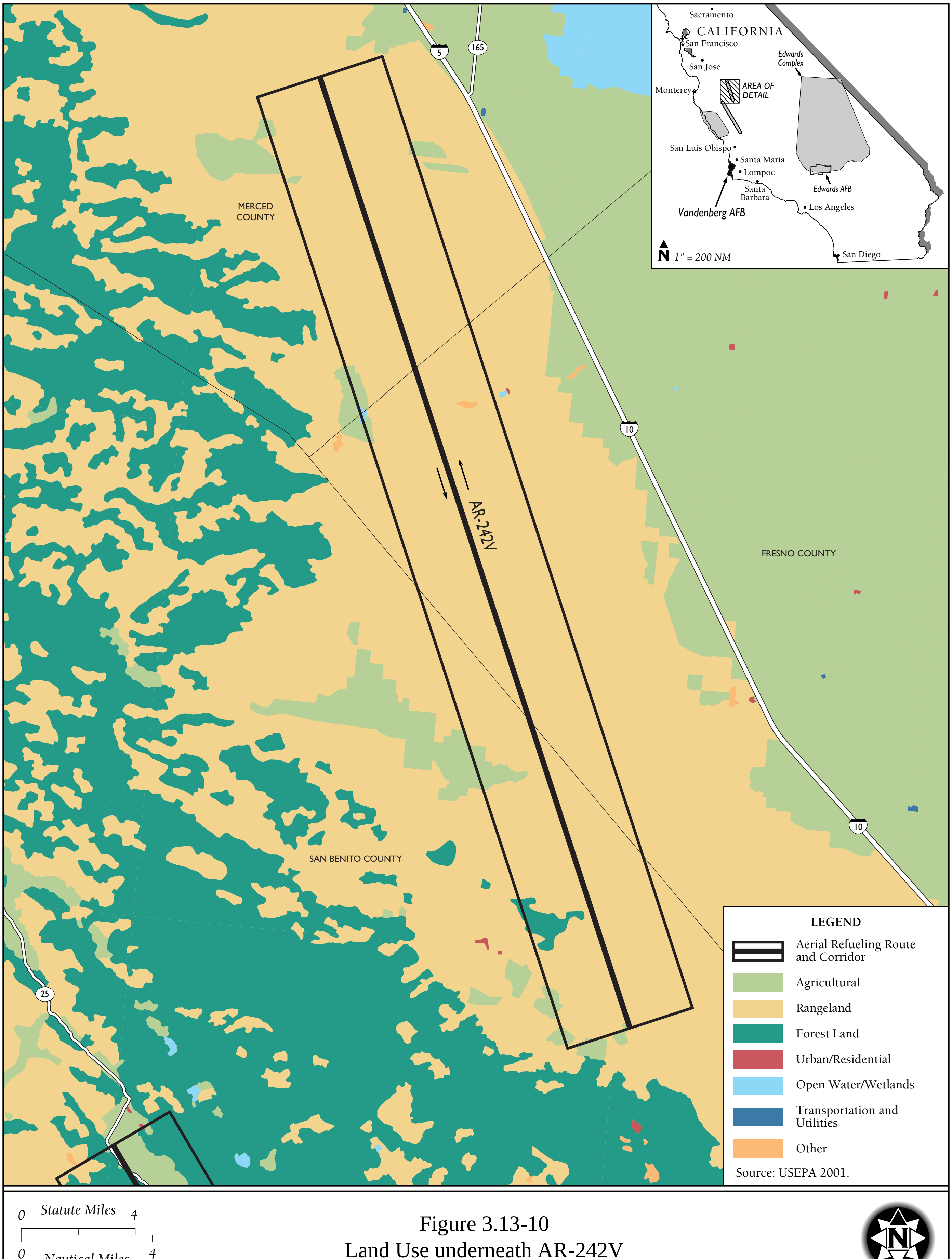
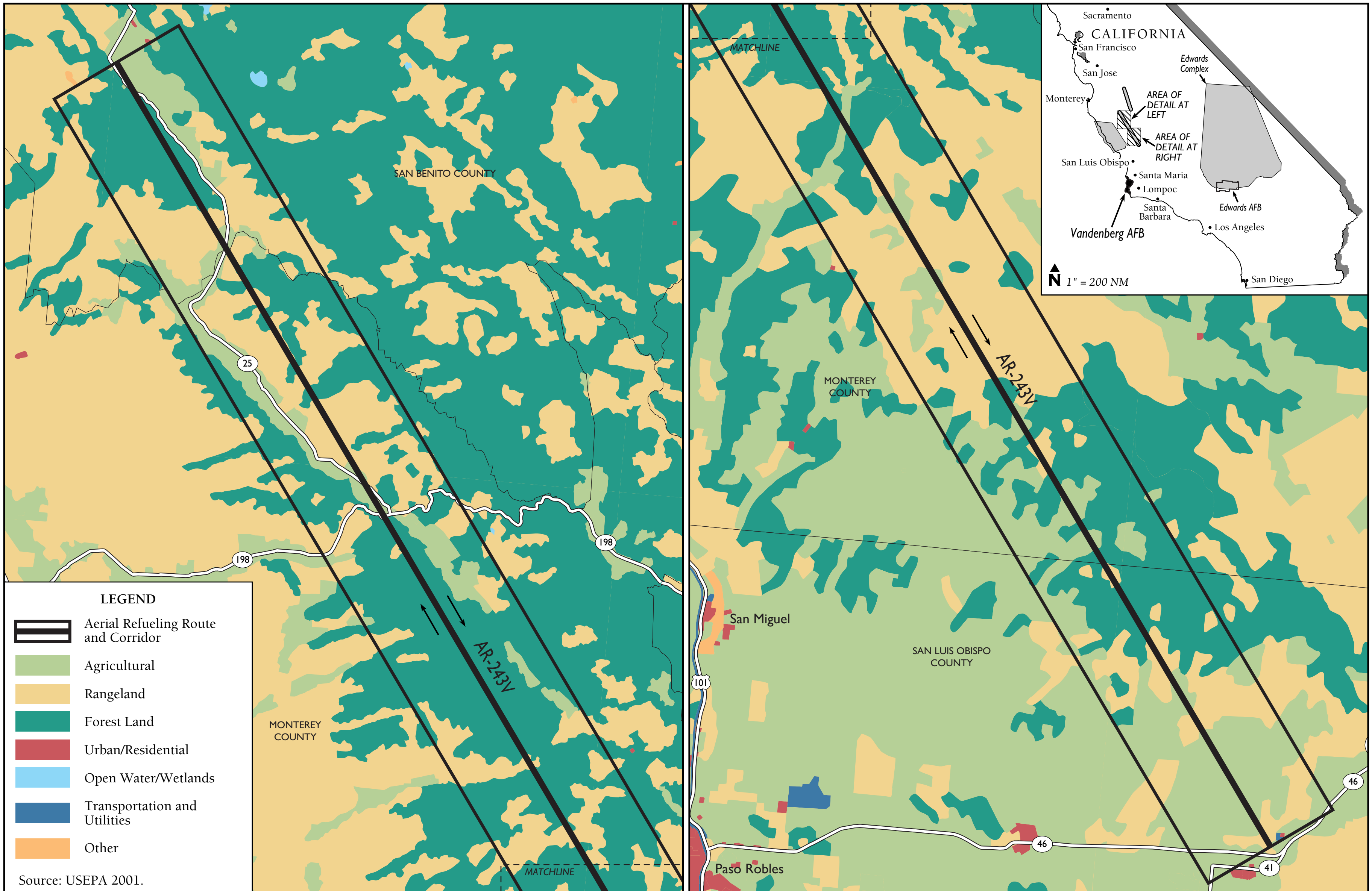


Figure 3.13-10
Land Use underneath AR-242V



0 Statute Miles 4

0 Nautical Miles 4

Figure 3.13-11
Land Use underneath AR-243

3.14 RECREATION AND VISUAL RESOURCES

Recreation resources include natural resources and human-made facilities designated or available for public recreational use. The setting, activity, and other elements that characterize affected recreational areas are considered in order to assess potential impacts. Visual resources are the natural and manufactured features that constitute the aesthetic qualities of an area. These features form the overall impression that an observer receives of an area or its landscape character. Landforms, water surfaces, vegetation, and manufactured features are considered characteristic of an area if they are inherent to the structure and function of the landscape.

The ROI for recreation and visual resources includes the areas most likely to be affected by an increase in aircraft activity and training. For this analysis, the ROI includes the proposed bases, airspace units, and WTA.

3.14.1 DAVIS-MONTHAN AFB, RANGES, AIRSPACE, AND WTA

3.14.1.1 Davis-Monthan AFB

Outdoor recreational areas on Davis-Monthan AFB include a golf course, an RV campground, outdoor pool, riding stables, bike paths, parks and picnic areas, playing fields, tennis courts, and running track. These recreational facilities are located throughout the installation in areas that are generally convenient to base residents and employees.

Recreation is a major land use within the Arroyo Chico Area in the vicinity of Davis-Monthan AFB. Reid Park (including a zoo, golf course, and recreation center) comprises one of the largest and most complete regional parks in the Tucson urban area. In addition, there are 3 small neighborhood parks serving the residential areas in Arroyo Chico: Eastmoor, Parkview, and Country Club. Popular recreational areas nearby include Saguaro National Park and Coronado National Forest (NF).

Davis-Monthan AFB itself is located in the Tucson urban area. The terrain in and around Davis-Monthan AFB is flat to sloping with alluvial washes typical of Sonoran desert topography. There are scenic mountain ranges to the west, northeast, and east of the base.

3.14.1.2 Ranges and Airspace

BMGR contains many areas open to the public for recreational purposes and access to a large portion of the Range is authorized by permit on a near-continuous basis. These areas are managed by a number of agencies including the Bureau of Land Management (which manages 3 Areas of Critical Environmental Concern), the Air Force (which allows recreation in 4 designated non-target, non-impact areas in the eastern section of BMGR), U.S. Marine Corps (which provides day-use and overnight recreational opportunities in the western section of BMGR) and the Arizona Game and Fish Department (which manages 4 Game Management Units and administers hunting permits within the eastern section of BMGR). Public entry into areas containing target ranges or undergoing military training activities is not allowed.

Adjacent to the BMGR and Yuma TACTS Range are 2 protected, undeveloped scenic areas: Cabeza Prieta National Wildlife Refuge (NWR) and Organ Pipe Cactus National Monument (NM). These recreation areas offer opportunities for hiking, mountain biking, scenic driving, wildlife and wildflower viewing, and nature photography.

Underlying the Sells Low MOA and 305 West LATN is the Buenos Aires NWR which offers visitors opportunities for birdwatching, hunting, hiking, wildlife observation, and scenic driving. The refuge contains one of Arizona's largest areas of ungrazed native grasslands. Most of the remainder of the land under the Sells Low MOA and 305 West LATN is within the Tohono O'Odham Indian Reservation boundaries. Kitt Peak National Observatory is also under the Sells Low MOA and 305 West LATN.

Land underlying these airspace units features classic Sonoran desert scenery: jagged desert mountain ranges, large expanses of undeveloped landscape and unique desert vegetation, including saguaro cactus and spring wildlflowers.

Underlying the Jackal Low MOA and 305 East LATN are portions of Coronado NF which offers visitors hiking, fishing, scenic driving, and wildlife viewing opportunities. The Coronado NF also offers scenic alpine and sub-alpine forests and several peaks over 7,000 above MSL, including the Pinaleno Mountains, one of the isolated "sky island" ranges in the area which offer visitors sweeping views of the Sonoran Desert and foothills below.

3.14.1.3 WTA

Recreational activities within the WTA co-exist with military uses of the area. Virtually all of the seaspace is available for sport fishing, sailing, boating, diving, and swimming, with most activities originating from nearby San Diego. The visual resources of the area are associated with ocean and coastline views.

3.14.2 EDWARDS AFB, RANGES, AIRSPACE, AND WTA

3.14.2.1 Edwards AFB

Recreational areas on Edwards AFB include a golf course, bowling center, riding stables, hunting/fishing areas, and off-road vehicle areas. In addition, the base has sports and fitness facilities and hosts recreational clubs such as the Desert Wheels Motorcycle Club.

Visual resources at Edwards AFB include natural and human-made features. The Mojave Desert terrain is nearly level or gently sloping, with low hills and domes in some outlying areas. Human-made features include access roads, base buildings, aircraft runways and hangars. The north base area is heavily developed and disturbed and it contains no unique visual resources.

3.14.2.2 Ranges and Airspace

Recreational areas beneath the Edwards Complex airspace include portions of Inyo and Sequoia NFs; the John Muir; Golden Trout, and South Sierra Wilderness Areas; and Sequoia, Kings Canyon, and Death Valley National Parks. Two state parks (Red Rock Canyon State Park and Tomo Kahini State Park) and four Wild and Scenic Rivers (north Fork Kern River, South Fork Kern River, South Fork Kings River, and Kings River) underlie the airspace. The recreational areas host activities such as hiking, fishing, hunting, boating, rockclimbing, horseback riding, cross-country skiing, rafting, and camping. In addition to the visual resources associated with these recreational areas, the scenic eastern Sierra Mountains and Mount Whitney (the highest peak in the Lower 48 states) underlie the airspace.

3.14.2.3 WTA

See Section 3.14.1.3 for a description of recreation and visual resources within the WTA.

3.14.3 VANDENBERG AFB, RANGES, AIRSPACE, AND WTA

3.14.3.1 Vandenberg AFB

Outdoor recreation on Vandenberg AFB includes camping, picnicking, hunting, fishing, horseback riding, wildlife viewing, bicycling, and off-road vehicle use. On base beaches, recreationists can engage in jogging, hiking, picnicking, swimming, and fishing. Developed base recreation areas include a golf course, swimming pool, gym, running track, ball fields, and tennis courts.

Visual resources at Vandenberg AFB include natural and human-made features. The terrain is dominated by low-growing chaparral vegetation between the Pacific coastline and the Coastal Range with deeply sloping hillsides and drainages. Human-made features include access roads, base buildings, missile launching and tracking facilities, and aircraft runways and hangars.

3.14.3.2 Ranges and Airspace

Recreation and visual resources underlying the ARs and airspace associated with Fort Hunter Liggett (including the Hunter MOAs) include Los Padres NF, San Antonio Reservoir, Nacimiento Reservoir, Big Sur coastline, San Simeon State Park, and W.R. Hearst Memorial State Beach. The region offers outstanding ocean views from scenic Highway 1 and area hiking trails. The airspace predominantly overlies California’s Central Valley, which is dominated by open, dry grassland and agricultural activities.

Recreational and visual resources associated with the China Lake EC Range (Edwards Airspace Complex) have been previously discussed in Section 3.14.2.2.

3.14.3.3 WTA

See Section 3.14.1.3 for a description of the recreation and visual resources within the WTA.

3.15 TRANSPORTATION

Transportation systems in the vicinity of Davis-Monthan, Edwards, and Vandenberg AFBs include roads, airports, and railroads. Since transportation systems beneath the airspace areas are not affected by aircraft overflights, the ROI for this discussion includes roadway networks on base and in the vicinity of the installations.

Level of service (LOS) is a measurement of congestion on roadways and is used to describe roadway conditions in this section. It is calculated by the ratio of volume to capacity or v/c ratio. LOS A, B, and C are represented by v/c ratios below 0.8; LOS D is between 0.8 and 0.9; LOS E is between 0.9 and 1.0; and LOS F is greater than 1.0.

3.15.1 DAVIS-MONTHAN AFB AND VICINITY

3.15.1.1 Regional and Local

Davis-Monthan AFB is located in the Tucson metropolitan area of Arizona. Regional access to the base is provided via Interstate 10 (I-10) and I-19. I-10 runs north from Tucson to Phoenix and east from Tucson to Las Cruces, New Mexico. I-19 runs south from Tucson to the border city of Nogales.

Traffic volume levels on Golf Links Road along the northern boundary of Davis-Monthan AFB range from 46,100 to 51,700 average daily trips (ADT) on a normal weekday (24-hour period, 2-way traffic). The volume along Kolb Road at the base's eastern boundary is 39,200 vehicles per day. The busiest intersection outside the base is at Golf Links Road and Swan Road at the base's main gate. Traffic flows along Golf Links Road are heaviest from 7:00 A.M. to 8:00 A.M. and from 5:00 P.M. to 6:00 P.M. (PAG 2001). The majority of personnel commute to and from the base.

Two of the busiest intersections accessing Davis-Monthan AFB are close to capacity. The intersection of Golf Links and Swan Roads is rated LOS E and the intersection of Craycroft and Golf Links Roads is rated LOS D (PAG 2001).

3.15.1.2 Base Access and Circulation

Major arterial roads to the base include Alvernon Way, Aviation Parkway, Swan Road, and Golf Links Road. Davis-Monthan AFB has 4 access gates (Main, Swan, Wilmot, and Irvington). The Main Gate is at the intersection of Golf Links Road and Craycroft Road, Swan Gate is at the intersection of Golf Links and Sunglow Roads, Wilmot Gate is located off Wilmot Road, and Irvington Gate is off Kolb Road. Golf Links Road, a major east-west route, and Kolb Road, a major north-south route, both connect to I-10 and I-19 and are controlled by signal lights (Davis-Monthan AFB 2000).

The majority of traffic through the installation is routed through Craycroft Road; the arterial combination of Sunglow Road, Fifth Street, and Yuma Street; Picacho Street; and Wilmot Road. Major connecting roadways on the installation include Quijota Road, Arizola Street, Comanche Street, Granite Street, Ironwood Street, First Street, and Third Street (Davis-Monthan AFB 2000).

3.15.2 EDWARDS AFB AND VICINITY

3.15.2.1 Regional and Local

Edwards AFB is bordered by State Highway 14 to the west, State Highway 58 to the north, and U.S. Highway 395 to the east. The base containment area is approximately 20 miles northeast of Lancaster, California.

3.15.2.2 Base Access and Circulation

Edwards AFB can be accessed by way of 3 gates: West Gate via Rosamond Boulevard from State Highway 14, North Gate via Rosamond Boulevard from State Highway 58, and South Gate via Lancaster Boulevard/120th Street East from Lancaster to the south. All roadways are improved with 2-inbound and 2-outbound lanes at each gate.

Lancaster and Rosamond Boulevards are the 2 primary roads on main base. These 2 roads form the spine of the base road system, providing high speed, high-volume access to connecting secondary and arterial roads and activity centers on main base. Significant secondary roads are Fitzgerald Boulevard, Forbes Avenue, Yeager Boulevard, and Wolfe Avenue. These roads are typically multi-lane with on-street parking prohibited. All other main base roads are classified as tertiary and service local areas of main base.

3.15.3 VANDENBERG AFB AND VICINITY

3.15.3.1 Regional and Local

Vandenberg AFB lies approximately 7 miles northwest of the City of Lompoc, California. Running north-south through the base, State Highway 1 is the main access route to the base from Lompoc and Santa Maria (approximately 17 miles northeast of the base). Predominately 2-lane, State Highway 1 connects with the 4-lane U.S. Highway 101 approximately 20 miles south and approximately 30 miles north of the base. State Highways 135 and 246 are both 2-lane and lead to Vandenberg AFB via Highway 1 from the east.

ADT volumes on Highway 1 average between 16,300 vehicles per day between Lompoc and Casmalia and 12,000 in the section south of California Boulevard (California Department of Transportation 2001).

3.15.3.2 Base Access and Circulation

Three major gates provide access to Vandenberg AFB’s cantonment area: Santa Maria Gate (main gate) on California Boulevard, the Utah Gate on Utah Avenue, and the Lompoc Gate on Pine Canyon Road. Major routes on Vandenberg AFB include Highway 1, California Boulevard, Utah Avenue, Washington Avenue, Thirteenth Street, and Nebraska Avenue. All of the streets in the cantonment area operate at or better than LOS C (traffic moves at free flow speed with minimal or no delay).

4.0 ENVIRONMENTAL IMPACTS

This chapter presents an assessment of the potential impacts of implementing the Proposed Action or alternatives. To evaluate impacts, the analysis presented in this chapter overlays the components of the Proposed Action or alternatives described in Chapter 2.0 onto baseline conditions provided in Chapter 3.0. Cumulative effects of the Proposed Action and alternatives with other past, present, and reasonably foreseeable future actions at Davis-Monthan, Edwards, and Vandenberg AFBs and the ROI are presented in Chapter 5.0.

4.1 AIRSPACE

This section analyzes impacts of the Proposed Action or alternatives on the structure, management, and use of the affected airspace. This evaluation focuses on whether the Proposed Action or alternatives would require alteration of airspace management procedures and assesses the capability of the airspace to accommodate the proposed use.

Impacts could occur if implementation of the Proposed Action or alternatives affect the movement of other air traffic in the area, ATC systems or facilities, or accident potential for mid-air collisions between military and non-participating civilian operations. Potential impacts were assessed to determine if proposed changes in aircraft operations would impact existing relationships with federal airways and airport-related air traffic operations.

The ROI for the Proposed Action and alternatives includes uncontrolled airspace, controlled airspace (Davis-Monthan AFB, AZ; Edwards AFB, CA, and Vandenberg AFB, CA), and special use airspace (MOAs, AR tracks, Ranges, and existing WTA) proposed for use under the Proposed Action and alternatives. For the purpose of this EA, a detailed analysis of potential impacts of the proposed aircraft operations within LATN areas is not presented. This is due to the following 3 reasons: 1) the proposed increase in annual sortie-operations equates to an increase of approximately 6 sorties per day; 2) the large area that the LATNs encompass (refer to Figures 3.1-1 and 3.1-7) and the relative randomness of aircraft operations within this large airspace (e.g., flight patterns are not confined to flight corridors and direction of flight is not restricted) makes it difficult to determine impacts to specific resource areas; and 3) all military aircraft operations would be similar to civilian and commercial aircraft operating within the LATN under VFR. In addition, no changes to the baseline structure or management of the LATN would be required to support the Proposed Action or alternatives and the airspace would be able to accommodate the proposed increase in sortie-operations.

4.1.1 PROPOSED ACTION: CSAR BEDDOWN AT DAVIS-MONTHAN AFB

4.1.1.1 Davis-Monthan AFB

Under the Proposed Action, no changes to the airspace structure associated with Davis-Monthan AFB or to the ATC procedures for its management would occur. Davis-Monthan AFB aircraft would continue to follow existing approach and departure routes and procedures, and would operate within the same airspace as they do under baseline conditions.

With implementation of the Proposed Action, annual aircraft sorties and airfield operations at Davis-Monthan AFB would increase from 19,566 to 22,316 (14 percent) and from (76,678 to 89,678 (17 percent), respectively (see Tables 2.3-4 and 2.3-5). This increase in annual flight operations would not exceed the capacity of Davis-Monthan AFB airspace. Although with implementation of the Proposed Action there would be an increase in the number of aircraft sorties and operations at Davis-Monthan AFB, no changes to ATC existing departure and approach procedures would occur. The proposed HH-60 and HC-130 aircraft are compatible with the existing aircraft assigned to Davis-Monthan AFB. Therefore, there would be no significant impacts to ATC operations at Davis-Monthan AFB under the Proposed Action.

4.1.1.2 Ranges and Airspace

Under the Proposed Action, training operations by HH-60 and HC-130 aircraft would occur in the BMGR (R-2301E, R-2304, and R-2305), Yuma TACTs Range (R-2301W), Sells Low MOA, and Jackal Low MOA. Annual use in scheduled airspace would increase by 6,369 sortie-operations.

MOAs

Under the Proposed Action, the number of sortie-operations in Sells Low MOA and Jackal Low MOA would increase by 2,121 (16 percent) and 2,120 (186 percent) annual sortie-operations, respectively, or an increase of approximately 8 sortie-operations per day in each MOA (see Table 2.3-6). This increased use of the existing MOAs under the Proposed Action would not affect general aviation in the region. There would be no need for new military special use airspace. Existing see-and-avoid procedures and avoidance measures for VFR civil aviation aircraft would remain unchanged. The scheduling, coordination, processes and procedures currently used to manage these MOAs are well established and would need no modification to support implementation of the Proposed Action. Controlling units would schedule use of the MOAs in accordance with existing regulations and letters of agreement with the FAA. Non-participating IFR military and civilian aircraft would continue to be directed above or around the MOA to avoid conflicts with the scheduled use of the MOAs. Therefore, no significant impacts to MOA airspace or civilian aviation would occur under the Proposed Action.

Ranges

Under the Proposed Action, the number of annual sortie-operations would increase within the East TAC Range of R-2304 by 1,148 (2 percent) and within the Yuma TACTS Range (R-2301W) by 405 (4 percent) (Table 4.1-1). Within the BMGR, there would be an increase of approximately 4 sortie-operations/day, with 50 percent of these occurring after dark. During those times when East TAC Range is closed (approximately 2 months/year) for annual cleanup and maintenance, CSAR operations would be conducted in the northeastern portion of North TAC Range (northeast of Crater Range) or at other approved off-station ranges (e.g., while on TDY at other installations). The proposed use of the Yuma TACTS Range would result in an increase of less than 2 sortie-operations/day. Operating procedures for scheduling and use of the BMGR and Yuma TACTs Range are well established and would need no modification to support implementation of the Proposed Action. Although there would be times of conflicting schedule requirements (e.g., annual TAC Range closures), controlling units would schedule use of the ranges in accordance with existing regulations. Therefore, no significant impacts to the airspace management of the ranges would occur under the Proposed Action.

Table 4.1-1. Proposed HH-60 and HC-130 Annual Sortie-Operations within BMGR under the Proposed Action

	Proposed Action						
	HH-60		*HC-130*			*Baseline/*	*%*
Range	*Day*	*Night*[1]	*Day*	*Night*[1]	*Total*	*No Action*	*Change*
BMGR (R-2301E, R-2304, R-2305)	585	90	473	0	1,148	59,608	2
Yuma TACTS Range (R-2301W)	225	45	135	0	405	10,975	4

Note: [1]Night = 10 P.M. – 7 A.M.
Sources: Air Force 1999, 2001a.

4.1.1.3 WTA

The WTA proposed for use under the Proposed Action would be an existing WTA established by the Navy off the coast of San Diego, California. The WTA is comprised of 2 areas (A1 and A2) that are a portion of a larger U.S. Navy administered training complex that extends to 24 NM offshore. Although there is no scheduling of this VFR area, Imperial Beach Ground Control monitors and provides flight monitoring and advisory activities. Currently, the area has multiple military (Navy, Air Force Reserve helicopters), USCG, and civilian users and had 2,964 sortie-operations in 2001. Implementation of the Proposed Action would increase the use of the WTA by 575 sortie-operations annually (19 percent) over baseline conditions (see Table 2.3-6). The airspace surrounding the region has several small commercial and general aviation airfields as well as a major international airport, San Diego International/Lindbergh Airport, and NAS North Island/Halsey. There are published departures and arrivals through Class B and D airspace to the north of the WTA.

With the relatively small number of proposed annual sortie-operations (500 HH-60 and 75 HC-130 annual sortie-operations) and the flight profiles of HH-60 and HC-130 training (low, VFR flight) in the WTA, implementation of the Proposed Action would not create a significant impact to current or the foreseeable future airspace use and management in the region of the WTA.

4.1.2 ALTERNATIVE A: CSAR BEDDOWN AT EDWARDS AFB

4.1.2.1 Edwards AFB

Under Alternative A, no changes to the airspace structure associated with Edwards AFB or to the ATC procedures for its management would occur. Edwards AFB aircraft would continue to follow existing approach and departure routes and procedures, and would operate within the same airspace as they do under baseline conditions.

With implementation of Alternative A, annual aircraft sorties and airfield operations at Edwards AFB would increase from 52,842 to 55,592 (5 percent) and from 162,364 to 175,364 (7 percent), respectively (see Tables 2.3-14 and 2.3-15). This increase in annual flight operations would not exceed the capacity of Edwards AFB airspace. Although with implementation of Alternative A there would be an increase in the number of aircraft sorties and operations at Edwards AFB, no changes to ATC existing departure and approach procedures would occur. The proposed HH-60 and HC-130 aircraft are compatible with the existing aircraft assigned to Edwards AFB. Therefore, there would be no significant impacts to ATC operations at Edwards AFB under Alternative A.

4.1.2.2 Ranges and Airspace

Under Alternative A, sortie-operations by the HH-60 and HC-130 aircraft would occur in the Edwards Airspace Complex (includes China Lake EC Range [R-2524]; Fort Irwin Range [R-2502N and E], portions of Isabella Owens MOAs, and the Edwards Range LATN). Annual airspace use would increase from 22,329 to 29,254 or approximately 31 percent (see Table 2.3-16).

Under Alternative A, the number of sortie-operations in Isabella and Owens MOAs would increase by 500 annual sortie-operations in each MOA, an increase of approximately 2 sortie-operations per day. The increased use of the existing MOAs under Alternative A would not affect general aviation in the region. There would be no need for new military special use airspace. Existing see-and-avoid procedures and avoidance measures for VFR civil aviation aircraft would remain unchanged. The scheduling, coordination, processes, and procedures currently used to manage these MOAs are well established and would need no modification to support implementation of Alternative A. Controlling units would schedule use of the MOAs in accordance with existing regulations and letters of agreement with the FAA. Non-participating IFR military and civilian aircraft would continue to be directed above or around the MOAs to avoid conflicts with the scheduled use of the MOAs. Therefore, no significant impacts to MOA airspace or civilian aviation would occur under Alternative A.

Operating procedures for scheduling and use of the China Lake EC and Fort Irwin Ranges are well established and would need no modification to support implementation of Alternative A. Controlling units would schedule use of the ranges in accordance with existing regulations. Therefore, no significant impacts to the airspace management of the ranges would occur under Alternative A.

4.1.2.3 WTA

Under Alternative A, the WTA and proposed activities would be the same as discussed under the Proposed Action; see Section 4.1.1.3. Therefore, there would be no impacts to airspace management in the region of the WTA with implementation of Alternative A.

4.1.3 ALTERNATIVE B: CSAR BEDDOWN AT VANDENBERG AFB

4.1.3.1 Vandenberg AFB

Under Alternative B, no changes to the airspace structure associated with Vandenberg AFB or to the ATC procedures for its management would occur. Vandenberg AFB aircraft (both transient and based) would continue to follow existing approach and departure routes and procedures, and would operate within the same airspace as they do under baseline conditions.

With implementation of Alternative B, annual aircraft sorties and airfield operations at Vandenberg AFB would increase from 8,451 to 11,201 (32 percent) and from 48,078 to 61,078 (27 percent), respectively (see Tables 2.3-22 and 2.3-23). This increase in annual flight operations would not exceed the capacity of Vandenberg AFB airspace. Although with implementation of Alternative B there would be an increase in the number of aircraft sorties and operations at Vandenberg AFB, no changes to ATC existing departure and approach procedures would occur. Vandenberg AFB ATC has the capability to handle increased airfield-operations with its current airspace management practices. The proposed HH-60 and HC-130 aircraft are compatible with the existing aircraft assigned to Vandenberg AFB (UH-1 helicopters). Therefore, there would be no significant impacts to ATC operations at Vandenberg AFB under Alternative B.

4.1.3.2 Ranges and Airspace

Under Alternative B, training sortie-operations by HH-60 and HC-130 aircraft would occur in the Edwards Airspace Complex (includes China Lake EC Range [R-2524] and the Isabella MOAs), Fort Hunter Liggett Range (R-2513), AR-242V, AR 243V, Hunter Low MOAs, and Priest and Vandenberg LATNs. Annual airspace use would increase from 22,329 to 24,304 annual sortie-operations (9 percent) in the Edwards Complex and would increase from 1,857 to 3,132 annual sortie-operations (69 percent) in R-2513 (Fort Hunter-Liggett).

AR Tracks

Under Alternative B, the number of annual sortie-operations in AR-242V and AR243V would increase by approximately 400 and 1,300 sortie-operations, respectively. This is an increase of approximately 1 sortie-operation per day in AR-242V and 5 sortie-operations per day in AR-243V. The increased use of the existing AR tracks would not affect general aviation in the region. There would be no need for new military special use airspace. Existing see-and-avoid procedures and avoidance measures for VFR civil aviation aircraft would remain unchanged. The scheduling, coordination, processes, and procedures currently used to manage these AR tracks are well established and would need no modification to support implementation of Alternative B. Therefore, no significant impacts to AR track airspace or civilian aviation would occur under Alternative B.

MOAs

Under Alternative B, the number of annual sortie-operations in the Hunter Low MOAs would increase by 500 sortie-operations, an increase of approximately 2 sortie-operations per day. The increased use of the existing MOAs would not affect general aviation in the region. There would be no need for new military special use airspace. Existing see-and-avoid procedures and avoidance measures for VFR civil aviation aircraft would remain unchanged. The scheduling, coordination, processes, and procedures currently used to manage these MOAs are well established and would need no modification to support implementation of Alternative B. Controlling units would schedule use of the MOAs in accordance with existing regulations and letters of agreement with the FAA. Non-participating IFR military and civilian aircraft would continue to be directed above or around the MOA to avoid conflicts with the scheduled use of the MOAs. Therefore, no significant impacts to MOA airspace or civilian aviation would occur under Alternative B.

Ranges

Under Alternative B, the number of annual sortie-operations in the Edwards Complex would increase from 22,329 to 24,304 (9 percent). Aircraft sortie-operations would increase from 1,857 to 3,132 (69 percent) in R-2513 (Fort Hunter-Liggett). Currently Fort Hunter Liggett Range (R-2513) is scheduled for only 27 percent of its availability (2,408 hours out of a total of 8,760 hours). Operating procedures for scheduling and use of the China Lake EC Range (R-2524) and the Fort Hunter Liggett Range (R-2513) are well established and would need no modification to support implementation of Alternative B. Controlling units would schedule use of the ranges in accordance with existing regulations. Therefore, no significant impacts to the airspace management of the ranges would occur under Alternative B.

4.1.3.3 WTA

Under Alternative B, the WTA and proposed activities would be the same as discussed under the Proposed Action; see Section 4.1.1.3. Therefore, there would be no impacts to airspace management in the region of the WTA with implementation of Alternative B.

4.1.4 ALTERNATIVE C: NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the proposed beddown of the CSAR unit (HH-60 and HC-130 aircraft and associated military personnel) and the ground-based and airspace training activities would not occur. Consequently, baseline conditions, as described in Section 3.1, would remain unchanged. Implementation of the No-Action Alternative would not change current activities at Davis-Monthan, Edwards, or Vandenberg AFBs; proposed training ranges; airspace units; or the WTA. Therefore, there would be no impacts to airspace.

4.2 NOISE

Noise effects in the vicinity of Davis-Monthan, Edwards, and Vandenberg AFBs were analyzed using the NOISEMAP (NMAP) computer model. Proposed HH-60 and HC-130 aircraft operations were added to the baseline aircraft operations. These values were then plotted to form noise contours in 5-dB increments ranging from 65 to 85 dB (DNL). By comparing these contours to the baseline noise environment, and by overlaying the contour plot on a map of the vicinity, the degree of change and the extent of noise effects were identified. Projected noise impacts for MOAs and restricted areas are based on the SEL levels of baseline and proposed aircraft types and the proposed number of operations under the Proposed Action or alternatives. The ROI for noise analysis includes the aerodromes of Davis-Monthan, Edwards, and Vandenberg AFBs; the MOAs, ranges; and restricted areas proposed for use by HH-60 and HC-130 aircraft. Operations within LATN areas have not been analyzed (see Section 4.1, Airspace). For a discussion of potential noise impacts within the WTA, refer to Section 4.9, Marine Biological Resources, and Appendix A, Aircraft Noise Analysis.

4.2.1 PROPOSED ACTION: CSAR BEDDOWN AT DAVIS-MONTHAN AFB

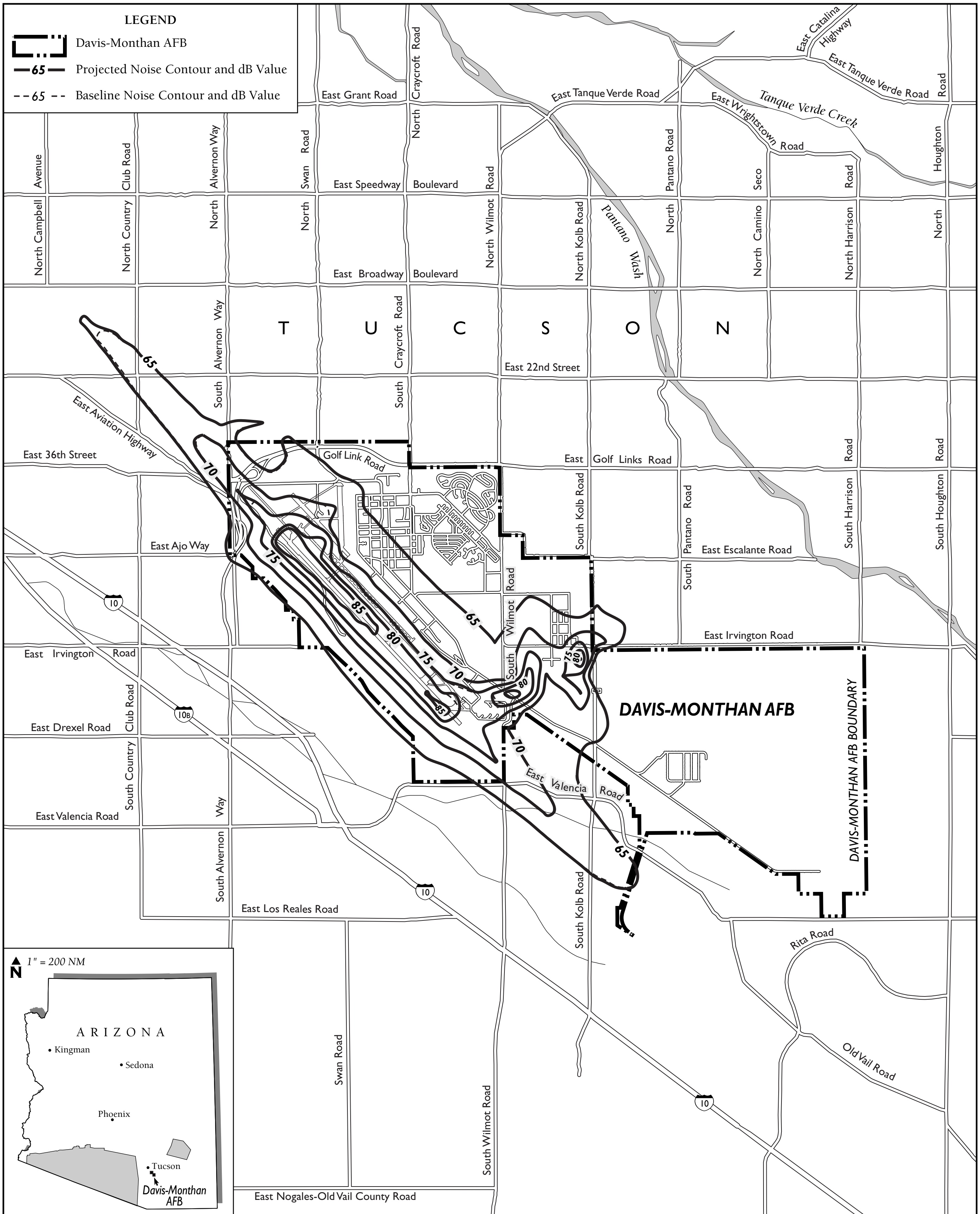
4.2.1.1 Davis-Monthan AFB

There would be no significant impacts to the noise environment at Davis-Monthan AFB. Under the Proposed Action, the total off-base acreage in the vicinity of Davis-Monthan AFB exposed to a DNL of 65-70 dB would increase by 49 acres (1%). HH-60s and C-130s currently operate out of Davis-Monthan AFB and with implementation of the proposed action there should be no discernable difference from existing conditions. People living in the vicinity of the base may experience additional aircraft overflights during late night hours when noise tends to be more intrusive. This increased annoyance is accounted for in the DNL methodology by applying a 10-dB penalty to all flights occurring between the hours of 10 P.M. and 7 A.M.

Under the Proposed Action, there would be a very minor increase in areas to the west of County Club Road that would be subjected to sound levels of 65-70 dB. While this change would increase the number of residences exposed to a DNL of 65 dB or greater from 2,200 to 2,230, this less than 1 dB change indicates that the number of people annoyed would remain similar to baseline conditions and no significant impacts are expected.

Table 4.2-1. Baseline and Projected Noise Contour Acreages in the Vicinity of Davis-Monthan AFB under the Proposed Action

Noise Contour (DNL)	*Baseline*	*Proposed Action*	*Change*
65-70 dB	3,457	3,506	+49
70-75 dB	1,279	1,293	+14
75-80 dB	636	642	+6
80+ dB	551	564	+13
Total	**5,923**	**6,005**	**+82**



Kilometers 0 2

Miles 0 1.5

Figure 4.2-1
Projected Noise Contours for Davis-Monthan AFB
under the Proposed Action

4.2.1.2 Ranges and Airspace

Aircraft operations in the BMGR are dominated by F-16 aircraft. Because noise is added on a logarithmic scale, SELs that are 10 dB apart are not additive to the louder noise source which is dominant. Aircraft operations on BMGR are dominated by the F-16 (118 dB) and A-10 (106.8 dB), and SELs for those aircraft are greater than 10 dB louder than the HH-60 (90.9) or C-130 (96.4) aircraft proposed for use under the Proposed Action. For increases in operations to cause changes in overall DNL levels requires a significant change in the number of operations of the dominant aircraft. A doubling of the number of sortie operations would be required to change the DNL by 3 dB. Operations in R-2304 will be increased by 2%, Yuma TACTS Range by 4%, and the Sells MOA by 16%. Coupled with the dominant fighter aircraft, the DNL in the affected airspace under the Proposed Action would not change appreciably from baseline conditions.

Proposed aircraft operations at NAS North Island in support of training operations within the WTA would not increase significantly from the current level (an increase of less than 1%). In addition, all CSAR operations would depart NAS North Island and travel due south to the WTA and would not fly over any nearby communities. Therefore, there would be no significant noise impacts to communities in the vicinity of NAS North Island.

4.2.2 ALTERNATIVE A: CSAR BEDDOWN AT EDWARDS AFB

4.2.2.1 Edwards AFB

Under Alternative A, DNL noise levels in the vicinity of North Base would increase slightly to a DNL of 65 dB. While residences of North Edwards could experience an increase in aircraft overflights, no off-base areas would be affected by DNL noise levels greater than 65 dB (DNL), and no significant impacts would be expected. Figure 4.2-2 presents baseline and projected noise contours in the vicinity of Edwards AFB.

4.2.2.2 Ranges and Airspace

As with the BMGR, aircraft operations in the Edwards Airspace Complex are dominated by jet aircraft, primarily F-16s, T-38s, F-15s, and F-18s. Changes in noise levels within the affected airspace under Alternative A would be similar to that previously discussed under the Proposed Action (i.e., the SELs of the predominant jet aircraft would dominate the proposed HH-60 and HC-130 aircraft). Coupled with the dominant fighter aircraft, the DNL in the affected airspace under Alternative A would not change appreciably from baseline conditions.

4.2.3 ALTERNATIVE B: CSAR BEDDOWN AT VANDENBERG AFB

4.2.3.1 Vandenberg AFB

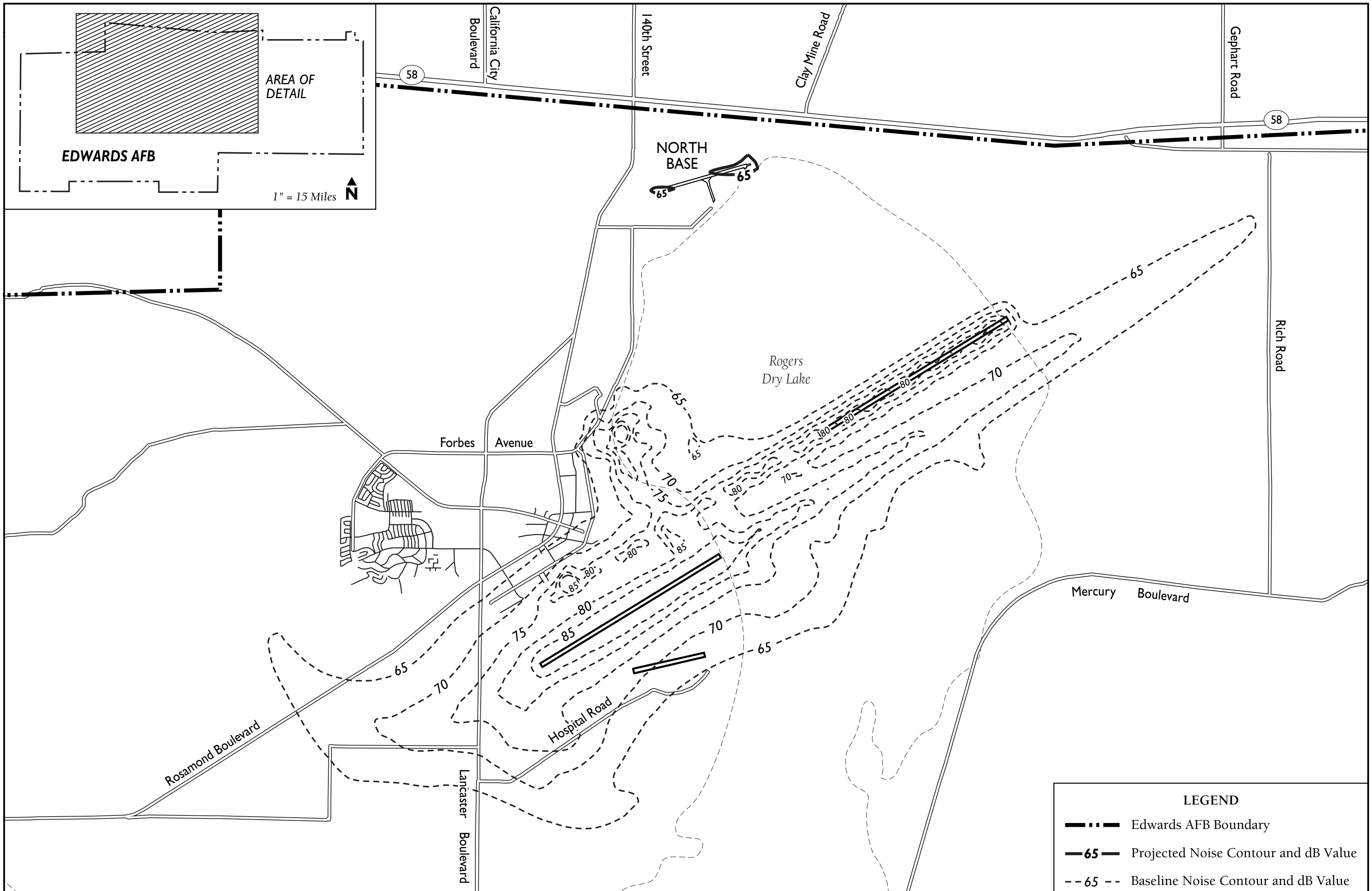
Under Alternative B, DNL noise levels at Vandenberg AFB would increase slightly to a DNL of 65 dB. While residences on base could experience an increase in aircraft overflights, no off-base areas would be affected by DNL noise levels greater than 65 dB (DNL), and no significant impacts would be expected. The only area subjected to an increase in noise levels above 65 dB (DNL) occurs over the Pacific Ocean. Figure 4.2-3 presents baseline and projected noise contours in the vicinity of Vandenberg AFB.

4.2.3.2 Ranges and Airspace

As with Alternative A, aircraft operations in the affected airspace under Alternative B are dominated by jet aircraft, primarily F-16s, F-15s, and F-18s. Changes in noise levels within the affected airspace under Alternative B would be similar to that previously discussed under the Proposed Action (i.e., the SELs of the predominant jet aircraft would dominate the proposed HH-60 and HC-130 aircraft). Coupled with the dominant fighter aircraft, the DNL in the affected airspace under Alternative B would not change appreciably from baseline conditions.

4.2.4 ALTERNATIVE C: NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the proposed beddown of the CSAR unit (HH-60 and HC-130 aircraft and associated military personnel) and the ground-based and airspace training activities would not occur. Consequently, baseline conditions, as described in Section 3.2, would remain unchanged. Implementation of the No-Action Alternative would not change current activities and therefore the noise environment at Davis-Monthan, Edwards, or Vandenberg AFBs; proposed training ranges; within airspace units; or the WTA.



0 Kilometers 2.5

0 Miles 2

Figure 4.2-2
Projected Noise Contours for Edwards AFB under Alternative A

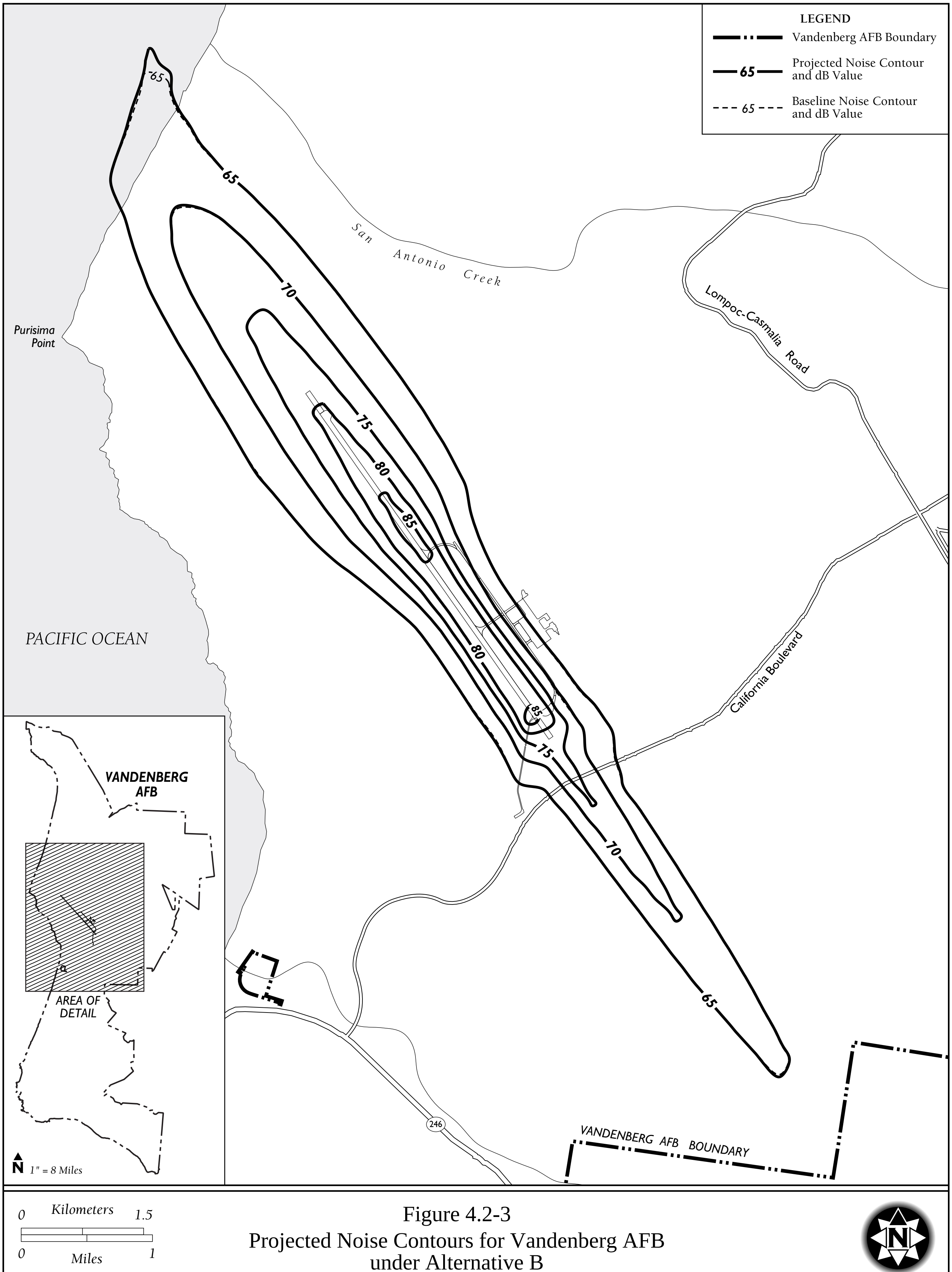


Figure 4.2-3
Projected Noise Contours for Vandenberg AFB
under Alternative B

4.3 AIR QUALITY

The assessment of potential air quality impacts involves estimating emissions that would result from aircraft operations and personnel changes associated with each alternative. The State of Arizona has adopted the primary and secondary NAAQS for all criteria pollutants. The State of California has established its own air quality standards, the CAAQS, which are generally more stringent than the NAAQS (refer to Figure 3.3-3). Air quality impacts would be significant if emissions from the implementation of any alternative would: 1) increase ambient air pollution concentrations above NAAQS or CAAQS, 2) contribute to an existing exceedance of NAAQS or CAAQS, 3) interfere with, or delay timely attainment of NAAQS or CAAQS, or 4) impair visibility within federally-mandated PSD Class I areas. Additionally, a conformity analysis would be required before initiating any action that may lead to an exceedance of *de minimis* criteria pollutant thresholds. For the purposes of this EA, air quality analysis has been conducted at the AQCR level for the Proposed Action and alternatives. If either of the alternatives in California are selected (i.e., CSAR beddown at Edwards or Vandenberg AFBs), then a more detailed air quality analysis will be conducted based on the appropriate APCDs and AQMDs for each airspace ROI.

Emissions associated with each alternative were estimated to assess potential exceedance of the criteria pollutant *de minimis* levels and NAAQS or CAAQS. This analysis included potential emissions from proposed aircraft operations in the ranges, AR Tracks, LATNs, and MOAs associated with each alternative, AGE emissions, vehicle emissions associated with the proposed increase in personnel, proposed construction activities, and airspace operations within the aerodromes associated with Davis-Monthan AFB, Vandenberg AFB, and Edwards AFB. For areas in attainment of the NAAQS or CAAQS, estimated emissions have been compared to *de minimis* levels for comparison purposes only; an exceedance of *de minimis* levels in these areas would not trigger a conformity analysis.

Airspace emissions have been presented as a function of the type of aircraft operating within the airspace within the associated AQCR, the number of operations, the amount of time per operation, and emissions factors associated with appropriate power settings. Presented emissions include volatile organic compounds (VOCs) and nitrogen oxides (NO_x), which include NO_2 and other compounds, which are precursors to the formation of ozone (O_3) in the atmosphere; carbon monoxide (CO); sulfur oxides (SO_x), which include SO_2 and other compounds; and particulate matter less than or equal to 10 microns in diameter (PM_{10}). Lead emissions have not been estimated, as aircraft emissions contain negligible amounts of lead. While aircraft would fly through other AQCRs en route to the WTA (refer to Figure 3.3-1), emissions as a result of time spent flying in these AQCRs have not been estimated as operations in the AQCRs would be transitory and short-term in nature.

4.3.1 PROPOSED ACTION: CSAR BEDDOWN AT DAVIS-MONTHAN AFB

4.3.1.1 Davis-Monthan AFB and Vicinity

Airfield Operations

Under the Proposed Action, sortie-operations within the Davis-Monthan AFB aerodrome would increase. As Davis-Monthan AFB is located within AQCR 269, emissions from implementation of the Proposed Action in AQCR 269 have been estimated and compared to applicable *de minimis* levels (Table 4.3-1).

AGE Emissions

Emissions from AGE would increase with implementation of the Proposed Action at Davis-Monthan AFB (Table 4.3-1).

Table 4.3-1. Estimated Annual Emissions in AQCR 269 under the Proposed Action

	Pollutant (tons/year)[1, 2]				
Airspace	*CO*	*VOCs*	*NO_x*	*SO_x*	*PM_{10}*
Airspace Operations	24.4	6.0	134.7	17.4	14.3
Davis-Monthan AFB (Airfield Operations)	10.5	7.5	19.1	1.4	2.4
Davis-Monthan AFB (AGE)	0.6	0.2	2.5	0.3	0.2
Davis-Monthan AFB (Vehicle Emissions)	8.6	3.4	6.8	-	1.5
Davis-Monthan AFB (Construction)	1.7	0.3	7.9	0.5	4.3[3]
Totals	**45.8**	**17.4**	**171.0**	**19.6**	**22.7**
de minimis threshold	100	100	100	100	100
Exceeds *de minimis* levels?	**No**	**NA**[4]	**NA**[5]	**No**	**No**

Notes: [1] Emissions have been calculated for the percentage of total sortie-operations occurring below 3,000 ft AGL.
[2] Sortie-operations in each AQCR have been determined based on percentages of each airspace within each AQCR.
[3] Includes 3.2 tons of fugitive dust emissions associated with grading and construction activities.
[4] The ROI is in attainment of the NAAQS for pollutants; *de minimis* levels are presented for comparison purposes only.
[5] While NO_x emissions are estimated to exceed *de minimis* levels, the ROI is in attainment of the NAAQS for NO_x; *de minimis* levels are presented for comparison purposes only and are therefore not applicable.

Vehicle Emissions

Emissions from vehicles at Davis-Monthan AFB would increase with the proposed increase in personnel under the Proposed Action (Table 4.3-1).

Construction Emissions

Under the Proposed Action, approximately 195,000 SF of construction would occur over a period of 4 years to support the beddown of the CSAR unit at Davis-Monthan AFB. Proposed construction activities would result in minor, temporary increases in criteria pollutant emissions (Table 4.3-1). The Air Force's Air Conformity Applicability Model (ACAM) was used to estimate emissions resulting from proposed construction activities at Davis-Monthan AFB. In addition, an emission factor of 1.2 tons/acre/month of activity was used to estimate total PM_{10} emissions resulting from grading and construction activities (USEPA 1999)

Total Davis-Monthan AFB Emissions.

As shown in Table 4.3-1, implementation of the Proposed Action would not exceed *de minimis* levels in AQCR 269 for all pollutants but NO_x. While NO_x emissions are estimated to exceed *de minimis* levels, the ROI is in attainment of the NAAQS for NO_x; *de minimis* levels are presented for comparison purposes only and are therefore not applicable. To assess potential impacts as a result of implementation of the Proposed Action with respect to NAAQS, pollutant concentrations were estimated assuming a uniform pollutant distribution in a fixed volume of air (AQCR 269) (Table 4.3-2). As shown in the table, Davis-Monthan AFB emissions would not cause an exceedance of NAAQS. In addition, implementation of the

Proposed Action would not impact visibility within PSD Class I Areas. Therefore, no significant impacts to air quality would occur as a result of implementation of the Proposed Action at Davis-Monthan AFB.

Table 4.3-2. Estimated Emission Concentrations in AQCR 269 under the Proposed Action

AQCR	*Criteria Pollutant*	*Averaging Period*	*Concentration*	
			NAAQS	*Projected Increment*
269	CO	1-hour	35 ppm	< 0.01 ppm
		8-hour	9 ppm	< 0.01 ppm
	NO_x	Annual	0.053 ppm	<< 0.01 ppm
	SO_x	24-hour	0.14 ppm	<< 0.01 ppm
		Annual	0.03 ppm	<< 0.01 ppm
	PM_{10}	24-hour	150 µg/m^3	< 0.01µg/m^3
		Annual	50 µg/m^3	< 0.01µg/m^3

Notes: ppm = parts per million.
µg/m^3 = micrograms per cubic meter.

4.3.1.2 Ranges and Airspace

Under the Proposed Action, sortie-operations would increase within the affected airspace. Emissions have been estimated and broken out into respective AQCRs and compared to applicable *de minimis* levels (Table 4.3-3). While aircraft would fly through other AQCRs en route to the WTA, emissions as a result of time spent flying in these AQCRs have not been analyzed as operations in these AQCRs would be transitory and short-term in nature.

To assess potential impacts as a result of implementation of the Proposed Action with respect to NAAQS, pollutant concentrations were estimated for each of the affected AQCRs (Table 4.3-4). As shown in the table, airspace emissions would not cause an exceedance of NAAQS. In addition, implementation of the Proposed Action would not impact visibility within PSD Class I Areas. Therefore, no significant impacts to air quality would occur as a result of implementation of the Proposed Action within the affected airspace.

Table 4.3-3. Estimated Annual Airspace Emissions in AQCRs 36, 268, 269, 271, and 272 under the Proposed Action

Airspace	*Pollutant (tons/year)*[1, 2] *CO*	*VOCs*	NO_x	SO_x	PM_{10}
AQCR 36					
Total	**3.5**	**0.8**	**18.4**	**3.6**	**2.0**
de minimis threshold	100	50	50	100	70
Exceeds *de minimis* levels?	**No**	**No**	**No**	**NA**[3]	**No**
AQCR 268					
Total	**2.4**	**0.3**	**6.5**	**5.4**	**0.9**
de minimis threshold	100	100	100	100	100
Exceeds *de minimis* levels?	**NA**[3]	**NA**[3]	**NA**[3]	**NA**[3]	**No**
AQCR 269					
Total	**24.4**	**6.0**	**134.7**	**17.4**	**14.3**
de minimis threshold	100	100	100	100	100
Exceeds *de minimis* levels?	**No**	**NA**[3]	**NA**[4]	**No**	**No**
AQCR 271					
Total	**3.1**	**0.7**	**17.3**	**2.3**	**1.8**
de minimis threshold	100	50	50	100	70
Exceeds *de minimis* levels?	**No**	**No**	**No**	**NA**[3]	**No**
AQCR 272					
Total	**26.4**	**6.5**	**145.8**	**18.6**	**15.4**
de minimis threshold	100	100	100	100	100
Exceeds *de minimis* levels?	**No**	**NA**[3]	**NA**[4]	**NA**[3]	**No**

Notes: [1] Emissions have been calculated for the percentage of total sortie-operations occurring below 3,000 ft AGL.
[2] Sortie-operations in each AQCR have been determined based on percentages of each airspace within each AQCR.
[3] The ROI is in attainment of the NAAQS for these pollutants; *de minimis* levels are presented for comparison purposes only.
[4] While emissions are estimated to exceed *de minimis* levels, the ROI is in attainment of the NAAQS for NO_x; *de minimis* levels are presented for comparison and are therefore not applicable.

Table 4.3-4. Estimated Emission Concentrations under the Proposed Action

AQCR	*Criteria Pollutant*	*Averaging Period*	*Concentration*		
			NAAQS	*CAAQS*	*Projected Increment*
164	CO	1-hour	35 ppm	20 ppm	< 0.01 ppm
		8-hour	9 ppm	9 ppm	< 0.01 ppm
	NO_x	Annual	0.053 ppm	-	<< 0.01 ppm
	SO_x	24-hour	0.14 ppm	0.04 ppm	<< 0.01 ppm
		Annual	0.03 ppm	-	<< 0.01 ppm
	PM_{10}	24-hour	150 µg/m^3	50 µg/m^3	< 0.01µg/m^3
		Annual	50 µg/m^3	30 µg/m^3	< 0.01µg/m^3
36, 268, 269, 271, 272	CO	1-hour	35 ppm	NA	< 0.01 ppm
		8-hour	9 ppm	NA	< 0.01 ppm
	NO_x	Annual	0.053 ppm	-	<< 0.01 ppm
	SO_x	24-hour	0.14 ppm	NA	<< 0.01 ppm
		Annual	0.03 ppm	-	<< 0.01 ppm
	PM_{10}	24-hour	150 µg/m^3	NA	< 0.01µg/m^3
		Annual	50 µg/m^3	NA	< 0.01µg/m^3

Notes: ppm = parts per million; µg/m^3 = micrograms per cubic meter; NA = not applicable, AQCR is not located within California.

4.3.1.3 WTA

Under the Proposed Action, sortie-operations would increase within the airspace associated with the WTA. Emissions have been estimated and compared to applicable *de minimis* levels (Table 4.3-5). To assess potential impacts as a result of implementation of the Proposed Action with respect to NAAQS and CAAQS, pollutant concentrations were estimated for AQCR 164 (see Table 4.3-4). As shown in the table, emissions associated with training activities in the WTA would not cause an exceedance of NAAQS or CAAQS. In addition, implementation of the Proposed Action would not impact visibility within PSD Class I areas.

Proposed aircraft operations at NAS North Island in support of training operations within the WTA would not increase significantly from their current level (an increase of less than 1%). Since air quality impacts within the WTA as a result of proposed training operations would not be significant and proposed NAS North Island operations are drastically less than those proposed in the WTA, no significant impacts to air quality would occur in the vicinity of NAS North Island. Therefore, no significant impacts to air quality would occur as a result of implementation of the Proposed Action within the WTA.

Table 4.3-5. Estimated Annual Airspace Emissions in AQCR 164 Associated with Aircraft Operations within the WTA under the Proposed Action and Alternatives A and B

	Pollutant (tons/year)[1, 2]				
	CO	*VOCs*	*NO_x*	*SO_x*	*PM_{10}*
WTA Aircraft Operations	1.3	0.2	3.0	3.3	0.5
de minimis threshold	100	50	50	100	100
Exceeds *de minimis* levels?	**NA**[3]	**No**	**No**	**NA**[3]	**No**

Notes: [1] Emissions have been calculated for the percentage of total sortie-operations occurring below 3,000 ft AGL
[2] Sortie-operations in each AQCR have been determined based on percentages of each airspace within each AQCR.
[3] The ROI is in attainment of the NAAQS and CAAQS for these pollutants; *de minimis* levels are presented for comparison purposes only.

4.3.2 ALTERNATIVE A: CSAR BEDDOWN AT EDWARDS AFB

4.3.2.1 Edwards AFB and Vicinity

Airfield Operations

Under Alternative A, sortie-operations within the Edwards AFB aerodrome would increase. As Edwards AFB is located within AQCR 167, emissions from implementation of Alternative A in AQCR 167 have been estimated and compared to applicable *de minimis* levels (Table 4.3-6).

Table 4.3-6. Estimated Annual Emissions in AQCR 167 under Alternative A

Airspace	*Pollutant (tons/year)*[1, 2]				
	CO	*VOCs*	*NO_x*	*SO_x*	*PM_{10}*
Airspace Operations	8.4	1.9	41.0	9.1	4.5
Edwards AFB (Airfield Operations)	8.6	7.1	9.7	2.5	1.5
Edwards AFB (AGE)	0.6	0.2	2.5	0.3	0.2
Edwards AFB (Vehicle Emissions)	24.3	9.6	19.3	--	4.1
Edwards AFB (Construction)	2.4	0.4	11.1	0.7	5.7[4]
Totals	**43.8**	**19.1**	**82.1**	**11.3**	**15.8**
de minimis threshold	100	50	50	100	100
Exceeds *de minimis* levels?	**NA**[3]	**No**	**Yes**	**NA**[3]	**No**

Notes: [1] Emissions have been calculated for the percentage of total sortie-operations occurring below 3,000 ft AGL.
[2] Sortie-operations in each AQCR have been determined based on percentages of each airspace within each AQCR.
[3] The ROI is in attainment of the NAAQS and CAAQS for CO and SO_x; *de minimis* levels are presented for comparison purposes only.
[4] Includes 4.5 tons of fugitive dust emissions associated with grading and construction activities.

AGE Emissions

Emissions from AGE would increase under Alternative A at Edwards AFB (see Table 4.3-6).

Vehicle Emissions

Emissions from vehicles at Edwards AFB would increase with the proposed increase in personnel under Alternative A (see Table 4.3-6).

Construction Emissions

Under Alternative A, approximately 206,000 SF of construction would occur over a period of 3 years to support the beddown of the CSAR at Edwards AFB. Construction activities associated with Alternative A would result in minor, temporary increases in criteria pollutant emissions. The Air Force's ACAM was used to estimate vehicle emissions resulting from proposed construction activities at Edwards AFB. In addition, an emission factor of 1.2 tons/acre/month of activity was used to estimate total PM_{10} emissions resulting from grading and construction activities (USEPA 1999) (see Table 4.3-6).

Total Edwards AFB Emissions

As shown in Table 4.3-6, implementation of Alternative A would exceed *de minimis* levels for NO_x in AQCR 167. To assess potential impacts as a result of implementation of Alternative A with respect to NAAQS and CAAQS, pollutant concentrations were estimated assuming a uniform pollutant distribution in a fixed volume of air (AQCR 167) (Table 4.3-7). As shown in the table, Edwards AFB emissions would not cause an exceedance of NAAQS or CAAQS. In addition, implementation of Alternative A would not impact visibility within any PSD Class I Areas. However, since implementation of Alternative A in AQCR 167 could exceed *de minimis* levels of NO_x (a precursor to O_3, which the AQCR is in non-attainment for), further detailed analysis would be required at the APCD or AQMD level to determine if the *de minimis* levels are exceeded.

Table 4.3-7. Estimated Emission Concentrations for AQCR 167 under Alternative A

Criteria Pollutant	*Averaging Period*	*Concentration*		
		NAAQS	*CAAQS*	*Projected Increment*
CO	1-hour	35 ppm	20 ppm	< 0.01 ppm
	8-hour	9 ppm	9 ppm	< 0.01 ppm
NO_x	Annual	0.053 ppm	-	<< 0.01 ppm
SO_x	24-hour	0.14 ppm	0.04 ppm	<< 0.01 ppm
	Annual	0.03 ppm	-	<< 0.01 ppm
PM_{10}	24-hour	150 µg/m^3	50 µg/m^3	< 0.01µg/m^3
	Annual	50 µg/m^3	30 µg/m^3	< 0.01µg/m^3

Notes: ppm = parts per million; µg/m^3 = micrograms per cubic meter.

4.3.2.2 Ranges and Airspace

Under Alternative A, sortie-operations would increase within the affected airspace. Emissions have been estimated and broken out into respective AQCRs and compared to applicable *de minimis* levels (Table 4.3-8). While aircraft would fly through other AQCRs en route to the WTA, emissions as a result of time spent flying in these AQCRs have not been analyzed as operations in these AQCRs would be transitory and short-term in nature. Implementation of Alternative A would not violate applicable *de minimis* levels (Table 4.3-8).

Table 4.3-8. Estimated Annual Airspace Emissions for AQCRs 159, 165, and 167 under Alternative A

AQCR and Airspace	*Pollutant (tons/year)*[1, 2]				
	CO	*VOCs*	*NO_x*	*SO_x*	*PM_{10}*
AQCR 159					
Total	9.0	2.1	37.5	8.8	4.2
de minimis threshold	100	50	50	100	100
Exceeds *de minimis* levels?	**NA**[3]	**No**	**No**	**NA**[3]	**No**
AQCR 165					
Total	7.9	1.9	41.4	6.8	4.5
de minimis threshold	100	50	50	100	100
Exceeds *de minimis* levels?	**NA**[3]	**No**	**No**	**NA**[3]	**No**
AQCR 167					
Total	8.4	1.9	41.0	9.1	4.5
de minimis threshold	100	50	50	100	100
Exceeds *de minimis* levels?	**NA**[3]	**No**	**No**	**NA**[3]	**No**

Notes: [1] Emissions have been calculated for the percentage of total sortie-operations occurring below 3,000 ft AGL.
[2] Sortie-operations in each AQCR have been determined based on percentages of each airspace within each AQCR.
[3] The ROI is in attainment of the NAAQS and CAAQS for these pollutants; *de minimis* levels are presented for comparison purposes only.

To assess potential impacts as a result of implementation of Alternative A with respect to NAAQS and CAAQS, pollutant concentrations were estimated for each of the affected AQCRs (Table 4.3-9). As shown in the table, airspace emissions would not cause an exceedance of NAAQS or CAAQS. In addition, implementation of Alternative A would not impact visibility within PSD Class I Areas. Therefore, no significant impacts to air quality would occur as a result of implementation of Alternative A within the affected airspace.

Table 4.3-9. Estimated Emission Concentrations under Alternative A

AQCR	*Criteria Pollutant*	*Averaging Period*	*Concentration*		
			NAAQS	*CAAQS*	*Projected Increment*
159,165, and 167	CO	1-hour	35 ppm	20 ppm	< 0.01 ppm
		8-hour	9 ppm	9 ppm	< 0.01 ppm
	NO_x	Annual	0.053 ppm	-	<< 0.01 ppm
	SO_x	24-hour	0.14 ppm	0.04 ppm	<< 0.01 ppm
		Annual	0.03 ppm	-	<< 0.01 ppm
	PM_{10}	24-hour	150 $\mu g/m^3$	50 $\mu g/m^3$	< 0.01$\mu g/m^3$
		Annual	50 $\mu g/m^3$	30 $\mu g/m^3$	< 0.01$\mu g/m^3$

Notes: ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter.

4.3.2.3 WTA

Under Alternative A, air quality impacts in the WTA would be the same as described under the Proposed Action (Table 4.3-5).

4.3.3 ALTERNATIVE B: CSAR BEDDOWN AT VANDENBERG AFB

4.3.3.1 Vandenberg AFB and Vicinity

Airfield Operations

Under Alternative B, sortie-operations within the Vandenberg AFB aerodrome would increase. As Vandenberg AFB is located within AQCR 166, emissions from implementation of Alternative B in AQCR 166 have been estimated and compared to applicable *de minimis* levels (Table 4.3-10).

AGE Emissions

Emissions from AGE would increase under Alternative B at Vandenberg AFB (Table 4.3-10).

Table 4.3-10. Estimated Annual Airspace Emissions in AQCR 166 under Alternative B

Airspace	*CO*	*VOCs*	*NO_x*	*SO_x*	*PM_{10}*
	Pollutant (tons/year)[1, 2]				
Airspace Operations	8.5	1.9	43.7	7.8	4.7
Vandenberg AFB (Airfield Operations)	8.6	7.1	9.7	2.5	1.5
Vandenberg AFB (AGE)	0.6	0.2	2.5	0.3	0.2
Vandenberg AFB (Vehicle Emissions)	8.1	3.2	6.4	-	1.4
Vandenberg AFB (Construction)	2.4	0.4	10.8	0.7	7.8[3]
Totals	**28.2**	**12.8**	**73.1**	**11.3**	**15.6**
de minimis threshold	100	50	50	100	100
Exceeds *de minimis* levels?	**NA**[4]	**No**	**Yes**	**NA**[4]	**No**

Notes: [1] Emissions have been calculated for the percentage of total sortie-operations occurring below 3,000 ft AGL.
[2] Sortie-operations in each AQCR have been determined based on percentages of each airspace within each AQCR.
[3] Includes 6.6 tons of fugitive dust emissions associated with grading and construction activities.
[4] The ROI is in attainment of the NAAQS and CAAQS for these pollutants; *de minimis* levels are presented for comparison purposes only.

Vehicle Emissions

Emissions from vehicles at Vandenberg AFB would increase with the proposed increase in personnel under Alternative B (see Table 4.3-10).

Construction Emissions

Under Alternative B, approximately 200,000 SF of construction would occur over a period of 3 years to support the beddown of the CSAR at Vandenberg AFB. Construction activities associated with Alternative B would result in minor, temporary increases in criteria pollutant emissions. The Air Force's ACAM was used to estimate vehicle emissions resulting from proposed construction activities at Vandenberg AFB. In addition, an emission factor of 1.2 tons/acre/month of activity was used to estimate total PM_{10} emissions resulting from grading and construction activities (USEPA 1999) (see Table 4.3-10).

Total Vandenberg AFB Emissions

As shown in Table 4.3-11, implementation of Alternative B would exceed *de minimis* levels for NO_x in AQCR 166. To assess potential impacts as a result of implementation of Alternative B with respect to NAAQS and CAAQS, pollutant concentrations were estimated assuming a uniform pollutant distribution in a fixed volume of air (AQCR 166). As shown in Table 4.3-11, Vandenberg AFB emissions would not cause an exceedance of NAAQS or CAAQS. In addition, implementation of Alternative B would not impact visibility within PSD Class I areas. However, since implementation of Alternative B in AQCR 166 could exceed *de minimis* levels of NO_x (a precursor to O_3, which the AQCR is in non-attainment for), further detailed analysis would be required at the APCD or AQMD level to determine if the *de minimis* levels are exceeded.

Table 4.3-11. Estimated Annual Airspace Emissions in AQCR 166 under Alternative B

Criteria Pollutant	*Averaging Period*	*Concentration*		
		NAAQS	*CAAQS*	*Projected Increment*
CO	1-hour	35 ppm	20 ppm	< 0.01 ppm
	8-hour	9 ppm	9 ppm	< 0.01 ppm
NO_x	Annual	0.053 ppm	-	<< 0.01 ppm
SO_x	24-hour	0.14 ppm	0.04 ppm	<< 0.01 ppm
	Annual	0.03 ppm	-	<< 0.01 ppm
PM_{10}	24-hour	150 $\mu g/m^3$	50 $\mu g/m^3$	< 0.01$\mu g/m^3$
	Annual	50 $\mu g/m^3$	30 $\mu g/m^3$	< 0.01$\mu g/m^3$

Notes: ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter.

4.3.3.2 Ranges and Airspace

Under Alternative B, sortie-operations would increase within the affected airspace. Emissions have been estimated and broken out into respective AQCRs and compared to applicable *de minimis* levels (Table 4.3-12). While aircraft would fly through other AQCRs (17, 21, and 165) while in the Priest LATN (refer to Figure 3.3-1), emissions as a result of time spent flying in these AQCRs have not been estimated as the majority of operations in the Priest LATN would occur in AQCRs 160 and 166. In addition, while aircraft would fly through other AQCRs en route to the WTA, emissions as a result of time spent flying in these AQCRs have not been analyzed as operations in these AQCRs would be transitory and short-term in nature. As shown in Table 4.3-12, implementation of Alternative B would exceed *de minimis* levels for NO_x in AQCR 160.

Table 4.3-12. Estimated Annual Airspace Emissions in AQCRs 160 and 166 under Alternative B

AQCR and Airspace	*Pollutant (tons/year)*[1, 2] *CO*	*VOCs*	*NO_x*	*SO_x*	*PM_{10}*
AQCR 160					
Totals	**14.2**	**3.0**	**66.4**	**17.2**	**7.4**
de minimis threshold	100	50	50	100	100
Exceeds *de minimis* levels?	**NA**[3]	**No**	**Yes**	**NA**[3]	**No**
AQCR 166					
Totals	**8.5**	**1.9**	**43.7**	**7.8**	**4.7**
de minimis threshold	100	50	50	100	100
Exceeds *de minimis* levels?	**NA**[4]	**No**	**No**	**NA**[4]	**No**

Notes: [1] Emissions have been calculated for the percentage of total sortie-operations occurring below 3,000 ft AGL.
[2] Sortie-operations in each AQCR have been determined based on percentages of each airspace within each AQCR.
[3] Monterey and San Luis Obispo counties are in attainment of the NAAQS and of the CAAQS for CO, NO_x, and SO_x; *de minimis* levels are presented for comparison purposes only.
[4] The ROI is in attainment of the NAAQS and CAAQS for these pollutants; *de minimis* levels are presented for comparison purposes only.

To assess potential impacts in other AQCRs as a result of implementation of Alternative B with respect to NAAQS and CAAQS, pollutant concentrations were estimated for each of the affected AQCRs (Table 4.3-13). As shown in the table, airspace emissions would not cause an exceedance of NAAQS or CAAQS. In addition, implementation of Alternative B would not impact visibility within PSD Class I areas. However, since implementation of Alternative B in AQCRs 166 and 160 would exceed *de minimis* levels of NO_x (a precursor to O_3, which the AQCR is in non-attainment for) (see Tables 4.3-10 and 4.3-12, respectively), potentially significant impacts to air quality would occur. Further detailed analysis would be required at the APCD or AQMD level to determine if the *de minimis* levels are exceeded.

Table 4.3-13. Estimated Emission Concentrations under Alternative B

AQCR	*Criteria Pollutant*	*Averaging Period*	*Concentration*		
			NAAQS	*CAAQS*	*Projected Increment*
160	CO	1-hour	35 ppm	20 ppm	< 0.01 ppm
		8-hour	9 ppm	9 ppm	< 0.01 ppm
	NO_x	Annual	0.053 ppm	-	<< 0.01 ppm
	SO_x	24-hour	0.14 ppm	0.04 ppm	<< 0.01 ppm
		Annual	0.03 ppm	-	<< 0.01 ppm
	PM_{10}	24-hour	150 µg/m^3	50 µg/m^3	< 0.01µg/m^3
		Annual	50 µg/m^3	30 µg/m^3	< 0.01µg/m^3

Notes: ppm = parts per million; µg/m^3 = micrograms per cubic meter.

4.3.3.3 WTA

Under Alternative B, air quality impacts in the WTA would be the same as described under the Proposed Action (see Table 4.3-5).

4.3.4 ALTERNATIVE C: NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the proposed beddown of the CSAR unit (HH-60 and HC-130 aircraft and associated military personnel) and the ground-based and airspace training activities would not occur. Consequently, baseline conditions, as described in Section 3.3, would remain unchanged. Implementation of the No-Action Alternative would not change current activities at Davis-Monthan, Edwards, or Vandenberg AFBs; proposed training ranges; airspace units; and WTA.

4.4 SAFETY

The following analysis assesses the potential safety impacts associated with the proposed CSAR beddown. Evaluated are the effects of flight risks associated with military operations (e.g., aircraft mishaps, aerial refueling, and BASH potential), use of ordnance, and fire and crash safety. In addition, as required under the Coastal Zone Management Act (CZMA), a Coastal Consistency Determination (CCD) on the potential effects of CSAR-related activities in the WTA will be completed and submitted to the California Coastal Commission for review.

For this analysis, the elements of the proposal with the potential to affect safety have been evaluated relative to the degree to which the action increases or decreases safety risks to aircrews, the public, and property. Safety issues analyzed in this section include: increased bird-aircraft strike hazard (BASH) potential, aircraft mishaps, fire and crash safety, accidental fuel spills during in-flight refueling operations, and unretrieved items expended in the marine environment (e.g., lightsticks and flares). Analysis of flight risks correlates Class A mishap rates and BASH potential with projected airspace use. When compared to similar data for baseline airspace use, assessments can be made for the magnitude of potential safety impacts resulting from the change. Fire and crash safety are assessed according to the potential increased risk, and the capability to manage that risk by responding to emergencies and preventing or suppressing fires.

Based on historical data of mishaps at all military installations and under all conditions of flight, the DoD calculates a Class A mishap rate per 100,000 flying hours for each type of aircraft in the inventory. The lifetime Class A mishap rate for the HH-60 helicopter is 2.85 per 100,000 flying hours, and the lifetime Class A rate for the HC-130 is 0.29 per 100,000 flying hours (AFSC 2002).

The ROI for the alternatives includes Davis-Monthan, Edwards, and Vandenberg AFBs; and respective ranges and affected airspace including restricted areas, MOAs, AR tracks, LATN areas, and the WTA.

4.4.1 PROPOSED ACTION: CSAR BEDDOWN AT DAVIS-MONTHAN AFB

4.4.1.1 Davis-Monthan AFB

Aircraft Mishaps

Under the Proposed Action, annual airfield operations at Davis-Monthan AFB would increase from 76,678 airfield operations under baseline levels to 89,678. This increase in flight activity of HC-130 and HH-60 aircraft at Davis-Monthan AFB would result in increases in potential aircraft mishaps. Based on the Class A mishap data, a potential Class A mishap would occur once every 15 years and once every 138 years for HH-60s and HC-130s, respectively. These extremely low mishap rates would not significantly impact safety to the Davis-Monthan AFB airfield flying environment.

Accident Potential Zones (APZs)

Under the Proposed Action, APZs would remain unchanged from baseline conditions. APZs are based on the number of operations, aircraft type, and the class of airport and account for all aircraft types and operations common to military airfields. Davis-Monthan AFB is designated a Class B airport and there would be no change to its airport class designation with implementation of the Proposed Action.

Therefore, no significant impacts to APZs at Davis-Monthan AFB would occur with implementation of the Proposed Action.

BASH

Under the Proposed Action, the increase of 15 percent in airfield operations would lead to a proportional increase in the amount of bird-aircraft strikes. Therefore, an increase in bird-aircraft strikes would increase the number from approximately 76 strikes per year to approximately 87 strikes per year. However, no aspect of the Proposed Action would create or enhance locales attractive to concentrations of birds, no would the current flight tracks at the base change. Additionally, Davis-Monthan AFB would continue efforts to reduce the incidence of bird-aircraft strikes in accordance with the Davis-Monthan AFB BASH Plan 91-202. Therefore, no significant impacts to bird-strike hazards at Davis-Monthan AFB would occur with implementation of the Proposed Action.

Fire and Crash Safety

Davis-Monthan AFB meets Air Force requirements for the amount and type of fire and crash equipment as well as for the number of personnel necessary to handle an aircraft mishap. The projected increase in airfield operations under the Proposed Action would not require additional staffing or equipment to respond to potential on-base fires and crashes. Therefore no significant impacts to fire and crash safety would occur with implementation of the Proposed Action.

4.4.1.2 Ranges and Airspace

Under the Proposed Action, sortie-operations would increase in all MOAs, Ranges, and LATNs from baseline conditions and the potential for a Class A mishap would increase slightly. Based on the total flying hours proposed for aircraft operations within affected airspace, there would be an HH-60 Class A mishap every 29 years and an HC-130 Class A mishap every 231 years. These mishap rates are extremely low and would not result in significant impacts to safety.

Gila Bend Air Force Auxiliary Field staffs a fire and crash rescue capability that responds to aircraft incidents at the auxiliary field and the ranges.

Air refueling would take place in authorized air refueling areas within existing MOAs under the Proposed Action or along published Air Refueling (AR) tracks. In-flight refueling is not considered to be a high-risk flying activity. In-flight refueling activities and associated flight risks would primarily associated with two or more aircraft flying in proximity to each other. There are minimum separation requirements for flying VFR in uncontrolled airspace. Since helicopter AR training distances are less than these requirements, the military assumes responsibility for separation of aircraft (MARSA) flying closer than what the FAA would approve. The Air Force has established helicopter AR procedures that provide guidance and directions for these situations. Air Force procedures are contained in Technical Order (TO) 1-1C-1-20, Section III, Rendezvous and Join-Up Procedures. This technical order dictates closure rates, visual conditions, and other restrictions to ensure safety.

Fuel spills can potentially occur during in-flight refueling. Such an event could affect public safety if large enough amounts of fuel reached the ground. The Air Force has conducted in-flight refueling of helicopters for many years and no documented fuel spills have occurred.

Air refueling that would be accomplished under the proposal between HH-60 and HC-130 aircraft would follow all established procedures for in-flight refueling operations, and required separation would be maintained between aircraft to minimize flight risks. In addition, the number of HH-60 and HC-130 wet-refueling operations is minimal (approximately 1 of every 5 practice refuelings), with associated low safety risks resulting from fuel spills. Since in-flight refueling conditions are the same for each of the alternative areas, no additional discussion of these issues is presented in this section. The increase in flight activities involving air refuelings would result in negligible increases in the potential for aircraft mishaps. Based on the Class A mishap data for each type aircraft (refer to Section 4.4.1.1), proposed aircraft activities would not have a significant impact to flight risks in the existing airspace.

During proposed refueling operations, there is a remote but potential scenario in which a helicopter blade could sever the fuel hose, releasing all contents from the hose (about 34 gallons of JP-8 aviation fuel) into the air. Approximately 13 gallons of fuel could actually reach to ground, and this amount would be spread over a relatively large area. At the most concentrated point within this area, the maximum expected concentration of fuel striking the surface would only be about 0.0002 ounce per square foot. This amount would be virtually imperceivable to a person on the ground, as it would be much less than the equivalent of a super fine mist. Furthermore, air-refueling areas within the MOAs or on published AR tracks overlie predominantly rural areas with relatively low population densities. While the severed fuel hose scenario could potentially occur, the Air Force has had only 1 case where the hose was severed. There was dropped object damage from the aircraft part; however, there was not report of fuel hitting the ground. Therefore, impacts of an accidental spill during refueling activities would not have significant impacts on safety.

All ordnance used during CSAR-related training activities will be handled and managed in accordance to current DoD, Air Force, range, and installation regulations and requirements. There would be no changes to ordnance and UXO handling procedures with implementation of the Proposed Action.

4.4.1.3 WTA

Flight Risks

With implementation of the Proposed Action sortie-operations would increase slightly in the WTA from baseline conditions. HH-60s would fly approximately 500 hours annually in the WTA equating to a potential Class A mishap every 70 years. HC-130s would fly approximately 37 annual hours in the WTA equating to a potential Class A mishap every 9,074 years. These mishap rates are extremely low and would not result in significant impacts to safety.

Based on the Bird Avoidance Model (BAM), the BASH risk factor for the WTA is identified as Moderate year-round. Proposed WTA aircraft activities would only slightly increase the potential for bird-strikes in the WTA. BASH potential is typically higher for high-speed fixed wing aircraft (e.g., jets) at low altitudes or in the vicinity of airfields. HH-60s would be hovering over the open ocean and flying relatively slowly (about 90 knots) within the WTA. This type of activity has a very low BASH risk. The HC-130s would be flying faster in the WTA (about 125 knots), but BASH would not pose a significant flight risk to these aircrews since concentrations of birds would be less over the WTA than along the shoreline.

Unretrieved Materials

An estimated 10,000 lightsticks would be deposited annually into the marine environment under the Proposed Action. Lightsticks would not represent a safety risk to the public because they are not considered to be toxic to humans. Search and rescue training operations in the WTA would also include the use of MK25 and MK6 marine flares. As described in Section 3.5.1, these flares are relatively safe and are intended to mark the location of downed personnel. Procedures for handling, storing, and maintenance of flares are found in *Air Force Technical Manual T.O. 11A10-26-7*. However, marine flares do present certain safety hazards. The marine flares are made of explosive and flammable materials, and if they are mishandled or unexpended they could create unintended fires or cause injury to the handler. The marine flares proposed for use have a reliability rate of 90-95 percent. Therefore, approximately 500-1,000 of the flares would potentially be unexpended. These unexpended flares could meet one of 3 fates: wash onshore, sink to the ocean bottom, or remain at sea. Any of these 3 scenarios could result in a potential public safety risk. Marine flares used by the Air Force and the Navy are marked with warning language and instructions to contact an appropriate safety officer. Only 1 such report has been received in the last 11 years (Naval Surface Warfare Center [NSWC] 1999). In addition, given the small quantity of potentially unexpended flares used and the large area in which flare drops would occur, the likelihood of a person encountering an unexpended flare is very low. No significant impacts would occur.

4.4.2 ALTERNATIVE A: CSAR BEDDOWN AT EDWARDS AFB

4.4.2.1 Edwards AFB

Under Alternative A, the flying hour program and the accident mishap rate for the HH-60 and HC-130 aircraft would be the same as discussed under the Proposed Action. There would be no unusual or unique operations required by HH-60 or HC-130 aircraft operations. There would be a 5 percent increase in annual aircraft sorties; therefore; no significant impacts to airfield operations would be expected.

Aircraft Mishaps

Since the number of proposed aircraft operations under Alternative A is the same as the Proposed Action, the aircraft mishap potential would be the same as previously discussed in Section 4.4.1.1.

Accident Potential Zones (APZs)

Under the Alternative A, APZs would remain unchanged from baseline conditions. APZs are based on the number of operations, aircraft type, and the class of airport and account for all aircraft types and operations common to military airfields. Edwards AFB is designated a Class B airport and there would be no change to its airport class designation with implementation of Alternative A. Therefore, no significant impacts to APZs at Edwards AFB would occur with implementation of Alternative A.

BASH

Under Alternative A, Edwards AFB bird-aircraft strike avoidance would remain in effect and no increased potential safety hazard would exist. Edwards AFB has an active “bird-aircraft strike hazard” BASH program to assist pilots in preventing bird strikes on aircraft. The program calls for modifications to operations according to bird watch threat conditions. During low threat conditions, normal operations prevail. Under moderate threat conditions, some restrictions would apply, such as limiting takeoffs, increasing altitude, and decreasing speed in the airfield environment. During severe bird strike threat conditions, all flying activity is either stopped or greatly curtailed, until the threat is reduced. Edwards AFB has in place extensive procedures to eliminate conflicts between aircraft originating from the base and other aircraft. During the wet season, Rosamond, Rogers, and Cuddeback Dry Lakes can be areas of potential bird strike hazards. Harper Dry Lake is an important stopover for migrant waterfowl and is a potential bird strike area year round. Large numbers of birds also congregate in the Piute Ponds area. Edwards AFB has established procedures in AFFTC Instruction 11-1, *Aircrew Operations*, to reduce the potential for accidents and to promote safety. There would be no significant impacts to safety in the airfield environment with implementation of Alternative A.

Fire and Crash Safety

Edwards AFB meets Air Force requirements for the amount and type of fire and crash equipment as well as for the number of personnel necessary to handle an aircraft mishap. The projected increase in airfield operations under Alternative A would not require additional staffing or equipment to respond to potential on-base fires and crashes. Therefore no significant impacts to fire and crash safety would occur with implementation of Alternative A.

4.4.2.2 Ranges and Airspace

Under Alternative A, the flying hour program and the accident mishap rate for the HH-60 and HC-130 aircraft within the affected airspace would be the same as discussed under the Proposed Action. No new safety procedures would need to be established for the HH-60 and HC-130 aircraft. The Edwards Complex has established procedures to keep non-participating military and civilian aircraft separate from the restricted areas where CSAR flight training would take place.

Based on BAM predictions for the Edwards Complex, there is a period of moderate bird activity and moderate threat of bird strike one hour before sunrise and one hour after sunset, from October through March. Edwards AFB does not normally schedule low altitude training in the Complex during these times. Edwards AFB has established procedures in AFFTC Instruction 11-1, *Aircrew Operations*, to reduce the potential for accidents and to promote safety. These procedures would remain in effect and there would not be any significant impacts to safety in the surrounding range and airspace used under Alternative A.

Under Alternative A, air-refueling activities would be the same as those previously discussed for the Proposed Action in Section 4.4.1.2. Air refueling activities would occur within existing MOAs within the Edwards Complex.

All ordnance used during CSAR-related training activities will be handled and managed in accordance to current DoD, Air Force, range, and installation regulations and requirements. There would be no changes to ordnance and UXO handling procedures with implementation of Alternative A.

4.4.2.3 WTA

Under Alternative A, potential safety impacts in the WTA would be the same as described under the Proposed Action; see Section 4.4.1.3.

4.4.3 ALTERNATIVE B: CSAR BEDDOWN AT VANDENBERG AFB

4.4.3.1 Vandenberg AFB

Under Alternative B the flying hour program and the accident mishap rate for the HH-60 and HC-130 aircraft would the same as discussed under the Proposed Action. Under the proposed flying hour program for the HC-130 and HH-60, a potential Class A mishap involving HH-60s could occur once every 15 years and a Class A mishap involving a HC-130 could occur once every 138 years at Vandenberg AFB. There would be a 25 percent increase in annual aircraft sorties under Alternative B. HH-60 and HC-130 aircrews would conduct no unusual or unique operations at the airfield. No significant impacts to airfield operations would be expected under this alternative.

Aircraft Mishaps

Since the number of proposed aircraft operations under Alternative B is the same as the Proposed Action, the aircraft mishap potential would be the same as previously discussed in Section 4.4.1.1.

Accident Potential Zones (APZs)

Under Alternative B, APZs would remain unchanged from baseline conditions. APZs are not based on the number of operations or aircraft type; rather they account for all aircraft types and operations common to military airfields. Therefore, so significant impacts to APZs at Vandenberg AFB would occur with implementation of Alternative B.

BASH

Under Alternative B, Vandenberg AFB bird-aircraft strike avoidance would remain in effect and no increased potential safety hazard would exist. Vandenberg AFB and their LATN area have a moderate BASH potential as identified by the Air Force's BAM. Vandenberg AFB BASH Plan 91-202, dated May 1999, identifies procedures and restrictions to minimize potential BASH. Vandenberg AFB would continue efforts to minimize the incidence of bird-aircraft strikes in accordance with the Vandenberg AFB BASH Plan. Therefore, no significant impacts to bird-strike hazards at Vandenberg AFB would occur with implementation of Alternative B.

Fire and Crash Safety

Vandenberg AFB meets Air Force requirements for the amount and type of fire and crash equipment as well as for the number of personnel necessary to handle an aircraft mishap. The projected increase in airfield operations under Alternative B would not require additional staffing or equipment to respond to potential on-base fires and crashes. Therefore no significant impacts to fire and crash safety would occur with implementation of Alternative B.

4.4.3.2 Ranges and Airspace

Under Alternative B the flying hour program and the accident mishap rate for the HH-60 and HC-130 aircraft within the affected airspace would the same as discussed under the Proposed Action. No new safety procedures would need to be established for the HH-60 and HC-130 aircraft with implementation of Alternative B.

Air refueling would take place in authorized air refueling areas AR-242V and AR-243V under Alternative B. In-flight refueling is not considered to be a high-risk flying activity. In-flight refueling activities and associated flight risks would primarily associated with two or more aircraft flying in proximity to each other as described in Section 4.4.1.2. There would be an increase of 303 air refueling sortie-operations in AR-242V and an increase of 1,314 sortie-operations in AR-243V. This increase in flight activities involving air refuelings would result in negligible increases in the potential for aircraft mishaps. Based on the Class A mishap data for each type aircraft (refer to Section 4.4.1.1), the proposed aircraft activity would not have a significant impact to flight risks in the existing airspace.

All ordnance used during CSAR-related training activities will be handled and managed in accordance to current DoD, Air Force, range, and installation regulations and requirements. There would be no changes to ordnance and UXO handling procedures with implementation of Alternative B.

4.4.3.3 WTA

Under Alternative B, potential safety impacts in the WTA would be the same as described under the Proposed Action; see Section 4.4.1.3.

4.4.4 ALTERNATIVE C: NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the proposed beddown of the CSAR unit (HH-60 and HC-130 aircraft and associated military personnel) and the ground-based and airspace training activities would not occur. Consequently, baseline conditions, as described in Section 3.4, would remain unchanged. Implementation of the No-Action Alternative would not change current activities at Davis-Monthan, Edwards, or Vandenberg AFBs; proposed training ranges; airspace units; and WTA. Therefore, there would be no impacts to safety.

4.5 MATERIALS MANAGEMENT

Potential impacts associated with hazardous materials and wastes are based on the use, toxicity, transportation, storage, and disposal of these substances. Hazardous materials and waste impacts result when activities involving these substances substantially increase human health risk or environmental exposure. Similarly, a significant impact would occur if an increase in the quantity or toxicity of hazardous substances used or generated exceeds the capacity to manage these materials in accordance with current regulations. If there is no change or a reduction in the quantity and types of hazardous substances used or generated, no adverse impacts would result. In addition, as required under the CZMA, a CCD on the potential effects of CSAR-related activities in the WTA will be completed and submitted to the California Coastal Commission for review.

The ROI for hazardous materials and hazardous waste includes each base and areas immediately surrounding the bases. Aircraft currently operate in the airspace proposed for use and aircraft operations would not generate or dispose of hazardous wastes in this airspace. Therefore, no further analysis of hazardous materials and wastes in the affected airspace is provided.

4.5.1 PROPOSED ACTION: CSAR BEDDOWN AT DAVIS-MONTHAN AFB

4.5.1.1 Davis-Monthan AFB

Hazardous Materials

Under the Proposed Action, hazardous materials associated with the beddown of HC-130 and HH-60 aircraft at Davis-Monthan AFB would include: paints, solvents, oils, stripping mixtures, and hydraulic fluids. These materials would be similar to materials currently used by other aircraft at Davis-Monthan AFB; there would not be any change in the procedures used to manage hazardous materials at Davis-Monthan AFB. Additionally, hazardous materials would be stored under applicable hazardous materials storage regulations. Should an accidental release or spill of hazardous substances occur, procedures within the *Spill Prevention and Response Plan* would be followed to minimize potential impacts.

Environmental Restoration Program. Under the Proposed Action, the 49 identified Environmental Restoration Program (ERP) sites at Davis-Monthan AFB would not be affected. Proposed construction activities would not occur within an identified ERP buffer zone. In addition, any new utility connectors or corridors (e.g., communications infrastructure) would be limited to trenches no deeper than 4 ft and would avoid any ERP sites. Therefore, no significant impacts associated with ERP sites would occur as a result of implementation of the Proposed Action.

Asbestos. Older buildings that are to be demolished or renovated at the beddown location under the Proposed Action could contain asbestos. If asbestos is encountered, appropriate safety measures would be taken by Air Force personnel in accordance with the Toxic Substances Control Act to minimize potential threats to human health. Any asbestos-containing materials removed from the existing buildings during demolition would be disposed of at a permitted hazardous waste disposal facility. Therefore, no significant impacts associated with asbestos-containing materials would occur with implementation of the Proposed Action.

Lead-Based Paint. Older buildings that are to be demolished or renovated at the beddown location under the Proposed Action could contain lead-based paint. If lead-based paint is encountered, appropriate safety measures would be taken by Air Force personnel to minimize potential threats to human health. Any lead-based paint containing materials removed from the existing buildings during demoltion would be disposed of at a permitted hazardous waste disposal facility. Therefore, no significant impacts associated with lead-based paint would occur with implementation of the Proposed Action.

Hazardous Waste

Under the Proposed Action, the addition of 10 HC-130 and 12 HH-60 aircraft at Davis-Monthan AFB would increase the annual amount of hazardous waste generated. Hazardous wastes associated with HC-130 and HH-60 aircraft would include paints, solvents, oils, stripping mixtures, and hydraulic fluids. Implementation of the Proposed Action would result in the projected addition of approximately 19,000 pounds of hazardous wastes per year, or an 11 percent increase over current levels (Table 4.5-1). Hazardous waste generation from other functions is not expected to change.

Table 4.5-1. Estimated Annual Hazardous Waste Generated at Davis-Monthan AFB under the Proposed Action (pounds/year)

Hazardous Waste Source	*Baseline*	*Proposed Action*
10 HC-130 Aircraft Support Functions	-	9,000
12 HH-60 Aircraft Support Functions	-	10,368
Other Aircraft Support Functions	90,071	90,071
All Other Functions	86,042	86,042
Total	**176,113**	**195,481**

The estimated increase in annual hazardous waste production at Davis-Monthan AFB would not affect Davis-Monthan AFB's hazardous waste generator status (the base would still be considered by the USEPA to be a large-quantity generator). The types of hazardous waste generated by HC-130 and HH-60 aircraft would be similar to waste streams associated with aircraft currently based at Davis-Monthan AFB. No additional hazardous waste storage tanks, improvements to spill containment structures, or changes to hazardous waste disposal procedures would be required under the Proposed Action. If new SAPs are found to be needed, they would be established in accordance with existing hazardous waste management guidelines as specified in Davis-Monthan AFB's *Hazardous Waste Management Plan.* Therefore, no significant impacts from hazardous materials and wastes would occur as a result of implementation of the Proposed Action.

Non-Hazardous Materials

Under the Proposed Action, construction of new facilities and renovation of existing facilities would occur. However, the increase in construction debris would not result in significant non-hazardous waste disposal impacts to existing off-base landfills. In addition, much of the construction debris and materials would be recycled or reused. Therefore, no significant impacts to materials management would occur with implementation of the Proposed Action.

4.5.1.2 Ranges

Materials generated through training exercises at BMGR and Yuma TACTS Range include metal fragments from inert ordnance, target debris, training ammunition, spent projectiles, and inert ordnance. Periodic use of live munitions for realistic training exercises may generate materials in the form of unexploded ordnance (UXO or duds). Cleanup of range materials is accomplished by explosive ordnance disposal (EOD) teams. The EOD teams are responsible for removal and disposal of inert training munitions, aircraft training ammunition, and other range residue, and for destroying unexploded ordnance on site. Range clearance would be accomplished in accordance with current Air Force regulations.

4.5.1.3 WTA

Under the Proposed Action, CSAR-related training activities would use 10,000 lightsticks, 2,320 marine flares, and 1,190 sea dye packs per year within the WTA. These items are not considered hazardous wastes. However, in sufficient numbers they could present a marine and shoreline debris issue, in addition to being a potential aesthetic consideration.

Both the MK6 and the MK25 ignition compositions contain small amounts of lead dioxide. Lead dioxide is a recognized poison and a powerful oxidizer that is a severe eye, skin, and mucous membrane irritant. When the ignition composition is heated, it emits toxic fumes of lead. The MK25 also contains phosphorous, a substance that is explosive, flammable, and toxic. Combustion products from the MK6 and MK25 are considered to be severely toxic, and inhalation of the fumes should be avoided (NSWC 1999). As the flares would be deployed in a dynamic environment, possible impacts associated with deployment would not be hazardous. This is because the pollutants would be quickly and effectively reduced to insignificant concentrations through dispersion and advection. Dispersion is a physical process by which pollutants are diffused as they move downwind or downgradient, and results in an associated decrease in contamination. Advection is a physical process by which pollutants are transported away from the source area by physical processes, in this case, wind. The potential for exposure to smoke generated by the flares would be minimal due to the remoteness of the WTA. Should a flare fail to deploy and be encountered by someone, instructions printed on the flares instruct the finder to contact appropriate authorities to remove the item (refer to Section 4.4, Safety).

The reliability rate (a percentage of the time successful deployment of the marine flares occurs) for the MK6 and MK25 marine flares is between 90 and 95 percent. Every 3 years, the flares undergo lot reliability tests in order to ensure a high reliability rate. Should a lot reliability test result in a reliability rate less than 88 percent, the flares are removed from service (NSWC 1999). At the current reliability rate (90-95 percent), it is estimated that WTA activities could potentially result in the deposition of 116 to 232 unexpended marine flares into the marine environment annually. A small percentage of MK6 and MK25 flares could fail to deploy, and could remain on the surface of the ocean. Depending on oceanographic conditions, the state of the flare, and the distance from shore that they are deployed, marine flares that do not deploy successfully could reach the beach environment. Generally, as marine flares are used closer to shore, the potential for failed marine location markers to end up at a beach environment increases. Due to the chemical and physical properties comprising the marine flares, failed marine location markers are considered "unexploded ordnance." Marine flares used by the Air Force and the Navy are marked with warning language and instructions to contact an appropriate safety officer. Only 1 such report has been received in the last 11 years.

Lightsticks

Illumination provided by lightsticks is generated by a chemical reaction that takes place when two solutions are allowed to mix. To prevent the reaction from occurring prematurely, one of the solutions is stored in a very thin glass capsule that is easily broken by flexing or bending the tube. Once the tube is broken, the two chemicals are allowed to mix, and illumination occurs. Cyalume is the active ingredient that creates the illumination associated with lightstick activation. Dimethyl phthalate is a component of cyalume and possesses a moderate potential to affect some aquatic organisms (Eastman Corporation 1999). However, it is not considered to be toxic to humans. Although it does not meet the criteria for a hazardous waste, hydrogen peroxide, one of the lightstick constituents, is an irritant to mammalian skin and mucous membranes at high concentrations. Due to the high-density plastic used to seal the lightsticks, it is unlikely that the materials contained within the lightstick would ever be discharged to the environment. However, should this ever occur, no harmful effects to aquatic organisms would result, due to the fact that when diluted with a large amount of water, neither dimethyl phthalate nor hydrogen peroxide are expected to have significant impacts (refer to Section 4.9, Marine Biological Resources).

When conditions allow, personnel involved in training operations within the WTA would attempt to recover lightsticks to the maximum extent practicable. Using a recovery rate of 1 percent, it is estimated that WTA activities would result in approximately 9,900 lightsticks entering the marine environment annually.

4.5.2 ALTERNATIVE A: CSAR BEDDOWN AT EDWARDS AFB

4.5.2.1 Edwards AFB

Hazardous Materials

Under Alternative A, hazardous materials impacts would be similar to those described under the Proposed Action (See Section 4.5.1.1). Therefore, there would be no significant impact to hazardous waste generation with implementation of Alternative A.

Under Alternative A, the 60 identified ERP sites at North Base would not be affected. Proposed construction activities would not occur within an identified ERP buffer zone (Figure 4.5-1). In addition, any new utility connectors or corridors (e.g., communications infrastructure) would be limited to trenches no deeper than 4 ft and would avoid any ERP sites. Therefore, no significant impacts associated with ERP sites would occur with implementation of Alternative A.

Hazardous Waste

Under Alternative A, the addition of 10 HC-130 and 12 HH-60 aircraft at Edwards AFB would increase the annual amount of hazardous waste generated. Hazardous wastes associated with HC-130 and HH-60 aircraft would include paints, solvents, oils, stripping mixtures, waste rags, and hydraulic fluids. Implementation of Alternative A would result in the projected addition of approximately 19,000 pounds of hazardous wastes per year, or a 3 percent increase over current levels (Table 4.5-2). Hazardous waste generation from other functions is not expected to change.

Table 4.5-2. Estimated Annual Hazardous Waste Generated at Edwards AFB under Alternative A (pounds/year)

Hazardous Waste Source	*Baseline*	*Alternative A*
10 HC-130 Aircraft Support Functions	-	9,000
12 HH-60 Aircraft Support Functions	-	10,368
Other Aircraft Support Functions	555,078	555,078
All Other Functions	48,936	48,936
Total	**604,014**	**623,383**

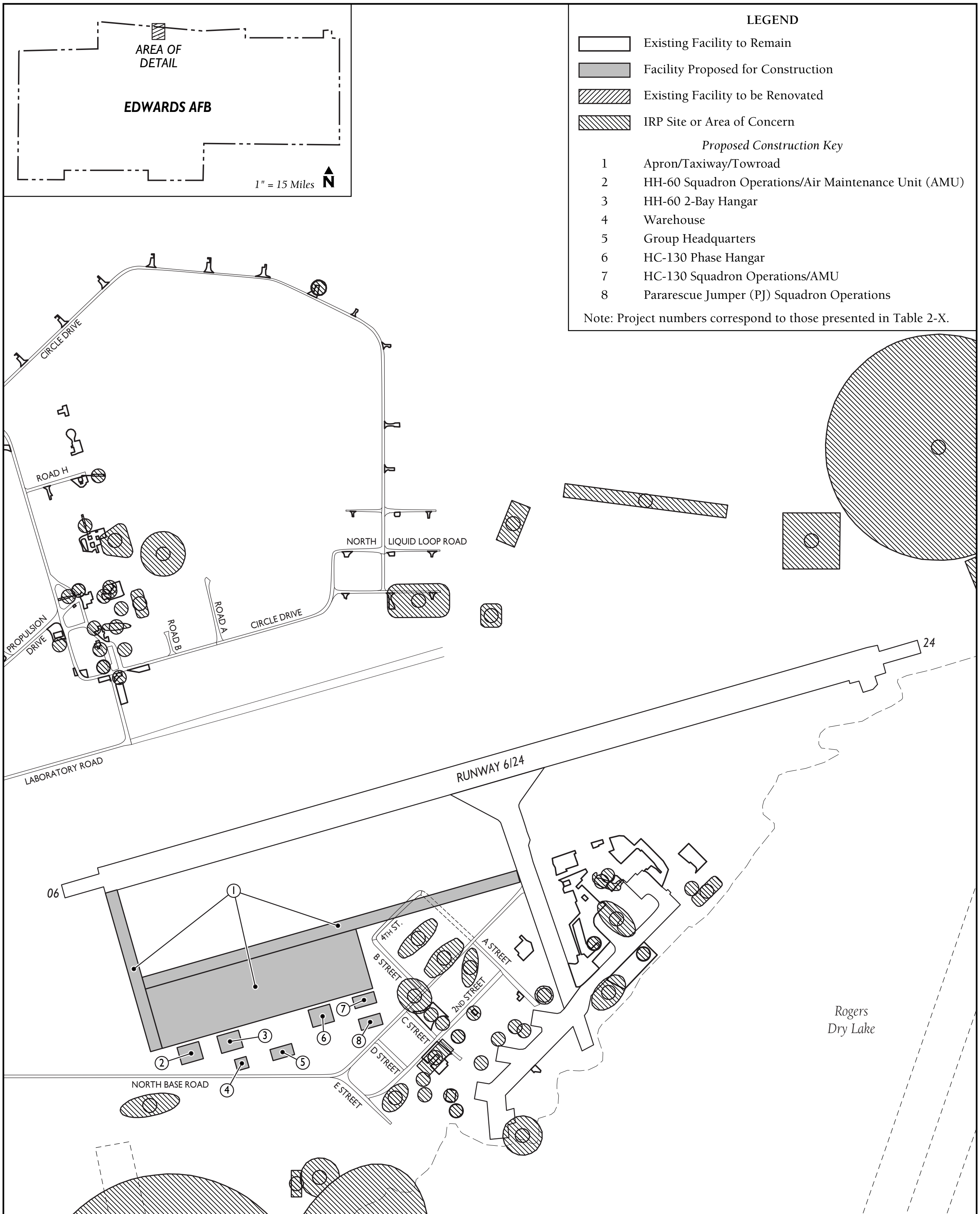


Figure 4.5-1
Location of IRP Sites and Areas of Concern in the Vicinity of the Proposed Construction and Renovation Projects at North Base, Edwards AFB

The estimated increase in annual hazardous waste production at Edwards AFB would not affect Edwards AFB's hazardous waste generator status (the base would still be considered by the USEPA to be a large-quantity generator). The types of hazardous waste generated by HC-130 and HH-60 aircraft would be similar to waste streams associated with aircraft currently based at Edwards AFB. No additional hazardous waste storage tanks, improvements to spill containment structures, or changes to hazardous waste disposal procedures would be required under Alternative A. If new SAPs are found to be needed, they would be established in accordance with existing hazardous waste management guidelines as specified in Edwards AFB's Hazardous Waste Management Plan. Therefore, no significant impacts to hazardous materials and waste management would occur as a result of implementation of Alternative A.

Non-Hazardous Waste

Under Alternative A, construction of new facilities and renovation of existing facilities would occur. However, the increase in construction debris would not result in significant non-hazardous waste disposal impacts to existing off-base landfills. In addition, much of the construction debris and materials would be recycled or reused. Therefore, no significant impacts to materials management would occur with implementation of Alternative A.

4.5.2.2 Ranges

Materials generated through training exercises at Fort Irwin and China Lake EC Range include metal fragments from inert ordnance, target debris, training ammunition, spent projectiles, and inert ordnance. Periodic use of live munitions for realistic training exercises may generate materials in the form of UXO or duds. Cleanup of range materials is accomplished by EOD teams. The EOD teams are responsible for removal and disposal of inert training munitions, aircraft training ammunition, and other range residue, and for destroying unexploded ordnance on site. Range clearance would be accomplished in accordance with current U.S. Army and Navy regulations.

4.5.2.3 WTA

Waste generation and management associated with Alternative A would be the same as that described under the Proposed Action (see Section 4.5.1.3). Therefore, there would be no significant impacts to waste generation associated with WTA operations with implementation of Alternative A.

4.5.3 ALTERNATIVE B: CSAR BEDDOWN AT VANDENBERG AFB

4.5.3.1 Vandenberg AFB

Hazardous Materials

Under Alternative B, hazardous materials generated from aircraft activity would be similar to those described under the Proposed Action (See Section 4.5.1.1). Therefore, there would be no significant impact to hazardous waste generation with implementation of Alternative B.

No ERP sites are located within or in the vicinity of proposed construction activities. Although 4 Areas of Concern are in the vicinity of the project area, none would be affected by proposed construction activities. Therefore, no significant impacts associated with ERP sites would occur as a result of implementation of Alternative B.

Hazardous Waste

Under Alternative B, the addition of 10 HC-130 and 12 HH-60 aircraft at Vandenberg AFB would increase the annual amount of hazardous waste generated. Hazardous wastes associated with HC-130 and HH-60 aircraft would include paints, solvents, oils, stripping mixtures, waste rags, and hydraulic fluids. Implementation of Alternative B would result in the projected addition of approximately 19,400 pounds of hazardous wastes per year, or a 6 percent increase over current levels (Table 4.5-3). Hazardous waste generation from other functions is not expected to change.

Table 4.5-3. Estimated Annual Hazardous Waste Generated at Vandenberg AFB under Alternative B (pounds/year)

Hazardous Waste Source	*Baseline*	*Alternative B*
HC-130 Aircraft Support Functions	-	9,000
HH-60 Aircraft Support Functions	-	10,368
All Other Functions	340,000	340,000
Total	**340,000**	**359,368**

The estimated increase in annual hazardous waste production at Vandenberg AFB would not affect the base's hazardous waste generator status. The types of hazardous waste generated by HC-130 and HH-60 aircraft would be similar to waste streams associated with activities currently being conducted at Vandenberg AFB. No additional hazardous waste storage tanks, improvements to spill containment structures, or changes to hazardous waste disposal procedures would be required under Alternative B. If new SAPs are found to be needed, they would be established in accordance with existing hazardous waste management guidelines as specified in Vandenberg AFB's *Hazardous Waste Management Plan.* Therefore, no significant impacts to hazardous materials and waste management would occur as a result of implementation of Alternative B.

Non-Hazardous Waste

Proposed construction and renovation activities under Alternative B would not result in significant non-hazardous waste disposal impacts to the existing on-base landfill. In addition, much of the construction debris and materials could be recycled or reused. Therefore, no significant impacts to waste generation would occur with implementation of Alternative B.

4.5.3.2 Ranges

Materials generated through training exercises at Fort Hunter Liggett Range and China Lake EC Range include metal fragments from inert ordnance, target debris, training ammunition, spent projectiles, and inert ordnance. Periodic use of live munitions for realistic training exercises may generate materials in the form of UXO or duds. Cleanup of range materials is accomplished by EOD teams. The EOD teams are responsible for removal and disposal of inert training munitions, aircraft training ammunition, and other range residue, and for destroying unexploded ordnance on site. Range clearance would be accomplished in accordance with current U.S. Army and Navy regulations.

4.5.3.3 WTA

Waste generation associated with Alternative B would be the same as that described under the Proposed Action (see Section 4.5.1.3). Therefore, there would be no significant impacts to waste generation associated with the WTA operations under Alternative B.

4.5.4 ALTERNATIVE C: NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the proposed beddown of the CSAR unit (HH-60 and HC-130 aircraft and associated military personnel) and the ground-based and airspace training activities would not occur. Consequently, baseline conditions, as described in Section 3.5, would remain unchanged. Implementation of the No-Action Alternative would not change current activities at Davis-Monthan, Edwards, or Vandenberg AFBs; proposed training ranges; airspace units; or the WTA. Therefore, there would be no impacts associated with materials management.

4.6 EARTH RESOURCES

The protection of unique geologic features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards are considered when evaluating impacts on geological resources. Generally, such impacts can be avoided or minimized if proper construction techniques, erosion control measures, and structural engineering measures are incorporated into project design.

The ROIs for the alternatives consist of the areas where proposed construction and ground-disturbing activities would occur at each alternative installation site. Ground-disturbing activities would only occur on approved ranges and would not occur on any land under any other airspace unit. Therefore, no further analysis of earth resources in these areas is provided.

4.6.1 PROPOSED ACTION: CSAR BEDDOWN AT DAVIS-MONTHAN AFB

4.6.1.1 Davis-Monthan AFB

The construction of new facilities to support the CSAR beddown at Davis-Monthan AFB would result in ground disturbance. However, proposed renovations or construction of new facilities would not significantly affect the geologic unit underlying Davis-Monthan AFB. No unique geologic features or hazards are present on base. Therefore, potential impacts to earth resources would be minimal, and no significant impacts would occur as a result of implementation of the Proposed Action.

Davis-Monthan AFB lies on mostly flat terrain and no significant topographical features would be affected by the proposed construction. Therefore, no significant impacts to topography would occur as a result of the implementation of the Proposed Action.

Soils would be disturbed during activities associated with the proposed facilities construction. However, soil disturbance would primarily occur in previously disturbed areas. Grading associated with construction would not require any special construction measures (e.g., recompaction) during grading activities. Because the proposed facilities construction would occur in an area that is relatively flat, runoff velocities would be slow. Some potential for soil erosion and transport of sediment exists during proposed construction activities. This potential would be minimized through the use of appropriate standard construction techniques (e.g., silt fencing), as needed, to control erosion. Therefore, potential impacts to earth resources would be minimal, and no significant impacts would occur as a result of the implementation of the Proposed Action.

4.6.1.2 Barry M. Goldwater Range (BMGR)

Since no construction associated with the Proposed Action would occur on ranges associated with this alternative, the only element of the alternative with the potential to affect earth resources is weapons firing. Weapons firing would occur only on DoD controlled land at the BMGR. This type of activity and potential ordnance-caused fires can reduce groundcover, thereby increasing the potential for soil erosion. However, several factors indicate that the use of the range under the Proposed Action would not measurably increase erosion or accelerate soil loss. First, notationally, the proposed number of live-fire training events per year on the range would be negligible in comparison to the number of live-fire training exercises that occur per year. There would be no increase in maintenance activities affecting groundcover and soils (i.e., disking of targets and firebreaks). Second, groundcover is very sparse over much of the existing target areas and the surrounding vicinities, so little opportunity exists for impacts due to weapons firing to reduce groundcover. Third, areas that do receive the most intensive weapons firing impacts (i.e., targets) occur on relatively flat ground. This topography is unsuitable for generating extensive erosion or soil loss. Lastly, low precipitation further reduces the potential for soil loss and erosion.

Fires remove groundcover, exposing soils to wind and water erosion. Although a flare-caused fire has the potential to remove groundcover, the probability of such an event is low because of the sparse groundcover in the target area and the restriction on minimum release altitudes for flares. Therefore, there would be no significant impacts to earth resources at the BMGR with implementation of the Proposed Action.

4.6.2 ALTERNATIVE A: CSAR BEDDOWN AT EDWARDS AFB

4.6.2.1 Edwards AFB

The construction of new facilities to support the CSAR beddown at Edwards AFB would result in ground disturbance. However, proposed renovations or construction of new facilities would not significantly affect the geologic unit underlying Edwards AFB. No unique geologic features or hazards are present on base. Therefore, potential impacts to earth resources would be minimal, and no significant impacts would occur as a result of implementation of Alternative A.

Edwards AFB lies on mostly flat terrain and no significant topographical features would be affected by the proposed construction. Therefore, no significant impacts to topography would occur as a result of the implementation of Alternative A.

Soils would be disturbed during activities associated with the proposed facilities construction. However, soil disturbance would primarily occur in previously disturbed areas. Grading associated with construction would not require any special construction measures (e.g., recompaction) during grading activities. Because the proposed facilities construction would occur in an area that is relatively flat, runoff velocities would be slow. Some potential for soil erosion and transport of sediment exists during proposed construction activities. This potential would be minimized through the use of appropriate standard construction techniques (e.g., silt fencing), as needed, to control erosion. Therefore, potential impacts to earth resources would be minimal, and no significant impacts would occur as a result of the implementation of Alternative A.

4.6.2.2 Ft. Irwin Range

Impacts to earth resources at the Ft. Irwin Range would be similar to those previously discussed for BMGR. Therefore, there would be no significant impacts to earth resources at the BMGR with implementation of Alternative A.

4.6.3 ALTERNATIVE B: CSAR BEDDOWN AT VANDENBERG AFB

4.6.3.1 Vandenberg AFB

The construction of new facilities to support the CSAR beddown at Vandenberg AFB would result in ground disturbance. However, proposed renovations or construction of new facilities would not significantly affect the geologic unit underlying Vandenberg AFB. No unique geologic features or hazards are present on base. Therefore, potential impacts to earth resources would be minimal, and no significant impacts would occur as a result of implementation of Alternative B.

The proposed project area at Vandenberg AFB lies on mostly flat terrain and no significant topographical features would be affected by the proposed construction. Therefore, no significant impacts to topography would occur as a result of the implementation of Alternative B.

Soils would be disturbed during activities associated with the proposed facilities construction. However, soil disturbance would primarily occur in previously disturbed areas. Grading associated with construction would not require any special construction measures (e.g. recompaction) during grading activities. Because the proposed facilities construction would occur in an area that is relatively flat, runoff velocities would be slow. Some potential for soil erosion and transport of sediment exists during proposed construction activities. This potential would be minimized through the use of appropriate standard construction techniques (e.g., silt fencing), as needed, to control erosion. Therefore, potential impacts to earth resources would be minimal, and no significant impacts would occur as a result of the implementation of Alternative B.

4.6.3.2 Ft. Hunter Liggett Range

Impacts to earth resources at the Ft. Hunter Liggett Range would be similar to those previously discussed for BMGR. Therefore, there would be no significant impacts to earth resources at the Ft. Hunter Liggett Range with implementation of Alternative B.

4.6.4 ALTERNATIVE C: NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the proposed beddown of the CSAR unit (HH-60 and HC-130 aircraft and associated military personnel) and the ground-based and airspace training activities would not occur. Consequently, baseline conditions, as described in Section 3.6, would remain unchanged. Implementation of the No-Action Alternative would not change current activities at Davis-Monthan, Edwards, or Vandenberg AFBs; proposed training ranges; airspace units; and WTA. Therefore, there would be no impacts to earth resources.

4.7 WATER RESOURCES

Potential impacts to water resources at each installation with implementation of the alternatives are associated with construction of new facilities, renovation of existing facilities, aircraft maintenance activities, and increased personnel. The evaluation of impacts to water use with increased personnel at each installation are presented in the discussion of utilities in Section 4.11, Socioeconomics. Potential impacts to water resources within the WTA are discussed in Section 4.9, Marine Biological Resources.

Since no construction associated with the alternatives would occur on any range or beneath any airspace unit proposed for use under each alternative, the only potential impacts to water resources within the affected airspace are associated with ordnance delivery, and chaff and flare use at the ranges.

4.7.1 PROPOSED ACTION: CSAR BEDDOWN AT DAVIS-MONTHAN AFB

4.7.1.1 Davis-Monthan AFB and Vicinity

Surface Water

Under the Proposed Action, proposed construction activities are expected to have no appreciable effects on the surface waters at Davis-Monthan AFB or the vicinity. Low precipitation in the region results in little surface water run-off. No perennial or ephemeral streams, natural lakes, or other open bodies of water are in the vicinity of the proposed construction activities. In addition, proposed activities would occur within previously disturbed areas of Davis-Monthan AFB. Therefore, impacts to surface waters at Davis-Monthan AFB would not be significant with implementation of the Proposed Action.

Groundwater

The addition of impervious (i.e., hardened) surfaces associated with the proposed construction would be minimal and would have no effect on groundwater resources. Ground disturbance associated with proposed renovation and construction activities would not reach depths that would affect groundwater resources. Therefore, no significant impacts to groundwater resources would occur as a result of implementation of the Proposed Action.

Floodplains

Proposed construction and renovation activities would not occur within any known 100-year floodplain. Therefore, no significant impacts to floodplains would occur as a result of implementation of the Proposed Action.

Wetlands

There are no delineated wetlands on Davis-Monthan AFB. Therefore, there would be no impacts to wetlands with implementation of the Proposed Action.

4.7.1.2 Ranges

Potential impacts to water resources from implementation of the Proposed Action at the BMGR are associated with air-to-ground weapons firing and associated ground disturbance and the use of chaff and flares. Potential impacts at the Yuma TACTS Range are limited to the use of chaff and flares as no live weapons firing would occur at this range.

Range activities and the potential effect they would have on surface water resources would be the same as currently exists. The proposed number of live-fire training events at BMGR would not measurably increase the potential for erosion. Proposed training would use existing targets and new disturbance of groundcover would be negligible. In addition, no additional maintenance of target areas would occur with this alternative. Low precipitation and the absence of surface water resources in the vicinity of existing target areas would also limit impacts to water resources at the BMGR.

As discussed in Section 3.5, Materials Management, the materials in chaff and flares are generally non-toxic. Laboratory tests of chaff, flare pellets, and flare ash indicate little or no potential for adverse effects on surface water resources (Naval Research Laboratory 1999). Therefore, under the Proposed Action, there would be no significant impacts to water resources from weapons firing at the BMGR and chaff and flare use at the BMGR and Yuma TACTS Range.

4.7.2 ALTERNATIVE A: CSAR BEDDOWN AT EDWARDS AFB

4.7.2.1 Edwards AFB

Surface Water

Under Alternative A, proposed construction activities are expected to have no appreciable effects on the surface waters at Edwards AFB. Low precipitation in the region results in little surface water run-off. No perennial or ephemeral streams, natural lakes, or other open bodies of water are in the vicinity of the proposed construction activities. In addition, proposed activities would occur within previously disturbed areas of Edwards AFB. Therefore, impacts to surface waters at Edwards AFB would not be significant with implementation of Alternative A.

Groundwater

The addition of impervious (i.e., hardened) surfaces associated with the proposed construction would be minimal and would have no effect on groundwater resources. Ground disturbance associated with proposed renovation and construction activities would not reach depths that would affect groundwater resources. Therefore, no significant impacts to groundwater resources would occur as a result of implementation of Alternative A.

Floodplains

Proposed construction and renovation activities would not occur within any known 100-year floodplain. Therefore, no significant impacts to floodplains would occur as a result of implementation of Alternative A.

Wetlands

There are no delineated wetlands at North Base, Edwards AFB. Therefore, there would be no impacts to wetlands with implementation of Alternative A.

4.7.2.2 Ranges

Potential impacts to water resources from implementation of Alternative A at the China Lake EC Range and Fort Irwin Range are associated with air-to-ground weapons firing and associated ground disturbance and the use of chaff and flares. Potential impacts at the China Lake EC Range are limited to the use of chaff and flares as no live weapons firing would occur at this range.

Impacts to surface water resources with implementation of Alternative A would be similar to those previously described for Alternative A. Therefore, there would be no significant impacts to water resources with implementation of Alternative A.

4.7.3 ALTERNATIVE B: CSAR BEDDOWN AT VANDENBERG AFB

4.7.3.1 Vandenberg AFB

Surface Water

Implementation of Alternative B would potentially result in a temporary increase in runoff and in total suspended particulate matter in nearby surface water features as a result of minimal site grading associated with facility construction. However, implementation of standard erosion control measures and incorporation of best management practices into project design and construction would minimize runoff and would be sufficient in minimizing construction-related sediment loading of surface waters. Therefore, potential impacts to surface waters would be temporary, and no significant surface water impacts would occur as a result of implementation of Alternative B.

Groundwater

The addition of impervious (i.e., hardened) surfaces associated with the proposed construction would be minimal and would have no effect on groundwater resources. Ground disturbance associated with proposed renovation and construction activities would not reach depths that would affect groundwater resources. Therefore, no significant impacts to groundwater resources would occur as a result of implementation of Alternative B.

Floodplains

Proposed construction and renovation activities would not occur within any known 100-year floodplains. Therefore, no significant impacts to floodplains would occur as a result of implementation of Alternative B.

Wetlands

The proposed construction activities would not occur near any delineated wetlands on Vandenberg AFB; therefore, there would be no impacts to wetlands with implementation of Alternative B.

4.7.3.2 Ranges

Potential impacts to water resources from implementation of Alternative B at the China Lake EC Range and Fort Hunter Liggett Range are associated with air-to-ground weapons firing and associated ground disturbance and the use of chaff and flares. Potential impacts at the China Lake EC Range are limited to the use of chaff and flares as no live weapons firing would occur at this range.

Impacts to surface water resources with implementation of Alternative B would be similar to those previously described for the Proposed Action. Therefore, there would be no significant impacts to water resources with implementation of Alternative B.

4.7.4 ALTERNATIVE C: NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the proposed beddown of the CSAR unit (HH-60 and HC-130 aircraft and associated military personnel) and the ground-based and airspace training activities would not occur. Consequently, baseline conditions, as described in Section 3.7, would remain unchanged. Implementation of the No-Action Alternative would not change current activities at Davis-Monthan, Edwards, or Vandenberg AFBs; proposed training ranges; airspace units; and WTA. Therefore, there would be no impacts to water resources.

4.8 TERRESTRIAL BIOLOGICAL RESOURCES

This section analyzes the potential for impacts to biological resources from implementation of the alternatives. Impacts potentially result from the projected changes in aircraft operations at the base and in airspace. Analysis of impacts on base focuses on whether and how ground-disturbing activities and changes in airfield operations may affect biological resources. For airspace, the analysis emphasizes those wildlife resources that might be affected by projected changes in airspace use.

Determination of the significance of potential impacts to biological resources is based on: 1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource; 2) the proportion of the resource that would be affected relative to its occurrence in the region; 3) the sensitivity of the resource to proposed activities; and 4) the duration of ecological ramifications. Impacts to biological resources are significant if species or habitats of concern are adversely affected over relatively large areas or disturbances cause reductions in population size or distribution of a species of concern.

4.8.1 PROPOSED ACTION: CSAR BEDDOWN AT DAVIS-MONTHAN AFB

4.8.1.1 Davis-Monthan AFB

Vegetation

Construction and renovation of facilities in the cantonment area associated with the Proposed Action would require small-scale vegetation removal in landscaped and previously disturbed areas. However, due to the lack of sensitive vegetation at the proposed sites, proposed construction would not have significant impacts on vegetation.

Wildlife

Construction activities associated with the Proposed Action could temporarily displace wildlife from suitable habitat in the immediate vicinity of the project area. Smaller, less mobile species and those seeking refuge in burrows (e.g., ground squirrels) could inadvertently be killed during construction activities; however, long-term impacts to populations of such species would not result and there would be no significant impacts to wildlife with implementation of the construction activities associated with the Proposed Action.

The increase in aircraft operations at Davis-Monthan AFB would not be expected to impact wildlife adversely as a result of bird-aircraft strikes. Despite having conducted hundreds of thousands of aircraft operations during the past 10 years, Davis-Monthan AFB has only experienced an average of approximately 76 bird strikes per year, primarily from O/A-10 operations. Bird-aircraft strike potential would not significantly increase under the Proposed Action due to the operational characteristics of CSAR-associated aircraft (i.e., HH-60 helicopters and HC-130 fixed-wing aircraft).

Implementation of the Proposed Action would not result in a significant increase in noise levels in the vicinity of Davis-Monthan AFB. Because aircraft have operated at the base for more than 20 years, wildlife species at and in the vicinity of the installation consist of those habituated to human disturbance and aircraft noise. Therefore, the change in the noise environment associated with implementation of the Proposed Action would not cause abandonment of habitat by wildlife or other adverse impacts.

Special-Status Species

No special-status species are known to occur within the vicinity of the proposed construction projects in the cantonment area of Davis-Monthan AFB. Therefore, there would be no impacts to threatened or endangered species with implementation of the construction activities associated with the Proposed Action.

4.8.1.2 Ranges and Airspace

Vegetation

Potential impacts to vegetation resources were evaluated for both direct and indirect effects as a result of fire; ordnance delivery, recovery, and removal; and maintenance of targets. Under the Proposed Action, CSAR personnel would use existing target areas on the East TAC and Yuma TACTS Ranges; no new roads, targets, or facilities would be built.

The use of flares and ordnance delivery may occasionally result in accidental fires that adversely affect vegetation and wildlife habitat by removing plant cover (short-term effect) or altering the plant community (long-term effect). Removal of vegetation can also lead to increased erosion and sedimentation that can cause long-term impacts. The level and extent of effects on biological resources are site specific and depend on factors such as type of plant community (i.e., adaptation to fire), season, and frequency of fires.

Range areas occasionally have fires, either caused by munitions spotting charges or, in rare cases, flares. Techniques used to keep fires from spreading include placing fire breaks around targets, on-site fire spotting, and operational restrictions. As stated in Table 2.3-7, illumination flares are released at altitudes above 3,000 ft AGL and are designed to burn out before reaching the ground. Luke AFB Supplement 1 to AFI 13-212 restricts the use of defensive flares within East TAC (R-2304) and the Yuma TACTS Range (R-2301W) to a minimum release altitude of 300 ft AGL when no fire hazards are present and a minimum of 1,000 ft AGL when fire hazards are present. Suspension of the use of flares during high-risk periods is an effective procedure to reduce fires (Air Force 1997a). Although fires do occasionally occur on the BMGR, they tend to be small and contained within the target areas, which are generally devoid of vegetation and have fire breaks around them. Therefore, impacts to vegetation on the ranges would be short term and minimal.

Wildlife

Potential impacts to wildlife were evaluated for both direct and indirect effects as a result of fire; ordnance delivery (including chaff and flares), recovery, and removal; maintenance of targets; and noise. Under the Proposed Action, CSAR personnel would use existing target areas on the East TAC and Yuma TACTS Ranges; no new roads, targets, or facilities would be built.

Flare use and ordnance delivery have the potential to cause accidental fires. Impacts to wildlife due to fire would be due to habitat disturbance, similar to those described for vegetation. These impacts would be short term and not significant.

The potential for chaff to affect wildlife is remote. Laboratory tests on chaff indicated little or no potential adverse effects on biological resources, either from ingestion or inhalation. Based on the properties of chaff and the digestive processes of animals, animals are not expected to suffer physical effects from chaff ingestion. Effects from inhalation are also not considered significant since chaff particles would represent a small percentage of particulates potentially inhaled by animals and the upper respiratory systems (including the nose) are effective in preventing particles from entering the airway (Naval Research Laboratory 1999).

Studies on the effects of noise on wildlife have been predominantly conducted on mammals and birds. Studies of subsonic aircraft disturbances on ungulates (e.g., pronghorn, bighorn sheep, elk, and mule deer), in both laboratory and field conditions, have shown that effects are transient and of short duration and suggest that the animals habituate to the sounds (Workman et al. 1992, Krausman et al. 1993, Weisenberger et al. 1996). Similarly, the impacts to raptors and other birds (e.g., waterfowl) from aircraft low-level flights were found to be brief and insignificant and not detrimental to reproductive success (Smith et al. 1988, Lamp 1989, Ellis et al. 1991, Grubb and Bowerman 1997). Consequently, changes to the number and types of overflights are not expected to result in significant impacts to wildlife or wildlife populations.

Special-Status Species

Under the Proposed Action, proposed CSAR training activities would occur on the East TAC Range and Yuma TACTS Range of the BMGR. No special-status species are known to occur within these areas. However, the endangered Sonoran pronghorn is known to occur on BMGR primarily in the area between the East TAC and Yuma TACTS Ranges (see Figure 3.8-1). Within the East TAC Range of BMGR, there would be an increase of approximately 4 sortie-operations/day, with 50 percent of these occurring after dark. The proposed use of the Yuma TACTS Range would result in an increase of less than 2 sortie-operations/day. To eliminate overflights of Sonoran pronghorn range and avoid potential impacts to pronghorn, proposed CSAR-training activities would:

- be limited to the East TAC Range to the maximum extent practicable;
- be conducted in the northeastern portion of North TAC Range (northeast of Crater Range, see Figure 3.8-1) or at other approved off-station ranges (e.g., while on TDY at other installations) during those times when East TAC Range is closed (approximately 2 months/year) for annual cleanup and maintenance;
- would transit to and from the Yuma TACTS Range and WTA by flying to the north of Interstate 8;
- would conduct all training activities within the BMGR (including the TAC Ranges) in accordance with the Conservation Measures and Terms and Conditions listed in the USFWS Biological Opinion issued to Luke AFB (the manager of BMGR) for proposed and on-going activities on the BMGR (USFWS 2001a); and
- would conduct all training activities within the Yuma TACTS Range to the west of 113 degrees 53 minutes West longitude, per the Terms and Conditions of the USFWS Biological Opinion issued to Marine Corps Air Station Yuma (the manager of the Yuma TACTS Range) for proposed and ongoing activities in the Yuma Training Range Complex (USFWS 2001b),

Overall, there would be no significant effect on special-status species due to noise with implementation of the Proposed Action because aircraft operations and noise levels within affected airspace units (MOAs, LATNs, and restricted areas) would not significantly increase over existing levels and would remain within the 62 dB (DNL) levels for the activities outlined in the Biological Opinion for on-going activities on BMGR (USFWS 2001a) and Yuma Training Range Complex (USFWS 2001b).

4.8.2 ALTERNATIVE A: CSAR BEDDOWN AT EDWARDS AFB

4.8.2.1 Edwards AFB

Vegetation

Construction and renovation of facilities in the cantonment area associated with Alternative A would require small-scale vegetation removal in landscaped and previously disturbed areas. However, due to the lack of sensitive vegetation at the proposed sites, proposed construction would not have significant impacts on vegetation.

Wildlife

Construction activities associated with Alternative A could temporarily displace wildlife from suitable habitat in the immediate vicinity of the project area. Smaller, less mobile species and those seeking refuge in burrows (e.g., ground squirrels) could inadvertently be killed during construction activities; however, long-term impacts to populations of such species would not result and there would be no significant impacts to wildlife with implementation of the construction activities associated with Alternative A.

The increase in aircraft operations at Edwards AFB would not be expected to impact wildlife adversely as a result of bird-aircraft strikes. Edwards AFB has experienced an average of approximately 12 bird-aircraft strikes per year (see Section 3.4, Safety). The 5 percent increase in aircraft operations would result in a similar increase in potential bird-aircraft strikes per year or an increase of less than 1 bird-aircraft strike per year.

Implementation of Alternative A would not result in a significant increase in noise levels at Edwards AFB. Because aircraft have operated at the base for more than 30 years, wildlife species at and in the vicinity of the installation consist of those habituated to human disturbance and aircraft noise. Therefore, the change in the noise environment associated with implementation of Alternative A would not cause abandonment of habitat by wildlife or other adverse impacts.

Special-Status Species

No special-status species are known to occur within the vicinity of the proposed construction projects in the North Base area of Edwards AFB. Therefore, there would be no impacts to special-status species with implementation of the construction activities associated with Alternative A.

4.8.2.2 Ranges and Airspace

Vegetation

Impacts to vegetation with implementation of Alternative A would be similar to those previously discussed for the Proposed Action; therefore, there would be no significant impacts to vegetation.

Wildlife

Impacts to wildlife with implementation of Alternative A would be similar to those previously discussed for the Proposed Action; therefore, there would be no significant impacts to wildlife.

Special-Status Species

The potential impacts from aircraft overflights in associated airspace on special-status species are expected to be similar to those discussed previously for wildlife.

4.8.3 ALTERNATIVE B: CSAR BEDDOWN AT VANDENBERG AFB

4.8.3.1 Vandenberg AFB

Vegetation

Construction and renovation of facilities in the cantonment area associated with Alternative B would require small-scale vegetation removal in landscaped and previously disturbed areas. However, due to the lack of sensitive vegetation at the proposed sites, proposed construction would not have significant impacts on vegetation.

Wildlife

Construction activities associated with Alternative B could temporarily displace wildlife from suitable habitat in the immediate vicinity of the project area. Smaller, less mobile species and those seeking refuge in burrows (e.g., gophers) could inadvertently be killed during construction activities; however, long-term impacts to populations of such species would not result and there would be no significant impacts to wildlife with implementation of the construction activities associated with Alternative B.

The increase in aircraft operations at Vandenberg AFB would not be expected to impact wildlife adversely as a result of bird-aircraft strikes. BASH-reduction measures would continue to be implemented per Vandenberg AFB's BASH Plan.

Implementation of Alternative B would not result in a significant increase in noise levels at Vandenberg AFB. Because aircraft and missile launch activities have occurred at the base for more than 20 years, wildlife species at and in the vicinity of the installation consist of those habituated to human disturbance and aircraft noise. In addition, CSAR activities would adhere to all restrictions contained in Vandenberg AFB flying regulations. Therefore, the change in the noise environment associated with implementation of Alternative B would not cause abandonment of habitat by wildlife or other adverse impacts.

Special-Status Species

No special-status species are known to occur within the vicinity of the proposed construction projects at Vandenberg AFB. In addition, to avoid any potential impacts to special-status species that may potentially occur beneath airfield approach/departure tracks (e.g., marine mammals, western snowy plovers, and least terns on area beaches), CSAR activities would adhere to all restrictions contained in Vandenberg AFB flying regulations. Therefore, there would be no impacts to special-status species with implementation of the construction activities associated with Alternative B.

4.8.3.2 Ranges and Airspace

Vegetation

Impacts to vegetation with implementation of Alternative B would be similar to those previously discussed for the Proposed Action; therefore, there would be no significant impacts to vegetation.

Wildlife

Impacts to wildlife with implementation of Alternative B would be similar to those previously discussed for the Proposed Action; therefore, there would be no significant impacts to wildlife.

Special-Status Species

The potential impacts from aircraft overflights in associated airspace on sensitive species are expected to be similar to those discussed previously for wildlife.

4.8.4 ALTERNATIVE C: NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the proposed beddown of the CSAR unit (HH-60 and HC-130 aircraft and associated military personnel) and the ground-based and airspace training activities would not occur. Consequently, baseline conditions, as described in Section 3.8, would remain unchanged. Implementation of the No-Action Alternative would not change current activities at Davis-Monthan, Edwards, or Vandenberg AFBs; proposed training ranges; and airspace units. Therefore, there would be no impacts to terrestrial biological resources.

4.9 MARINE BIOLOGICAL RESOURCES

This section analyzes the potential for impacts to marine biological resources from implementation of the Proposed Action or alternatives. This section comprises 3 major subsections: 1) marine flora; 2) invertebrates, fish, and sea turtles; and 3) marine mammals. Potential impacts from the Proposed Action and alternatives are addressed within each of these major subsections as appropriate. The major marine biological resource issues addressed within these subsections include: 1) the potential for marine marker ingestion by marine species of concern, and 2) potential acoustic impacts on marine mammals from aircraft overflights and CSAR training operations. In addition, as required under the CZMA, a CCD on the potential effects of CSAR-related activities in the WTA will be completed and submitted to the California Coastal Commission for review.

Since marine biological resources only occur in the WTA, this discussion focuses on the WTA and does not include proposed and alternative bases and their associated ranges or airspace.

4.9.1 PROPOSED ACTION: CSAR BEDDOWN AT DAVIS-MONTHAN AFB

4.9.1.1 Marine Flora

Approximately 10,000 lightsticks, 2,320 marine flares, and 1,190 sea dye packs are expected to be used in conjunction with CSAR training in the WTA each year. Although personnel may be able to recover some of this debris, a significant portion of the debris and their by-products are expected to be released into the marine environment. Some flare types may release small amounts of wood, aluminum, and magnesium into the marine environment. None of these substances are toxic so there would be no significant impacts to marine flora.

Due to the lack of extensive kelp forests and other marine flora in the WTA, the dispersed nature of proposed training operations within the WTA, and the rapid dispersion and dilution of the by-products of any of the marine location markers, impacts to marine flora would be insignificant.

4.9.1.2 Invertebrates, Fish, and Sea Turtles

Invertebrates

As discussed previously (see Marine Flora above), the use of marine location markers (i.e., flares, lightsticks, and sea dye packs) during search and rescue training operations in the WTA would result in the addition of these items or their by-products into the marine environment. Due to the dispersed nature of training operations within the WTA and the rapid dispersion and dilution of the by-products of any of the marine location markers, impacts to marine invertebrates would not be significant.

Fish

As discussed previously (see Marine Flora above), the use of marine location markers (i.e., flares, lightsticks, and sea dye packs) during search and rescue training operations in the WTA would result in the addition of these items or their by-products into the marine environment. Due to the dispersed nature of training operations within the WTA and the rapid dispersion and dilution of the by-products of any of the marine location markers, impacts to marine fish would not be significant.

Due to the nature of the proposed CSAR training activities in the WTA (e.g., short duration, transitory, and occurring on the ocean surface or immediately above) and the large size of the EFH zones surrounding the WTA, there would be no significant impacts to EFH within the WTA.

Sea Turtles

The ingestion of man-made debris constitutes a potential threat to sea turtles that occur in the study region (Balazs 1985; Carr 1987). Plastic can lodge in an animal's digestive tract causing reduced nutrient absorption, intestinal damage, releases of toxic chemicals, or blockages, which cause starvation (Balazs 1985).

Although rare in the area containing the WTA, leatherbacks and juvenile loggerheads are expected to be the most common sea turtles at the depths occurring in the WTA. Further, it has been documented that loggerheads have a high rate of debris ingestion with plastics being the dominant debris type consumed. Should a marine marker-sea turtle interaction occur, the affected species would most likely be either a leatherback or loggerhead.

A total of 10,000 lightsticks, 2,320 marine flares, and 1,190 sea dye packs would be dropped annually within the WTA. Of the 3 types of marine markers, marine flares would be the least likely to be ingested by sea turtles because of their basic construction (refer to Section 4.5, Materials Management). Most instances of sea turtles ingesting foreign objects involve soft-plastic derivatives such as plastic bags, plastic sheeting, balloons, and monofilament fishing line that might be confused with jellyfish or other prey (National Research Council [NRC] 1990). The MK6 flare is designed to completely incinerate its wooden housing and internal contents. Small amounts of uncombusted wood may float and wash ashore. The MK25 flare is composed of an aluminum housing containing the flare materials. Upon combustion of the internal flare materials, the aluminum housing would sink. The expended remains of either flare would not be an attractant to a feeding or swimming sea turtle. In addition, the size of the expended aluminum casing of the MK25 would preclude any possibility of ingestion by a bottom foraging sea turtle. Any unexpended flares would sink, wash ashore, or remain afloat at sea. Due to their relatively large size, these unexpended flares would not pose a hazard to sea turtles.

The likelihood that either a sea dye pack or lightstick would be consumed is low however, because the expected densities of sea turtles, lightsticks, and expended sea dye packs in the project area would be low. The dispersal of buoyant lightsticks would be wind-driven and therefore variable. On average, net dispersal would be expected to be from north to south. Lightsticks, being highly buoyant, could be transported out of the study area by prevailing currents, while others could find their way into coastal beaches, creating more of an aesthetic problem as opposed to a biological hazard. While lightsticks could drift into these coastal habitats, their density would be low following the dispersal occurring in the unknown time interval between the "point source" release and their stranding on the coast. In addition, the size, shape, and composition of a lightstick make it unlikely that a sea turtle would be able to ingest a lightstick. Sea turtles are known to investigate or "mouth" potential food items and if a lightstick is encountered a turtle may attempt to consume it. However, there have been no records of sea turtles having ingested lightsticks (Plotkin and Amos 1988, 1990; Stanley et al. 1988; NRC 1990; Plotkin 1993).

Because of its similarity to the types of plastics most often consumed by sea turtles, expended sea dye packs would be the more likely of the 3 marine markers to be consumed if encountered. Over the longer term, neutrally buoyant expended sea dye packs would be more of a concern. If dye packs submerge, they would be less likely to be purged from the marine system. Some could be transported out of the study area by prevailing currents, while others could find their way into coastal areas or bays. If expended sea dye packs are not transported out of the San Diego region in substantial numbers, the cumulative effect of adding 1,190 sea dye packets per year to the area would increase the probability of a sea turtle encounter. If a sea turtle were to encounter and consume an expended sea dye pack released into the WTA during CSAR-related training activities, it could result in a detrimental affect. However, sea turtles are rarely found in the WTA making the potential for ingestion remote. Consultation with the National Marine Fisheries Service under section 7 of the Endangered Species Act has been initiated to address potential effects on sea turtles resulting from the use of the WTA during CSAR-training activities.

4.9.1.3 Marine Mammals

In this EA mathematical modeling and information from the acoustic and marine mammal literature were used to estimate the potential impacts of proposed search and rescue training operations on marine mammals. The activities analyzed are the potential acoustic impacts of HC-130 and HH-60 aircraft operations, potential impacts of exposure to lightsticks, marine flares, and sea dye markers.

The sound sources considered in this EA are HC-130 fixed-wing aircraft and HH-60 helicopters. A notable portion of the concern about noise impacts involves marine mammals at or below the surface of the water. Thus, transmission of airborne sound into the ocean is an important consideration. For further discussion of the basic characteristics of air-to-water transmission of sound for subsonic sources and how it is modeled, please refer to Appendix A. A detailed description of air-water sound transmission is also given in Richardson et al. (1995). A general summary of the characteristics of air-to-water sound transmission and metrics used to describe underwater noise is provided below.

Air-to-Water Sound Transmission

The audibility or apparent loudness of a noise source is determined by the radiated acoustic power (source level), the propagation efficiency, the ambient noise, and the hearing sensitivity of the subject species at relevant frequencies. Sound from an elevated source in air is refracted upon transmission into water because of the difference in sound speeds in the two media (a ratio of about 0.23). Because of this difference, the direct sound path is totally reflected for grazing angles less than 77 degrees (i.e., if the sound reaches the surface at an angle more than 13 degrees from vertical) (Figure 4.9-1). In addition, because of the large difference in the acoustic properties of water and air, the pressure field is actually doubled at the surface of the water, resulting in a 6-dB increase in pressure level at the surface.

For a passing airborne source, received levels at and below the surface diminish with increasing source altitude, but the duration of exposure increases. The maximum received levels at and below the surface also diminish with increasing source altitude. Total noise energy exposure is inversely proportional to the product of source altitude and speed because of the link between altitude and duration of exposure. With increasing horizontal distance from the airborne source, underwater sound diminishes more rapidly than does the airborne sound.

Sound transmission in shallow water is highly variable and site-specific because it is strongly influenced by the acoustic properties of the bottom and surface as well as by variations in sound speed within the water column. As in deep water, variations in temperature and salinity with depth cause sound rays to be refracted downward or upward. However, shallow depth does not allow most types of sound channeling effects evident for deep water. Refraction of sound in shallow water can result in either reduced or enhanced sound transmission. With upward refraction, bottom reflections and the resulting bottom losses are reduced; with downward refraction, the opposite occurs. Thus, sound transmission conditions in continental shelf areas can vary widely. In this EA, airborne sound transmission was also considered during acoustic modeling because sound from aircraft travels through air before entering water, and is attenuated along the airborne portion of the propagation path.

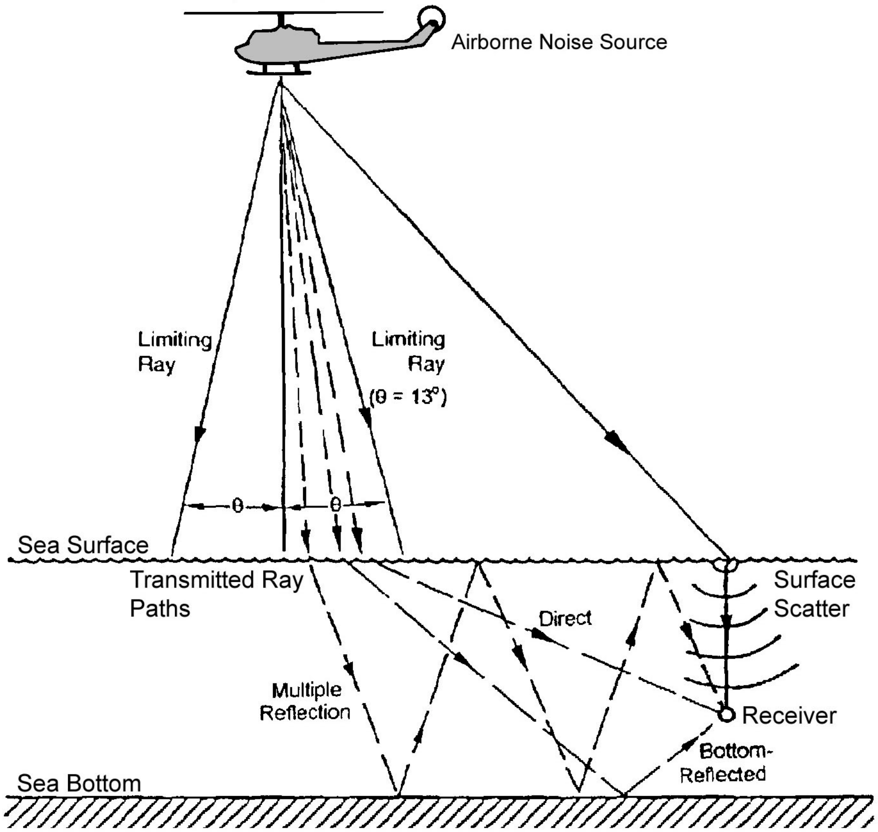


Figure 4.9-1. Paths for Sound Propagation from an Airborne Noise Source over Water.

Underwater ambient noise, if it is sufficiently strong, may prevent a marine mammal from detecting a man-made sound through a process known as masking. Masking can occur as a result of either natural sounds (e.g., during periods of strong winds or near surf zones) or manmade sounds (e.g., shipping noise). Predicted impacts of the aircraft sounds modeled in this EA are based on the assumption that ambient noise is low enough such that hearing sensitivity (rather than masking by ambient noise) will always be the factor limiting delectability of aircraft sound. This is a conservative assumption since it is unlikely that ambient noise would always be low.

Sound level often depends on the frequency and bandwidth under consideration. The relevant bandwidth will vary with the circumstances. Sound level data from studies of human community noise often are weighted (e.g., A-weighted) to place most emphasis on frequencies to which humans are most sensitive. A-weighted and other human-related sound level data (Richardson et al. 1995) are often inappropriate for other species including cetaceans. Therefore for the purposes of this EA, analyses are based on sound levels and auditory sensitivity at each frequency in relation to the hearing sensitivity of the particular marine mammal at that frequency.

Sound spectra depict the distribution of sound power as a function of frequency. Frequency is the rate of particle vibrations measured in cycles per second or hertz (Hz). Low- and high-frequency sounds are perceived by humans as low-pitched (as in a bass voice) and high-pitched (as in a soprano voice). Spectra depict the relative or absolute levels of the sound components at various frequencies. The sound spectra presented in this EA are "proportional bandwidth spectra", showing levels in bands 1/3-octave wide. A 1/3-octave band is a range of frequencies whose upper limit in hertz is 21/3 (or 1.26) times the lower limit; bandwidth is proportional to center frequency. Three adjacent 1/3-octave bands span one octave, which is a band whose upper frequency is two times its lower frequency.

Animals generally respond to sound as pressure, and sound pressure levels underwater are usually expressed in units of micropascals (µPa) or in dB reference to 1 µPa (dB re µPa). A decibel is a logarithmic measure of sound strength calculated as 20 log10 (P/P_{ref}), where P is sound pressure and P_{ref} is a reference pressure (e.g., 1 µPa).

The hearing ability of any mammal, marine or otherwise, is a complex function of a variety of biotic and abiotic factors. For instance, the absolute threshold is the level of sound that is barely audible in the absence of significant ambient noise (although, even for a single animal, the minimum detectable sound level varies over time). Also, threshold varies with sound frequency. The graph relating threshold to frequency is the audiogram (as shown in Figure 4.9-2). The best frequency is the one with the lowest threshold, that is, the best sensitivity. The best frequency varies among marine mammal species, with some species being more sensitive than others at their respective best frequencies (see next section).

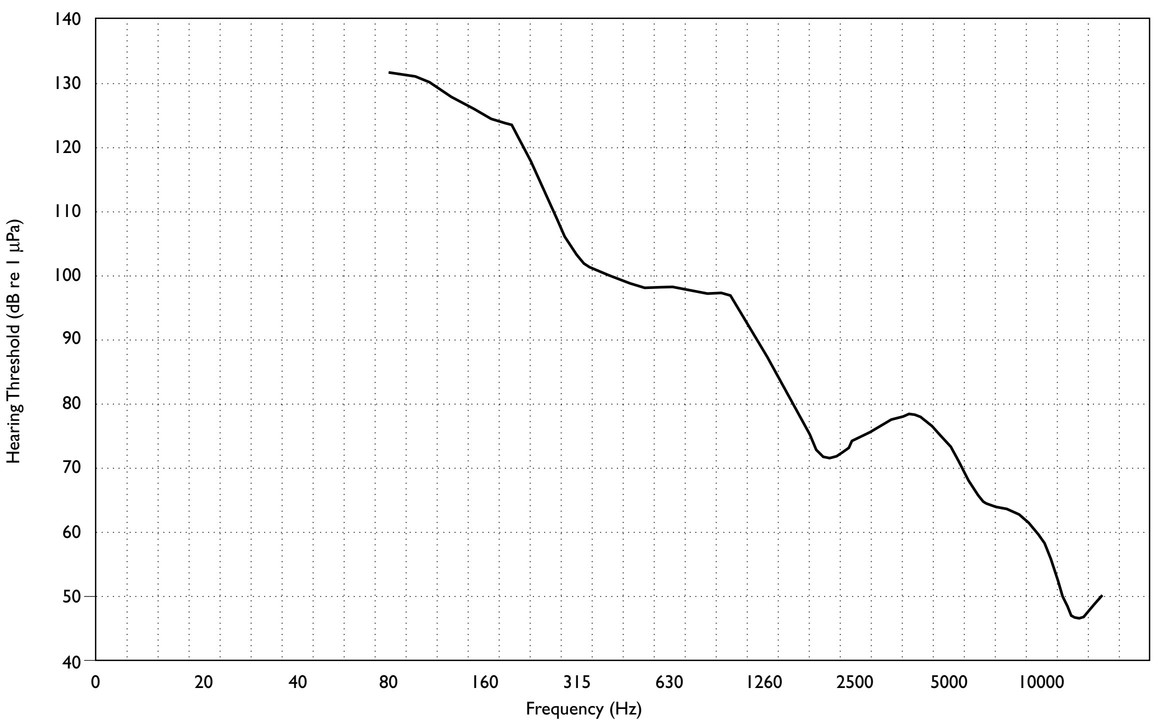


Figure 4.9-2. Underwater hearing threshold (audiogram) of the bottlenose dolphin. From Johnson (1967).

Hearing Abilities of Marine Mammals

The hearing abilities of some species of odontocetes (toothed whales) have been studied in detail (reviewed in Richardson et al. 1995). Hearing sensitivity of both the bottlenose dolphin and beluga whale (*Delphinapterus leucas*) have been studied at low as well as moderate and high frequencies, and audiograms for both species are available (Johnson 1967, White et al. 1978, Awbrey et al. 1988, Johnson et al. 1989). In addition, some audiometric data are available for the Pacific white-sided dolphin (Tremel et al. 1998) and for the harbor porpoise (Andersen 1970). Due to the similar hearing characteristics of bottlenose dolphin to other odontocetes, and due to this species potential occurrence near the WTA, hearing data on bottlenose dolphins were used in this analysis to evaluate potential impacts to other odontocetes which may also occur in the WTA.

Bottlenose dolphins hear well underwater. Dolphins are most sensitive to sounds at frequencies above 10 kilohertz (kHz). Hearing extends at least as low as 40 to 75 Hz in the bottlenose dolphin (Johnson 1967). However, its sensitivity at these low frequencies is relatively poor (Figure 4.9-1). Although this odontocete (toothed whale) usually seems rather insensitive to low-frequency sounds, it may be more sensitive to some combination of low-frequency particle motion and pressure fluctuations when in the near field of the acoustic source (Turl 1993). At higher frequencies, the bottlenose dolphin's hearing sensitivity improves markedly.

In comparison to odontocetes, pinnipeds tend to have lower best frequencies, lower high-frequency cutoffs, and poorer sensitivity at the best frequency. Phocids or hair seals (e.g., harbor seal) can detect very high frequencies up to 180 kHz. However, the upper limit of effective hearing is approximately 60 kHz, above which sensitivity is poor. Underwater sensitivity is about the same from 1-50 kHz. Within this range of best underwater hearing, sensitivity is not as high as in odontocetes. Sensitivity at low frequencies (100 Hz) is better than in odontocetes or otariids (or eared seals, e.g., California sea lion). Although otariids are similar to phocids with regard to underwater hearing sensitivity at moderate frequencies, their upper frequency limit is lower (36-40 kHz versus 60 kHz) (Richardson et al. 1995).

As mammals that have evolved for a marine existence, cetaceans are well adapted to hearing underwater sounds-even in the presence of significant background noise, some of which is generated by human activities. There have been assessments of hearing sensitivity in several species of moderate- and small-sized toothed whales, both in captivity and on stranded animals (see previous discussion). However, due to their large size and the consequent difficulties in maintaining them in captivity, the hearing abilities of mysticete whales have not been studied directly using either behavioral or AEP methods. In the AEP method, electrical brain activity is detected using electrodes attached harmlessly to the skin of the whale as sounds are played to the marine mammal.

The available data on low-frequency hearing suggest that in odontocetes and pinnipeds, as in terrestrial mammals, sensitivity deteriorates with decreasing frequency below the "best" frequency. This is probably, in part, an adaptation to the typically high levels of natural underwater noise at low frequencies. However, it is not known how closely mysticetes follow this trend. They are known to emit low-frequency sounds. That, plus the anatomy of their auditory organs (Ketten 1991, 1992, 2000), suggests that mysticete whales have good low-frequency hearing.

Behavioral evidence indicates that mysticetes hear very well at frequencies below 1 kHz (Richardson et al. 1995). Mysticete whales have also been observed to react to sonar sounds at 3.1 kHz and other sources centered at 4 kHz. Some mysticetes react to pinger sounds up to 28 kHz, but not to pingers or sonars emitting sounds at 36 kHz or above (Watkins 1986).

Some mysticetes produce sounds at frequencies up to 8 kHz, although their calls are predominantly at low frequencies, mainly below 1 kHz (Richardson et al. 1995). Based on this, plus the aforementioned anatomical evidence, it is presumed that their hearing abilities are good at low frequencies. The auditory system of mysticete whales is almost certainly more sensitive to low-frequency sounds than is the auditory system of the small- to moderate-sized odontocete whales. Mysticetes are known to detect the low-frequency sound pulses emitted by seismic airguns and change their direction of movement (Richardson et al. 1986, Miller et al. 1999, McCauley et al. 2000), or change their calling behavior (Greene et al. 1999).

Based on this indirect field and anatomical evidence, the Air Force assumes that mysticete whale hearing is similar at frequencies ranging from <1 kHz to 8 kHz, and then deteriorates with increasing frequency. Ambient noise energy in the ocean is higher at low frequencies than at mid frequencies. At frequencies in the 1 to 8 kHz range, ambient noise levels occurring under the quietest natural conditions (and in the absence of man-made sound) are rarely less than 60 dB on a 1/3rd octave basis, i.e. in bands roughly approximating the filter bandwidth of the mammalian ear (Richardson et al. 1995). It is unlikely that mammals would have evolved a hearing system able to hear sounds much lower than the weakest masking noise that would ever be encountered. It might therefore be expected that the hearing threshold for mysticete whales is about 50 dB at their best frequencies. Sensitivity probably deteriorates at higher frequencies. It probably also deteriorates slowly with diminishing frequency below 1 kHz, in parallel with the lowest levels of natural ambient noise (on a 1/3rd octave basis). So, like other mammals the hearing sensitivity curve might have a "J" shape, with reduced sensitivity at high and very low frequencies. However, this curve might be shifted to the left relative to those of odontocetes such that these whales' hearing threshold is lower at sound frequencies lower than odontocetes.

Behavioral Responses of Marine Mammals to Aircraft

As compared with continued and undisturbed occupancy of a preferred area, displacement from a preferred area due to noise-related or visual disturbance can be considered potentially negative. However, it may be preferable for an animal to be displaced rather than to remain in an area where there is risk of physical injury or chronic behavioral or physiological effects (Richardson et al. 1995). In this sense, displacement, initiated by the animal itself, can prevent potentially adverse effects.

There are published observations of marine mammal reactions to aircraft, or lack of reactions (for a review see Richardson et al. 1995). In most cases, airborne or waterborne noise from aircraft was the apparent stimulus. However, vision was probably involved in some cases. Variable responses to aircraft are partly a result of differences in aircraft type, altitude, and flight pattern (e.g., straight-line overflight, circling, or hovering) (Richardson et al. 1995). These factors can affect the spectral properties, temporal properties, and level of noise received by animals.

Most species of toothed whales do not appear to react to aircraft overflights, except when the aircraft fly at low altitude (below 500 ft) (Richardson et al. 1995). Beaked whales, pygmy and dwarf sperm whales, and Dall's porpoise appear to react more notably to low-level aircraft overflights than do dolphins or sperm whales. Whales that do react will dive hastily, turn, or swim away from the flight path (see below). Feeding or socializing cetaceans (whales and dolphins) are less likely to react than those engaged in other activities.

Bottlenose dolphins observed during aerial surveys from Twin Otter turboprop aircraft operating at 750 ft MSL and 110 knots revealed that this species did not react as strongly to the presence of the aircraft as did some other odontocete species. The bottlenose dolphins changed their behavior in response to overflights by this aircraft during only a relatively small proportion of the encounters (Würsig et al. 1998). They were most likely to change their behavior (usually by diving) when they were milling or resting. During earlier surveys with a similar aircraft and methodology, bottlenose dolphins reacted like other small cetaceans (Mullin et al. 1991); bottlenose dolphins did not appear to react aversively to the aircraft except when its shadow passed directly over them. In this case, the dolphins would make a startled dive. These reactions are likely to be of short duration. For cetaceans, reactions, if any, to straight-line aircraft overflights appear to be brief and there is no evidence that infrequent aircraft overflights cause long-term changes in cetacean distribution (Richardson et al. 1995).

The majority of studies on the effects of aircraft overflights on pinnipeds have been done on hauled out animals on land. Pinnipeds hauled out on land react most strongly to aircraft overflights, particularly low flying aircraft and helicopters. However, there are few specific data on reactions of pinnipeds in water to aircraft overflights (Richardson et al. 1995). It is assumed that reactions by pinnipeds in water to aircraft overflights would be similar to those documented for odontocetes.

Very few data on reactions of mysticetes to helicopters hovering at low altitude are available in the literature. Minke, bowhead, and right whales sometimes reacted to aircraft overflights at altitudes of 150-300 m by diving, changing dive patterns, or leaving the area (Leatherwood et al. 1982; Watkins and Moore 1983; Payne et al. 1983; Richardson et al. 1985a, b, 1995). However, the majority of the bowheads did not react noticeably even to a low-altitude (~150 m) overflight.

Gray whale reactions to aircraft also are variable. On the Alaskan summering grounds, mother-calf pairs seemed particularly sensitive to a small turboprop survey aircraft at 335+ m altitude. The adult usually moved over the calf, or the calf swam under the adult (Ljungblad et al. 1983, Clarke et al. 1989). A mating group of gray whales did not react immediately to the arrival of a survey aircraft at 366 m altitude, but dispersed after it had circled at 670 m for 11 min (Clarke et al. 1989). Migrating gray whales rarely showed detectable reactions to a straight-line overflight by a Twin Otter at 60 m altitude (Green et al. 1992).

Migrating gray whales react to underwater playbacks of recorded underwater sounds from a Bell 212 helicopter (Malme et al. 1983, 1984). There were significant course changes and some whales slowed down in response to an average of 3 simulated passes per minute. Received broadband sound levels eliciting minor avoidance reactions by 10, 50, and 90% of the whales were 115, 120, and >127 dB re 1 μPa. These tests did not determine if gray whales would respond to noise from a single overflight, and excluded the strong low-frequency components of Bell 212 noise. However, the playback experiments showed that gray whales respond to helicopter noise itself; vision was not involved. SRA (1988) stated that migrating gray whales never reacted overtly to a Bell 212 helicopter at >425 m altitude, occasionally reacted when it was at 305-365 m, and usually reacted (by abrupt turns, dives, or both) when it was below 250 m.

In the calving lagoons of Baja California, gray whales herded into shallow water by a helicopter hovering at very low altitude "churned the water with flukes and fins until their wakes became swirling cauldrons of foam," especially when sensitized by repeated herding (Walker 1949). Mothers occasionally "shielded" calves with their bodies, as observed in summer (Ljungblad et al. 1983). Harassment by low-flying (<75 m) aircraft "causes the animals to dive and occasionally leads to separation of mother and young" (Withrow 1983).

Helicopter disturbance to humpback whales is a concern off Hawaii, where helicopters are prohibited from approaching humpbacks within a slant range of 1000 ft (305 m) (NMFS 1987, Tinney 1988, Atkins and Swartz 1989).

Less information is available about reactions of other species of baleen whales to aircraft. Minke whales usually responded to an H-52 turbine helicopter at 230 m altitude by changing course, rolling onto the side, or slowly diving (Leatherwood et al. 1982). Other "fright" reactions were seen occasionally. An International Whaling Commission (IWC) report (IWC 1990) mentions that minke whales off Norway were disturbed by a helicopter. Watkins (1981b) was able to observe the behavior of fin whales from a light aircraft circling at 50-300 m, but he implies that engine noise or the aircraft shadow sometimes caused reactions.

In summary, data on reactions of baleen whales to aircraft are meager and largely anecdotal. Only Malme et al. (1984) provided data on reactions of whales to aircraft sound isolated from other stimuli. Theirs was also the only study to determine whale reactions versus received sound level. Whales often react to aircraft overflights by hasty dives, turns, or other changes in behavior. Responsiveness depends on the activities and situations of the whales. Whales actively engaged in feeding or social behavior often seem rather insensitive. Whales in confined waters, or those with calves, sometimes seem more responsive (e.g., gray whales in Baja). There is no indication that single or occasional aircraft overflights cause long-term displacement of whales. In general, mysticetes are more likely to react to an aircraft at low than at high altitude, that passes directly overhead rather than well to the side, and that circles or hovers rather than simply flying over (Richardson et al. 1995a, b).

Based on these limited observational data, the high noise level at the surface below the helicopter, and the extended duration of exposure (relative to aircraft such as jets), behavioral reactions are expected to be stronger than to helicopters or fixed-wing aircraft engaged in overflights at higher altitude.

Masking Effects

Hearing thresholds represent the lowest levels of sound cetaceans can detect in a quiet environment. However, the sea is usually noisy, even in the absence of man-made sounds. Background ambient noise often interferes with or masks the ability of an animal to detect a sound signal even when that signal is above the absolute hearing threshold. On the coastal shelf west of the California, as elsewhere, natural ambient noise includes contributions from wind, waves, precipitation, other animals, and (at frequencies above 30 kHz) thermal noise resulting from molecular agitation (Richardson et al. 1995). Background noise can also include sounds from distant human activities such as shipping and oil exploration and production. Masking of natural sounds can result when human activities produce high levels of background noise. Conversely, if the background level of underwater noise is high (e.g., on a day with strong wind and high waves), an anthropogenic noise source will not be detectable as far away as would be possible under quieter conditions, and will itself be masked at the longer distances where it could be detected at a "quieter" time. In fact, ambient noise is highly variable on continental shelves (Thompson 1965, Myrberg 1978, Chapman et al. 1998, Desharnais et al. 1999). This inevitably results in a high degree of variability in the range at which marine mammals can detect anthropogenic sounds such as those that might come from Air Force activities within the WTA.

Although masking is a natural phenomenon to which marine mammals must be adapted, introduction of strong sounds into the sea at frequencies important to marine mammals will inevitably increase the severity and the frequency of occurrence of masking. For example, if a mysticete is exposed to continuous low-frequency noise from an anthropogenic source such as a hovering helicopter, this will reduce the size of the area around that whale within which it will be able to hear the calls of another whale. In general, little is known about the importance to marine mammals of detecting sounds from conspecifics, predators, prey, or other natural sources. In the absence of much information about the importance of detecting these natural sounds, it is not possible to predict the impacts if mammals are unable to hear these sounds as often, or from as far away, because of masking by industrial noise (Richardson et al. 1995). In general, masking effects are expected to be less severe in the case of transient sounds than with continuous sounds. In the former case, mammals will still be able to hear other sounds of interest in the "gaps" between the transient sounds.

Although some degree of masking is inevitable when high levels of man-made broadband sounds are introduced into the sea, marine mammals have evolved systems and behavior that function to reduce the impacts of masking. Some of these are summarized below.

Structured signals such as echolocation click sequences of small odontocetes may be readily detected even in the presence of strong background noise because their frequency content and temporal features usually differ strongly from those of the background noise (Au and Moore 1988, 1990). It is primarily the components of background noise that are similar in frequency to the sound signal in question that determine the degree of masking of that signal. Low-frequency anthropogenic noise (such as helicopter sounds propagating into the water) has little or no masking effect on high-frequency echolocation sounds. Redundancy and context can also facilitate detection of weak signals. These phenomena may help marine mammals detect weak sounds in the presence of natural or man-made noise.

Most masking studies present the test signal and the masking noise from the same direction. The sound localization abilities of marine mammals suggest that, if signal and noise come from different directions, masking would not be as severe as the usual types of masking studies might suggest (Richardson et al. 1995). The dominant background noise may be highly directional if it comes from a particular anthropogenic source such as a ship or industrial site. Directional hearing may significantly reduce the masking effects of these noises by improving the effective signal-to-noise ratio. In the cases of high-frequency hearing by the bottlenose dolphin, beluga, and killer whale, empirical evidence confirms that masking depends strongly on the relative directions of arrival of sound signals and the masking noise (Penner et al. 1986, Dubrovskiy 1990, Bain et al. 1993, Bain and Dahlheim 1994).

Odontocetes, and probably other marine mammals as well, have additional capabilities besides directional hearing that can facilitate detection of sounds in the presence of background noise. There is evidence that some odontocetes can shift the dominant frequencies of their echolocation signals from a frequency range with much ambient noise toward frequencies with less noise (Au et al. 1974, 1985; Moore and Pawloski 1990; Thomas and Turl 1990; Romanenko and Kitain 1992; Lesage et al. 1999). Some of these studies also showed that source levels of echolocation signals may increase when necessary to counteract noise.

In summary, high levels of noise generated by anthropogenic activities such as hovering military helicopters, and to a lesser extent transient sounds such as aircraft overflights, may act to mask the detection of weaker biologically important sounds by some marine mammals. This masking may be more prominent for lower frequencies such as those at which mysticetes are more sensitive. For higher frequencies, such as used in echolocation by odontocetes, several mechanisms are available that may allow them to reduce the effects of such masking. However, given the transient nature of most of these acoustic events (except a hovering helicopter), it is concluded that the potential biological impacts of the masking of cetacean and pinniped hearing for short periods would not be significant.

Acoustic Thresholds

Most of the activities conducted by the Air Force in the WTA would be relatively transient from the perspective of a specific marine mammal. For most Air Force activities (except hovering helicopters), the potential source of disturbance at a given location lasts for no more than a few seconds. Also, the frequencies of occurrence and distributions of the proposed search and rescue training operations are such that any given animal would be exposed to strong noise transients only infrequently. A few of the CSAR training operations may result in more prolonged exposure to sounds produced by Air Force activities. For purposes of this EA, prolonged exposure is taken to be "more than a few seconds." (Frequent exposure to transient sounds, if it occurred, would fall into a similar category.) For marine mammals, prolonged activities are considered to have a potentially significant impact if the activities may exclude animals from important areas such as feeding, breeding, or nursing areas for a period of days or longer. Temporary displacement (i.e., for a period of less than 1 to 2 days) would be considered potentially significant if there were risk of injury to calves and/or a risk of separating calves from their mothers. However, as discussed below, there is no such risk.

In this EA, strong and/or prolonged disturbance is considered to be at least potentially significant, as is Temporary Threshold Shift (TTS) in their hearing. TTS is the mildest form of hearing impairment. For sound exposures at or somewhat above the TTS threshold, hearing sensitivity recovers rapidly after exposure to the noise ends. However, momentary mild disturbance is considered to be less than significant. More specifically,

- For cetaceans and pinnipeds, exposure to prolonged activities is considered to have potentially significant impacts on individuals and potentially significant impacts on populations if the activities exclude the mammals from important areas for a period of days or longer. Temporary displacement for less than 1 or 2 days is considered to be less than significant provided there is no potential for injury, calf separation, or TTS, and provided that these incidents are infrequent for any 1 marine mammal.
- Exposure to brief transient sounds such as those from aircraft overflights often causes alert or startle reactions without any extended interruption of prior activities. Brief alert or startle responses are considered less than significant unless they are accompanied by other indicators of more severe disturbance.
- Cases in which the received level of transient sound is high enough to cause TTS are considered to have adverse impacts on the individuals involved (following NMFS 1995) and may be potentially significant to their populations, depending on the severity of the TTS and the status of the animals involved. However, the analysis described below indicates that the proposed activities would not cause TTS.

Table 4.9-1 shows, for odontocetes, pinnipeds, and mysticetes, the received levels of transient and prolonged sounds at which potentially significant disturbance reactions may begin to occur. These criteria are based on the general principles outlined above. Following convention, underwater levels are quoted in decibels with respect to 1 µPa (dB re 1 µPa).

Table 4.9-1. Assumed Sound Pressure Criteria (dB re 1 µPa) for Disturbance and Temporary Threshold Shift (TTS) in Odontocetes and Mysticetes

Criteria	*Odontocetes and Pinnipeds*	*Mysticetes*
Disturbance from Prolonged Sounds in Water (1)	140 (2)	120 (4)
TTS from Transient Sounds in Water (SEL)	190 (3)	- (5)

Notes: [1]For purposes of this EA, prolonged exposure is taken to be "more than a few seconds."
[2]Based on a review of published and reported behavioral responses of odontocetes and pinnipeds to anthropogenic sounds, many of which are described in Richardson et al. (1995).
[3]Based on published threshold values for TTS in 1 toothed whale species (Ridgway et al. 1997) and speculative inference from in-air human TTS values (Kryter 1985, Richardson et al. 1995), plus criteria in NMFS (1995).
[4]Based on the assumption that mysticetes may be more sensitive to prolonged low-frequency sounds than are odontocetes (see text).
[5]Data are not available.

The levels of underwater sound obtained using the sound prediction model adopted for this EA (based on Urick 1972, Malme and Smith 1988) are maximum received root mean square (rms) sound levels (refer to Appendix A for more details). Transient sounds are often described in terms of their equivalent SEL. SEL refers to a cumulative exposure to sound equivalent in energy to that received during 1 second of exposure at the stated level. For the slow aircraft of interest in this EA, the SEL values are typically 3 to 10 dB higher than the maximum rms value because the effective sound duration is longer than 1 second. For the hovering helicopter, the sound is essentially continuous. While the measurements in air provide the effective time duration of the overflight, the underwater sound duration does not directly follow the same time history because of the multipath contributions of the direct-refracted path and the laterally transmitted path. The sound prediction model is a frequency domain model and is not capable of estimating the time-spread due to multipath.

Because of the 2 factors discussed above, the maximum rms sound level reached at a given receiving point is considered the most relevant output of the model. This output can then be applied independent of the temporal nature of the source.

It is assumed that odontocetes and pinnipeds exposed to prolonged sounds at received levels of 140 dB re 1 µPa or above may show avoidance. There is no general consensus on an appropriate response criterion for this situation. However, based on the literature reviewed in Richardson et al. (1995), it is apparent that most small toothed whales and pinnipeds exposed to prolonged or repeated underwater sounds are unlikely to be displaced unless the overall received level is at least 140 dB re 1 µPa.

It is assumed that mysticetes exposed to prolonged sounds at received levels of 120 dB re 1 µPa or above may show avoidance (Malme et al. 1984). Given the apparently superior low-frequency hearing abilities of mysticetes, and the predominance of low frequency energy in the spectra of both the HH-60 and HC-130 aircraft, mysticetes might show avoidance when exposed to received levels lower than those eliciting behavioral reactions in odontocetes. The 120 dB disturbance criterion threshold is therefore a conservative (i.e., probably low) estimate of the level of prolonged underwater sound that could elicit behavioral disturbance in mysticetes.

TTS is the mildest form of hearing impairment. It is the process whereby exposure to a strong sound results in a non-permanent elevation of hearing sensitivity (Kryter 1985). TTS can last from minutes or hours to days. The magnitude of TTS depends on the level and duration of noise exposure, among other considerations (Richardson et al. 1995).

There are no data on noise levels that might induce permanent hearing impairment in marine mammals. In theory, physical damage to a marine mammal's hearing apparatus could occur immediately if it is exposed to sound impulses that have very high peak pressures, especially if they have very short rise times. Also, very prolonged exposure to noise strong enough to elicit TTS, or shorter-term exposure to noise levels well above the TTS threshold, could cause hearing injury. Such damage can result in a permanent decrease in functional sensitivity of the hearing system at some or all frequencies. This permanent increase in the threshold above which the mammal can detect sound is termed Permanent Threshold Shift (PTS).

Given the normal mobility of most marine mammals, we would not expect them to remain close to any one location long enough to be exposed to excessive noise levels for very long, even if the animal exhibited no avoidance reaction to this high noise level. Also, the strongest sources of nonimpulsive noise in the WTA (e.g., hovering helicopters) are themselves mobile or discontinuous. Even after exposure to the loudest sounds from a hovering helicopter, it is highly unlikely that any cetacean or pinniped would be exposed to sound levels thought necessary to induce TTS. The risk of PTS is much lower than that for TTS.

The following subsections address the potential for impacts of anthropogenic sounds, lightsticks, marine flares and sea dye markers on cetaceans and pinnipeds within the WTA resulting from HH-60 and HC-130 training operations.

Impacts of the Overflight of an HC-130 at 1,000 ft MSL

The predicted underwater sound levels resulting from the overflight of an HC-130 aircraft transiting the ocean at 1,000 ft MSL and low speed would be relatively low. Directly under the flight path at a depth of 1 foot, the maximum level in any 1/3-octave band (the one centered at 80 Hz; refer to Appendix A) would be about 110 dB re 1 µPa. The maximum overall level would be about 112- 115 dB (Figure 4.9-3). The highest levels would be at low frequencies (<200 Hz). At almost all frequencies the sound levels would decline at increasing lateral distances from the aircraft's track. Received sound levels would also diminish with increasing depth in the water. In addition, at any location, underwater sounds originating from the aircraft would decline rapidly after the aircraft has passed. By comparing the estimated sound levels of an overflight at 1,000 ft MSL with those at 250 ft MSL (see next section), the decrease in received sound level with increasing aircraft altitude is apparent.

Given the hearing abilities of cetaceans and pinnipeds (see previous subsection), it is likely that they would hear the sounds from a direct overflight at 1,000 ft MSL by an HC-130 aircraft. Odontocetes, pinnipeds, and mysticetes would hear the sound components above a few hundred hertz, and mysticetes would hear the lower frequencies as well. However, the overall as well as the 1/3-octave received levels of these sounds would be less than the disturbance criteria listed in Table 4.9-1, and would not likely result in a behavioral disturbance even upon prolonged exposure. In this case, the sound would be transient, not prolonged. TTS would not occur. Cetaceans and pinnipeds might dive if the shadow of the aircraft crossed their position, but this occurrence would be rare and this transitory response would have no lasting consequences. Therefore, the impacts, if any, of an HC-130 aircraft overflight at 1,000 ft MSL would not be significant at individual or population levels for cetaceans or pinnipeds that potentially occur within the WTA.

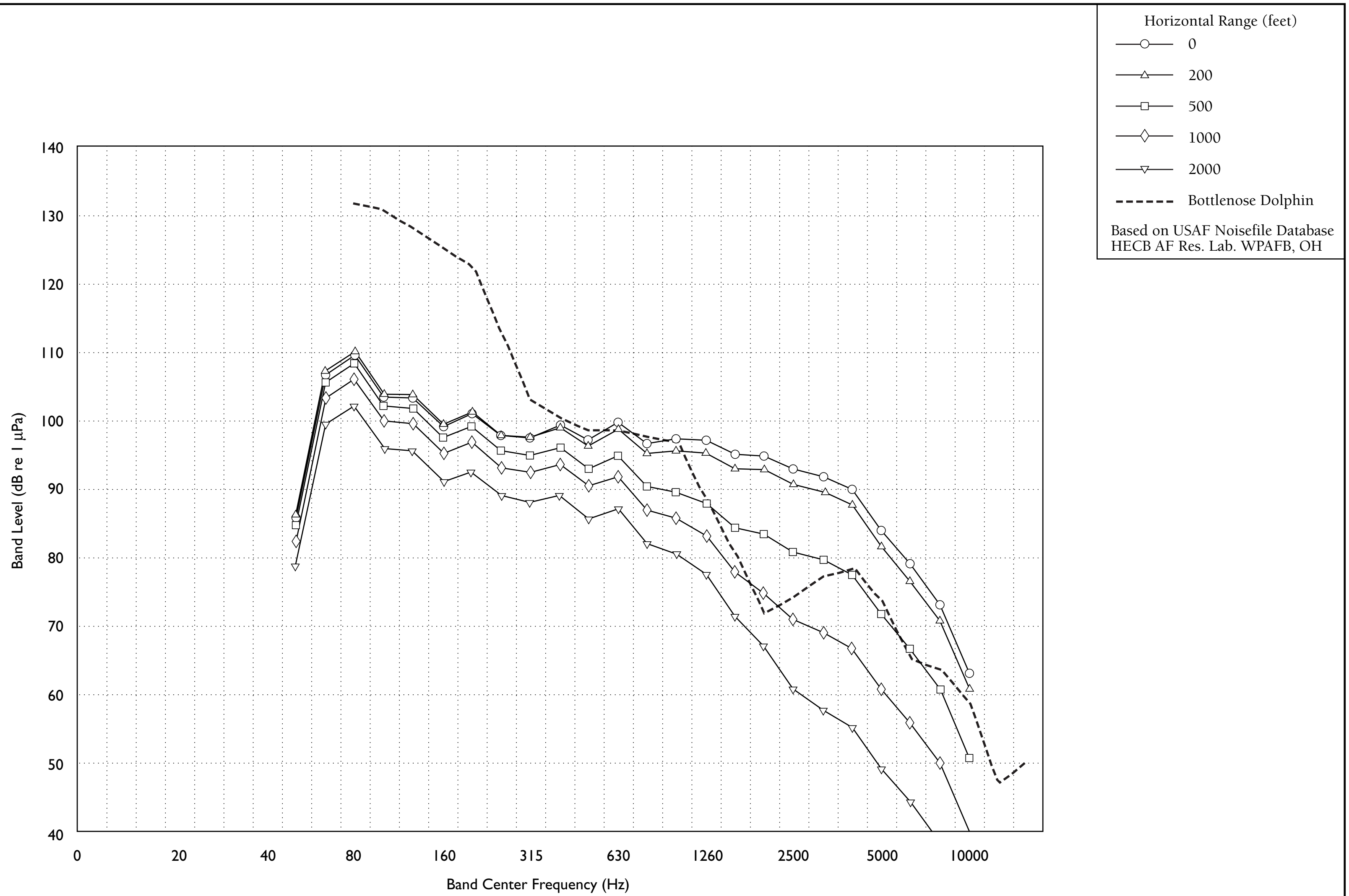


Figure 4.9-3

Predicted underwater sound levels (1-ft depth) during an overflight by an HC-130 aircraft at 1,000 ft MSL and a speed of 140 knots presented as a set of 1/3-octave spectra vs. range curves. The audiogram of the bottlenose dolphin (based on Johnson 1967) is also shown.

Impacts of the Overflight of an HC-130 at 250 ft MSL

The predicted underwater sound levels resulting from the overflight of an HC-130 aircraft transiting the ocean at 250 ft MSL and low speed would be relatively low. Directly under the flight path at a depth of 1 foot, the maximum level in any 1/3-octave band (the one centered at 80 Hz; refer to Appendix A) would be about 121 dB re 1 µPa. The maximum overall level would be about 126-127 dB (Figure 4.9-4). The highest levels would be at low frequencies (<200 Hz). At almost all frequencies the sound levels would decline at increasing lateral distances from the aircraft's track, and the decline with increasing lateral distance would be more rapid than for overflights at higher altitudes (see Figure 4.9-3). Received sound levels would also diminish with increasing depth in the water. In addition, at any location, underwater sounds originating from the aircraft would decline rapidly after the aircraft has passed.

Given the hearing abilities of cetaceans and pinnipeds, it is likely they would hear sounds from a direct HC-130 overflight at 250 ft MSL. Odontocetes, pinnipeds, and mysticetes would hear the sound components above a few hundred hertz, and mysticetes would hear the lower frequencies as well (Figure 4.9-4). Because the overall as well as the 1/3-octave received levels of these sounds could exceed the disturbance criteria for mysticetes listed in Table 4.9-1, this overflight could result in a behavioral disturbance for this species. Because the mysticetes exposed to sound levels high enough to exceed the disturbance criterion would likely move away from the area rapidly, the disturbance would be transitory. The aircraft's sound would be transient, not prolonged, and TTS would not occur. Cetaceans and pinnipeds might dive if the shadow of the aircraft crossed their position, but this occurrence would be rare and transitory and would have no lasting consequences. Therefore, potential impacts of an HC-130 aircraft overflight at 250 ft MSL would not be significant at individual or population levels for cetaceans and pinnipeds within the WTA.

Impacts of the Overflight of an HH-60 at 1,000 ft MSL

Similar to the HC-130 overflights at 1,000 ft MSL, the predicted underwater sound levels at 1-ft depth resulting from the overflight of an HH-60 helicopter transiting the ocean at 1,000 ft MSL and 120 knots would be relatively low—less than 100 dB re 1 µPa in any 1/3-octave band above 40 Hz directly under the helicopter's track (Figure 4.9-5).

Only at very low frequencies (≤20 Hz) would the predicted 1/3-octave sound level reach as high as 110 dB re 1 µPa directly under the helicopter's track. The overall level would not exceed 114 dB re 1 µPa. The sound levels generally decline at increasing lateral distances from the helicopter's track. Received sound levels would also diminish with increasing depth in the water. In addition, at any location, underwater sounds originating from the helicopter would decline rapidly after the helicopter has passed. By comparing the estimated sound levels of an overflight at 1,000 ft MSL with those at 100 ft MSL (described below), the decrease in received sound level with increasing aircraft altitude is apparent. Given the hearing abilities of the cetaceans and pinnipeds it is likely that they would hear sounds from an HH-60 overflight at 1,000 ft MSL. However, these sounds would not be injurious (e.g., much less than that required to produce TTS) and, based on the criteria in Table 4.9-1, would not likely result in behavioral disturbance.

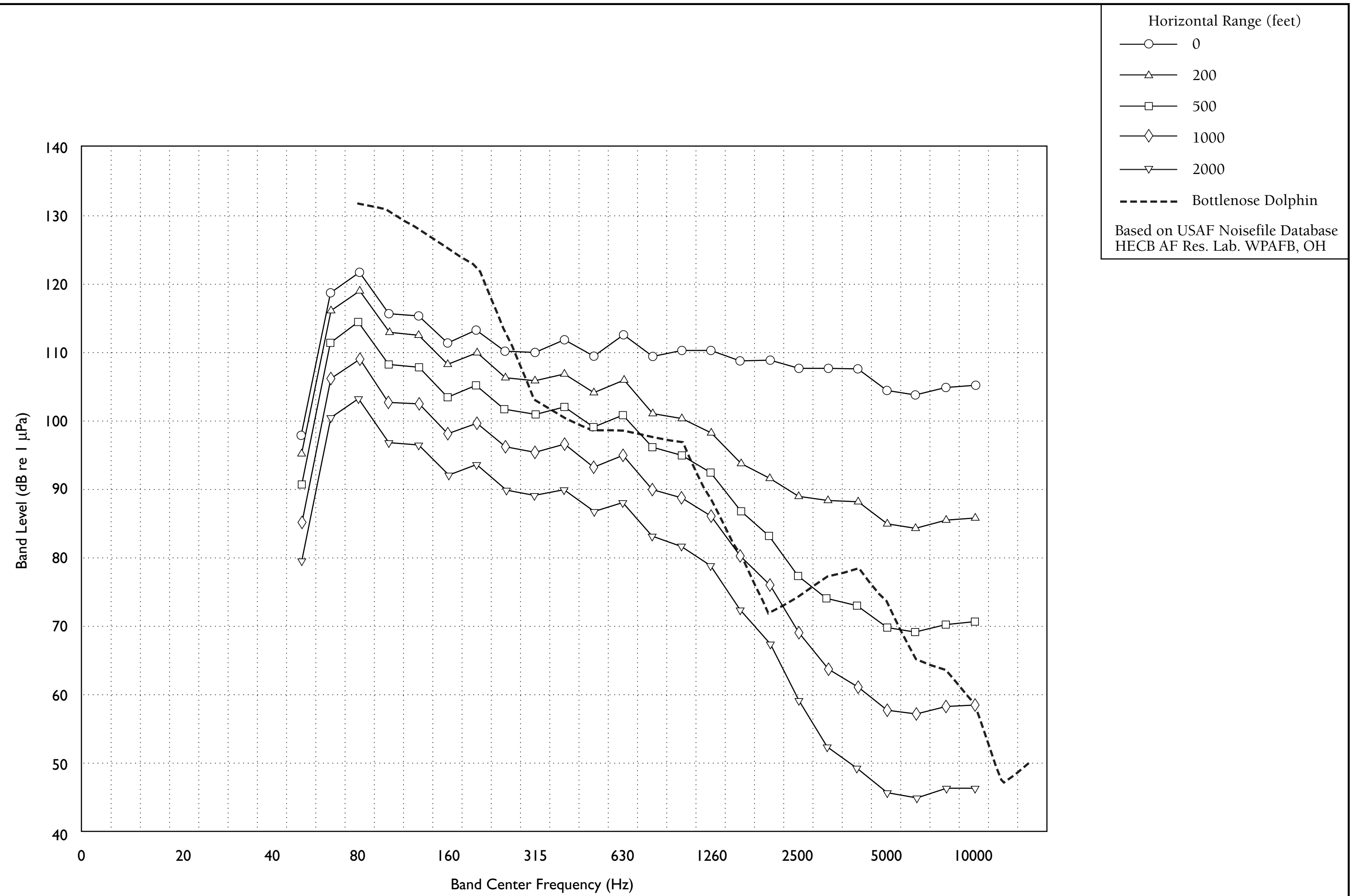


Figure 4.9-4
Predicted underwater sound levels (1-ft depth) during an overflight by an HC-130 aircraft at 250 ft MSL and a speed of 140 knots presented as a set of 1/3-octave spectra vs. range curves. The audiogram of the bottlenose dolphin (based on Johnson 1967) is also shown.

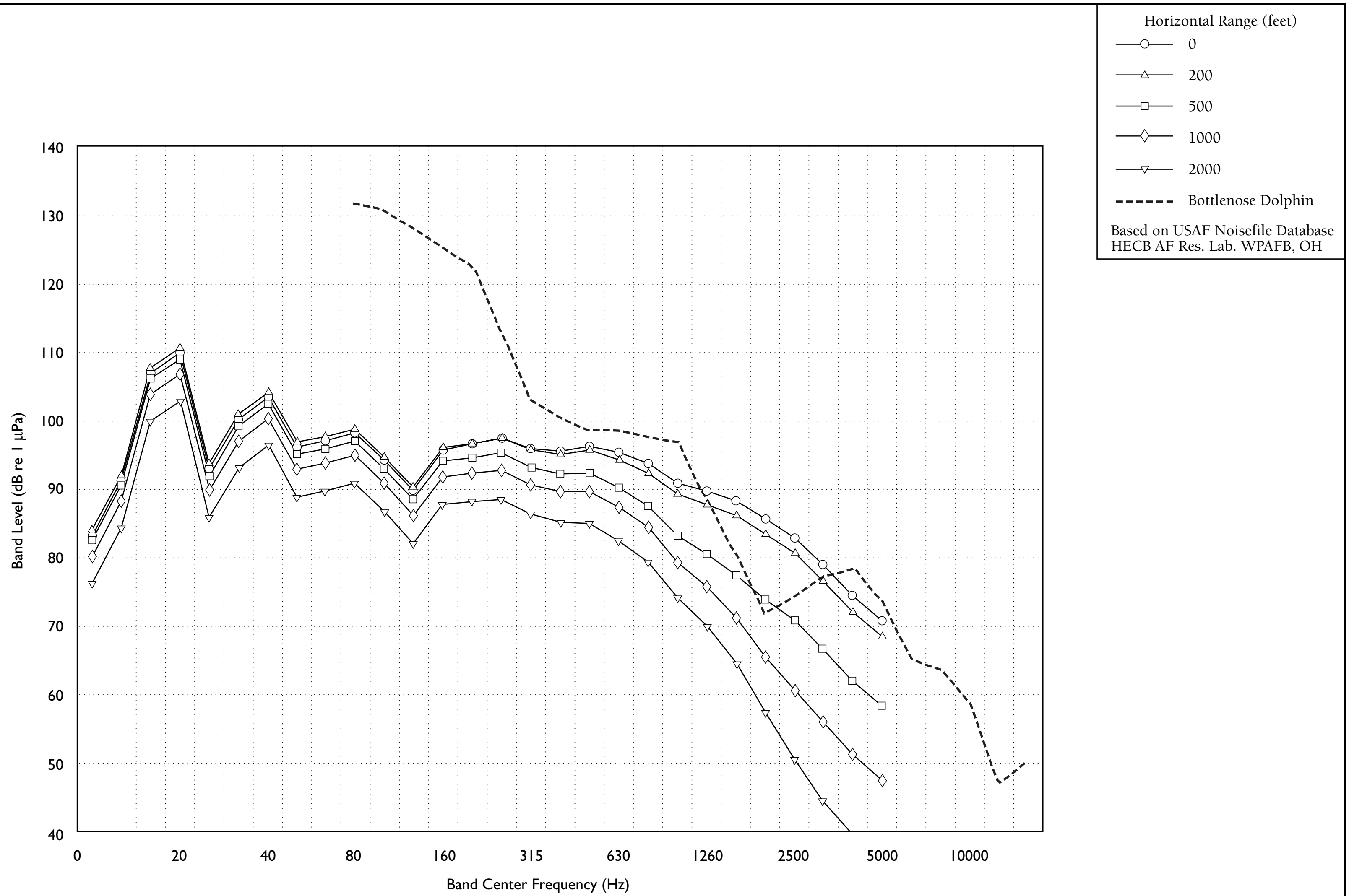


Figure 4.9-5
Predicted underwater sound levels (1-ft depth) during an overflight by an HH-60 helicopter at 1,000 ft MSL and a speed of 120 knots presented as a set of 1/3-octave spectra vs. range curves. The audiogram of the bottlenose dolphin (based on Johnson 1967) is also shown.

As noted previously, cetaceans and pinnipeds may dive in response to the shadow of an aircraft crossing their position, but as for the HC-130 overflight at 1,000 ft MSL, this occurrence would be very rare and the response would likely be transitory. Therefore, the potential impacts of an HH-60 helicopter overflight at 1,000 ft MSL would not be significant at individual or population levels for cetaceans or pinnipeds that may potentially occur within the WTA.

Impacts of the Overflight of an HH-60 Helicopter at 100 ft MSL

The predicted underwater sound levels at 1-ft depth resulting from the overflight of an HH-60 helicopter transiting the ocean at 100 ft MSL would be higher than those at 1,000 ft MSL. One-third octave levels would be about 112-118 dB re 1 µPa directly under the helicopter's track for most of the lower frequencies (Figure 4.9-6). At very low frequencies (<20 Hz) the predicted 1/3-octave sound level could reach as high as 129 dB re 1 µPa directly under the helicopter's track. The overall level would be as high as 132 dB re 1 µPa directly below the helicopter. As expected, at almost all frequencies the sound levels decline at increasing lateral distances from the aircraft's track. The track width at which 1/3-octave sound levels would exceed 120 dB re 1 µPa extends out to 250 ft for some of the lower frequencies. Given the hearing abilities of cetaceans and pinnipeds, they would hear sounds from the low-altitude HH-60 overflight. These sounds would not be injurious (e.g., much less than that required to produce TTS).

As noted previously, cetaceans and pinnipeds will dive in response to the shadow of an aircraft crossing their position, but as for the other operations this occurrence would be very rare and the response would likely be transitory. Thus, the potential impacts of an HH-60 overflight at 100 ft MSL would not be significant at individual or population levels for cetaceans or pinnipeds potentially occurring within the WTA. Because impacts of an overflight at 100 ft MSL are not significant, impacts of overflights at higher altitudes would also not be significant.

Impacts of an HH-60 Helicopter Hovering at 10 ft MSL

The predicted underwater sound levels resulting from the stationary hover of an HH-60 helicopter at 10 ft MSL would be higher than during transit flights at 100 ft or greater. The overall predicted underwater sound levels would be about 146-147 dB re 1 µPa directly under the helicopter (Figure 4.9-7). One-third octave levels would be about 130-136 dB re 1 µPa below the helicopter across a range of frequencies. At very low frequencies (<20 Hz) the predicted 1/3-octave sound level could reach as high as 143 dB re 1 µPa directly under the helicopter. As expected, at almost all frequencies the sound levels decline at increasing lateral distances from the helicopter's position. The distance at which 1/3-octave sound levels would exceed 120 dB re 1 µPa extends out to 100 ft for some of the lower frequencies.

Given the presumed hearing abilities of cetaceans and pinnipeds, there is no doubt that these species would hear sounds from the hovering HH-60. However, even at the relatively high predicted sound levels, these sounds would be non-injurious (e.g., less than that required to produce TTS). Based on the criteria in Table 4.9-1, a hovering HH-60 is likely to cause behavioral disturbance to odontocetes or pinnipeds at a maximum distance of 10 ft and to mysticetes at a maximum distance of 100 ft. However, aircrews would make every reasonable effort to avoid contact or interaction with any marine mammal encountered in the WTA during training operations. Therefore, the potential impacts of an HH-60 helicopter hovering at 10 ft MSL would not be significant at individual or population levels for cetaceans or pinnipeds that may potentially occur within the WTA.

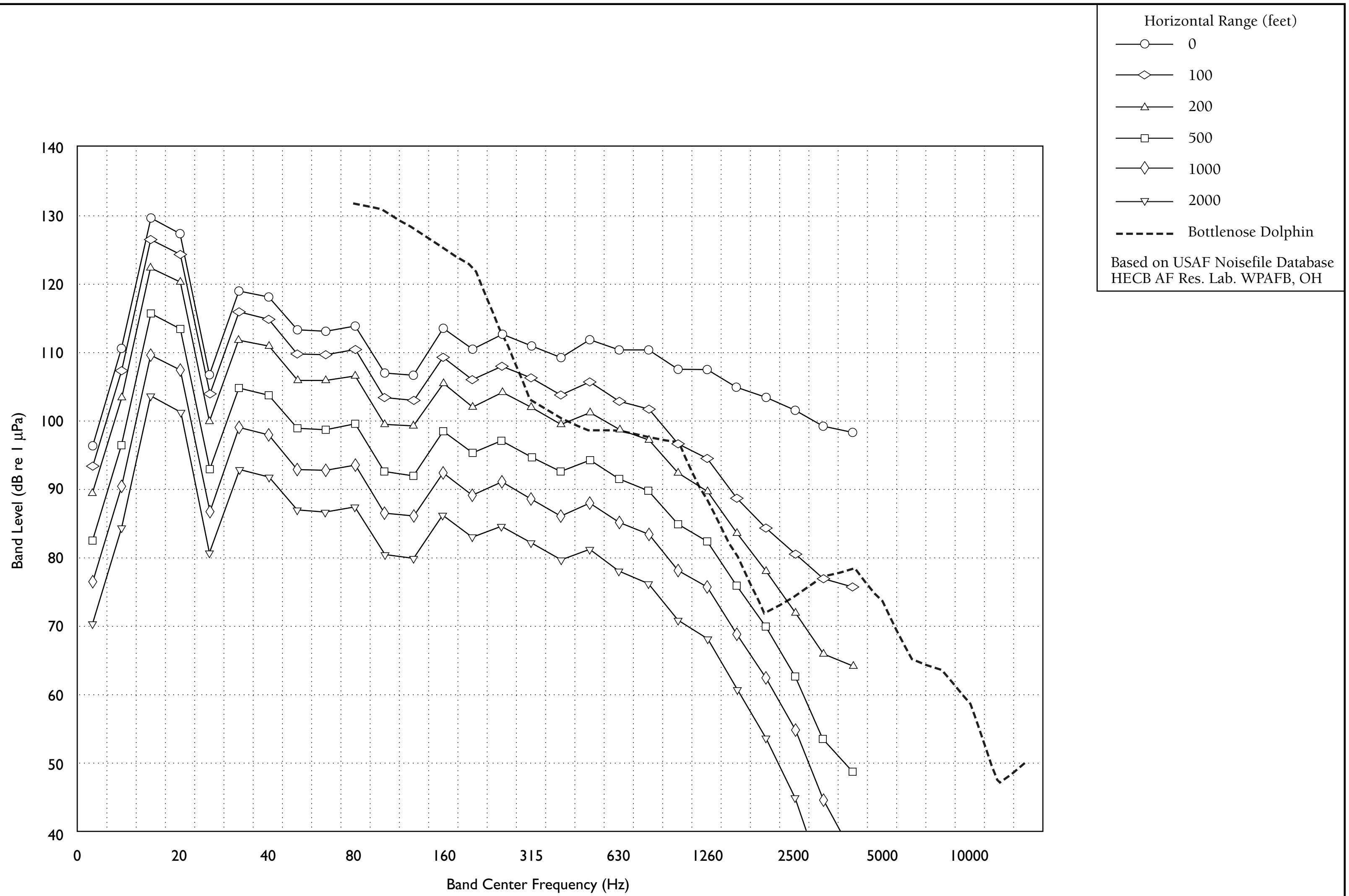


Figure 4.9-6

Predicted underwater sound levels (1-ft depth) during an overflight by an HH-60 helicopter at 100 ft MSL and a speed of 70 knots presented as a set of 1/3-octave spectra vs. range curves. The audiogram of the bottlenose dolphin (based on Johnson 1967) is also shown.

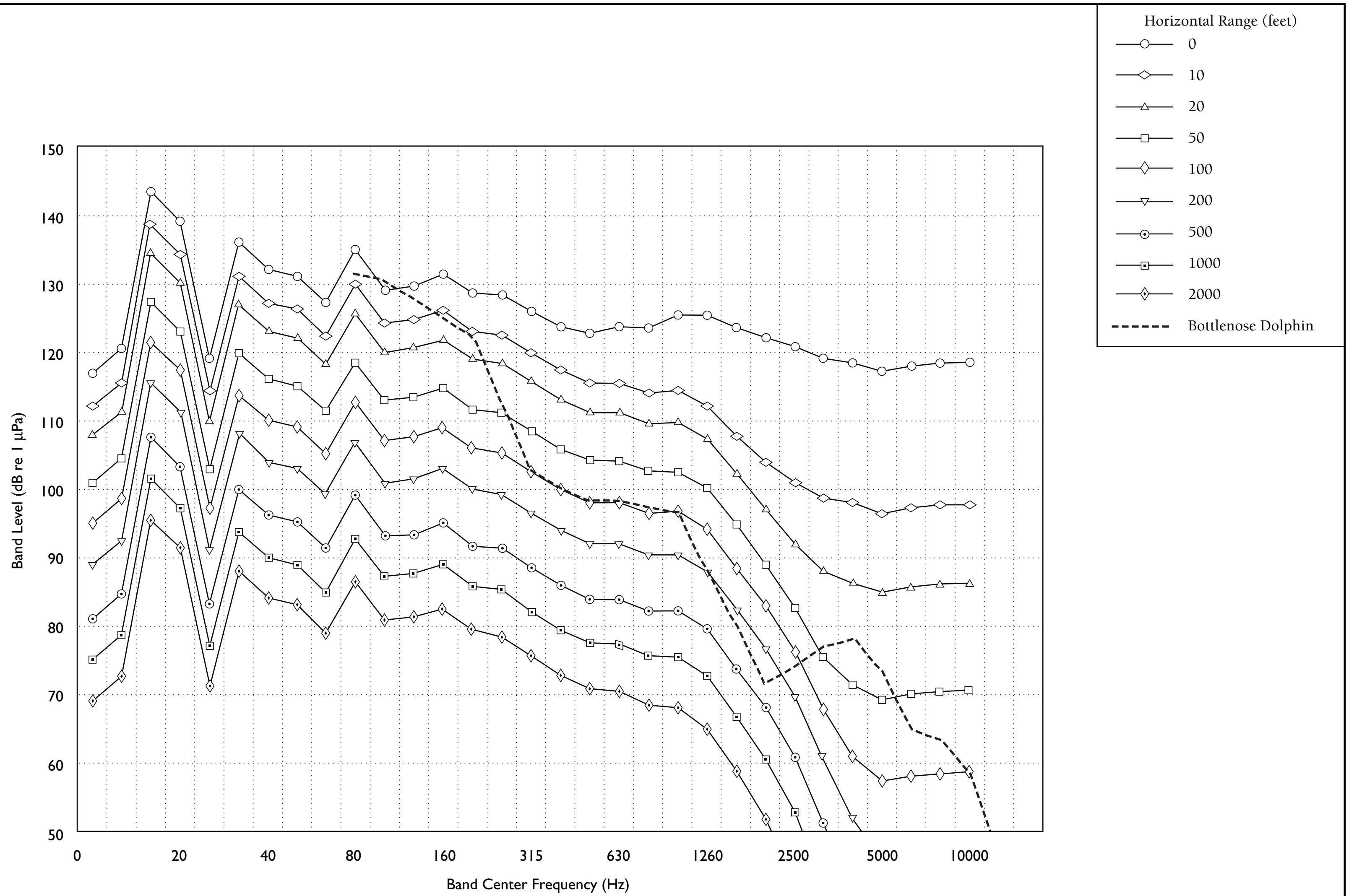


Figure 4.9-7
Predicted underwater sound levels (1-ft depth) of a hovering HH-60 helicopter at 10 ft MSL presented as a set of 1/3-octave spectra vs. range curves. The audiogram of the bottlenose dolphin (based on Johnson 1967) is also shown.

Impacts of Exposure to Lightsticks

Lightsticks are small, plastic chemiluminescent devices that would be used as portable light sources during operations after dark in the WTA. A total of 10,000 lightsticks would be dropped annually within the WTA. As described in Section 3.5 (Materials Management), Navy, Air Force, and USCG groups operating within the waters off of San Diego use lightsticks during some of their training and rescue operations. Lightsticks are also used by divers and by commercial fishermen on their longlines to attract fish.

The 6-inch long by 1-inch in diameter lightsticks contain 2 solutions which, when mixed together by breaking two small glass ampoules within the plastic casing, produce a light with little or no heat by-product. The constituents of these solutions do not meet the criteria for a listed hazardous waste, although hydrogen peroxide, one of the constituents, is an irritant to mammalian skin and mucous membranes at high concentrations. It is unlikely that contact with the spent lightsticks would result in exposure to the chemical contents as the housing is a tough, pliable plastic. If the casing were broken, either through degradation over time or physical destruction (such as a bottlenose dolphin chewing through the casing during play or feeding), the enclosed small quantity of chemicals would disperse rapidly. The compounds within the spent lightsticks are relatively inert, and those (such as hydrogen peroxide) within unspent lightsticks are not present in sufficient quantities to cause more than short-term, localized irritation to mucous membranes of the mouth or eyes. While there might be some risk of injury to marine mammals if they ingested the sharp plastic or glass shards of a broken lightstick, this would be an unlikely event due to the large area over which lightsticks are released. There are no records of marine mammal deaths resulting from ingestion of lightsticks and ingestion of foreign objects by cetaceans or pinnipeds in the wild does not appear to be a common occurrence (Tarpley and Marwitz 1993).

Impacts of Exposure to Marine Flares and Sea Dye Markers

Approximately 2,320 flares would be used annually in the WTA during search and rescue training activities. No non-military uses of flares are anticipated in the area, although commercial and recreational vessel operators might use flares for detection during an emergency. Navy, Air Force, and USCG groups may occasionally use flares during training and rescue operations in the area. Toxicity is not a concern with flares because the primary material in flares, magnesium, is not highly toxic (Naval Research Laboratory 1999). There have been no documented reports of wildlife consuming flare materials, and it is unlikely that cetaceans or other marine animals would ingest these materials. The probability of injury from falling dud flares and debris would be extremely remote. Although impulse cartridges and squibs used in some flares contain chromium and lead, a screening health risk assessment concluded that they do not present a significant health risk in the environment in the quantities that would be used in the WTA (Naval Research Laboratory 1999).

Cetaceans or pinnipeds could ingest marine flare debris with food. This scenario is unlikely, and any effects of such ingestion are likely to be short-term and unlikely to cause serious internal damage to digestive organs. Being primarily bottom feeders, gray whales could potentially encounter marine debris on the sea floor while they are feeding, although it is thought that this species does not feed much during its northward or southward migrations along the California coast (Corkeron and Connor 1999). Contact with marine flare debris is unlikely to cause injury to skin or eyes because contact would not be prolonged and the materials contained in spent flares are biologically inert. Marine flare debris would be encountered in very small quantities and, aside from a small amount of wood debris (i.e., from the MK6), would sink in oceanic waters (particularly the aluminum housing of the MK25). Therefore, the potential impacts of marine flares on marine mammals are not considered significant.

During proposed search and rescue training operations in the WTA, CSAR personnel would deploy plastic bags of brightly-colored fluorescein dye to provide visual reference during marine operations. The sea dye is contained in a plastic bag, approximately the length and width of a piece of letter-format paper, that would be dropped from an aircraft at an altitude greater than 50 ft. Upon impact the bags burst and the dye is dispensed into the water. At dilute concentrations the dye itself is relatively inert.

A bowhead whale calf has been observed orienting to and playing for an extended period (22 minutes) within an area colored by fluorescein dye (Würsig et al. 1985) so for this animal the dilute dye did not appear to be particularly noxious. The plastic bags associated with dye markers may sink to the bottom or remain on the surface of the water and drift toward shore, causing a potential ingestion hazard for wildlife.

In mysticete whales, floating plastic debris could lodge or tangle in the baleen and reduce filtration efficiency. However, these items would likely remain in place for only a brief period as the large volume of water expelled from within the mouth, and through the baleen, during feeding would likely dislodge and discharge these materials before they could cause irritation of the oral mucosa or be ingested. As baleen plates are robust inert structures made of keratin, either brief or prolonged contact with a piece of debris would not likely cause damage.

Based upon data collected on stomach analyses of dead or stranded marine wildlife, only a small proportion of the debris found in the gastrointestinal tracts was plastic fragments or plastic bags. Ingestion of foreign objects, including plastic bags, by marine wildlife does not appear to be a common occurrence based on analysis of the stomach contents of stranded animals (Tarpley and Marwitz 1993).

It is possible that the plastic bags used to dispense sea dye might pose a potential ingestion hazard for marine mammals. However, the evidence to date does not suggest that the risk to marine mammal species from exposure to these bags is high. These sea dye bags probably represent a small fraction of the total man-made plastic debris to which these species have been and will be exposed (Kullenberg 1994). The impacts of sea dye bags on marine mammals would not be significant.

4.9.2 ALTERNATIVES A AND B: CSAR BEDDOWN AT EDWARDS AFB OR VANDENBERG AFB

Since the WTA would be utilized in all alternatives (except the No-Action Alternative) and includes all marine biological resources for the Proposed Action, the marine biological impacts for Alternatives A and B are the same as for the Proposed Action; see section 4.9.1.

4.9.3 ALTERNATIVE C: NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the proposed beddown of the CSAR unit (HH-60 and HC-130 aircraft and associated military personnel) and the ground-based and airspace training activities would not occur. Consequently, baseline conditions, as described in Section 3.9, would remain unchanged. Implementation of the No-Action Alternative would not change current activities and conditions within the WTA. Therefore, there would be no impacts to marine biological resources.

4.10 CULTURAL RESOURCES

The methodology for identifying, evaluating, and mitigating impacts to cultural resources has been established through federal laws and regulations including the National Historic Preservation Act, the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, and the American Indian Religious Freedom Act.

A proposal affects a significant resource when it alters the property's characteristics, including relevant features of its environment or use that qualify it as significant according to National Register criteria. Effects may include physical destruction, damage, or alteration of all or part of the resource; alteration of the character of the surrounding environment that contributes to the resource's qualifications for the National Register of Historic Places (NRHP); introduction of visual, audible, or atmospheric elements that are out of character with the resource or alter its setting; or neglect of the resource resulting in its deterioration or destruction.

Potential impacts are assessed by: 1) identifying project activities that could directly or indirectly affect a significant resource; 2) identifying the known or expected significant resources in areas of potential impact; and 3) determining whether a project activity would have no effect, no adverse effect, or an adverse effect on significant resources (36 CFR 800.9). Impacts to cultural resources may occur from changes in the setting caused by visual or audible intrusions, ground-disturbing activities such as construction, or modifications to structures.

The ROI for cultural resources includes those areas on base proposed for construction or renovation of facilities. No new areas would be overflown, only existing ranges would be used, and aircraft activity would increase only slightly from current conditions. Therefore, no further analysis of cultural resources at the affected ranges or beneath affected airspace is provided.

4.10.1 PROPOSED ACTION: CSAR BEDDOWN AT DAVIS-MONTHAN AFB

No cultural or historic resources are in the vicinity of the project area at Davis-Monthan AFB. The area has been extensively disturbed and no resources have been identified or are expected in the area. Although these areas would have a low probability of containing buried archaeological resources (due to their disturbed nature), evidence of such resources could be uncovered during ground-disturbing activities. In the event such resources were uncovered during the course of project development, construction would be suspended until the State Historic Preservation Office (SHPO) has been contacted and a qualified archaeologist could determine the significance of the encountered resource(s). Therefore, implementation of the Proposed Action would not result in significant impacts to cultural resources.

4.10.2 ALTERNATIVE A: CSAR BEDDOWN AT EDWARDS AFB

No cultural resources are located within the vicinity of the project area at North Base, Edwards AFB. However, the Muroc Flight Test Base, a potential historic district, is located within the project area. The Muroc Flight Test Base may be eligible for nomination to the NRHP under Criterion A, B, C, and D. Section 106 of the National Historic Preservation Act therefore requires that consultation with SHPO take place prior to implementation of this alternative. All other impacts associated with Alternative A would be similar to those described under the Proposed Action. Therefore, no significant impacts to cultural resources would occur as a result of implementation of Alternative A.

4.10.3 ALTERNATIVE B: CSAR BEDDOWN AT VANDENBERG AFB

No cultural or historic resources are in the vicinity of the project area at Vandenberg AFB. The area has been extensively disturbed and no resources have been identified or are expected in the area (Vandenberg AFB 2002b). Impacts associated with Alternative B would be the same as those described under the Proposed Action. Therefore, no significant impacts to cultural resources would occur as a result of implementation of Alternative B.

4.10.4 ALTERNATIVE C: NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the proposed beddown of the CSAR unit (HH-60 and HC-130 aircraft and associated military personnel) and the ground-based and airspace training activities would not occur. Consequently, baseline conditions, as described in Section 3.10, would remain unchanged. Implementation of the No-Action Alternative would not change current activities at Davis-Monthan, Edwards, or Vandenberg AFBs; proposed training ranges; airspace units; and WTA. Therefore, there would be no impacts to cultural resources.

4.11 SOCIOECONOMICS

The significance of population and expenditure impacts are assessed in terms of their direct effects on the local economy and related indirect effects on other socioeconomic resources (e.g., housing). The Proposed Action or alternatives would affect socioeconomic resources through the increase in military and civilian personnel at each of the alternative installations and the resultant impacts on population, employment, earnings, education, and housing at each installation and their vicinities.

4.11.1 PROPOSED ACTION: CSAR BEDDOWN AT DAVIS-MONTHAN AFB

4.11.1.1 Davis-Monthan AFB ROI

Population

Implementation of the Proposed Action would increase manpower authorizations at Davis-Monthan AFB from 8,710 to 9,769, an increase of 1,059 personnel (Table 4.11-1). Based on an average of 2.5 persons per household in the region of influence (ROI) (USBC 2000a), the number of personnel and dependents associated with the base would increase from approximately 21,775 to 24,423, or by 2,648 people. This represents a population increase in the ROI of less than one percent. Although not significant, this would generate an increase in economic activity in the ROI associated with Davis-Monthan AFB.

Table 4.11-1. Population Impacts

2000 ROI Population[1]	*Baseline/No-Action*		*the Proposed Action*		*Increase in ROI (%)*
	Personnel[2]	*Total Population[3]*	*Personnel*	*Total Population*	
818,306	8,710	21,775	9,769	24,423	2,648 (0.3%)

Notes: [1]ROI includes Pima County.
[2]Davis-Monthan AFB Manpower Authorizations.
[3]Total population (Davis-Monthan AFB personnel plus dependents) derived by multiplying Manpower Authorizations by 2.5.
Sources: USCB 2000a.

Employment

Using multipliers discussed in Section 3.11, it is estimated that the implementation of the Proposed Action would result in the addition of 159 indirect jobs in the surrounding communities (Table 4.11-2). Based on a total work force in the ROI of 388,052 (refer to Table 3.11-3), this represents an increase in employment within the ROI of less than 1 percent. Therefore, these indirect employment opportunities would have a small positive impact on regional economic activity.

Table 4.11-2. Indirect Employment Impacts

	Baseline/No-Action			*the Proposed Action*			
Personnel	*No.*	*Factor*	*Indirect Jobs*	*No.*	*Factor*	*Indirect Jobs*	*Change*
Officer	863	0.29	250	995	0.29	289	39
Enlisted	5,276	0.13	686	6,203	0.13	806	120
Civilian	2,571	0.43	1,105	2,571	0.43	1,105	0
Total	**8,710**	**-**	**2,041**	**9,769**	**-**	**2,200**	**159**

Sources: Logistics Management Institute 1995.

Earnings

Implementation of the Proposed Action would result in the increase of approximately $30 million in payroll disbursements in the ROI. A multiplier of 1.95 is applied to payroll disbursements to project the indirect economic affects associated with economic activity of a given entity (refer to Section 3.11). Applying this multiplier to payroll disbursements as a result of implementation of the Proposed Action, the combined (direct plus indirect) annual economic gain resulting from the Proposed Action would be approximately $58 million or 3 percent of ROI total personal income (TPI) (Table 4.11-3). Thus, the increase of earnings would have a beneficial impact on the ROI.

Table 4.11-3. Earnings Impacts (in millions)

ROI 1999 TPI	*Baseline/No-Action Davis-Monthan AFB TPI*	*the Proposed Action: Davis-Monthan AFB TPI*	*Change in ROI TPI (%)*
$19,200	$476	$534	$58 (3%)

Sources: Bureau of Economic Analysis (BEA) 1999; Oregon State University 1999.

Education

The ROI has an estimated 0.6 children per household (USBC 2000a). With 1,059 manpower authorizations coming to Davis-Monthan AFB, approximately 635 school-aged children would be introduced into the local school districts. This would be an increase of less than one percent above the baseline enrollment of 132,924 students for ROI school districts (refer to Table 3.11-5). This amount would not exceed the maximum classroom load for any grade level; therefore, no significant impact with regard to primary educational facilities would occur as a result of implementation of the Proposed Action.

In terms of funding, the increase in enrollment would equate to approximately $5 million more in annual allocations. This would represent a less than 1 percent increase over baseline in funding for the school districts within the ROI (Table 4.11-4). This change would not have a significant impact on education within the ROI.

Table 4.11-4. Education Impacts

Baseline/No-Action		*the Proposed Action*		*Change*
Total Students	*Funding (in millions)*[1]	*Total Students*	*Funding (in millions)*	*(%)*
132,924	$938	133,559	$943	$5 (0.5%)

Note: [1]Funding at $5,794 per student.
Sources: Arizona Department of Education 2002a,b.

Housing

Under the Proposed Action, the addition of 1,059 personnel would result in an increased housing demand within the ROI. However, since most of the personnel associated with the Proposed Action would likely live on base, this increased demand would be negligible. In addition, the Davis-Monthan AFB ROI currently has a 9 percent vacancy rate, or approximately 34,387 available housing units (USCB 2000a). Therefore, adequate housing exists in the local community for personnel that would choose to live off base. Therefore, no significant impacts would occur.

Health Services

Under the Proposed Action, no increase in health services would be required. Current resources would have sufficient capacity to meet the needs of the personnel associated with the Proposed Action. Therefore, no significant impacts to health services would occur as a result of implementation of the Proposed Action.

Public Services and Utilities

No significant increases would be required from local municipal services. Current facilities and resources would be capable of meeting the demands associated with increases in the local population as a result of implementation of the Proposed Action. Therefore, no significant impacts to municipal services would occur.

4.11.2 ALTERNATIVE A: CSAR BEDDOWN AT EDWARDS AFB

4.11.2.1 Edwards AFB

Population

Implementation of Alternative A would increase manpower authorizations at Edwards AFB from 11,687 to 12,887, an increase of 1,200 personnel (Table 4.11-5). Based on an average of 3.0 persons per household in the ROI (USBC 2000a), the number of personnel and dependents associated with the base would increase from approximately 35,061 to 38,661, or by 3,600 people. This represents a population increase in the ROI of less than 1 percent. Although not significant, this would generate an increase in economic activity in the ROI associated with Edwards AFB.

Table 4.11-5. Population Impacts

2000 ROI Population[1]	*Baseline/No-Action*		*Alternative A*		*Increase in ROI (%)*
	Personnel[2]	*Total Population*[3]	*Personnel*	*Total Population*	
11,890,417	11,687	35,061	12,887	38,661	3,600 (< 1%)

Notes: [1]ROI includes Kern County, Los Angeles County, and San Bernardino County.
[2] Edwards AFB Manpower Authorizations.
[3]Total population (Edwards AFB personnel plus dependents) derived by multiplying Manpower Authorizations by 3.0.
Sources: USCB 2000a.

Employment

Using multipliers discussed in Section 3.11, it is estimated that implementation of Alternative A would result in the addition of 182 indirect jobs in the surrounding communities (Table 4.11-6). Based on a total work force in the ROI of 6,024,500 (refer to Table 3.11.9), this represents an increase in employment within the ROI of less than 1 percent. Therefore, these indirect employment opportunities would have a small positive impact on regional economic activity.

Table 4.11-6. Indirect Employment Impacts

Personnel	*Baseline/No-Action*			*Alternative A*			*Change*
	No.	*Factor*	*Indirect Jobs*	*No.*	*Factor*	*Indirect Jobs*	
Officer	679	0.29	197	837	0.29	243	46
Enlisted	3,174	0.13	413	4,210	0.13	547	134
Civilian	7,834	0.43	3,369	7,840	0.43	3,371	2
Total	**11,687**	**-**	**3,979**	**12,887**	**-**	**4,161**	**182**

Earnings

Implementation of Alternative A would result in the increase of approximately $40 million in payroll disbursements in the ROI. A multiplier of 1.95 is applied to payroll disbursements to project the indirect economic affects associated with economic activity of a given entity (refer to Section 3.11). Applying this multiplier to payroll disbursements as a result of implementation of Alternative A, the combined (direct plus indirect) annual economic gain resulting from implementation of Alternative A would be approximately $79 million or 8 percent of ROI total personal income (TPI) (Table 4.11-7). Thus, the increase of earnings would have a beneficial impact on the ROI.

Table 4.11-7. Earnings Impacts (in millions)

ROI 1999 TPI	*Baseline/No-Action Edwards AFB TPI*	*Alternative A: Edwards AFB TPI*	*Change in ROI TPI (%)*
$103,900	$1,016	$1,095	$79 (8%)

Sources: Bureau of Economic Analysis (BEA) 1999; Oregon State University 1999.

Education

The ROI has an estimated 0.9 children per household (USBC 2000a). With 1,200 manpower authorizations coming to Edwards AFB, approximately 1,080 school-aged children would be introduced into the local school districts. This would be an increase of less than 1 percent above the baseline enrollment of 2,170,941 students for ROI school districts (refer to Table 3.11-11). This amount would not exceed the maximum classroom load for any grade level; therefore, no significant impact with regard to primary educational facilities would result upon implementation of Alternative A.

In terms of funding, the increase in enrollment would equate to approximately $6 million more in annual allocations. This would represent a less than 1 percent increase over baseline conditions in funding for the school districts within the ROI (Table 4.11-8). This change would not have a significant impact on education within the ROI.

Table 4.11-8. Education Impacts

Baseline/No-Action		*Alternative A*		*Change (in millions)*
Total Students	*Funding (in millions)*[1]	*Total Students*	*Funding (in millions)*	*(%)*
2,170,941	$12,876	2,172,021	$12,882	$6 (>1%)

Note: [1]Funding at $5,931 per student.
Sources: U.S. Department of Education 1999a, b.

Housing

The addition of 1,200 personnel under Alternative A would result in an increased housing demand within the ROI. However, since most of the personnel associated with Alternative A would likely live on base, this increased demand would be negligible. In addition, the Edwards AFB ROI has an 8.7 percent vacancy rate, or approximately 232,822 available housing units (USCB 2000a). Therefore, adequate housing exists in the local community for personnel that would choose to live off base. No significant impacts would occur.

Health Services

Under Alternative A, no increase in health services would be required. Current resources would have sufficient capacity to meet the needs of the personnel associated with Alternative A. Therefore, no significant impacts to health services would occur as a result of implementation of Alternative A.

Public Services and Utilities

No significant increases would be required from local municipal services. Current facilities and resources would be capable of meeting the demands of increases in the local population with implementation of Alternative A. Therefore, no significant impacts to municipal services would occur.

4.11.3 ALTERNATIVE B: CSAR BEDDOWN AT VANDENBERG AFB

4.11.3.1 Vandenberg AFB

Population

Implementation of Alternative B would increase manpower authorizations at Vandenberg AFB from 8,658 to 9,858, an increase of 1,200 personnel (Table 4.11-9). Based on an average of 2.9 persons per household in the ROI (USBC 2000a), the number of personnel and dependents associated with the base would increase from approximately 25,108 to 28,588, or by 3,480 people. This represents a population increase in the ROI of approximately 9 percent. Although not significant, this would generate an increase in economic activity in the ROI associated with Vandenberg AFB.

Table 4.11-9. Population Impacts

2000 ROI Population[1]	*Baseline/No-Action*		*Alternative B*		*Increase in ROI (%)*
	Personnel[2]	*Total Population*[3]	*Personnel*	*Total Population*	
41,103	8,658	25,108	9,858	28,588	3,480 (8%)

Notes: [1]ROI includes City of Lompoc.
[2] Vandenberg AFB Manpower Authorizations.
[3]Total population (Vandenberg AFB personnel plus dependents) derived by multiplying Manpower Authorizations by 2.9.
Sources: USCB 2000a

Employment

Using multipliers discussed in Section 3.11, it is estimated that the implementation of Alternative B would result in the addition of 183 indirect jobs in the surrounding communities (Table 4.11-10). Based on a total work force in the ROI of 18,310 (refer to Table 3.11-16), this represents an increase in employment within the ROI of less than 1 percent. Therefore, these indirect employment opportunities would be a small positive impact on regional economic activity.

Table 4.11-10. Indirect Employment Impacts

Personnel	*Baseline/No-Action*			*Alternative B*			*Change*
	No.	*Factor*	*Indirect Jobs*	*No.*	*Factor*	*Indirect Jobs*	
Officer	740	0.29	215	898	0.29	260	45
Enlisted	2,548	0.13	331	3,584	0.13	466	135
Civilian	5,370	0.43	2,309	5,376	0.43	2,312	3
Total	**8,658**	**-**	**2,855**	**9,858**	**-**	**3,038**	**183**

Sources: Logistics Management Institute 1995.

Earnings

Implementation of Alternative B would result in the increase of approximately $31 million in payroll disbursements in the ROI. A multiplier of 1.95 is applied to payroll disbursements to project the indirect economic affects associated with economic activity of a given entity (refer to Section 3.11). Applying this multiplier to payroll disbursements as a result of implementation of Alternative B, the combined (direct plus indirect) annual economic gain resulting from implementation of Alternative B would be approximately $60 million or 7 percent of ROI total personal income (TPI) (Table 4.11-11). Thus, the increase of earnings would have a beneficial impact on the ROI.

Table 4.11-11. Earnings Impacts (in millions)

ROI 1999 TPI	*Baseline/No-Action Vandenberg AFB TPI*	*Alternative B: Vandenberg AFB TPI*	*Change in ROI TPI (%)*
$827.3	$429	$489	$60 (7%)

Sources: Bureau of Economic Analysis (BEA) 1999; Oregon State University 1999.

Education

The ROI has an estimated 0.9 children per household (USBC 2000a). With 1,200 manpower authorizations coming to Vandenberg AFB, approximately 1,080 school-aged children would be introduced into the local school districts. This would be an increase of 9 percent above the baseline enrollment of 11,384 students for ROI school districts (refer to Table 3.11-18). This amount would not exceed the maximum classroom load for any grade level; therefore, no significant impact with regard to primary educational facilities would result upon implementation of Alternative B.

In terms of funding, the increase in enrollment would equate to approximately $6 million more in annual allocations. This would represent a 10 percent increase over baseline in funding for the school districts within the ROI (Table 4.11-12). This change would not have a significant impact on education within the ROI.

Table 4.11-12. Education Impacts

Baseline/No-Action		*Alternative B*		*Change (in millions)*
Total Students	*Funding (in millions)*[1]	*Total Students*	*Funding (in millions)*	*(%)*
11,384	$68	12,464	$74	$6 (9)

Note: [1]Funding at $5,931 per student.
Sources: U.S. Department of Education 1999a, b.

Housing

The addition of 1,200 personnel under Alternative B would result in an increased housing demand within the ROI. However, since most of the personnel associated with Alternative B would likely live on base, this increased demand would be negligible. In addition, the Vandenberg AFB ROI has a 4.1 percent vacancy rate, or approximately 562 available housing units (USCB 2000a). Therefore, adequate housing exists in the local community for personnel that would choose to live off base. No significant impacts would occur.

Health Services

Under Alternative B, no increase in health services would be required. Current resources would have sufficient capacity to meet the needs of the personnel associated with Alternative B. Therefore, no significant impacts to health services would occur as a result of implementation of Alternative B.

Public Services and Utilities

No significant increases would be required from local municipal services. Current facilities and resources would be capable of meeting the demands of increases in the local population with implementation of Alternative B. Therefore, no significant impacts to municipal services would occur.

4.11.4 ALTERNATIVE C: NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the proposed beddown of the CSAR unit (HH-60 and HC-130 aircraft and associated military personnel) and the ground-based and airspace training activities would not occur. Consequently, baseline conditions, as described in Section 3.11, would remain unchanged. Implementation of the No-Action Alternative would not change current activities at Davis-Monthan, Edwards, or Vandenberg AFBs; proposed training ranges; airspace units; and WTA. Therefore, there would be no impacts to socioeconomics.

4.12 ENVIRONMENTAL JUSTICE

The analysis of environmental justice identifies the potential for disproportionately high and adverse effects on minority and low-income populations. In addition, the analysis considers the environmental health and safety risks that may proportionately affect children upon implementation of any of the identified alternatives.

4.12.1 PROPOSED ACTION: CSAR BEDDOWN AT DAVIS-MONTHAN AFB

4.12.1.1 Davis-Monthan AFB

Minority and Low-Income Populations

As described in Section 3.12, the percentage of minority and low-income communities within the ROI are consistent with those in the State of Arizona and the nation. Based on data presented in Chapter 4, implementation of the Proposed Action is not projected to result in impacts to any resource area that would disproportionately affect minority and low-income communities. Therefore, there would be no significant disproportionate impacts to minority or low-income populations with implementation of the Proposed Action.

Protection of Children

Implementation of the Proposed Action would not result in a change in the shape or location of safety zones associated with the airfield complex at Davis-Monthan AFB; therefore, impacts with regard to airfield safety and aircraft mishap potential would not have the potential to disproportionately impact affected populations of children. Further, implementation of the Proposed Action would not result in substantial changes in the storage, transport, use, or disposal of hazardous materials and wastes associated with operations at the base. Consequently, children would not be exposed to increased health or safety risks with regard to hazardous materials. Therefore, no significant impacts would occur as a result of implementation of the Proposed Action.

4.12.2 ALTERNATIVE A: CSAR BEDDOWN AT EDWARDS AFB

4.12.2.1 Edwards AFB

Minority and Low-Income Populations

As described in Section 3.12, the percentage of minority and low-income communities within the ROI are consistent with those in the State of California and the nation. Based on data presented in Chapter 4, implementation of Alternative A is not projected to result in impacts to any resource area that would disproportionately affect minority and low-income communities. Therefore, there would be no significant disproportionate impacts to minority or low-income populations with implementation of Alternative A.

Protection of Children

Implementation of Alternative A would not result in a change in the shape or location of safety zones associated with the airfield complex at Edwards AFB; therefore, impacts with regard to airfield safety and aircraft mishap potential would not have the potential to disproportionately impact affected populations of children. Further, implementation of Alternative A would not result in substantial changes in the storage, transport, use, or disposal of hazardous materials and wastes associated with operations at the base. Consequently, children would not be exposed to increased health or safety risks with regard to hazardous materials. Therefore, no significant impacts would occur as a result of implementation of Alternative A.

4.12.3 ALTERNATIVE B: CSAR BEDDOWN AT VANDENBERG AFB

4.12.3.1 Vandenberg AFB

Minority and Low-Income Populations

As described in Section 3.12, the percentage of minority and low-income communities within the ROI are consistent with those in the State of California and the nation. Based on data presented in Chapter 4, implementation of Alternative B is not projected to result in impacts to any resource area that would disproportionately affect minority and low-income communities. Therefore, there would be no significant disproportionate impacts to minority or low-income populations with implementation of Alternative B.

Protection of Children

Implementation of Alternative B would not result in a change in the shape or location of safety zones associated with the airfield complex at Vandenberg AFB; therefore, impacts with regard to airfield safety and aircraft mishap potential would not have the potential to disproportionately impact affected populations of children. Further, implementation of Alternative B would not result in substantial changes in the storage, transport, use, or disposal of hazardous materials and wastes associated with operations at the base. Consequently, children would not be exposed to increased health or safety risks with regard to hazardous materials. Therefore, no significant impacts would occur as a result of implementation of Alternative B.

4.12.4 ALTERNATIVE C: NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the proposed beddown of the CSAR unit (HH-60 and HC-130 aircraft and associated military personnel) and the ground-based and airspace training activities would not occur. Consequently, baseline conditions, as described in Section 3.12, would remain unchanged. Implementation of the No-Action Alternative would not change current activities at Davis-Monthan, Edwards, or Vandenberg AFBs; proposed training ranges; airspace units; and WTA. Therefore, there would be no impacts to minority or low-income populations and populations of children.

4.13 LAND USE

Analysis of potential impacts to land use is interrelated with other resource areas discussed in this chapter, including Noise, Environmental Justice, Recreation and Visual Resources, Terrestrial Biological Resources, and Marine Biological Resources. Full analyses of the impacts on these resources are discussed in their respective sections. This section focuses on the impacts of the Proposed Action and alternatives on land ownership or land status, general land use patterns, and land management. The primary effect of HH-60 and HC-130 sortie-operations relative to land use is noise generated by aircraft overflights and associated training activities. Noise exposure greater than 65 decibels (dB) day-night average sound level (DNL_{mr}) over residential areas, public services, cultural resources, or recreational areas is considered generally unacceptable (Federal Interagency Committee on Urban Noise [FICUN] 1980). Discussions of noise characteristics and estimated noise levels associated with baseline conditions are presented in Sections 3.2 and 4.2, respectively. In addition, as required under the CZMA, a CCD on the potential effects of CSAR-related activities in the WTA will be completed and submitted to the California Coastal Commission for review.

4.13.1 PROPOSED ACTION: CSAR BEDDOWN AT DAVIS-MONTHAN AFB

4.13.1.1 Davis-Monthan AFB

Implementation of the Proposed Action would require construction of new facilities and modification of existing facilities. Potential construction and renovations would be limited to developed areas and no changes to current land use would be made. All proposed construction and facilities modification projects have been sited in accordance with established land use development guidelines addressing safety, functionality, and environmental protection zones. Further, each proposed construction project would support a land use activity that could be defined under a land use category that currently exists at the installation (i.e., no new type of land is proposed). Consequently, each construction component of the Proposed Action is consistent with installation planning policies and guidelines. With regard to regional land use, no new construction or changes in land use patterns in the Tucson area would be required to facilitate implementation of the Proposed Action.

Based on the analysis presented in Section 4.2, Noise, the change in aircraft operations associated with the Proposed Action would not result in significant changes to areas exposed to DNL noise levels of 65-85+ dB on and in the vicinity of Davis-Monthan AFB (see Table 4.2-1 and Figure 4.2-1). Further, since changes in noise exposure would neither result in new sensitive receptors being exposed to unacceptable noise levels nor result in new land use incompatibilities in the vicinity of Davis-Monthan AFB, impacts to land use upon implementation of the Proposed Action would not be significant.

4.13.1.2 Ranges and Airspace

Under the Proposed Action, aircraft operations within the affected airspace would increase. Projected increases in sortie-operations and noise levels within the MOAs, LATNs, and ranges and associated restricted areas would not adversely affect land use. In addition, land uses under the affected airspace have been subjected to aircraft overflights in the past. The increase in aircraft operations from the Proposed Action would not introduce different impacts to current land uses. Therefore, implementation of the Proposed Action would not have a significant impact.

4.13.1.3 WTA

Government (Navy, Air Force, USCG), commercial, and recreational users currently operate in the WTA at NAS North Island. The frequency of aircraft activity in the WTA would increase slightly with implementation of the Proposed Action but no change to the configuration (i.e., size, shape or location) of the WTA is proposed or would be necessary to accommodate the additional aircraft and proposed training activities. In addition, there would be no new restrictions placed on the current users of the WTA and the vicinity. Therefore, there would be no significant impacts within the WTA with respect to current users upon implementation of the Proposed Action.

4.13.2 ALTERNATIVE A: CSAR BEDDOWN AT EDWARDS AFB

4.13.2.1 Edwards AFB and Vicinity

Implementation of Alternative A would require construction of new facilities and modification of existing facilities. Potential construction and renovations would be limited to developed areas and no changes to current land use would be made. All proposed construction and facilities modification projects have been sited in accordance with established land use development guidelines addressing safety, functionality, and environmental protection zones. Further, each proposed construction project would support a land use activity that could be defined under a land use category that currently exists at the installation (i.e., no new type of land is proposed). Consequently, each construction component of Alternative A is consistent with installation planning policies and guidelines. With regard to regional land use, no new construction or changes in land use patterns in the vicinity of Edwards AFB would be required to facilitate implementation of Alternative A.

Based on the analysis presented in Section 4.2, Noise, the change in aircraft operations associated with Alternative A would not result in significant changes to areas exposed to DNL noise levels of 65-85+ dB on and in the vicinity of North Base, Edwards AFB (see Figure 4.2-2). Further, since changes in noise exposure would neither result in new sensitive receptors being exposed to unacceptable noise levels nor result in new land use incompatibilities in the vicinity of Edwards AFB, impacts to land use upon implementation of Alternative A would not be significant.

4.13.2.2 Ranges and Airspace

Implementation of Alternative A would increase aircraft operations within the affected airspace. Projected increases in sortie-operations and noise levels within the MOAs, LATNs, and ranges and associated restricted areas would not adversely affect land use. In addition, land uses under the affected airspace have been subjected to aircraft overflights in the past. The increase in aircraft operations from implementation of Alternative A would not introduce different impacts to current land uses. Therefore, implementation of Alternative A would not have a significant impact.

4.13.2.3 WTA

Impacts to civilian and government use of the WTA with implementation of Alternative A would be similar to those previously described for the Proposed Action. Therefore, there would be no significant impacts with implementation of Alternative A.

4.13.3 ALTERNATIVE B: CSAR BEDDOWN AT VANDENBERG AFB

4.13.3.1 Vandenberg AFB and Vicinity

Implementation of Alternative B would require construction of new facilities and modification of existing facilities. Potential construction and renovations would be limited to developed areas and no changes to current land use would be made. All proposed construction and facilities modification projects have been sited in accordance with established land use development guidelines addressing safety, functionality, and environmental protection zones. Further, each proposed construction project would support a land use activity that could be defined under a land use category that currently exists at the installation (i.e., no new type of land use is proposed). Consequently, each construction component of Alternative B is consistent with installation planning policies and guidelines. With regard to regional land use, no new construction or changes in land use patterns in the vicinity of Vandenberg AFB would be required to facilitate implementation of Alternative B. If Alternative B is selected for implementation, as required under the CZMA, a CCD would be completed and submitted to the California Coastal Commission for review.

Based on the analysis presented in Section 4.2, Noise, the change in aircraft operations associated with Alternative B would not result in significant changes to areas exposed to DNL noise levels of 65-85+ dB on and in the vicinity of Vandenberg AFB (see Figure 4.2-3). Further, since changes in noise exposure would neither result in new sensitive receptors being exposed to unacceptable noise levels nor result in new land use incompatibilities in the vicinity of Vandenberg AFB, impacts to land use upon implementation of Alternative B would not be significant.

4.13.3.2 Ranges and Airspace

Alternative B would increase aircraft operations within the affected airspace. Projected increases in sortie-operations and noise levels within the MOAs, LATNs, and ranges and associated restricted areas would not adversely affect land use. For the affected airspace, projected noise levels with implementation of Alternative B would remain below 60 dB (DNL_{mr}). In addition, land uses under the affected airspace have been subjected to aircraft overflights in the past. The increase in aircraft operations with implementation of Alternative B would not introduce different impacts to current land uses. Therefore, implementation of Alternative B would not have a significant impact.

4.13.3.3 WTA

Impacts to civilian and government use of the WTA with implementation of Alternative B would be similar to those previously described for the Proposed Action. Therefore, there would be no significant impacts with implementation of Alternative B.

4.13.4 ALTERNATIVE C: NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the proposed beddown of the CSAR unit (HH-60 and HC-130 aircraft and associated military personnel) and the ground-based and airspace training activities would not occur. Consequently, baseline conditions, as described in Section 3.13, would remain unchanged. Implementation of the No-Action Alternative would not change current activities at Davis-Monthan, Edwards, or Vandenberg AFBs; proposed training ranges; airspace units; and WTA. Therefore, there would be no impacts to land use.

4.14 RECREATION AND VISUAL RESOURCES

This section addresses potential effects of the alternatives on recreational areas and on the visual qualities of the landscape and surrounding environment. The analysis addresses the potential for: 1) changes in recreation use and access due to increased sortie-operations in specific areas; 2) changes to the visual qualities of the landscape as a result of increased training operations in specific areas; and 3) changes to the visual setting under affected airspace resulting from aircraft noise and overflights associated with the Proposed Action and alternatives. In addition, as required under the CZMA, a CCD on the potential effects of CSAR-related activities in the WTA will be completed and submitted to the California Coastal Commission for review.

Impacts of aircraft overflights to the visual environment of an area are difficult to quantify due to the inability to separate such impacts from the noise of aircraft and overflights. In most instances, aircraft are not noticed because of visual cues, but rather are noticed after being heard. The nature of the impact depends on the sensitivity of the resource affected, the distance from which it is viewed, and the length of time it is visible. Altitude and screening relative to the viewer also play a key role in determining impacts from aircraft overflights.

4.14.1 PROPOSED ACTION: CSAR BEDDOWN AT DAVIS-MONTHAN AFB

4.14.1.1 Davis-Monthan AFB and Vicinity

Use of recreational facilities on base and in Tucson would be expected to increase as a result of the additional manpower authorizations associated with the Proposed Action. On-base and regional recreational areas have sufficient resources to accommodate the potential increase in use and would not be significantly affected with the projected increase in personnel. Therefore, implementation of the Proposed Action would have no impact on recreational resources at or in the vicinity of Davis-Monthan AFB.

Proposed construction and renovation of facilities associated with the Proposed Action would occur in previously developed areas within the cantonment/flightline area of Davis-Monthan AFB. Construction and renovation projects would be visually consistent with existing structures at the base and available views of proposed facilities from off site would remain limited. Further, the visual environment of Davis-Monthan AFB is already characteristic of a military airfield and regional visual sensitivity is low. Therefore, no significant impact to visual resources would occur upon implementation of the Proposed Action.

Potential visual impacts from aircraft overflights would not be significant since air traffic would only increase by 14 percent. This increase in overflights would not have a significant adverse effect on the character of the underlying visual resources. In addition, Davis-Monthan AFB is located in an urban environment where the visual character is dominated by human-related activities. Therefore, implementation of the Proposed Action would not have a significant impact on visual resources at or in the vicinity of Davis-Monthan AFB.

4.14.1.2 Ranges and Airspace

Under the Proposed Action, aircraft operations would increase within the affected airspace. However, this increase in aircraft operations would not significantly change the noise environment for recreation areas underlying the affected airspace. Based upon projected noise levels (refer to Section 4.2, Noise), it would be unlikely that visitors of recreation areas would be able to distinguish these changes in noise levels from the ambient noise environment. Furthermore, aircraft operating in existing airspace associated with this alternative are required to follow restrictions specifically designed to minimize disturbance to recreation users. Therefore, implementation of the Proposed Action would not have a significant impact on recreational and visual resources underlying the affected airspace.

4.14.1.3 WTA

There are no designated or protected recreational areas within the WTA; therefore, implementation of the Proposed Action would not have a significant impact on designated recreational areas.

Proposed aircraft activities associated within the WTA would result in average noise levels of 45 dB DNL (refer to Section 4.2, Noise). These levels would be similar to estimated ambient noise levels, which are well below accepted guidelines for noise compatibility. Therefore, noise levels associated with HH-60 and HC-130 operations would not be high enough to disrupt recreational activities taking place within WTA. In addition, the HH-60s would conduct reconnaissance overflights to select a training site away from civilian vessels. This would help minimize any effects on recreational activities. Therefore, implementation of training activities within the WTA with implementation of the Proposed Action would not result in significant impacts to recreational resources with respect to noise effects.

As a result of the proposed training activities within the WTA, flares, sea dye packs, and lightsticks would be generated as debris (refer to Section 4.5, Materials Management). Unrecovered items in the marine environment have the potential to affect the aesthetic quality of the environment. However, these materials would be quickly dispersed throughout the training area and beyond and this quantity of waste would not result in significant impacts to the recreational or visual resources in the WTA. Furthermore, lightsticks would be retrieved as much as practicable when search and rescue training personnel are in the water and whenever environmental conditions allow.

Within the WTA, training activities would take place at altitudes below 500 ft MSL; however, the resulting effect of overflights in the WTA would be temporary and consistent with on-going training activities within the area (e.g., Navy and U.S. Coast Guard). In addition, since proposed training operations within the WTA would be located approximately 3 NM from the California coastline at its closest point, aircraft operations would not be a visually dominant feature when seen from shore. Therefore, aircraft operations associated with the use of the WTA would not result in significant impacts to visual resources.

4.14.2 ALTERNATIVE A: CSAR BEDDOWN AT EDWARDS AFB

4.14.2.1 Edwards AFB and Vicinity

Use of recreational facilities on base and in the vicinity would be expected to increase as a result of the additional manpower authorizations associated with Alternative A. On-base and regional recreational areas have sufficient resources to accommodate the potential increase in use and would not be significantly affected with the projected increase in personnel. Therefore, implementation of Alternative A would have no impact on recreational resources at or in the vicinity of Edwards AFB.

Proposed construction and renovation of facilities associated with Alternative A would occur in previously developed areas within the North Base area of Edwards AFB. Construction and renovation projects would be visually consistent with existing structures at the base. Further, the visual environment of Edwards AFB is already characteristic of a military airfield and regional visual sensitivity is low. Therefore, no significant impact to visual resources would occur upon implementation of Alternative A.

Under Alternative A, potential visual impacts from aircraft overflights would be insignificant since air traffic would only increase by approximately 5 percent. These small increases in overflights would not have a significant adverse effect on the character of the underlying visual resources. Therefore, implementation of Alternative A would not have a significant impact on visual resources at or in the vicinity of Edwards AFB.

4.14.2.2 Ranges and Airspace

Under Alternative A, aircraft operations would increase within the affected airspace. However, this increase in aircraft operations would not significantly change the noise environment for recreation areas underlying the affected airspace. Based upon projected noise levels (refer to Section 4.2, Noise), it would be unlikely that visitors of recreation areas would be able to distinguish these changes in noise levels from the ambient noise environment. Furthermore, aircraft operating in existing airspace associated with this alternative are required to follow restrictions specifically designed to minimize disturbance to recreation users. Therefore, implementation of this alternative would not have a significant impact on recreational and visual resources underlying the affected airspace associated with Alternative A.

4.14.2.3 WTA

Impacts to recreational areas and visual resources associated with Alternative A would be the same as those described under the Proposed Action (see Section 4.14.1.3.).

4.14.3 ALTERNATIVE B: CSAR BEDDOWN AT VANDENBERG AFB

4.14.3.1 Vandenberg AFB and Vicinity

Use of recreational facilities on base and in the vicinity would be expected to increase as a result of the additional manpower authorizations associated with Alternative B. On-base and regional recreational areas have sufficient resources to accommodate the potential increase in use and would not be significantly affected with the projected increase in personnel. Therefore, implementation of Alternative B would have no impact on recreational resources at or in the vicinity of Vandenberg AFB.

Proposed construction and renovation of facilities associated with Alternative B would occur in previously developed areas within the cantonment/flightline area of Davis-Monthan AFB. Construction and renovation projects would be visually consistent with existing structures at the base. Further, the visual environment of Vandenberg AFB is already characteristic of a military airfield and regional visual sensitivity is low. Therefore, no significant impact to visual resources would occur upon implementation of Alternative B.

Under Alternative B, aircraft operations at Vandenberg AFB would increase by approximately 33 percent. Although this is a significant increase, this increase would not have an adverse effect on the character of the underlying visual resources for 3 reasons. First, the runways at Vandenberg AFB are located deep within the boundaries of the base and associated noise contours as the result of aircraft operations do not extend beyond base boundaries. Second, although there would be an increase in approaches and departures by aircraft at Vandenberg AFB, by the time these aircraft leave Vandenberg AFB boundaries they would be at an altitude that would not be intrusive either visually or acoustically to an off-base receptor. And third, Vandenberg AFB is a military installation and proposed aircraft activities would be consistent with the mission and character of an Air Force installation. Therefore, implementation of Alternative B would not have a significant impact on visual resources.

4.14.3.2 Ranges and Airspace

Under Alternative B, aircraft operations would increase within the affected airspace. However, this increase in aircraft operations would not significantly change the noise environment for recreation areas underlying the affected airspace. Based upon projected noise levels (refer to Section 4.2, Noise), it would be unlikely that visitors of recreation areas would be able to distinguish these changes in noise levels from the ambient noise environment. Furthermore, aircraft operating in existing airspace associated with this alternative are required to follow restrictions specifically designed to minimize disturbance to recreation users. Therefore, implementation of this alternative would not have a significant impact on recreational and visual resources underlying the affected airspace associated with Alternative B.

4.14.3.3 WTA

Impacts to recreational areas and visual resources associated with Alternative B would be the same as those described under the Proposed Action (see Section 4.14.1.3.).

4.14.4 ALTERNATIVE C: NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the proposed beddown of the CSAR unit (HH-60 and HC-130 aircraft and associated military personnel) and the ground-based and airspace training activities would not occur. Consequently, baseline conditions, as described in Section 3.14, would remain unchanged. Implementation of the No-Action Alternative would not change current activities at Davis-Monthan, Edwards, or Vandenberg AFBs; proposed training ranges; airspace units; and WTA. Therefore, there would be no impacts to recreation and visual resources.

4.15 TRANSPORTATION

Potential transportation impacts are assessed with respect to the potential for disruption of transportation patterns and deterioration of existing levels of service. Impacts may arise from the introduction of construction-related traffic on local and base roads or changes in traffic volumes created by either direct or indirect workforce and population changes. Transportation systems beneath the airspace areas are not affected by aircraft overflights. Therefore, for transportation resources, the ROI for the proposed alternatives includes roadway networks on base and in the vicinity. There would be no transportation-related impacts to communities in the vicinity of NAS North Island since there would be a small number of CSAR personnel at the base for a short period of time during TDY.

4.15.1 PROPOSED ACTION: CSAR BEDDOWN AT DAVIS-MONTHAN AFB

4.15.1.1 Davis-Monthan AFB and Vicinity

Construction-Related Impacts

Implementation of the Proposed Action would require delivery of materials to and removal of construction-related debris from construction and renovation sites. However, construction traffic would make up only a small portion of the total existing traffic volume in the local area and on base. Many of the vehicles would be driven to the construction site and kept on site for the duration of construction, resulting in very few actual increased trips. Furthermore, increases in traffic volumes associated with construction activity would be temporary; upon completion of construction, no long-term impacts to off- or on-base transportation systems would result with implementation of the Proposed Action.

Personnel Increases

Under the Proposed Action, 1,059 manpower authorizations would be added resulting in an increase of full-time personnel reporting to work each day. Increases in personnel would result in a slight increase in the amount of congestion that generally occurs at the gates during the morning and evening workday rush hours. In addition, a small decrease in the availability of parking on base would occur due to the addition in the number of personnel. Vehicular circulation and available parking on the installation are adequate. No off-base transportation impacts are anticipated since traffic flow is not a problem. Therefore, implementation of the Proposed Action would not have a significant impact on transportation resources on or in the vicinity of Davis-Monthan AFB.

4.15.2 ALTERNATIVE A: CSAR BEDDOWN AT EDWARDS AFB

4.15.2.1 Edwards AFB and Vicinity

Construction-Related Impacts

Implementation of Alternative A would require delivery of materials to and removal of construction-related debris from construction and renovation sites. However, construction traffic would make up only a small portion of the total existing traffic volume in the local area and on base. Many of the vehicles would be driven to the construction site and kept on site for the duration of construction, resulting in very few actual increased trips. Furthermore, increases in traffic volumes associated with construction activity would be temporary; upon completion of construction, no long-term impacts to off- or on-base transportation systems would result with implementation of Alternative A.

Personnel Increases

Under Alternative A, 1,200 manpower authorizations would be added resulting in an increase of full-time personnel reporting to work each day. Increases in personnel would result in a slight increase in the amount of congestion that generally occurs at the gates during the morning and evening workday rush hours. In addition, a small decrease in the availability of parking on base would occur due to the addition in the number of personnel. Vehicular circulation and available parking on the installation are adequate. Therefore, implementation of Alternative A would not have a significant impact on transportation resources on or in the vicinity of Edwards AFB.

4.15.3 ALTERNATIVE B: CSAR BEDDOWN AT VANDENBERG AFB

4.15.3.1 Vandenberg AFB and Vicinity

Construction-Related Impacts

Implementation of Alternative B would require delivery of materials to and removal of construction-related debris from construction and renovation sites. However, construction traffic would make up only a small portion of the total existing traffic volume in the local area and on base. Many of the vehicles would be driven to the construction site and kept on site for the duration of construction, resulting in very few actual increased trips. Furthermore, increases in traffic volumes associated with construction activity would be temporary; upon completion of construction, no long-term impacts to off- or on-base transportation systems would result with implementation of Alternative B.

Personnel Increases

Under Alternative B, 1,200 manpower authorizations would be added resulting in an increase of full-time personnel reporting to work each day. Increases in personnel would result in a slight increase in the amount of congestion that generally occurs at the gates during the morning and evening workday rush hours. In addition, a small decrease in the availability of parking on base would occur due to the addition in the number of personnel. Vehicular circulation and available parking on the installation are adequate. Therefore, implementation of Alternative B would not have a significant impact on transportation resources on or in the vicinity of Vandenberg AFB.

4.15.4 ALTERNATIVE C: NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the proposed beddown of the CSAR unit (HH-60 and HC-130 aircraft and associated military personnel) and the ground-based and airspace training activities would not occur. Consequently, baseline conditions, as described in Section 3.15, would remain unchanged. Implementation of the No-Action Alternative would not change current activities at Davis-Monthan, Edwards, or Vandenberg AFBs; proposed training ranges; airspace units; and WTA. Therefore, there would be no impacts to transportation.

5.0 CUMULATIVE EFFECTS

This section provides: 1) a definition of cumulative effects, 2) a description of past, present, and reasonably foreseeable actions relevant to cumulative effects, 3) an assessment of the nature of interaction of the Proposed Action or alternatives with other actions, and 4) an evaluation of cumulative effects potentially resulting from these interactions.

5.1 DEFINITION OF CUMULATIVE EFFECTS

CEQ regulations stipulate that the cumulative effects analysis within an environmental assessment (EA) should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR 1508.7). Recent CEQ guidance in *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997) affirms this requirement, stating that the first steps in assessing cumulative effects involve defining the scope of the other actions and their interrelationship with the proposed action or alternatives. The scope must consider geographic and temporal overlaps among the proposed action and other actions. It must also evaluate the nature of interactions among these actions.

Cumulative effects are most likely to arise when a relationship or synergism exists between a proposed action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with or in close proximity to the proposed action would be expected to have more potential for a relationship than those more geographically separated. Similarly, actions that coincide, even partially, in time would tend to offer a higher potential for cumulative effects.

To identify cumulative effects the analysis needs to address three fundamental questions:

1. Does a relationship exist such that affected resource areas of the proposed action might interact with the affected resource areas of past, present, or reasonably foreseeable actions?
2. If one or more of the affected resource areas of the proposed action and another action could be expected to interact, would the proposed action affect or be affected by impacts of the other action?
3. If such a relationship exists, then does an assessment reveal any potentially significant impacts not identified when the proposed action is considered alone?

5.2 PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS

The scope of the cumulative effects analysis involves both the geographic extent of the effects and the time frame in which the effects could be expected to occur. For this EA, the ROI delimits the geographic extent of the cumulative effects analysis which includes the base boundaries for Davis-Monthan AFB, Vandenberg AFB, and Edwards AFB. In addition, a cumulative effects analysis is also provided for airspace (MOAs, LATNs, ARs, and Restricted Areas), WTA, and ranges associated with the Proposed Action and alternatives. Actions not occurring within or near these locations are not considered in the analysis.

The scope of the cumulative effects analysis also involves identifying other relevant actions in the ROI. Beyond determining that the geographic scope and time frame for the actions interrelate to the proposed action, the analysis employs the measure of "reasonably foreseeable" to include or exclude other actions.

For the purposes of this analysis, public documents prepared by federal, state, and local government agencies form the primary sources of information regarding reasonably foreseeable actions. Documents used to identify other actions included military construction documentation, environmental impact statements (EISs), EAs, management plans, land use plans, and other NEPA studies. The list of actions described in this section is not all-inclusive, but serves to highlight some major influences in the region and to provides perspective on the individual actions' contribution to any impacts generated by implementation of the Proposed Action or alternatives.

5.2.1 PROPOSED ACTION: CSAR BEDDOWN AT DAVIS-MONTHAN AFB

5.2.1.1 Davis-Monthan AFB and Vicinity

Projects with the potential to interact with implementation of the Proposed Action that could contribute to cumulative effects are presented in Table 5-1. These projects represent past, present, and planned projects with the potential for creating cumulative effects when combined with potential impacts from the Proposed Action. The amount of available information regarding these actions varies, so this assessment only presents the degree of specificity provided in existing documentation.

Table 5-1. Cumulative Projects at Davis-Monthan AFB

Project	*Area (SF)*	*Year of Implementation*
305 RQS Expansion	TBD	TBD
43 ECS Squad Operations/SMU	43,500	TBD
41 ECS Squad Operations/SMU	43,500	TBD
Aircraft Processing Ramp	88,400	TBD
Aircraft Reclamation Parts Processing	37,000	TBD
Ambulatory Health care	36,300	TBD
ANG (162nd) Operations Facility	5,600	TBD
ANG (162nd) Dormitory	TBD	TBD
Auto Skills Center Addition	1,400	TBD
Base Exchange	180,000	TBD
Car Care Center	8,000	TBD
Child Development Center	28,470	TBD
Civil Engineering Administration	24,000	TBD
Cons Mission Support	24,000	TBD
Data Automation Addition	3,170	TBD
Deactivation of 42nd Airborne Command and Control Squadron (42 ACCS)	NA	FY02
Dining Hall Replacement	25,000	TBD
Explosive Processing	1,500	TBD
FAMCAMP Addition	100 Spaces	TBD
Family Aquatic Center	50M	TBD
Family Housing Maintenance	5,400	TBD
Family Support Addition	1,300	TBD
Fitness Center Complex	51,000	TBD
Fuel Systems Maintenance Dock	35,600	TBD
Golf Cart Storage Addition	TBD	TBD
Golf Course Expansion	9 Holes	TBD
Housing Storage Addition	1,120	TBD
M-60 Machine Gun Range	TBD	TBD
Multi-Purpose Center	2,400	TBD
New Dorm Area	TBD	TBD

Table 5-1 (cont.). Cumulative Projects at Davis-Monthan AFB

Project	*Area (SF)*	*Year of Implementation*
POV Carwash	TBD	TBD
Replacement Housing	128 Units	TBD
4th Skeet Range and Clubhouse	2,000	TBD
Storage Facility - Billeting	2,500	TBD
U.S. Border Patrol Facility	TBD	TBD
Vehicle Maintenance Facility	4,900	TBD
Youth Center Addition	7,500	TBD

Note: SF = square ft, TBD = To be determined.
Source: Davis-Monthan AFB 2002a.

Based on available information, only one of the projects listed is likely to have a synergistic relationship to the CSAR beddown at Davis-Monthan AFB: the deactivation of the 42nd Airborne Command and Control Squadron (42 ACCS). The deactivation would entail the loss of 7 EC-130 aircraft and 516 manpower authorizations from Davis-Monthan AFB. The loss of these personnel combined with the addition of 1,059 personnel associated with the proposed CSAR beddown at Davis-Monthan would result in a net increase of 543 personnel to Davis-Monthan AFB. This would provide a beneficial impact to socioeconomics within the region of Davis-Monthan AFB.

Neither the base nor surrounding communities have planned or proposed any further actions that would interact with the proposed CSAR beddown and result in cumulative impacts. Therefore, no significant cumulative impacts would be expected to occur for any resource area as a result of implementation of the Proposed Action or other projects in the region.

5.2.1.2 Ranges and Airspace

BMGR, Yuma TACTS Range, and Associated Restricted Areas

BMGR. The BMGR is the nation's second largest aerial gunnery range and is used for developing and maintaining the combat readiness of tactical air forces of the Air Force, USMC, Navy, Army, and National Guard. Under the Military Lands Withdrawal Act of 1999, the USMC was established as the manager of the western section of BMGR lands (under R-2301W) and the Air Force as the manager of the eastern section of BMGR (R-2301E, R-2304, and R-2305). Prior to 1999, the Air Force managed the entire BMGR with the Bureau of Land Management assigned the land management jurisdiction. The lands were withdrawn from the public for DoD purposes until 2024. A Final LEIS evaluated the effects of continued military activities on BMGR as the result of the land withdrawal (Air Force 1999).

Yuma Training Range Complex (YTRC). An EIS and subsequent Supplemental EIS were prepared in 1997 and 2001, respectively, by the USMC for the management, operation, and development of the YTRC, a military aviation training facility composed of special use airspace and bombing and gunnery range lands. The YTRC includes airspace as well as lands within the BMGR (R-2301W) in Arizona and the Chocolate Mountain Aerial Bombing and Gunnery Range in California. The EIS analyzed alternatives to improve training procedures, develop training facilities, and reconfigure airspace (Marine Corps Air Station Yuma 1997).

In November 2001, the USFWS issued a revised biological opinion (BO) for military training on BMGR as identified in the LEIS. The biological opinion was revised based on concerns over the cumulative effects of military activities (Air Force, Army National Guard, and USMC) and land management activities by other federal agencies (Bureau of Land Management and National Park Service) conducted within the range of the Sonoran pronghorn. Based on a number of conservation measures implemented by the Air Force and under the Terms and Conditions of the BO, the USFWS found that the proposed military training activities on BMGR are not likely to jeopardize the continued existence of the Sonoran pronghorn. For BMGR, the BO used 61,895 sortie-operations per year as a baseline upon which to evaluate the potential impacts of military training activities on the Sonoran pronghorn. Current operations within BMGR are below this baseline number and the addition of the proposed CSAR-training operations would not cause an exceedance of this baseline level of operations. In addition, all proposed CSAR operations would be conducted outside of the known range of the Sonoran pronghorn.

Under the Proposed Action analyzed in this EA, the number of annual sortie-operations would increase within the East TAC Range of R-2304 by 1,148 (2 percent) and within the Yuma TACTS Range (R-2301W) by 405 (4 percent). Within the BMGR, there would be an increase of approximately 4 sortie-operations/day, with 50 percent of these occurring after dark. During those times when East TAC Range is closed (approximately 2 months/year) for annual cleanup and maintenance, CSAR operations would be conducted in the northeastern portion of North TAC Range (northeast of Crater Range) or at other approved off-station ranges (e.g., while on TDY at other installations). The proposed use of the Yuma TACTS Range would result in an increase of less than 2 sortie-operations/day. Operating procedures for scheduling and use of the BMGR and Yuma TACTs Range are well established and would need no modification to support proposed CSAR training activities. Although there would be times of conflicting schedule requirements (e.g., annual TAC Range closures), controlling units would schedule use of the ranges in accordance with existing regulations. Propose use of the East TAC Range by CSAR aircraft is not expected to result in increased use of R-2301E due to range availability and scheduling procedures. Proposed CSAR activities would not occur over or within the known range of the Sonoran pronghorn. Therefore, no discernable cumulative impacts to the airspace management of the ranges or to Sonoran pronghorn would occur with implementation of the proposed CSAR-training activities at BMGR or Yuma TACTS Range.

Implementation of the Proposed Action would result in an increase in aircraft operations and the delivery of ordnance, chaff, self-protection flares, and parachute flares at BMGR and Yuma TACTS Range. However, these increases would not result in any measurable cumulative impacts for any resource area. Based on the cumulative effects analysis presented in the YTRC Supplemental EIS (Marine Corps Air Station Yuma 2001), there would be no cumulative effects on any resource area with the continued management, operation, and development of the YTRC as analyzed in the EIS (Marine Corps Air Station Yuma 1997). Therefore, implementation of the Proposed Action would not result in significant cumulative impacts.

Current activities within the WTA include various training operations by federal agencies (Navy, Air Force, and USCG), commercial operations (e.g., fishing, diving, whale watching), and recreational activities by individuals. Proposed CSAR training operations would not result in a change in any of these operations nor would they result in cumulative effects on any resource area within the WTA.

Airspace

FAA Modernization and Reengineering of the National Airspace System. The FAA has proposed to modernize and reengineer the National Airspace System. The National Airspace Architecture describes changes in communication, navigation, surveillance, automation tools, avionics, and computer/networks.

These changes will affect flight operations over Arizona and California. The FAA is planning to redesign ARTCCs to accommodate air traffic in the area. None of these changes would affect proposed aircraft operations within the airspace associated with the Proposed Action.

One of the proposed changes by the FAA is a Free Flight operational concept. Free flight allows pilots, whenever practical, to choose the optimum flight profile. The concept of operations is expected to decrease user costs, improve airspace flexibility, and remove flight restrictions. Implementation of the National Airspace System is being synchronized with the International Civil Aviation Organization to ensure interoperability and global integration. During the next 10 years, the navigation system is expected to use satellites augmented by ground monitoring stations to provide navigational signal coverage throughout the National Airspace System. Satellite-based navigation will support direct routes and help users meet their schedules with more predictability. Reliance on ground-based navigation aids is expected to decline as satellite navigation provides equivalent levels of service (FAA 1999).

Since this FAA initiative is still in the planning stages, the cumulative effects to aircraft operations and airspace management associated with the Proposed Action remain unknown at this time. Regionally, no other changes in airspace or airspace boundaries have been recently completed or are planned that would affect or be affected by implementation of the alternative. Implementation of the Proposed Action would increase aircraft overflight in areas underlying associated LATNs and MOAs; however, these increases would not result in cumulative impacts for any resource area. Therefore, implementation of the Proposed Action would not result in significant cumulative impacts.

5.2.2 ALTERNATIVE A: CSAR BEDDOWN AT EDWARDS AFB

5.2.2.1 Edwards AFB and Vicinity

Projects with the potential to interact with implementation of Alternative A that could contribute to cumulative effects are presented in Table 5-2. These projects represent past, present, and planned projects with the potential for creating cumulative effects when combined with potential impacts associated with Alternative A. The amount of available information regarding these actions varies, so this assessment only presents the degree of specificity provided in existing documentation.

Table 5-2. Cumulative Projects at North Base, Edwards AFB

Project	*Area (SF)*	*Year of Implementation*
RPR North Base Runway	TBD	FY06
Consolidate Oil/Water Separators	TBD	FY02
Demolish Fuel Tanks	TBD	TBD
Repair Fire Suppression	TBD	TBD
Seismic Upgrade Building 4456	TBD	TBD
Construct Emergency Generator	TBD	TBD
Repair Asbestos Fire Station	36,300	TBD

Note: SF = square ft, TBD = To be determined.
Source: Edwards AFB 2002.

Based on available information, none of the projects listed are likely to have a synergistic relationship to the CSAR beddown at Edwards AFB. Neither the base nor surrounding communities have planned or proposed actions that would interact with the proposed CSAR beddown and result in cumulative impacts.

Therefore, no significant cumulative impacts would be expected to occur for any resource area as a result of implementation of Alternative A or other projects in the region.

5.2.2.2 Ranges and Airspace

Fort Irwin Range, China Lake ECR, and Associated Restricted Areas

Currently, there are no other existing or reasonably foreseeable proposals at Fort Irwin Range. Implementation of this alternative would increase aircraft activity at the range; however, these increases would not result in cumulative impacts for any resource area. Therefore, implementation of Alternative A would not result in significant cumulative impacts.

Implementation of the Comprehensive Land Use Management Plan (CLUMP) and Associated Military Operational Increases at Naval Air Weapons Station (NAWS) China Lake. NAWS China Lake is currently in the process of preparing an Environmental Impact Statement for implementation of the CLUMP and associated military operational increases. Military operational increases will include moderate increases in current levels of military test and evaluation and training activities. Proposed changes to military operations include increases in the type, tempo, and location of ongoing military Research Development Test and Evaluation, training, and support operations over five years. Over the 5-year implementation period, range flight operations and airfield flight operations would increase by approximately 25 percent. In addition, range ground operations, specifically, tempo of target and test sites would increase by approximately 25 percent over 5 years (NAWS China Lake 2001).

Implementation of Alternative A would result in an increase in aircraft activity at the China Lake EC Range. However, these increases would not result in cumulative impacts for any resource area. Therefore, implementation of Alternative A would not result in significant cumulative impacts.

Airspace

As previously described, the FAA has proposed to modernize and reengineer the National Airspace System. Since this FAA initiative is still in the planning stages, the cumulative effects to aircraft operations and airspace management associated with this alternative remain unknown at this time. Regionally, no other changes in airspace or airspace boundaries have been recently completed or are planned that would affect or be affected by implementation of Alternative A. Implementation of this alternative would increase aircraft overflight in areas underlying associated MOAs; however, these increases would not result in cumulative impacts for any resource area. Therefore, implementation of Alternative A would not result in significant cumulative impacts.

5.2.3 ALTERNATIVE B: CSAR BEDDOWN AT VANDENBERG AFB

5.2.3.1 Vandenberg AFB and Vicinity

Projects with the potential to interact with implementation of Alternative B that could contribute to cumulative effects are presented in Table 5-3. These projects represent past, present, and planned projects with the potential for creating cumulative effects when combined with potential impacts associated with Alternative B. The amount of available information regarding these actions varies, so this assessment only presents the degree of specificity provided in existing documentation.

Based on available information, none of the projects listed are likely to have a synergistic relationship to the CSAR beddown at Vandenberg AFB. Neither the base nor surrounding communities have planned or proposed actions that would interact with the proposed CSAR beddown and result in cumulative impacts. Therefore, no significant cumulative impacts would be expected to occur for any resource area as a result of implementation of Alternative B or other projects in the region.

Table 5-3. Cumulative Projects at Vandenberg AFB

Project	*Area (SF)*	*Year of Implementation*
San Antonio Road West Erosion Repair Project	TBD	TBD
Power Line Modifications and Encapsulated Payload Transport.	TBD	TBD
AETC Space Training Facility	59,255	TBD
Large Missile Training Facility	41,979	TBD
Upgrade Water Distribution System, Phase I and Phase 2	93,963	FY01
Road Repair Projects	TBD	FY02
Basewide Demolition Program	TBD	FY02-04
El Rancho Road Bridge Project (Missile Transport Bridge)	2,461	FY02
Landfill Drainage Improvement	TBD	FY03
Consolidate Fitness Center	66,952	FY05
Base Education Center	56,220	FY06
Child Development Center	12,518	FY06
Consolidated Voice/Data Network Control Center	TBD	FY06
Base Library	12,917	FY07
Main Post Office	3,767	FY07
Refueling Vehicle Maintenance Shop	3,488	FY07
Alterations to Headquarters (HQ) Facility 7000	161,459	FY07
ATC Tower	4,198	FY07
Air Field Fence	172,223	FY07
Wing HQ Facility 11777	99,997	FY07
Military Family Housing (MFH)	TBD	Ongoing to FY08

Note: SF = square ft, TBD = To be determined.
Source: Vandenberg AFB 2001a, b; 2002c.

5.2.3.2 Ranges and Airspace

Fort Hunter Liggett Range, China Lake ECR, and Associated Restricted Areas

Currently, there are no other existing or reasonably foreseeable proposals at Fort Hunter Liggett Range. Implementation of this alternative would increase aircraft activity at the range; however, these increases would not result in cumulative impacts for any resource area. Therefore, implementation of Alternative B would not result in significant cumulative impacts.

As previously described, NAWS China Lake is proposing implementation of the CLUMP and associated military operational increases. Implementation of this alternative would result in an increase in aircraft activity at the China Lake EC Range. However, these increases would not result in cumulative impacts for any resource area. Therefore, implementation of Alternative B would not result in significant cumulative impacts.

Airspace

As previously described, the FAA has proposed to modernize and reengineer the National Airspace System. Since this FAA initiative is still in the planning stages, the cumulative effects to aircraft operations and airspace management associated with this alternative remain unknown at this time. Regionally, no other changes in airspace or airspace boundaries have been recently completed or are planned that would affect or be affected by implementation of Alternative B. Implementation of this alternative would increase aircraft overflight in areas underlying associated ARs and MOAs; however, these increases would not result in cumulative impacts for any resource area. Therefore, implementation of Alternative B would not result in significant cumulative impacts.

5.3 SUMMARY OF CUMULATIVE EFFECTS

In summary, none of the projected impacts of the proposed alternatives are individually significant. The incremental contribution of impacts of the alternatives, when considered in combination with other past, present, and reasonably foreseeable actions would not be significant.

6.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

NEPA requires that environmental analysis include identification of "…any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented." Irreversible and irretrievable resource commitments are related to the use of non-renewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame and could have been used for other purposes. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., the disturbance of a cultural site).

For the Proposed Action and alternatives, most resource commitments are neither irreversible nor irretrievable. Most impacts are short-term and temporary, or long lasting but not significant. Those limited resources that may involve a possible irreversible or irretrievable commitment under the Proposed Action or alternatives are discussed below.

Under the Proposed Action and alternatives, renovation and construction of on-base facilities would require the consumption of limited amounts of materials typically associated with interior renovations (e.g., wiring, insulation, windows, etc.) and construction (e.g., concrete, sand, bricks, steel, etc.) An undetermined amount of energy to conduct renovations, construction, and operations of these facilities would be expended and irreversibly lost. All construction debris would be recycled or reused where practicable. Facilities proposed for construction do not have any cultural significance.

The Proposed Action and alternatives would require fuels used by aircraft and surface vehicles. The flight activities associated with the proposed beddown of HH-60 and HC-130 aircraft at Davis-Monthan AFB, Edwards AFB, or Vandenberg AFB would result in fuel use for as long as the programs continued. Since flight activities would increase relative to baseline, total fuel use would increase. Fuel use by surface vehicles supporting aircraft maintenance and operations would also increase relative to baseline; therefore, total fuel consumption would increase and this nonrenewable resource considered irreversibly lost.

Use of personal vehicles by personnel associated with the proposed CSAR beddown would result in the consumption of additional fuel, oil, and lubricants. Since personnel numbers would increase relative to baseline, total fuel, oil, and lubricant use would increase and these nonrenewable resources considered irreversibly lost.

Implementation of the Proposed Action or alternatives would not result in the destruction of environmental resources. Further, the Proposed Action or alternatives would not adversely affect the biodiversity of Davis-Monthan, Edwards, or Vandenberg AFBs or the areas located beneath the airspace proposed for use. No wildlife habitat at the installations or under the airspace proposed for use would be lost as a result of implementation of the Proposed Action or alternatives. Therefore, there would be no irretrievable commitment of this resource.

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Appendix A

AIRCRAFT NOISE ANALYSIS

APPENDIX A. AIRCRAFT NOISE ANALYSIS

A.1 NOISE

This appendix presents a detailed discussion of noise and its effects on people and the environment. An assessment of aircraft noise requires a general understanding of how sound is measured and how it affects people in the natural environment. The purpose of this appendix is to address public concerns regarding aircraft noise impacts.

Section A.1.1 is a general discussion on the properties of noise. Section A.1.2 summarizes the noise metrics discussed throughout this environmental assessment (EA). Section A.1.3 provides federal land-use compatibility guidelines that are used in applying aircraft noise impacts to land use planning in the airport environment. Section A.2 addresses public concerns on potential impacts such as hearing loss, nonauditory health effects, annoyance, speech interference, sleep interference, and noise effects on livestock and wildlife. Since one of the issues addressed in this EA is the potential for noise impacts on marine mammals, a discussion of underwater noise characteristics is provided in Section A.1.5. Section A.2.7 addresses airborne noise effects on marine mammals.

A.1.1 General

Noise, often defined as unwanted sound, is one of the most common environmental issues associated with aircraft operations. Of course, aircraft are not the only sources of noise in an urban or suburban surrounding, where interstate and local roadway traffic, rail, industrial, and neighborhood sources also intrude on the everyday quality of life. Nevertheless, aircraft are readily identifiable to those affected by their noise and are typically singled out for special attention and criticism. Consequently, aircraft noise problems often dominate analyses of environmental impacts.

Sound is a physical phenomenon consisting of minute vibrations which travel through a medium, such as air, and are sensed by the human ear. Whether that sound is interpreted as pleasant or unpleasant depends largely on the listener's current activity, past experience, and attitude toward the source of that sound. It is often true that one person's music is another person's noise.

The measurement and human perception of sound involves two basic physical characteristics: intensity and frequency or pitch. Intensity is a measure of the acoustic energy of the sound vibrations and is expressed in terms of sound pressure. The higher the sound pressure, the more energy carried by the sound and the louder the perception of that sound. The second important physical characteristic is sound frequency which is the number of times per second the air vibrates or oscillates. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches.

The loudest sounds which can be detected comfortably by the human ear have intensities which are 1,000,000,000,000,000 times larger than those of sounds which can just be detected. Because of this vast range, any attempt to represent the intensity of sound using a linear scale becomes very unwieldy. As a result, a logarithmic unit known as the decibel (dB) is used to represent the intensity of a sound. Such a representation is called a sound level.

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. However, some simple rules of thumb are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example:

60 dB + 60 dB = 63 dB, and

80 dB + 80 dB = 83 dB

The total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

60.0 dB + 70.0 dB = 70.4 dB

Because the addition of sound levels behaves differently than that of ordinary numbers, such addition is often referred to as "decibel addition" or "energy addition." The latter term arises from the fact that what we are really doing when we add decibel values is first converting each decibel value to its corresponding acoustic energy, then adding the energies using the normal rules of addition, and finally converting the total energy back to its decibel equivalent.

An important facet of decibel addition arises later when the concept of time-average sound levels is introduced to explain Day-Night Average Sound Level (DNL). Because of the logarithmic units, the time-average sound level is dominated by the louder levels that occur during the averaging period. As a simple example, consider a sound level which is 100 dB and lasts for 30 seconds, followed by a sound level of 50 dB which also lasts for 30 seconds. The time-average sound level over the total 60-second period is 97 dB, not 75 dB.

A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB begin to be felt inside the human ear as discomfort and eventually pain at still higher levels.

The minimum change in the time-average sound level of individual events which an average human ear can detect is about 3 dB. A change in sound level of about 10 dB is usually perceived by the average person as a doubling (or halving) of the sound's loudness, and this relation holds true for loud sounds and for quieter sounds.

Sound frequency is pitch measured in terms of hertz (Hz). The normal human ear can detect sounds which range in frequency from about 20 Hz to about 15,000 Hz. All sounds in this wide range of frequencies, however, are not heard equally well by the human ear, which is most sensitive to frequencies in the 1,000 to 4,000 Hz range. To account for the varied frequency sensitivity of people, we use the A-weighted scale that approximates the average, healthy human ear. The A-weighting de-emphasizes the low and high frequency portion of the noise signal and emphasizes the mid-frequency portion.

Sound levels measured using A-weighting are most properly called A-weighted sound levels while sound levels measured without any frequency weighting are most properly called sound levels. However, since most environmental impact analysis documents deal only with A-weighted sound levels, the adjective "A-weighted" is often omitted, and A-weighted sound levels are referred to simply as sound levels. In some instances, the author will indicate that the levels have been A-weighted by using the abbreviation dBA or dB(A), rather than the abbreviation dB, for decibel. As long as the use of A-weighting is understood to be used, there is no difference implied by the terms "sound level" and "A-weighted sound level" or by the units dB, dBA, and dB(A). The A-weighting function de-emphasizes higher and especially lower frequencies to which humans are less sensitive. Because the A-weighting is closely related to human hearing characteristics, it is appropriate to use A-weighted sound levels when assessing potential noise effects on humans and many terrestrial wildlife species.

Sound levels do not represent instantaneous measurements but rather averages over short periods of time. Two measurement time periods are most common – 1 second and 1/8 of a second. A measured sound level averaged over 1 second is called a slow response sound level; one averaged over 1/8 of a second is called a fast response sound level. Most environmental noise studies use slow response measurements, and the adjective "slow response" is usually omitted. It is easy to understand why the proper descriptor "slow response A-weighted sound level" is usually shortened to "sound level" in environmental impact analysis documents.

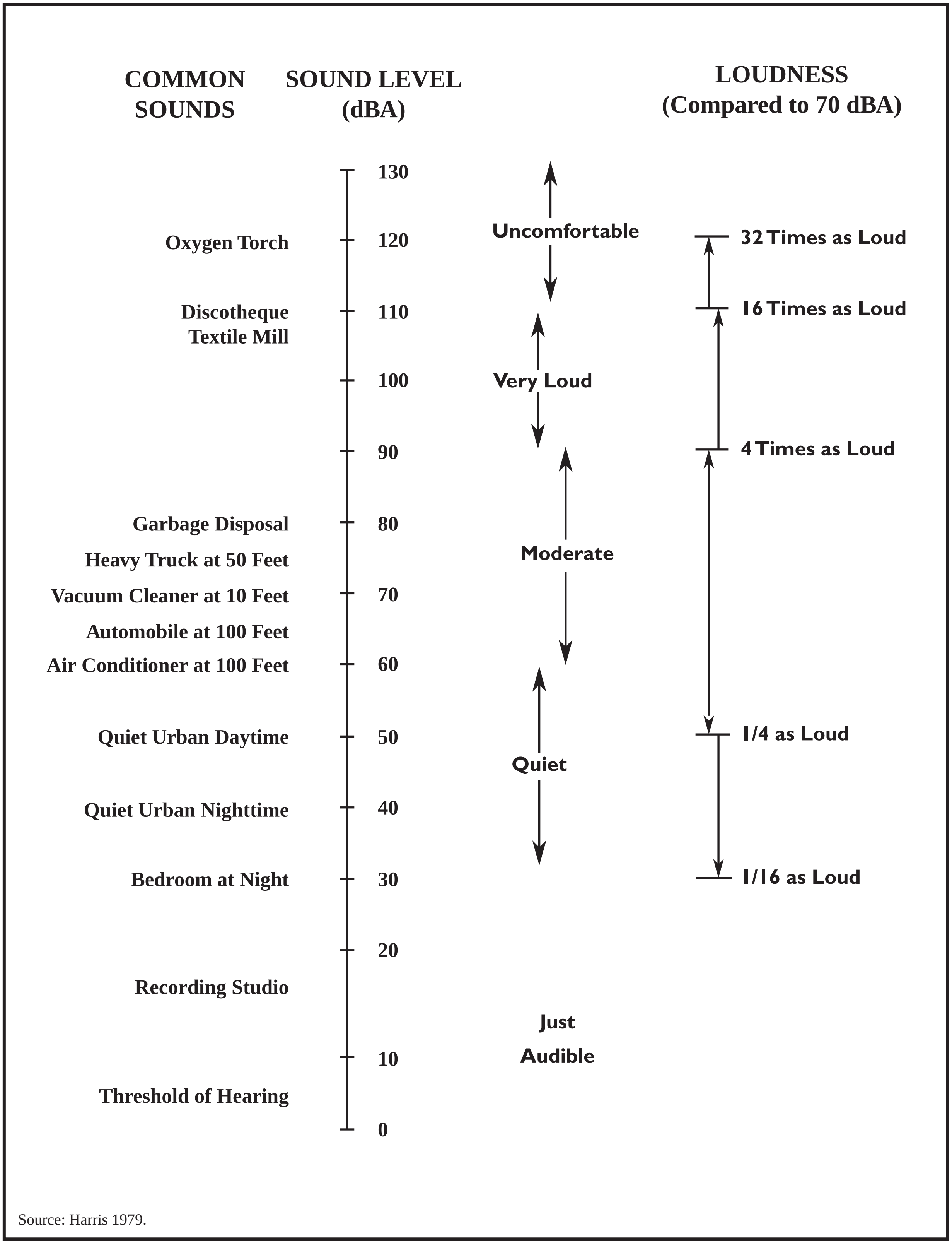
In this document, all levels are A-weighted and are reported in dB, except for those discussions that address potential noise effects on marine mammals. Because marine mammals are sensitive to a different range of frequencies than humans, various other protocols are more appropriate, especially when the marine mammal's specific hearing characteristics are known. Alternative measurement procedures such as C-weighting or flat-weighting (unweighted), which do not de-emphasize lower frequencies, may be more appropriate for various marine mammal species (see Section A.1.5 for a discussion of underwater noise).

A.1.2 Noise Metrics

A "metric" is defined as something "of, involving, or used in measurement." As used in environmental noise analyses, a metric refers to the unit or quantity which quantitatively measures the effect of noise on the environment. Noise studies have typically involved a confusing proliferation of noise metrics as individual researchers have attempted to understand and represent the effects of noise. As a result, past literature describing environmental noise or environmental noise abatement has included many different metrics. Recently, however, various federal agencies involved in environmental noise mitigation have agreed on common metrics for environmental impact analysis documents, and both the Department of Defense (DoD) and the Federal Aviation Administration (FAA) have specified those which should be used for federal aviation noise assessments. These metrics are as follows.

A.1.2.1 MAXIMUM SOUND LEVEL

The highest A-weighted sound level measured during a single event in which the sound level changes value as time goes on (e.g., an aircraft overflight) is called the maximum A-weighted sound level or maximum sound level, for short. It is usually abbreviated by ALM, L_{max}, or LA_{max}. The typical A-weighted levels of common sounds are shown in Figure A-1. The maximum sound level is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleep, or other common activities.



Examples of Typical Sound Levels in the Environment

Figure A-1

A.1.2.2 SOUND EXPOSURE LEVEL

Individual time-varying noise events have 2 main characteristics: 1) a sound level which changes throughout the event, and 2) a period of time during which the event is heard. Although the maximum sound level, described above, provides some measure of the intrusiveness of the event, it alone does not completely describe the total event. The period of time during which the sound is heard is also significant. The sound exposure level (SEL) combines both of these characteristics into a single metric.

Sound exposure level is a logarithmic measure of the total acoustic energy transmitted to the listener during the event. Mathematically, it represents the sound level of the constant sound that would, in one second, generate the same acoustic energy as did the actual time-varying noise event. Since aircraft overflights usually last longer than one second, the SEL of an overflight is usually greater than the maximum sound level of the overflight.

Sound exposure level is a composite metric which represents both the intensity of a sound and its duration. It does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event. It has been well established in the scientific community that SEL measures this impact much more reliably than just the maximum sound level. Because the SEL and the maximum sound level are both A-weighted sound levels expressed in dB, there is sometimes confusion between the two, so the specific metric used should be clearly stated.

For the purposes of this EA, the single event noise exposure level (SENEL) refers to the combined noise exposure from a single event (e.g., the combined noise exposure when three aircraft fly together in tight formation during refueling operations).

A.1.2.3 DAY-NIGHT AVERAGE SOUND LEVEL

Time-average sound levels are the measurements of sound levels which are averaged over a specified length of time. These levels provide a measure of the average sound energy during the measurement period.

For the evaluation of community noise effects, and particularly aircraft noise effects, the day-night average sound level (abbreviated DNL or L_{dn}) is used. Day-night average sound level averages aircraft sound levels at a location over a complete 24-hour period, with a 10-dB adjustment added to those noise events which take place between 10:00 p.m. and 7:00 a.m. (local time) the following morning. This 10-dB "penalty" represents the added intrusiveness of sounds which occur during normal sleeping hours, both because of the increased sensitivity to noise during those hours and because ambient sound levels during nighttime are typically about 10 dB lower than during daytime hours.

Ignoring the 10-dB nighttime adjustment for the moment, DNL may be thought of as the continuous A-weighted sound level which would be present if all of the variations in sound level which occur over a 24-hour period were smoothed out so as to contain the same total sound energy.

Day-night average sound level provides a single measure of overall noise impact, but does not provide specific information on the number of noise events or the individual sound levels which occur during the day. For example, a DNL of 65 dB could result from a very few noisy events, or a large number of quieter events.

As noted earlier for SEL, DNL does not represent the sound level heard at any particular time, but rather represents the total sound exposure. Scientific studies and social surveys which have been conducted to appraise community annoyance to all types of environmental noise have found the DNL to be the best measure of that annoyance. Its use is endorsed by the scientific community (American National Standards Institute [ANSI] 1980, 1988; U.S. Environmental Protection Agency [EPA] 1974; Federal Interagency Committee on Urban Noise [FICUN] 1980; Federal Interagency Committee on Noise [FICON] 1992).

There is, in fact, a remarkable consistency in the results of attitudinal surveys about aircraft noise conducted in different countries to find the percentages of groups of people who express various degrees of annoyance when exposed to different levels of DNL. This is illustrated in Figure A-2, which summarizes the results of a large number of social surveys relating community responses to various types of noises, measured in DNL.

Figure A-2 is taken from Schultz (1978) and shows the original curve fit. A more recent study has reaffirmed this relationship (Fidell et al. 1991). Figure A-3 shows an updated form of the curve fit (Finegold et al. 1992) in comparison with the original. The updated fit, which does not differ substantially from the original, is the current preferred form. In general, correlation coefficients of 0.85 to 0.95 are found between the percentages of groups of people highly annoyed and the level of average noise exposure. The correlation coefficients for the annoyance of individuals are relatively low, however, on the order of 0.5 or less. This is not surprising, considering the varying personal factors which influence the manner in which individuals react to noise. Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using DNL.

This relation between community annoyance and time-average sound level has been confirmed, even for infrequent aircraft noise events. A NASA study (Fields and Powell 1985) reported the reactions of individuals in a community to daily helicopter overflights, ranging from 1 to 32 per day. The stated reactions to infrequent helicopter overflights correlated quite well with the daily time-average sound levels over this range of numbers of daily noise events.

The use of DNL has been criticized recently as not accurately representing community annoyance and land-use compatibility with aircraft noise. Much of that criticism stems from a lack of understanding of the basis for the measurement or calculation of DNL. One frequent criticism is based on the inherent feeling that people react more to single noise events and not as much to "meaningless" time-average sound levels.

Time-average noise metric, such as DNL, takes into account both the noise levels of all individual events which occur during a 24-hour period and the number of times those events occur. As described briefly above, the logarithmic nature of the decibel unit causes the noise levels of the loudest events to control the 24-hour average.

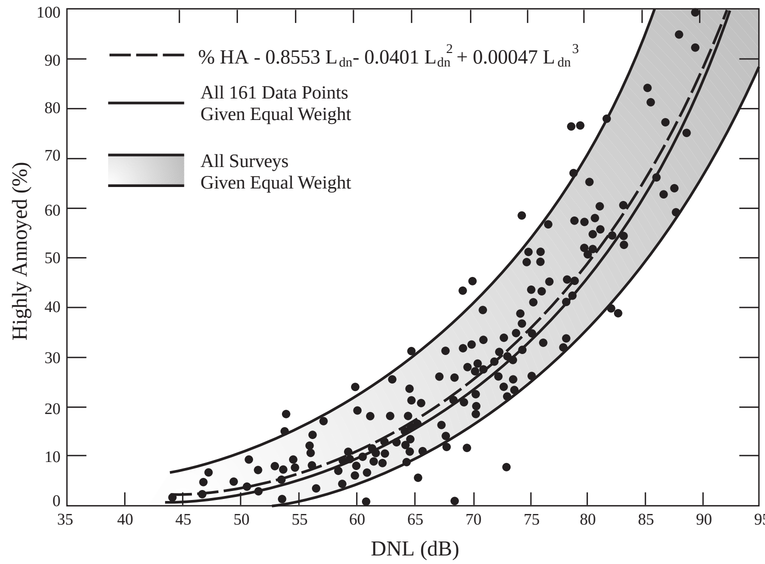
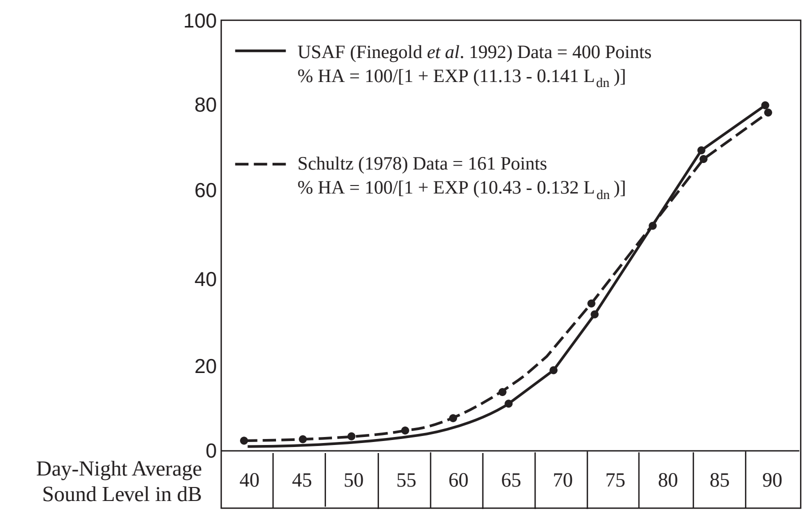


Figure A-2. Community Surveys of Noise Annoyance (Schultz 1978).



Calculated % HA Points												
	USAF	0.41	0.83	1.66	3.31	6.48	12.3	22.1	36.5	53.7	70.2	82.6
	Schultz	0.58	1.11	2.12	4.03	7.52	13.6	23.3	37.1	53.3	68.8	81.0

Figure A-3. Response of Communities to Noise (Finegold *et al*. 1994).

As a simple example of this characteristic, consider a case in which only one aircraft overflight occurs in daytime during a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours, 59 minutes, and 30 seconds of the day, the ambient sound level is 50 dB. The DNL for this 24-hour period is 65.5 dB. Assume, as a second example, that 10 such 30-second overflights occur in daytime hours during the next 24-hour period, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes of the day. The DNL for this 24-hour period is 75.4 dB. Clearly, the averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and number of events. This is the basic concept of a time-average sound metric, and specifically the DNL.

A.1.3 Land-Use Compatibility

As noted above, the inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, when a community is considered as a whole, its overall reaction to noise can be represented with a high degree of confidence. As described above, the best noise exposure metric for this correlation is the DNL. In June 1980, an *ad hoc* Federal Interagency Committee on Urban Noise (FICUN) published guidelines for considering noise in land use planning (FICUN 1980). These guidelines related DNL to compatible land uses in urban areas. The committee was composed of representatives from the DoD, Department of Transportation, Department of Housing and Urban Development; the EPA; and the Veterans Administration. Since the issuance of these guidelines, federal agencies have generally adopted these guidelines to make recommendations to the local communities on land use compatibilities.

The FAA included the committee's guidelines in the Federal Aviation Regulations (Harris 1984). These guidelines are reprinted in Table A-1, along with the explanatory notes included in the regulation. Although these guidelines are not mandatory (refer to the *Notes* in the table), they provide the best means for evaluating noise impact in airport communities. In general, residential land uses normally are not compatible with outdoor DNL (L_{dn} values) above 65 dB, and the extent of land areas and populations exposed to DNL of 65 dB and higher provides the best means for assessing the noise impacts of alternative aircraft actions.

In 1990, the FICON was formed to review the manner in which aviation noise effects are assessed and presented. This group released its report in 1992 and reaffirmed the use of DNL as the best metric for this purpose (FICON 1992).

Analyses of aircraft noise impacts and compatible land uses around DoD facilities are normally made using NOISEMAP (Moulton 1992). This computer-based program calculates DNL at many points on the ground around an airfield and draws contours of equal levels for overlay onto land-use maps of the same scale. The program mathematically calculates the DNL of all aircraft operations for a 24-hour period, taking into consideration the number and types of aircraft, their flight paths and engine thrust settings, and the time of day (daytime or nighttime) that each operation occurs.

Day-night average sound levels may also be measured directly around an airfield, rather than calculated with NOISEMAP; however, the direct measurement of annualized DNL is difficult and costly since it requires year-round monitoring or careful seasonal sampling.

Table A-1. Land Use Compatibility with Yearly Day-Night Average Sound Levels

Land Use	*Yearly Day-Night Average Sound Level (L_{dn}) in Decibels*[1]					
	Below 65	*65-70*	*70-75*	*75-80*	*80-85*	*85+*
Residential						
Residential, other than mobile homes and transient lodgings	Y	N[2]	N[2]	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N[2]	N[2]	N[2]	N	N
Public Use						
Schools	Y	N[2]	N[2]	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoria, and concert halls	Y	25	30	N	N	N
Government services	Y	Y	25	30	N	N
Transportation	Y	Y	Y[3]	Y[4]	Y[5]	Y[5]
Parking	Y	Y	Y[3]	Y[4]	Y[5]	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail – building materials, hardware, and farm equipment	Y	Y	Y[3]	Y[4]	Y[5]	N
Retail trade – general	Y	Y	25	30	N	N
Utilities	Y	Y	Y[3]	Y[4]	Y[5]	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y[3]	Y[4]	Y[5]	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y[6]	Y[7]	Y[8]	Y[8]	Y[8]
Livestock farming and breeding	Y	Y[6]	Y[7]	N	N	N
Mining, fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y[9]	Y[9]	N	N	N
Outdoor music shells and amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts, and camps	Y	Y	Y	N	N	N
Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N

Notes: The designations contained in this table do not constitute a federal determination that any use of land covered by the program is acceptable or unacceptable under federal, state, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise-compatible land uses.

[1]Y = yes, land use and related structure compatible without restrictions; N = no, land use and related structure not compatible and should be prohibited;
25, 30, or 35 = land use and related structures generally compatible; measure to achieve Noise Level Reduction (NLR) of 25, 30, or 35 dB must be incorporated into design and construction of structures;

[2]Where the community determines that residential or school uses must be allowed, measures to achieve outdoor-to-indoor NLR of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide and NLR of 20 dB; thus the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year-round. However, the use of NLR criteria will not eliminate outdoor noise problems.

[3]Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal level is low.

[4]Measures to achieve NLR 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal level is low.

[5]Measures to achieve NLR 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal level is low.

[6]Residential buildings require an NLR of 25.

[7]Residential buildings require an NLR of 30.

[8]Residential buildings not permitted.

[9]Land-use compatible provided special sound reinforcement systems are installed.

Source: Harris 1984.

NOISEMAP provides an accurate projection of aircraft noise around airfields. NOISEMAP also has the flexibility of calculating sound levels at any specified ground location so that noise levels at representative points under flight paths can be ascertained. NOISEMAP is most accurate for comparing “before and after” noise impacts which would result from proposed airfield changes or alternative noise control actions, so long as the various impacts are calculated in a consistent manner.

A.1.4 Rotorcraft Noise Modeling

One limitation of NOISEMAP is its modeling of rotorcraft (helicopters and tilt-rotor aircraft). NOISEMAP does not model the types of flight operations common to rotorcraft such as hover, vertical ascents, and sharp turns. Also, the noise generated by rotorcraft vehicles is more complex than noise generated by fixed-winged aircraft. Rotorcraft noise is highly dependent on the direction from which it propagates away from the aircraft to the receiver, and it depends on the actual flight airspeed and flight path angle. This directionality and operational dependence is not properly modeled by fixed-wing based prediction models such as NOISEMAP. To improve noise prediction capability of rotorcraft, National Aeronautics and Space Administration’s (NASA’s) Langley Research Center has led the development of the Rotorcraft Noise Model (RNM) (Lucas 1998). The model is composed of detailed noise data, a propagation algorithm, and basic output routines. The noise data for each rotorcraft consist of a series of noise hemispheres that are a function of airspeed and flight path angle. Each individual hemisphere contains sound levels as a function of attitude and azimuth relation to references fixed in an aircraft-based coordinated system. Thus, for a single flight condition, a rotorcraft noise hemisphere will have over 1,000 spectra compared to one spectrum for a fixed-winged aircraft.

RNM uses these sound hemisphere source data to predict the sound levels on the ground. The propagation algorithms used in RNM are based on the same analytical techniques that are contained in the NASA Aircraft Noise Prediction Program (ANOPP) (Zorumski 1982; Zorumski and Weir 1986; Weir et al. 1995). Since the early 1980’s ANOPP has served as the primary noise propagation model that NASA uses in its aero-acoustic research. The algorithms contained in ANOPP, and in turn RNM, have been validated through many years of testing. The propagation model accounts for spherical spreading, atmospheric air absorption, ground reflection, Doppler shifts, and the difference in phase between direct and reflected rays and neglects the effects due to wind, barriers, and terrain. Some of the metrics that can be calculated by RNM include L_{max}, SEL (overall, C-, A-weighted), and DNL.

As output, RNM creates several different files depending on the user selection. The program will output a text file that echoes the input operation data, as well as the computed noise results. In addition, the program will output ASCII and binary grid files that are used by NMPLOT and other commercial software to graphically display the noise results. The program is capable of presenting the time history of a noise event at a single observer position, the noise footprint on the ground at a given instance in time, or the noise contours for many of the different noise metrics. RNM is also capable of outputting the results in a file format that can be imported easily into a Geographic Information System (GIS). The noise contours can then be overlaid to scale onto a background map which is ideal for performing noise abatement studies, evaluating noise impacts at an airport/vertiport, and performing land-use noise studies.

A.1.5 Underwater Noise Characteristics

A.1.5.1 UNDERWATER NOISE CHARACTERISTICS

Many of the general characteristics of sound and its measurement were discussed in the introduction to airborne noise characteristics (see Section A.1.1). This section expands on this introduction to summarize the properties of underwater noise that are relevant to understanding the effects of noise produced by aircraft operations on the underwater marine environment. Since the effect of underwater noise on human habitat is not an issue (except perhaps for divers), the primary environmental concern that is addressed is the potential impact on marine mammals.

Units of Measure

As discussed in Section A.1.1, the range of sound levels that humans are capable of hearing is very large. The reference level for the decibel scale used to describe airborne sound is the threshold of hearing (for the average, healthy human ear). In physical terms, this corresponds to a sound pressure of 20 micropascal (μPa). Atmospheric pressure is about 100,000 Pa. For underwater noise, sound pressure is typically used to describe sound levels. For underwater sound, a reference level of 1 μPa is used because this provides a more convenient reference and because a reference based on the threshold of human hearing in air is irrelevant. For this reason, as well as the different propagation properties of air and water, it is not meaningful to compare the levels of sound received in air (measured in dB re 20 μPa) and in water (in dB re 1 μPa) without adding the 26 dB correction factor to the airborne sound levels.

Underwater Sound Transmission

Airborne sources transmit most of their acoustic energy to the surface by direct paths which attenuate sound energy by spreading and absorption. However, for underwater sound, refracted and multipath transmission is often more important than direct path transmission, particularly for high-power sound sources capable of transmitting sound energy to large distances. The many interacting variables involved in prediction of underwater transmission loss have led to the development of analytical and computer models. For this EA, one or more of these models were used (cited as appropriate in the following subsections) in analyzing the potential impact of the underwater noise sources in the project areas.

Underwater Ambient Noise

Above 500 Hz, deep ocean ambient noise is produced primarily by wind and sea state conditions. Below 500 Hz, the ambient noise levels are strongly related to ship traffic, both near and far. In shallow water near continents and islands, surf noise is also a significant factor. In any one ocean location, underwater ambient noise is determined by one or more of these factors.

A.1.5.2 SOUND TRANSMISSION THROUGH THE AIR-WATER INTERFACE

All of the sound sources considered in this EA are airborne vehicles, but one of the concerns about potential noise effects involves marine animals at or below the surface of the water. Thus, transmission of airborne sound into the ocean is a consideration. This subsection describes some basic characteristics of air-to-water transmission of sound for subsonic sources.

Sound is transmitted from an airborne source to a receiver underwater by four principal means:

1) a direct path, refracted upon passing through the interface;
2) direct-refracted paths, reflected from the bottom in shallow water;
3) lateral (evanescent) transmission through the interface from the airborne sound field directly above; and
4) scattered sound paths from interface roughness due to wave motion.

Urick (1972) presents a discussion of the effect of the transmission of sound from air into water and reports data showing the difference in the underwater acoustic signature of an aircraft overflight for deep and shallow conditions. He includes analytic solutions for both the direct and lateral transmission paths and he compares the acoustic energy received at near-surface receivers via these paths. Young (1973) presents an analysis which, while directed at deep-water applications, derived an equivalent dipole underwater source for an aircraft overflight that can be used to estimate the level received underwater via the direct path. A detailed description of air-water sound transmission is given in Richardson et al. (1995). The following is a short summary of the principal features.

Sound from an elevated source in air is refracted upon transmission into water because of the difference in sound speeds in the two media (a ratio of about 0.23). Because of this difference, the direct sound path is totally reflected for grazing angles less than 77° (i.e., if the sound reaches the surface at an angle more than 13° from vertical). For smaller grazing angles, sound reaches an underwater observation point only by scattering from wave crests on the surface, by non-acoustic (lateral) pressure transmission from the surface, and by bottom reflections in shallow water. As a result, most of the acoustic energy transmitted into the water from a source in air arrives through a cone with a 26° apex angle extending vertically downward from the airborne source. For a moving source, the intersection of this cone with the surface traces a "footprint" directly beneath the path of the source; the width of the footprint being a function of the altitude of the source. To a first approximation, it is only the sound transmitted within this footprint that can reach an underwater location by a direct-refracted path. Because of the large difference in the acoustic properties of water and air, the pressure field is actually doubled at the surface of the water, resulting in a 6 dB increase in pressure level at the surface. Within the direct-refracted cone, the in-air sound transmission paths are affected both by geometric spreading and by the effects of refraction.

In shallow water within the direct transmission cone, the directly transmitted sound energy is generally greater than the energy contribution from bottom reflected paths. At horizontal distances greater than the water depth, the energy transmitted by reflected paths becomes dominant, especially in shallow water. The ratio of direct to reverberant energy depends on the bottom properties. For hard bottom conditions, the reverberant field persists for longer ranges than the direct field. However, with increasing horizontal distance from the airborne source, underwater sound diminishes more rapidly than does the airborne sound.

Near the surface, the laterally transmitted pressure from the airborne sound is transmitted hydrostatically into the water. Beyond the direct transmission cone, this component can produce higher levels than the underwater-refracted wave. However, the lateral component is very dependent on frequency and thus on acoustic wavelength. The level received underwater is 20 dB lower than the airborne sound level at a depth equal to 0.4 wavelength.

Air-Water Transmission Model

For this application, it is necessary to have an analytical model to predict the total acoustic exposure level experienced by marine mammals near the surface and at depth near the path of an aircraft overflight. Malme and Smith (1988) described a model to calculate the acoustic energy at an underwater receiver in shallow water, including the acoustic contributions of both the direct sound field (Urick 1972) and a depth-averaged reverberant sound field (Smith 1974).

In the present application, the Urick (1972) analysis for the lateral wave field was also included to predict this contribution. The paths of most concern for this application are the direct-refracted path and the lateral path. These paths will likely determine the highest sound level received by mammals located nearly directly below a passing airborne source and mammals located near the surface, but at some distance away from the source track. In shallow areas near shore, bottom-reflected acoustic energy will also contribute to the total noise field, but it is likely that the direct-refracted and lateral paths will make the dominant contributions.

Figure A-4 shows an example of the model prediction for a representative source-receiver geometry. The transmission loss (TL) for the direct-refracted wave, the lateral wave, and their resultant energy-addition total is shown. Directly under the aircraft, the direct-refracted wave has the lowest TL. For the shallowest receiver at a 3-foot depth, the lateral wave is seen to become dominant at about a horizontal range of 40 feet. Beyond this point, the underwater level is controlled by the sound level in the air directly above the receiver and follows the same decay slope with distance. For the deeper receiver at 10 feet, the lateral wave does not become dominant until the horizontal range is about 130 feet. When sound reaches the receiver via the direct-refracted path, it decays at about 12 dB/distance doubled (dd), consistent with a surface dipole source. In contrast, when the sound reaches the receiver via the lateral path, it decays at about 6 dB/dd, consistent with the airborne monopole source. Underneath the aircraft, the drop in sound level with depth change from 3 to 10 feet is only about 2 dB, but beyond about 200 feet, a 12 dB drop occurs for the same change in depth.

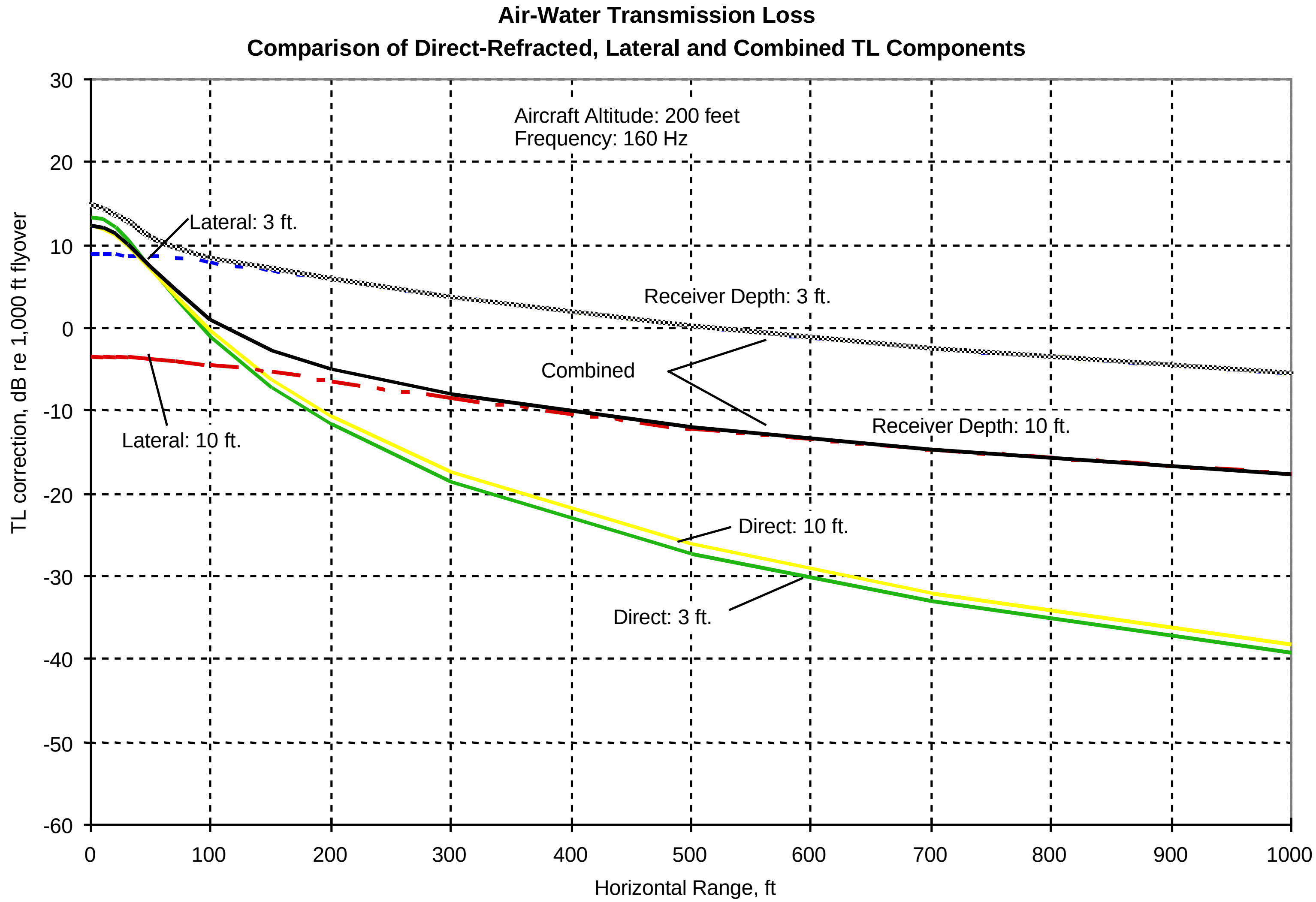


FIGURE A-4. Propagation Model Prediction of Sound Transmission Loss for a Direct-Refracted Sound Wave, a Lateral Sound Wave, and Their Resultant Energy Addition.

Application of the Air-Water Transmission Model to HH-60 and HC-130 Aircraft Sources

For a passing airborne source, received level at and below the surface diminishes with increasing source altitude, but the duration of exposure increases. The maximum received levels at and below the surface are inversely proportional to source altitude, but total noise energy exposure is inversely proportional to the product of source altitude and speed because of the link between altitude and duration of exposure.

Calibrated measurements of radiated noise from both military and commercial aircraft have been made by Air Force research laboratories and are available in standardized databases. Specific conditions of interest in this EA, such as a hovering HH-60 helicopter and an HC-130 aircraft flying at 115 kts during aerial refueling of an HH-60, are not available in the databases of calibrated noise measurements. However, measurements of similar aircraft and/or similar power settings are available and were used as inputs to the modeling process. UH-60 helicopter data were used as a substitute for the HH-60 since the UH-60 has the same power plant but a different external configuration[1]. No data were available for the HC-130 at a cruise power setting for 115 knots, but data were available for an approach power setting for 140 kts. The difference in radiated noise output was estimated to be less than about 2 dB[2].

The measured radiated noise data from the USAF Noisefile database (HECB, Air Force Research Laboratory, Wright-Patterson AFB, OH)[3] that were used for the model input were in the form of 1/3 octave-band noise spectra. The levels have been adjusted to a standard range (typically 1000 feet for aircraft and 250 feet for helicopters) and to a standard set of meteorological conditions (59º F and 70 percent relative humidity). The attenuation of sound by molecular absorption becomes very significant above 1 kHz at ranges beyond 1000 feet. The transmission loss model incorporates molecular absorption and compensates for altitudes and slant ranges that differ from the reference range for the input noise spectrum. The model output contains a set of 1/3 octave-band levels as a function of range and frequency. In addition to the radiated noise source spectra for the aircraft type and speed (power) setting, the model input parameters are source altitude, receiver depth, and horizontal range increments. The predicted model output levels can be presented either as a set of level vs. range curves for specific frequencies as shown in Figure A-5, or as a set of spectra vs. range curves as shown in Figure A-6. While the format shown in Figure A-5 may be more familiar, the spectra format shown in Figure A-6 is more convenient for prediction of potential acoustic impacts since the hearing threshold of the species of interest can be plotted on the same graph.

The hover data obtained for the UH-60 noise showed that the radiated noise has frequency-dependent directionality. The probability of exposure for marine mammals in the vicinity of the aircraft was assumed to be equal in all directions. This permitted the calculated 1/3 octave-band levels averaged over azimuth to be used as the input source spectra for the model work. This is not the same as an equivalent omnidirectional source level because it is not an energy average—it is the average of the sound levels in dB in 10 degree increments for a given band.

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[1] M. Downing, Wyle Laboratories, personal communication.

[2] *Ibid.*

[3] Specific data reduction for the UH-60 hover conditions was performed by M. Downing, Wyle Laboratories.

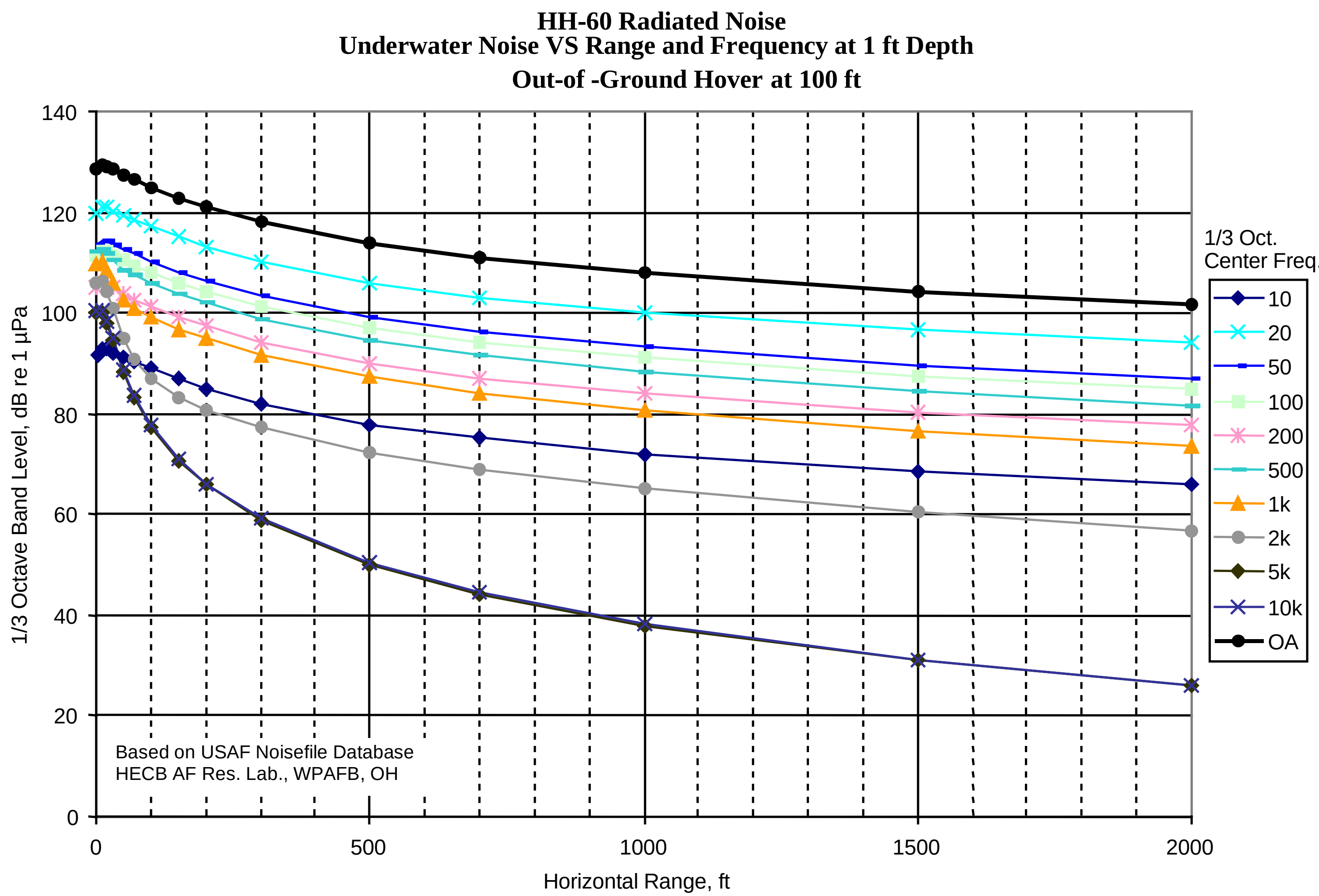

FIGURE A-5. Predicted Sound Output Levels (1-foot depth) Presented as a Set of Level vs. Range Curves for Specific Frequencies.

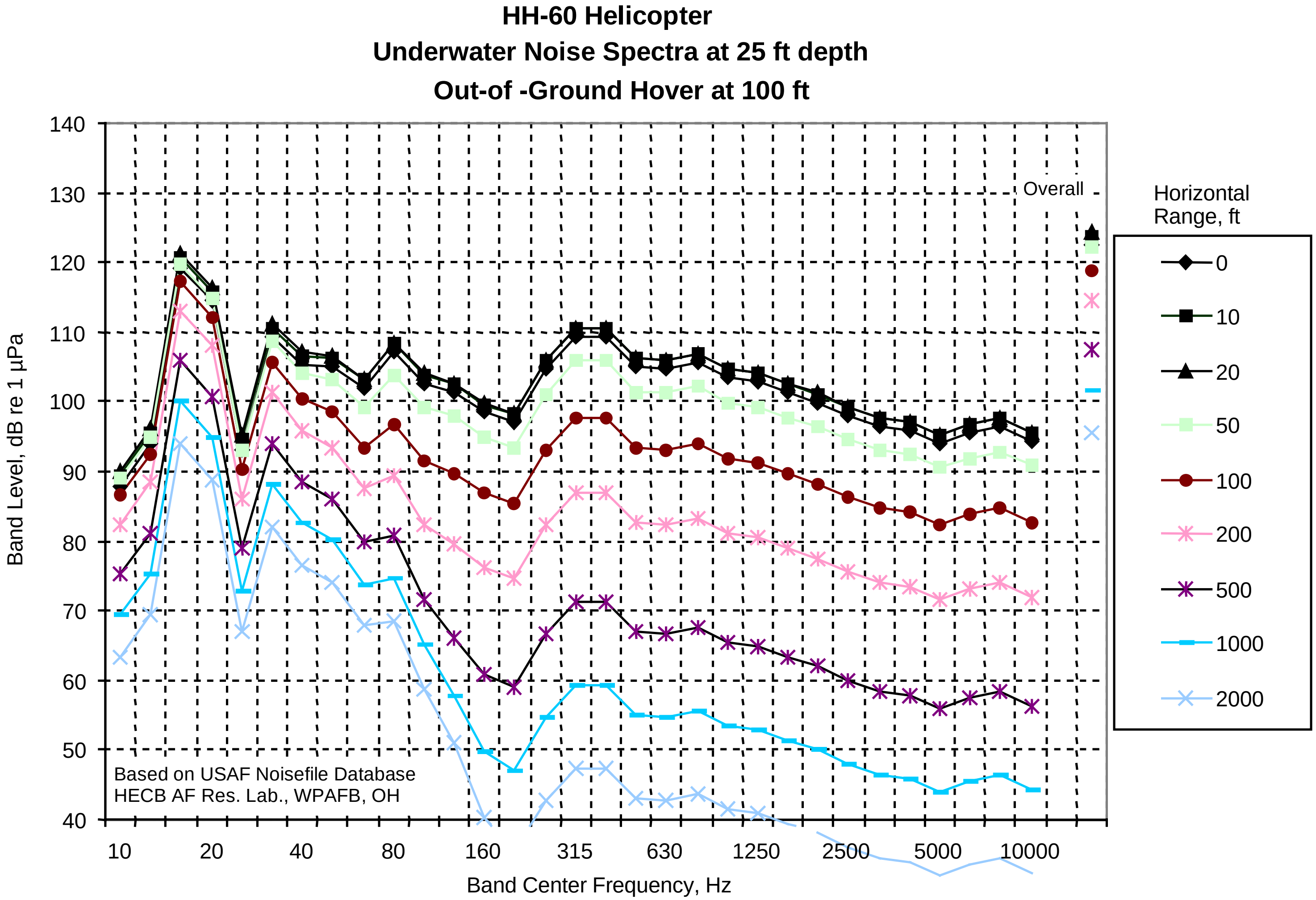

FIGURE A-6. Predicted Sound Output Levels (25-ft depth) Presented as a Set of Spectra vs. Range Curves.

Range increments out to 2,000 feet and depth increments of 1, 5, and 25 feet were used in the modeling procedure. While predicted received noise spectra for positions near the hovering helicopter have been included in the model output, these probably overestimate the levels that would actually be measured in the near field. A near-field correction was applied but it is only an approximate adjustment to the model, which was designed for far-field applications. For low-altitude noise estimates, another artifact results; when the aircraft is closer than the standard distance, the previously applied correction for atmospheric absorption between the source and standard distance must be removed. The standard spectra are normally corrected to either a 1,000-feet or a 250-foot reference range assuming "Standard Day" conditions (59º F, 70 percent relative humidity). If an inexact adjustment was made to the original data, "unadjustments" using "Standard Day" attenuation values often provide too much or too little TL correction. This was particularly evident, during the present analysis, in the case of hover spectra at a 10-foot altitude, where an upturn in the high frequency predictions was present. Part of this upturn is probably correct because high frequency sound reaching a receiver when the underwater refracted path is dominant does not suffer as much molecular absorption as would occur along an air path to the same point. The air path in this case is only from the source to the surface within the cone of acceptance beneath the source.

A.2 NOISE EFFECTS

A.2.1 Hearing Loss

Noise-induced hearing loss is probably the best defined of the potential effects of human exposure to excessive noise. Federal workplace standards for protection from hearing loss allow a time-average level of 90 dB over an 8-hour work period, or 85 dB averaged over a 16-hour period. Even the most protective criterion (no measurable hearing loss for the most sensitive portion of the population at the ear's most sensitive frequency, 4,000 Hz, after a 40-year exposure) suggests a time-average sound level of 70 dB over a 24-hour period (EPA 1972). Since it is unlikely that airport neighbors will remain outside their homes 24 hours per day for extended periods of time, there is little possibility of hearing loss below a DNL of 75 dB, and this level is extremely conservative.

A.2.2 Nonauditory Health Effects

Nonauditory health effects of long-term noise exposure, where noise may act as a risk factor, have never been found to occur at levels below those protective against noise-induced hearing loss, described above. Most studies attempting to clarify such health effects have found that noise exposure levels established for hearing protection will also protect against any potential nonauditory health effects, at least in workplace conditions. The best scientific summary of these findings is contained in the lead paper at the National Institutes of Health Conference on Noise and Hearing Loss which states the following:

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

induced hearing loss would not only solve the noise-induced hearing loss problem but also any potential nonauditory health effects in the work place" (von Gierke 1990; parenthetical italicized wording added for clarification).

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

For example, in an often-quoted paper, two University of California – Los Angeles (UCLA) researchers apparently found a relation between aircraft noise levels under the approach path to Los Angeles International Airport (LAX) and increased mortality rates among the exposed residents by using an average noise exposure level greater than 75 dB for the "noise-exposed" population (Meacham and Shaw 1979). Nevertheless, three other UCLA professors analyzed those same data and found no relation between noise exposure and mortality rates (Frericks et al. 1980).

As a second example, two other UCLA researchers used this same population near LAX to show a higher rate of birth defects during the period of 1970 to 1972 when compared with a control group residing away from the airport (Jones and Tauscher 1978). Based on this report, a separate group at the U.S. Centers for Disease Control performed a more thorough study of populations near Atlanta's Hartsfield International Airport for 1970 to 1972 and found no relation in their study of 17 identified categories of birth defects to aircraft noise levels above 65 dB (Edmonds 1979).

A recent review of health effects, prepared by a Committee of the Health Council of The Netherlands (CHCN) reviewed currently available published information on this topic (CHCN 1996). They concluded that the threshold for possible long-term health effects was a 16-hour (0600 to 2200) L_{eq} of 70 dB. Projecting this to 24 hours and applying the 10 dB nighttime penalty used with DNL, this corresponds to DNL of about 75 dB. The study also affirmed the risk threshold for hearing loss, as discussed earlier.

In summary, there is no scientific basis for a claim that potential health effects exist for aircraft time-average sound levels below 75 dB.

A.2.3 Annoyance

The primary effect of aircraft noise on exposed communities is one of annoyance. Noise annoyance is defined by the EPA as any negative subjective reaction on the part of an individual or group (EPA 1972). As noted in the discussion of DNL (L_{dn}) above, community annoyance is best measured by that metric.

Because the EPA Levels Document (EPA 1972) identified DNL of 55 dB as "…requisite to protect public health and welfare with an adequate margin of safety," it is commonly assumed that 55 dB should be adopted as a criterion for community noise analysis. From a noise exposure perspective, that would be an ideal selection. However, financial and technical resources are generally not available to achieve that goal. Most agencies have identified DNL of 65 dB as a criterion which protects those most impacted by noise, and which can often be achieved on a practical basis (FICON 1992). This corresponds to about 13 percent of the exposed population being highly annoyed.

Although DNL of 65 dB is widely used as a benchmark for evaluating potential significant noise impact, and is often an acceptable compromise, it is not a statutory limit and it is appropriate to consider other thresholds in particular cases. In this EA, no specific threshold is used. The noise in each affected area is evaluated on the basis of the information presented in this appendix and in the body of the EA.

A.2.4 Speech Interference

Speech interference associated with aircraft noise is a primary cause of annoyance to individuals. The disruption of routine activities such as radio or television listening, telephone use, or family conversation gives rise to frustration and irritation. The quality of speech communication is also important in classrooms, offices, and industrial settings and can cause fatigue and vocal strain in those who attempt to communicate over the noise. Research has shown that the use of the SEL metric will measure speech interference successfully, and that an SEL exceeding 65 dB will begin to interfere with speech communication.

A.2.5 Sleep Interference

Sleep interference is another source of annoyance associated with aircraft noise. This is especially true because of the intermittent nature and content of aircraft noise, which is more disturbing than continuous noise of equal energy and neutral meaning.

Sleep interference may be measured in either of two ways. "Arousal" represents actual awakening from sleep, while a change in "sleep stage" represents a shift from one of four sleep stages to another stage of lighter sleep without actual awakening. In general, arousal requires a somewhat higher noise level than does a change in sleep stage.

An analysis sponsored by the Air Force summarized 21 published studies concerning the effects of noise on sleep (Pearsons et al. 1989). The analysis concluded that a lack of reliable studies in homes, combined with large differences among the results from the various laboratory studies and the limited in-home studies, did not permit development of an acceptably accurate assessment procedure. The noise events used in the laboratory studies and in contrived in-home studies were presented at much higher rates of occurrence than would normally be experienced in the home. None of the laboratory studies were of sufficiently long duration to determine any effects of habituation, such as that which would occur under normal community conditions.

Nevertheless, some guidance is available in judging sleep interference. The EPA identified an indoor DNL of 45 dB as necessary to protect against sleep interference (EPA 1972). Assuming a very conservative structural noise insulation of 20 dB for typical dwelling units, this corresponds to an outdoor DNL of 65 dB as minimizing sleep interference.

Kryter (1984) reviewed the probability of arousal or behavioral awakening in terms of SEL. Figure A-7 (from Kryter [1984]:Figure 10.37) indicates that an indoor SEL of 65 dB or lower should awaken less than 5 percent of those exposed. These results do not include any habituation over time by sleeping subjects.

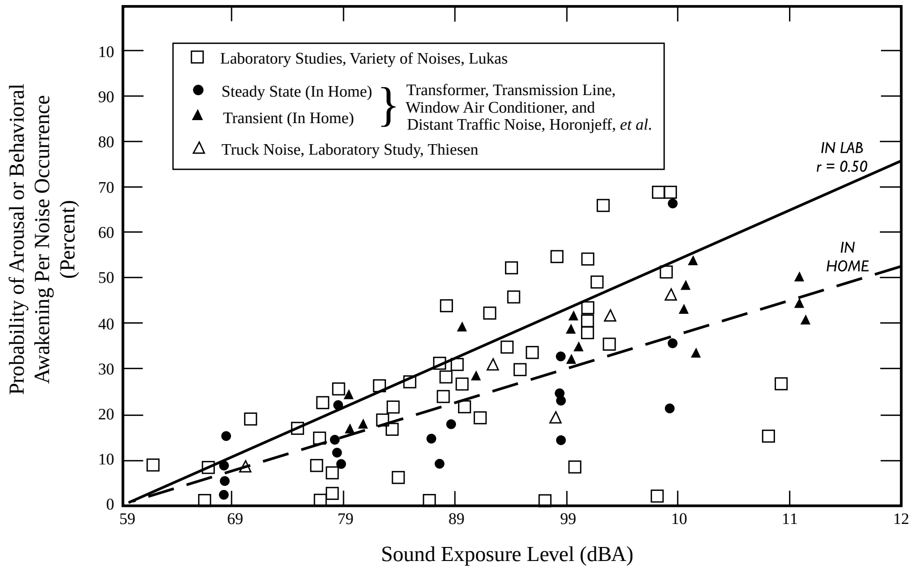

Figure A-7. Probability of Arousal or Behavioral Awakening in Terms of Sound Exposure Level.

Nevertheless, this provides a reasonable guideline for assessing sleep interference and corresponds to similar guidance for speech interference, as noted above.

A.2.6 Noise Effects on Livestock and Terrestrial Wildlife

Animal responses to aircraft are influenced by many variables including aircraft size, proximity (both height above the ground and lateral distance), engine noise, color, and flight profile. The type of aircraft (e.g., fixed-wing versus rotary-winged [helicopters]) and its flight mission may also produce different levels of disturbance and animal response (Smith *et al.* 1988).

Livestock

A large bibliography of studies on the effects of aircraft noise on large stock has consistently minimized the effects of noise and vibration on the health and well-being of many animal species. Without exception, these studies failed to provide conclusive evidence of any serious effect except trauma due to panic reaction. In the literature review of Manci *et al.* (1988), behavior reactions observed in livestock exposed to low-altitude subsonic overflights have generally consisted of startle reactions that were considered minimal. Large livestock have been reported to respond to aircraft noise by sporadic jumping, galloping, vocalization, and random movement. Reactions of beef cattle to low-altitude overflights were comparable to the reactions to the presence of strange objects or persons.

Wildlife

The greatest impact to wildlife from aircraft overflights is from the visual effect of the approaching aircraft and the concomitant subsonic noise. Studies have shown that wildlife react to visual stimuli (e.g., aircraft overflights) that are below 1,000 feet AGL (Lamp 1989, Bowles 1995). Aircraft overflights and the associated noise can affect wildlife directly. Wildlife responses may include increased movement after an overflight, avoiding or leaving areas where overflights occur, changes in foraging patterns, and arousal of species-specific defensive behaviors (e.g., flight, aggression). Noise from aircraft overflights may also have indirect affects on wildlife such as masking. Masking occurs when noise interferes with the perception of a sound of interest. For example, masking may affect predator avoidance and the detection of social signals (Bowles 1995).

The effects of noise from aircraft overflights are difficult to assess because a number of adaptive responses may be involved, making the overt behavioral or physiological changes in response to noise highly variable. These responses include the acoustic startle, the orienting response, and other species-typical and individual strategies for coping with novelty, species-typical defensive behaviors, and responses conditioned by previous exposures to noise.

Studies on the effects of noise on wildlife have been predominantly conducted on mammals and birds. Studies on subsonic aircraft disturbances of ungulates (e.g., pronghorn, bighorn sheep, elk, and mule deer), in both laboratory and field conditions, have shown that effects are transient and of short duration and suggest that the animals habituate to the sounds (Workman *et al.* 1992; Krausman *et al.* 1993, 1998; Weisenberger *et al.* 1996). Similarly, the impacts to raptors and other birds (e.g., waterfowl, grebes) from aircraft low-level flights were found to be brief and insignificant and not detrimental to reproductive success (Smith *et al.* 1988; Lamp 1989; Ellis *et al.* 1991; Grubb and Bowerman 1997).

The primary concern with aircraft overflights, and the associated noise, is the startle effect. For example, this occurs when birds are surprised by sudden, unexpected loud noises and leave the nest or perch suddenly. Possible negative impacts from this behavior include the expulsion of eggs or nestlings from the nest as the parent leaves suddenly, increased predation of eggs or young when parents are off the nest, and eggs or young may become chilled if the parent is off the nest for an extended period of time. Studies of seven raptor species (including gyrfalcon and peregrine and prairie falcons) exposed to low-level aircraft overflights found that raptor adults on nests tend to sit much more tightly than roosting adults and those that did fly usually left for less than 5 minutes.

In experiments using 211 nests exposed to gunshots, blasting, and low-level aircraft overflights, no eggs or young were ever rejected (Bowles 1995). However, adult peregrines have been known to step on eggs or young and occasionally kick eggs out of the nest during rapid exits following gunshots and other explosions (Smith *et al.* 1988). On the other hand, the U.S. Forest Service (USFS) found that eggs and young are only rarely ejected from the nest after a startle. Panic responses are induced only after close and abrupt approaches (e.g., an approach at 50 meters over a cliff face). Adults are very reluctant to leave the nest, and generally remain away for a minute or less (USFS 1992).

In studies on the impacts of low-level jet overflights on nesting peregrine and prairie falcons, Ellis (1981) and Ellis *et al.* (1991) found that responses to extremely frequent and nearby jet aircraft were often minimal and never associated with reproductive failure. Typically, birds quickly resumed normal activities within a few seconds following an overflight. While the falcons were noticeably alarmed by the noise stimuli in this study, the negative responses were brief and not detrimental to reproductive success during the course of the study.

Similarly, 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. Minor reactions consisted of the bird assuming an alert posture or turning its head and watching the aircraft pass overhead. Duration of raptor response to aircraft disturbances was monitored for one year and was found to average 14 seconds for low-level overflights. All raptor nests under observation successfully fledged young (Lamp 1989).

In a literature review of raptor responses to aircraft noise, Manci *et al.* (1988) found that most studies of raptors did not show a negative response to overflights. When negative responses were observed they were predominantly associated with rotary-winged aircraft or jet aircraft that were repeatedly passing within one-half mile of a nest. A study on the potential impacts of a proposed airport on a large colony of federally endangered Florida snail kites (*Rostrhamus sociabilis plumbeus*), suggested that impacts to the habitat by land development associated with the airport could be more detrimental to the kites than the impact of aircraft overflights (Manci *et al.* 1988).

In 1995, a 3 year study was initiated for the U.S. Air Force by the Alaska Cooperative Fish and Wildlife Research Unit, University of Alaska, Fairbanks, and Alaska Biological Research to assess the effects of jet overflights on the behavior, nesting success, and productivity of nesting peregrine falcons beneath five MOAs in interior Alaska (Ritchie *et al.* 1998). To measure noise levels experienced by adult peregrines and their young, animal noise monitors (ANM) were positioned on the nest cliff approximately 50 meters from the nest in a position with similar exposure and elevation characteristics of the nest site. Control nests, with no overflights, were also monitored for productivity and nest success.

An average of 34 nests per year were monitored over the 3 year study, with over 125,000 hours of overflight and ambient noise data recorded by ANMs. Data from 1996 and 1997 indicate that the number of overflights experienced by unsuccessful nests did not differ from successful nests and averaged 28 and 27 overflights each, respectively, through the nesting season. Daily sound exposure levels (SEL) were slightly higher at successful nests (89.5 dBA) compared to unsuccessful nests (89.1 dBA). The daily SEL, which is a time-averaged descriptor of the daily exposure of each nest to noise during the monitoring period, ranged from 60 to 109.6 dBA for successful nests that had at least one overflight, and from 60 to 110.6 dBA for unsuccessful nests. Overall, the average number of young per successful pair was greater at the experimental sites than at the control sites (Ritchie *et al.* 1998).

Even if proven significant, most of the effects of noise are mild enough that they may never be detectable as changes in population size or population growth against the background of normal variation (Bowles 1995). Many other environmental variables (e.g., predators, weather, changing prey base, ground based human disturbance) may influence reproductive success and confound the ability to tease out the ultimate factor in limiting productivity of a certain nest, area, or region (Smith *et al.* 1988). In contrast, the effects of other human intrusions near nests, foraging areas, dens, etc. (e.g., hiking, bird watching, timber harvesting, boating) are readily detected and substantial (USFS 1992).

A.2.7 Airborne Noise Effects on Marine Mammals

The previous discussions primarily concerned the metrics and thresholds that have been developed to predict human and terrestrial animal response to various noise spectral and temporal characteristics. Response prediction metrics for non-human species such as marine mammals are generally not available, except in a limited form for a few examples such as gray and humpback whales, whose responses to industrial noise playbacks and vessel traffic have been studied. Some studies of response to impulse noise in the form of air gun signals have also been made. Those sounds are underwater sounds. Although several studies of pinniped response to airborne noise and sonic booms from aircraft and missile flyovers have been made, few sound exposure data have been reported.

Because of the limited amount of response data available for marine mammals, it is not possible to develop total sound exposure metrics similar to those applied to human population centers. Instead, the potential impacts of noise sources in the project areas need to be assessed by examining individual source-receiver encounter scenarios typical of the proposed operations.

In assessing the potential impact of airborne noise sources on non-human species, it is necessary to provide an overall sound level measure that is proportional to the sound level perceived by a given species. This facilitates the application of sound level criteria based on potential avoidance behavior, potential temporary threshold shift (TTS), or some other appropriate response (refer to Section 4.11.3, Marine Mammals). A weighting function related to the hearing characteristics of a specific species is required, analogous to the A-weighting used for human response prediction. If the hearing thresholds of a species have been measured at various frequencies, the resulting audiogram can be used as a weighting function.

A.2.8 Noise Effects on Structures

Normally, the most sensitive components of a structure to airborne noise are the windows and, infrequently, the plastered walls and ceilings. An evaluation of the peak sound pressures impinging on the structure is normally sufficient to determine the possibility of damage. In general, at sound levels above 130 dB, there is the possibility of the excitation of structural component. While certain frequencies (such as 30 Hz for window breakage) may be of more concern than other frequencies, conservatively, only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components (National Research Council/National Academy of Sciences 1977).

A recent study, directed specifically at low-altitude, high-speed aircraft on MTRs, showed that there is little probability of structural damage from such operations (Sutherland 1990). One finding in that study is that sound levels at damaging frequencies (e.g., 30 Hz for window breakage or 15 to 25 Hz for whole-house response) are rarely above 130 dB.

Noise-induced structural vibration may also cause annoyance to dwelling occupants because of induced secondary vibrations, or “rattle,” of objects within the dwelling — hanging pictures, dishes, plaques, and bric-a-brac. Window panes may also vibrate noticeably when exposed to high levels of airborne noise, causing homeowners to fear of breakage. In general, such noise-induced vibrations occur at sound levels above those considered normally incompatible with residential land use. Thus, assessments of noise exposure levels for compatible land use should also be protective of noise-induced secondary vibrations.

A.2.9 Noise Effects on Terrain

Members of the public often perceive that noise from low-flying aircraft can cause avalanches or landslides by disturbing fragile soil or snow structures, especially in mountainous areas. There are no known instances of such effects, and it is considered improbable that such effects will result from routine, subsonic aircraft operations.

A.2.10 NOISE EFFECTS ON HISTORICAL AND ARCHAEOLOGICAL SITES

Because of the potential for increased fragility of structural components of historical buildings and other historical sites, aircraft noise may affect such sites more severely than newer, modern structures. Again, there are few scientific studies of such effects to provide guidance for their assessment.

One study involved the measurements of sound levels and structural vibration levels in a superbly restored plantation house, originally built in 1795, and now situated approximately 1,500 feet from the centerline at the departure end of Runway 19L at Washington Dulles International Airport. These measurements were made in connection with the proposed scheduled operation of the supersonic Concorde airplane at Dulles (Wesler 1977). There was special concern for the building's windows, since roughly half of the 324 panes were original. No instances of structural damage were found. Interestingly, despite the high levels of noise during the Concorde takeoffs, the induced structural vibration levels were actually less than those induced by touring groups and vacuum cleaning within the building itself.

As noted above for the noise effects of noise-induced vibrations of normal structures, assessments of noise exposure levels for normally compatible land uses should also be protective of historic and archaeological sites.

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APPENDIX B
AIRSPACE

APPENDIX B: AIRSPACE

Table B-1. Proposed Flight Profiles within Affected Airspace under the Proposed Action

Airspace Unit	*Aircraft Type*	*Minutes in Airspace*	*Avg % Power*	*Avg KIAS*	*Altitude (ft AGL)* 100-300	300-500	500-1,000	1,000-3,000	3,000+
305 West and East LATNs	HH-60	60	60	100	80 %	0	0	20 %	0
	HC-130	120	50	210	0	75 %	20 %	5 %	0
BMGR (R-2304)	HH-60	75	60	100	80 %	10 %	0	0	10 %
	HC-130	10	40	140	0	0	45 %	25 %	30 %
Yuma TACTS Range (R-2301W)	HH-60	75	60	100	80 %	10 %	0	0	10 %
	HC-130	10	40	140	0	0	45 %	25 %	30 %
Sells Low MOA	HH-60	30	90	105	0	0	0	100 %	0
	HC-130	80	45	135	0	0	0	75%	25%
Jackal Low MOA	HH-60	30	90	105	0	0	0	100 %	0
	HC-130	80	45	135	0	0	0	75%	25%

Note: KIAS = knots indicated airspeed.
Source: Air Force 2001a.

Table B-2. Proposed Flight Profiles within Alternative A Affected Airspace

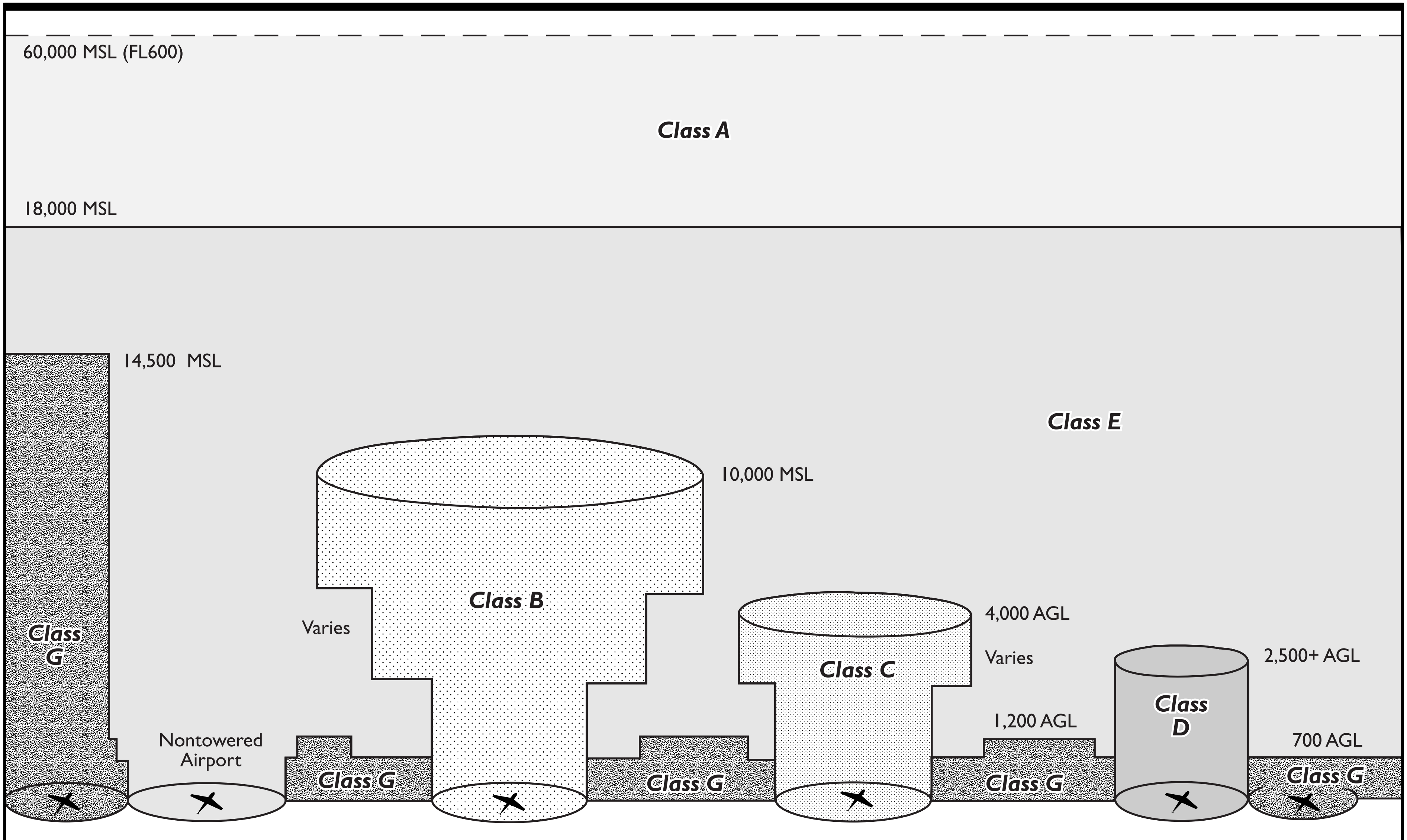
Airspace Unit	*Aircraft Type*	*Minutes in Airspace*	*Avg % Power*	*Avg KIAS*	*Altitude (ft AGL)* 100-300	300-500	500-1,000	1,000-3,000	3,000+
Edwards Range LATN	HH-60	60	60	100	80 %	0	0	20 %	0
	HC-130	120	50	210	0	75 %	20 %	5 %	0
Fort Irwin Range (R-2502N and R-2502E)	HH-60	75	60	100	80 %	10 %	0	0	10 %
	HC-130	10	40	140	0	0	45 %	25 %	30 %
China Lake EC Range (R-2524)	HH-60	75	60	100	80 %	10 %	0	0	10 %
	HC-130	10	40	140	0	0	45 %	25 %	30 %
Isabella and Owens MOAs	HH-60	30	90	105	0	0	0	100 %	0
	HC-130	80	45	150	0	0	0	75 %	25 %

Note: KIAS = knots indicated airspeed.
Source: Air Force 2001a.

Table B-3. Proposed Flight Profiles within Alternative B Affected Airspace

Airspace Unit	*Aircraft Type*	*Minutes in Airspace*	*Avg % Power*	*Avg KIAS*	*Altitude (ft AGL)* 100-300	300-500	500-1,000	1,000-3,000	3,000+
Priest and Vandenberg LATNs	HH-60	60	60	100	80 %	0	0	20 %	0
	HC-130	120	50	210	0	75 %	20 %	5 %	0
Fort Hunter Liggett Range (R-2513)	HH-60	75	60	100	80 %	10 %	0	0	10 %
	HC-130	10	40	140	0	0	45 %	25 %	30 %
China Lake EC Range (R-2524)	HH-60	75	60	100	80 %	10 %	0	0	10 %
	HC-130	10	40	140	0	0	45 %	25 %	30 %
Isabella and Hunter Low MOAs	HH-60	-	-	-	-	-	-	-	-
	HC-130	80	45	150	0	0	0	50 %	50 %
AR-242V and AR-243V	HH-60	30	90	105	0	0	0	100 %	0
	HC-130	45	40	120	0	0	0	100 %	0

Note: KIAS = knots indicated airspeed.
Source: Air Force 2001a.



LEGEND

AGL = feet above ground level

FL = flight level

MSL = feet above mean sea level

Airport

Source: National Imaging and Mapping Agency 1998.

Not to scale

FAA Airspace Classifications

Figure B-1

Appendix C
AGENCY CORRESPONDENCE

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

MEMORANDUM FOR See Distribution

FROM: HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley Air Force Base VA 23665-2760

SUBJECT: Environmental Assessment (EA) for the Proposed West Coast Combat Search and Rescue (CSAR) Unit Beddown

1. The U.S. Air Force is preparing an EA for the proposed establishment of an active-duty Combat Search and Rescue (CSAR) unit on the West Coast. This CSAR unit would provide long-range, deployable, CSAR capability as well as domestic support under the national search and rescue plan.

2. The proposed action includes the beddown of 12 HH-60 helicopters, 10 HC-130 fixed-wing aircraft, increases in personnel, and on-base construction. Three alternative locations will be analyzed: Davis-Monthan Air Force Base (AFB) in Tuscon AZ, Edwards AFB north of Lancaster CA, and Vandenberg AFB near Lompoc CA. Each alternative includes the use of existing airspace, training ranges, and water training areas (Attachment 2); no new training areas are being proposed. CSAR training would include personnel insertions and extractions; the use of markers such as illuminating flares, sea dye, and light sticks, and self-protection chaff and flares.

3. This EA is being prepared in compliance with the National Environmental Policy Act of 1969. In accordance with Executive Order 12372, Inter-governmental Review of Federal Programs, we request your assistance in identifying potential issues to be addressed in the EA. The environmental issues analyzed will identify the potential impacts of implementing this proposed action at all three locations and lead to either a Finding of No Significant Impact (FONSI) or a decision to prepare an Environmental Impact Statement. When the Environmental Impact Analysis Process (EIAP) is complete, the study will assist the decision maker in making an informed decision regarding the final beddown location for this CSAR unit.

4. Request your comments no later than 1 Jan 02; however, comments received at any time throughout the EIAP will be considered to the extent possible in the preparation of the EA. Should you have any questions or desire additional information, please feel free to contact Ms. Linda DeVine at the address above.

Alton Chavis
ALTON CHAVIS
Chief, Environmental Analysis Branch

2 Attachments:
1. Distribution List
2. Generalized Airspace

Global Power For America

DISTRIBUTION LIST
COMBAT SEARCH AND RESCUE SQUADRON-WEST

Gail Kushner
Pima Association of Governments
177 N. Church Ave., Suite 405
Tucson, AZ 85701

Diana Walls
State Historic Preservation Office
Arizona State Parks
1300 W. Washington
Phoenix, AZ 85007
(602) 542-4009

Arizona Game & Fish Department
Duane L. Shroufe, Director
2221 W. Greenway Rd.
Phoenix, AZ 85023-4399
(602) 942-3000

US Fish and Wildlife Service, Ecological Services
David Harlow
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4915

California Department of Parks and Recreation
Office of Historic Preservation
P.O. Box 942896
Sacramento, CA 94296-0001

Headquarters Office
Robert C. Hight, Director
California Department of Fish and Game
1416 Ninth Street
Sacramento, California 95814

US Fish and Wildlife Service
Ecological Services
Joel A. Medlin, Field Supervisor
2800 Cottage Way, E-1803
Sacramento, CA 95825

National Marine Fisheries Service
Bob Hoffman
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, CA 90802-4213

Mr. David Tomsovic (CMD-2)
Region 9
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco CA 94105

Mr. Dan Muslin
Business Line and Environmental Planning Coordinator
Naval Facilities Engineering Command
U.S. Department of Defense
Southwest Division Code 03PL.DM
1220 Pacific Highway
San Diego CA 92132-5190

Bob Walkup, Mayor
City Hall
255 West Alameda Street
Tucson, Arizona 85701

Steve Perez
1115 Truxtun Avenue, 5th floor
Bakersfield, CA 93301

Frank C. Roberts, Mayor
44933 N. Fern Avenue
Lancaster, CA 93534

Dick DeWees, Mayor
100 Civic Center Plaza
P.O. Box 8001
Lompoc, CA 93438

Native American Reservations

Tohono O'Odham Reservation
Research and Planning Department
P.O. Box 837
Sells, AZ 85634

Gilbert Stewart, Director
Natural Resources Division
Southern California Agency
Bureau of Indian Affairs
3600 Lime Street, Suite 722
Riverside, CA 92501

Barona Indian Reservation
Tribal Chairman
Barona Group of the Barona Reservation
1095 Barona Road
Lakeside, CA 92040

Cuyapaipe Indian Reservation
Tribal Chairman
Cuyapaipe Band of Mission Indians
4390 La Pasta Tracktrail
Pine Valley, CA 92062

Campo Indian Reservation
Tribal Chairman
Campo Band of Mission Indians
1779 Campo Truck Trail
Campo, CA 91906

Manzanita Indian Reservation
Tribal Chairman
Manzanita Band of Mission Indians
P.O. Box 1302
Boulevard, CA 92005

La Posta Indian Reservation
Tribal Chairman
La Posta Band of Mission Indians
1064 Barona Road
Lakeside, CA 92040

Viejas Indian Reservation
Tribal Chairman
Viejas Tribal Council
P.O. Box 908
Alpine, CA 91903

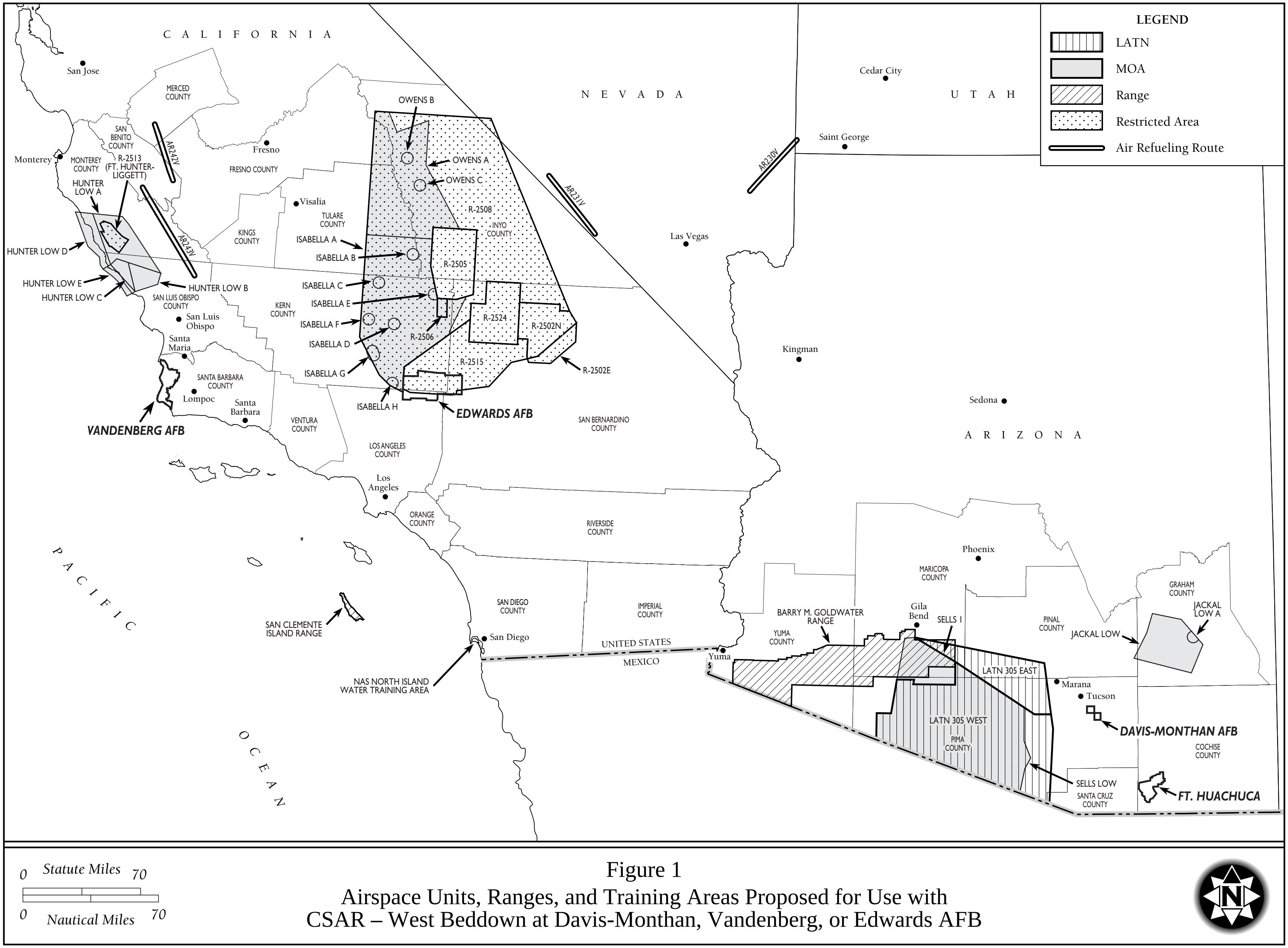


Figure 1
Airspace Units, Ranges, and Training Areas Proposed for Use with
CSAR – West Beddown at Davis-Monthan, Vandenberg, or Edwards AFB

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

MEMORANDUM FOR Ms. Terry Roberts
Chief, California State Clearinghouse
Governor's Office of Planning and Research
P O Box 3044
Sacramento CA 95814

FROM: HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley Air Force Base VA 23665-2760

SUBJECT: Environmental Assessment (EA) for the Proposed West Coast Combat Search and Rescue (CSAR) Unit Beddown

1. The U.S. Air Force is preparing an EA for the proposed establishment of an active-duty Combat Search and Rescue (CSAR) unit on the West Coast. This CSAR unit would provide long-range, deployable, CSAR capability as well as domestic support under the national search and rescue plan.

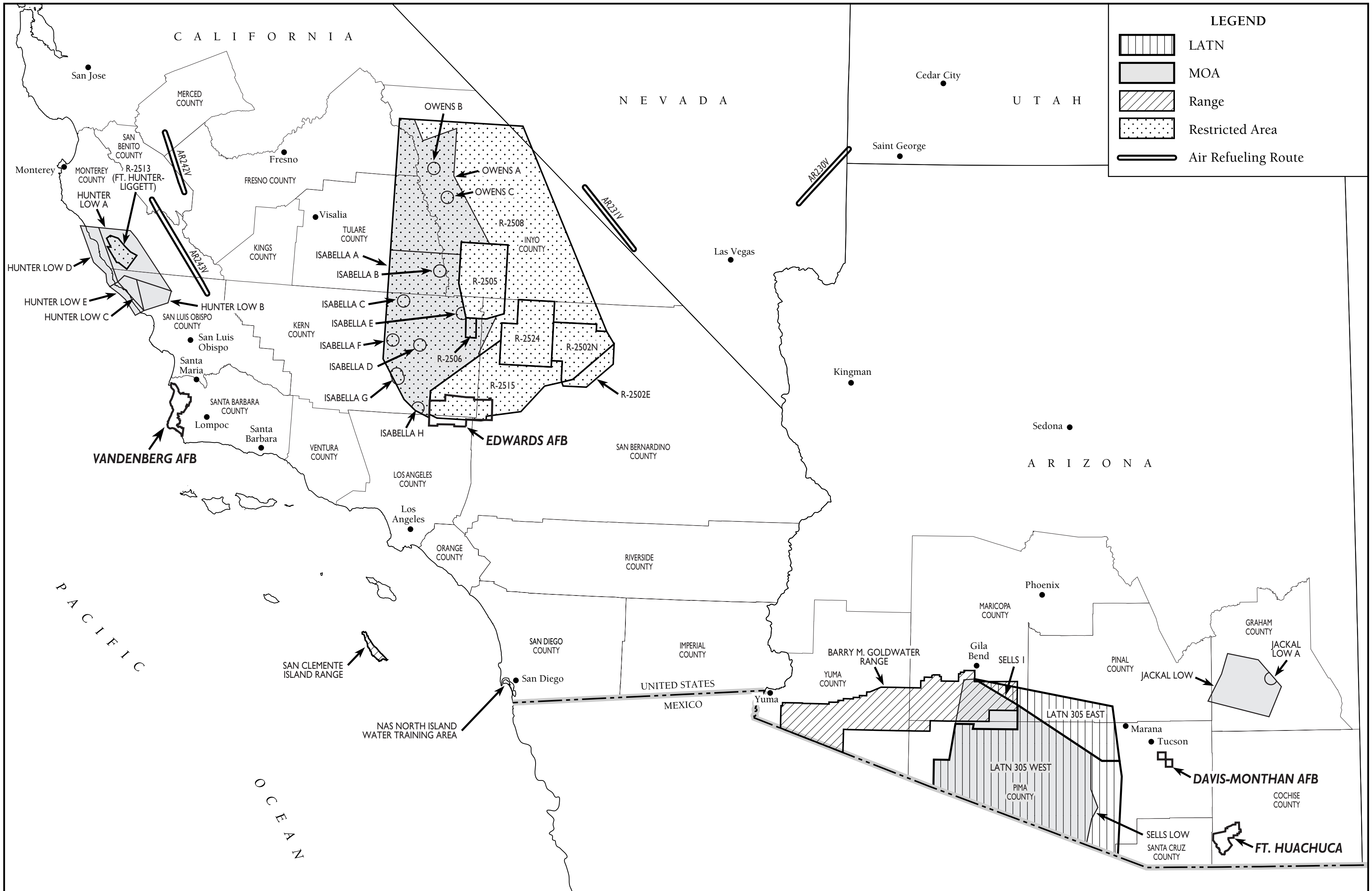
2. The proposed action includes the beddown of 12 HH-60 helicopters, 10 HC-130 fixed-wing aircraft, increases in personnel, and on-base construction. Three alternative locations will be analyzed: Davis-Monthan Air Force Base (AFB) in Tuscon AZ, Edwards AFB north of Lancaster CA, and Vandenberg AFB near Lompoc CA. Each alternative includes the use of existing airspace, training ranges, and water training areas (Attached); no new training areas are being proposed. CSAR training would include personnel insertions and extractions; the use of markers such as illuminating flares, sea dye and light sticks, and self-protection chaff and flares.

3. This EA is being prepared in compliance with the National Environmental Policy Act of 1969. In accordance with Executive Order 12372, Inter-governmental Review of Federal Programs, we request your assistance by advising the appropriate state and local agencies of this proposal and soliciting their comments and identification of potential issues to be addressed in the EA. The environmental issues analyzed will identify the potential impacts of implementing this proposed action at all three locations and lead to either a Finding of No Significant Impact or a decision to prepare an Environmental Impact Statement. When the Environmental Impact Analysis Process (EIAP) is complete, the study will assist the decision maker in making an informed decision regarding the final beddown location for this CSAR unit.

4. Request your comments no later than 1 Jan 02; however, comments received at any time throughout the EIAP will be considered to the extent possible in the preparation of the EA. Should you have any questions or desire additional information, please feel free to contact Ms. Linda DeVine at the above address.

Alton Chavis
ALTON CHAVIS
Chief, Environmental Analysis Branch

Attachment:
Generalized Airspace



0 Statute Miles 70

0 Nautical Miles 70

Figure 1

Airspace Units, Ranges, and Training Areas Proposed for Use with CSAR – West Beddown at Davis-Monthan, Vandenberg, or Edwards AFB

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE, VIRGINIA

MEMORANDUM FOR Ms. Jacqueline Schafer
Director, Arizona Department of Environmental Quality
3033 North Central Avenue
Phoenix AZ 85012-1991

FROM: HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley Air Force Base VA 23665-2769

SUBJECT: Environmental Assessment (EA) for the Proposed West Coast Combat Search and Rescue (CSAR) Unit Beddown

1. The U.S. Air Force is preparing an EA for the proposed establishment of an active-duty Combat Search and Rescue (CSAR) unit on the West Coast. This CSAR unit would provide long-range, deployable, CSAR capability, as well as domestic support under the national search and rescue plan.

2. The proposed action includes the beddown of 12 HH-60 helicopters, 10 HC-130 fixed-wing aircraft, increases in personnel, and on-base construction. Three alternative locations will be analyzed: Davis-Monthan Air Force Base (AFB) in Tuscon AZ, Edwards AFB north of Lancaster CA, and Vandenberg AFB near Lompoc CA. Each alternative includes the use of existing airspace, training ranges, and water training areas (Attached); no new training areas are being proposed. CSAR training would include personnel insertions and extractions; the use of markers such as illuminating flares, sea dye and light sticks, and self-protection chaff and flares.

3. This EA is being prepared in compliance with the National Environmental Policy Act of 1969. In accordance with Executive Order 12372, Inter-governmental Review of Federal Programs, we request your assistance by advising the appropriate state and local agencies of this proposal and soliciting their comments and identification of potential issues to be addressed in the EA. The environmental issues analyzed will identify the potential impacts of implementing this proposed action at all three locations and lead to either a Finding of No Significant Impact or a decision to prepare an Environmental Impact Statement. When the Environmental Impact Analysis Process (EIAP) is complete, the study will assist the decision maker in making an informed decision regarding the final beddown location for this CSAR unit.

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Alton Chavis

ALTON CHAVIS
Chief, Environmental Analysis Branch

Attachment:
Generalized Airspace

Global Power For America

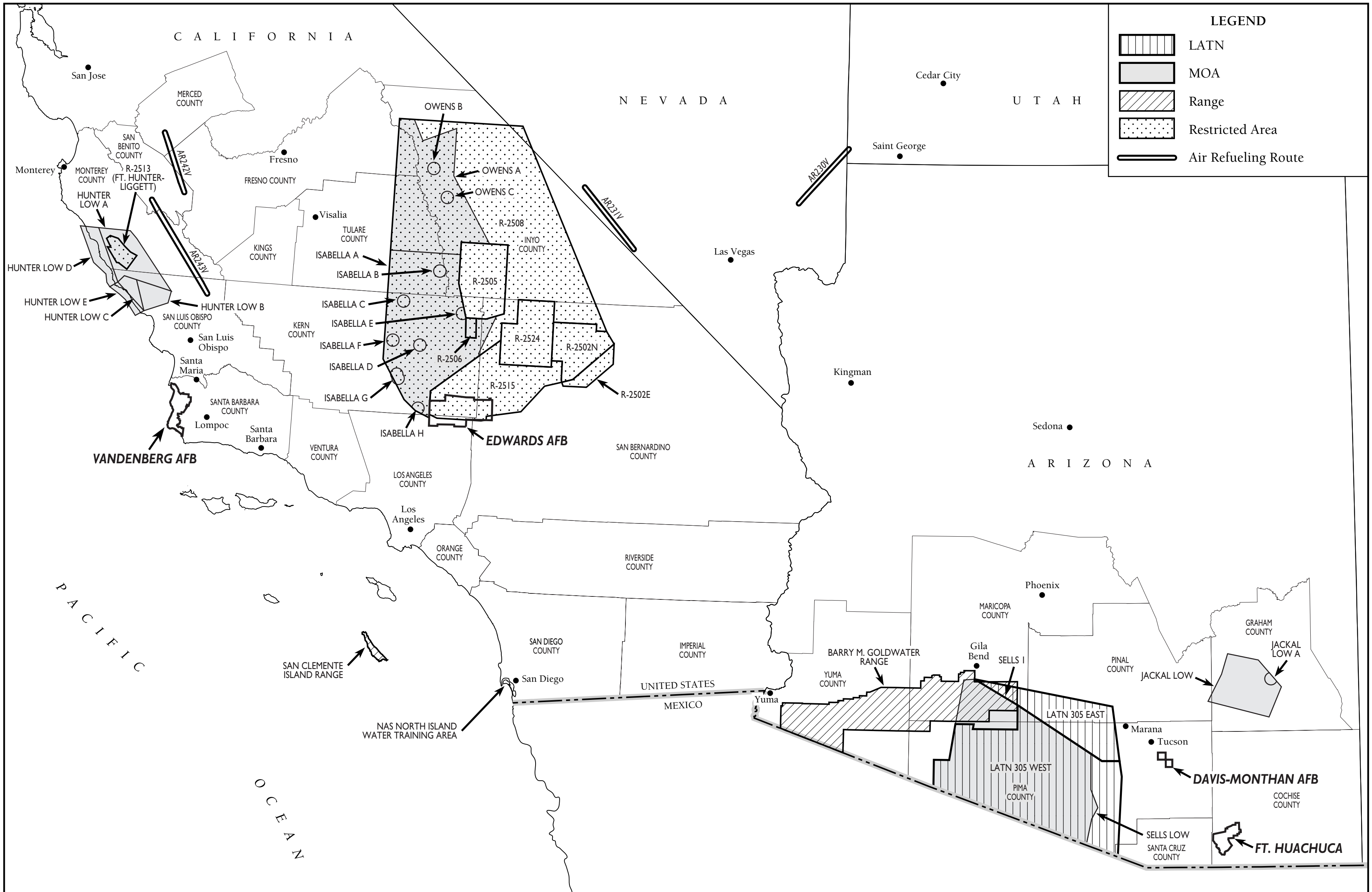


Figure 1
Airspace Units, Ranges, and Training Areas Proposed for Use with
CSAR – West Beddown at Davis-Monthan, Vandenberg, or Edwards AFB

The Environmental Company, Inc.

1525 State Street • Suite 103
Santa Barbara, CA 93101
(805) 564-4940 • Fax (805) 564-4988
Internet: www.tecinc.com

December 4, 2001

U.S. Fish and Wildlife Service
Field Supervisor, Ecological Services
2493 Portela Rd. – Suite B
Ventura, CA 93003

SUBJECT: Proposed Air Force Actions in California

The U.S. Air Force, Headquarters Air Combat Command (ACC) is in the process of preparing an environmental assessment (EA) for the proposed establishment of an active-duty Combat Search and Rescue (CSAR) unit on the West Coast. This CSAR unit would provide long-range, deployable CSAR capability as well as domestic support under the national search and rescue plan.

The proposed action includes the beddown of 12 HH-60 helicopters and 10 HC-130 fixed-wing aircraft, increases in personnel, and on-base construction. Three alternative locations will be analyzed: Davis-Monthan Air Force Base (AFB), Tucson, Arizona; Edwards AFB, Mojave, California; and Vandenberg AFB, Lompoc, California. Each alternative includes the use of exisiting airspace, training ranges, and a water training area (see Figures 1 and 2); no new training areas, ranges, or airspace are proposed. CSAR training would include personnel insertions and extractions; the use of markers such as illuminating flares, sea dye, and lightsticks; and self-protection chaff and flares.

The California counties underlying the affected airspace that you oversee are: San Benito, Monterey, San Luis Obispo, Santa Barbara, Inyo, Kern, San Bernadino, and Los Angeles. The proposed action could potentially affect these counties through increase use of the overlying airspace.

Pursuant to the Endangered Species Act and the National Environmental Policy Act (NEPA), we are requesting information regarding federally listed or proposed species that may be present in the potentially affected area. If any of this information is available digitally, we would appreciate receiving it in that format. Until the extent of the potential impact to species is determined, we will make no determination regarding the need for section 7 consultation.

Please provide responses and direct inquiries on this matter directly to me. Thank you for your assistance.

Rick Spaulding

RICK SPAULDING
Senior Biologist
E-mail: rlspaulding@tecinc.com

Attachment: Maps of Affected Airspace
cc: USFWS, Ecological Services, Sacramento Office
Linda DeVine, Project Manager, HQ ACC/CEVP

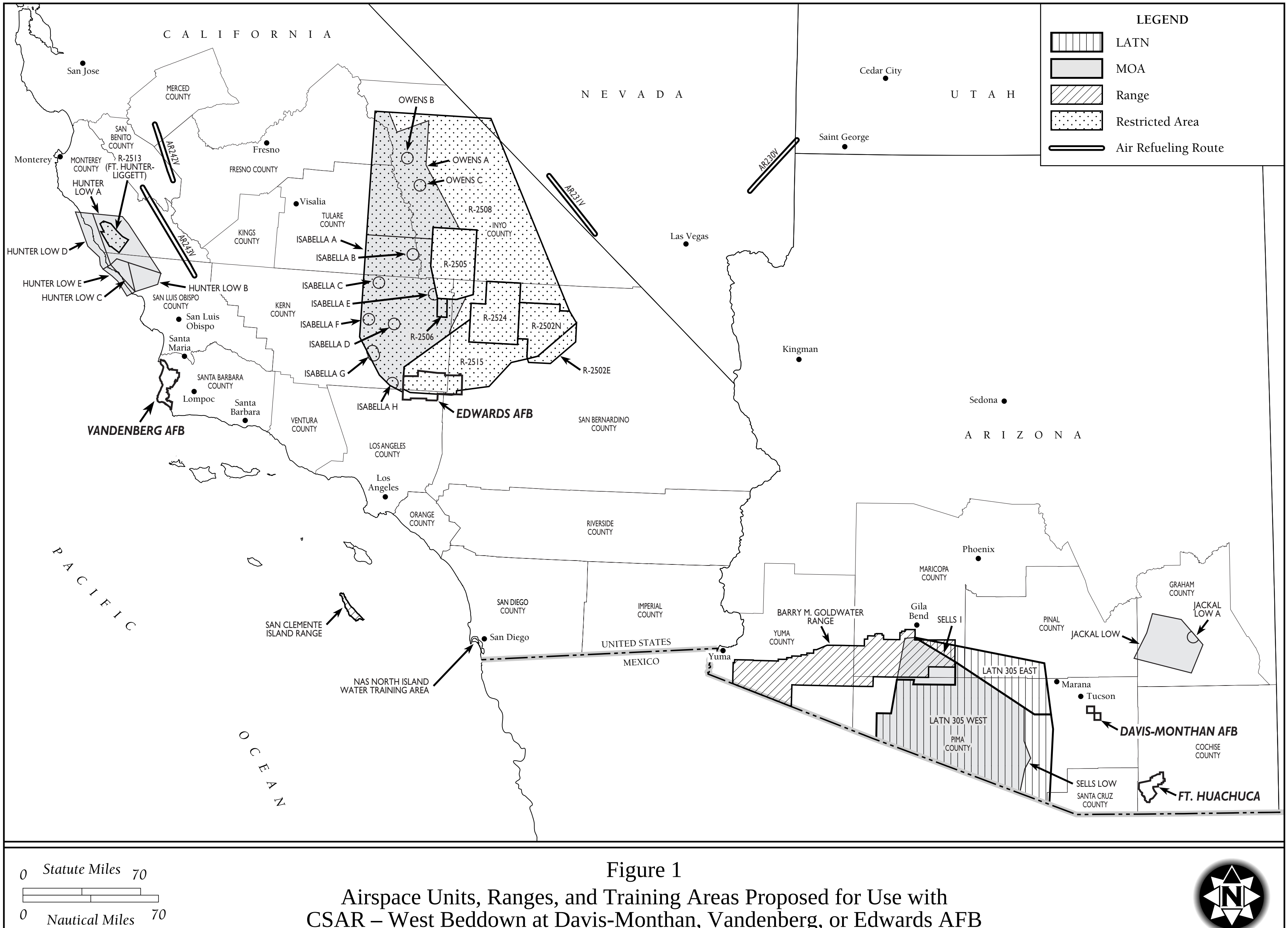
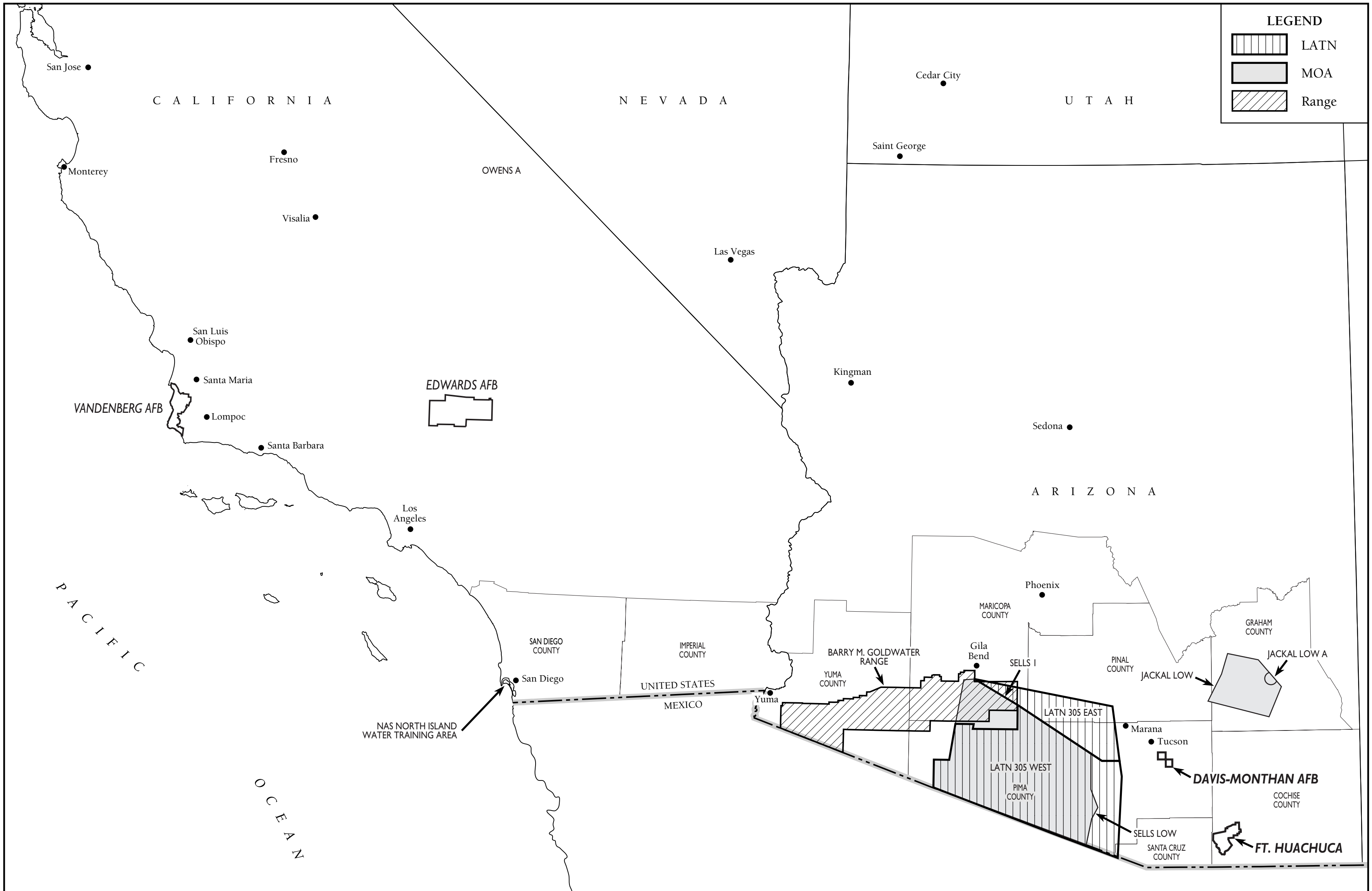


Figure 1
Airspace Units, Ranges, and Training Areas Proposed for Use with
CSAR – West Beddown at Davis-Monthan, Vandenberg, or Edwards AFB



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0 Nautical Miles 70

Figure 2
Airspace Units, Ranges, and Training Areas Proposed for Use with CSAR – West Beddown at Davis-Monthan AFB

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

DEC 10 2001

F/SWR4:WBC
150416SWR01HC669
HCD_J10

Linda DeVine
HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley Air Force Base, VA 23665-2760

Dear Ms. DeVine:

The National Marine Fisheries Service (NMFS) has received your scoping letter related to an Environmental Assessment (EA) for the Proposed West Coast Combat Search and Rescue Unit Beddown. In response to your request for assistance in identifying potential issues to be addressed in the EA, NMFS is providing the following comments.

Of the three locations that are being analyzed in the EA, Vandenberg Air Force Base (VAFB) in Lompoc, California, is the only one that has resources of concern to NMFS. Essential Fish Habitat (EFH), as defined in the Magnuson-Stevens Fishery Conservation and Management Act, for the Coastal Pelagics and Pacific Groundfish Fishery Management Plans occurs in the VAFB vicinity. EFH of particular concern to NMFS in the project area are kelp beds, rocky bottom, and seagrasses. In addition, marine mammals protected under the Marine Mammal Protection Act occur in the project vicinity. Moreover, the Federally endangered southern steelhead may utilize creeks in the VAFB area. Therefore, any activities that have the potential to affect these resources should be included in the EA.

If you have any questions related to these comments, please contact Bryant Chesney at (562) 980-4037 or bryant.chesney@noaa.gov .

Sincerely,

Rodney R McInnis

Rodney R. McInnis
Acting Regional Administrator

United States Department of the Interior

U.S. Fish and Wildlife Service
Arizona Ecological Services Field Office
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 242-0210 Fax: (602) 242-2513

In Reply Refer to:

AESO/SE
2-21-96-F-094-R1

December 17, 2001

Mr. Alton Chavis, Chief, Environmental Analysis Branch
HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley Air Force Base, Virginia 23665-2760

Dear Mr. Chavis:

This document transmits the U.S. Fish and Wildlife Service's (Service) comments on your undated proposal to prepare an Environmental Assessment (EA) for the Proposed West Coast Combat Search and Rescue (CSAR) Unit Beddown. The proposed action will include the deployment of 12 HH-60 helicopters, 10 HC-130 fixed wing aircraft, increases in personnel, and on-base construction for one of three proposed west coast bases.

This letter only comments on the potential deployment of the CSAR unit to Davis-Monthan Air Force Base in Tucson, Arizona and the effects of this potential deployment on the Sonoran pronghorn (*Antilocapra americana sonoriensis*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)

Essentially, the Service is concerned about any additional actions that may take place in currently occupied habitat for the Sonoran pronghorn. If the CSAR units come to Arizona, and if they use the Barry M. Goldwater Range (BMGR), we request that the direct and indirect effects of this action be carefully analyzed during the NEPA process. The Air Force should also make a determination as to whether reinitiation will be required pursuant to 50 CFR§402.16 in regard to the recently completed biological opinion on military training at the BMGR authorized or carried out by Luke Air Force Base (Consultation #2-21-96-F-094-R1). Federal actions affecting the Sonoran pronghorn have recently undergone a long, involved, court action that is not yet completed. Any additional Federal actions that occur within Sonoran pronghorn habitat that may affect these animals need to be carefully considered in light of this court case so that our work in the lawsuit is not undone.

The Service appreciates this opportunity to comment on your proposal to prepare the above EA and looks forward to assisting you with any consultations you may request as a result of this action. Please contact Jim Rorabaugh (x238) or Mike Coffeen (x251) if you have further questions.

Sincerely,

Sheryl A. Barrett

for David L. Harlow
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Cabeza Prieta National Wildlife Refuge, Ajo, AZ
Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ
Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ
Regional Solicitor, Department of the Interior, Albuquerque, NM
Mark Stermitz, WMRS, Department of Justice, Washington, D.C.

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Jane Dee Hull
Governor

3033 North Central Avenue • Phoenix, Arizona 85012-2809
(602) 207 2300 • www.adeq.state.az.us

Jacqueline E. Schafer
Director

January 11, 2002

HQ ACC/CEVP
Alton Chavis, Chief
129 Andrews Street, Suite 102
Langley Air Force Base, VA 23665-2769
Attn : Linda DeVine

Dear Mr. Chavis:

I received your letter on December 4, 2001, Subject: Environmental Assessment (EA) for the Proposed West Coast Combat Search and Rescue (CSAR) Unit Beddown. You asked for comments and identification of potential issues to be addressed in an environmental assessment Air Combat Command (ACC) is preparing for the proposed beddown. I have been tasked to reply to your letter for the state government of Arizona. I look forward to collaborating with you to ensure ACC has accurate information concerning this action.

I know you will do a thorough job preparing this assessment and will consider the many issues you usually do. Among the issues you normally evaluate, we are particularly interested in your assessment of water use, hazardous substances and waste management, socio-economic impacts, and changes in air emissions. I would note in regard to the latter that the Tucson area is now in attainment for all criteria air pollutants. Please send future correspondence concerning this beddown to me for response and I will ensure it is distributed to the appropriate agencies within the state government of Arizona. My mailing address is: Richard W. Tobin II, Deputy Director, Arizona Department of Environmental Quality, 3033 N. Central Avenue, Phoenix, AZ 85012. You may reach me by phone at 602-207-2204, or by e-mail at Tobin.Richard@ev.state.az.us.

Sincerely,

Richard W. Tobin II

Richard W. Tobin II
Deputy Director

cc: Jacqueline E. Schafer, Director, ADEQ
Kathi Tees, Governor's Executive Assistant, Environment
Steve Jewett, Director, Governor's Southern Office
Ann Howard, State Historic Preservation Office
John Kennedy, Arizona Game & Fish Department

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

February 11, 2002

Rick Spaulding, Senior Biologist
The Environmental Company, Inc.
1525 State Street, Suite 103
Santa Barbara, California 93101

Subject: Species Lists for the Proposed Establishment of an Active-duty Combat Search and Rescue (CSAR) Unit on the West Coast

Dear Mr. Spaulding:

This letter is in response to your request, dated December 4, 2001, and received in our office on December 5, 2001, for information on federally endangered, threatened or proposed species that may be present at each of the three alternate locations being evaluated for the proposed establishment of an active-duty CSAR unit on the west coast. The Region 2 U.S. Fish and Wildlife Service office in Albuquerque, New Mexico will need to be contacted for information regarding listed species which may be present at Davis-Monthan Air Force Base in Tuscon, Arizona. The other two alternate locations to be evaluated include Edwards Air Force Base in Mojave, California and Vandenberg Air Force Base in Lompoc, California. We have enclosed lists of federally listed and proposed species which may occur within each of these two alternate project locations, depending on the specific habitat present at each site.

The U.S. Fish and Wildlife Service's (Service) responsibilities include administering the Endangered Species Act of 1973, as amended (Act), including sections 7, 9, and 10. Section 9 of the Act prohibits the taking of any federally listed endangered or threatened species. Section 3(18) of the Act defines take to mean to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Service regulations (50 CFR 17.3) define harm to include significant habitat modification or degradation which actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. Harassment is defined by the Service as an intentional or negligent action that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. The Act provides for civil and criminal penalties for the unlawful taking of listed species.

Exemptions to the prohibitions against take may be obtained through coordination with the Service in two ways: through interagency consultation for projects with federal involvement pursuant to section 7 or through the issuance of an incidental take permit under section 10(a)(1)(B) of the Act. If the subject project is to be funded, authorized, or carried out by a federal agency and may affect a listed species, the federal agency must consult with the Service, pursuant to section 7 of the Act. If a proposed project does not involve a federal agency but may result in the take of a listed animal species, the project proponent should apply for an incidental take permit, pursuant to section 10(a)(1)(B) of the Act. We recommend that you review information in the California Department of Fish and Game's Natural Diversity Data Base and that you contact the California Department of Fish and Game at (916) 324-3812 for information on other sensitive species that may occur in these areas.

If you have any questions regarding this letter, please contact Valary Bloom of my staff at (805) 644-1766.

Sincerely,

Cathi Martin

for Diane K. Noda
Field Supervisor

Enclosure

ENDANGERED, THREATENED, AND PROPOSED SPECIES WHICH MAY OCCUR AT EDWARDS AIR FORCE BASE, MOJAVE, CALIFORNIA
(Updated January 1, 2001)

<u>Reptiles</u>		
Desert Tortoise	*Gopherus agassizii*	E

Key:
E - Endangered

ENDANGERED, THREATENED, AND PROPOSED SPECIES WHICH MAY OCCUR AT VANDENBERG AIR FORCE BASE, LOMPOC, CALIFORNIA

(Updated January 1, 2001)

Mammals		
Southern sea otter	*Enhydra lutris nereis*	T
Birds		
California brown pelican	*Pelecanus occidentalis californicus*	E
Bald eagle	*Haliaeetus leucocephalus*	T
Western snowy plover	*Charadrius alexandrinus nivosus*	T
Mountain plover	*Charadrius montanus*	PT
California least tern	*Sterna antillarum browni*	E
Southwestern willow flycatcher	*Empidonax trailii extimus*	E
Amphibians		
California red-legged frog	*Rana aurora draytonii*	T
Fish		
Unarmored threespine stickleback	*Gasterosteus aculeatus williamsoni*	E
Tidewater goby	*Eucyclogobius newberryi*	E
Steelhead trout *	*Oncorhynchus mykiss*	E
Plants		
La Graciosa thistle	*Cirsium loncholepis*	E
Lompoc yerba santa	*Eriodictyon capitatum*	E
Gaviota tarplant	*Hemizonia increscens ssp. villosa*	E
Beach layia	*Layia carnosa*	E
Gambel's watercress	*Rorippa gambellii*	E

Key:

E - Endangered T - Threatened PT- Proposed Threatened

* The National Marine Fisheries Service is the responsible agency for the steelhead.

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE VIRGINIA

30 April 2002

MEMORANDUM FOR: ALL INTERESTED GOVERNMENT AGENCIES, INDIVIDUALS, ORGANIZATIONS, AND PUBLIC AND ACADEMIC REFERENCE LIBRARIES

FROM: HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley AFB, VA 23665-2769

SUBJECT: Draft Environmental Assessment (EA) for the West Coast Combat Search and Rescue (CSAR) Beddown

1. We are pleased to provide you with the Draft EA and Draft Finding of No Significant Impact (FONSI) for the proposed establishment of a CSAR unit on the West Coast. This EA analyzes impacts from the proposed beddown of 12 HH-60 helicopters and 10 HC-130 fixed wing aircraft and associated personnel, as well as establishment of a Combat Rescue Officer (CRO)-led unit of pararescue personnel and Survival, Evasion, Resistance, and Escape (SERE) specialists. The proposed beddown location is Davis-Monthan Air Force Base (AFB), Arizona, with training in portions of the Barry M. Goldwater Range, Jackal Low Military Operations Area (MOA), Sells Low MOA, and Fort Huachuca, Arizona. Alternatives analyzed include beddown at Edwards AFB, California, and Vandenberg AFB, California, and their associated airspace. Under the Proposed Action and each alternative, on-base building renovation and construction would be required and use of the Naval Air Station North Island's overwater training area off the coast of San Diego, California, would be needed for training. This action would establish the CSAR assets required to more adequately support the need to provide worldwide, deployable long-range combat search and rescue of downed aircrew members. The document is provided in compliance with the regulations of the President's Council on Environmental Quality.

2. Libraries are requested to file this document for public access and reference.

3. All comments must be received at the below address before close of business, May 30, 2002.

HQ ACC/CEVP
Attn: Ms. Linda DeVine
129 Andrews Street, Suite 102
Langley AFB, VA 23665-2769

Alton Chavis

ALTON CHAVIS
Chief, Environmental Analysis Branch

Attachment: Draft EA

Distribution List: CSAR West Draft EA

US Fish and Wildlife Service, Ecological Services
David Harlow
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4915

Los Angeles Public Library
601 W. Lancaster Blvd.
Lancaster, CA 93534

Kern County Library: Wanda Kirk Branch
3611 Rosamond Blvd
Rosamond, CA 93560
661-256-3236

Kern County Library
16916 State Hwy 14
Mojave, CA 93501

Frank C. Roberts, Mayor
44933 N. Fern Avenue
Lancaster, CA 93534

Dick DeWees, Mayor
100 Civic Center Plaza
P.O. Box 8001
Lompoc, CA 93438

John Patton, Director
Planning & Development
123 E. Anapamu St.
Santa Barbara, CA 93101

Ms. Terry Roberts
Chief, California State Clearinghouse
Office of Planning and Research
1400 Tenth St.
Sacramento, California 95814

USFWS, Ecological Services
Diane Noda, Field Supervisor
2493 Portola Rd, Suite B
Ventura, CA 93003

Bureau of Indian Affairs
Sacramento Area Office
2800 Cottage Way
Sacramento, California 95825

Charlie Barr, Program Manager
Ocean Conservancy
1432 N. Great Neck Rd., Suite 103
Virginia Beach, VA 23454

Marco Ganzalez, Director
San Diego Surfriders
PO Box 1511
Solana Beach, CA 92075

Kern County Library
9507 California Blvd
California City, CA 93505

Brian Ludicke
Planning Director
44933 N. Fern Avenue
Lancaster, CA 93534

City of Coronado Public Library
640 Orange Avenue
Coronado, CA 92118

Lompoc City of Libraries
501 East North Avenue
Lompoc, CA 93436

Arlene Pelster
City of Lompoc
100 Civic Center Plaza
Lompoc, CA 93438

California Department of Parks and Recreation
Office of Historic Preservation
P.O. Box 942896
Sacramento, CA 94296-0001

California Coastal Commission
James Raives
45 Fremont St., Suite 2000
San Francisco, CA 94105

National Marine Fisheries Service, Protected Resources
Mr. Jim Lecky, Asst. Regional Administrator
501 West Ocean Boulevard, Suite 4200
Long Beach, CA 90802-4213

Headquarters Office
Robert C. Hight, Director
California Department of Fish and Game
1416 Ninth Street
Sacramento, California 95814

Sarah Adams, Program Manager
I Love a Clean San Diego
4355 Ruffin Rd, Suite 118
San Diego, CA 92123

Distribution List: CSAR West Draft EA

HQ ACC/CEVP (Ms Linda DeVine)
11817 Canon Blvd, Suite 213
Newport News VA 23606-2558

HQ ACC/XPX (Mr. Creasy/Maj Mahn/Maj Plass)
204 Dodd Blvd, Suite 331
Langley AFB, VA 23665-2778

HQ ACC/JAV (Col Andersen)
114 Douglas St, Suite 114
Langley AFB VA 23665-2774

HQ ACC/DORA (Mr. Ed Odom)
114 Thompson Street. Room 105
Langley AFB VA 23665-2789

HQ ACC/DOTO (SMSgt Fleck)
204 Dodd Blvd, Suite 101
Langley AFB VA 23665-2789

HQ AETC/CEVN (Ms Marion Erwin)
266 F Street W.
Randolph AFB, TX 78150

Maj. Daniel Garcia
Chief, Environmental Science Mgmt.
56th Range Management Office
7224 N. 139th Dr.
Luke AFB, AZ 85309-1420

Mr. Jim John
Operations Department, Building 516
NAS North Island
San Diego, CA 92135-7035

City of Tucson
Office of Environmental Management
201 N. Stone, Suite 215
Tucson, AZ 85726-7210

Bob Walkup, Mayor
City Hall
255 West Alameda Street
Tucson, Arizona 85701

Tucson-Pima Public Library
Main Library
101 N. Stone Ave.,
Tucson, AZ 85701

Mr. Richard W. Tobin
Deputy Director, Arizona DEQ
3033 North Central Avenue, M0801A
Phoenix, Arizona 85012-2809

Arizona Game & Fish Department
Duane L. Shroufe, Director
2221 W. Greenway Rd.
Phoenix, AZ 85023-4399

355 CES/CEVA (Dr. CW Miller)
5285 E. Madera, Rm 216
Davis-Monthan AFB, AZ 85707

30 CES/CEV (Mr Jim Johnston)
806 13th Street, Suite 116
Vandenberg AFB, CA 93437

HQ AFSPC/CEVP (Robert J. Novak)
Environmental Program Manager
150 Vandenberg St, Suite 1105
Peterson AFB, CO 80914-2370

AFFTC/EM (Mr Keith Dyas)
5 East Popson Ave., Bldg 2650A
Edwards AFB, CA 93524

56 RMO/ESMP (Ms. Lisa McCarrick)
6605 N. 140 Drive
Luke AFB, AZ 85309

HQ AFMC/CEVQ (Ms Teresa Fink)
4375 Chidlaw Rd., Suite 6
Wright-Patterson AFB, OH 45433

Mr. Ron Pearce
Range Management Dept.
Bldg 1756
Co. 13th St.
MCAS Yuma, AZ 85369-9134

ACC/PAM (2d Lt Michael Meredith)
115 Thompson St, Ste 211
Langley AFB, VA, 23665-1987

Field Services Manager
Pima County Department of Environmental Quality
130 W. Congress St.
Tucson, AZ 85701

Yuma County Library-Main Branch
350 Third Avenue
Yuma, Arizona 85364

Maricopa County Library
202 N. Euclid
Gila Bend, Arizona 85337

Diana Walls
State Historic Preservation Office
Arizona State Parks
1300 W. Washington
Phoenix, AZ 85007

Tohono O'Odham Reservation
Research and Planning Department
P.O. Box 837
Sells, AZ 85634

NEWSPAPER ADVERTISEMENT LIST FOR THE

CSAR – WEST BEDDOWN DRAFT EA

APRIL 30, 2002

ARIZONA
Arizona Daily Star – Tucson
Arizona Republic – Phoenix

CALIFORNIA
Antelope Valley Press – Palmdale, Lancaster
Desert Dispatch – Barstow
Mojave Desert News – Mojave
San Diego Union-Tribune – San Diego
Santa Barbara News Press – Santa Barbara
The Daily Independent – Ridgecrest

AIR FORCE SEEKS COMMENT ON ENVIRONMENTAL ANALYSIS

The Air Force invites public review and comment on a Draft Environmental Assessment (EA) that examines the establishment of a Combat Search and Rescue unit in the western U.S. The Draft EA examines the establishment of a unit of more than 1,000 personnel, 12 HH-60 helicopters, and 10 HC-130 fixed wing aircraft at Davis-Monthan AFB, Ariz. The EA also looked at 2 alternative bases: Edwards and Vandenberg AFBs, CA. The proposal includes the use of an existing water training area off the coast of San Diego, CA.

The Draft EA is available at the following library: City of Coronado Public Library, Coronado, CA. The Draft EA is also available on the World Wide Web at http://www.cevp.com. A hard copy may be requested from Linda DeVine at Headquarters, Air Combat Command at (757) 764-9434. The public comment period ends on May 31. Comments should be mailed to: HQ ACC/CEVP (CSAR), 129 Andrews Street, Suite 102, Langley AFB VA 23665-2769. For more information, please contact the ACC Public Affairs Office at (757) 764-5007 or e-mail acc.pam@langley.af.mil. 36517 · 04/30/02

Henry M. Salisbury
[redacted]

Linda DeVine
Headquarters, Air Combat Command
HQ ACC/CEVP (CSAR),
129 Andrews Street, Suite 102,
Langley AFB VA 23665-2769

April 30, 2002

Dear Sirs;

I am responding to your request for comments on an environmental analysis posted in the local paper. A copy is provided below.

I am a retired aerospace reliability engineer that has worked on several Air Force Weapon Systems design and development programs subcontracted to General Dynamics, Raytheon, and Textron. I retired from General Dynamics in 1987, and continued work on Reliability programs for weapon system contractors until 1990.

In 1995 I responded to a request for comments on a proposed environmental analysis for a Department of Energy proposal for modification and continued operation of a nuclear fusion program (DIII-D Facility) at General Atoms, La Jolla, CA)

I also responded to a request for comments and participation in a citizen's review board for the San Diego Naval Base. The citizen's review board provided comments on the Navy's activities to repair and correct environmental problems that had accumulated over the years. I was on that board while I still lived in Chula Vista, CA, as an interested neighbor to the base. I later resigned from the review board when I moved north about 50 miles to Vista, Ca

I am not affiliated with any private or government contractor or agency. I am only a bored retired engineer interested in any activity that might utilize some of my many years of technical experience.

I am not directly familiar with Davis-Monthan AFB, Arizona. However I am familiar with Edwards and Vandenberg AFBs, CA. I am also familiar with the coastal areas of San Diego County.

I would welcome receiving a copy of the Draft Environmental Assessment to review it and provide any comments that I might feel would be helpful to the preparation of the final environmental impact report.

Sincerely,
Henry M. Salisbury
Henry M. Salisbury

AIR FORCE SEEKS COMMENT ON ENVIRONMENTAL ANALYSIS

The Air Force invites public review and comment on a Draft Environmental Assessment (EA) that examines the establishment of a Combat Search and Rescue unit in the western U.S. The Draft EA examines the establishment of a unit of more than 1,000 personnel, 12 HH-60 helicopters, and 10 HC-130 fixed wing aircraft at Davis-Monthan AFB, Ariz. The EA also looked at 2 alternative bases: Edwards and Vandenberg AFBs, CA. The proposal includes the use of an existing water training area off the coast of San Diego, CA.

The Draft EA is available at the following library: City of Coronado Public Library, Coronado, CA. The Draft EA is also available on the World Wide Web at http://www.cevp.com. A hard copy may be requested from Linda DeVine at Headquarters, Air Combat Command at (757) 764-9434. The public comment period ends on May 31. Comments should be mailed to: HQ ACC/CEVP (CSAR), 129 Andrews Street, Suite 102, Langley AFB VA 23665-2769. For more information, please contact the ACC Public Affairs Office at (757) 764-5007 or e-mail acc.pam@langley.af.mil. 36517 · 04/30/02

DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

8 May 2002

Major Daniel F. Garcia
Chief, Environmental Science Management
56th Range Management Office
7224 N 139 Dr
Luke AFB AZ 85309-1420

Mr. David L. Harlow
US Fish and Wildlife Service
Arizona Ecological Services
2321 W. Royal Palm Road, Suite 103
Phoenix, AZ 85021-4951

Subject: West Coast Combat Search and Rescue Beddown

Dear Mr. Harlow:

The Air Force requests informal consultation in accordance with Section 7 of the Endangered Species Act for the proposed beddown of the West Coast Combat Search and Rescue (CSAR). The proposed action would base the full complement of aircraft and personnel at Davis-Monthan AFB, and flight operations would be conducted in the Jackal Military Operating Area (MOA) northeast of Tucson, the Low Altitude Tactical Navigation (LATN) area and Sells MOA west of Tucson, and on portions of the Barry M. Goldwater Range (BMGR). The draft environmental assessment was provided to you on under separate cover letter (dated 30 April 2002) from HQ Air Combat Command.

Most flight activity on BMGR-East would be limited to the East Tactical Range (ETAC); other areas would generally be used when ETAC is not available. This proposed action would not change the military mission and management practices as described in the November 16, 2001 biological opinion (Consultation No. 2-21-96-F-094-R1).

The proposed action on BMGR and in the Sells MOA and LATN area may overlap the known or potential ranges of three endangered species: Sonoran pronghorn (*Antilocapra americana sonoriensis*), lesser long-nosed bat *(Leptonycteris curasoae yerbabuenae*) and cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*). Of these, the pronghorn does not occupy ETAC, and our surveys for pygmy-owls over the past several years have not resulted in any detections on BMGR. The lesser long-nosed bat may forage over parts of the area on a seasonal basis.

The proposed action includes flight activity in the Jackal Low MOA, portions of which overlie the range of the endangered Mt. Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*) and the threatened Mexican spotted owl (*Strix occidentalis lucida*). Overall, there would be no significant effect on special-status species because aircraft operations and noise levels within affected airspace units would not significantly increase over existing levels.

The Sonoran pronghorn may be affected when areas of BMGR other than ETAC are used for this proposed action. Possible effects of the proposed action include exposure to rotary-wing and fixed-wing overflights, plus small arms fire, smoke, chaff, and flares. Live fire at existing targets would be conducted in compliance with existing practices as described in the biological opinion.

Even with this additional mission, the total number of sorties flown on the range would likely not exceed the numbers specified in the biological opinion (61,895 sorties in airspace blocks R-2301E, R-2304, and R-2305). Furthermore, it is anticipated that the flying schedule for ETAC can absorb the additional usage without displacing other missions to the North or South Tactical Ranges.

Given the above discussion, we request your concurrence that the proposed action will not affect the lesser long-nosed bat, cactus ferruginous pygmy-owl, Mexican spotted owl, and Mt. Graham red squirrel, and may effect but is not likely to adversely affect Sonoran pronghorn. If you have any questions or need more information, please contact Ms. Betsy Wirt at (623) 856-3823 ext. 259, fax (623) 856-8409.

Sincerely

//signed//
DANIEL F. GARCIA, Major, USAF

Henry M. Salisbury

[redacted]

HQ ACC/CEVP
Attn: Ms Linda DeVine
129 Andrews Street, Suite 102,
Langley AFB VA 23665-2769

May 13,2002

Subject: Comments after review of "Draft Environmental Assessment for the West Coast Combat Search and Rescue Beddown" dated April 2002.
1. This review has been made as a result of the Air Force inviting public review and comment on the above subject document.
2. This reviewer is not affiliated with any private or government contractor or agency. The opportunity to review this document provided an activity that utilized years of pre-retirement technical experience.
3. Comments refer to specific pages and lines of text in the document in review, when applicable.

Comments:

There was little reference to the potential need for increased automotive traffic control in the area of Davis-Monthan AFB. Is the local community happy with the current traffic situation? Is there already a significant indication of a need for improved or expanded capability to handle traffic in the area of the air base? 1

No mention was made of any potential impact on electronic communications, such as wireless phone services, television, and other commercial wireless communications that could be impacted by the special wireless communications required for Combat Search And Rescue training.

Is there any potential impact on scientific activity such as astronomy that could be impacted by the addition of additional lighting for Combat Search and Rescue activities at the airforce base, or at the planned military operations area?

While living on the seacoast of Imperial Beach in 1983 the activity at the water training area A1 was observed from the beach area at an altitude of about 30 feet above sea level (using binoculars). At the time, the lights of aircraft and training operations using parachute flares and lightsticks and in the daytime the hovering of aircraft in that area was observable but was a complete mystery about what was going on.

The area near the water training area, is relatively close to the Mexican border, and to the Imperial Beach Naval Reserve Base (see figure 2-6 Water Training area).

Illegal drug traffic and illegal immigrant border crossing in this corner of the coast and Mexican border could require some coordination with the border patrol and coast guard. Traffic in drugs and illegal immigrants may try to bypass the border patrol by entering the sea west of Mexico and traveling by sea into United States territory. Small boats, swimmers, sailboats, wind surfers, and kayaks along with fishing boats are not uncommon vehicles used for such illegal activity. Such illegal activity may occasionally be in progress in the area just east of the Water Training Area A1 and A2. With the indicated schedule for annual sortie-operations within the Water Training Area, there may be an occasional sighting of such illegal activity.

The Water Test Area operations would include use of facilities at Naval Air Station North Island (see page 2-14 line 7). Would there be any impact on North Island facilities and support by this activity? After all about 575 sorties are to make use of these facilities and services. 2

Comment Responses

1. No off-base transportation impacts are anticipated since traffic flow is not a problem. See Section 4.15.1.1 Transportation, Personnel Increases.

2. NAS North Island supports TDY aircraft and personnel on a routine basis, and facilities and ramp space are available within their existing capability to support this proposed action. See Section 2.2.1.5 Affected Airspace, WTA Operations.

What are the details of the Imperial Beach Ground control that provides flight following and monitoring for Water Training Area operations? Is there any significant impact on this facility and services? (See page 2-14 line 6). 3

General Comments:

The Draft Environmental assessment for the West Coast Combat Search and Rescue Beddown, is an impressive document. It seemed to cover every aspect of environmental impact in a detailed and technically impressive manner.

Appendix A: Aircraft Noise Analysis presented a very comprehensive scientific background for understanding the lack of important environmental impact due to noise.

Appendix B: Airspace provided good technical information about flight profiles and class A through G, FAA Airspace Classifications.

Some persons will claim problems with noise from nearby flight operations. The same persons tend to ignore nearby truck and local automotive traffic noise. Such claims should be considered frivolous. The same problem is true for air pollution. Aircraft operations will often get complaints about air pollution, while nearby truck, automotive, and upwind industrial air pollution is relatively ignored.

The opportunity to read and comment on this document is appreciated. The document is educational and interesting. It will be retained as an important item of technical data for future reference. It was a challenge to find some item of environmental impact that might have been overlooked.

Sincerely
Henry M. Salisbury
Henry M. Salisbury

Comment Responses

3. The airspace surrounding the WTA is uncontrolled airspace and is located on the western edge of Imperial Beach Ground Control Radar coverage. Aircraft flying in this area follow established see-and-avoid procedures for VFR uncontrolled airspace. Imperial Beach Ground Control provides flight monitoring for military aircraft using this area via radio reporting. Military aircraft provide a radio check-in when entering the area and an operations normal radio report to Imperial Beach Ground Control every 30 minutes until they leave the area. Imperial Beach Control does not provide any other service for normal aircraft operations. There would be no impact to the work load or schedule on this facility or their current services. See Section 2.2.1.5 Affected Airspace, WTA Operations.

S.H.P.O.- 2001 - 3088 (11127)

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE VIRGINIA

Rec'd

13 MAY 2002

MEMORANDUM FOR Arizona State Historic Preservation Office
(Ms Diana Walls)
Arizona State Parks
1300 W. Washington
Phoenix AZ 85007

MAY 15 2002
5/16/02

FROM: HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley AFB VA 23665-2769

SUBJECT: Draft Environmental Assessment (EA) for the West Coast Combat Search and Rescue (CSAR) Beddown

1. We are pleased to provide you with the Draft EA and Draft Finding of No Significant Impact (FONSI) for the proposed beddown of a CSAR unit at Davis-Monthan AFB in Tucson, Arizona. This EA analyzes impacts from the proposed beddown of 12 HH-60 helicopters and 10 HC-130 fixed wing aircraft and associated personnel, as well as establishment of a Combat Rescue Officer (CRO)-led unit of pararescue personnel and Survival, Evasion, Resistance, and Escape (SERE) specialists. Beddown at Davis Monthan AFB requires renovation and demolition of existing building as well as new construction.

2. The information gathered for this EA indicates that no historic properties are located in or near the project area. A minor increase in aircraft activity would occur in portions of the Barry M. Goldwater Range, Jackal Low Military Operations Area (MOA), Sells Low MOA, and at Fort Huachuca, Arizona, however, no new ranges or airspace would be proposed.

3. In accordance with 36 CFR 800.4(d)(1), we request your concurrence with the Air Force's determination that the proposed CSAR beddown action will have no effect on historic properties. Please provide comments on this matter to Ms. Linda DeVine, HQ ACC/CEVP, CSAR Project Manager, 129 Andrews Street, Suite 102, Langley AFB VA 23665-2769. Ms. DeVine may be reached at (757) 764-9434.

This NEPA submittal does not constitute consultation under Section 106 of the National Hist. Preservation Act. Provisions at 36 CFR Part 800.8 must be followed in order for this Office to accept NEPA documentation as Section 106 compliance consultation.

Alton Chavis
ALTON CHAVIS
Chief, Environmental Analysis Branch

Attachment
Draft EA and FONSI

Jim G. Howard
AZ SHPO 6/10/02

Global Power For America

CALIFORNIA COASTAL COMMISSION
45 FREMONT STREET, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE AND TDD (415) 904-5200

May 20, 2002

Alton Chavis
Chief, Environmental Analysis Branch
Department of the Air Force
Headquarters Air Combat Command
ATTN: Linda DeVine
129 Andrews Street, Suite 102
Langley AFB, VA 23665-2769

Subject: Consistency Determination CD-033-02 (Proposed Combat Search and Rescue Operations off the coast of San Diego, CA).

Dear Mr. Chavis:

Pursuant to 15 CFR Section 930.41(b), I am hereby requesting the automatic 15-day extension to the 60-day time limit for Commission review of the above-referenced consistency determination. This will extend our deadline from June 30, 2002, to July 15, 2002, and allow us to schedule this item at the Commission's July 9-12, meeting in Huntington Beach (Orange County).

Thank you for your cooperation and please contact me at (415) 904-5288 if you have any questions regarding this matter.

Sincerely,

LARRY Simon

Larry Simon
Coastal Program Analyst

The Good Guys at
Kalil Bottling Co.
50th Anniversary

KALIL BOTTLING CO.
P.O. Box 26888 / Tucson, Arizona 85726-6888 / (520) 624-1788

May 22, 2002

HQ ACC/CEVP (CSAR)
129 Andrews St. Suite 102
Langley AFB, VA 23665-27569

Dear Sirs:

I am very familiar with Davis Monthan and I am very happy with everything that they do for the community.

I would be delighted to see the plan to base a search and-rescue team go into effect at Davis Monthan Air Force Base that would increase flights from the base by 14 percent yearly.

Sincerely,

George Kalil

George Kalil
President

GK/dc

CITY OF CORONADO
COMMUNITY DEVELOPMENT

1825 STRAND WAY
CORONADO, CALIFORNIA 92118
E-MAIL: COMDEV@CORONADO.CA.US

CITY HALL
PHONE: (619) 522-7326
FAX: (619) 435-6009

May 23, 2002

HQ ACC/CEVP
Attn: Ms. Linda DeVine
129 Andrews Street, Suite 102
Langley AFB, VA 23665-2769

Dear Ms. DeVine:

I appreciate this opportunity to comment on behalf of the City of Coronado on your "Draft Environmental Assessment (EA) for the West Coast Combat Search and Rescue (CSAR) Beddown". Coronado is supportive of the training that you propose to undertake. I also wish to take this opportunity to thank you for arranging today's briefing on this subject by Lt. Col. Dunn. His explanation of the project helped clarify some points that warrant further exposition in the EA. Based on this briefing and the EA material, it is my understanding that the project would have no significant impact on Coronado, wildlife or the ocean environment. The occasional addition of 15 to 30 personnel and two helicopters to the operations on Naval Air Station North Island (NASNI), or of a less than 1% increase in the sea rescue drills conducted off of Imperial Beach are not expected to significantly impact Coronado residents. These flights, total about 500 per year, and conducted in perhaps 50 or so two or three day periods, will likely be indistinguishable from present military operations in the area.

The City recommends that the EA be augmented by the information provided the City in today's briefing to assure that the EA adequately addresses issues of concern to its citizens. The traversing of the City by military aircraft to reach either NASNI or the Water Training Areas (WTA) should be further detailed. 4 The level of additional activity that will occur on NASNI should be detailed, and how this activity will not significantly affect aircraft, truck and personal vehicle traffic to the base. 5 City traffic congestion, air or noise pollution, et cetera. 6 The document should note that the project would not generate a significant number of new flights near to Coronado, and that therefore air or noise pollution, safety concerns, et cetera, will not impact Coronado. Finally, the document should note that not only will the type of usage of the WTA be unchanged, the amount of usage of these areas will increase by less than 1%.

Please feel free to contact Senior Planner Ed Kleeman at (619) 522-7329 if you have any questions concerning the City's comments.

Sincerely,

Tony A. Pena

Tony Pena
Director of Community Development

cc: Mark Ochenduszko, City Manager

I:CD GENERAL Letters&Memos Memos&Ltrs from DirCD CSAR Beddown Env Assesment 052302.doc

Comment Responses

4. See Description of Proposed Action and Alternatives, Section 2.2.1.5 Affected Airspace, Table 2.3-6 for list of baseline and proposed HH-60 and HC-130 annual sortie-operations within the affected airspace.

5. See Airspace Section 4.1.1.3 WTA for a detailed description of the airspace surrounding the region. With a relatively small number of proposed annual sortie-operations and low VFR flight profiles in the WTA, the Proposed Action would not create a significant impact to current or foreseeable future airspace use.

6. See Noise, Section 4.2.1.2; Air Quality, Section 4.3.1.3; and Transportation, Section 4.15 for a detailed description of Noise, Air Quality, and Transportation impacts that would occur on NAS North Island, respectively.

STATE OF CALIFORNIA
Governor's Office of Planning and Research
State Clearinghouse

Gray Davis
GOVERNOR

Tal Finney
INTERIM DIRECTOR

ACKNOWLEDGEMENT OF RECEIPT

DATE: May 23, 2002

TO: Linda DeVine
U.S. Air Force, HQ ACC/CEVP
11817 Canon Blvd., Suite 213
Newport News, VA 23606

RE: West Coast Combat Search and Rescue Beddown
SCH#: 2002054002

This is to acknowledge that the State Clearinghouse has received your environmental document for state review. The review period assigned by the State Clearinghouse is:

Review Start Date: May 1, 2002
Review End Date: May 30, 2002

We have distributed your document to the following agencies and departments:

Air Resources Board, Airport Projects
California Coastal Commission
Caltrans, District 7
Caltrans, Division of Aeronautics
Department of Boating and Waterways
Department of Fish and Game, Marine Region
Department of Fish and Game, Region 5
Department of Parks and Recreation
Native American Heritage Commission
Office of Historic Preservation
Regional Water Quality Control Board, Region 9
Resources Agency
State Lands Commission
State Water Resources Control Board, Division of Water Quality

The State Clearinghouse will provide a closing letter with any state agency comments to your attention on the date following the close of the review period.

Thank you for your participation in the State Clearinghouse review process.

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
916-445-0613 FAX 916-323-3018 www.opr.ca.gov

Jane Dee Hull
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

3033 North Central Avenue • Phoenix, Arizona 85012-2809
(602) 207-2300 • www.adeq.state.az.us

Jacqueline E. Schafer
Director

May 29, 2002

Alton Chavis, Chief
Environmental Analysis Branch
HQ ACC/CEVP
129 Andrews Street, Suite 102
Langley AFB VA 23665-2769
Attn: Ms. Linda DeVine

Subject: Draft Environmental Assessment for the West Coast Combat Search and Rescue Beddown

Dear Mr. Chavis:

The State of Arizona has reviewed the draft Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) for the proposed establishment of a Combat Search and Rescue Unit on the West Coast. The draft EA analyzes the impact from the proposed beddown of 12 HH-60 helicopters and 10 HC-130 fixed wing aircraft and associated personnel, as well as establishment of a Combat Rescue Officer-led unit of pararescue personnel and Survival, Evasion, Resistance, and Escape specialists. The proposed beddown location is Davis-Monthan Air Force Base, Arizona, with training in portions of the Barry M. Goldwater Range (BMGR), Jackal Low Military Operations Area (MOA), Sells Low MOA, and Fort Huachuca, Arizona. After a thorough review, Arizona finds this to be a clear and well-done review and is supportive of the assessment and of the action.

When we received the draft EA, we found several inaccuracies in sections 3.3 Air Quality and 4.3 Air Quality. However, after notifying your consultants at The Environmental Company, Inc., of our concerns they immediately corrected the inaccuracies and redid their analysis. They forwarded substitute pages, which they said would be included in the final EA, to me. This review is of the draft EA with those substitute pages.

We find implementation of the proposed action at Davis-Monthan AFB would result in long-term increases in stationary and mobile source emissions. However, we concur that these emissions would not produce long-term air quality degradation. It is our understanding that this action is not subject to State rule R18-2-1438, General Conformity for Federal Actions, which incorporates by reference subpart 40 CFR 93, Determining Conformity of Federal Actions to State or Federal Implementation plans, since the proposed action would not exceed *de minimis* levels for the Pima County CO Maintenance Area and the Yuma PM_{10} Moderate Nonattainment

HQ QCC/CEDVP
Attn: Ms. Linda DeVine
Page Two
May 22, 2002

Area. There is no evidence that sortie-operations within the Sells Low MOA, Jackal Low MOA, 305 East and West Low Altitude Tactical Navigation areas, portions of BMGR and associated Restricted Areas, and the Yuma Tactical Aircrew Combat Training System Range will threaten the current status of those areas. Implementation of the proposed action will have no adverse impacts on the environmental restoration activities at Davis-Monthan AFB. The depth to groundwater is 350 feet beneath the ground surface, and the proposed construction activities will have no significant impact on groundwater resources. While increased hazardous wastes will be generated, we agree that such wastes can be managed adequately by current TSD facilities at Davis-Monthan AFB.

The other issues mentioned in our letter of January 11, 2002, have been adequately addressed.

We thank you for this opportunity to comment on the draft EA, and request that you forward to this office two copies of the Final EA and FONSI. If you need to contact me, I may be reached by phone at (602) 207-2204, or by e-mail at Tobin.Richard@ev.state.az.us. The Department of Environmental Quality is moving July 1, 2002, and any correspondence after that date should be directed to:

Richard W. Tobin II, Deputy Director
Arizona Department of Environmental Quality
1110 W. Washington Street
Phoenix, AZ 85007
Phone: 602-771-2204
Fax: 602-771-2218

Sincerely,

Richard W. Tobin II

Richard W. Tobin II
Deputy Director

cc: Jacqueline E. Schafer, Director, ADEQ
Kathi Tees, Governor's Executive Assistant, Environment
Steve Jewett, Director, Governor's Southern Office
Ann Howard, State Historic Preservation Office
John Kennedy, Arizona Game & Fish Department

The City of Imperial Beach

(619) 628-1356
FAX: (619) 429-9770

COMMUNITY DEVELOPMENT DEPARTMENT
825 IMPERIAL BEACH BOULEVARD • IMPERIAL BEACH, CALIFORNIA 91932

May 29, 2002

LTC Gregory M. Perkinson, USAF
Air Combat Command (ACC) Environmental Leadership Board
129 Andrews Street, Suite 102
Langley Air Force Base, VA 23665-2760

RE: Environmental Assessment (EA) for the West Coast Combat Search and Rescue (CSAR) Beddown

Dear Colonel Perkinson:

The City of Imperial Beach was not a recipient of the draft EA. From the information provided from a briefing by LTC Bob Dunn of Davis-Monthan (D-M) Air Force Base (AFB) on May 23, 2002 at the Coronado City Hall and from the information provided on the website at http://www.cevp.com/docs/EA/CSAR_DRAFT_EA/CSAR_DRAFT_EA.pdf, the City's understanding of the proposal is for the establishment of an active duty Western U.S. Combat Search and Rescue (CSAR) Beddown unit at Davis-Monthan (D-M) Air Force Base (AFB) in Tucson, Arizona. Currently the only fully-complemented active duty USAF CSAR unit is located at Moody AFB, Georgia.

The 305 Rescue Squadron (RQS) of the Air Force Reserve (AFRES) at D-M has been conducting water training operations for years in the Imperial Beach Water Training Area (WTA), which is about two to eight miles from our city's coastline. They have been operating from North Island for three-night stays per visit with the use of four helicopters and tanker aircraft. The transport of personnel from Arizona for water operations has been by automobile, truck, or helicopters flying over Otay Mountain, up San Diego Bay to North Island (to minimize conflicts with fixed wing flight paths).

The establishment of CSAR at D-M would add 1,059 personnel to the existing 8,710 personnel and an increase from 5 HH-60 helicopters to 17 (with one backup inventory) and from no HC-130 tanker/Pararescue Jumper (PJ) transports to 10 (with one backup inventory), in addition to the expansion of facilities at D-M. The water training operations will continue to be conducted from North Island. On occasion, there may be a need to land briefly at the Imperial Beach Naval Outlying Landing (Ream) Field during the training to change crews. In the last few years, 7
we understand that this has not been necessary. The preference of the USAF is to operate far from the lights of the city (which would be further west than WTA A1 and A2) to increase the effectiveness of their night vision equipment.

Comment Responses

7. Use of Naval Outlying (Ream) Field is not part of the Proposed Action; see Description of Proposed Action and Alternatives, Section 2.2.1.5 Affected Airspace, WTA Operations.

The EA identifies two other locations for the CSAR unit: Alternative A at Edwards AFB and Alternative B at Vandenberg AFB. Potentially significant impacts to air quality could occur with implementation of either of these alternatives. Both of these alternatives include the Imperial Beach WTA as a part of the training operations.

The EA should include the existing number of flight operations and the proposed increase in flight operations not only at North Island but at the Imperial Beach Naval Outlying Landing Field. This information should be included in order to conclude that de minis impacts would result and support the Finding of No Significant Impact (FONSI). The City Of Imperial Beach has been and remains opposed to increases in air operations at the Imperial Beach Naval Outlying Landing (Ream) Field due to the noise impacts. Please advise us if our understanding of the proposal and its impacts are incorrect. 7

You may contact Imperial Beach City Planner, Jim Nakagawa, at 619-628-1355 or myself at 619-628-1354 if you have any questions.

Sincerely,

Greg Wade
Community Development Director

GW:JAN

c: file
R. Matt Rodriguez, Interim City Manager
Environmental Company, Inc., 115 West Plaza Street, Solana Beach, CA 92075
Ed Kleeman, Senior Planner, City of Coronado, 1825 Strand Way, Coronado, CA 92118

Comment Responses

7. Use of Naval Outlying (Ream) Field is not part of the Proposed Action; see Description of Proposed Action and Alternatives, Section 2.2.1.5 Affected Airspace, WTA Operations.

STATE OF CALIFORNIA
Governor's Office of Planning and Research
State Clearinghouse

Gray Davis
GOVERNOR

Tal Finney
INTERIM DIRECTOR

May 31, 2002

Linda DeVine
U.S. Air Force, HQ ACC/CEVP
11817 Canon Blvd., Suite 213
Newport News, VA 23606

Subject: West Coast Combat Search and Rescue Beddown
SCH#: 2002054002

Dear Linda DeVine:

The State Clearinghouse submitted the above named Environmental Assessment to selected state agencies for review. The review period closed on May 30, 2002, and no state agencies submitted comments by that date. This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act.

Please call the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process. If you have a question about the above-named project, please refer to the ten-digit State Clearinghouse number when contacting this office.

Sincerely,

Terry Roberts

Terry Roberts
Director, State Clearinghouse

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
916-445-0613 FAX 916-323-3018 www.opr.ca.gov

Document Details Report
State Clearinghouse Data Base

SCH# **2002054002**
Project Title West Coast Combat Search and Rescue Beddown
Lead Agency U.S. Air Force

Type **EA** Environmental Assessment

Description The United States Air Force (Air Force), Headquarters Air Combat Command proposes to establish a full complement of Combat Search and Rescue (CSAR) assets at Davis-Monthan Air Force Base (AFB), AZ. The proposed CSAR unit would include 3 squadrons: HC-130 fixed-wing aircraft squadron; HH-60 helicopter squadron; and a Combat-Rescue Officer (CRO)-led squadron that would include CROs, Pararescue Jumpers (PJs), and Survival, Evasion, Resistance, and Escape (SERE) specialists. The Air Force needs more CSAR assets to adequately support worldwide, deployable long-range combat search and rescue of downed aircrew members. The proposed action would begin in the fall of 2002 and the beddown would be completed by 2007. The action would add 12 HH-160 helicopters, 10 HC-130 fixed-wing aircraft, and 1,059 personnel to Davis-Monthan AFB. Building renovations and construction would be necessary to support the beddown. Training would occur in Low Altitude Tactical Navigation areas; portions of the Barry M. Goldwater Range (BMGR), and the Yuma Tactical Aircrew Combat Training System Range, and their associated restricted airspace; Jackal Low Military Operations Area (MOA); Sells Low MOA; and the Naval Air Station North Island Water Training Area off the coast of San Diego, CA. No changes to airspace structure, management, or scheduling are proposed.

Lead Agency Contact

Name Linda DeVine
Agency U.S. Air Force, HQ ACC/CEVP
Phone 757-764-9434 ***Fax***
email
Address 11817 Canon Blvd., Suite 213
City Newport News ***State*** VA ***Zip*** 23606

Project Location

County San Diego
City Coronado
Region
Cross Streets
Parcel No.
Township ***Range*** ***Section*** ***Base***

Proximity to:

Highways
Airports
Railways
Waterways Pacific Ocean
Schools
Land Use

Project Issues Aesthetic/Visual; Air Quality; Archaeologic-Historic; Coastal Zone; Economics/Jobs; Geologic/Seismic; Noise; Population/Housing Balance; Recreation/Parks; Solid Waste; Traffic/Circulation; Vegetation; Water Quality; Wetland/Riparian; Wildlife; Landuse; Cumulative Effects

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Reviewing Agencies Resources Agency; Department of Boating and Waterways; California Coastal Commission; Department of Fish and Game, Region 5; Department of Fish and Game, Marine Region; Office of Historic Preservation; Department of Parks and Recreation; Caltrans, Division of Aeronautics; Caltrans, District 7; Air Resources Board, Airport Projects; State Water Resources Control Board, Division of Water Quality; Regional Water Quality Control Board, Region 9; Native American Heritage Commission; State Lands Commission

Note: Blanks in data fields result from insufficient information provided by lead agency.

Document Details Report
State Clearinghouse Data Base

Date Received 05/01/2002 ***Start of Review*** 05/01/2002 ***End of Review*** 05/30/2002

Note: Blanks in data fields result from insufficient information provided by lead agency.

Air Resources Board

Winston H. Hickox
Agency Secretary

Alan C. Lloyd, Ph.D.
Chairman
1001 I Street • P.O. Box 2815 • Sacramento, California 95812 • www.arb.ca.gov

Gray Davis
Governor

June 7, 2002

Department of the Air Force
HQ Air Combat Command/CEVP
Attn: Ms. Linda DeVine
129 Andrews Street, Suite 102
Langley Air Force Base, Virginia 23665-2769

Dear Ms. DeVine:

Thank you for the opportunity to provide comments on the Draft Environmental Assessment and Draft Finding of No Significant Impact for the proposed establishment of a Combat Search and Rescue (CSAR) unit in the Western United States.

We note that the preferred location for the CSAR unit is at a military installation in Arizona. However, the draft findings also conclude "that implementation of either Alternative A (beddown at Edwards AFB, CA) or Alternative B (beddown at Vandenberg AFB, CA) would have the potential for significant impacts to regional air quality, and additional analysis would be required." In light of that finding, should the Air Combat Command select either of the two California locations for the CSAR unit, we strongly urge that an air quality analysis be conducted in accordance with both the National Environmental Policy Act and the California Environmental Quality Act.

If you have any questions, please call me at (916) 322-7236 or you may contact Mr. Gary Honcoop, Manager, Strategic Analysis and Liaison Section at (916) 322-8474.

Sincerely,

Sylvia Oey for
Cynthia Marvin, Chief
Air Quality and Transportation Planning Branch

cc: State Clearinghouse #2002054002