EG3 EGLIN AFB AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Aircraft Operations

As an active, combat-ready unit, the Initial F-22 Operational Wing would conduct aircraft operations, including training, both at the base's airfield and in the associated airspace. Within these areas, aircraft performing training activities generate noise and emit exhaust, so they can affect the noise environment and air quality. Maintenance activities, construction, and ground vehicles also produce emissions that can affect air quality. All training and other activities must be performed safely and with regard for all other users both in the air and on the ground. Because these training activities have the potential to affect safety and airspace management, the Air Force has analyzed them in this Draft EIS.

The following resource discussion presents airspace management and use, noise, air quality, and safety for the base, the airspace surrounding the airfield, and associated training airspace for Eglin AFB. Appendix AO-1 contains the methodological approach employed for these analyses. For this Draft EIS, the best available data were used for this new generation of advanced fighter aircraft. However, there are limitations to the extent of the data since this aircraft is new and there are only four prototype aircraft flying. Noise, air quality, and safety data have been collected to the greatest extent possible for F-22 specific aircraft.

Noise data have been collected on the F-22; however, none of them has flown the full range of maneuvers and engine power settings needed to develop the complete noise database required for noise analysis. Although the Air Force used the current F-22 aircraft for data collection, it is still possible these developmental test engines may be further modified as a result of ongoing testing. Therefore, a composite approach was used to model noise for the F-22. Current data on the prototype aircraft were used as well as information on comparable turbofan engines and other similar fighter aircraft power settings, speed, and maneuvering.

As a new, developing aircraft, the F-22 and its systems (e.g., engines, avionics) have evolved since the first flight in 1997 and will continue to evolve in the future. Acquisition of detailed knowledge of the outputs (such as noise levels and emissions) resulting from F-22 operations has followed a similar evolutionary pattern. Basically, this information will improve in precision the more the F-22 flies and undergoes evaluation.

This evolution in knowledge of F-22 outputs (especially noise) has clearly evolved over the past few years. In the environmental analysis performed on the F-22, *F-22 Force Development Evaluation and Weapons School Beddown, Nellis AFB* (Air Force 1999a), the best available information was used (at the time only one F-22 prototype had been flown). This information indicated that the F-18 noise profile formed the most appropriate surrogate for the F-22 at that time.

By 2000, when the F-22 *Conversion of Two F-15 Fighter Squadrons to F-22 Fighter Squadrons at Tyndall AFB, Florida* (Air Force 2000a) environmental analysis was completed, the Air Force Research

Laboratory had collected additional F-22 noise data. Correlating these data to the known noise signatures for other aircraft led the Air Force to continue to use the F-18 as the best available surrogate for the F-22.

As noted above, further actual noise data on the F-22 has been collected. Although these data do not provide a complete noise database, they demonstrate the evolution of information on the aircraft. These data further establish that a composite of comparable engines and fighter aircraft best characterize the noise profile for the F-22.

For air quality, the best available data were also used. The F-22 uses a new propulsion system – the F119-PW-100 – a low-bypass ratio turbofan built by Pratt & Whitney. This engine is still under test and evaluation and may require changes depending on the test program. Many operational parameters of this new engine are classified or competitively sensitive. In an effort to approximate the fuel emissions that would be expected for this F119 engine, the F100 series of engines were evaluated. These series of engines were chosen because they most closely represent the function of the F119 engine and the power settings anticipated to be used by the F-22.

Safety data are unavailable for the F-22 because there are only four test and evaluation prototype aircraft flying. There have not been enough flight hours to accurately depict the safety record for this new aircraft. Therefore, similar fighter aircraft safety records have been used and conclusions drawn based on their flight history.

Although some F-22 data for noise, air quality, and safety are currently incomplete or unavailable, this Draft EIS provides a thorough analysis of known parameters. The Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) recognizes that such a situation may occur. This situation is managed in accordance with 40 Code of Federal Regulations (CFR) § 1502.22, *Incomplete or Unavailable Information*, which provides the following guidance.

> When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an Environmental Impact Statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.
>
> (a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the Environmental Impact Statement.
>
> (b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the Environmental Impact Statement the following:
>
> 1. A statement that such information is incomplete or unavailable;
>
> 2. A statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;

3. A summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and

4. The agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this Section, "reasonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

As indicated above, data for the F-22 aircraft that are necessary to model the aircraft's noise, air quality, and safety are incomplete. While the costs to obtain complete data are not exorbitant, those data cannot be obtained at this time due to limitations on aircraft performance during its developmental stage, the need for further testing of operational aircraft, analyses during normal (versus developmental) flying conditions, and time to develop a flight safety record (40 CFR §§ 1502.22[b]; 1502.22[b]1). The data and factors used in this analysis are presented in the body of this Draft EIS and further detailed in Appendix AO-1 through AO-3.

No-Action Alternative

Under the no-action alternative, ongoing Air Force and interagency programs and activities at Eglin AFB would continue operating at planned levels as reflected in current Air Force management plans. These plans include recent activities that have been approved by Air Force and have existing NEPA documentation.

Under the no-action alternative, Eglin AFB would continue to operate as the Air Armament Center and be responsible for development, acquisition, testing, deployment, and sustainment of all air-delivered weapons. Aircraft operations and airspace management and use would continue at current levels. There would be no change in the use of any existing airspace. Under the no-action alternative, existing noise levels would not change, either in the vicinity of the base, or under the affected airspace. Impacts to air quality would reflect current and ongoing activities in the region; pollutant emissions would stay the same. Eglin AFB would continue to operate under conditions in its current air permit and comply with all applicable state and federal laws and regulations. There would be no change in operational F-15C or other aircraft operations; therefore, there would be no new or unique safety issues. Operation and maintenance activities conducted at Eglin AFB would continue in accordance with all applicable safety directives.

EG3.1 Airspace Management and Use

EG3.1.1 Base

Affected Environment

The affected environment for aircraft sorties at Eglin AFB includes the base and the airspace surrounding the airfield. A total of 27,086 sorties are annually conducted in the base air traffic environment. Baseline conditions for the affected environment include two squadrons of

operational F-15Cs (48 PAI). A description of the factors used to define the affected environment and the methods used to evaluate baseline conditions are presented in Appendix AO-1.

Airspace currently supporting sorties at Eglin AFB also includes a larger airspace encompassing Eglin AFB and 29 airports. The Eglin Radar Control Facility sequences and separates air traffic within the larger airspace. All aircraft using this airspace must maintain communication with the tower, employ a transponder that allows precise radar tracking by the tower, and have altitude-reporting equipment. This ensures the safe passage of military, civilian, and commercial aircraft in this airspace environment.

Environmental Consequences

Beddown of the Initial F-22 Operational Wing at Eglin AFB would not adversely affect airspace use or management within the base air traffic environment. The incremental replacement of F-15C operations by the F-22 would result in about a 16 percent net increase in total sorties above baseline conditions. No changes would be required to the Eglin AFB airspace or the base arrival and departure procedures to accommodate the F-22 aircraft performance or operations. Therefore, effects on airspace use in the local air traffic environment would be negligible as it is for the other alternative locations.

Comparative Summary of the Five Potential Basing Locations

Airspace management procedures in the vicinity of each base are adequate to support the additional sorties associated with the F-22 beddown. No changes would be required to airspace management at Eglin. Eglin would increase sorties 16 percent, Langley would have a slight increase of 7 percent sorties, Elmendorf would increase sorties by 26 percent, Mountain Home would increase sorties by 58 percent, and Tyndall would increase sorties by 43 percent. Despite the variation in increases in sorties, there would be no noticeable effect on airspace management at any of the bases. Only at Mountain Home, where a second runway would be constructed, would effects differ slightly from other locations.

EG3.1.2 Airspace

Affected Environment

The affected airspace units for the Eglin AFB alternative consist of four Warning Areas (designated with a "W") and four (MOAs) (refer to Table EG2.2-2 and Figure EG3.1-1). Used on a consistent basis for training, this airspace receives more than 99 percent of current F-15C use and would continue at the same levels for the F-22s. Carabelle Work Area (overlying Tyndall E) is used by Eglin AFB F-15Cs on an occasional basis, with less than 1 percent of operations occurring in this airspace unit. In total, the F-15Cs fly 10,000 sortie-operations annually in the primary airspace units. Warning Areas W-151 and W-470 receive the most use by F-15Cs (2,600 and 5,200 sortie-operations, respectively). But other aircraft, including advanced fighter training F-15Cs and F-22s from Tyndall AFB, share the same airspace units, especially Tyndall LLA MOA and W-470. In contrast, less than 10 sortie-operations occurred in the Carabelle Work Area for F-15Cs at Eglin AFB.

Section EG2 describes the baseline use of the airspace and its general parameters. The MOAs and Warning Areas affected by the Eglin AFB basing alternative are depicted in Figure EG3.1-1.

Primary Use Airspace
Camden Ridge/Pine Hill MOA
Rose Hill MOA
Moody 3 MOA
Tyndall LLA MOA
W-151
W-155
W-453
W-470
Occasional Use Airspace
Carabelle Work Area

A number of Military Training Routes (MTRs) overlap the four MOAs and one Warning Area (W-470). Camden Ridge/Pine Hill MOA and Moody 3 MOA each have 11 MTRs that coincide with the MOAs. Rose Hill MOA and W-470 each has only one MTR that overlaps with these airspace units. Close coordination of scheduling and use of these MOAs, MTRs, and Warning Areas by respective scheduling agencies ensures safe air traffic transiting throughout this region. Therefore, air traffic traveling in this area should not be adversely affected by military flight activities. See Appendix AO-1 for further description of the MTR coincidence with MOAs and Warning Areas.

Environmental Consequences

The Initial F-22 Operational Wing beddown at Eglin AFB would not require any change to existing airspace.

Selection of Eglin AFB as an F-22 basing alternative would not have adverse effects on airspace use and management within this coastal region. This alternative would not itself require changes to the current configuration of the primary and occasional use MOAs, ATCAAs, or Warning Areas considered for F-22 use, nor would it alter the normal scheduled times of use for this airspace. The incremental replacement of F-15C sortie-operations by the F-22 would result in a minimal net change to the amount of activity in any of the MOAs or Warning Areas identified for the Eglin alternative. W-151 and W-470 may increase by two to three sortie-operations per flying day (260 flying days/year). Increases in the other airspace units would be less than one sortie-operation per day. Activities in occasional use airspace would remain comparable to baseline levels. The general use of the over-water airspace would distance F-22 training activities from most civil and commercial air traffic operating throughout the Gulf Coast region. Therefore, since the proposed beddown represents a continuation of current activities with only minor increases in sortie-operations, no adverse impacts in airspace use and management would be expected.

Comparative Summary of the Five Potential Basing Locations

Airspace management for the training airspace associated with all five locations would be unchanged as a result of the F-22 beddown. There would be no substantive differences in the consequences at any of the five locations to airspace management.

EG3.2 Noise

Within this Draft EIS, noise is described by the sound level. Sound level is the amplitude (level) of the sound that occurs at any given time. When an aircraft flies by, the level changes continuously, starting at the ambient (background) level, increasing to a maximum as the aircraft passes closest to the receptor, and then decreasing to ambient as the aircraft flies into the distance. Sound levels are on a logarithmic decibel scale; a sound level that is 10 decibels (dB) higher than another will be

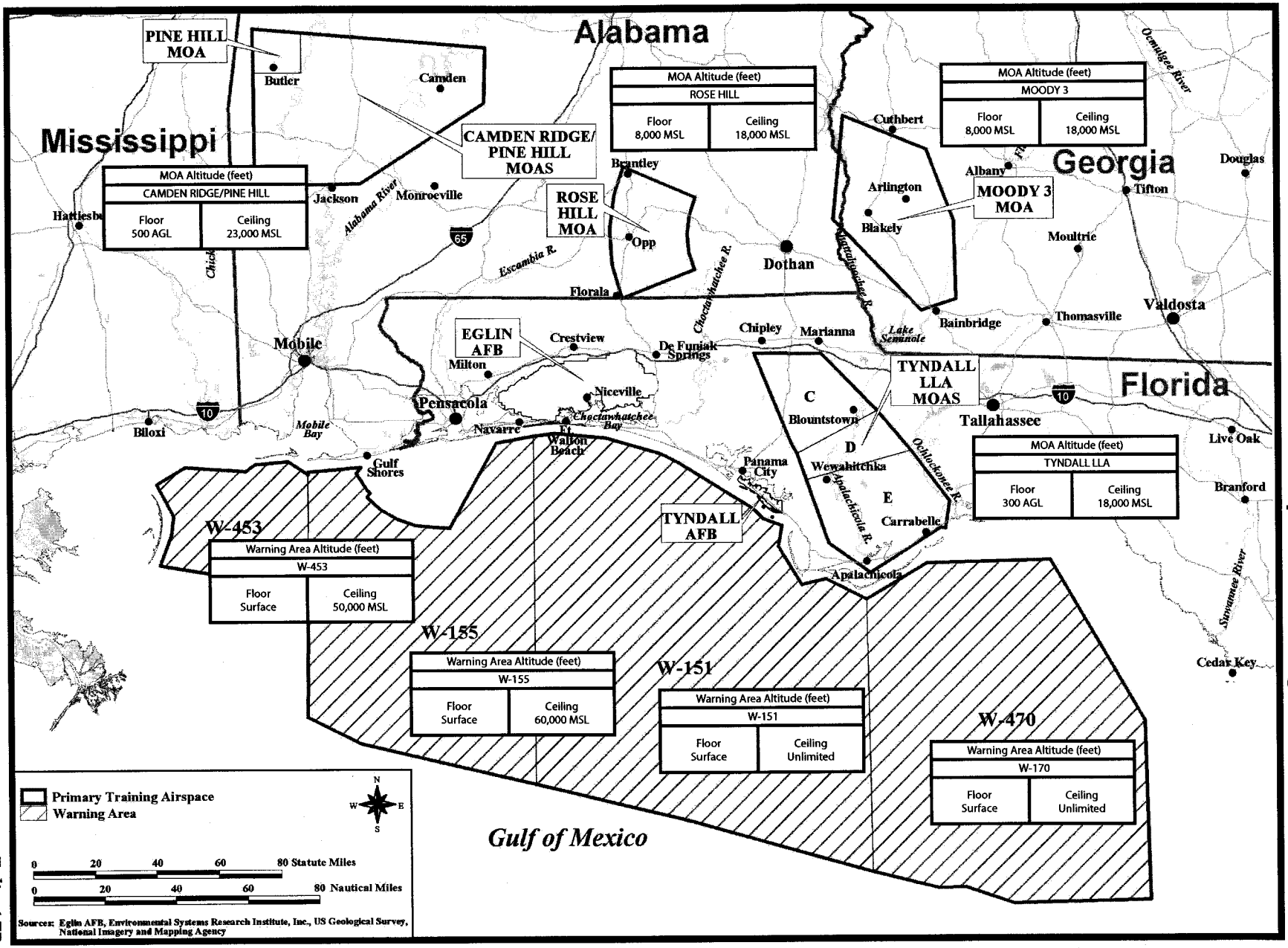


Figure EG3.1-1
Eglin AFB Affected Airspace Environment

perceived as twice as loud. More specific noise metrics include Maximum Sound Level (L_{max}), the Sound Exposure Level (SEL), Day-Night Average Sound Level (DNL), and Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}). A-weighted levels are used for subsonic aircraft noise, and C-weighted levels are used for sonic booms and other impulsive noises. A "C" is included in the symbol to denote when C-weighting is used. Each of these metrics is summarized below and discussed in detail in Appendix AO-1.

- Maximum Sound Level (L_{max}) is used to define maximum noise levels. L_{max} is the highest sound level measured during a single aircraft overflight. For an observer, the noise level starts at the ambient noise level, rises up to the maximum level as the aircraft flies closest to the observer, and returns to the ambient level as the aircraft recedes into the distance.

- Sound Exposure Level (SEL) accounts for both the maximum sound level and the length of time a sound lasts. SEL does not directly represent the sound level heard at any given time. Rather, it provides a measure of the total sound exposure for an entire event averaged over 1 second.

- Day-Night Average Sound Level (DNL) is a noise metric combining the levels and durations of noise events and the number of events over an extended time period. It is a cumulative average computed over a 24-hour period to represent total noise exposure. DNL also accounts for more intrusive night time noise, adding a 10 dB penalty for sounds after 10:00 pm and before 7:00 am. DNL is the appropriate measure to account for total noise exposure around airfields such as Eglin AFB.

- Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}) is the measure used for subsonic aircraft noise in military airspace (MOAs or Warning Areas). This metric accounts for the fact that when military aircraft fly low and fast, the sound can rise from ambient to its maximum very quickly. Known as an onset-rate, this effect can make noise seem louder due to added "startle" effects. Penalties of up to 11 dB are added to account for this onset-rate.

- C-Weighted Day-Night Sound Level (CDNL) is day-night sound levels computed for areas subject to sonic booms. These areas are also subjected to subsonic noise assessed according to L_{dnmr}.

Comments received during scoping placed special emphasis on a comprehensive presentation of noise effects. Aircraft noise effects can be described according to two categories: annoyance and human health considerations. Annoyance, which is based on perception, represents the primary effect associated with aircraft noise. Far less potential exists for effects on human health. Appendices AO-1 and AO-2 provide detail on these effects and the studies used to identify them.

Studies of community annoyance to numerous types of environmental noise show that DNL correlates well with effects and Schultz (1978) showed a consistent relationship between noise levels and annoyance. A more recent study reaffirmed and updated this relationship (Fidell *et al.* 1991). The updated relationship, which does not differ substantially from the original, is the current preferred form.

In general, there is a high correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL. The correlation is lower for the annoyance of individuals. This is not surprising considering the varying personal factors that influence the manner in which individuals react to noise. The inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using DNL.

Relation Between Annoyance and DNL

DNL	*% Population Highly Annoyed*
65	12.3
70	22.1
75	36.5
80	53.7
85	70.2

In addition to annoyance, the effect of noise on human health was raised during the public scoping process for this Draft EIS. Other factors that can be used to evaluate a noise environment are noise-induced hearing loss, speech interference, and sleep disturbance. Effects on speech and sleep also contribute to annoyance.

A considerable amount of data on hearing loss have been collected and analyzed. It has been well established that continuous exposure to high noise levels (such as that occurring in a factory) will damage human hearing (USEPA 1978). Hearing loss is generally interpreted as the shifting to a higher sound level of the ear's sensitivity to perceive or hear sound (sound must be louder to be heard). This change can be either temporary or permanent. Federal workplace standards for protection from hearing loss allow an A-weighted time-average level of 90 dB over an 8-hour work period, or 85 dB averaged over a 16-hour period. As shown later in this section, noise levels associated with the activities of the F-22s would be more than 30 dB below these standards. In a MOA or Warning Area, the operations are random and widely dispersed. The random nature of operations and the wide altitude structure within the MOA make it unlikely that any one location would be repeatedly overflown over a short duration.

Studies on community hearing loss from exposure to aircraft flyovers near commercial airports showed that there is no danger, under normal circumstances, of hearing loss due to aircraft noise (Newman and Bettie 1985). Commercial airport traffic is much more continuous and frequent than at a military airfield and also commonly lower in altitude than flights in MOAs or Warning Areas. In Warning Areas and MOAs, military aircraft fly at varied altitudes, rarely fly over the same point on the ground repeatedly during a short period, and occur sporadically over a day. These factors make it unlikely that any hearing loss would occur (Thompson 1997). Other factors, described in Appendix AO-1, demonstrate the lack of potential hearing loss from the F-22 beddown.

Another non-auditory effect of noise is disruption of conversations. Speech interference associated with aircraft noise is a primary cause of annoyance to individuals on the ground. Aircraft noise can also disrupt routine activities, such as radio listening, television watching, or telephone use. The disruption generally lasts only a few seconds, and almost always less than 10 seconds. It is difficult to predict speech intelligibility during an individual event, such as a flyover, because people automatically raise their voices as background noise increases. A study (Pearsons *et al.* 1977) suggests that people can communicate acceptably in background A-weighted noise levels of 80 dB, but some speech interference occurs when background noise levels exceed 65 dB. Typical home insulation reduces the noise levels experienced by 20 dB or more and decreases speech interference.

Noise-related awakenings form another issue associated with aircraft noise. Sleep is not a continuous, uniform condition but a complex series of states through which the brain progresses in a cyclical pattern. Arousal from sleep is a function of a number of factors including age, gender, sleep stage, noise level, frequency of noise occurrences, noise quality, and presleep activity. Quality sleep is recognized as a factor in good health. Although considerable progress has been made in understanding and quantifying noise-induced annoyance in communities, quantitative understanding of noise-induced sleep disturbance is less advanced.

Studies (Fidell *et al.* 1994; Pearsons *et al.* 1995; Kryter 1984) of the effects of nighttime noise exposure on the in-home sleep of residents near military airbases, civil airports, and in several households with negligible nighttime aircraft noise exposure, revealed the SEL as the best noise metric predicting noise-related awakenings and a strong influence of habituation on susceptibility to noise-induced sleep disturbance.

To date, no exact quantitative dose-response relationship exists for noise-related sleep interference; yet, based on studies conducted to date and the United States Environmental Protection Agency (USEPA) guideline of a 45 DNL to protect sleep interference, useful ways to assess sleep interference have emerged. If homes are conservatively estimated to have a 20-dB noise insulation, an average of 65 DNL would produce an indoor level of 45 DNL and would form a reasonable guideline for evaluating sleep interference. This also corresponds well to the general guideline for assessing speech interference.

EG3.2.1 Base

Affected Environment

Eglin AFB has supported operations by a wide variety of aircraft throughout its history. Currently, the base supports F-15, F-16, A-10, UH-1, and MC-130 aircraft. In addition, Eglin AFB regularly has different transient (visiting) aircraft temporarily using the base to conduct test and training in the over-water ranges. Because the mix of based and transient aircraft using Eglin AFB has varied over the years, the shape and extent of areas affected by aircraft noise has also varied.

DNL, or Day-Night Average Sound Level, is the most widely accepted metric for evaluation of noise around airfields.

In the recent past, noise conditions have been similar to those reflected by the baseline noise environment. Baseline noise levels, expressed as DNL, were modeled based on aircraft types, runway use patterns, engine power settings, altitude profiles, flight track locations, airspeed, and other factors. Appendices AO-1 and AO-2 detail the methods used for defining airfield noise levels and presents further information on noise metrics.

During scoping, participants asked what the difference would be between noise generation of the F-22 compared to the F-15C.

To identify the areas affected by noise levels, a program known as NOISEMAP is used to generate contours that depict noise levels ranging from 65 to 85 DNL or greater in 5 dB increments. Table EG3.2-1 and Figure EG3.2-1 present the baseline noise conditions for Eglin AFB.

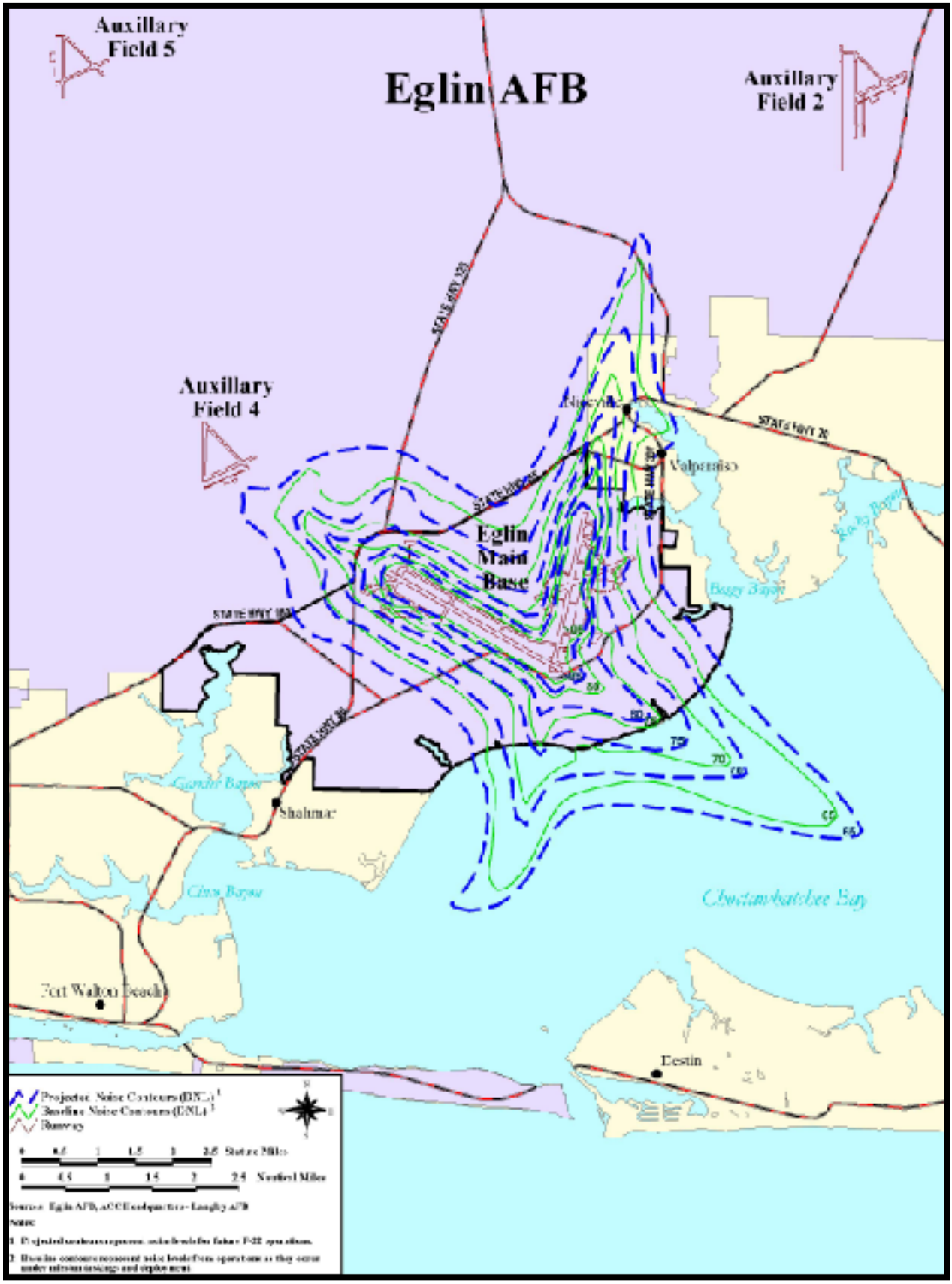


Figure EG3.2-1
Baseline and Projected Noise Contours at Eglin AFB

Table EG3.2-1. Acreage Under Baseline Noise Contours in the Vicinity of Eglin AFB

Noise Contour (DNL)	*Acres Affected: On Base*	*Acres Affected: Off Base[1]*	*Acres Affected: Total*
65-70	3,116	2,808	5,924
70-75	2,118	886	3,004
75-80	1,356	84	1,440
80-85	689	14	703
>85	1,066	0	1,066
Total	8,345	3,792	12,137

Note: 1. Off-base acreage includes both land and water.

Noise levels of 65 DNL or greater affect both on-base and off-base lands. Fifty-five percent of the affected area lies on base, including all of the area subject to noise levels greater than 85 DNL. Section EG3.12 describes the land use implications of these noise levels.

Eglin AFB operates 24 hours a day; however, the base employs a quiet-hours program in which aircraft operations (certain takeoff and landing patterns, as well as engine run-ups) are minimized after 10:00 pm and before 6:00 am every day of the week. Environmental night operations for F-15Cs after 10:00 pm and before 7:00 am are infrequent, accounting for 5 percent of total activity at the airfield.

Noise due to construction and maintenance equipment, as well as general vehicle traffic is a common, ongoing occurrence in the base environment. Existing, continuing military construction projects are currently in progress at Eglin AFB. Trucks, as well as heavy equipment are usually found in the base environment on a daily basis to support these existing facility and infrastructure upgrades.

Environmental Consequences

Under this alternative, the area affected by noise levels of 65 DNL or greater would increase by approximately 4,206 acres (Table EG3.2-2 and Figure EG3.2-1). This increase would result from a 30 percent expansion in the area affected by noise levels of 65 to 75 DNL, combined with a 49 percent increase in the area affected by noise levels greater than 75 DNL. This increase in affected area would result from the fact that the F-22 would perform more sorties than the F-15C under baseline conditions.

Table EG3.2-2. Acreage Under Noise Contours in the Vicinity of Eglin AFB Comparison of Baseline and Projected Conditions

	BASELINE			PROJECTED			CHANGE		
Noise Contour (DNL)	*Acres Affected: On Base*	*Acres Affected: Off Base[1]*	*Acres Affected: Total*	*Acres Affected: On Base*	*Acres Affected: Off Base[1]*	*Acres Affected: Total*	*Acres Affected: On Base*	*Acres Affected: Off Base[1]*	*Acres Affected: Total*
65-70	3,116	2,808	5,924	4,017	3,447	7,464	+901	+639	+1,540
70-75	2,118	886	3,004	2,559	1,553	4,112	+441	+667	+1,108
75-80	1,356	84	1,440	1,869	381	2,250	+513	+297	+810
80-85	689	14	703	1,178	34	1,212	+489	+20	+509
>85	1,066	0	1,066	1,305	0	1,305	+239	0	+239
Total	8,345	3,792	12,137	10,928	5,415	16,343	+2,583	+1,623	+4,206

Note: 1. Acreage includes water and land areas.

Areas affected by the increase in noise would be predominantly on base; off-base areas (land and water) affected by noise would increase by 1,623 acres. Section EG3.12 describes the implications for changes in land use affected by noise.

The noise levels around the base would be somewhat ameliorated because the F-22 accelerates more quickly to climb speed and is able to set a lower power level sooner than the F-15C on takeoff. The F-22 would generate more noise closer to the runway and less noise further from the runway (i.e., over the areas surrounding Eglin AFB). In addition, the F-22 (as compared to F-15Cs) would require fewer maintenance activities where the engine is run at varying speeds along the flightline.

Short-term noise increases due to construction and renovation, as well as infrastructure (stormwater and electric lines) installment and realignment would occur. Construction occurs in stages; the earlier stage entails trucks, bulldozers, and other heavy construction equipment for the major construction projects (e.g., hangars, squadron operations, and maintenance facilities). This stage of construction would be temporary and isolated to those areas where construction would occur. Most of these projects would be undertaken adjacent to the flight line, occupy industrial areas, and be isolated from any off-base communities. In addition, construction would take place during daylight hours and would follow best management practices to minimize noise to any off-base receptors. Construction noise would be contained within base environs since most heavy construction would occur near the flight line, where noise would be compatible with ongoing activities.

Comparative Summary of the Five Potential Basing Locations

Noise impacts at Eglin would be the greater than at any other location. The area affected by noise levels of 65 DNL or greater off base at Eglin would increase by approximately 1,623 acres, including 123 acres of residential lands. Basing the F-22 at Langley and Elmendorf would result in the least potential consequences from noise. Acreage affected by noise levels of 65 DNL or greater off base at Langley would decrease by 366 acres; acreage affected by noise at Elmendorf would increase by

607 acres, but all of it would be over water. Although the affected area would increase by 3,875 acres at Tyndall and 2,455 acres at Mountain Home, respectively, the effects on off-base lands would be negligible; most of the area outside Tyndall is water, and at Mountain Home, the lands are used for grazing/agriculture.

EG3.2.2 Airspace

Affected Environment

Within MOAs, overlying ATCAAs, and Warning Areas, subsonic flight can be either disbursed and randomly occurring, or due to either airspace configuration or training scenarios, it may be concentrated or channeled into specific areas or corridors. The Air Force has developed the MR_NMAP (MOA-Range NOISEMAP) computer program (Lucas and Calamia 1996) to calculate subsonic aircraft noise in these areas. MR_NMAP can calculate noise for both random operations and operations channeled into corridors. It is supported by measurements in several military airspaces (Lucas *et al.* 1995). The affected airspace for the Eglin AFB alternative includes MOAs and Warning Areas in which random aircraft operation is the norm.

The primary noise metric calculated by MR_NMAP for this assessment is DNL (also know as L_{dn} or, by extension L_{dnmr}). This quantity has been computed for each of the eight airspace units potentially affected by the proposed action and no-action alternative. As discussed in Appendix AO-1, this cumulative metric represents the most widely accepted method of quantifying noise impact. However, it does not provide an intuitive description of the noise environment. People often desire to know what the loudness of an individual aircraft will be; MR_NMAP and its supporting programs can provide the maximum sound level, L_{max}, (Table EG3.2-3) and SEL (Table EG3.2-4) that accounts for both the duration and intensity of a noise event for individual aircraft at various distances and altitudes. The L_{max} indicates the noise that would be heard by an individual the instant an aircraft flies overhead. SELs reflect the noise levels of a flyover, including the maximum level, averaged over 1 second as the aircraft approaches and departs. Both measures are described in Appendix AO-2.

L_{dnmr} is the monthly average of the Onset-Rate Adjusted Day-Night Average Sound Level (DNL). Noise levels are interpreted the same way for both DNL and L_{dnmr}. The annual sortie-operations for a MOA is divided by 12 to define monthly average sortie-operations. For this Draft EIS, all training airspace noise levels were interpreted using L_{dnmr}. However, to enhance readability, these noise levels will be referred to as DNL throughout the document.

Table EG3.2-3. Representative A-Weighted Instantaneous Maximum (L_{max}) in dB Under the Flight Track for the Aircraft at Various Altitudes in the Primary Airspace[1]

			ALTITUDE IN FEET ABOVE GROUND LEVEL						
Aircraft Type	*Airspeed (Knots)*	*Power Setting[3]*	*300*	*500*	*1,000*	*2,000*	*5,000*	*10,000*	*20,000*
F-15C	520	81% NC	119	114	107	99	86	74	57
F-22[2]	520	70% ETR	120	116	108	99	85	71	54
F-16A	450	87% NC	112	108	101	93	80	67	50
F-18A	500	92% NC	120	116	108	99	85	71	54
F-14A	530	100% NC	115	111	103	94	80	67	51
B-1B	550	101% RPM	117	112	106	98	86	75	61

Notes: 1. Level flight, steady high-speed conditions.
2. Projected based on F-22 composite aircraft.
3. Engine power setting while in a MOA. The type of engine and aircraft determines the power setting: RPM = rotations per minute, NC = percent core RPM, and ETR = engine throttle ratio.

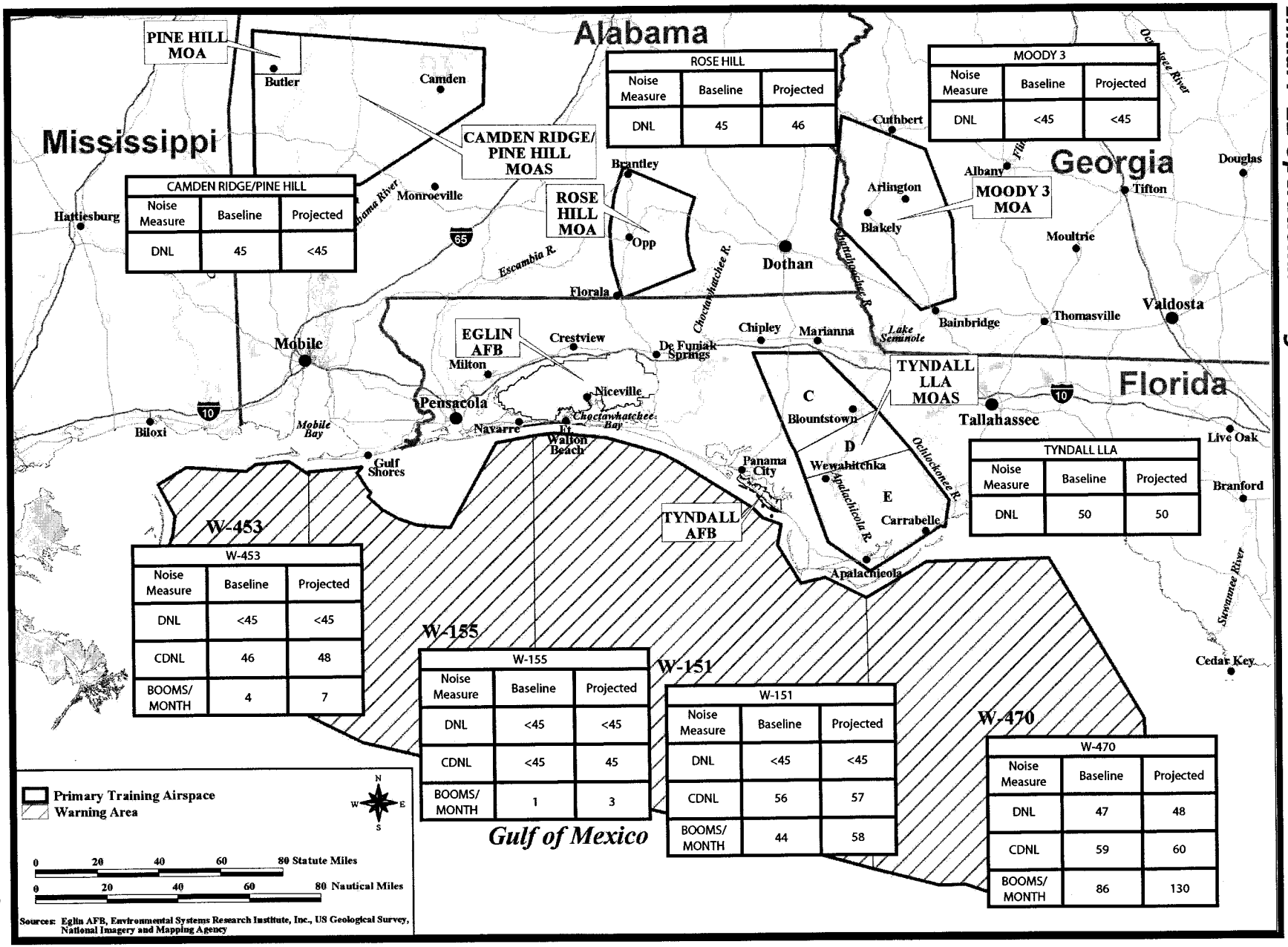
Table EG3.2-4. Sound Exposure Levels (SEL) in dB Under the Flight Track for Aircraft at Various Altitudes in the Primary Airspace[1]

		ALTITUDE IN FEET ABOVE GROUND LEVEL						
Aircraft Type	*Airspeed (Knots)*	*300*	*500*	*1,000*	*2,000*	*5,000*	*10,000*	*20,000*
F-15C	520	116	112	107	101	91	80	65
F-22[2]	520	118	114	108	101	89	77	62
F-16A	450	110	107	101	95	85	74	59
F-18A	500	118	114	108	101	89	77	62
F-14A	530	112	109	103	96	84	73	58
B-1B	550	116	112	107	101	92	82	70

Notes: 1. Level flight, steady high-speed conditions.
2. Projected based on F-22 composite aircraft.

Figure EG3.2-2 shows the baseline and projected noise levels for the eight primary airspace units: four MOAs and four Warning Areas. As these data show, noise levels in six of the eight airspace units are at or below 45 DNL. In the Tyndall LLA, cumulative noise levels are 50 DNL because most (a portion of Tyndall LLA has a ceiling of 18,000 feet MSL) flight activity occurs below 6,000 feet MSL. Noise levels of 47 DNL in W-470 are low, but the volume of sortie-operations accounts for current noise conditions.

Supersonic flight for fighter aircraft is primarily associated with air combat training. This occurs in the Warning Areas, generally above 10,000 feet MSL. No supersonic activity is permitted in any of the MOAs. The amplitude of an individual sonic boom is measured by its peak overpressure in pounds per square foot (psf), and depends on the aircrafts size, weight, geometry, mach number,



CAMDEN RIDGE/PINE HILL		
Noise Measure	Baseline	Projected
DNL	45	<45

ROSE HILL		
Noise Measure	Baseline	Projected
DNL	45	46

MOODY 3		
Noise Measure	Baseline	Projected
DNL	<45	<45

TYNDALL LLA		
Noise Measure	Baseline	Projected
DNL	50	50

W-453		
Noise Measure	Baseline	Projected
DNL	<45	<45
CDNL	46	48
BOOMS/ MONTH	4	7

W-155		
Noise Measure	Baseline	Projected
DNL	<45	<45
CDNL	<45	45
BOOMS/ MONTH	1	3

W-151		
Noise Measure	Baseline	Projected
DNL	<45	<45
CDNL	56	57
BOOMS/ MONTH	44	58

W-470		
Noise Measure	Baseline	Projected
DNL	47	48
CDNL	59	60
BOOMS/ MONTH	86	130

Figure EG3.2-2
Baseline and Projected Noise Environment for Eglin AFB Airspace

and flight altitude. Table EG3.2-5 shows sonic boom peak overpressures for the F-15 and F-22 aircraft in level flight at various conditions. The biggest single condition among these is altitude.

Maneuvers can also affect boom amplitude, increasing or decreasing overpressures from those shown in Table EG3.2-5.

Table EG3.2-5. Sonic Boom Peak Overpressures (psf) for F-15 and F-22 Aircraft at Mach 1.2 Level Flight

	ALTITUDE (FEET)			
Aircraft	*10,000*	*20,000*	*30,000*	*40,000*
F-15	5.40	2.89	1.90	1.46
F-22	5.68	3.00	1.97	1.50

Aircraft exceeding Mach 1 always create a sonic boom; however, not all supersonic flight activities will cause a boom at the ground. As altitude increases, air temperature decreases, and the resulting layers of temperature change cause booms to be turned upward as they travel toward the ground. Depending on the altitude of the aircraft and the Mach number, many sonic booms are bent upward sufficiently that they never reach the ground. This same phenomenon, referred to as "cutoff," also acts to limit the width (area covered) of the sonic booms that reach the ground (Plotkin *et al.* 1989).

When a sonic boom reaches the ground, it impacts an area which is referred to as a "footprint" or (for sustained supersonic flight) a "carpet." The size of the footprint depends on the supersonic flight path and on atmospheric conditions. Sonic booms are loudest near the center of the footprint, with a sharp "bang-bang" sound. Near the edges, they are weak and have a rumbling sound like distant thunder.

Sonic booms from air combat training activity have an elliptical pattern. Aircraft will set up at positions up to 100 nautical miles apart, before proceeding toward each other for an engagement. The airspace used tends to be aligned, connecting the setup points in an elliptical shape. Aircraft will fly supersonic at various times during an engagement exercise. Supersonic events can occur as the aircraft accelerate toward each other, during dives in the engagement itself, and during disengagement. The long-term average (CDNL) sonic boom patterns also tend to be elliptical.

Long-term sonic boom measurement projects have been conducted in four airspaces: White Sands in New Mexico (Plotkin *et al.* 1989), the eastern portion of the Goldwater Range in Arizona (Plotkin *et al.* 1992), the Elgin MOA at Nellis in Nevada (Frampton *et al.* 1993), and the western portion of the Goldwater Range (Page *et al.* 1994). These studies included analysis of schedule and air combat maneuvering instrumentation data, and they supported development of the 1992 BOOMAP model (Plotkin *et al.* 1992). The current version of BOOMAP (Frampton *et al.* 1993; Plotkin 1996) incorporates results from all four studies. Because BOOMAP is directly based on long-term measurements, it implicitly accounts for maneuvers, statistical variations in operations, atmospheric effects, and other factors.

A variety of aircraft conducting training perform flight activities that include supersonic events. Predominantly, these events occur during air-to-air combat, often at high altitudes. Roughly 3 to 10 percent of air combat training flight activities, depending upon aircraft type, result in supersonic events within the Warning Areas where supersonic activities are authorized. On average, F-15Cs fly supersonic about 7.5 percent of the time with Mach numbers usually 1.1 or less, but occasionally up to about 1.3. This is typical of all the current-generation supersonic aircraft studied in development of BOOMAP. Baseline supersonic noise levels, sonic booms, and CDNL in affected airspace are provided in Figure EG3.2-2.

For Eglin AFB, supersonic operations occur only in offshore Warning Areas and, therefore, under most conditions, sonic boom footprints would fall entirely over the ocean. There is, however, variability in the distance that sonic booms will propagate (or travel) and, in some situations, booms may reach the shore. Those situations depend on specific flight parameters and atmospheric conditions. Aircrews and mission planners are aware of the effects of those conditions and follow procedures that avoid or minimize on-shore booms. By following these procedures, the occasional on-shore boom would be infrequent.

In addition to CDNL, the estimated number of booms per month that would be generated at an average location in each airspace is shown in Figure EG3.2-2. Individual sonic boom footprints would affect areas from about 10 square miles to 100 square miles, which is a small portion of the area under the airspace.

Environmental Consequences

Despite increases in sortie-operations, proposed F-22 flight activities would not perceptibly increase subsonic noise levels in the airspace used for training. In five of the primary airspace units, DNL noise levels would remain at or below 45 DNL (refer to Figure EG3.2-2). Tyndall LLA noise levels would not change from 50 DNL. In the Camden Ridge/Pine Hill MOA, noise levels would decrease minimally (less than 2 dB). In the Rose Hill MOA and W-470, noise levels would increase by about 1 dB, but still remain low. The overall lack of change to subsonic noise result from the F-22's greater proportion of time at higher altitudes in comparison to the F-15C's. F-22s would fly, on average, 80 percent of the time above 10,000 feet MSL and 30 percent of the total time would be spent above 30,000 feet MSL.

Refer to Table EG3.2-3 for SELs for subsonic noise of several aircraft, including the F-22. Current data indicate that F-22 noise levels (SELs) would be similar to most other fighter aircraft commonly using the airspace units. Given that most F-22 flight activity would occur above 10,000 feet MSL, no noticeable difference is expected. No substantive difference exists among the basing alternatives relative to subsonic noise under the training airspace.

Scoping comments included questions about whether there would be any increase in sonic booms.

The F-22 has enhanced supersonic capability relative to the current-generation fighter aircraft. It is projected that its supersonic time would be more than three times that of aircraft such as the F-15C (25 percent, versus 7.5 percent). For example, during a typical 14-minute engagement, the F-22 would be supersonic 3 to 4.5 minutes, while the F-15C would be supersonic 1 to 2 minutes. The F-22 would also commonly achieve Mach

numbers up to about 1.3, versus 1.1 for the F-15C. The combination of more supersonic time and higher Mach number would result in a sonic boom environment six to seven times that of a similar number of F-15Cs. There are, however, two mitigating factors.

First, the majority of F-15C supersonic activity is below 30,000 feet, while 60 percent of F-22 supersonic activity would be above 30,000 feet. Booms generated at high altitude are weaker than those at low altitude. Applying the boom amplitudes shown in Table EG3.2-5 to the altitude distributions for the two aircraft types, impact per boom for the F-22 would be about 60 percent of the F-15C, for an enhanced boom factor (i.e., potential to generate booms) of about four.

The second mitigating factor is that not all F-22s would fly at full capability. In a typical combat training mission of 2 versus 2 or 4 versus 4, aircraft on one side would fly as F-22s, while aircraft on the other side would limit their performance to emulate enemy aircraft of current-generation technology. Thus, half of the F-22 sorties would have the enhanced boom factor, while the others would fly as non-F-22s and would not have an enhanced boom factor.

In the analysis of supersonic activity, the enhanced boom factor has been applied to half of the F-22 sorties, while other aircraft follow the BOOMAP model as originally developed. This corresponds to an increase to CDNL of 4 dB. For comparison, if all F-22s fly at full capability, the increase in CDNL would be 6 dB. Individual sonic boom amplitudes would be approximately the same as current fighters such as the F-15C. Refer to Figure EG3.2-2 for the projected F-22 CDNL. With the enhanced boom factor applied to one-half of the F-22 sorties, sonic boom exposure (CDNL) in W-155, W-151, W-470, and W-453 would increase by 5 dB, 1 dB, 2 dB, and 3 dB, respectively. Overall, the number of sonic booms per month in W-470 would increase by 44. W-151 and W-453 would have an increase of 14 and 5 booms per month, respectively. W-155 would experience a four-boom increase per month with the F-22 beddown.

Comparative Summary of the Five Potential Basing Locations

Noise effects from increased flight activities in the training airspace represent the most prominent factor in assessing the differences among the basing locations. For airspace units, subsonic noise would not change perceptibly under the proposed action at Langley or any of the four alternative locations. Despite increases in sortie-operations in the airspace units associated with the locations, the greater use of higher altitudes by the F-22 would reduce its noise contribution. Supersonic activity and sonic booms would increase substantially in some airspace units, but for Eglin, Langley, and Tyndall, these increases in sonic booms would occur over water and effects would be minor. In contrast, substantial increases in sonic booms over land would result in greater potential for impacts under the Mountain Home and Elmendorf alternatives. In Mountain Home airspace, an increase of 55 sonic booms per month would be concentrated in two adjacent overland MOAs, resulting in greater potential effects than the other alternatives. Impacts for Elmendorf, also with overland MOAs, would be less than Mountain Home because the increase in sonic booms in any individual airspace unit would be less (1 to 28 per month) and the supersonic activity would be dispersed over several MOAs.

EG3.3 Air Quality

Air quality in a given location is described by the atmospheric concentration of six pollutants: ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter equal to or less than 10 microns in diameter (PM_{10}), and lead. As part of the Clean Air Act (CAA), the USEPA has established criteria for these pollutants. These criteria, set forth as national ambient air quality standards (NAAQS) represent maximum levels of background pollution that are considered safe, with an adequate margin of safety, to protect the public health and welfare. Based on measured ambient criteria pollutant data, the USEPA designates areas of the United States as having air quality better than (attainment) or worse than (nonattainment) the NAAQS. Individual states are delegated the responsibility to regulate air quality in order to achieve or maintain air quality in attainment with these standards. States are required to develop a state implementation plan (SIP) that sets forth how the CAA provisions will be implemented within the state. The SIP is the primary means for the implementation, maintenance, and enforcement of the measures needed to attain and maintain the NAAQS in each state. Details of the NAAQS and specific regulatory requirements for sources of these emissions in attainment and nonattainment areas are included in Appendix AO-1.

The CAA also establishes a national goal of preventing degradation or impairment in federally designated Class I areas. Class I areas are defined as those areas where any appreciable degradation in air quality or associated visibility impairment is considered significant. As a part of the Prevention of Significant Deterioration (PSD) Program, Congress assigned mandatory Class I status to all national parks, national wilderness areas (excluding wilderness study areas or wild and scenic rivers), and memorial parks greater than 5,000 acres. In Class I areas, visibility impairment is defined as atmospheric discoloration (such as from an industrial smokestack) and a reduction in regional visual range. Visibility impairment or haze results from smoke, dust, moisture, and vapor suspended in the air. Very small particles are either formed from gases (sulfates, nitrates) or are emitted directly into the atmosphere from sources like electric utilities, industrial fuel burning processes and vehicle emissions. Stationary sources, such as industrial areas, are typically the issue with impairment of visibility in Class I areas so the permitting process under the PSD program requires a review of all Class I areas within a 62-mile radius of a proposed industrial facility. Mobile sources, including aircraft and their operations at Eglin AFB, are generally exempt from review under this regulation. While the review under the PSD permit program does not apply directly to base operations at Eglin AFB, this analysis assessed a 62-mile (100-kilometer) radius area as a screening tool for reviewing potential visibility impacts.

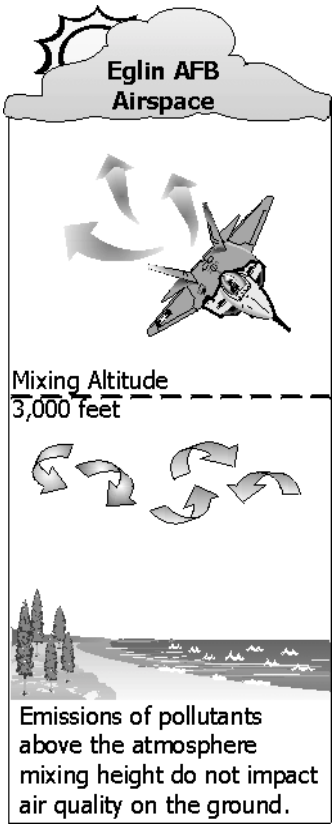
Pollutants considered in this Draft EIS include volatile organic compounds (VOCs), which are precursors to (indicators of) O_3, nitrogen oxides (NO_x), which are also precursors to O_3 as well as CO, SO_2, and PM_{10}. Airborne emissions of lead are not addressed because the affected areas contain no significant sources of this criteria pollutant.

EG3.3.1 Base

Affected Environment

The affected environment varies according to pollutant. For pollutants that do not undergo a chemical reaction after being emitted from a source (PM_{10}, CO, and SO_2), the affected area is

generally restricted to a region in the immediate vicinity of the base. However, the region of concern for ozone and its precursors (NO_x and VOCs) is a larger regional area because they undergo a chemical reaction and change as they disperse from the source. This change can take hours, so depending upon weather conditions, the pollutants could be some distance from the source.



Another factor used in defining the affected environment is mixing height. Mixing height is the upper vertical limit of the volume of air in which emissions may affect air quality. Emissions released above the mixing height become so widely dispersed before reaching ground level that any potential ground-level effects would not be measurable. Emissions of pollutants released below the mixing height may affect ground-level concentrations. The portion of the atmosphere that is completely mixed begins at the earth's surface and may extend up to altitudes of a few thousand feet. Mixing height varies from region to region based on daily temperature changes, amount of sunlight, and other climatic factors. An average mixing height of 3,000 feet conservatively characterizes the conditions at Eglin AFB. This mixing height was derived from a review of historical data (USEPA 1972) and a detailed analysis of morning and afternoon mixing heights at a nearby upper air monitoring station in Apalachicola, Florida (USEPA 2000a). Impacts of the proposed action can be evaluated in the context of the existing local air quality, the baseline emissions for the base and region, and the relative contribution of the F-22 beddown to regional emissions.

Base Environment

The Florida Department of Environmental Protection (FDEP), Division of Air Resources Management, has primary jurisdiction over air quality and stationary source emissions at Eglin AFB. Stationary source emissions at Eglin AFB include jet engine testing (off the aircraft), external combustion sources, degreasing operations, storage tanks, fueling operations, heating, solvent usage, surface coating, asphalt production, and miscellaneous general process operations. Base emissions (as shown in Table EG3.3-1) from Eglin AFB are above the major stationary source threshold for several pollutants; therefore, Eglin AFB is classified as a major stationary source and operates under a 40 CFR, Part 70 State Operating Permit (Title V) issued by FDEP.

Mobile source emissions include aircraft operations (takeoffs and landings), aerospace ground equipment (AGE), ground support equipment (GSE), and maintenance aircraft operations performed with the engines still mounted on the aircraft (engine run-ups and trim checks). Emissions from aircraft takeoffs and landings, as well as other flight operations at the base, considered all based and transient aircraft. Aircraft emissions were calculated for all flight activities below the mixing height (3,000 feet). These emissions, combined with those from the other mobile sources, account for the majority of the emissions from the base.

Table EG3.3-1. Baseline Emissions for Eglin AFB Affected Environment

Base Emissions Source Category	POLLUTANTS (TONS PER YEAR)				
	CO	*VOCs*	*NO_x*	*SO_2*	*PM_{10}*
Stationary Sources	109.2	106.2	131.1	19.0	104.5
Mobile Sources	941.0	115.2	251.6	7.2	12.9
TOTAL Base Emissions	1,050.2	221.4	382.7	26.2	117.4

Source: Air Force 1999b.

Regional Environment

Eglin AFB is located within the Mobile (Alabama)-Pensacola-Panama City (Florida)-Southern Mississippi Interstate Air Quality Control Region, designated as AQCR #5. The AQCR that was developed for planning purposes includes southern Mississippi, a three-county area in the southern coastal portion of Alabama, and ten counties in the Florida panhandle. Due to the extremely large extent of the AQCR, base emissions from Eglin are compared to the three-county area, which encompass the Eglin Military Reservation: Okaloosa, Santa Rosa, and Walton counties. Table EG3.3-2 summarizes the regional emissions (stationary and mobile) of criteria pollutants and precursor emissions for these counties. Baseline Eglin AFB emissions are incorporated into these totals for the affected three-county area. For each criteria pollutant except NO_x, Eglin AFB contributes less than 1 percent of regional emissions. The base generates less than 2 percent of regional NO_x emissions.

Table EG3.3-2. Regional Emissions for Eglin AFB Affected Environment

Regional Emissions	POLLUTANTS (TONS PER YEAR)				
	CO[1]	*VOCs*	*NO_x*	*SO_2*	*PM_{10}*
Okaloosa County	69,141	10,626	7,226	737	8,232
Santa Rosa County	62,218	15,263	13,496	6,800	13,015
Walton County	14,484	2,696	2,356	221	3,731
Total	145,843	28,585	23,078	7,758	24,978

Source: USEPA 2000b.

Air quality in the Mobile (Alabama)-Pensacola-Panama City (Florida)-Southern Mississippi Interstate AQCR has been designated as either in "attainment" or "unclassifiable/ attainment" with the NAAQS for all pollutants. Moreover, the region is expected to be in attainment with the proposed 8-hour O_3 standard, with the exception of the Pensacola metropolitan statistical area (FDEP 2000a). This area, which includes Escambia and Santa Rosa counties, has significant sources of interrelated industrial and transportation related emissions. Currently, the new 8-hour O_3 standard is pending a decision from the United States Supreme Court; which is expected sometime in 2001. While future implementation of this standard is still uncertain, it should be noted that the proposed Pensacola nonattainment area does not include Eglin Main Base.

Countywide emissions include stationary, mobile, and area sources. The majority of permitted stationary emissions are from two activities: fuel combustion, such as coal and oil at power-generating facilities, and pollutant emissions from industrial processes. Emissions from on-road

mobile sources are based on average daily vehicle miles traveled in each county. This category includes the contribution of off-base use of private and government vehicles associated with the baseline military and civilian personnel at Eglin AFB. Off-road mobile sources include aviation, locomotive, and marine vessel emissions. Aviation and marine vessels include both commercial and military sources. Area source emissions include sources of emissions from solvent/coating usage, vehicle refueling, as well as combustion emissions from heating of industrial, commercial, and residential facilities.

Environmental Consequences

The air quality analysis at Eglin AFB quantifies the changes (increases and decreases) due to the Initial F-22 Operational Wing beddown. Since Eglin AFB is located in an "attainment" area for all pollutants, the beddown would not interfere with any SIP measures or budgets established in order to achieve or maintain the NAAQS. Thus, there currently are no federal conformity requirements under 40 CFR 51 Subpart W for the (See Appendix AO-3).

Information on projected aircraft operations incorporated F-22-specific data on maintenance run-up procedures, uninstalled engine cell testing, and typical ground run-up times (taxi, idle-in and idle-out times) for each landing-takeoff cycle (personal communication, McGettrick and Myers 2000, 2001). Time-in-modes for take-off, climb-out, and approach were based on default time-in-modes developed for comparable jet aircraft. Modal-specific emission factors and fuel flow rates are not currently available for the F-22 engines. The advanced design of the F-22 includes the development of a new propulsion system, the F119-PW-100, a low bypass turbofan engine. The engine is still under test and evaluation and many operational parameters are classified or competitively sensitive. Therefore, according to NEPA guidance, *Incomplete and Unavailable Information* 40 CFR §1502.22, the analysis used the best available data.

The F-22 would require fewer maintenance activities where the engine is run at varying speeds along the flightline, thereby reducing emissions.

A composite set of emission factors and fuel flow rates for each pollutant at each power setting was developed based on recently published modal emission factors for the F100 series of engines (Air Force 1999c) using JP-8 as a fuel. The F100 series engines are the power plants of both the F-15 and F-16 aircraft. Details of the emission factors and time-in-modes used for the analyses are included in Appendix AO-3.

Direct emissions generated by both stationary and mobile sources at Eglin AFB are detailed in Table EG3.3-3. Stationary sources include external and internal combustion sources, engine cell testing, and other aircraft maintenance operations. Mobile sources include aircraft operations (takeoffs and landings), aircraft maintenance run-ups, and exhaust emissions from aircraft ground support equipment. This analysis reflects the changes associated with drawdown of F-15Cs and the overall increase of aircraft and sorties associated with the beddown of F-22s.

Table EG3.3-3. Projected Direct Emissions for Eglin AFB Affected Environment

Base Emissions Source Category	POLLUTANTS (TONS PER YEAR)				
	CO	*VOCs*	*NO_x*	*SO_2*	*PM_{10}*
Projected Stationary Sources	107.8	106.0	125.7	18.9	104.5
Projected Mobile Sources	1,122.5	136.9	263.8	9.9	21.6
Baseline Stationary Sources	109.2	106.2	131.1	19.0	104.5
Baseline Mobile Sources	941.0	115.2	251.6	7.2	12.9
Stationary Sources Change	-1.4	-0.2	-5.4	0.0	0.0
Mobile Sources Change	181.6	21.7	12.2	2.7	8.7
TOTAL Change in Base Emissions	180.2	21.5	6.8	2.7	8.7

All criteria pollutant direct emissions would increase as a result of the beddown. Increases would range from 1 percent (NO_x) to about 17 percent (CO). Increases in emissions and addition of new stationary sources would be subject to air quality regulations and/or permitting review by FDEP. Since the base is already classified as a major stationary source, increased emissions from stationary sources, such as engine test cells, would not impact the base's status. There would be no new categories of stationary source emissions from the base, and increases in stationary source emissions would not be significant.

Emissions of criteria pollutants from mobile sources would result from increased aircraft operations at the base due to additional based aircraft and additional annual sorties. Emissions would increase due to added takeoff and landing operations at the base, as well as AGE and GSE operations associated with each takeoff and landing operation. Minimal emissions would result from maintenance run-ups since the F-22 has eliminated the need to run these checks (as compared to the many needed for the F-15C).

Direct emission increases of all criteria pollutants is less than 220 tons per year. These emission increases from the F-22 beddown are small in comparison to the Eglin AFB baseline and compared to Okaloosa County totals. The increases in emissions represent less than a 1-percent contribution to countywide emissions.

Indirect emissions are those not generated from sources at the base but which contribute to the regional inventory, such as emissions from vehicles from commuting personnel and construction workers. Table EG3.3-4 shows the total regional (direct and indirect) contribution from the beddown at Eglin AFB.

Table EG3.3-4. Regional Emissions for Eglin AFB Affected Environment

Source Category	POLLUTANTS (TONS PER YEAR)				
	CO	*VOCs*	*NO_x*	*SO_2*	*PM_{10}*
Base Emissions (Direct)	180.2	21.5	6.8	2.7	8.7
F-22 Commuting Contribution (Indirect)	20.6	3.0	2.5	0.1	0.1
TOTAL F-22 Projected Contribution	200.8	24.5	9.3	2.8	8.8
Regional Emissions (Three-County Area)	145,843	28,585	23,078	7,758	24,978
TOTAL Percent F-22 Projected Regional Emissions Contribution	0.1%	0.1%	<0.1%	<0.1%	<0.1%

Emissions from the F-22 beddown, including indirect commuting emissions, are also evaluated in the context of regional emissions. Emissions from the F-22 beddown would be insignificant in relation to regional sources of emissions and would contribute 0.1 percent or less to the total regional (three-county area emissions).

Conformity requirements could potentially be triggered by indirect sources from the action which affect the Pensacola airshed (Escambia and Santa Rosa counties), which is currently expected to be nonattainment for the new 8-hour O_3 standard. However, indirect emissions of O_3 precursors (NO_x and VOCs) are minimal due to the limited number of new personnel associated with the beddown. These emissions would be regionally insignificant and would not exceed conformity *de minimis* thresholds.

Temporary Construction Emissions		
	Tons per year	***% Regional Contribution***
CO	54	<0.1
VOCs	11	<0.1
NO_x	18	<0.1
SO_2	1	<0.1
PM_{10}	2	0.01

While construction activities are of temporary nature and short duration, emissions during the construction period were quantified in order to determine their impacts on regional air quality. The construction phase would span a three-year period from 2002 to 2004. Construction emissions were calculated for all 3 years, with the maximum annual emissions compared to existing baseline. Sources of emissions considered during the construction phase include exhaust from internal combustion engines, exhaust from diesel-powered construction equipment, fugitive dust from the construction site, as well as indirect emissions from construction worker commuting. Construction emissions would be negligible compared to base and regional emissions and would represent less than 0.1 percent of the regional emissions.

Visibility impairment due to base emissions from the Eglin alternative is not of concern since there are no PSD Class I areas within a 62-mile (standard review distance) radius of Eglin.

Comparative Summary of the Five Potential Basing Locations

Impacts to air quality at Eglin would be minimal. No substantive difference exists among the bases relative to air quality, and none of the bases would exceed regulatory thresholds. The contribution of annual regional emissions of criteria pollutants would be less than 0.01 percent at Eglin, Langley,

and Elmendorf; between 0.1 and 10 percent at Mountain Home; and between 0.1 and 1 percent at Tyndall.

EG3.3.2 Airspace

Affected Environment

The likelihood for air quality impacts to the airspace was evaluated based on the floor altitude of the MOAs and Warning Areas relative to the mixing height for pollutants (3,000 feet AGL). The affected environment for Eglin AFB includes both overland (two MOAs) and over-water airspace (four Warning Areas) with floors below the mixing height. Air quality in the over-water area is good due to the meteorological conditions and the limited number and size of pollution sources. The primary source of emissions within the over-water area due to Eglin AFB activities is aircraft operations. Other minor sources include the flight of drones and ordnance test and training activities. Eglin AFB F-15Cs fly 10 percent or less below the mixing height in the Warning Areas and about 95 percent or less in the MOAs.

The affected airspace does not overlie any nonattainment or PSD Class I areas where visibility is protected. Of the eight airspace units listed, the Tyndall LLA MOA is the closest (within 20 miles) to a Class I area (St. Marks Wilderness).

Table EG3.3-5 summarizes baseline emissions for aircraft operating in the affected airspace. Appendices AO-1 and AO-3 provide details of the calculations used to estimate aircraft emissions in these airspace units. Emission concentrations associated with aircraft operations are minimal due to the large size of the airspace units. Because these emissions are dispersed over millions of acres, much of it over water, they do not measurably affect air quality.

Table EG3.3-5. Baseline Emissions for Eglin AFB Affected Primary Airspace

	Pollutants (tons/year)				
Affected Airspace[1]	*CO*	*VOCs*	*NO_x*	*SO_2*	*PM_{10}*
Camden Ridge/Pine Hill MOAs	7.04	3.26	334.94	0.52	1.39
Tyndall LLA MOA	6.76	2.43	273.88	0.39	0.65
W-151	17.30	4.59	358.86	0.62	4.53
W-155	0.22	0.07	8.83	0.01	0.01
W-453	5.33	2.39	52.45	0.14	1.93
W-470	10.26	3.14	374.99	0.52	1.29

Note: 1. Airspace units with a floor below 3,000 feet AGL (mixing height).

Environmental Consequences

Table EG3.3-6 summarizes projected emissions in the primary affected MOAs and Warning Areas for the Eglin AFB alternative. Emission increases in primary airspace units would increase only in the offshore Warning Areas (W-151, W-155, W-453, and W-470). These emission increases, the

result of increased sortie-operations, combined with higher emission rates for the F-22 (compared to the F-15C), are appreciable only for NO_x and are less than 10 tons per year for W-151, W-155, and W-453 and less than 20 tons per year for W-470. Since these increases in emissions would be both generated and dispersed over millions of acres of over-water areas (W-470 covers over 4.4 million acres), the impact on air quality would not be significant.

Decreases in criteria pollutant emissions in the over-land airspace units (Camden Ridge/Pine Hill MOA and Tyndall LLA MOA) would be the result of the lower amount of F-22 flying time at altitudes below the mixing height compared to F-15Cs. This would offset potential emission increases due to increased number of sortie-operations and higher F-22 aircraft emissions. In general, emissions in the airspace units for Eglin would be less due to the higher altitudes the F-22s would use to conduct their training.

Comparative Summary of the Five Potential Basing Locations

Emissions from aircraft operations in the training airspace would be transitory and dispersed over extensive areas. Overall emissions in the airspace would be minimal and no substantive difference exists among the bases relative to air quality.

Table EG3.3-6. Projected Emissions for Eglin AFB Affected Primary Airspace

	POLLUTANTS (TONS/YEAR)[1]				
Affected Airspace	*CO*	*VOCs*	*NO_x*	*SO_2*	*PM_{10}*
Camden Ridge/Pine Hill MOAs	5.82	2.86	286.16	0.46	1.34
Tyndall LLA MOA	6.12	2.27	249.06	0.38	0.72
W-151	17.47	4.72	366.76	0.65	4.68
W-155	0.25	0.09	10.05	0.02	0.03
W-453	5.34	2.41	54.16	0.15	1.95
W-470	10.61	3.40	390.83	0.58	1.58

Note: 1. To compare totals to baseline, refer to Table EG3.3-5.

EG3.4 Safety

EG3.4.1 Base

Affected Environment

Aircraft safety concerns typical for bases include aircraft mishaps and bird-aircraft strikes. Aircraft mishaps and their prevention, represent a paramount concern for the Air Force. Class A mishaps, associated with a loss of life, loss of an aircraft, or costs in excess of $1 million, provide an indicator of aircraft safety. Through 30 September 1999, the F-15C has a lifetime historical Class A mishap rate of 2.65 per 100,000 flying hours or one mishap every 37,736 flying hours (Air Force 2000a). Using this rate, a Class A mishap would be predicted to occur once about every 2.5 years. There

have been two Class A mishaps in the last five years involving F-15C aircraft from Eglin AFB. This equates to an accident rate of 2.65, the same rate as the F-15C historical lifetime rate (personal communication, Whitney 2000).

Data on mishaps within 10 nautical miles of an airfield reveal that 75 percent of aircraft accidents occur on or adjacent to the runway and in a corridor extending out from the end of a runway for 15,000 feet. Three zones within this corridor are established based on aircraft mishap patterns: the Clear Zone (CZ), Accident Potential Zone (APZ) I, and APZ II. Within the CZ, which covers a 3,000-by-3,000-foot area at the end of each runway, the overall accident risk is highest. APZ I, which extends for 5,000 feet beyond the CZ, is an area of reduced accident potential. In APZ II, which is 7,000 feet long, accident potential is the lowest among the three zones. At Eglin AFB, on the north/south runway, the Air Force has acquired property within the CZ and the APZs off the north end of the runway. The zones off the south end of the runway are over the water (personal communication, Whitney 2000). On the east/west runway, the CZs are either over water (east) or over Eglin range land (west).

Bird-aircraft strikes and the hazards they present form another safety concern for aircraft operations. The Air Force Bird Aircraft Strike Hazard (BASH) Reduction Program was established to reduce bird strikes through awareness, bird control, bird avoidance, and aircraft design. Air Force Pamphlet 91-212, 1 April 1997, provides guidance for implementing an effective BASH reduction program. Appendix AO-1 of this Draft EIS contains additional information on the Air Force BASH Program.

Although not in a bird migration corridor, Eglin AFB maintains an aggressive BASH Program. Historically, Eglin AFB F-15C aircraft have experienced approximately five bird-aircraft strikes per year. Most of the incidents resulted in little or no damage to the aircraft, and none resulted in a Class A mishap (personal communication, Whitney 2000).

Environmental Consequences

Aircraft safety conditions would change as a result of the F-22 beddown except for the CZs and APZs at the base. Historically, when new military aircraft first enter the inventory, the accident rate is higher. However, it is impossible to predict the potential mishap level. Historical trends do, however, show that mishaps of all types decrease the more an aircraft is flown. Over time, operations and maintenance personnel learn more about the aircraft's capabilities and limitations. Some of this experience has already been gained for the F-22.

By the time the proposed F-22 operations at Eglin AFB would begin, the aircraft testing and pilot training phases of the aircraft's integration into the operational force will have progressed substantially. Significant knowledge will have been gained about the aircraft's safest flight regime. As the overall F-22 program proceeds from 2002 onward, the potential for mishaps would likely decrease to low levels comparable to other fighter aircraft. Since the F-22 design incorporates the most modern technology, knowledge is constantly being gained about the safe operating envelope of the aircraft. The F-22 will be flown by the most experienced pilots and will operate as safely as, or more safely than, other aircraft in the Air Force inventory.

Since the F-22 would operate in the same airfield environment as the F-15C, the overall potential for bird-aircraft strikes would increase because of the increased airfield operations associated with the F-22. The potential for increase would be mitigated to some degree because the F-22 would more rapidly reach altitudes above where the majority of the strikes occur.

Comparative Summary of the Five Potential Basing Locations

There would be no substantive difference among the bases relative to safety. Existing BASH programs and other safety programs would remain in place. For the additional runway at Mountain Home, safety zones would extend off base but would not be incompatible with existing land use.

EG3.4.2 Airspace

Affected Environment

As noted for the base, Eglin AFB F-15Cs have a mishap rate of 2.65, the same rate as the F-15C historical lifetime rate (personal communication, Whitney 2000). Since mishaps tend to occur more frequently around airfields and low-altitude flight regimes, activities of F-15Cs in the Warning Areas and MOAs do not have as high a potential for mishaps. Additionally, the potential for bird-aircraft strikes in the MOAs and Warning Areas is negligible because the F-15Cs fly most of the time at altitudes above the zone (3,000 feet AGL) where 95 percent of strikes typically occur.

Environmental Consequences

Although more sortie-operations are flown by the F-22, it would fly at higher altitudes more often than the F-15C. Neither aircraft mishaps nor bird-aircraft strikes would be expected to increase as a result of F-22 training in the airspace.

Comparative Summary of the Five Potential Basing Locations

There would be no substantive difference among the bases or training airspace units relative to potential safety impacts. The only difference would be a minor increase in flare use in overland areas for Elmendorf and Mountain Home, but both bases would continue to implement restrictions on flare use designed to minimize fire risks.

Natural Resources

Natural resources include native and exotic biota, their habitats, and the physical medium necessary for these resources to function. Biota are plant and animal life and are typically referred to as vegetation and wildlife, respectively. When groups of plant and animal species in a given area are linked by ecological processes they are referred to as communities. A special community designation discussed in this document is Threatened, Endangered and Special Status Species/Communities. This designation refers to those plant and animal species or areas that are afforded special regulatory status (i.e., Endangered Species Act [ESA]). The term *habitat* is also used to describe natural resources and refers to the necessary physical

and biological features to sustain plant and animal species. Physical medium, as discussed in this section, include the soil and water that provide the foundation for all biota. A description of the components used to define the affected environment, and methods used to evaluate baseline conditions are presented in Appendix NR-1.

Designations of special status species protection are generally in accordance with specific acts (i.e., ESA, Marine Mammal Protection Act [MMPA]) as established by specific agencies (i.e., United States Fish and Wildlife Service, National Marine Fisheries Service). Due to the overlapping jurisdiction of some agencies and acts, individual species often exhibit multiple state and federal status designations. For example, species identified as federal threatened or endangered in accordance with the ESA are often, but not always, also designated as threatened or endangered in accordance with state statutes. To avoid confusion and ensure clarity in the Draft EIS, please refer to Appendix NR-2 when counting special status species or determining the special status designations of species potentially occurring on base and under the affected airspace.

No-Action Alternative

Although considered negligible, ongoing impacts to natural resources would continue under the no-action alternative.

Under the no-action alternative, Eglin AFB would continue to manage its natural resources in accordance with state and federal regulations and in accordance with the Eglin AFB Integrated Natural Resources Management Plan. Eglin AFB would continue to employ best management practices, such as the use of filter fences and vegetative plantings for erosion control and shoreline stabilization and wetland enhancement projects. Under the no-action alternative, threatened, endangered, and special status species/communities, and marine communities would not be impacted. There would be no additional adverse impacts to soil and water resources.

EG3.5 Soil and Water

EG3.5.1 Base

Affected Environment

Eglin AFB is situated within the Choctawhatchee Bay and the Pensacola Bay Basins. The F-22 construction area is located approximately 6,800 feet east of Garnier Creek and 4,200 feet west of Tom's Creek. These perennial streams flow to the Choctawhatchee Bay and ultimately discharge to the Gulf of Mexico. Water quality within these areas has been rated as good to fair by FDEP (FDEP 2000b).

Soils at Eglin AFB are almost entirely Entisol, although Histosols and Ultisols occur in association with stream channels and or man-made drainage ditches. Entisols on base formed in the deep sands of upland and alluvial terraces and silty clays of coastal marine terraces. Histosols have a high content of organic matter and are frequently referred to as muck or peat soils. Ultisols are highly developed and leached soils characterized by accumulated clay in a lower soil layer called the argillic horizon (Air Force 2000, Natural Resources Conservation Service 2000).

Environmental Consequences

Construction would disturb 10 acres of soil in a developed area with a history of ground disturbance.

Construction would disturb 10 acres of previously disturbed land. Approximately 64.5 tons of soil are expected to erode due to F-22-related construction activities. Refer to Figure EG2.1-1 for construction area and proposed building locations. Since more than five acres would be disturbed by construction, a NPDES stormwater permit would be required. Under the permit, the base must develop a Storm Water Pollution Prevention Plan (SWPPP) that describes best management practices to be implemented to eliminate or reduce sediment and non-stormwater discharges. With proper design and implementation of the SWPPP, impacts from erosion and offsite sedimentation would be negligible. This would be similar to the potential consequences for soil and water at Langley AFB.

Comparative Summary of the Five Potential Basing Locations

Impacts to soils and water at Eglin would be minimal and similar to Langley and Elmendorf. Land area disturbed would be approximately 16 acres for Langley; 10 acres for Eglin; 46 acres for Elmendorf; 440 acres for Mountain Home; and 73 acres for Tyndall. Based on area affected, the greatest potential for impacts to soils and water would occur at Mountain Home followed by Tyndall.

EG3.6 Terrestrial Communities (Wildlife and Vegetation)

EG3.6.1 Base

Affected Environment

In presettlement times, land that now encompasses Eglin AFB was covered mostly with longleaf pine. Historically, logging and suppression of fire had the most effect on wildlife and habitat. Despite this effect, much of the undeveloped land on Eglin AFB remains in a relatively natural condition (Air Force 1995).

Terrestrial resources on Eglin AFB and surrounding lands are classified into five terrestrial ecological associations (including sandhills, sandpine, flatwoods, pine/mixed hardwood, and barrier island) (Air Force 1999d). Wildlife species reflect the diversity of ecological associations and include reptiles, amphibians, raptors, shorebirds, and large and small mammals. Common plant and animal species and habitat characteristics of the base are summarized in Appendix NR-3.

Environmental Consequences

Approximately 10 acres would be disturbed to construct facilities that support the F-22 squadrons. This does not include new construction that would likely be required off base to house the estimated 218 additional base personnel. Construction on base would take place on previously disturbed ground including landscaped and paved areas that contain little, if any, native vegetation. Eglin AFB is similar to Langley AFB in that construction activities on base would displace disturbance-tolerant

species occupying marginal habitat. Therefore, adverse effects to individual species and overall biodiversity are expected to be negligible.

An increase in area (about 4,206 acres) would occur under the projected noise contours (i.e., above 65 DNL) with the Eglin AFB alternative. Wildlife species inhabiting areas under noise contours associated with the base have likely habituated to aircraft noise, and the proposed changes in noise levels would not be expected to represent biologically significant changes for these species (see Appendix NR-4 for a discussion of the effects of noise on wildlife).

Comparative Summary of the Five Potential Basing Locations

Impacts to the terrestrial community on base were determined from an analysis of the quantity and diversity of habitat and species in the proposed construction zone and under the noise contours for the F-22. Construction at Eglin would affect 10 acres of previously developed area; much of the remaining base is similarly developed and exhibits marginal habitat and relatively low species diversity. The amount (16 acres) and quality of habitat in the construction area at Langley is similar to Eglin. Construction at Elmendorf would affect a larger (46 acres), more naturally diverse area than either Langley or Eglin. Mountain Home would affect disturbed habitat dominated by exotic species; however, the sheer size (440 acres) of the construction area would have an effect greater than Langley or Eglin and similar to Elmendorf. Construction at Tyndall would affect 73 acres of habitat supporting a diversity of species; areas adjacent to the construction area and under the base noise contours support the highest diversity of habitat and species relative to any of the base alternatives.

EG3.6.2 Airspace

Affected Environment

As shown in Figure EG2.2-1, overland airspace includes four MOAs and almost 5,200,000 acres of land in three states (see Appendix NR-3). Upland forests cover almost 62 percent of this land. Mixed conifer and deciduous forests are the most common types in the Alabama and Georgia MOAs, while conifer plantations are the most common forest type in the Tyndall MOAs in Florida (see Appendix NR-3). A total of 748,047 acres of special use areas (e.g., state parks, national forest lands, wildlife refuges, and water management and conservation areas) occur under the four MOAs. Part of the airspace includes the biologically diverse Apalachicola River and Apalachicola National Forest.

Environmental Consequences

Based on projected aircraft operations and review of the literature on the effects of noise on wildlife (see Appendix NR-4), impacts to wildlife under airspace used by Eglin AFB would not be significantly different from baseline conditions. Although there are more sensitive biological habitats than under Langley AFB airspace, no terrestrial populations would be expected to be adversely affected for the following reasons: (1) many wildlife species have habituated to (become used to) subsonic noise associated with jet aircraft, and there will be no perceptible increase in subsonic noise levels; (2) the percent of F-22 flight time (5 percent) below 5,000 feet AGL would be less than half current F-15C use (11 percent); (3) existing airspace restrictions over certain sensitive

areas such as wildlife refuges and sensitive habitats would continue; (4) use of chaff and flares in the airspace would continue at rates similar to baseline; and (5) supersonic flight would not occur over land for the Eglin AFB alternative.

Comparative Summary of the Five Potential Basing Locations

Because proposed differences in subsonic noise levels under airspace are not expected to be biologically significant, impacts to the terrestrial community were primarily determined from an analysis of the number and altitude of sonic booms relative to the size, type, and diversity of habitat underneath airspace. Supersonic activity would occur only over-water Warning Areas for Eglin, Langley, and Tyndall and only above 10,000 feet MSL. Because Eglin and Tyndall airspace covers a larger, more biologically diverse area, impacts to the terrestrial community are expected to be relatively greater at these bases than at Langley. Because Elmendorf overland airspace includes a diversity of species and special habitat areas that would be subject to sonic booms, impacts would be similar to Eglin and Tyndall. Increases in sonic booms in the airspace associated with Mountain Home would be substantial. This factor, in combination with the number and nature of wildlife species underlying the Mountain Home airspace, suggests that potential consequences would be greater than those associated with any of the five locations.

EG3.7 Wetland and Freshwater Aquatic Communities

EG3.7.1 Base

Affected Environment

Wetlands are found in all ecological associations on Eglin AFB and are estimated to cover 49,700 acres and include 11 types. Streams and other water bodies on base encompass about 600 acres. Streams and rivers on Eglin AFB are divided into four categories: (1) alluvial streams; (2) backwater streams; (3) seepage streams; and (4) spring run streams.

Environmental Consequences

No wetlands, streams, creeks, or ponds/lakes are identified in the proposed construction area; therefore, wetland and freshwater aquatic communities would not be directly impacted. Best management practices would be applied to control sedimentation and erosion during construction, thereby avoiding secondary impacts to wetlands. A Clean Water Act Section 404 permit for discharges to waters of the United States is not anticipated. As may be required by Executive Order 11988 (Floodplain Management) and 11990 (Protection of Wetlands), the appropriate designee of the Secretary of the Air Force will publish a "finding of no practicable alternative" for any activities impacting floodplains and wetlands, respectively.

Comparative Summary of the Five Potential Basing Locations

Impacts to wetlands and freshwater aquatic communities were determined from the extent of filling, draining, and sedimentation anticipated during construction. Direct impacts to wetlands would not occur at Eglin, Langley, or Elmendorf. Construction at Mountain Home could impact aquatic communities (including wetlands) although a jurisdictional wetland delineation would be required to

make a final determination. Potential impacts to wetlands (26 acres) and the need for a Section 404 permit are greatest at Tyndall although a jurisdictional wetland delineation would be required to determine the precise acreage of wetland impact.

EG3.7.2 Airspace

Affected Environment

Wetlands and aquatic habitat cover an estimated 652,500 acres under the overland MOAs (see Appendix NR-3). Forested wetlands are much more common in all areas (see Appendix NR-3).

Environmental Consequences

The proposed action would not fill or otherwise directly impact wetlands under airspace. Impacts to wildlife that use these habitats are discussed in sections EG3.6 and EG3.9.

Comparative Summary of the Five Potential Basing Locations

Direct impacts to wetlands and freshwater aquatic communities underlying airspace are not anticipated as a result of the proposed action and alternatives. Indirect impacts to species comprising these communities would not be appreciably different among locations and are expected to be negligible.

EG3.8 Threatened, Endangered, and Special Status Species/Communities

EG3.8.1 Base

Affected Environment

Seventy-seven special status species occur or have the potential to occur on Eglin AFB (Chafin and Schotz 1995, Air Force 1999d). Scientific names and areas of occurrence for each special status species/communities are provided in a table in Appendix NR-2.

Fourteen federally listed species are known to occur on Eglin AFB (see Appendix NR-2). Twelve of these, excluding the American alligator and flatwoods salamander, all are listed as threatened or endangered by the state of Florida. The American alligator is not threatened or endangered, but is federally listed because of its similar appearance to the endangered American crocodile. For discussion of protected sea turtles see LA3.8.1.

Sixteen high-quality natural areas have been identified on base (Kindell et al. 1997). These areas often support special status species like those identified in Appendix NR-2.

An additional 37 state listed species that are not listed under the ESA occur on Eglin AFB (Appendix NR-2). Forty-three federal species of concern and/or state species of special concern occur on Eglin AFB (see Appendix NR-2).

Environmental Consequences

It is highly unlikely that any listed or special status plant or animal species occur in the area proposed for construction. An occasional southeastern American kestrel may fly through the area, and the least tern may nest on nearby flat-roofed buildings. Noise from construction or aircraft operations on base may affect the least tern; however, noise under the Eglin alternative will be similar to existing conditions on base. Surveys for the least tern would be conducted prior to any construction.

Comparative Summary of the Five Potential Basing Locations

Impacts to threatened, endangered, and special status species/communities were determined by the potential of these species/communities to be impacted during construction or from aircraft operations under the base noise contours. Construction and aircraft operations at Eglin and Elmendorf are unlikely to affect special status species/communities; however, the proximity of protected species (least tern at Eglin and Beluga whale and six state species at Elmendorf) result in a slightly higher potential for impacts at these bases than at Langley. Langley has the lowest potential for adverse consequences because construction and aircraft operations would have no effect on special status species/communities. Additional surveys and species information at Eglin and Elmendorf could result in a no effect determination for these species. Mountain Home has a slightly greater potential for impacts because habitat of the burrowing owl, a special status species, may be affected. Tyndall has the greatest potential for impacts because the threatened flatwoods salamander uses habitat similar to that found in the construction zone.

EG3.8.2 Airspace

Affected Environment

Fifty-seven special status species are known to occur in areas underlying the MOAs (see Appendix NR-2). Sensitive species occurring in this area include 9 fish, 5 marine turtles, eastern indigo snake, gopher tortoise, red-cockaded woodpecker, bald eagle, southeastern osprey, American kestrel, brown pelican, numerous sensitive species of wading birds, manatee, and 27 species of whales and dolphins. The bald eagle and osprey nest in the Apalachicola estuary and the highest density of nesting osprey along the northeast Florida gulf coast occurs in this area (Air Force 1987).

Environmental Consequences

Literature on the effects of noise on wildlife (including sensitive species) is summarized in Appendix NR-4. Literature on noise suggest that aircraft operations proposed for the Eglin alternative will not adversely affect special status species and communities relative to baseline conditions.

Comparative Summary of the Five Potential Basing Locations

Training airspace associated with Eglin, Langley, and Tyndall that is used for supersonic activity consists entirely of over-water Warning Areas and, therefore, the potential for impacts to special status species/communities at these bases are lowest for the five locations. The bases with only overland airspace, Mountain Home and Elmendorf, tend to have a greater potential for impacts to

special status species due to supersonic activity and associated increases in sonic booms. Because the Mountain Home airspace is essentially one unit, the effects of sonic booms would be less dispersed, and the potential for impact greater, than at Elmendorf.

EG3.9 Marine Communities

EG3.9.1 Base

Although Eglin AFB property does not include marine habitats, sections of the margins of the base abut waters of Choctawhatchee Bay and noise contours associated with this alternative extend over marine habitat. Base activities associated with this alternative would not affect marine communities. Marine communities occur only under airspace and are, therefore, not discussed in this section.

Comparative Summary of the Five Potential Basing Locations

Relatively small components of Eglin, Langley, and Tyndall include marine communities; however, the lack of physical disturbance to the marine environment and the lack of biologically significant changes in noise conditions on base are expected to result in negligible affect to the marine community. Because training airspace for Mountain Home and Elmendorf does not overlie marine communities, there would be no potential for impacts.

EG3.9.2 Airspace

Affected Environment

The Gulf of Mexico is characterized by a shallow and, in places, broad continental shelf, steep slopes leading from the shelf, two large deep-water plains, and scattered regions where the bottom is somewhat raised (Weber *et al*. 1992). The average depth is more than three-quarters of a mile and the maximum depths in the deep waters is more than two miles.

The Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. 1801 et. seq. requires federal agencies to assess potential impacts to Essential Fish Habitat. Aircraft operations under the Eglin airspace will not impact Essential Fish Habitat.

Fish species of the eastern Gulf have been generally described as a warm-temperate assemblage (Briggs 1973). The entire affected area falls within the Essential Fish Habitat of one commercial fish species or another at any given time of the year (Gulf of Mexico Fishery Management Council 1998).

Approximately two-thirds of the breeding bird species of the eastern United States migrate through the eastern Gulf on their way to Central and South America, Mexico, and the Caribbean (Keast and Morton 1980). Marine vertebrates known to occur within the affected area include sea turtles, whales and dolphins (cetaceans), and manatees. Figure EG3.9-1 includes recent sightings of marine mammals from ship and aerial surveys conducted from 1992 – 1997 by the NMFS (Davis *et al*. 2000).

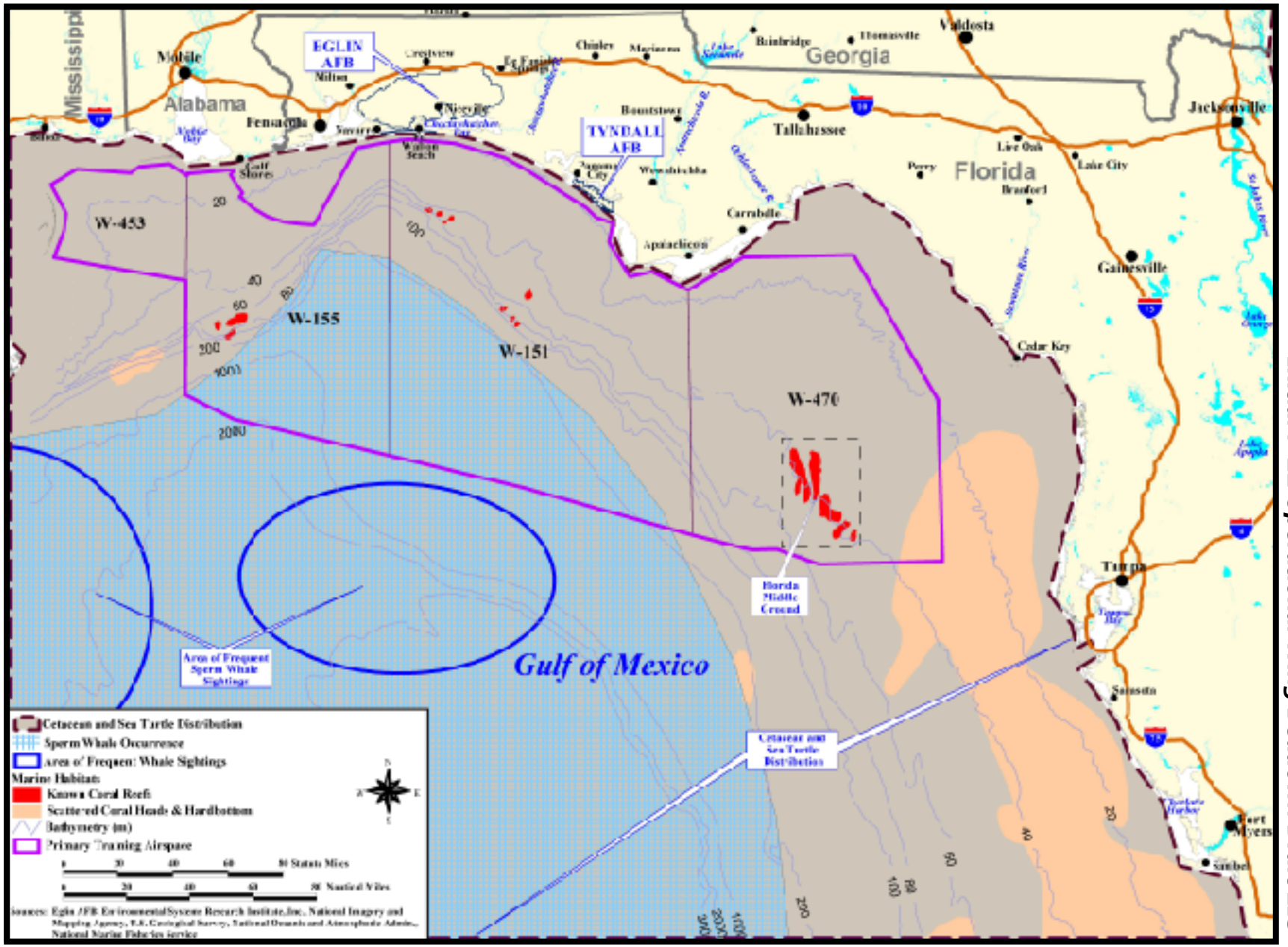


Figure EG3.9-1
Marine Communities Identified Under the Airspace Associated with Eglin AFB

At scoping there were concerns about noise effects on marine mammals.

The Florida Middle Grounds, the principal hard-bottom in the eastern Gulf, is the most biologically developed live bottom in the eastern Gulf (Bright and Jaap 1976; Rezak and Bright 1981). It is a habitat for as many as 197 species of fish and has been designated as a Special Biological Resource Area and as a Habitat of Particular Concern by the Gulf of Mexico Fishery Management Council (50 CFR 638) (Hopkins *et al.* 1977, Rezak and Bright 1981).

Sargassum, or Gulf-weed, is another Special Biological Resource Area and, a dominant genus in shallow waters, is a free-floating brown algae that is present in the tropics and subtropics including the Gulf of Mexico. Mats of floating *Sargassum* provide an important niche for numerous species and support a community of animals not found elsewhere.

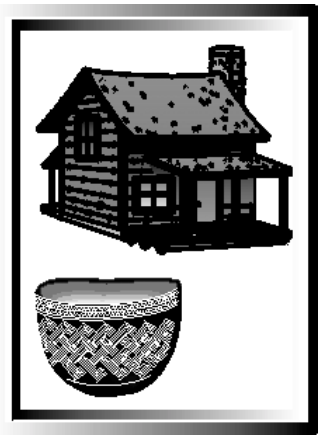
Environmental Consequences

The Eglin AFB F-22 Operational Wing beddown alternative would have no effect on submerged marine communities, such as hardbottom areas and seagrass beds, or Essential Fish Habitat. Operational F-22 sortie-operations would occur primarily over deep water and at altitudes greater than 5,000 feet, thus limiting noise at the surface and not adversely affecting marine communities. A summary of noise effects on sensitive marine species is presented in Appendix NR-4. Bird and aircraft collisions are discussed in EG3.4. No critical habitat would be directly affected by F-22 training from Eglin and no significant impacts are anticipated to any MMPA species. The number of protected species that occur under the Gulf over-water ranges suggests slightly greater potential for consequences than the Atlantic over-water ranges associated with the proposed action.

Comparative Summary of the Five Potential Basing Locations

The potential for impacts to the marine community under Eglin, Langley, and Tyndall airspace is low due to current restrictions on flying below 5,000 feet MSL and the absence of supersonic flight below 10,000 feet MSL. Because training airspace for Mountain Home and Elmendorf do not overlie marine communities there would be no potential for impacts.

Cultural and Traditional Resources



This section identifies the affected environment and environmental consequences for both cultural and visual resources. Cultural and visual resources are grouped for this analysis because they often address similar visual landscape issues.

Cultural resources are any prehistoric or historic district, site, building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. Cultural resources include archaeological resources (both prehistoric and historic), historic architectural resources, and traditional resources. Significant cultural resources are considered for potential adverse impacts. Significant resources are those that are eligible for inclusion in the NRHP or that are identified as important to traditional groups. Significant

traditional resources are identified by Native American or other traditional groups. DoD *American Indian and Alaska Native Policy* (November 21, 1999) requires an assessment, through consultation, of the effect of proposed DoD actions that may have the potential to significantly affect protected tribal resources, tribal rights, and Indian lands, before decisions are made by the services.

Visual resources are usually defined as areas with unique features that are a result of the combined characteristics of the natural and human aspects of land use. Examples of the natural aspects of land include wild and scenic rivers, topography, and geologic landforms. Examples of human aspects of land use include scenic highways and historic districts. The assessment of visual and aesthetic value involves a characterization of visual features in the study area.

The area of analysis for cultural resources considers both the immediate location of ground actions on base, as well as areas under airspace. For visual resources, analysis focuses on construction-related visual impacts within the base itself. Outside the base, aircraft are visually common and this action would not represent a change. A detailed description of impact analysis methods for cultural and visual resources is provided in Appendix CR-1.

No-Action Alternative

The no-action alternative would have low to negligible impacts to cultural resources because of the nature of the ongoing activities at Eglin AFB. In the event that features are discovered during any activity, Eglin AFB would implement the standard Air Force procedures in Air Force Instruction 32-7065 for unanticipated archaeological discoveries and maintain compliance with applicable regulations and established procedures for the protection and conservation of cultural resources.

Under the no-action alternative, visual resources would not be impacted. Eglin AFB would continue to operate as an active air base. There would be no change in the overall scenic perspectives on base or any changes that would obscure views of the base.

EG3.10 Visual

EG3.10.1 Base

Affected Environment

Eglin AFB can be seen from a number of different public viewpoints. Some public highways, such as State Routes (SR) 85, 285, and 87, run through the base. Forested areas, wildlife, and the occasional military structure characterize views from these highways.

Eglin AFB is in the East Gulf Coastal Plain physiographic region. The northern half of the base is in the Western Highlands physiographic province. Elevations in this part of the base range from 100 to 200 feet MSL. Much of the southern half of the base (including Eglin Main, Hurlburt Field, and the southern mainland portions of Eglin AFB) is in the Coastal Lowlands physiographic province, an area characterized by beach ridge plains, shorelines, and marine terraces. Portions of the eastern part of the base front onto Choctawhatchee Bay, while portions of the western part of the base front onto the East Bay. The topography of the base is generally flat. The only portions of the base that have slopes greater than 15 percent are the banks of creeks.

As Eglin AFB covers a large expanse of land, development is scattered throughout the area. The runway and taxi system is located in the central portion of the base. The residential area is generally clustered around the scenic Choctawatchee Bay. These structures consist of a mixture of architectural styles ranging from World War II to modern. Much of the base is undeveloped and consists of upland coniferous forests and hardwood forests. With the rural, forested nature of the base, wildlife is common. Typical wildlife seen include deer, squirrels, armadillo, and raccoons, as well as variety of amphibians and reptiles and birds. The Eglin Main area is located in the central portion of the base and is zoned for administrative use and aircraft operations and maintenance. Many single- and multi-level structures are present in this area.

Environmental Consequences

Determination of the significance of the impact on visual resources is based on the level of visual sensitivity in the area (refer to Appendix CR-1 for a description of the analytical approach).

Eglin AFB is currently exposed to military aircraft overflights. As a result of using the base daily for takeoffs and landings, military aircraft have become a common and expected aspect of the visual environment. Under this alternative, the use of the F-22 aircraft would increase overall sorties by 16 percent. This minor increase would not likely affect visual resources, as visual sensitivity on base is low and existing aircraft overflights are common.

Construction projects included in this alternative would be designed and constructed in similar architectural fashion to the existing environment and compatible with existing facilities and structures. Much of the construction associated with this alternative would occur in the Eglin main area, where this type of development is typical. The addition of new structures to previously undeveloped areas would not alter the visual character of the area, because similar buildings exist in the surrounding areas, and operations-type buildings would be expected in an airfield environment.

Comparative Summary of the Five Potential Basing Locations

The potential for visual impacts is low at all bases because of the pre-existing military character and industrial uses. Eglin has less likelihood of impacts compared to Langley and Elmendorf and is similar to Tyndall and Mountain Home.

EG3.11 Cultural

EG3.11.1 Base

Affected Environment

Archaeological Resources

More than 900 archaeological sites have been recorded at Eglin AFB (Air Force 1995). None of these lie within the area of affected environment for the proposed action. An estimated 36 percent of Eglin lands are considered to have a high probability for unrecorded cultural resources; 56 percent of the base has been designated low probability; and 8 percent is of undetermined probability (Air Force 1995).

Architectural Resources

Table EG3.11-1 shows the six architectural resources at Eglin AFB that are listed on the NRHP (see Figure EG3.11-1). None of the proposed construction activities would take place within either of the historic districts or at the other NRHP-listed sites. Appendix CR-2 lists buildings that contribute to the NRHP-eligibility of Eglin's historic districts.

Table EG3.11-1. National Register-Listed Properties at Eglin AFB

County	*Property*	*Location*
Okaloosa	Camp Pinchot Historic District	Eglin AFB
	Eglin Field Historic District	Eglin AFB
	McKinley Climatic Laboratory	Building 440, Eglin AFB
	Operation Crossbow Site	Eglin AFB
	World War II JB-2 Mobile Launch Site	Eglin AFB
	World War II JB-2 Launch Site	Eglin AFB

Source: NRIS 2000

In addition to NRHP-listed historic properties and districts, Eglin AFB has a variety of other buildings that are eligible for the NRHP because of their association with the historic military mission. Ten structures within the 33rd Fighter Wing (FW) area (Buildings 1318, 1326, 1328, 1343, 1344, 1345, 1351, 1352, 1353, and 1355) recently have been identified as NRHP-eligible because of their association with the prior Strategic Air Command mission at the base. Building 1353 is proposed for possible demolition under the present action. There are also several hangars east of the flightline that are potentially eligible for the NRHP.

Traditional Resources

No traditional resources have been identified at Eglin AFB (Air Force 1995). The base has ongoing consultation with Native American groups with ties to the base region. Records review identified the following federally recognized Indian tribes with potential ties to the Eglin AFB area: the Mississippi Band of Choctaw Indians, Philadelphia, Mississippi; the Seminole Tribe, Hollywood, Florida; the Miccosukee, Miami, Florida; the Seminole Nation of Oklahoma, Wewoka, Oklahoma; and the Poarch Band of Creek Indians, Atmore, Alabama (Air Force 1995).

Environmental Consequences

The Eglin AFB alternative would include construction of seven new buildings and associated infrastructure, possible demolition of Building 1353, additions to Building 1363, and hangar upgrades. None of the construction activities would take place within either the Camp Pinchot Historic District or the Eglin Field Historic District.

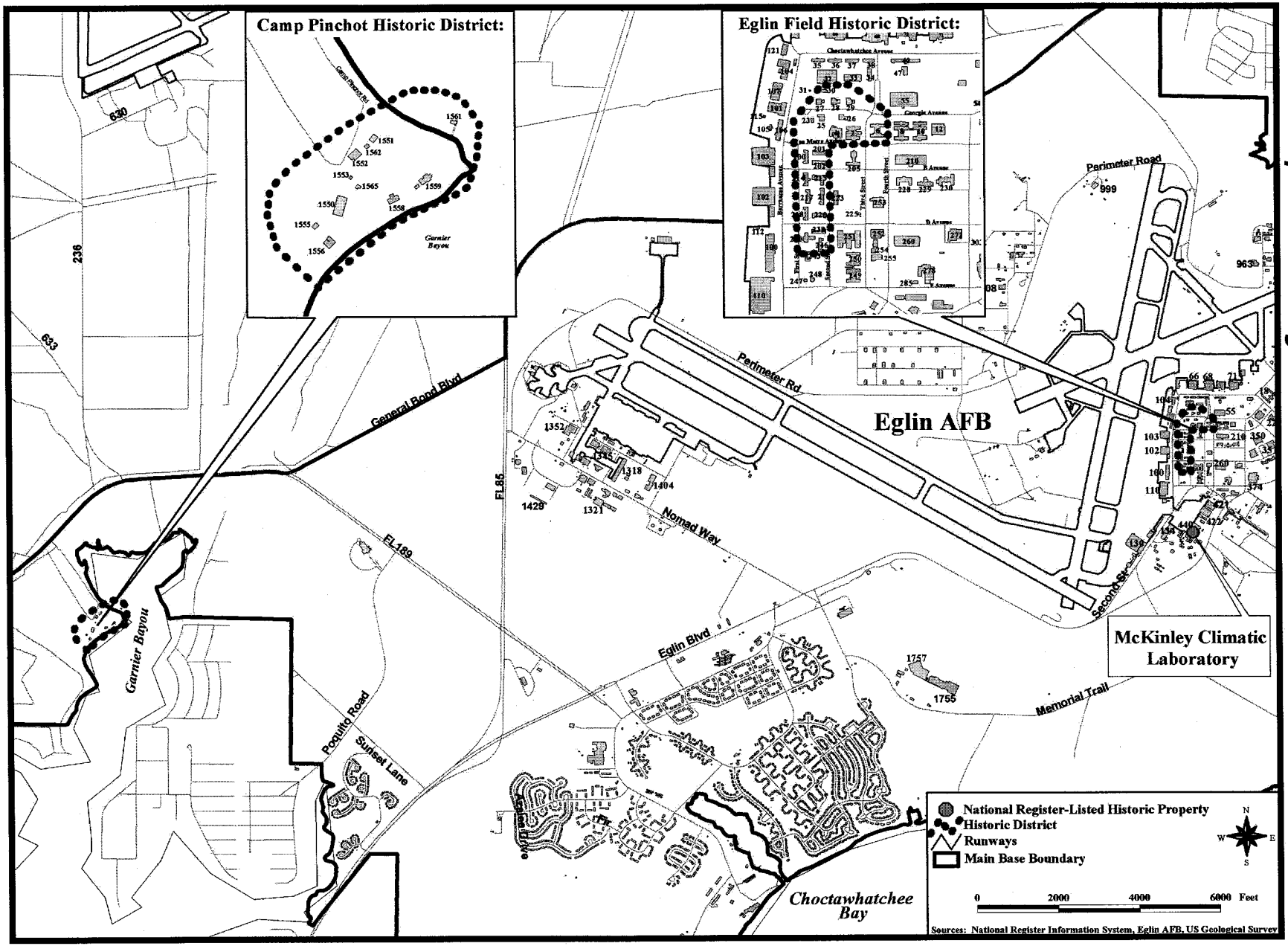


Figure EG3.11-1
Eglin AFB Historic Districts

As at Langley AFB, no impacts to archaeological or traditional resources are expected at Eglin AFB. Proposed project construction lies within the main base in an area of low probability for cultural resources (Air Force 1995). Although it has not been surveyed for archaeological resources (Air Force 1995), the area is disturbed by past use and is unlikely to contain intact cultural deposits. Unsurveyed areas would be addressed in compliance with Section 106 of the NHPA prior to construction.

Impacts to architectural resources in the 33rd FW area could occur under this alternative although there would be fewer impacts than expected at Langley AFB. At Eglin AFB, building 1353 is proposed for possible demolition, and Buildings 1343 and 1344 are in the possible location of two new Fighter Squadron Operations facilities. In addition, several hangars east of the flightline are potentially eligible for the NRHP. Following the development of final siting plans, the Section 106 process, including consultation with the Florida DHR, would be completed prior to the beginning of construction or renovation associated with this alternative. Alterations to significant historic properties would be conducted in compliance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings* (1995). Consultation with DHR regarding project plans has been initiated.

Table EG3.11-2 lists NRHP-eligible buildings in the vicinity of the proposed action.

Table EG3.11-2. Eglin AFB Buildings Associated with the Proposed Action

Building Number	*Proposed Action*	*NRHP Status*	*Effects*
1318	None	Eligible	No effect
1326	None	Eligible	No effect
1328	None	Eligible	No effect
1343	Possible demolition	Eligible	Adverse effect
1344	Possible demolition	Eligible	Adverse effect
1345	None	Eligible	No effect
1351	None	Eligible	No effect
1352	None	Eligible	No effect
1353	Possible demolition	Eligible	Adverse effect
1355	None	Eligible	No effect
Hangars	Upgrade	Potentially eligible	Potential effect

Impacts to traditional resources are not likely. No traditional resources have been identified within the main base (Air Force 1995). Consultation with interested Native American groups regarding actions at the base is ongoing.

Comparative Summary of the Five Potential Basing Locations

The potential for impacts to archaeological and traditional resources at all bases is low. Eglin would have less likelihood of impacts to architectural resources compared to Langley and would be similar to Elmendorf. Tyndall and Mountain Home would have the lowest likelihood of impacts because of the lack of historic structures.

EG3.11.2 Airspace

Affected Environment

A number of NRHP-listed properties have been identified under Eglin AFB airspace. In addition, many more eligible or potentially eligible cultural resources associated with the history of the region are likely to underlie project airspace. Appendix CR-2 lists NRHP-listed resources under Eglin airspace.

Camden Ridge/Pine Hill MOA. This airspace lies above southwestern Alabama. NRHP-listed properties under Camden Ridge MOA include residences and an archeological site. No federally recognized Indian lands underlie this MOA (BIA 1998).

Moody 3 MOA. This airspace is above the southwestern corner of Georgia along the Alabama border. NRHP-listed properties under Moody 3 airspace include courthouses, residences, a historic district, and a mound site. One National Historic Landmark (NHL), Kolomoki Mounds, lies under Moody 3 airspace. No federally recognized Indian lands underlie Moody 3 MOA (BIA 1998).

Rose Hill MOA. This airspace is above southern Alabama. NRHP-listed properties under this MOA consist of a residence, a courthouse, and a hydropower facility. No federally recognized Indian lands underlie Rose Hill MOA (BIA 1998).

Tyndall LLA MOAs. This airspace lies above the panhandle of northwestern Florida. NRHP-listed resources under the Tyndall MOAs include mound sites and other archaeological sites, a lighthouse, a courthouse, a schooner, churches, and a residence. One National Historic Landmark underlies the Tyndall MOAs: Governor Stone Schooner. No federally recognized Indian lands underlie this airspace.

W-155, W-151, W-453, W-470. This airspace lies over the Gulf of Mexico. There are no NRHP-listed properties under this airspace. The northern part of the MOAs overlies a potential area of submerged Native American sites and numerous known or potential submerged shipwreck sites along the coastline (Air Force 1995). In particular, waters under portions of W-151 are considered to have a high potential for both Native American sites and potential shipwrecks (Air Force 1995). W-470 also overlies a potential area of submerged Native American sites and known or potential submerged shipwreck sites (Air Force 1995).

Environmental Consequences

Projected F-22 overland airspace use under the proposed action would increase by about 0.2 to 2.6 percent over existing F-15C use (refer to section EG2.2-1). Subsonic noise would generally

decrease, especially in the Camden Ridge/Pine Hill MOA due to higher altitude flight. Supersonic activity (sonic booms) is expected to increase from about 2 per month in W-155 to about 44 per month in W-470. All supersonic actions are expected to take place above 10,000 feet MSL.

No impacts to cultural or traditional resources under airspace are expected under either the comparable Eglin AFB or Tyndall AFB alternatives. F-22s would typically operate at higher altitudes than F-15Cs, and subsonic noise would decrease over existing conditions. Increased supersonic activity is unlikely to produce a level of overpressures that would affect historic properties. None of the airspace overlies federally recognized Indian lands.

Previous and existing use of chaff and flares by F-15C aircraft is not known to have impacted cultural resources. Increased use by F-22 aircraft is also not expected to result in impacts. About 80 percent of flare release by F-22 aircraft is expected to occur above 10,000 feet MSL.

Comparative Summary of the Five Potential Basing Locations

No substantive difference exists among the bases' airspace relative to potential impacts to archaeological or architectural resources. Potential impacts to traditional resources are unlikely at Eglin, Tyndall, and Langley. Mountain Home and Elmendorf have greater potential for impacts.

Human Resources

The following resource discussion is concerned with the potential effects of the beddown of the Initial F-22 Operational Wing to the human environment. Human Resources include land use, socioeconomics, and environmental justice. Appendix HR-1 contains the methodological approach. The proposed F-22 operational beddown and related training activities would create changes in aircraft operations and overflights, which would in turn affect noise levels associated with each installation. Proposed activities that could potentially affect existing human resources also include construction of new facilities on each base.

The affected area for human resources includes areas on base and the surrounding vicinity specifically those jurisdictions whose economies are closely associated with activities at the base. For the land use and environmental justice resources, the effects on areas underlying the airspace are also presented.

No-Action Alternative

The implementation of the no-action alternative would have no impacts on land use, socioeconomics, or environmental justice. Land use and existing land use patterns would remain the same. Eglin AFB would continue to cooperate with the local communities in developing its Air Installation Compatible Use Zones programs. Eglin AFB would continue to operate and contribute to the economic health of the region. Under the no-action alternative, there would be no negative impacts to any resource area; therefore, there would be no negative or disproportionate impacts to minority or low-income populations, and environmental justice conditions would remain the same.

EG3.12 Land Use

EG3.12.1 Base

Affected Environment

Eglin AFB is located in Okaloosa, Walton, and Santa Rosa counties. The Eglin Main portion of the installation comprises 10,500 acres of the total 463,000 acres of Eglin AFB. Duke Field, located in a separate enclave approximately 11 miles north of Eglin Main, encompasses approximately 2,700 acres.

The airfield land use area of Eglin Main contains 2,006 acres and includes two runways, various taxiways, several aircraft parking ramps/aprons, and associated setbacks and clear zones. Aircraft operations and maintenance comprise 356 acres supporting the flightline activities. Industrial land uses comprise 2,057 acres in nine separate areas and include such uses as large facility infrastructure, fuels storage and management facilities, munitions storage areas, research and testing facilities, logistics, supply, and base engineer complexes. Three administrative land use areas comprise 92 acres including offices and service-oriented base support activities. Community-commercial and community-service land uses comprise nearly 500 acres. Residential uses comprise over 1,000 acres. Additional land uses include outdoor recreation (351 acres), open space (4,141 acres), and water (82 acres) (STV Incorporated 1996).

F-15 aircraft on the Okaloosa County seal depicts the close relationship between the county and Eglin AFB.

Land use planning on Eglin AFB is guided by several plans and programs. The Eglin AFB Land Use Plan component of the Base Comprehensive Plan presents a comprehensive planning strategy to support military missions assigned to the installation. The plan provides general information regarding the installation and describes existing land uses, a planning analysis of constraints and opportunities, future land uses, and implementation guidelines. The Integrated Natural Resources Transitional Plan provides interdisciplinary strategic guidance for base natural resources management.

Eglin Main shares a common boundary with both Okaloosa County and the city of Valparaiso. Boundary land uses are generally compatible and no major conflicts have been identified (STV Incorporated 1996). The county side of the boundary is developed with single-family homes and is zoned for low- and medium-density residential uses. Valparaiso shares approximately 24,800 feet of boundary along the northeast portion of Eglin Main. There is a scattering of private parcels with residences surrounded by reservation land. Table EG3.12-1 presents a list of land uses within the vicinity of the installation situated within the baseline 65 DNL noise contour line depicted on Figure EG3.2-1.

Table EG3.12-1. Land Uses within the Eglin AFB Baseline 65 DNL Noise Contour

Land Use	*Percent*
Residential	2
Commercial	1
Other Urban Uses[1]	2
Undeveloped Lands[2]	3
Water	24
Eglin AFB	68

Notes: 1. Includes transportation, communication, industrial, and institutional uses.
2. Agricultural uses, forests, wetlands, and beaches.
Source: FDEP 1999.

Base plans and studies present factors affecting both on- and off-base land use and include recommendations to assist on-base officials and local community leaders ensure compatible development. In general, land use recommendations are made for areas affected by both the potential for aircraft accidents (refer to section EG3.4, Safety) and aircraft noise (refer to section EG3.2, Noise). There are safety zones defined for each end of the runway based on the analysis of historic mishap data that defines where most aircraft accidents occur. At Eglin AFB, compatible land uses exist within the safety zones.

Other base plans and programs deal with noise contours generated by the modeling program NOISEMAP. These noise contours are used to describe noise exposure around the base and support compatible land use recommendations. Noise is one of the major factors used in determining appropriate land uses since elevated sound levels are incompatible with certain land uses. When noise levels exceed a DNL of 65 dB, residential land uses are normally considered incompatible. Further, the percentage of persons highly annoyed by noise can be estimated based upon varying noise levels. Noise exposure (depicted with contours) from operations occurring today at Eglin AFB are shown in Figure EG3.2-1. These contours provide the baseline against which to measure the projected change should the F-22 be based at Eglin AFB.

Noise sensitive receptors (hospitals, schools, and churches) may occur within the vicinity of an airfield. At Eglin AFB, one elementary school (Valparaiso Elementary) and one middle school (Lewis Middle) occur within the 65 to 70 DNL contour, north of the main base in Valparaiso. One church occurs within the 70 to 75 DNL contour. Recreational boaters and other vessel operators on Choctawhatchee Bay and the Intercoastal Waterway may also be exposed to current aircraft operations.

Environmental Consequences

Amount of Off-Base Land Area Change from Baseline to Projected at Eglin AFB		
Noise Contours (DNL)	***Total Land Area (acres)***	***Total Residential Area (acres)***
65-70	-2.3	51.5
70-75	203.3	-4.2
75-80	112.7	75.5
80-85	20.2	0.1
>85	0.0	0.0
Total	333.9	123.0

Note: 1. All referenced acreages are located off Eglin AFB.

The Initial F-22 Operational Wing beddown would require construction and modification of facilities on base, a slight increase in personnel, and an increase in flight operations. However this should not adversely affect on-base land uses. Proposed development should be consistent with base plans, particularly since they would occur in proximity to other similar land uses. No changes to the safety zones are anticipated.

Figure EG3.2-1 also depicts the projected NOISEMAP contours should the F-22s replace the F-15Cs at Eglin AFB. For areas in the vicinity of Eglin AFB, the amount of acreage exposed to 65 to 70 DNL would decrease by 2 acres off base. This reduction may be attributed to the F-22 accelerating more quickly to climb speed and reducing power sooner past the departure end of the runway. The F-22 would generate more noise closer to the runway and less noise farther from the runway. Consequently, the areas exposed to higher DNLs, such as 70 to 75 DNL, 75 to 80 DNL, and 80 DNL or higher, would expand by about 200, 110, and 20 acres off base, respectively. Off base there is an overall increase of 334 acres exposed to 65 DNL and above. Approximately 123 acres are residential areas. These areas are predominantly medium-density (4 to 8 dwelling units per acre) single-family developments with some duplex and occasional apartment structures. Four new sensitive receptors will be exposed under the proposed action: Lula J. Edge Elementary School and the Bay Heritage Nursing and Convalescent Home will be located just under the new 65 dB contour line, and two churches in Valparaiso will be newly affected.

A site inspection of those lands that will be newly affected by the noise contours was undertaken. The purpose of the inspection was to determine the number of houses that occur in those off-base, overland areas where an increase in area is projected. The following units were counted: in the 65 to 70 DNL contour, 449 dwelling units; in the 70 to 75 DNL contour, 286 dwelling units; in the 75 to 80 DNL contour, 250 dwelling units. Average household size for the Eglin area, as identified in the 1990 census, is 2.6.

In order to better understand the effects of aircraft noise on individuals in the vicinity of airfield and underlying other aircraft use areas, numerous studies have been undertaken. Aircraft noise effects can be described according to two categories: annoyance and human health considerations. Annoyance, which is based on a perception, represents the primary effect associated with aircraft noise. Far less potential exists for effects on human health. Studies of community annoyance to numerous types of environmental noise show that DNL correlates well with effects. Schultz (1978) showed a consistent relationship between noise levels and annoyance. A more recent study reaffirmed this relationship (Fidell *et al.* 1991).

A number of studies have been conducted analyzing the effects of aircraft noise on people. These studies focus on effects in two categories: annoyance and human health. A complete discussion of this topic may be found in Appendix AO-2.

In general, there is a high correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL. The correlation is lower for the annoyance of individuals. This is not surprising considering the varying personal factors that influence the manner in which individuals react to noise. The inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, findings substantiate that group or community annoyance to aircraft noise is represented quite reliably using DNL. Table EG3.12-2 presents the relation between annoyance and DNL. The change in population highly annoyed as a result of the project was estimated by multiplying the number of off-base dwelling units identified in newly affected areas by the average household size in the area, and then applying the percentage of population highly annoyed for each noise level. For the Eglin AFB alternative, 545 additional people would be highly annoyed, when compared with baseline conditions.

Table EG3.12-2. Relation Between Annoyance and DNL

DNL	*Percent of Population Highly Annoyed*
65	12.3
70	22.1
75	36.5
80	53.7
85	70.2

Source: Finegold *et al.* 1994.

Appendices AO-1 and AO-2 include additional information regarding aircraft noise effects. For purposes of the land use analysis, it is important to note that human effects is one of the factors used to determine appropriate land uses for areas in proximity to airfields. Assessments of land use compatibility may then be used to develop community land use plans, guidelines, and regulations.

Residential property values in the vicinity of airfields in general are affected by a variety of non-noise factors such as national, regional, and community economic conditions; national and regional trends in employment, inflation, and interest rates; local population changes; and real estate development (Fidell *et al.* 1996). While property values in the vicinity of Eglin AFB may be affected by local perceptions of environmental issues such as noise exposure, the complex interaction of multiple economic and real estate factors makes the estimation of such effects highly speculative. A study, *Effects of Military Aircraft Noise on Residential Property Values*, indicated that there was no reliable correlation between aircraft noise and residential property sale prices at Langley AFB, and concludes that the number of variables and confounding factors at Davis-Monthan AFB obviate a conclusion of a direct relationship between noise and residential property sale prices (Fidell *et al.* 1996).

In summary, the proposed beddown of the Initial F-22 Operational Wing at Eglin AFB would have a negligible impact on land use patterns, ownership, plans or property values. Should the decision be made to place the F-22 at Eglin AFB and once flying operations have commenced, a detailed data

collection effort would occur and existing noise studies and land use recommendations would be updated.

Comparative Summary of the Five Potential Basing Locations

Land use impacts stem from changes in subsonic noise levels for off-base areas. The F-22 beddown would result in the greatest potential effects at Eglin, where 1,623 off-base acres, including 123 acres of residential lands, would be newly exposed to noise levels of 65 DNL or higher. Impacts at Langley, where the off-base area affected by noise would decrease with beddown of the F-22, would be greater than at Elmendorf or Mountain Home because residential lands would continue to be affected. Despite an increase of about 2,500 acres affected by noise, the off-base land uses at Mountain Home consist of grazing/agricultural. For this reason, potential impacts would be less than at Eglin and Tyndall where noise would affect 123 and 23 acres of residential land use, respectively. The potential effects of noise would be the least at Elmendorf because the only off-base areas affected are over water.

EG3.12.2 Airspace

Affected Environment

This section summarizes land uses underlying MOAs proposed for this alternative; no lands occur under the Warning Areas. Offshore oil platforms are the only permanent land uses in Warning Areas. The only effect could potentially be increased annoyance from aircraft overflights. As illustrated in Figure EG2.2-1, the MOAs overlie a three-state area in the southeastern United States. Although most of the affected airspace is located in Florida, some areas extend into portions of Georgia and Alabama.

The general land use patterns underlying this airspace may be characterized as rural. Agricultural uses include farms, cropland, and timber. There are also a number of small towns throughout the area that occur along area roads and highways. Within these populated areas, a wide variety of land use types occur, including residential, commercial, industrial, and public lands. Areas of cultural significance also occur under the airspace; Appendix CR-2 identifies properties that have been placed on the NRHP. An analysis of these cultural resources is provided in section EG3.11.

Special use areas have been identified under the MOAs. Appendix HR-2 contains tables summarizing special use areas for each state under the airspace. They are considered special use areas because they provide recreational opportunities (trails and parks) and/or they provide solitude or wilderness experience (parks, forests, and wilderness areas). Recreational areas include large public land areas such as state or national parks, forests and reserves, which may include individual campgrounds, trails and visitor centers.

Special uses under this airspace include national wildlife refuges, national forests, state parks, recreation areas and forests, nature preserves, and areas of historic interest. Notably, the Choctaw National Wildlife Refuge, managed by the United States Fish and Wildlife Service, underlies the Camden Ridge/Pine Hill MOA in southwestern Alabama.

The Apalachicola National Forest, managed by the United States Forest Service, is the largest national forest (564,000 acres) in the state of Florida and underlies the Tyndall MOAs. Hunting and fishing are popular activities. Visitors may also catch glimpses of rare and endangered species.

Environmental Consequences

Under this alternative, noise would increase very slightly in some MOAs. In most cases, the increase would overlap the existing noise levels for ongoing airspace use (refer to section EG3.2). Most noise levels are expected to remain below 45 DNL. Where noise levels are higher than 45 DNL, they are expected to remain the same under this alternative as under existing conditions. Therefore, it is unlikely the land use patterns, ownership, or management practices will be affected by the use of the airspace by F-22s.

Comparative Summary of the Five Potential Basing Locations

The potential for impacts to land use as a result of airspace use would be negligible for Eglin, Langley, and Tyndall. For these installations, most of the F-22 sortie-operations and all of the supersonic activity would occur in over-water Warning Areas. Impacts at Elmendorf and Mountain Home would be similar and greater than for the other three locations, because supersonic activity would increase noticeably. At both Elmendorf and Mountain Home, all supersonic activity would occur over land. Increases in sonic booms over special use areas would make the potential for consequences under Mountain Home airspace greater than any other location.

EG3.13 Socioeconomics

EG3.13.1 Base

Affected Environment

Employment and Earnings

Information regarding employment and earnings is presented for Okaloosa, Santa Rosa, and Walton counties whose economies are closely associated with activities at Eglin AFB. Comparisons are also presented with conditions for the state of Florida.

Okaloosa, Santa Rosa, and Walton counties form the affected area for socioeconomic impacts.

In the region, total full- and part-time employment increased from 119,608 jobs in 1990 to 154,623 in 1997 at an average rate of 3.7 percent annually. The largest contributions to employment in 1997 were made by services (29.3 percent), retail trade (19.6 percent), and military (11.3 percent). For the years 1980, 1990, and 1997, the contribution of the military decreased from 19.0 percent to 14.7 percent and 11.3 percent, respectively. The sectors of the economy exhibiting the greatest addition of jobs over the period 1990-1997 were services, retail trade, and construction (United States Department of Commerce, Economics, and Statistics Administration [USDCESA] 2000).

In Florida, military employment declined from 2.6 percent of total employment in 1980 to 2.2 percent in 1990 and 1.5 percent in 1997. The number of military personnel stationed at Eglin AFB stood at about 7,560 with an additional 7,760 civilian workers in 1999. The sectors of the economy exhibiting the greatest addition of jobs in the state over the period 1990-1997 were services, retail trade, and state and local government.

Non-farm earnings in the three-county region totaled over $3.5 billion in 1997. The major contributions were made by services (26.4 percent), military (16.8 percent), retail trade (11.2 percent), and state and local government (10.5 percent). In Florida, non-farm earnings totaled over $219 billion in 1997, with the major contributions made by services (33.9 percent), retail trade (11.7 percent), and state and local government (11.5 percent) (USDCESA 2000).

The value of payroll associated with government personnel at Eglin AFB reached approximately $440 million in 1999.

In addition to economic effects associated with payroll expenditures by personnel associated with Eglin AFB, the installation also purchases significant quantities of goods and services from local and regional firms. In 1999, annual expenditures by the base totaled over $140 million. Further, the Air Force estimates that the economic stimulus of Eglin AFB created approximately 10,250 secondary jobs in the civilian economy (Air Force 1999e).

Population

Information describing population is presented for the three-county region of Okaloosa, Santa Rosa, and Walton counties and municipalities within them. The population of the three-county region increased by about 29 percent between 1990-1999, reaching 329,125 in 1999. This increase took place at an average annual rate of 2.9 percent. By comparison, the population of Florida increased by 16 percent during the same period, reaching 15,111,244 in 1999, at an average annual rate of 1.7 percent (U.S. Census Bureau 2000a).

Approximately 29 percent of the 1998 population of the three counties reside in incorporated communities. These cities and towns range in size from Fort Walton Beach (with a population of 21,501) to Shalimar (with a population of 411). The largest include Fort Walton Beach, Crestview (12,556 persons), and Niceville (11,973 persons).

The combined population of the three counties is projected to increase from about 340,900 in 2000, to 540,600 by the year 2025, at an average annual rate of 1.9 percent.

Based on information provided by Eglin AFB concerning the place of residence (by zip code) of personnel assigned to the installation, it is possible to derive an estimate of the number of personnel residing in each of a number of communities in the vicinity of the base. The largest numbers of military personnel reside in the following communities: Fort Walton Beach, Crestview, Niceville, and Valparaiso. Compared to the general population, however, military personnel have a greater than average propensity to reside especially in Crestview and Niceville and are noticeably under-represented in Destin.

Military retirees in the vicinity of Eglin AFB comprise about 5.4 percent of the total regional population, higher than any of the other beddown options.

Housing

This section describes the housing contained in the three counties; the data were derived from the 1990 United States Census of Population and Housing, which is the most comprehensive source of information describing housing in detail. Although somewhat dated, it still presents an accurate

description. Information depicting the magnitude and type of residential construction activity over the period 1990-1999 is also presented at the county level.

There were a total of 114,128 housing units in the region in 1990, with a vacancy rate of about 17.2 percent. Of the vacant units, 37.3 percent were for seasonal and recreational use. Of the total number of housing units, 14.6 percent were mobile homes (U.S. Census Bureau 1991).

Over the period 1990 to 1999, an average of 4,098 building permits for residential units was issued annually. The number of units permitted on an annual basis varied from a high of 5,369 units in 1997 to a low of 2,309 units in 1990. The majority (77 percent) of these units were single-family homes. The proportion of units contained in structures with five or more units comprised 20 percent of the new units. The number of such multi-family units permitted varied from a high of 1,666 in 1998 to a low of 167 in 1990 (U.S. Census Bureau 2000b).

Of the active-duty personnel assigned to Eglin AFB in fiscal year (FY) 99, just under 37 percent resided on-base in government family and unaccompanied housing.

Environmental Consequences

At scoping, commentors expressed interest in continuing Air Force activity at Eglin that benefited the local economy.

Construction activity will peak in 2002 with the expenditure of over $27 million. It is estimated that these expenditures will support 434 construction jobs and 338 secondary jobs for a total employment effect of 772. This number of jobs comprises 0.5 percent of the 1997 level of regional employment. Earnings associated with both the direct and secondary jobs would total over $21 million or about 0.6 percent of total non-farm earnings in the region in 1997. It is estimated that a total of 77 workers could temporarily relocate and take up residency in the region during the construction phase.

The operations phase would see an increase in base personnel of 218 (158 active-duty personnel and 60 civilian/contractor personnel) and a secondary employment of 107 jobs. Total employment in the region would increase by 325 jobs by FY 2007. Such increases comprise 1.4 percent of the 1999 base personnel and 0.2 percent of regional employment. The increase in earnings associated with the personnel buildup is estimated at over $10 million or about 0.3 percent of the total regional non-farm earnings in 1997.

The arrival of active-duty personnel and their dependents (350 persons), civilian workers and contractors (130 persons), and those associated with secondary jobs (23 persons) would result in a net addition of 503 persons to the region by FY 2007. This increase represents 0.2 percent of the regional population total in 1999.

Of the approximately 500 persons expected to relocate to the region by FY 2007, the largest number (280 persons) are expected to reside in the unincorporated portions of Okaloosa County. In addition, there could be about 60 persons each in Crestview and Fort Walton Beach, 50 persons in Niceville, and almost 30 persons in Valparaiso.

As families arrive in the region, an impact on the housing market could result. There could be a cumulative demand for 187 housing units (both owner-occupied and rented) off base by those persons entering the area over the period 2002 through 2007. The maximum annual increase in

demand would be for 63 units. Assuming that all housing is found in the communities off the base, a measure of its magnitude can be gained from a comparison with recent levels of building activity in the region. Between 1990 and 1999, there have been an average of just over 4,000 residential units permitted for construction. A demand for 63 housing units in one year comprises 1.5 percent of recent annual regional residential construction activity. This demand comprises a higher proportion (3.3 percent) of housing construction activity in Okaloosa County, the more immediate area of potential impact. It is possible that the added demand for housing units could decrease the vacancy rate in the region, but not to a substantial degree.

Of the 158 military personnel estimated to move to the region, 47 would be unaccompanied personnel and the remaining 111 would have family members.

There is little likelihood for socioeconomic consequences under the airspace.

Comparative Summary of the Five Potential Basing Locations

Based on differences in both personnel changes and construction projects, the socioeconomic influence of the F-22 beddown would vary among the five bases. Eglin would create the smallest increase in operations employment and earnings and no substantive impacts. Operations employment would increase by 325 direct and secondary jobs and earnings by $10 million. Elmendorf would experience a greater increase in operations employment and earnings than Eglin; operations employment would increase by 390 direct and secondary jobs and earnings by $13 million. Employment at Mountain Home would increase by 1,560 direct and secondary jobs and earnings by $57 million. Tyndall would have the greatest increase in operations employment and earnings, creating 2,392 direct and secondary jobs and earnings of $80 million. Langley is the only base where a decrease in operations employment and earnings would occur. Operations employment would decrease by 358 direct and secondary jobs and earnings would decrease by $12 million. It is the only base where a reduction in project-related population and housing demand would occur.

EG3.14 Environmental Justice

EG3.14.1 Base

Affected Environment

Executive Order 12898 (Environmental Justice) requires analysis of the potential for federal actions to cause disproportionate health and environmental impacts on minority and low-income populations.

The analysis of environmental justice for the base and vicinity considers changes in noise levels created by the action alternative. The existing area affected by noise levels of 65 DNL or greater around Eglin AFB overlies land areas in Okaloosa County and water areas in the Choctawhatchee Bay. Okaloosa County comprises the region of comparison for the Eglin AFB alternative. The county is comprised of 143,776 persons, of which 14.8 percent are minority, 10.3 percent are low-income, and 26.0 percent are children. The information regarding minority and low-income population groups is derived from the 1990 United States Census of Population. This is the latest source of information containing data at the required level of detail.

To satisfy the requirements of Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, locations of off-base schools exposed to aircraft noise levels of 65 DNL or above were identified. Currently, two off-base schools in the vicinity of Eglin AFB are exposed to noise levels of 65 to 70 DNL: Valparaiso Elementary and Lewis Middle School. The schools are located north and east, respectively, of the main base in Valparaiso.

Environmental Consequences

For the Eglin AFB alternative, off-base land areas affected by noise levels of 65 DNL or greater were identified, and the affected population was estimated. For Eglin AFB, an additional 956 persons would potentially be affected by noise levels of 65 DNL and above, with most being affected by noise levels of 70 to 80 DNL. Approximately 118 persons, or 12.3 percent, of the potentially affected additional population would be minority and 109 persons, or 11.4 percent, would be low-income. This compares to a 14.8 percent minority population in the region of comparison and a 10.3 percent low-income population in the region of comparison. The percentage of low-income population affected by the F-22 beddown would be slightly (1.1 percent) higher than average in the affected area, though not substantially different. These areas have been previously exposed to elevated (65 DNL and above) noise levels in the past (refer to section EG3.2). As such, there would not be a disproportionately high and adverse noise impact on minority populations or low-income populations living under the area affected by aircraft noise for the Eglin AFB alternative.

Under the proposed Eglin AFB alternative, one additional school would be exposed to aircraft noise levels of 65 DNL or above: Lula J. Edge Elementary, located north of the main base in Niceville. This would result from an expansion of the 65 to 70 DNL noise contour in this location. In addition, two schools currently exposed to noise levels in the 65 to 70 DNL range (Valparaiso Elementary and Lewis Middle School) could experience noise increases of approximately 3 to 5 dB or less. This has the potential to be a slight, but not substantial, impact on children.

Comparative Summary of the Five Potential Basing Locations

No disproportionate impacts would occur to minority or low-income populations at any of the bases. Impacts are similar at all bases. Eglin has the greatest potential for increased area affected by noise and therefore, may have a slight but not substantial, disproportionate impact to children.

EG3.14.2 Airspace

Affected Environment

Baseline data on minority and low-income populations residing in counties under the airspace are presented in Appendix HR-4. There are no federally recognized Indian lands under the airspace.

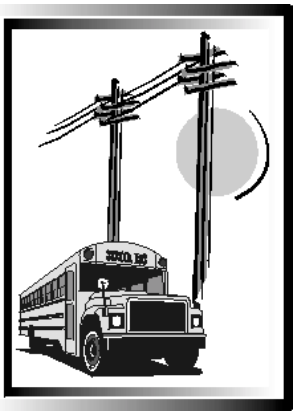
Environmental Consequences

Subsonic noise would not generate environmental justice issues affecting minority populations, low-income populations, or children living under the airspace. In addition, any noise impacts from supersonic noise would occur in Warning Areas that are over water.

Comparative Summary of the Five Potential Basing Locations

No substantive difference exists among the bases' airspace relative to potential environmental justice concerns. Potential impacts at Eglin are comparable to Langley and Tyndall. Concerns were raised during scoping about overflights and sonic booms over traditional use land areas at Elmendorf and Mountain Home.

Community and Infrastructure



Community and infrastructure resources include public services such as potable water, wastewater treatment, electric and natural gas utilities, solid waste management, and hazardous materials and waste. It also includes public schools and transportation. These resources are typically impacted by fluctuations in population and generally occur at the base and environs. Airspace and ranges are not addressed for community and infrastructure, as they are not applicable to this resource. Pertinent regulatory methodological information can be found in Appendix CI-1. Additional technical information can be found in Appendix CI-2.

No-Action Alternative

Implementation of the no-action alternative would not affect current demands on public services or infrastructure. There would be no change in base population and, therefore, no changes to demands on schools and other social services. Under the no-action alternative, hazardous material use and waste generation at Eglin AFB would continue at current trends. Current Environmental Restoration Programs (ERP) at the base would continue, and Eglin AFB would continue to manage its hazardous materials and wastes in accordance with all applicable laws and regulations.

EG3.15 Public Services

EG3.15.1 Base

Affected Environment

Potable Water

The Eglin AFB water supply system consists of 146 wells with a total storage capacity of over 5 million gallons. The water wells supply potable water to Eglin AFB, including Santa Rosa Island and Cape San Blas, and have a design capacity of 16.43 million gallons per day (mgd). Only 43 of the active wells on Eglin AFB have standard water use permits, which have been required for all production wells withdrawing from the Floridian Aquifer since 1982. Estimated average daily flow from the active potable water wells is not available (Air Force 1995). Although there are five active wells on Cape San Blas, its daily consumptive use of 300 gallons is provided by the city of Port St. Joe.

Drinking water for the surrounding communities is supplied by several privatized systems within the tri-county area. The community water supply is sufficient for current and future projected usage rates (personal communication, Northwest Florida Water Management District 2000).

Wastewater Treatment

Eglin AFB has five on-base wastewater treatment plants, including two on Eglin Main. In addition to the treatment plants, there are 86 septic tanks located on base.

The Eglin Main wastewater treatment plant, with a capacity of 1.0 mgd, treats wastewater from the administrative areas, research laboratories, aircraft operations, and aircraft support areas of Eglin Main. Two plants (Plews I and II), which serve the housing areas, are side-by-side contact stabilization treatment facilities that operate under a single permit. All three plants discharge treated wastewater to a 209-acre spray field located west of the junction of SR 85 and SR 123. The range wastewater treatment plants are located at Army Ranger Camp (Test Area B-6), Duke Field, and Test Area C-6. These plants have design capacities of 0.072 mgd, 0.125 mgd, and 0.02 mgd, respectively. Wastewater originating from Hurlburt Field, with the exception of the Commando Village Housing area, is treated at the Hurlburt Field wastewater treatment plant. Though currently operating at 0.61 mgd, this facility has a permitted capacity of 1.0 mgd. The city of Mary Esther provides wastewater treatment for Commando Village (Air Force 1995).

The test areas and test sites that require sanitation facilities on Eglin AFB (including Santa Rosa Island) are supported by septic tanks. Cape San Blas maintains a septic tank for Test Area D-3 and utilizes portable facilities for all other test areas (Air Force 1995).

Wastewater treatment for the surrounding communities is provided by facilities located in Okaloosa, Santa Rosa, and Walton counties. All of these systems have sufficient capacity for existing and future projected usage rates (personal communications, Brazzle, Johnson, and Walker 2000).

Electric Power & Natural Gas

Natural gas is provided to Eglin AFB from Okaloosa Gas District through nine metering and three regulating stations. The theoretical capacity of the gas pipeline into Eglin AFB is a maximum throughput in excess of 68 billion cubic feet (bcf) per day. Eglin AFB utilizes only 7 to 8 percent of the theoretical capacity. The total base demand for natural gas in 1994 was approximately 475 bcf per year or 1.3 bcf per day. Test areas utilize propane, butane, and heating oil (Air Force 1995).

Choctawhatchee Electric Cooperative, Inc. (CHELCO), Gulf Power Company, and Florida Power Company provide electricity to Eglin AFB and the surrounding communities.

Solid Waste Management

Municipal waste generated on base is transported off base by a contractor to the Okaloosa County Transfer Station in Fort Walton Beach for temporary storage before continuing to Springhill Landfill. Additional solid waste going to the Okaloosa Transfer Station and Springhill Landfill originates from Hurlburt Field and the housing area is picked up by contractors. Eglin AFB operates a construction and demolition landfill on the reservation in an abandoned borrow pit near Field 4. The landfill receives construction and demolition debris and

landscaping waste (vegetation) generated on Eglin AFB. This landfill is permitted by the FDEP (General Permit Number S046-195906). Eglin AFB also disposes of construction and demolition wastes at the Point Center landfill near Crestview. Hurlburt Field's construction debris is removed from the base by the construction contractor.

Solid waste generated at Cape San Blas is deposited in a 4-cubic-yard dumpster that is picked up weekly by Argus Services, Inc. The solid waste is ultimately disposed of at the Bay County Incinerator in Panama City, operated by the Bay County Solid Waste Authority (Air Force 1995).

Schools

Public school districts in the surrounding community include Okaloosa, Santa Rosa, and Walton Counties school districts. Of the three districts, Okaloosa County is the largest with 30,339 students enrolled as of September 2000. The smallest district is Walton County with a total enrollment of 5,927 students. Santa Rosa County school district has a current enrollment of 23,230 students. Each of the three districts has capacity for additional students, with higher capacities available in the Santa Rosa and Walton counties districts (Walton, Santa Rosa, and Okaloosa County School Districts 2000).

Environmental Consequences

This alternative calls for an off-base population increase of 503 persons. With an increase of 503 users on the community water and wastewater systems as a whole, the increased demand of only 0.10 mgd (assuming 200 gal/capita/day) should be accommodated. Though it is understood that 218 additional personnel would work on base during the day, it is assumed that the majority of their consumptive water use would occur at their place of residence. Therefore, environmental consequences of on-base water and wastewater impacts are considered insignificant.

Community power and natural gas capacities within the tri-county area are more than sufficient to accommodate an influx of 504 persons.

Under this alternative, 503 additional personnel are expected to reside in the tri-county area. Assuming a waste generation rate of 5 pounds/capita/day, an additional 1.3 tons per day of waste would be generated. This could be accommodated by the Springhill Landfill as they have excess capacity.

It is assumed that an additional 121 school-age dependents would be introduced into the tri-county school districts over the course of three years under this alternative. Each of the three school districts has the capacity to accommodate such an increase, and no significant impact is expected.

There is little likelihood for public services consequences under the airspace.

Comparative Summary of the Five Potential Basing Locations

The potential for impacts to public services would be low for all installations. Eglin would have an increase in off-base population by approximately 503 persons and an increase of 121 students. This is greater than the potential impacts of a decrease in 150 students at Langley. Comparatively, Elmendorf would increase school students by 161; Mountain Home would increase school

enrollment by 686 students. Tyndall would have the largest increase in student population, estimated to be 1,063 new students. Impacts associated with demand for public services would be the greatest at Mountain Home. Due to its relatively remote location and small associated community, Mountain Home would be the least able to absorb the large influx of personnel and their families.

EG3.16 Transportation

EG3.16.1 Base

Affected Environment

Eglin AFB has approximately 343 miles of roads on the main base with a total of 1,349 road miles on the entire Eglin reservation. Traffic statistics are not available for Eglin AFB, since the base does not conduct routine traffic counts. However, according to base personnel, the road system is able to adequately handle current base traffic (Air Force 1995). Additionally, planned transportation improvements and land use changes described in the Eglin AFB General Plan would further improve Eglin's transportation system.

Environmental Consequences

The unsignaled Air Combat Command gate may face increased traffic, especially during construction.

The Eglin AFB alternative is expected to increase on-base employment by 218 jobs, with the potential to generate up to 218 vehicle trips to and from the installation each work day during the am and pm peak travel periods. Current employment on the installation is 15,324 jobs with the potential for 15,324 vehicle trips during the peak travel periods. The proposed increase in employment and associated travel demand would increase peak period travel demand by 1.4 percent. The anticipated 1.4 percent increase in traffic volumes do not exceed the primary (11.1 percent) capacity screening criterion (Appendix CI-3). For adjacent intersections and access gates, the increase does not have the potential to degrade service levels. The only area of possible increased congestion would be the unsignaled Air Combat Command gate. Routing of construction traffic to signaled gates could reduce any potential for consequences. For more removed intersections, the impact of the proposed action will be less than at gates and adjacent intersections. Therefore, the potential for impacts is considered to be minor and somewhat greater than Langley AFB.

Comparative Summary of the Five Potential Basing Locations

The potential for impacts to transportation is low for all installations. Eglin would have an increase of 218 peak hour trips but this would have little impact on congestion. Elmendorf would have an approximate 6 percent increase in traffic and Mountain Home would have an approximate 9.2 percent increase. Tyndall would have the highest potential impact with an increase of 1,500 peak hour trips and one-third increase in base worker travel. Langley would have a decrease of 243 peak hour vehicle trips and an approximate 2.7 percent decrease in travel demand.

EG3.17 Hazardous Materials and Waste

EG3.17.1 Base

Affected Environment

The majority of the non-weapon hazardous materials used by Air Force and contractor personnel on Eglin AFB are controlled through the Hazardous Material Management Process (HMMP). This six-phase process provides centralized management of the procurement, handling, storage, and issuing of hazardous materials and the turn-in, recovery, reuse, recycling, or disposal of hazardous wastes. The HMMP process includes review and approval by Air Force personnel to ensure users are aware of exposure and safety risks.

Existing Eglin AFB hazardous materials and hazardous waste management programs will be retained and used to manage F-22 hazardous materials and wastes. See Appendix CI-1 for more information on these materials and wastes.

The Eglin AFB Spill Prevention Control and Countermeasures Plan, July 2000, addresses the management of petroleum products. ACC Plan 32-6, Oil and Hazardous Substance Pollution Contingency Plan, July 1999, addresses hazardous material response, including notification, containment, decontamination, and cleanup of spilled materials.

The Air Armament Center Asbestos Management Plan, December 1998, provides guidance for the identification of asbestos contaminated materials and the management of asbestos wastes. An asbestos facility register is maintained by Civil Engineering. Persons inspecting, designing, or conducting asbestos response actions in public or commercial buildings must be properly trained and accredited through an applicable asbestos training program approved by the state of Florida. The design of building alteration projects and requests for self-help projects are reviewed to determine if asbestos contaminated materials are present in the proposed work area and, if so, are disposed of in an off-base permitted landfill (Air Force 1995).

Eglin AFB is a large-quantity hazardous waste generator. Hazardous wastes are generated during operations and maintenance activities. Types of waste include combustible solvents from parts washers, inorganic paint chips from lead abatement projects, fuel filters, metal-contaminated spent acids from aircraft corrosion control, painting wastes (e.g., paper with chrome from overspray, thinners), battery acid, fixer, corrosive liquids from boiler operations, toxic sludge from wash racks, aviation fuel from tank cleanouts, and pesticides. Hazardous wastes are managed in accordance with the Air Armaments Center Hazardous Waste Management Plan, April, 1999. Hazardous wastes are initially stored at approximately 121 Initial Accumulation Points at work locations. No more than 55 gallons of hazardous waste or one quart of acutely hazardous waste can be accumulated at these points. Sixteen of these points are managed by 33rd FW personnel. Once the storage limit is reached, the waste is taken to Hazardous Waste Accumulation Sites where the material may be accumulated for up to 90 days. There are 16 accumulation sites on Eglin AFB. A licensed contractor, American Environmental Services, manages a central 90-day storage facility for collection, consolidation, and processing hazardous waste. The other sites are managed by various organizations across the base. They transport the waste to the Defense Reutilization and Marketing Office (DRMO) Part B storage facility. A licensed disposal contractor under contract to DRMO picks up the wastes from the DRMO facility and transports it off base for disposal in a licensed disposal facility. In 1997, slightly over 83 tons of hazardous waste were removed from Eglin AFB

and disposed of in off-base permitted disposal facilities. In 1998, the amount of hazardous waste removed from the base was approximately 80 tons. It is estimated that about 23 tons were generated during F-15 aircraft maintenance activities.

The DoD developed the ERP to identify, investigate, and remediate potentially hazardous material disposal sites on DoD property prior to 1984. One hundred and seventeen ERP sites are currently being managed at Eglin AFB.

Environmental Consequences

The amount of hazardous materials used during F-22 operations and maintenance would increase approximately 30 percent, compared to the amounts used to support the F-15C. F-22 materials that are hazardous would require special handling procedures. The impact on other base operations that use hazardous materials, such as vehicle maintenance, would be very slight. Existing procedures for the centralized management of the procurement, handling, storage, and issuing of hazardous materials through the HMMP would be adequate to handle the changes and would be retained and used. The scope of the management process would have to be expanded to cover the increase in use of hazardous materials.

There is little likelihood for hazardous materials or waste consequences under the airspace.

The 33rd FW would continue to generate hazardous wastes during various operations and maintenance activities. The amount of hazardous waste would increase approximately 25 percent because of the increase in the number of aircraft in the wing. Only a small increase of hazardous waste would be generated by other activities such as vehicle maintenance. Hazardous waste disposal procedures, including off-base disposal procedures, would require expansion to cover the increase in hazardous waste generation. The base Hazardous Waste Management Plan would be updated to reflect any changes of hazardous waste generators and waste accumulation point monitors. Additional asbestos removal may be required, depending on the scope of the proposed renovation plan. Hazardous waste accumulation sites would increase because of new work locations. No change to permits or management would be required and no significant adverse environmental impacts are anticipated. Procedures at Eglin AFB would be modified to ensure that any hazardous materials used or hazardous wastes generated by the F-22 are managed to protect public health and the environment.

Comparative Summary of the Five Potential Basing Locations

The potential for impacts to hazardous waste management is low for all installations. Eglin would increase hazardous waste by 30 percent over baseline; Elmendorf would increase by 40 percent over baseline; Mountain Home would increase hazardous waste by 50 percent; and Tyndall would have a 100 percent increase in hazardous waste. Langley would generate the smallest increase in hazardous waste. No change in current operations would be required for any of the bases.