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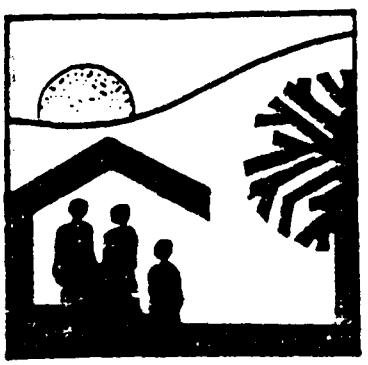

July 1985

Draft Environmental Impact Statement

Winnersville Weapons Range

Lanier and Lowndes Counties, Georgia

DEPARTMENT OF THE AIR FORCE

TACTICAL AIR COMMAND

90 08 17 200

This Draft Environmental Impact Statement was prepared by Oak Ridge National Laboratory for the U.S. Air Force under Project Order DEV-84-06. Oak Ridge National Laboratory is operated by Martin Marietta Energy Systems, Inc., for the U.S. Department of Energy under Contract No. DE-AC05-84OR21400

July 1985 Draft EIS

Winnersville Weapons Range Lanier and Lowndes Counties, Georgia

Headquarters Tactical Air Command
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This statement assesses the environmental impacts expected to result from construction and operation of the proposed Winnersville Range (an air-to-surface weapons range). The no-action alternative of not proceeding with establishment of the range is also considered. Salient impacts of range development would result from clearing vegetation on the 450-acre target area near the center of the Grand Bay/Banks Lake wetlands complex. The principal impacts of operation would result from increased noise levels in the vicinity of the 5900-acre range. It is concluded that no overriding environmental factors are evident that would render establishment of the proposed range unacceptable.

Moody AFB GA
Aircraft Range
Airspace

Aircraft Noise
EIS (Environmental Impact Statement)

110

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Cover Sheet

(a) Responsible Agency: U.S. Air Force

(b) Proposed Action: Establishment of an air-to-surface weapons range adjacent to the east side of Moody Air Force Base, Georgia. The primary user of the range would be the 347 Tactical Fighter Wing which is based at Moody.

(c) Contact for Further Information: Mr. Alton Chavis
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Phone: (804) 764-4430

(d) Designation: Draft Environmental Impact Statement (DEIS)

(e) Abstract: This statement assesses the environmental impacts expected to result from construction and operation of the proposed Winnersville Range. The no-action alternative of not proceeding with establishment of the range is also considered. Salient impacts of range development would result from clearing vegetation on the 450-acre target area near the center of the Grand Bay/Banks Lake wetlands complex. The principal impacts of operation would result from increased noise levels in the vicinity of the 5900-acre range. It is concluded that no overriding environmental factors are evident that would render establishment of the proposed range unacceptable.

(f) Comments on the Draft EIS should be addressed to Mr. Alton Chavis at the address noted above. The comment period ends on September 2, 1985. Comments must be received by September 2, 1985. The comments should be sent to Mr. Alton Chavis at the address noted above or call (804) 764-4430. A public hearing will be held on August 15, 1985. Notice of this hearing will appear in local newspapers. Mr. Chavis can also be contacted for information on this meeting.

per ltr

SUMMARY

An air-to-surface weapons range is proposed for a tract of land (approximately 5900 acres) adjacent to Moody Air Force Base and currently owned by the U.S. Forest Service. The mission of the proposed Winnersville Range would be to provide training in air-to-surface weapon deliveries for the primary user, the 347 Tactical Fighter Wing (TFW), based at Moody, and other Department of Defense users. The 347 TFW currently uses ranges 85 to 150 nautical miles from the base on an "as available" basis. The purpose of this proposal is to take advantage of a unique opportunity to acquire the land at no cost and develop a range that, because of its proximity to Moody, would conserve resources and be more cost-effective and efficient.

The site of the proposed Winnersville Range lies near the center of the Grand Bay/Banks Lake wetlands complex, primarily in Lanier County, Georgia, immediately east of Moody. Development of a range at this location would require construction of a 600 x 700-ft strafe pit, a bomb target on a mound of sand 600 ft in diameter, two 50-ft high observation towers, and a small support building and parking lot. Most of the 450-acre target area would be clear-cut to allow an unobstructed line of sight from the towers to the strafe pit and bomb target. The construction effort would take place over a period of about 9 months at a projected cost of less than $1 million.

No significant environmental impacts are expected to result from the construction of the proposed range. Vegetation that would be cleared in the target area includes pine flatwoods, shrub/cypress/gum wetlands, and pine plantations. No unique vegetation or habitat type is known to occur in the area to be clear-cut. Up to 15 acres of wetlands would be eliminated by construction of facilities; these wetlands are not known to contain any particularly important or unique features. Some alligators might be present in the area to be clear-cut and could be adversely affected by the clearing operation, but this area is not their primary habitat and thus the vast majority of alligators at Grand Bay would be unaffected. A recent archeological survey revealed that range development would not be expected to cause any significant damage to historical or archeological resources. Because range development would be of short duration and involve a relatively small work force, the attendant socioeconomic impacts would be minimal.

The principal environmental impacts of range operation would result from the increased noise, chiefly in the vicinity of the proposed range area, from F-4, F-15, F-16, F-18, A-4, A-6, A-7, and A-10 aircraft. The primary user of the proposed range (the 347 TFW) currently has F-4 aircraft, but is scheduled to convert to quieter F-16 aircraft during the early phases of range operation. Even with this conversion, however, the loudest noise in the vicinity of the range would be from F-4 aircraft from other units. Using conservative estimates of the increased noise levels, no appreciable hearing loss is anticipated for individuals who live within the projected noise contours. With F-4s

using the range (the worst case) about 103 households would experience DNLs (average day/night sound levels in decibels on an A-weighted scale) of 65 to 80, and about 86 individuals who currently reside in these households are predicted to find the increased noise levels unpleasant and intrusive. No schools would be overflown by aircraft during maneuvers on the proposed range. The density of wildlife in the range area would not be reduced as a result of anticipated noise levels. It is concluded that the potential impacts of the increased noise are not large enough to warrant mitigation measures over and above those already included in the proposed action.

The alternative to proceeding with the proposed action (i.e., development and operation of the range) is to take no action (not to proceed with the range). For the no-action alternative, the 347 TFW would continue to use distant ranges (operated by other military services or commands) on an as available basis. The potential environmental impacts that would be associated with development and operation of the range would not occur. Echols County, Georgia, which is adjacent to Lowndes County and was suggested as an alternative during scoping, was examined and found to be an unsuitable location for an air-to-surface weapons range as proposed.

In conclusion, no overriding environmental factors are evident that would render the proposed action unacceptable.

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ACRONYMS AND ABBREVIATIONS

AF	-	Air Force
AFB	-	Air Force Base
AFR	-	Air Force Regulation
AGL	-	above ground level
ATA	-	airport traffic area
CEQ	-	Council on Environmental Quality
dB	-	decibels
dB(A)	-	decibels on the A-weighted scale
DEIS	-	Draft Environmental Impact Statement
DNL	-	day/night weighted average noise level
DOI	-	Department of Interior
FAA	-	Federal Aviation Administration
h	-	hour
IFR	-	instrument flight rules
Leq	-	equivalent sound level
MOA	-	military operations area
MSL	-	mean sea level
MTR	-	military training route
NEPA	-	National Environmental Policy Act
NM	-	nautical mile
RCO	-	Range Control Officer
TAC	-	Tactical Air Command
TFW	-	Tactical Fighter Wing
USFS	-	United States Forest Service
USGS	-	United States Geological Survey
VFR	-	visual flight rules

1. PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 PURPOSE

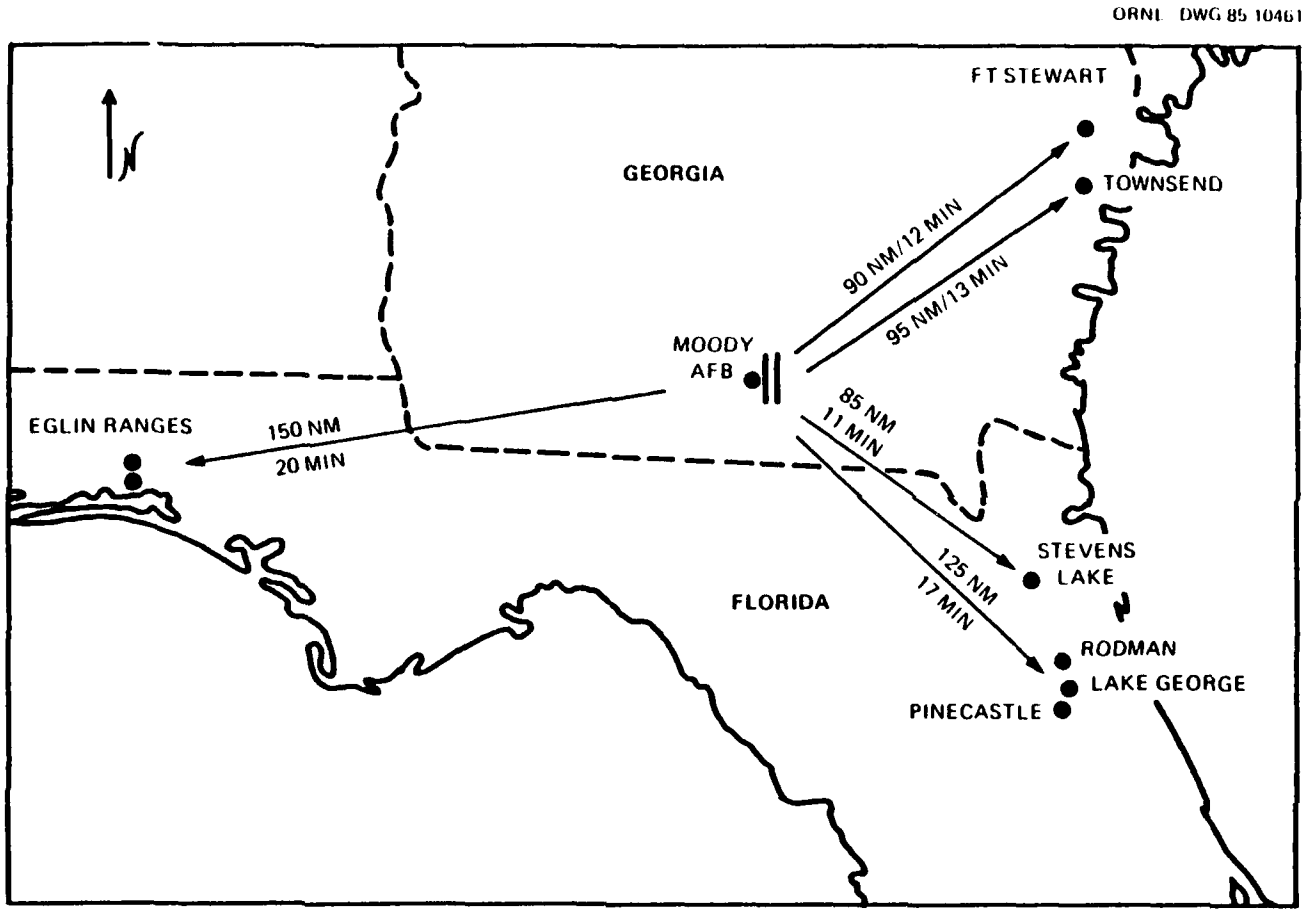
The U.S. Air Force proposes to construct and operate an air-to-surface weapons range on an approximately 5900-acre tract of land contiguous with Moody Air Force Base (AFB), Georgia. The proposed Winnersville Range would include strafe and bomb targets and support facilities and would be used primarily by the 347th Tactical Fighter Wing (347 TFW) of the Tactical Air Command (TAC). The 347 TFW, whose primary mission is air-to-surface attack, is based at Moody. The purpose of this action is to take advantage of a unique opportunity to acquire the land at no cost from the U.S. Forest Service (USFS) and develop a range that, because of its close proximity to Moody, would conserve resources and provide an opportunity to more than double the current number of training events during each sortie with no increase in training costs.

1.2 NEED

The 347 TFW is composed of 72 F-4E Phantom (jet fighter) aircraft based at Moody. The mission of the wing is to perform air-to-surface combat anywhere in the world within 24 h. Aircraft and crews must be ready to fly to a combat zone and begin conventional attacks on enemy troops, equipment, facilities, supplies, and lines of communication and achieve air superiority over the battlefield. To maintain this capability, crews must maintain combat readiness by completing a minimum number of practice sorties per month.

Currently, crews train on ranges that are 85 to 150 nautical miles from Moody. The ranges used are primarily those at Eglin AFB, near Pensacola, Florida, and the Townsend Range, near Savannah, Georgia. Additional ranges used include Pine Castle, Fort Stewart, Rodman, Lake George, and Stevens Lake (Fig. 1.1). Training time for 347 TFW crews is scheduled on the various ranges on an "as available" basis. Crews from Moody have relatively low scheduling priority on most ranges currently in use. At all ranges, competition for range time is increasing because of the growth of other flying units, including the Air Force Reserves and the Air National Guard.

The problems caused by using distant ranges are inefficient use of fuel and time for commuting, decreased quality of training due to shorter time spent on ranges, and aborted or curtailed missions. These problems, while manageable, make it very desirable for the 347 TFW to have access to a range in the immediate geographical area of Moody. However, because the Air Force does not consider that a nearby range is absolutely essential to Moody's mission, no plans were made for a new range until the adjacent federal land became available to the Air Force.



NM = nautical miles

Fig. 1.1. Weapons ranges currently used by Moody AFB.

1.3 SCOPE OF THE ENVIRONMENTAL REVIEW

This environmental impact statement (EIS) is prepared pursuant to Sect. 102 of the National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190), as implemented by regulations promulgated by the President's Council on Environmental Quality (CEQ) (1978) and Air Force Regulation (AFR) 19-2. The principal objectives of NEPA are to build into the decision-making process an appropriate and careful consideration of environmental aspects of proposed actions and to make environmental information available to public officials and citizens before decisions are made and actions are taken.

Consistent with AFR 19-2 and CEQ regulations, a public scoping meeting was held on March 5, 1985, at the Lanier County Courthouse, Lakeland, Georgia, for determining the scope of issues to be addressed and for identifying the significant issues related to development and operation of the proposed Winnersville Range. The predominant concern voiced at the meeting was the noise that would be generated by range operation. Other issues identified include alternative sites, airspace restrictions, air traffic safety, access to Shiner Pond Road, and public hunting on the range.

The proposed action evolved from an opportunity to acquire nearby land from the USFS at no cost, rather than a planned effort to locate, acquire, and develop a site. The feasibility of siting the range in Echols County is considered in this EIS (Sect. 2.2.2) because this alternative was identified at the scoping meeting. Other issues identified during scoping were also considered in preparation of the EIS. The alternative of no action is also considered (Sect. 2.2.1).

REFERENCE FOR SECTION 1

Council on Environmental Quality 1978. National Environmental Policy Act --- Regulations: Implementation of Procedural Provisions; 40 CFR 1500-1508 or Fed. Regist. 43 (No. 230) 55978-56007 (Nov. 29, 1978).

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

This section includes a detailed description of the proposed action, a brief description of the alternatives, and a comparison of the impacts of the proposed action and alternatives. The environmental impacts of the proposed action are addressed in Sect. 4.

2.1 THE PROPOSED ACTION

The proposed action is to construct and operate an air-to-surface bombing and gunnery range on the approximately 5900-acre tract of U.S. Forest Service (USFS) land adjacent to Moody. This proposed action became feasible when the USFS declared the property surplus, providing an opportunity for the Air Force to acquire the land at no cost. The primary user of the weapons range would be Moody's 347th Tactical Fighter Wing (347 TFW). Beginning in late 1986, the 347 TFW is scheduled to convert from F-4 to F-16 aircraft which will have essentially the same mission as the F-4s. The F-16s would eventually become the primary aircraft used on the range. Other occasional users would include the Navy, Air Force Reserves, and Air National Guard, who use F-4, F-15, F-16, F-18, A-4, A-6, A-7, and A-10 aircraft. These users would not increase landing and takeoff traffic at Moody.

2.1.1 Location and History of the Proposed Site

The site of the proposed Winnersville Range is the USFS land located primarily in Lanier County, Georgia, immediately east of Moody (Fig. 2.1). Lakeland, Georgia, is located about 5 miles northeast of the proposed range; Valdosta, Georgia, is about 8 miles southwest. Immediately north and northeast of the USFS tract is the Banks Lake complex, an area of about 3500 acres, which was transferred February 22, 1985, from the Nature Conservancy to the U.S. Department of Interior (DOI) to be managed as part of the Okefenokee National Wildlife Refuge.

During World War II, the proposed site was a part of Moody and was used as a bombing range. Subsequently, the land was transferred to the USFS and used for tree production and wildlife management. In 1981 the U.S. Department of Agriculture (parent agency of the USFS) was directed by Executive Order 12348 to release public lands that were not being used or could not be justified for future federal use. The Air Force subsequently began studying the feasibility of establishing a weapons range on the USFS land.

Study of the USFS land by a range-planning survey team indicated that the area would be generally suitable for an air-to-surface range. Air Force Regulation (AFR) 50-46 requires that a conventional range have sufficient property to accommodate the "weapons descriptor" for the activities to be conducted on the range. The weapons descriptor is the area within which 99.99% of all ordnance used is expected to fall (see Sect. 4.3.1). The fact that the Winnersville Range would be adjacent to Moody property allows the weapon descriptor to be located entirely on the proposed range tract and Moody property.

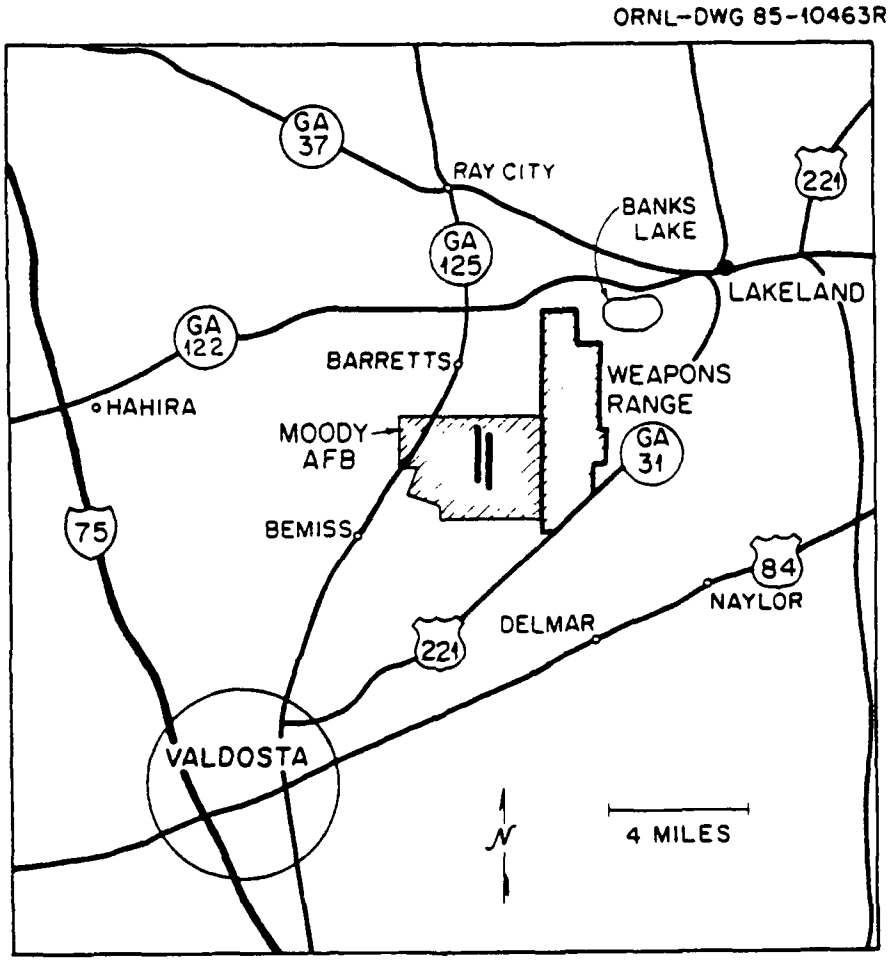


Fig. 2.1. Location of the proposed Winnersville Range.

The land requirements for the range include a square area of 480 acres on the west side of the proposed site (Fig. 2.2). This area is an isolated portion of the DOI Banks Lake refuge area. The Air Force proposes to develop a Memorandum of Agreement with DOI to ensure compatibility with operation of the range.

Part of the USFS land is already under use by the Air Force under an agreement with the USFS. Bemiss Field, in the southeast corner of the tract, is designated for emergency jettison and bailout and is used for training and exercises. The Air Force also has access rights to all the roads and trails on the USFS land for use in case of emergencies.

2.1.2 Range Facilities

Operation of the range would require construction of bomb and strafe targets and support facilities, which would include a main tower, flank tower, and a small support building with a septic system and parking lot. Construction would disturb a 450-acre area, much of which would be clear-cut to allow personnel in the range towers to observe the targets and to score bombing events. Layout of the target area is shown in Fig. 2.3. Most of the target area north of Shiner Pond Road is not expected to require clear-cutting; however, disturbance would result from placement of tires for run-in and foul lines, and possible tree-top removal (without harvesting) to improve visibility. The construction effort would span approximately nine months at a projected cost of less than $1 million.

The strafe target would consist of a 600 x 700-ft area of exposed sandy soil. To construct a strafe target, the land would be graded, all rocks and hard objects would be removed to reduce the danger of ricochets, and an acoustical scoring system would be installed. At frequent intervals the soil would be disked to eliminate any hard ground surface. To provide pilots with visual reference, run-in and foul lines would be constructed by placing salvaged tires in appropriate lines on the ground or mounted on poles above wetland areas.

The bomb target would be a pylon or salvaged vehicle outlined with tires and located in the center of a slightly elevated mound of sandy soil 600 ft in diameter. The mound would be created by bulldozing or excavating sandy soil from the area to be clear-cut and mounding the soil.

The observation towers constructed for the range would be 50 ft high and have a 150-ft^2 cab at the top. The main tower would be located inside a cyclone fence, which would also enclose a cantonment area having a small parking lot and a 900-ft^2 support building. The support building would have office space and workshops for maintenance of targets, range equipment, and vehicles. A well would be drilled to provide potable water, and a septic system would be installed. Providing electrical service would require installation of about 2 miles of overhead line, 1 mile of underground line, and a backup generator.

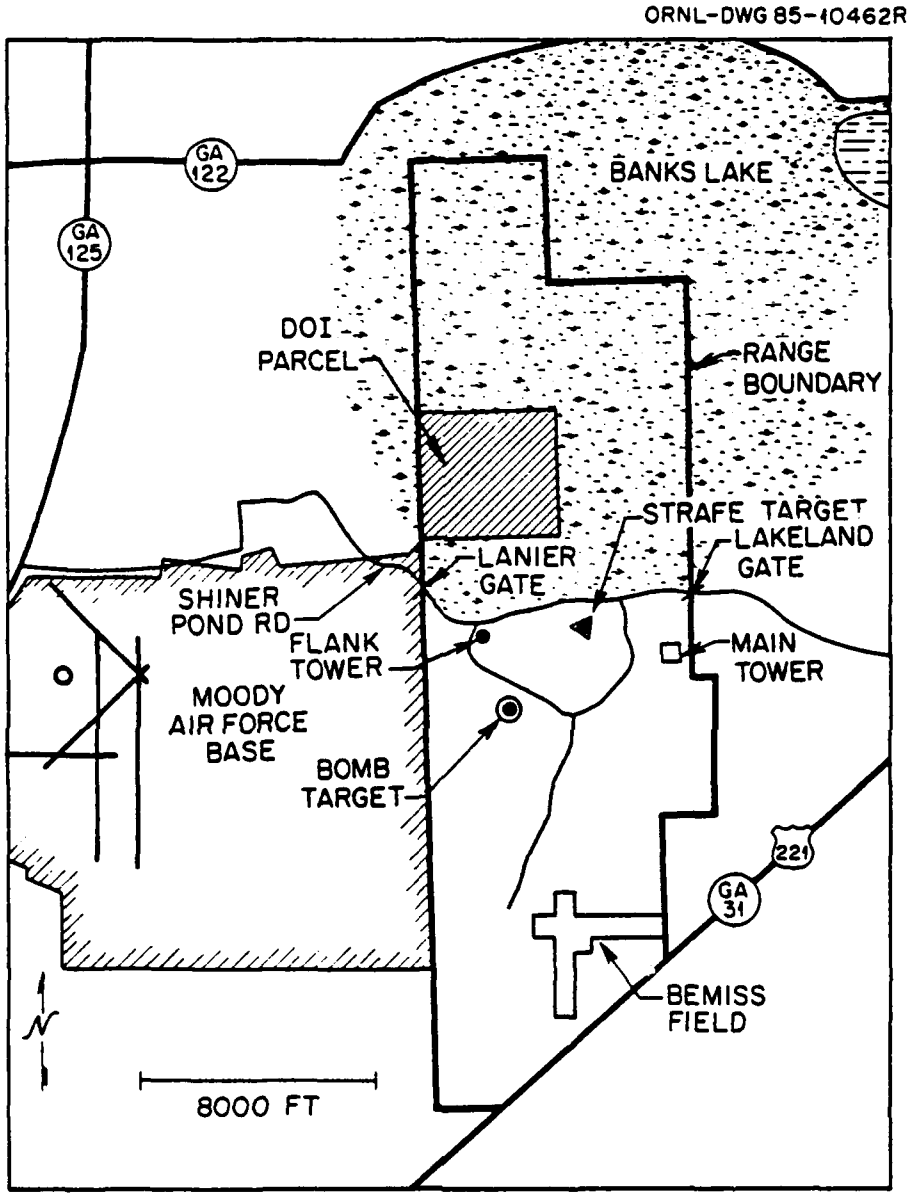


Fig. 2.2. Map of the proposed Winnersville Range.

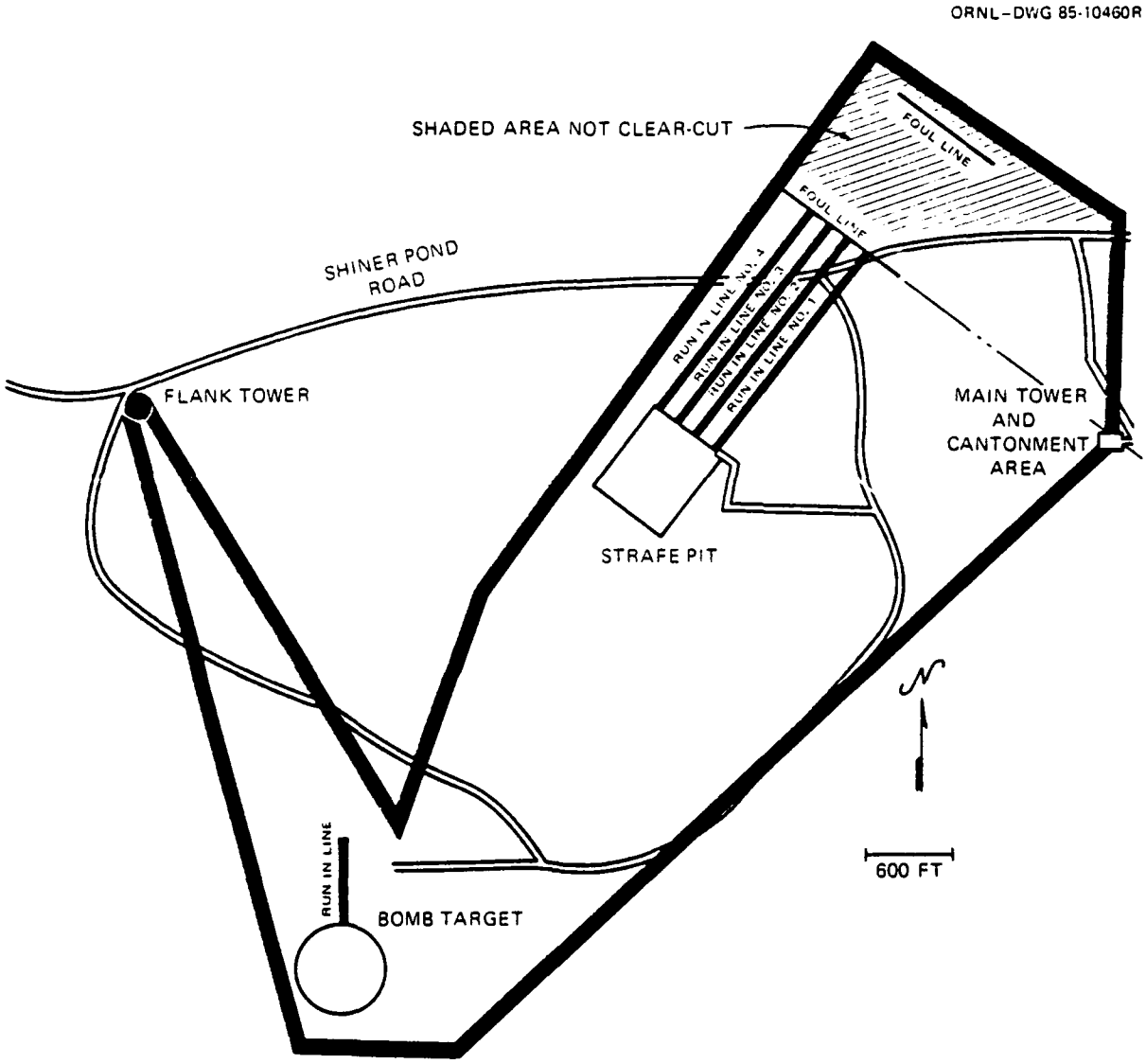


Fig. 2.3. Target area for the proposed Winnersville Range.

2.1.3 Airspace

Operation of the weapons range would require that airspace be restricted near the range to exclude nonparticipating aircraft. The proposed restricted area (Table 2.1 and Fig. 2.4) consists of three parts. Within Part A, the area immediately adjacent to the bomb and strafe targets, the restriction extends from ground level to 10,000 ft above mean sea level (MSL). Part B is a larger area that encompasses the approach and exit flight paths for the target area; within this area, the restriction extends from 100 ft above ground level (AGL) to 10,000 ft MSL. Part C is an area of about 200 sq. miles that encompasses all the flight routes for the range plus the towns of Lakeland, Naylor, and Delmar; the restriction within Part C extends from 500 ft AGL to 10,000 ft MSL.

To accommodate high-altitude delivery patterns, the proposed restricted area would extend vertically 2,000 ft into the existing Moody military operations area No. 1 (MOA-1), which has a floor of 8,000 ft MSL. As much as one-third of the total range usage might involve flights between 8,000 and 10,000 ft. When range missions could be conducted below 8,000 ft, Moody's radar approach control (which also controls MOA-1) would be able to open the airspace above 8,000 ft for use by nonparticipating aircraft. During periods when the range was not in operation, nonparticipating aircraft could fly through the entire restricted airspace.

2.1.4 Range Operation

It is projected that operation of the proposed range would involve 9000 sorties per year (Table 2.2). (A sortie consists of one mission by a single plane.) Of this total number of sorties, 7500 would be flown by Moody aircraft. The 347 TFW's program for maintaining combat readiness requires about 21,600 h of flight and 17,300 sorties per year. Operation of the proposed weapons range at Moody, however, would not change the total number of sorties flown by Moody aircraft and, thus, would not change the total number of takeoffs and landings from Moody's runways.

Use of the range would be limited by bad weather, time required for range maintenance, and time allocated for recreational use, such as scheduled hunting. The range would not be used when the ceiling is less than 3000 ft or visibility less than 3 miles.

Under current planning for the range, a maximum of 288 passes per day over the target area would occur. The maximum-usage scenario is based on the scheduling of 12 30-min periods per day, an average flight size of three aircraft each period, generating an average of 36 sorties per day and an average of 8 passes over the range per sortie. While the number of sorties and the length of range periods are expected to vary, the total number of aircraft passes would not be expected to exceed 288. The weapons range would normally operate on weekdays between 7:00 a.m. and 7:00 p.m. At times the range would also operate on weekends and during evening hours, as dictated by training requirements.

Table 2.1. Restricted airspace

Part A From surface to 10,000 ft MSL.
Coordinates: From
30°57'35"N 83°11'05"W to 30°59'12"N 83°10'00"W to 30°59'12"N 83°07'53"W to 30°58'30"N 83°07'53"W to 30°58'30"N 83°07'45"W to 30°57'43"N 83°07'45"W to 30°57'43"N 83°08'05"W to 30°56'55"N 83°08'05"W to 30°56'23"N 83°08'43"W to 30°56'50"N 83°10'00"W then to point of beginning.

Part B From 100 ft AGL to 10,000 ft MSL.
Coordinates: From
30°59'12"N 83°10'00"W to 31°02'00"N 83°09'00"W to 31°01'30"N 83°06'00"W to 30°54'30"N 83°06'00"W to 30°53'30"N 83°09'00"W to 30°56'50"N 83°10'00"W to 30°56'23"N 83°08'43"W to 30°56'55"N 83°08'05"W to 30°57'43"N 83°08'05"W to 30°57'43"N 83°07'45"W to 30°58'30"N 83°07'45"W to 30°58'30"N 83°07'43"W to 30°59'12"N 83°07'53"W then to point of beginning.

NOTE: There is no intent to overfly Highway 221 below 500 ft AGL.

Part C From 500 ft AGL to 10,000 ft MSL.
Coordinates: From
31°04'00"N 83°01'00"W to 31°04'00"N 83°08'00"W to 31°02'00"N 83°09'00"W to 31°01'30"N 83°06'00"W to 30°54'30"N 83°06'00"W to 30°53'30"N 83°09'00"W to 30°51'00"N 83°08'00"W to 30°51'00"N 83°01'00"W then to point of beginning. Excluding that airspace below 1500 ft AGL within one nautical mile of Lakeland, Georgia. (One nautical mile radius centered on 31°02'30"N 83°04'15"W.)

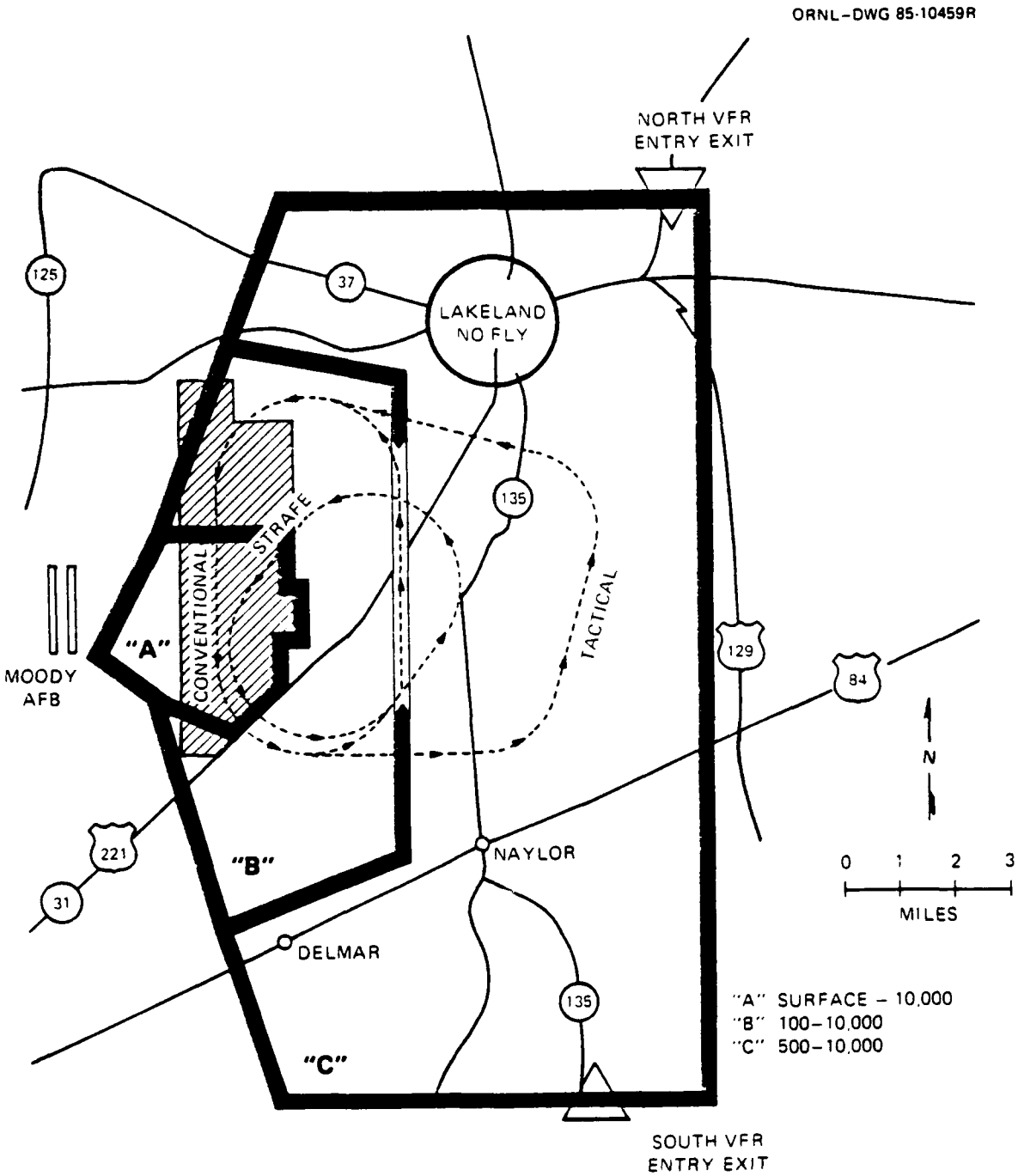


Fig. 2.4. Flight paths and airspace restrictions for the proposed Winnersville Range.

For the first six months after opening, the Winnersville Range would be used exclusively by Moody aircraft. After that time, about one-sixth of the range time at Moody would be used by aircraft from other Air Force units, Navy, Air Force Reserves, and Air National Guard (Table 2.2). Non-Moody aircraft would make an average of six sorties per day, or 1500 sorties per year. These aircraft, however, would not land at Moody except under emergency conditions.

The activities that would be conducted on the weapons range consist of strafing and bombing events (Table 2.3). Figure 2.4 shows the flight paths that would be used on the range and the points where aircraft would enter or exit the range airspace. In a typical training flight for the 347 TFW, two to four aircraft would (1) take off, climb to about 5000 ft and rejoin in close formation; (2) engage in training exercises (e.g., simulated attacks and low-level flight) in MOA-1 or 2 or on military training routes until fuel in external tanks is exhausted; (3) enter range airspace, fly over target at medium altitude, establish spacing between aircraft, and enter range flight pattern for bombing or strafing events (Fig. 2.4); (4) conduct bombing and strafing events; (5) complete training events, exit range pattern, rejoin in close formation, and exit range airspace; and (6) enter Moody's landing pattern. All flight activities associated with the Winnersville Range would be conducted at subsonic airspeeds.

Strafing events would involve a race-track-shaped flight path (Fig. 2.4). Most of the pattern would be flown at altitudes of 3000 to 5000 ft. Aircraft would then turn and descend to enter the strafe run at speeds normally from 300 to 500 knots. In the final strafe run-in, the aircraft would approach the target at a 5 to 15° angle. Firing of the 20-mm and 30-mm weapons would begin only after the aircraft is over government property and within 6000 ft of the target. To recover from the strafe run, power normally would be advanced to 100%; altitude over the target might be as low as 100 ft AGL. On the weapons range, aircraft would use solid (nonexplosive) training/practice ammunition designed for training practice. Scoring would be accomplished by an acoustical system.

The bombing events conducted on the range would involve one flight path for conventional attack and another path for tactical attack (Fig. 2.4). Depending on the bombing event, altitudes would vary from 10,000 MSL to 100 ft above the target. Bombing maneuvers would include dive bomb, low-angle bomb, low-angle low drag, and dive-toss. When the aircraft are not over the federally owned land, altitudes would generally be above 3000 ft AGL, except for the "pop-up" pattern used on the tactical pattern. In the pop-up maneuver, aircraft would descend to about 500 ft AGL to simulate low-level approach. Aircraft would then advance power and climb rapidly to an altitude suitable for a given bombing maneuver. The pop-up pattern would be used in one-sixth of all bomb passes. Airspeeds for the bombing run-in would normally vary from 300 to 500 knots. Aircraft would drop practice bombs that carry a small

Table 2.2. Projected range usage

Unit	Aircraft	Sorties flown per day	Sorties flown per year
347 TFW	F-4, F-16[a]	30	7500
Other users	F-15, F-4, F-16, A-10, A-4, A-7, F-18	6	1500
Total		36	9000

[a]F-4 aircraft will be used through 1986, F-16s will be used thereafter.

Table 2.3. Anticipated maximum daily events

Total	By aircraft			
	Before 1987		1987 and after	
	F-4	Other users[a]	F-16	Other users[b]
Strafe events				
72 Strafe passes daily	60	12	60	12
Bomb events				
216 Bomb passes daily				
36 Pop-up	30	6	30	6
60 Low-angle bomb	50	10	50	10
60 Low-angle low drag	50	10	50	10
60 Dive bomb	50	10	50	10

[a]Other users assumed to be equally divided among F-4, F-16, A-4, A-7, and A-10.
[b]Other users assumed to be 50% F-15 and 50% equally divided among F-4, F-16, A-4, A-7, and A-10.

charge about the size of an 8-gauge shotgun shell. This charge detonates on impact, producing a flash of light and a puff of smoke to allow spotting for scoring the accuracy of the bomb drop.

2.1.5 Management and Control

Responsibility for the weapons range would be assigned to the Range Operation Officer (ROO) attached to the 347 Combat Support Group Division for Operations and Training. The range would be operated by a contractor employing one manager and five workers and performing the following operations: maintenance of the range, targets, facilities, and vehicles; scoring; preparing reports; fire protection; communications; ordnance clearance and decontamination; and security patrols.

Before range operations begin the entire tract would be inspected and cleared of any unexploded ordnance that might remain from World War II operations. Each month the area within 500 ft of the bomb target would be cleared of practice ordnance and inert residue. The area within 2000 ft of the bomb target would be cleared annually, and every five years clearance to 1 nautical mile would be accomplished.

Access to the weapons range would be restricted to ensure the safety of the general public. Gates would be installed on all roads entering the range tract. Authorized recreational access to the range tract would be restricted to periods determined by agreement between the Air Force and the Georgia Game and Fish Division. Vehicles would not be permitted off-road, and warning signs that identify the area as a gunnery range would be located along range boundaries and access roads. The target area would be fenced with barbed wire and posted with additional warning signs prohibiting unauthorized entry.

Shiner Pond Road (Fig. 2.3), an unpaved road maintained by Lanier County, would be closed when the range is operational, but normally would be open between 7:00 p.m. and 7:00 a.m. However, the gates would be equipped with telephones so that, if necessary, persons could request to cross the range during idle periods. Access would be controlled by a Range Control Officer (RCO). The range contractor's personnel would routinely patrol the range, and Moody security police would also patrol periodically.

Telephone communications would be established between the range towers and the Moody system, providing contact between the range controllers, Moody radar approach control, and the Moody tower. Hand-held radios would be used as backup communication and for communication between vehicles and range facilities. Air-to-surface communication would be provided by ultrahigh frequency (UHF) radios.

2.1.6 Supplemental Use of Range Land

The USFS currently contracts with the Georgia Game and Fish Division to manage the tract to enhance wildlife and recreation opportunities. The area is designated the Grand Bay Public Hunting Area

and is open through purchase of a special permit for deer and waterfowl hunting during specified periods. If the weapons range is established, the Air Force intends to develop an agreement with the State of Georgia for joint wildlife management of the area, including public hunting. Most of the range, except the target area (about 450 acres) and other small areas set aside for protection or management of sensitive wildlife species, would be available for hunting. A permit fee, in addition to the state license fee, would be collected and used by the Air Force, in coordination with the State of Georgia, to improve wildlife management and outdoor recreation opportunities. Management of the range would be conducted in a manner compatible with the newly established wildlife refuge adjacent to the range.

2.2 ALTERNATIVES

Given the opportunistic nature of the proposal, the Air Force is not aware of any reasonable alternatives. The availability of existing federal land adjacent to Moody presents the Air Force with an attractive opportunity to significantly improve the existing training environment. The decision facing the Air Force is whether to use the available land to establish a weapons range (the proposed action) or to continue to operate as usual (the "no action" alternative). The Air Force is considering the proposed action because the USFS land became available, not because of a programmatic requirement to establish a weapons range for Moody.

During the public scoping meeting (Sect. 1.3), however, several individuals commented that the Air Force should consider purchasing land in Echols County for a range. The primary rationale given was that Echols County has large tracts of land available for sale and that the population density is less than that near the proposed site. Thus, the no-action alternative and the feasibility of an alternative site in Echols County are described below.

2.2.1 No Action

For the no-action alternative, the 347 TFW would continue their training operations as they are currently conducted. Air-to-surface ranges located 85 to 150 nautical miles from Moody AFB would be used on a "space available" basis. Such ranges primarily include those at Eglin AFB, near Pensacola, Florida, and the Townsend Range, near Savannah, Georgia, and to a lesser extent ranges at Pine Castle, Fort Stewart, Rodman, Lake George, and Stevens Lake (see Fig. 1.1). No new facilities would be required and the existing noise environment (Sect. 3.1) would remain unchanged.

2.2.2 Echols County

Echols County lies southeast of Moody and adjoins the Georgia-Florida border (Fig. 2.5). Most of Echols County's 421 square-mile area

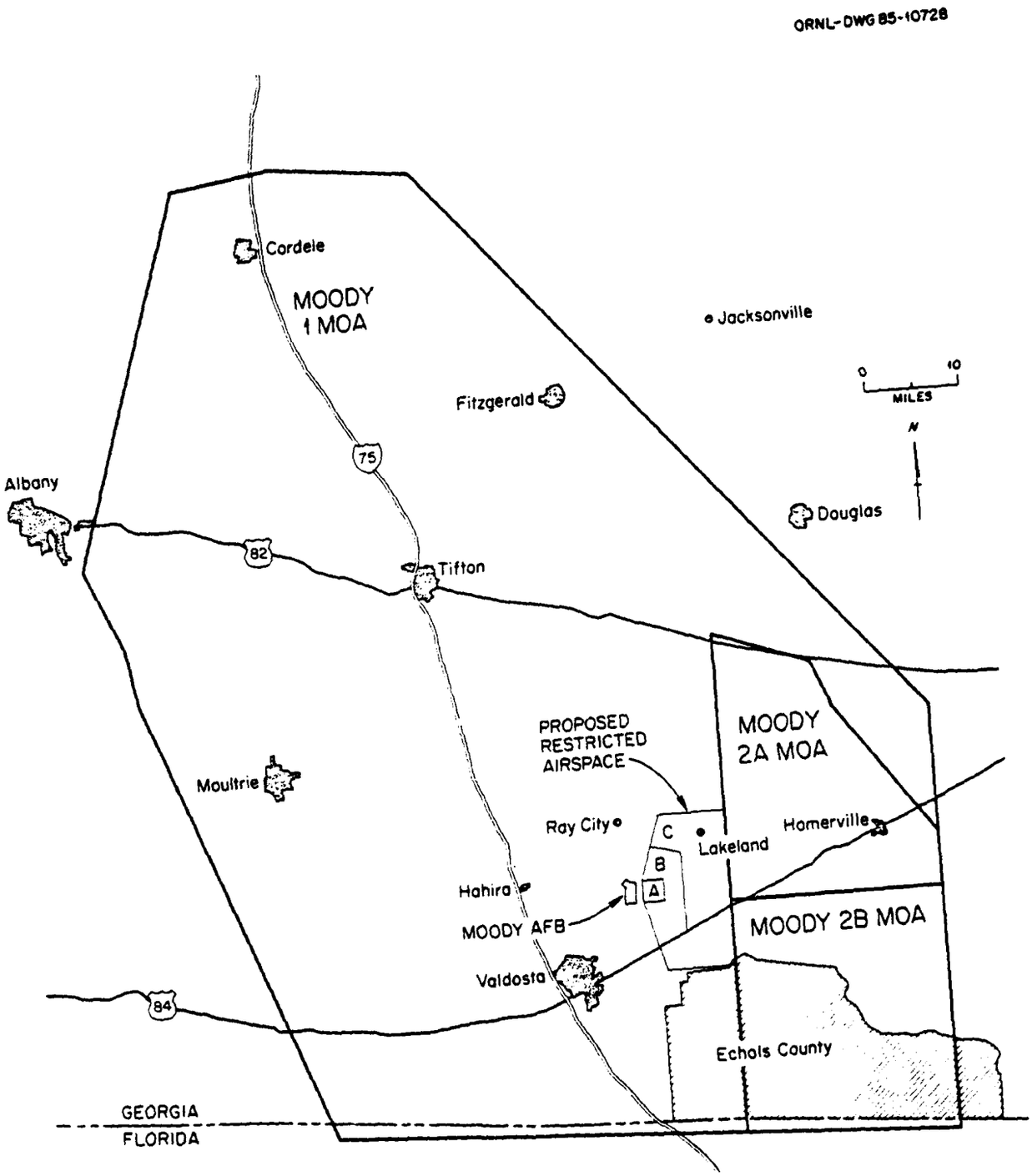


Fig. 2.5. Location of Echols County and Moody AFB military operations areas (MOAs).

and a significant portion of its 2297 population (1980 census) are beneath the Moody military operations area (MOA-2B) (Fig. 2.5). MOAs are identified on air navigation charts so that civilian aircraft using visual flight rules (VFR) may be aware of possible military operations while flying through a MOA. The Moody MOA-2B is a block of airspace extending from 100 ft AGL to 8000 ft MSL; it is overlain by the southeastern corner of MOA-1, which extends to 18,000 ft MSL. Three military training routes (MTRs) also pass above Echols County--Visual Route (VR) 1002, VR 1003, and Instrument Route (IR) 16 (Fig. 2.6). MTRs are used for low-altitude high-speed training. The VR routes share a common block of airspace that is 10 nautical miles (NM) wide and ranges in altitude from 200 ft AGL to 1500 ft MSL. The IR route is 8 NM wide with an altitude block of 300 ft AGL to 6000 ft MSL north of Highway 94, and 7 NM wide and 300 ft AGL to 1000 ft MSL south of Highway 94.

Establishing a weapons range in Echols County would require a land area of 6 x 4.3 miles. More land would be required than at the Moody site because a stand-alone range must completely enclose the weapons descriptor (Sect. 4.3), whereas the weapons descriptor for the range adjacent to Moody is enclosed in the range tract plus the Moody property. As with the proposed range at Moody (Fig. 2.4), restricted airspace would be established with various lower limits (from ground level to 500 ft AGL) and an upper limit of 10,000 ft MSL.

Locating a weapons range in Echols County under the Moody MOA-2B would be incompatible with air training activities conducted by the 347 TFW.* The Moody MOA-2A and B are currently used for training with both Pave Spike Laser Guided Munitions and Maverick Optically Guided Missiles. This training requires both low- and medium-altitude airspace not available on MTRs or elsewhere near Moody. Training with these specialized weapons is an essential part of Moody's mission and a key justification for the use of Moody by the Tactical Air Command (TAC). In addition, Moody aircraft use the MOA-2 for low-altitude intercept training. This requires use of the whole length of the MOA and, due to Federal Aviation Administration (FAA) restrictions, cannot be accomplished on MTRs.

The same characteristic that makes Echols County desirable for a weapons range, low population density, also makes this area valuable for low-altitude flight training. No other suitable training area is

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*The training requirements for a multimission fighter, such as the F-4E or F-16, necessitate training areas that provide airspace for conducting both air-to-air and air-to-surface training activities. Air-to-surface operations involve practice training in strafing and bomb drops, which must be conducted at a weapons range (such as the proposed Winnersville Range) where there is restricted airspace over government controlled land. Air-to-air operations involve practice training for offensive and defensive counter-maneuvers, intercept operations, low-level navigation, and simulated weapons deliveries. Air-to-air activities are conducted in areas designated by the Federal Aviation Administration (FAA) as military operations areas (MOAs).

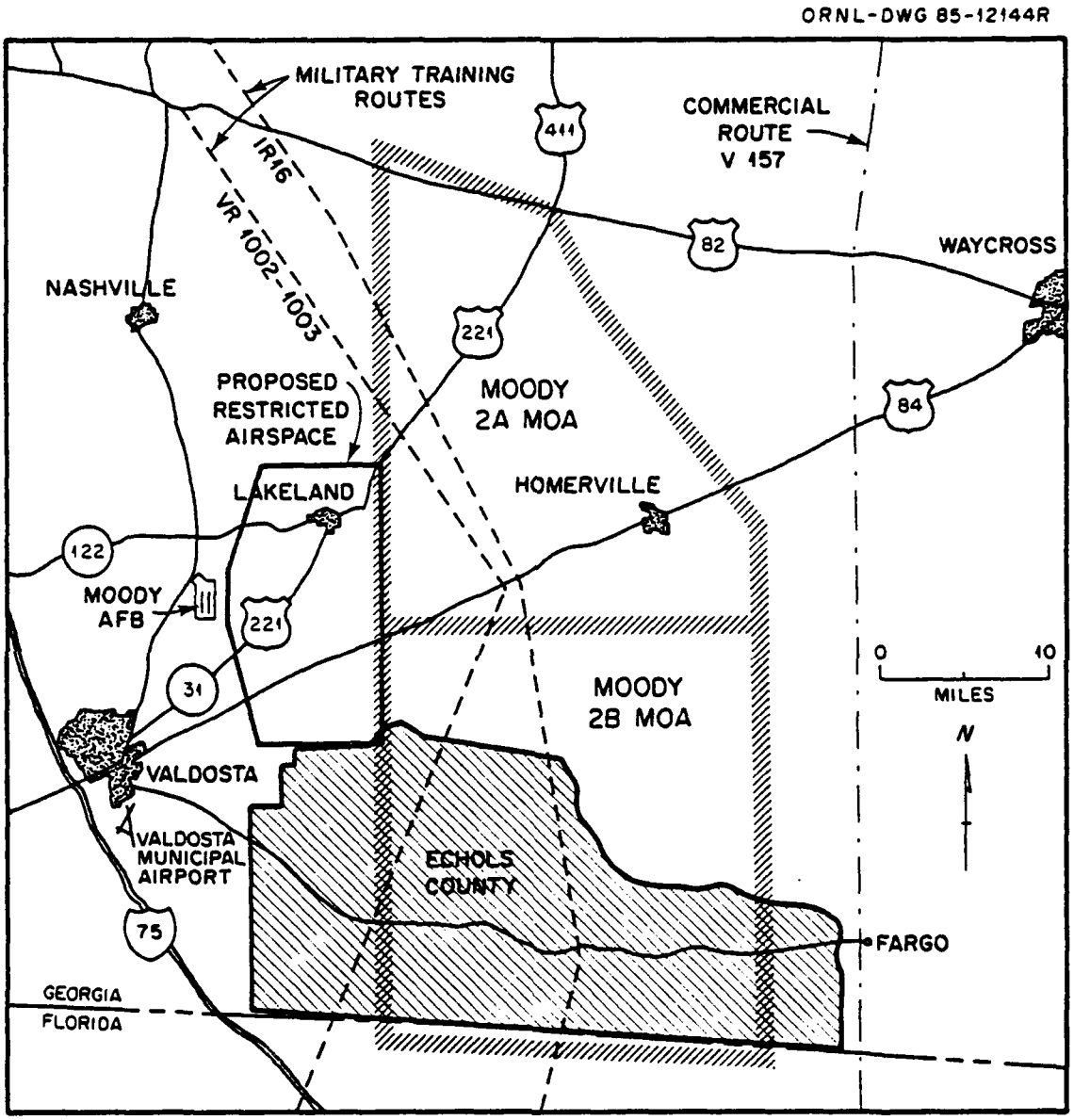

Fig. 2.6. Location of Moody MOA-2B, military training routes, and Echols County.

available within reasonable distance from Moody, and the prospects for establishing a new equivalent area to replace MOA-2 are remote.

Although portions of Echols County do not lie below Moody MOA-2, other problems preclude the use of these areas. In the western portion of the county, the airspace needed for a weapons range could conflict with civilian operations at the Valdosta Municipal Airport. In the eastern end of the county, commercial air route V 157 could be affected (see Fig. 2.6). In both of these areas, establishment of a range would require relocation of roads.

In summary, the training requirement for a multimission fighter will exist at Moody AFB for the foreseeable future. The establishment of an air-to-surface weapons range in Echols County would eliminate full use of MOA-2B and restrict the use of MOA-2A. Rather than enhancing the level of training conducted by the 347 TFW, the establishment of a weapons range in Echols County would substantially decrease the training airspace available to the 347 TFW and would result in significant degradation of the overall training capability.

2.3 COMPARISON OF ALTERNATIVES

The salient environmental impacts that would result from the proposed action are summarized in Table 2.4. For establishment of a weapons range in a rural area and near the center of a wetland complex, these impacts are neither unique nor of such magnitude to require significant mitigation measures. Most notably, the increased noise levels would cause no appreciable hearing loss, even for the few (less than 15) individuals who could experience exposure to the highest noise levels [day/night average noise levels (DNLs) between 75 and 80 dB] (Sect. 4.1). The principal noise impact would be to individuals who might find the noise unpleasant and intrusive. It is estimated that about 86 persons who reside in dwellings within the DNL 65 or above noise contours would be adversely affected in this manner (Sect. 4.1). The impacts of developing the 5900-acre range near the center of the Grand Bay/Banks Lake wetlands complex would also have minimal consequences. Relatively little wetland (up to 15 acres) would be eliminated, and no significant impact to wildlife populations or unique vegetation would be anticipated.

For the no-action alternative (continuing training operations on existing ranges), the proposed Winnersville Range area (described in Sect. 3) would not be affected. The environmental impacts of existing training operations are principally noise related, resulting from takeoff and landing events at Moody and from sorties flown at the various ranges used. The elevated noise levels in the immediate vicinity of Moody (Fig. 3.1), and thus noise impact, would be essentially the same with or without the range. Because the 347 TFW would continue to use existing ranges on a space available basis with other training units, no direct comparison of the noise impacts at these ranges with the proposed range would be meaningful.

Table 2.4. Summary of environmental impacts of the proposed Winnersville Range

Impact Area					
Noise	Airspace	Safety	Terrestrial/Aquatic Resources	Socioeconomics	Historical/Archeological Resources
• 103 households, occupied by 358 persons, and 4 churches would be exposed to noise levels greater than 65 dB DNL. • No appreciable hearing loss is expected (maximum of 4 dB). • 86 individuals may find the increased noise levels unpleasant and intrusive. • Fishing in some portions of Banks Lake may be less attractive.	• Restricted airspace would require small detour for some flights. • Some crop dusting operations may be inconvenienced.	• Range operations would result in small probability of accidents in vicinity of range area. • Incidence of dropped objects on privately owned land would be less than one occurrence every 80 years.	• Most high-growing vegetation in the 450-acre target area would be cleared. Up to 15 acres of wetlands would be eliminated by construction of facilities. However, no unique vegetation or habitats would be impacted significanty. • Impact on aquatic resources would be minimal. • No significant impact on wildlife populations or habitats are anticipated. Vegetation clearing operations could, however, adversely affect some alligators.	• Closing of Shiner Pond Road while range is operating would inconvenience users. • Revenues received in lieu of taxes by Lanier and Lowndes Counties would be eliminated. • State would receive funds from sale of clear-cut timber and future forestry management.	• Potentially affected area has been surveyed. Potential resources lie outside area which would be disturbed.

In conclusion, no overriding environmental factors are evident that would render the proposed action unacceptable.

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The proposed site for the weapons range is the U.S. Forest Service (USFS) and Department of Interior tracts adjacent to Moody Air Force Base (Sect. 2.1). Other areas that would be affected by the operation of the range include portions of Lanier and Lowndes counties beneath the range flight paths (Fig. 2.1). The following sections describe existing conditions for the affected environment.

3.1 NOISE

The areas that will be most affected by noise from the proposed Winnersville Range are rural. The flight paths (Fig. 2.4) pass over an area of small farms and isolated homes. Current operations at Moody involve an average of 139 takeoff and landing events per day. Figure 3.1 (the noise footprint for Moody) shows the proposed range location with respect to the current noise environment of the area. As indicated, the proposed range would be largely outside the existing 65 dB DNL contour. Current ambient noise levels in the range area have not been measured but are estimated to vary from the mid-40s to less than 65 dB DNL. This estimate is based on current overflights, their altitude, airspeed, and engine power level, as well as consideration of normal attenuation of noise with distance from the flight track.

3.2 AIRSPACE

3.2.1 Description

The major features of the airspace near Moody are (1) an airport traffic area (ATA) for Moody; (2) Moody military operations areas (MOAs) 1 and 2; and (3) several military training routes (MTRs) (Figs. 2.5 and 2.6). The ATA is a controlled airspace that extends to a 5-mile radius from Moody's control tower and extends from ground level to 3000 ft above ground level (AGL). Aircraft entering the ATA must be in contact with the control tower. The Moody MOAs 1 and 2 and the MTRs are described in Sect. 2.2.2 and shown in Figs. 2.5 and 2.6. MOAs are neither restricted nor controlled airspaces, and civilian aircraft routinely fly through them using visual flight rules (VFR) procedures. Pilots can contact Valdosta approach control for advisories regarding military operations within the Moody MOAs.

3.2.2 Air Traffic

Air traffic to and from Valdosta Municipal Airport between October 1984 and September 1985 was about 14% commercial air carrier, 4% air taxis, and 82% general aviation, as indicated by the number of contacts to the Federal Aviation Administration's Flight Service Center in Valdosta. Traffic to and from Valdosta generated an average of 35 takeoffs and 35 landings per day (Rhue 1985). Valdosta is served by one

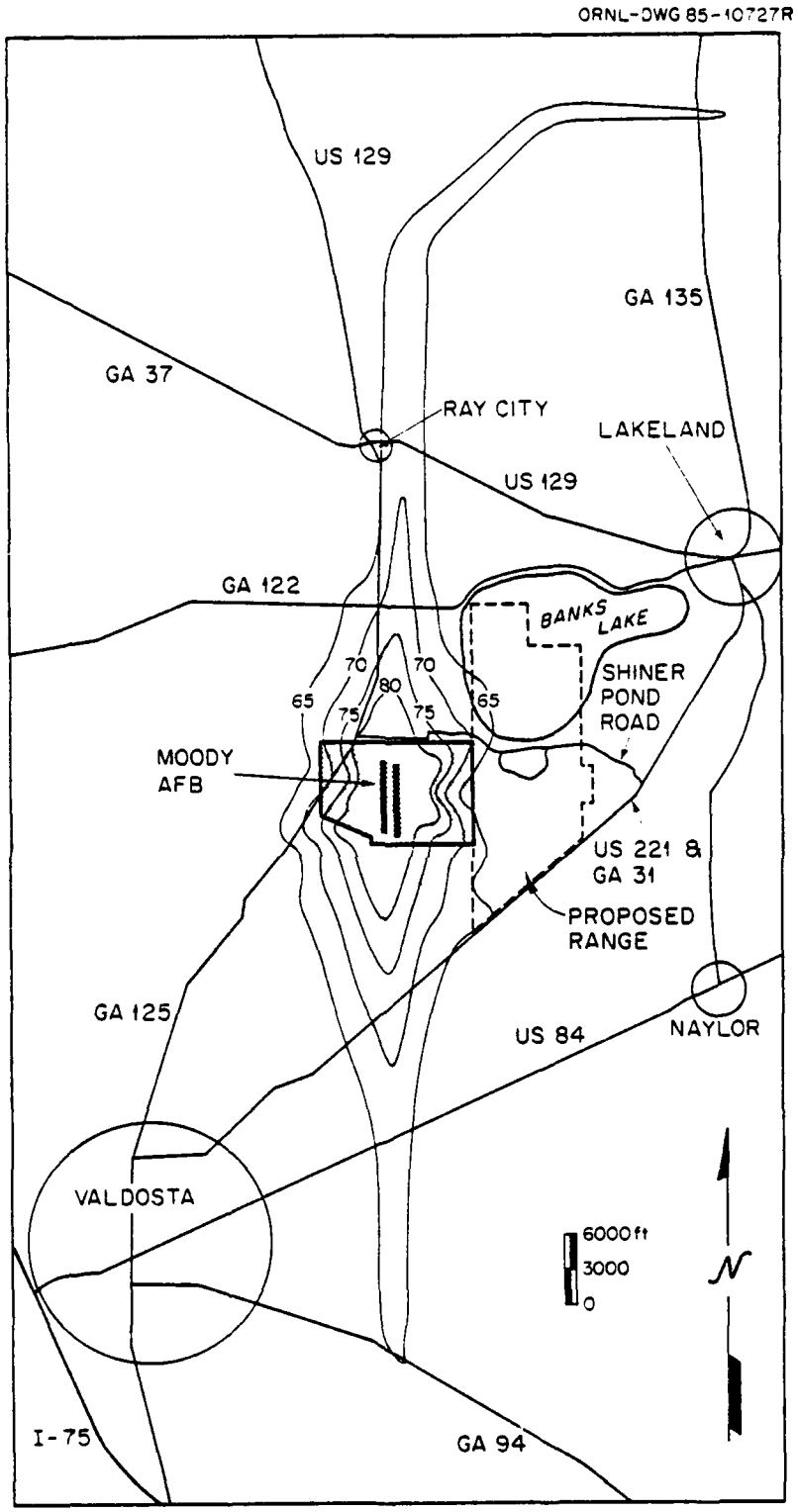

Fig. 3.1. Noise levels (DNL) for current operations at Moody.

commerical carrier, Atlantic Southeast Airlines, which transports passengers between Valdosta and Atlanta and has 34 flights per week. Two air taxi services, Air Valdosta and Holland Air, operate from the municipal airport. The airport also serves as a base for numerous general aviation aircraft used for business, recreation, and other purposes.

Crop dusting is an activity that generates low-altitude air traffic near Moody and the proposed Winnersville Range. Farmers in Lanier and Lowndes counties are served by at least three commercial crop dusting services based in Valdosta and Nashville, Georgia, and numerous entrepreneurs operating from private airstrips. When crop dusters need to spray fields within the airport traffic area around Moody, they contact the Moody tower to receive permission to enter the area. Crop dusting activities are described in Sect. 3.7.3.

3.2.3 Air Traffic Control

Moody has a control tower that coordinates traffic on runways and within 5 miles of the tower. In 1981 the Federal Aviation Administration discontinued operation of the control tower at Valdosta Municipal Airport; however, a contractor-operated control tower is expected to begin operation before 1986. Approach control for Moody and Valdosta is provided by a regional air traffic control facility at Moody. In addition to controlling approaches and departures, air traffic controllers also advise pilots regarding military operations in the Moody MOAs.

3.3 SAFETY

In the region likely to be affected by the proposed range, the safety environment is influenced by overflights of Moody aircraft in their approach and departure paths. Tactical Air Command (TAC) and Moody flying hours for F-4 and F-16 aircraft are presented in Table 3.1. Rates for Class A mishaps (damage of more than $500,000 or a fatality) for each aircraft in calendar year 1984 and in 1985 through April are also presented for TAC and for Moody.

With regard to objects dropped by planes in flight, TAC's Logistics Maintenance and Flightline group has developed data both for Moody and for the F-4 and F-16 aircraft. Table 3.2 presents these data, both in actual numbers and in rates per 1000 sorties.

3.4 AIR QUALITY AND METEOROLOGY

The climate of southern Georgia is influenced by the Atlantic Ocean and the Gulf of Mexico; hot and humid conditions prevail throughout the summer, and winters are short and mild. Precipitation is common; annual averages exceed 50 in. Most of the spring and summer precipitation is a result of thunderstorm activity, whereas winter precipitation is

Table 3.1. TAC and Moody flying hours and Class A mishap rates for F-4 and F-16 aircraft

	Average annual TAC flying hours	Average annual Moody flying hours	Average Class A mishap rate per 100,000 h			
			TAC flying time		Moody flying time	
			1984	1985[a]	1984	1985[a]
F-4	349,747	21,000	3.6	2.9	0	0
F-16	108,223	0	4.7	2.3	0	0

[a]January-April.

Table 3.2. Dropped objects[a] and rates for TAC F-4s, F-16s, and Moody F-4s

	October 1983-September 1984		October-December 1984	
	Number	Rate (Number per 1000 sorties)	Number	Rate (Number per 1000 sorties)
TAC F-4	140	1.5	8	0.5
TAC F-16	110	1.2	28	1.2
Moody F-4	13	0.8	11	2.5

[a]Objects dropped from aircraft most commonly are inspection-panel covers, about the size of silver dollars.

normally associated with frontal passage. Average wind speed for Moody is 7 mph, and winds from the west and southwest predominate (Gale Research 1980). Occasional severe weather occurs in Georgia; an average of 18 tornadoes is reported in the state each year. In addition, hurricanes occasionally penetrate into the area, resulting in widespread rainfall and damaging winds (Gale Research 1980).

The area surrounding Moody AFB is part of the South Georgia Air Quality Control Region (AQCR 59). The region is currently meeting all federal and Georgia standards for ambient air quality (48 FR 46537). Current flight operations from Moody contribute particulate matter, carbon monoxide, hydrocarbons, oxides of nitrogen, and oxides of sulfur to the regional pollution levels, but because of the amounts emitted and the altitudes at which they typically occur, these emissions have only minor impact on regional pollutant levels.

3.5 TERRESTRIAL AND WETLAND RESOURCES

3.5.1 Range and Vicinity

The approximately 5900-acre site for the proposed range, including the 450-acre target area, lies near the center of the Grand Bay/Banks Lake wetlands complex (Fig. 3.2). This complex consists primarily of two large depressions (Grand Bay) to the southwest, each occupying about 2 sq. miles, and one larger depression (Banks Lake) to the northeast, occupying about 13 sq. miles. Many smaller wetlands, primarily shrub and forested swamps, are scattered among and around these larger depressions. Banks Lake, as shown on U.S. Geological Survey topographic maps, is not a typical lake, but rather is more than 75% shrub or forested swamp. The remainder consists of an actual open water lake, which is located in the northern parcel of U.S. Department of Interior property (Fig. 3.2). The wetlands or swamps of the Grand Bay complex (other than the open-water, lacustrine areas) are palustrine, acidic, freshwater wetlands having organic soils; these wetland types are identified in Appendix C, Table C.1, based on the classification system of the National Wetlands Inventory prepared by the U.S. Fish and Wildlife Service (Cowardin et al. 1979).

The Grand Bay area lies between a region of lime sinks to the south and a region of Carolina bays to the north. Thus, it is not certain whether the Grand Bay complex consists of Carolina bays, lime sinks, or some combination of the two. Grand Bay has some of the distinguishing features of Carolina bays and is, therefore, considered by some to be one of the largest Carolina bays in the Southeast, if not the largest (Wharton 1978). Excluding the Okefenokee Swamp, the Grand Bay/Banks Lake complex is probably the largest natural freshwater lake-swamp in the coastal plain of Georgia. However, it has not been officially recognized as a national natural landmark (U.S. Department of the Interior 1983).

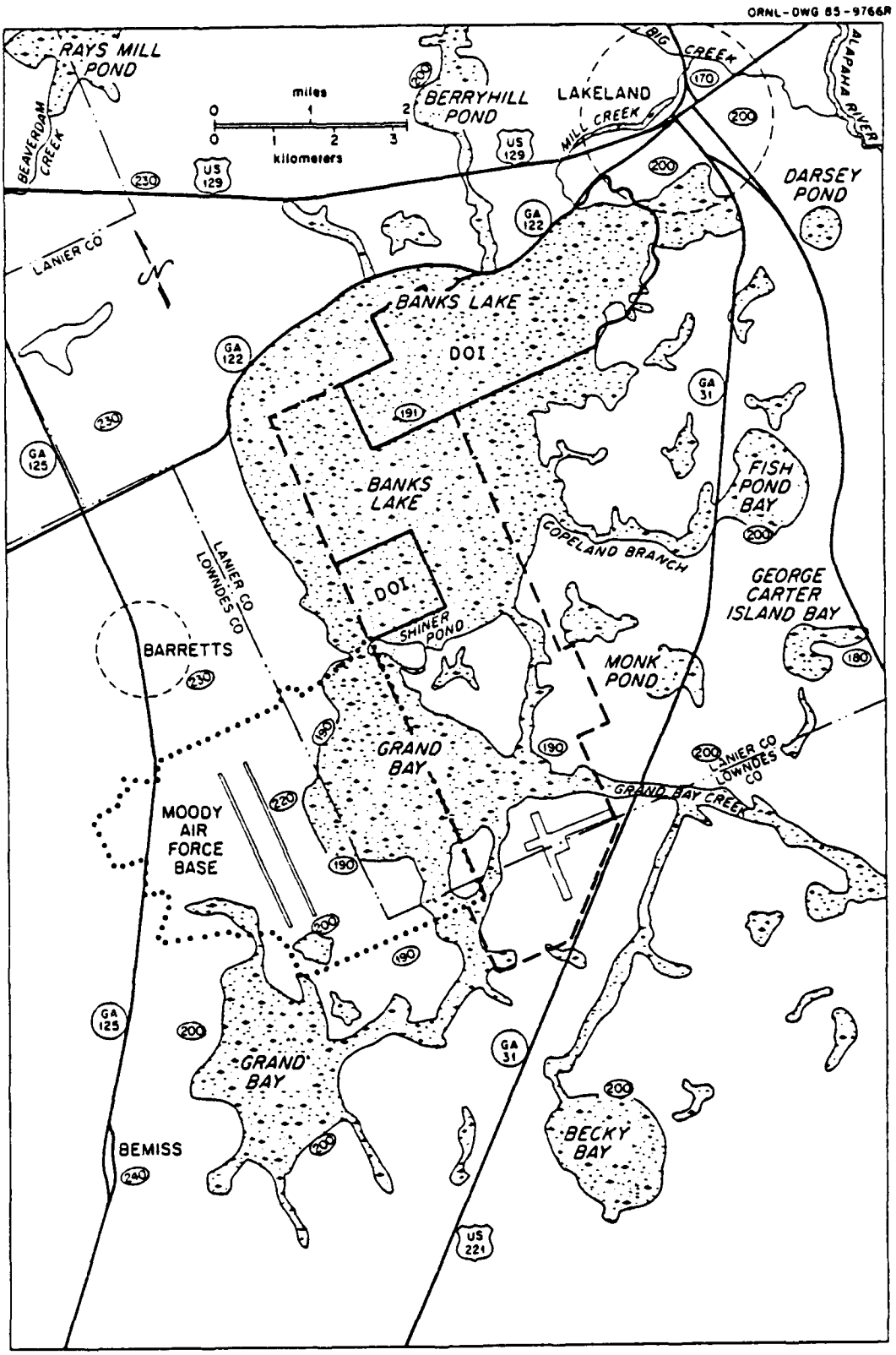

Fig. 3.2. Distribution of major wetlands of the Grand Bay/Banks Lake complex. Many small wetlands are not shown. Numbers within ovals are elevations. The dotted line encloses Moody AFB and the heavy dashed line encloses the proposed range. DOI = U.S. Department of Interior.

Much of the Grand Bay/Banks Lake complex is occupied by the Grand Bay Wildlife Management Area, which consists of U.S. Forest Service land and privately owned land. This wildlife management area is managed by the Georgia Department of Natural Resources in cooperation with the landowners (Niles and Strickland, undated). Ownership of two wetland areas at Grand Bay was recently transferred from the Nature Conservancy to the U.S. Department of the Interior (DOI). One area is a 480-acre tract within the proposed range, and the other is a much larger tract adjoining the range to the northeast (see DOI parcels in Fig. 3.2). Both parcels are now part of the Okefenokee National Wildlife Refuge.

Northern parts of Banks Lake drain to the northeast into Mill Creek, which leads to Big Creek and the Alapaha River. Southern parts of Banks Lake and the remainder of Grand Bay drain to the southeast via Grand Bay Creek, which leads directly to the Alapaha River.

Habitat types of the Grand Bay complex are listed in Appendix C, Table C.2. The wetlands are primarily shrub swamps, black gum swamps, and cypress swamps. Some open water (primarily in Banks Lake) and various stages of aquatic succession also exist. Outer portions of broad drainageways are dominated by lowland mixed hardwoods, chiefly black gum, water oak, red maple, and sweet bay (Rainwater, undated). Central portions consist of pond pine and evergreen shrubs that form an extremely dense swamp. Moderately well-drained lands are covered by longleaf and slash pine forests, which form extensive pine flatwoods, and by plantations primarily of slash pine. Elevated areas are dominated by mixed hardwoods, principally evergreens. An example is Dudley's Hammock, located on the Lanier County-Lowndes County line southwest of the target area. Dominant species in this hammock are longleaf pine, pond pine, southern magnolia, water oak, live oak, and the rare spruce pine. Understory species include staggerbush, farkleberry, and blueberry. Dudley's Hammock is similar to the hammocks found in northern Florida and is the only known hammock of this kind in Georgia.

The approximately 5900-acre site for the proposed range is essentially that area occupied by Unit 1 of the Grand Bay Wildlife Management Area managed by the Georgia Department of Natural Resources and the USFS. The habitats within Unit 1 consist of the following (Niles and Strickland, undated):

Longleaf and slash pine	1930 acres	33%
Creek, shrub, and forested swamp	3806 acres	65%
Cultivated or open land	120 acres	2%
Total	5856 acres	

The pine forests are managed for saw timber on an 80-year rotation by the U.S. Forest Service. Although stands of all age categories are present, most are more than 30 years old.

3.5.2 Target Area

The proposed target area occupies an area of about 450 acres located primarily on the south side of Shiner Pond Road at the center of the proposed range site (Figs. 2.3 and 3.2). This area has more pine plantation and pine flatwoods than the surroundings dominated by wetlands (Fig. 3.3). The soil types and the wetland water regimes of the proposed target area are shown in Appendix C (Fig. C.1), based on soils mapping done by the U.S. Soil Conservation Service (1973) and on the wetlands classification system of the National Wetlands Inventory (Cowardin et al. 1979). The most recent disturbance has been the conversion of relatively natural pine flatwoods of longleaf pine to pine plantations of primarily slash pine in the western half of the area. Grand Bay and Banks Lake predominate to the north, west, and south, whereas pine flatwoods predominate to the east. Grand Bay Creek and its associated creek swamp lie at the eastern perimeter of the target area.

3.5.3 Fauna

The Grand Bay area is located within the geographic ranges of 250 vertebrate species (excluding fishes), consisting of 12 species of turtles, 10 of lizards, 34 of snakes, 19 of frogs and toads, 15 of salamanders, sirens, and newts (determined from distribution maps in Conant 1958), 105 of birds that breed in the area (Cook 1969), and 55 of mammals (Simpson 1964). Not all of these species would be expected to occur at Grand Bay because not all the habitat types required by these species are present (generally, the number of species present increases with the size of the area being considered). Nevertheless, the presence of extensive wetlands as well as pine flatwoods attracts a large diversity of species.

Game animals on the area include white-tailed deer, gray squirrel, bobwhite, mourning dove, wood ducks, and several other species of migratory waterfowl that spend late fall and winter in the area (Niles and Strickland, undated). Wood duck populations are relatively large, due in part to the placement of many wood duck nesting boxes in the wetland areas. Other waterfowl populations, however, appear to be relatively small, as indicated by aerial counts conducted each year as part of a statewide waterfowl survey. The Grand Bay complex is the largest inland waterfowl resting area in southcentral Georgia. Deer are common but populations are small, estimated to be 5 to 10 per square mile. Raccoons and bobcats, both furbearers, are also common on the management area.

Fields are managed for bobwhite and deer and are planted mostly in perennial grasses and chufas. Future plans of the Georgia Department of Natural Resources call for stocking of wild turkey, increasing the number of wood duck nesting boxes, adding wildlife food plots, and prescribed burning on a two- to four-year cycle (Niles and Strickland, undated).

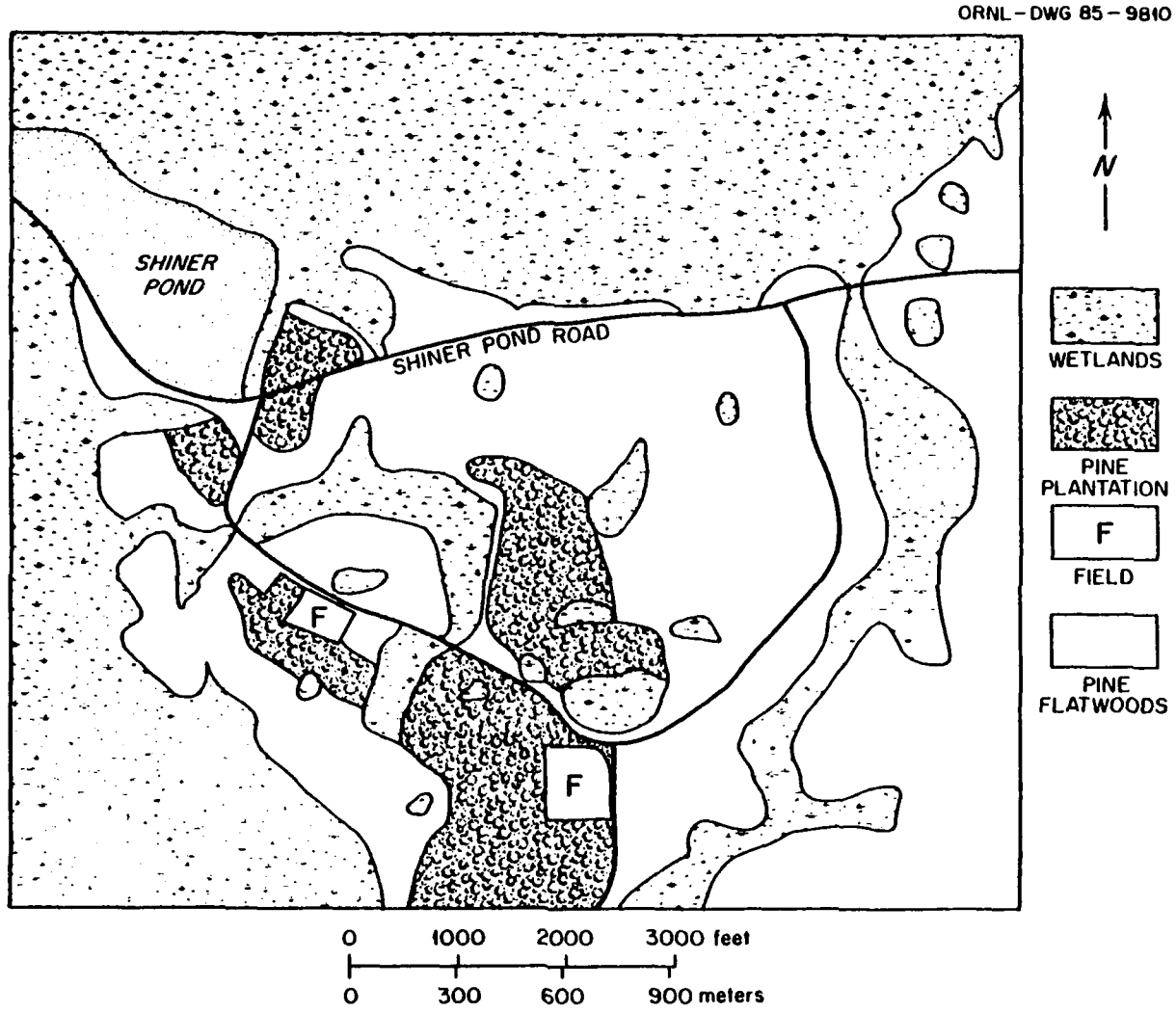

Fig. 3.3. Distribution of generalized vegetation types at the proposed weapons range, based on examination of aerial photographs. Some areas classified as pine flatwoods are wetland areas dominated by pines (see Appendix C, Fig. C.1.). Wetlands identifiable on the aerial photos were those dominated by broad-leaved shrubs, cypress, and black gum.

The extensive wetlands of the area also attract a number of wading bird species, including snowy egrets, great egrets, great blue herons, and little blue herons. Cattle egrets, anhingas, and ospreys have also been observed in the area. An egret and heron rookery, present in the Grand Bay section to the south of Moody, has been surveyed frequently by personnel of the Georgia Department of Natural Resources (Niles and Strickland, undated).

3.5.4 Threatened and Endangered Species

No plant species listed as threatened or endangered by the U.S. Fish and Wildlife Service (1984) occurs in Lanier or Lowndes counties. However, the geographic ranges of several endangered animal species include the Grand Bay area (Hankla 1984). One of these species, the American alligator, is a common resident of relatively permanent wetlands of Grand Bay and Banks Lake. The alligators do not commonly frequent upland areas such as the pine flatwoods that predominate on the proposed target area.

The wood stork occurs occasionally in the area but is not known to nest in Lanier County or any of the adjacent counties. Bald eagles may also occur occasionally at Grand Bay, but these would appear to be wandering, nonbreeding individuals because there are no nests in the area; the nearest nest is in Lowndes County south of Valdosta. The peregrine falcon is not known to nest in Georgia but could possibly occur at Grand Bay as an extremely rare migrant.

The red-cockaded woodpecker, which forms breeding colonies, is a permanent resident of mature pine forests in the Southeast. Although some of the pine flatwoods at the range are mature and may be suitable habitat, none of these woodpeckers are known to occur in the area or anywhere in Lanier County. The closest known colony is in extreme northwestern Lowndes County, about 16 miles west of Banks Lake (Baker 1981). The threatened eastern indigo snake is occasionally observed in Lanier County, as well as in many other counties in southeastern Georgia (Diemer and Speake 1981). The species has not been observed on the proposed target area, however, and would not be expected to be common there because of absence of its preferred habitat of xeric sandhills or sand ridges.

3.6 AQUATIC RESOURCES

Surface hydrology of the 18,000-acre Grand Bay system has not been described, but USGS topographic maps and field observations indicate that water in the vicinity of the proposed target area flows generally southward from the large swamp to the north until it enters Grand Bay Creek approximately 0.6 mile south of the area proposed for the bombing target (Fig. 3.2). Grand Bay Creek flows southeasterly several miles before turning south, eventually flowing into the Alapaha River, a tributary of the Suwannee River. At 157 ft above mean sea level (MSL), the 100-year flood elevation (floodplain) of the Alapaha River is still 33 ft lower than the elevation of the target area (Price 1985).

Grand Bay and the southern half of Banks Lake appear to flow into Grand Bay Creek (Fig. 3.2). Water in the northern half of Banks Lake flows east through the open water portion of Banks Lake, a shallow (5 to 10 ft deep) lake of 710 acres that discharges through a small dam on its northern perimeter into a tributary of Big Creek. Big Creek joins the Alapaha River several miles east of Banks Lake. Several much smaller open water areas are scattered throughout Grand Bay. Shiner Pond, about 70 acres in area, lies immediately to the northwest of the proposed site for the flank tower.

Except for the lakes, ponds, small savannahs, and few cleared areas, Grand Bay is covered with wetland and some upland forest and thicket adapted to varying degrees of wetness---from forest inundated most or all of the year (e.g., gum-cypress swamp) to occasionally ground-soaked stands of runner oak, myrtle, gallberry, huckleberry, saw-palmetto, and wiregrass. Approximately 7300 acres, or 41% of Grand Bay, have been classified as creek swamp and bay swamp (Niles and Strickland, undated). Principal factors controlling inundation are precipitation and elevation of the water table, rather than flooding by streams. As shown in Table 3.3, the average annual precipitation of 48 in. is fairly evenly distributed throughout the year, except for the relatively dry months of October and November. As a result, low water usually occurs from October through December (Wharton 1978).

The surface waters of Grand Bay are "blackwater" systems, characterized by very soft, poorly buffered, and acid (pH 4.5 to 6.5) waters of relatively low fertility and a brown color caused primarily by the presence of high concentrations of humic acids. The larger open water areas such as Banks Lake and Shiner Pond provide good sport fishing (Geihsler 1985). Limited sampling in Banks Lake during 1979 and 1984 by the State Game and Fish Division (Geihsler 1985) yielded, in order of decreasing numbers of fish caught, bluegill, largemouth bass, lake chubsucker, bowfin, chain pickerel, and warmouth. Several of these species were also caught in Eagle's Nest Run, a creek flowing eastward from the swamp portion of Banks Lake into Banks Lake proper. These and other species caught during these sampling efforts are listed in Table 3.4.

Based on their occurrence in similar aquatic ecosystems elsewhere in Georgia, South Carolina, and North Carolina, other fish that may reside in Grand Bay include several species of darters, shiners, madtoms and other catfish, topminnows, sunfish, gar, and carp (Wharton et al. 1981). No fish or aquatic invertebrates that are listed by the U.S. Fish and Wildlife Service as threatened or endangered are believed to occur in Grand Bay. Most fish in Grand Bay probably reside in the more or less perennial lakes, ponds, and creeks during periods of low water. Others may migrate back and forth between Grand Bay and the Alapaha and Suwannee rivers during seasonal highwater in the wetlands. In any event, many species from local waters as well as from downstream probably enter the inundated areas, including those in and around the proposed site, for feeding and spawning. The young fish may reside in these flooded "nursery" areas until the water recedes in late summer or

Table 3.3. Average monthly and annual precipitation for Lanier County, Georgia

Month	Average precipitation (in.)
January	3.46
February	4.20
March	4.95
April	4.52
May	3.54
June	4.69
July	5.66
August	4.88
September	4.22
October	2.34
November	1.86
December	3.86
Total	48.2

Source: Stevens, J. G. 1973. Soil Survey of Berrien and Lanier Counties, Georgia. Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C.

Table 3.4. Fish species known to occur in Banks Lake and Grand Bay, listed in order of decreasing numbers of fish caught during electrofishing

Common name	Scientific name
Bluegill	*Lepomis macrochirus*
Largemouth bass	*Micropterus salmoides*
Lake chubsucker	*Erimyzon sucetta*
Bowfin	*Amia calva*
Chain pickerel	*Esox niger*
Warmouth	*Lepomis gulosus*
Brook silverside	*Labidesthes sicculus*
Florida gar	*Lepisosteus platyrhincus*
Flier	*Centrarchus macropterus*
Golden shiner	*Notemigonus chrysoleucus*
Mosquito fish	*Gambusia affinis*
Spotted sunfish	*Lepomis punctatus*
Black crappie	*Pomoxis nigromaculatus*
Banded sunfish	*Enneacanthus obesus*
Bluespotted sunfish	*Enneacanthus gloriosus*
Lined topminnow	*Fundulus sp.*
Brown bullhead	*Ictalurus nebulosus*

Source: M. Geihsler, Game and Fish Division, Georgia Department of Natural Resources, Fitzgerald, Ga., letters to G. K. Eddlemon, Oak Ridge National Laboratory, Oak Ridge, Tenn., Feb. 4 and 13, 1985.

fall. Thus, both perennially and seasonally flooded wetlands in Grand Bay probably contribute not only to fish production in local waters but also to aquatic ecosystems downstream.

The food web that supports these fish populations includes detritus, phytoplankton and other algae, zooplankton, and macroinvertebrates such as numerous aquatic and terrestrial insects and crayfish. Emergent and submergent macrophytes provide shelter, feeding, and spawning sites.

3.7 SOCIOECONOMICS

3.7.1 Land Use

Both Lanier and Lowndes counties are largely rural: 53.2% of the Lanier County population is indicated by the U.S. Bureau of the Census as nonurban, and in Lowndes County it is 44.7%. Lowndes County, however, has about 2.5 times more land area than Lanier County and 12 times the number of inhabitants.

The land east and south of the proposed range is used for farming and includes a large turf farm operated on a year-round basis. Farms occupy about 79 sq. miles in Lanier County and about 238 sq. miles in Lowndes County (Bachtel 1984). The major crops raised are typical of the Gulf Coast region and include soybeans, cotton, corn, and tobacco. Extensive pine forests in both counties are a source of pulpwood and support local lumber industries.

3.7.2 Population Characteristics

The total 1980 population of Lanier County was 5,654, representing a growth of about 12% in the period 1970 to 1980. Lowndes County, on the other hand, with a 1980 population of 67,972, experienced a growth of 23% in the same ten-year period (U.S. Bureau of the Census 1983). Population densities, or persons per square mile, are indicated in Table 3.5 for the two counties. Figure 3.4 shows the approximate population distribution in the area likely to experience increased noise levels from operation of the proposed range (Sect. 4.1). The Georgia Office of Planning and Budget (1983) projects a 17% growth in population for Lanier County from 1980 to 2000 resulting in 6611 persons. A projected growth of 31% for Lowndes County over the same period will result in a population of 88,910 by the year 2000.

3.7.3 Economic Base

3.7.3.1 Agriculture

In 1983 Lanier County farmers produced corn, soybeans, tobacco, and wheat with a dollar value of about $5,300,000. Lowndes County farmers derived an income of about $16,500,000 from a greater number of products, namely corn, cotton, oats, peanuts, rye, soybeans, tobacco, and wheat (Georgia Crop Reporting Service 1984).

Table 3.5. Population densities, Lanier and Lowndes Counties, 1980.

Area	Area (sq. miles)	Population	Population density (per sq. mile)
Lanier County	194	5,654	29.1
Lakeland	3.1	2,647	853.9
Rural Lanier Co.	190.9	3,007	15.8
Lowndes County	507	67,972	134.1
Valdosta	16	37,596	2349.8

Source: U.S. Bureau of the Census, 1983. County and City Data Book 1983, U.S. Government Printing Office, Washington, D.C.

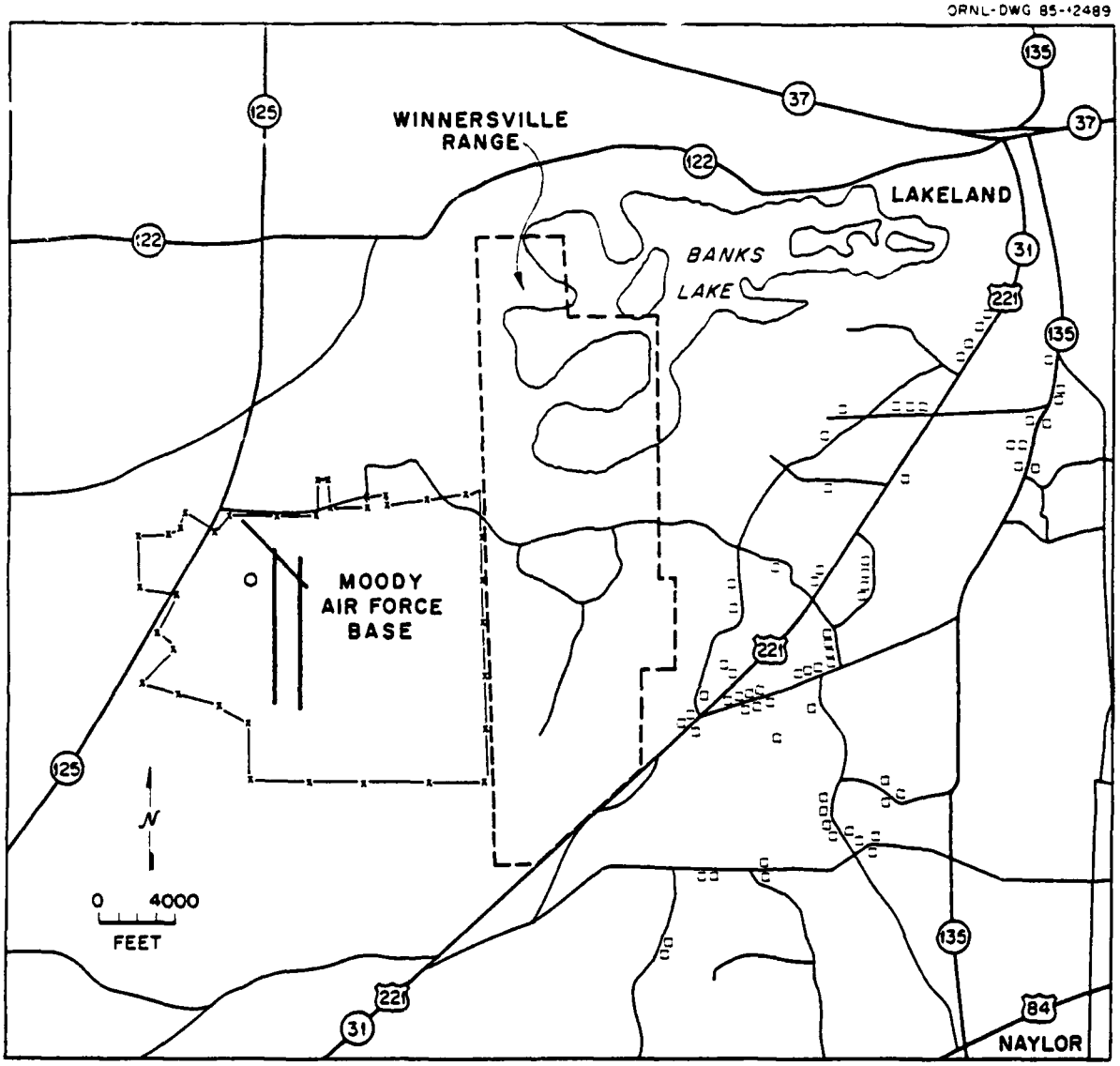

Fig. 3.4. Population distribution in the area likely to experience noise levels above 65 dB DNL from the proposed Winnersville Range. Each square represents about five residents, based on Air Force site investigation, February 1985.

Cotton and soybeans are two crops that must be dusted with pesticides on a regular basis at certain times during their growth cycle in order to guarantee good production. Lanier County has about 1000 acres of cotton and 10,000 acres of soybeans; Lowndes County has about 3610 acres of cotton and 17,500 acres of soybeans. Cotton is usually dusted weekly from mid-June through August. Soybeans are usually sprayed twice between mid-July and mid-August. This crop dusting is performed most efficiently by aircraft during the daytime after dew has disappeared (about 10 a.m.) until dark. About 90% of the farmers use this method of applying pesticides to their cotton and soybeans (Tucker 1985).

In addition to cropdusting aircraft that use Valdosta Municipal Airport and other airports within a radius of perhaps 50 miles, there are many privately owned aircraft in the vicinity that fly from private strips and perform dusting services.

3.7.3.2 Taxes

The Air Force is acquiring 9340 acres of U.S. Forest Service land, 5900 acres of which would be used to establish the range; the remainder of this land is within the existing Moody property boundary. The land pending transfer to the Air Force is "entitlement land" not subject to local government taxation (P.L. 94-565, 31 USC 6902). The Bureau of Land Management, however, now makes annual payments in lieu of taxes to Lanier and Lowndes counties at the rate of $0.75 per acre of USFS land within each of the counties. The maximum amounts receivable by Lanier and Lowndes counties are $5072 and $1933, respectively. Because of federal funding limitations, the amount paid in the last few years has been prorated at amounts less than 100%. In 1984 Lanier County received $4860 for its 6763 acres of USFS land, and Lowndes County received $1852 for its 2577 acres.

3.8 HISTORICAL AND ARCHEOLOGICAL RESOURCES

In compliance with federal regulations for protection of historic and cultural properties (36 CFR 800 and 36 CFR 66), a background investigation and an initial archeological survey were conducted (Wright 1985). The survey investigated at least 10% of that portion of the target area south of Shiner Pond Road, including the sites of the two towers, the cantonment area, and the bomb and strafe targets; at least 35 acres were surveyed. The background research and field work were carried out during February and March 1985 (Wright 1985) and are described in Appendix D.

The archeological survey reported the existence of four sites where artifacts were found. These sites (Fig. 3.5) were given provisional numbers 9-Ln-ARA-M1 through 9-La-ARA-M4. Only scattered artifacts were found at three of the sites, but site 9-Ln-ARA-M3 contained artifacts indicating repeated human occupation (see Appendix D).

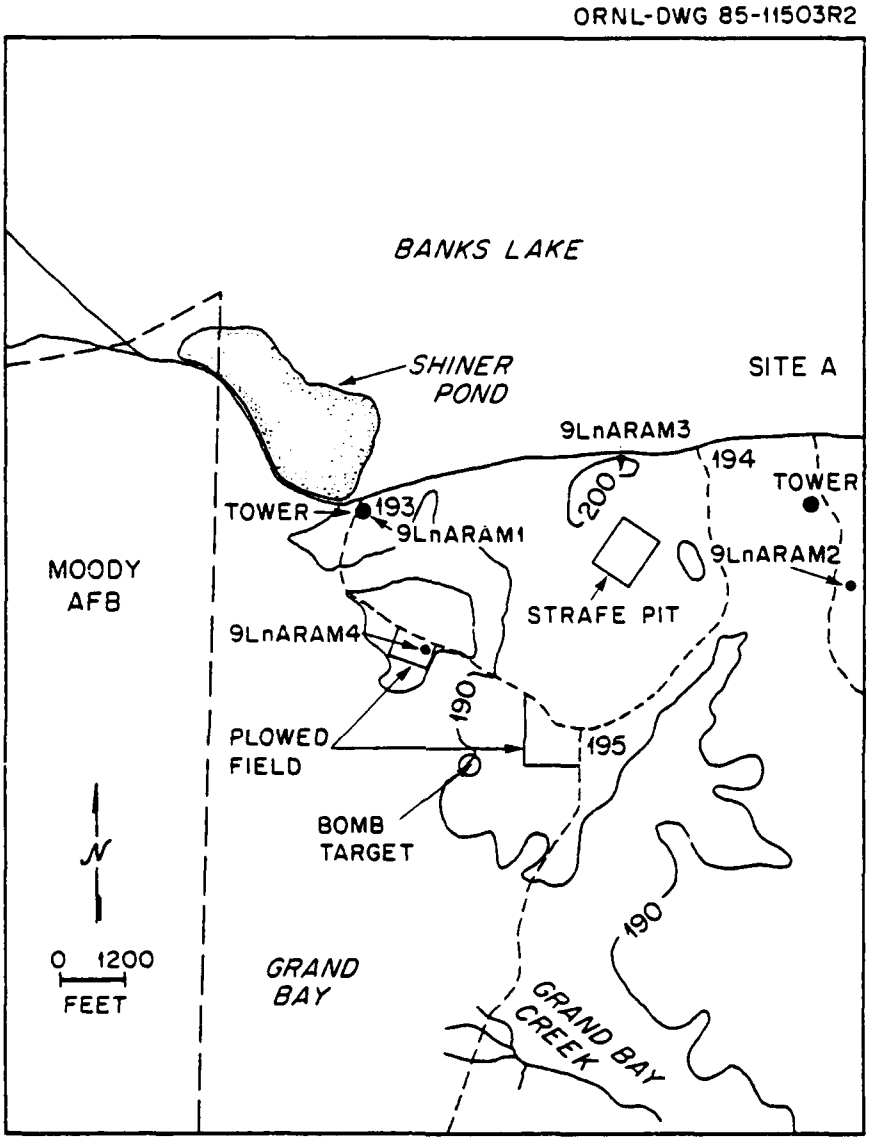

Fig. 3.5. Map of area surveyed for archeological and historical resources. Source: Wright, N. O. 1985. Archaeological Resources of the Weapons Range, Moody Air Force Base, Georgia, Archaeological Research Associates, Report of Investigation 16, Valdosta, Ga.

In addition to the sites discovered in the field survey, previous archeological investigations have identified a multicomponent site (Site A on Fig. 3.5) north of Shiner Pond Road near the eastern border of the federal tract (Wright 1985). The Air Force has initiated consultation with the Georgia State Historic Preservation Office regarding archeological and historic resources on the proposed site.

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4. ENVIRONMENTAL CONSEQUENCES

4.1 NOISE

A major issue associated with establishment of the proposed Winnersville Range is noise. The following sections describe the noise levels that are projected to result from range operation (Sect. 4.1.1), indicate the number of persons who would be exposed to noise (Sect. 4.1.2), and discuss the potential effects of this noise (Sect. 4.1.3).

The projected noise levels are given in terms of DNL values, which are used by the U.S. Environmental Protection Agency (EPA), U.S. Department of Housing and Urban Development (HUD), and the Department of Defense, to describe noise exposure. DNL values are average day/night sound levels in decibels on an A-weighted scale. The A-scale de-emphasizes the low-frequency portion of the sound spectrum, so that the A-weighting gives a good approximation of an average human ear. The A-scale correlates well with a person's judgement of the loudness of a noise event (EPA 1974). In calculating DNL levels, noises that occur between 10:00 p.m. and 7:00 a.m. are penalized by adding 10 dB to their actual noise levels. This penalty accounts for the fact that noises occurring at nighttime are usually judged to be more annoying than those occurring during the day.

It is concluded in the following sections that the noise, at most, will be unpleasant and intrusive to some residents in the immediate vicinity of the proposed range. No appreciable physiological or psychological effects are anticipated, nor are significant socioeconomic effects likely to occur. Similarly, the effects of the noise on domestic animals are anticipated to be minimal.

4.1.1 Projected Noise Levels

The noise that would be generated by aircraft activity over the weapons range was estimated using the NOISEMAP program (Beckmann and Seidmann 1978). The predicted noise levels are based on the proposed flight parameters of the aircraft, including the engine type, altitude, and throttle setting, and on the projected range usage, the aircraft type, and the proposed flight paths. The NOISEMAP program calculates DNL values in decibels (dB) and plots a map of the noise "footprint." Noise contours are plotted with a minimum DNL value of 65 dB, because studies have determined that the percentage of persons highly annoyed increases rapidly above this level. Also, HUD considers that DNL levels exceeding 65 dB may make the development of residential property less attractive than quieter property. For the Winnersville Range, the inputs to the NOISEMAP program included the projected levels of use specified in Table 2.2 and the maneuvers identified in Table 2.3. Figures 4.1, 4.2, and 4.3 present the predicted noise levels resulting under three cases: Case 1 — all F-4s, Case 2 — combination of F-4s and F-16s, and Case 3 — all F-16s. Case 1 represents F-4 aircraft stationed at Moody and only F-4 aircraft using the range. Because the F-4 is the loudest aircraft that would use the range, the all F-4 case represents a worst case for the base and the range. Noise levels predicted for this case would be expected to occur immediately after the range opened in

1986 and before the 347 TFW converted to F-16 aircraft. Case 2 (F-4/F-16 combination) indicates the noise expected from non-Moody F-4 aircraft using the range and Moody operations with F-16s. This represents a future worst-case in which non-Moody aircraft, represented by F-4s, use the range. This case is judged to approximate noise levels for normal range operation when the 347 TFW has converted to F-16 aircraft and sorties are flown as given in Table 2.2. The occasional F-4 use would be the dominant noise source. Case 3 (all F-16s) is representative of the time immediately following changeover from F-4s to F-16s at Moody, during which only Moody aircraft would be allowed to use the range. Case 3 also represents conditions after 1986 on occasions when Moody aircraft are the only users of the range. The noise levels that would occur near the range after 1986 would be expected to be intermediate between the F-4/F-16 combination and the all F-16s case.

Predicted noise levels due to operation of the proposed range, shown in Figs. 4.1 to 4.3, are generally confined to the target area and flight paths (Fig. 2.4). Although present use of the airspace near the proposed range contributes to existing noise levels (Sect. 3.1. and Fig. 3.1), the proposed activities will dominate the sound levels in the vicinity of the proposed range. Only a small 1 x 5-mile area between Moody and the target areas will have cumulative effects from Moody operations and proposed range activities. In this area, largely confined to Moody property, the combined effect of base operations and range activity is expected to cause a 3 dB increase above existing noise levels.

The DNL values represent noise levels averaged over time. Although this averaged noise level is commonly used to determine the noise impacts, people may be sensitive to the noise levels produced by single events, such as a single aircraft overflight. Noise produced by these single overflight events depends upon the aircraft type, altitude, throttle setting, attitude, and meteorological conditions. For a worst-case analysis, the single event is assumed to be an F-4 at military power at an altitude of 500 ft above ground level. A peak noise level of 110 dB(A), lasting for a period of about 1 s, would result. Such levels would occur frequently directly over the range and would also occur off-range northeast of the target area as a result of the pop-up maneuver (see Sect. 2.1.4). Noise levels in a small "island" northeast of the range would exceed DNL values of 75 dB (Fig. 4.1). Outside the weapons range itself, this is the only area that would be exposed to the worst-case noise event; no residences are located in this island. With only F-16s flying on the range the peak noise level from the worst-case single event would be 105 dB(A).

4.1.2 Exposure of Population to Noise

During February 1985, a count was made of households likely to be affected by DNL levels greater than 65 dB from proposed worst-case range operations (all F-4s). This effort identified 103 households, occupied by 358 persons, and four churches (Fig. 3.4). The locations of all dwellings and churches were noted on a base map of the proposed range area. The number of persons living within a DNL contour interval was determined by placing this base map over the footprints generated for

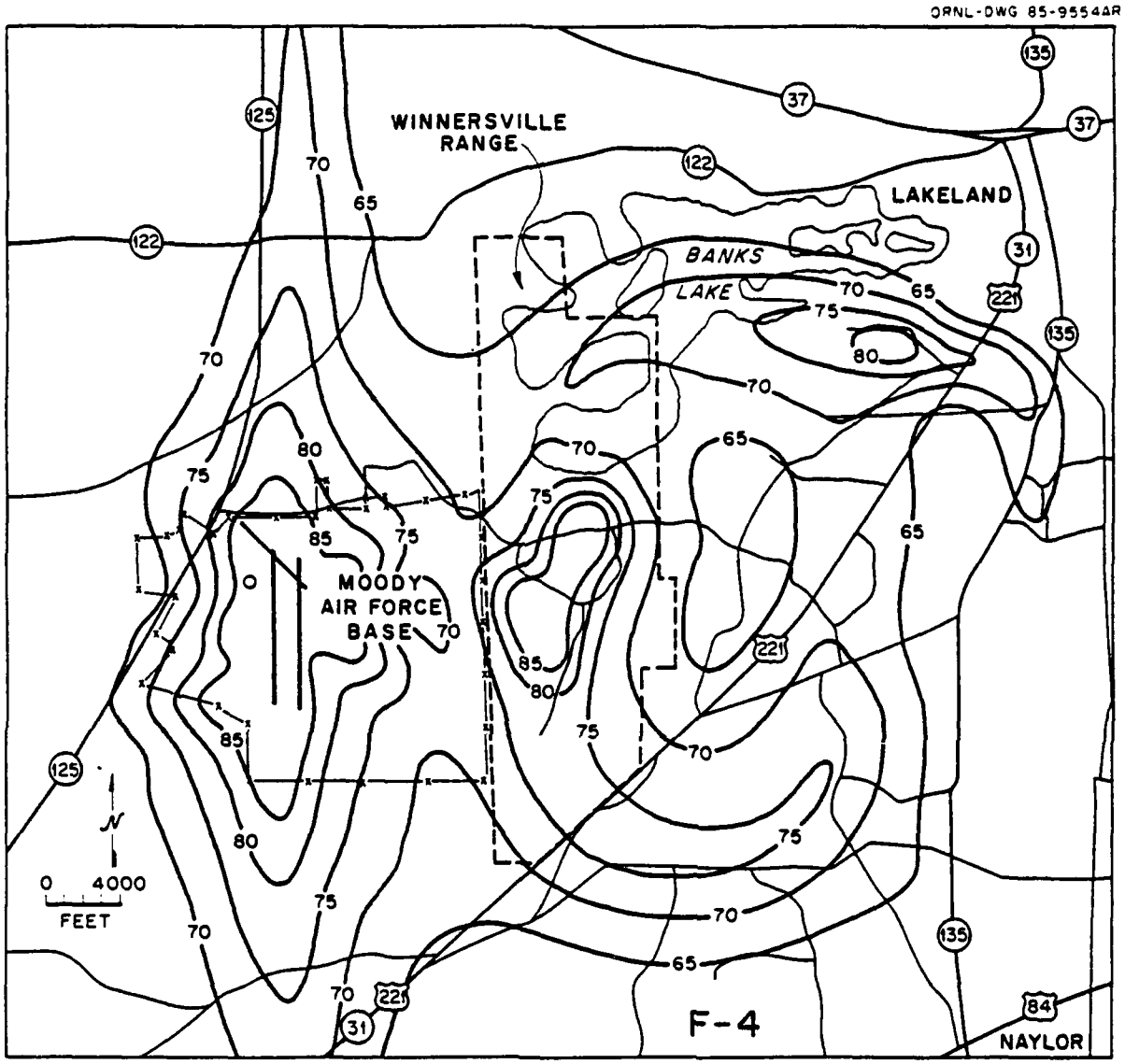

Fig. 4.1. Noise levels predicted from Moody AFB and the Winnersville Range with F-4s at Moody and on the range. Noise is indicated as DNL levels.

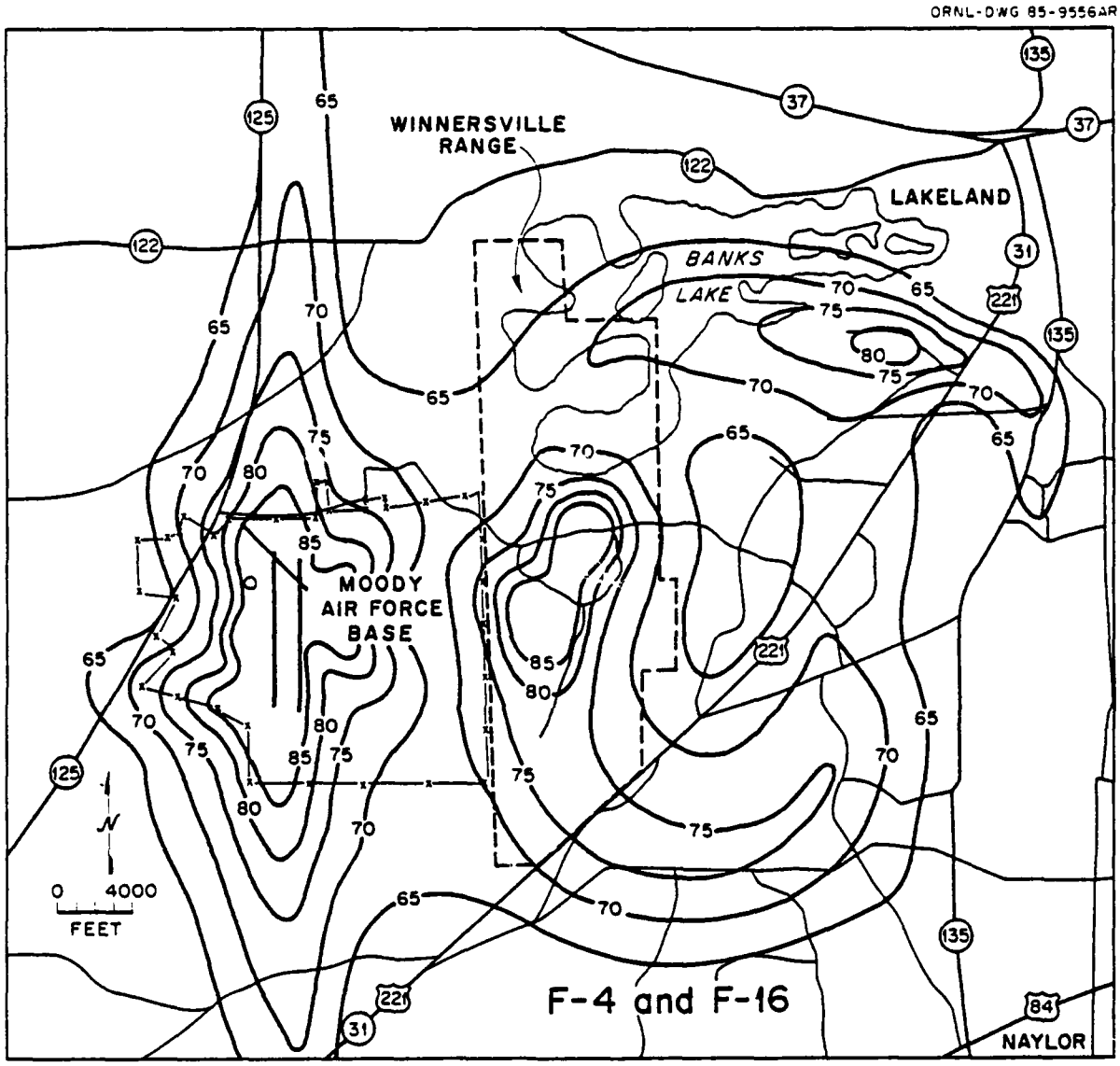

Fig. 4.2. Noise levels predicted from Moody AFB and the Winnersville Range with non-Moody F-4s on the range and Moody F-16s at the base. Noise is indicated as DNL levels.

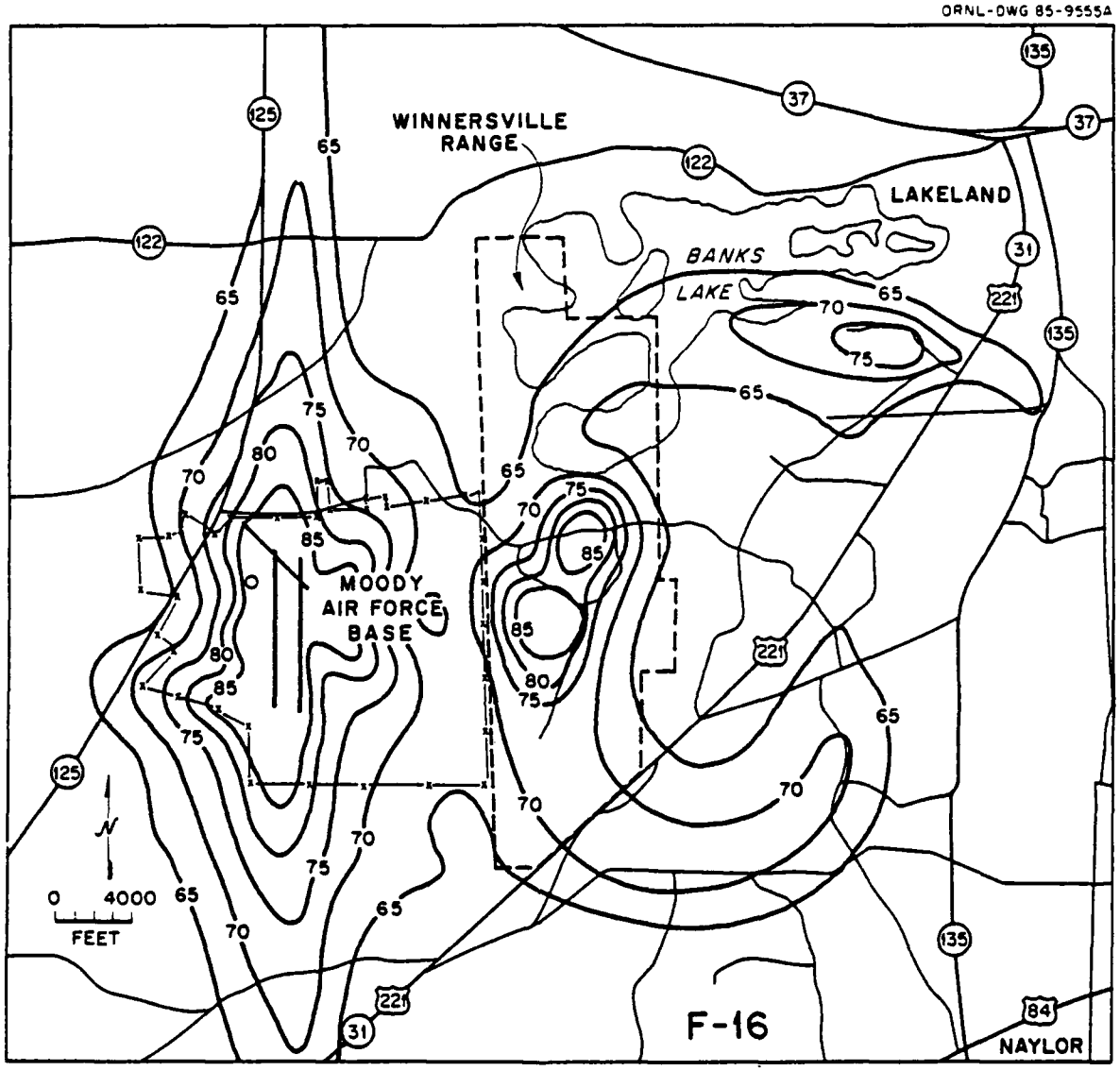

Fig. 4.3. Noise levels predicted from Moody AFB and the Winnersville Range with F-16s at Moody and on the range. Noise is indicated as DNL levels.

the various scenarios. The approximate numbers of persons affected by the various noise levels in the vicinity of the proposed range are listed in Tables 4.1 and 4.2. Table 4.1 indicates the effects of F-4s using the range and Table 4.2 indicates the effects of F-16s. The area encompassed by each DNL contour interval is listed, as well as the population density.

The number of persons indicated in Tables 4.1 and 4.2 refers to permanent residents of the households identified by canvassing. These represent the maximum numbers of residents who could be exposed to the aircraft noise, because some persons will be working away from home during the day and children will be attending schools. The at-home daytime population is, of course, greater during the summer months, when children are not in school.

The number of persons exposed to noise from range operations is the same for the all F-4 case and the F-4/F-16 combination case (Table 4.1), because both cases involve only F-4 aircraft using the range. It is expected that this case most closely approximates normal range operation, because the occasional F-4 use (Table 2.2) would still be the dominant noise source. For these cases, the majority of persons live in the 65-70 DNL interval (235 persons) and the 70-75 DNL interval (108 persons). There are 6 dwellings containing 15 persons located between the 75 and 80 DNL contours. No dwellings would be located between the 80 and 85 dB contours. Four churches lie in the 65-70 DNL interval.

In Case 3 (all F-16s, Table 4.2) no residents would experience DNL levels greater than 75 dB. It is expected that 113 persons would experience DNL levels of 65-70 dB and 27 persons would be in the 70-75 dB interval. The four churches would have DNL levels below 65 dB.

Agricultural workers on farms beneath the noise contours would also experience noise from aircraft operations on the proposed range. However, no farms are within contours greater than 75 dB. An estimated 75 workers work on these farms during the inactive season; this number increases to 145 to 160 workers during the growing season. The number of workers at any given time on any given farm in the area cannot be stated with certainty. In the worst case, however, exposures to noise will not be greater than those experienced by permanent residents.

4.1.3 Effects of Noise

During the public scoping meeting held at the Lanier County Courthouse, Lakeland, Georgia, on March 5, 1985, several individuals expressed concern over the effects of noise on human beings (Sect. 1.3). Potential effects have been examined. Methods of quantifying effects of noise have undergone extensive scientific development during the past several decades. The most reliable measures at present are noise-induced hearing loss and annoyance. Nonauditory effects (those not directly equated to hearing capability) are also important, although they are not as well understood. The current scientific consensus is that "evidence from available research reports is suggestive, but it does not provide definitive answers to the question of health effects, other than to the auditory system, of long-term exposure to noise" (NAS 1981).

Table 4.1. Population features by DNL interval near proposed Winnersville Range for operations with all F-4s[a]

DNL	Persons[b]	Households	Churches	Area for DNL range (sq. miles)	Population density (persons/sq. mile)
65-70	235	68	4	15.2	15.4
70-75	108	29	0	9.9	10.9
75-80	15	6	0	3.7	4.1
80-85	0	0	0	0.8	0
>85	0	0	0	0.9	0

[a]Applies to Case 1 (all F-4s) and Case 2 (F-4/F-16 combination).
[b]Refers to persons identified as potentially affected by range operation.

Table 4.2. Population features by DNL interval near proposed Winnersville Range for operation with all F-16s (Case 3)

DNL	Persons[a]	Households	Churches	Area for DNL range (sq. miles)	Population density (persons/sq. mile)
65-70	113	33	0	9.3	12.2
70-75	27	8	0	4.7	5.7
75-80	0	0	0	1.0	0
80-85	0	0	0	0.6	0
>85	0	0	0	0.6	0

[a]Refers to persons identified as potentially affected by range operation

4.1.3.1 Hearing

Hearing is important to the health and well-being of human beings. Efforts are therefore required to determine whether or not significant degradation of hearing would accompany the proposed operation of the range. Hearing loss can be either temporary or permanent. A noise-induced temporary threshold shift is a temporary loss of hearing experienced after a relatively short exposure to excessive noise. A noise-induced threshold shift means that the detection level of sound has been increased. Recovery is fairly rapid after cessation of the noise. A noise-induced permanent threshold shift is an irreversible loss of hearing caused by prolonged exposure to excessive noise. This loss is essentially indistinguishable from the normal hearing loss associated with aging. Permanent hearing loss is generally associated with destruction of the hair cells of the inner ear. Based on EPA criteria, hearing loss is not expected for people living within noise contours below DNL levels of 75 dB. Further, as stated in the EPA "Levels Document," changes in hearing levels of less than 5 dB are generally not considered noticeable or significant (EPA 1974).

The worst-case scenario for noise levels at the proposed Winnersville Range would occur when only F-4s are used (Fig. 4.1 and Table 4.1). Following the guidelines recommended by the Committee on Hearing, Bioacoustics, and Biomechanics (NAS 1977), the average change in threshold of hearing for the 15 persons living in the footprint of DNL 75 dB and above has been evaluated. Results show that an average of 1 dB hearing loss could be expected for people exposed to DNL 75 dB and above. For the most sensitive 10% of the exposed population, the maximum anticipated hearing loss would be 4 dB. These hearing-loss projections must be considered worst-case predictions because the calculations are based on an average daily outdoor exposure of 16 h (7:00 a.m. to 10:00 p.m.) over a 40-year period. It is doubtful that any individual will spend this amount of time outdoors within the DNL 75 and above noise contours. It is not expected that any agricultural workers will work in noise levels greater than 75 dB DNL. Changes in hearing levels of less than 5 dB are generally not considered by EPA to be noticeable or significant (EPA 1974). Therefore, based on a worst-case scenario, no appreciable hearing losses associated with operation of the proposed Winnersville Range are expected.

4.1.3.2 Annoyance

Noise annoyance is defined by EPA as any negative subjective reaction to noise on the part of an individual or group (EPA 1978). "Except in the case of speech interference, however, the degree of interference is hard to specify and difficult to relate to the level of noise exposure" (EPA 1978). "Aircraft noise may . . . be found annoying because it may startle people, cause houses to shake, or elicit fear of a crash" (EPA 1978).

Nighttime annoyance is the specific reason that the DNL calculations are given a 10 dB penalty (for nighttime flying); as the ambient noise level declines at night, the creation of aircraft noise becomes more evident and similarly bothersome. This conclusion is also reached by Ollerhead (1978) as he notes that, "In terms of disturbance or annoyance, aircraft noise is considered to be worse during the evening than during the day." Ollerhead further observes that

> "Overall, aircraft noise causes little or no disturbance to most people at night, presumably because they sleep through it. Thus when specifically asked to compare different time periods, most people say that they are more bothered by aircraft noise when they are up and about than when they are in bed . . . either asleep or falling asleep. However people who are disturbed at night consider the disturbance to be more severe and more annoying than during waking hours.

Similarly, Josse (1980) supports the position that there is less impact after people have gone to sleep. He also writes " . . . personal factors cause some people to react quite differently to noise compared to the group average. Future research should examine these factors and the problems of night disturbance." For the purpose of identifying protective noise levels, annoyance is quantified by using the percentage of people who are highly annoyed by the noise. This is felt to be the best estimate of the general adverse response of people, and, in turn, is viewed as reflecting activity interference and the overall desire for quiet. Table 4.3 provides an estimate of the percent of the population that will be annoyed by the projected aircraft noise based on CHABA (Committee on Hearing, Bioacoustics, and Biomechanics) Guidelines (NAS 1977).

The Department of U.S. Housing and Urban Development (HUD) provides noise criteria for new construction and major remodeling assistance, subsidy, and insurance (Table 4.4). Under the criteria (24 CFR Part 51), areas of 75 dB DNL or greater are considered unacceptable for residential purposes unless special approval is given for noise attenuation in new construction. About six existing homes would be exposed to DNL levels of 75 to 80 dB. While about a third of the people living in this noise contour would be highly annoyed, the overall number of people is not considered signifiant. New home construction in this zone would be strongly discouraged unless noise attenuation procedures were acceptable to HUD. HUD would not discourage resale of existing facilities. Areas in the DNL 65 and 70 dB contours are normally considered by HUD to be unacceptable noise zones unless 5 and 10 dB additional noise attenuation, respectively, are incorporated in the construction. Again, resale of existing facilities is not discouraged.

4.1.3.3 Nonauditory physiological and psychological effects

Nonauditory effects are those effects that are not directly associated with actual hearing. The question of whether nonauditory responses are significant to the health and well-being of humans is still subject to scientific debate, despite reports on a large number of

Table 4.3. Persons highly annoyed by operation of proposed range

DNL interval	Proportion of persons highly annoyed (%)	Persons highly annoyed	
		Cases 1 & 2 (all F-4s on the range)	Case 3 (all F-16s)
65-70	15-25	46	22
70-75	25-37	33	8
75-80	37-52	7	0
Total		86	30

Table 4.4. HUD site acceptability standards

	Day-night average sound level in decibels (DNL)	Special approvals and requirements
Acceptable	Not exceeding 65 dB[a]	None
Normally unacceptable	Above 65 dB but not exceeding 75 dB	Special approvals[b] Environmental review[b] Attenuation[c]
Unacceptable	Above 75 dB	Special approvals[b] Environmental review[b] Attenuation[d]

[a]Acceptable threshold may be shifted to 70 dB on a case-by-case basis, if project does not require an environmental impact statement, has received a special environmental clearance, meets other program goals in providing housing, is in conformance with local goals and maintains character of the neighborhood, or the project sponsor has acceptable reasons why noise attenuation measures cannot be met.

[b]Requires a special environmental clearance. An EIS is required for a proposed project located in a largely undeveloped area, or where the HUD action may encourage the establishment of incompatible land use in this noise zone.

[c]Additional attenuation of 5 dB required for sites above 65 dB but not exceeding 70 dB, and 10 dB additional attenuation required for sites above 70 dB but not exceeding 75 dB. These measures are those required in addition to attenuation provided by dwellings commonly constructed in the area and requiring open windows for ventilation.

[d]Attenuation measures to be submitted to the HUD Assistant Secretary for Community Planning and Development for approval on a case-by-case basis.

Source: Adapted from 24 CFR 51.103 to 51.105

studies during the past decade. The major focus of the studies has been on the role of noise as a biological stressor. Early reports found an association between continuous noise and constriction of blood vessels, primarily at peripheral regions of the body (Lehmann and Tomm 1956). It was later suggested that vasoconstriction would contribute to the development and/or aggravation of stress-related conditions such as high blood pressure and coronary disease (Jansen 1969). Some more recent work suggests that the acoustic-vascular response to expected noise (a reflexive constriction of the peripheral blood vessels), when it occurs, is more likely to be related to nonstressful auditory protective interactions than to the autonomic-system response, which is presumed to be physiologically stressful (Kryter and Poza 1980).

The results of some researchers suggest that the possibility cannot be ignored that short-term and long-term noise-induced stress could increase susceptibility to diseases (especially cardiovascular) that are regarded as consequences of chronic general stress. The World Health Organization has recently reviewed the area of nonauditory health effects (WHO 1980) and states the following: "However, although the reported observations are considered by many to be indicators of potential danger to health and have been suspected as predecessors of pathological changes, research on this subject has not yielded any positive evidence, so far, that disease is caused or aggravated by noise exposure insufficient to cause hearing impairment. More epidemiological and animal studies are required to clarify the nature of non-auditory health risks associated with noise."

The same conclusion is voiced in an EPA study of evidence regarding the effects of noise on the cardiovascular system (Thompson 1981a, 1981b). This study concluded that research results to date are inadequate for establishing cause-effect relationships between noise and cardiovascular disease. Another review, by the Committee on Hearing, Bioacoustics, and Biomechanics, found no conclusive evidence of detrimental prenatal effects of high-intensity external sound in higher mammals (NAS 1982). However, the authors did advise that until better information is available, it would be prudent for pregnant women to avoid exposures of long duration (hours per day) to sounds of 90 dB and above. Based on the evidence cited, no serious nonauditory effects are anticipated from operation of the proposed Winnersville Range.

4.1.3.4 Effects on domestic animals

Potential adverse effects of noise from the proposed Winnersville Range have been examined and no adverse effects are anticipated. It has been known for many years that certain noises may cause physiological responses in some domestic animals. As a consequence, the possible effects must be carefully assessed. The primary domestic animals in Lanier and Lowndes counties are poultry, swine, and cattle (Georgia Crop Reporting Service 1984). Each of these species has been the subject of noise studies.

Poultry. The two principal types of production from poultry are eggs and meat. Intermittent exposures to 120 dB of recorded airfield noise cumulating to 4.8 h/d resulted in no effects on hatchability of eggs or on the quality of chicks hatched (Stadelman 1958a, 1958b). Exposure to 120 dB noise caused hens to leave incubating eggs; however, exposures to 80 to 115 dB had no effect on the brooding (nest tending) of hens or on hatchability, weight gain, feeding efficiency, meat tenderness, or mortality of noise-exposed compared to nonexposed hens and chicks (Stadelman 1958a, 1958b). Laying hens exposed to loud impact noises exhibited a startle reaction but did not experience a decrease in egg production (Cottereau 1978). Other than a temporary startle effect at noise onset, little effect on poultry is expected at the levels described for the scenario in Fig. 4.1.

Swine. Swine have been the subject of studies investigating the physiological and behavioral effects of noise as a stressor (Bond et al., 1963). Evidence of stress responses were obtained through biochemical and behavioral measurements. Noise levels between 93 and 135 dB were employed in a series of experiments that examined reproductive ability, feed utilization, and other potentially economically predictive measures (Bond et al., 1963). No adverse effects on these measures were observed. The primary conclusion reached on a review of noise effects on swine is that the only evidence that noise causes stress in pigs is a temporary increase in heart rate (Dufour 1980).

Cattle. The effects of noise on milk production was studied in 182 milk cow herds within 3 miles of eight Air Force bases using jet aircraft. In the one-year study, no differences in milk production were found when compared with herds that were not exposed to the aircraft noise. Also, no differences were found between herds close to the end of the runway and those farther removed (Parker and Bayley 1960). Cottereau (1978) reports that loud sound has no effect on semen quality nor was any effect found on the pregnancy outcomes.

EPA has reviewed the literature on noise effects in domestic animals (Dufour 1980). In general there is an overall trend for domestic animals to adapt to intermittent (aircraft or aircraft-like) noise under 120 dB. Busnell (1978) reviewed effects on the biota around large airports and found no evidence to suspect noise-related adverse effects. Based on the evidence cited, no adverse effects on domestic animals are expected to result from operation of the proposed Winnersville Range.

4.2 AIRSPACE AND AIR TRAFFIC SAFETY

Operation of the Winnersville Range would involve establishment of restricted airspace over much of Lanier County. The airspace restriction, extending from an upper limit of 10,000 ft above mean sea level (MSL) to lower limits ranging from ground level to 500 ft above ground level (AGL), would make it necessary for aircraft to fly around the restricted area if they were approaching Valdosta from the northeast

or departing to northeasterly destinations. However, establishment of the restricted airspace should have minimal impact on aviation, because the restricted airspace would be relatively small (16 x 10 miles) and flying around the restricted area would involve relatively little extra distance. A worst-case detour would be required for an aircraft taking off to the north of Valdosta Municipal Airport and flying 62 miles northeast to Waycross, Georgia. At the point where the pilot turned out of the departure path, the flight path to Waycross would pass directly across the restricted airspace. however, the maximum extra distance that would be flown to avoid the restricted area would be 3 to 4 miles; this would add only 7% to the time or distance of the flight.

Air traffic associated with the operation of the Winnersville Range would be controlled by Valdosta Approach Control, located at Moody. Controllers at Moody would be able to coordinate the approaches and departures for Moody and Valdosta with traffic for the weapons range. Before the weapons range becomes operational, an additional controller would be added to the staff, and another radar scope would be put into operation. Because of the unified control of range traffic and nonparticipating aircraft, no adverse impacts on air traffic safety would be anticipated. When the range is inactive, controllers would allow civilian aircraft to pass through the restricted airspace. When range operations do not require the airspace above 8000 ft, controllers would allow nonparticipating aircraft to use this airspace. If nonparticipating aircraft stray into the resricted airspace, controllers would contact the range control officer, who would suspend range operations until the airspace was clear.

The additional traffic generated by non-Moody aircraft using the range would be expected to have no significant impact on air traffic safety. Non-Moody users (estimated to be six aircraft per day) would cause less than a 6% increase in the traffic currently handled by Valdosta Approach Control (about 70 aircraft per day for Moody and 35 per day for Valdosta Municipal Airport) (Sect. 3.2.2).

The airspace restriction would affect access of crop dusters to farms in Lanier and Lowndes counties near the Winnersville Range (see Sect. 3.7). Crop dusters would have to call the range scheduling office or the Moody command post to request entry into the restricted airspace. To some extent, the schedule for crop dusting is predictable; Moody is willing to work with crop dusting operators to develop a range schedule with idle periods during which crop dusters could operate. Such advance scheduling is expected to minimize conflicts between range operation and crop dusting. However, the Air Force recognizes that crop dusting requires specific meteorological conditions for optimum effectiveness and that agriculture is the principal economic base fo. the vicinity beneath the restricted airspace. Therefore, under conditions where delay of crop dusting would cause agricultural loss, Moody would, to the maximum extent possible, accommodate same-day requests to schedule periods when crop dusting can occur.

In planning for the Winnersville Range, the Tactical Air Command (TAC) has submitted its proposal for creation of the restricted airspace (Sect. 2.1.3) to the Federal Aviation Administration (FAA) (HQ TAC/DOX 1983). If upon completion of this environmental impact statement, the Air Force proceeds to establish the proposed weapons range, the FAA will issue a decision whether to approve the proposed restricted airspace.

4.3 SAFETY

Operation of the proposed Winnersville Range is expected to expose the general public to very small increased risks resulting from weapons operations, dropped objects, and other aircraft accidents. The following sections describe these risks.

4.3.1 Weapons Operations

An important part of range planning is the location of the targets. The amount of land needed to ensure safety in training exercises is determined by defining potential hazard areas, based in part on "weapon descriptors" for the weapons to be used. A weapon descriptor defines that area within which 99.99% of the weapons are likely to be contained. Weapon descriptors are developed through a statistical analysis of the data on performance of a weapons system; a weapon descriptor can be used to predict weapons containment to the 95% confidence level. The initial impacts of the weapon and subsequent ricochet impacts are considered in designing the weapon descriptors. Other factors include the delivery tactic, the weapon type, and the target/terrain composition.

A site survey team determined that the strafing and bombing targets for the proposed Winnersville Range could be located so that 99.99% of the ordnance (spent 20- and 30-mm ammunition and BDU-33 and MK-106 practice bombs) would be expected to fall within the composite weapon descriptor shown in Fig. 4.4. The boundaries of this descriptor lie completely within federal property lines (either the proposed range tract or Moody property). Therefore, the weapons operations at the proposed Winnersville Range will involve only an extremely small risk to the general public.

4.3.2 Bird Strikes

The consequences of a bird striking an aircraft or being drawn into the engine during flight can be minor (such as dents in wings or the fuselage) or major (destruction of a jet engine, loss of power during flight, or even crash of an aircraft). Air Force records for a 3-year period show that 50% of the bird strikes occur on or near airfields (Long 1983). Proper management of areas close to runways can reduce the attractiveness for birds. By keeping grass mowed to a certain height, among other measures, insect attractants for birds can be decreased and habitats for small animals attractive to birds of prey can be reduced.

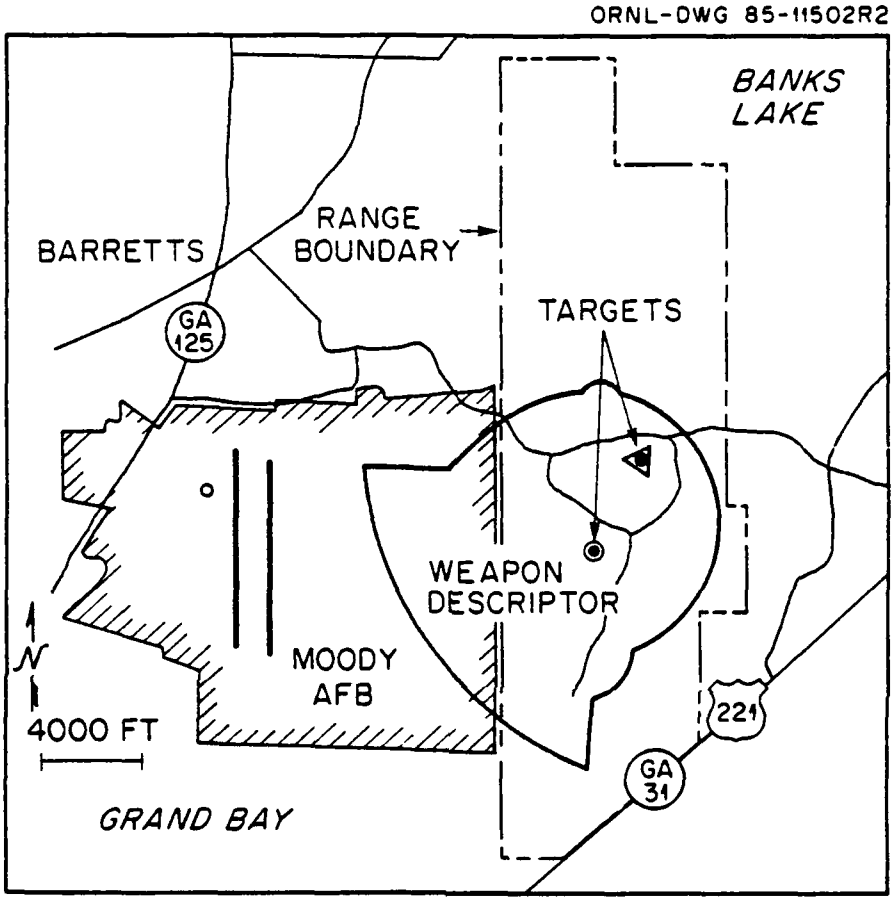

Fig. 4.4. Composite weapons descriptor for activities proposed at the Winnersville Range.

The management practices at Moody have been successful in reducing the hazards due to birds along the runways. The Moody Flight Safety Officer (Plump 1985) reported that in calendar year 1984 two bird strikes occurred with Moody F-4s within 5 miles of the base. On the average, Moody F-4s experience about two bird strikes per year on the ranges presently used.

There is no record of a bird strike occurring over the proposed range; however, current flights over this area occur at medium altitude (1500 to 3000 ft). It is likely that the low-altitude maneuvers (as low as 100 ft above ground level) and the presence of large wetland areas would involve an increased risk of bird strikes. However, the risk of jet crash would be largely confined to uninhabitated federally owned property. If management of the proposed range to encourage wildlife creates a significant hazard to aircraft through increased bird populations, it might be necessary to manage the area to control bird populations (see also Sect. 4.5.2).

4.3.3 Dropped Objects and Accidents

Operation of the Winnersville Range would involve an extremely small risk to the public from dropped objects. Dropped objects include inadvertent ordnance release. The frequency of dropped objects over nonfederal land is predicted to be 0.0125 incidents/year. This prediction is based on an "accident areal incident descriptor" developed by statistical analysis of data for all Air Force range operations from 1972 to present. Using the accident areal incident descriptor allows the frequency of dropped objects to be predicted with 95% confidence. For the use now anticipated at the Winnersville Range (Table 2.2), the average frequency of a dropped object incident on privately owned property would be once in 80 years.

The risks associated with low-altitude maneuvers would be largely confined to uninhabited areas, most of which are federally owned. The 347 TFW would be expected to spend 3750 flying hours in the vicinity of the proposed range (7500 sorties, 30 min per sortie). If the TAC Class A accident rate for 1984 (Table 3.1) were used as a worst-case scenario, one accident every 7.4 years could be expected for F-4s in the vicinity of the proposed range. The corresponding case for F-16s would predict one accident every 5.7 years for the F-16s in the vicinity of the proposed range. Although a Class A accident might occur once or twice a decade near the proposed range, many Class A accidents do not involve a crash and pose no risk to the general public. For accidents in which aircraft can stay aloft, overall flight safety would be enhanced (relative to the current use of distant ranges), because Moody, located less than 3 miles from the range, could provide an immediate response and landing area for any in-flight emergencies. Operation of the proposed Winnersville Range would result in a very small risk of accidents that could affect the general public.

4.4 AIR QUALITY

Aircraft operations over the proposed range would result in increased emissions of air pollutants and would contribute to regional air pollution. The effects of the increased activity over the range on pollution were estimated using fuel consumption rates for F-4 and F-16 aircraft and emission rates for the appropriate engine for each aircraft studied (Scott and Naugle 1978). The impacts of the increased emissions were estimated by assuming uniform mixing of the pollutants over the range area and comparing the values with appropriate air quality standards. Because the range would not affect the number of Moody's takeoffs and landings, which generate most of the ground-level air quality impacts of aircraft operations, the estimated impacts are small.

Approximately 36 sorties per day, 30 from Moody and 6 by aircraft from other bases, are planned for the proposed range (Table 2.2). As a worst case, each aircraft is assumed to operate at military power for 15 min over the range area, with the impacts spread uniformly throughout the 5900-acre area (Sect. 2.1). (In actuality, aircraft would operate at military power only during recovery from a bomb or strafe approach.) An additional assumption is that all the pollutants emitted during operations are contained within the airspace over the range area, to a height of 1640 ft. This "box," containing all of the material emitted by the aircraft each day, was assumed not to mix with the surrounding atmosphere, which means that the worst-case estimate of operational impacts is conservative. The pollutant emission rates for the aircraft using the proposed range are given in Table 4.5. These emissions are multiplied by the number of sorties by aircraft type and are assumed to be uniformly mixed throughout the range airspace. The concentrations resulting from these flight parameters and scenarios, and the applicable air quality standards are presented in Table 4.6.

The predicted worst-case values do not result in violations of air quality regulations, although the predicted NOx concentrations do approach the annual NOx standard. The predicted concentrations result from the assumptions of 36 aircraft over the range every day of the year and that all pollutants are confined to the 1640 ft of atmosphere over the range. In actuality, the typical afternoon mixing height over southern Georgia is in excess of 3900 ft (Holzworth 1972). The concentrations predicted by this crude box model would occur for less than 24 h, due to the time aircraft actually use the range and natural ventilation of the range airspace. In addition, these 24-h values are assumed to occur 365 d/year, while the scheduled usage rate is 250 d/year. Therefore, the predicted concentrations do not compare directly with the annual average standards presented in Table 4.6. The predicted concentrations would be expected to last for 12 h of each flying day; the 24-h values would be less than 90% of these calculated concentrations (Turner 1970). The annual values would be a smaller fraction, on the order of 50-60% of the calculated values presented in Table 4.6. Based upon the conservative assumptions made in the calculations, it can be concluded that no violations of air quality standards would result from flight operations over the range.

Table 4.5. Predicted pollutant emissions for flight activities over the proposed range (grams of pollutant per sortie)[a]

Aircraft	Carbon monoxide (CO)	Unburned hydrocarbons (HC)	Oxides of nitrogen (NOx)	Particulates (PM)	Oxides of sulfur (SOx)
F-4	12,000	220	24,000	2,000	2,200
F-16	1,100	120	32,000	400	1,200
A-10[b]	1,300	58	5,800	29	580

[a]Assumes 15-min flight over the range at military power.
[b]A-10 is representative of non-Moody aircraft to be flown at the proposed range.
Source: Scott, H. A. and Naugle, D. F. 1978. Aircraft Air Pollution Emission Estimation Techniques-ACEE, CEEDO-TR-78-33, Tyndall AFB, Fla.

Table 4.6. Predicted pollutant concentrations resulting from aircraft operations at the proposed range ($\mu g/m^3$)[a]

Pollutant	Year		Standard
	1986	1987	
CO	29.5	3.3	10000[b]
HC	0.6	0.3	
NOx	62	81	100[c]
PM	5.2	1.0	75[c] 260[d]
SOx	6.7	4.1	80[c] 365[d]

[a]F-4s flown until 1986, F-16s thereafter.
[b]During 8 h.
[c]Annual average.
[d]24-h average.

4.5 TERRESTRIAL AND WETLAND RESOURCES

Effects of range development on vegetation and wildlife would result principally from clearing the forests for the 450-acre target area. The increased frequency of low-level flights and the attendant increases in noise levels in certain areas (Sect. 4.1) are not expected to significantly affect wildlife populations. No species' population at Grand Bay/Banks Lake should be significantly impacted as a result of the project. Also, the extent of wetlands loss would be inconsequential. Therefore, impacts on terrestrial biota and wetland resources would not be particularly significant.

4.5.1 Vegetation

Just over one-half of the vegetation that would be cleared is pine flatwoods (238 acres) (Table 4.7). The remainder consists primarily of shrub/cypress/gum wetlands (108 acres) and pine plantations (93 acres). Fields occupy about 10 acres. Both the flatwoods and the plantations include some pine-dominated wetlands. Trees would be removed from the entire area; however, shrubs or other low-growing vegetation on about 430 acres would be left in place or managed, depending on the development of wildlife habitat management plans by the Georgia Department of Natural Resources and the Air Force. All vegetation would be largely eliminated on up to 20 acres of the clear-cut area as a result of the construction of facilities, including the cantonment facilities and main tower (less than 1 acre), flank tower (less than 1 acre), strafe pad (10 acres), and bomb pad (7 acres). Construction of new roads would also eliminate vegetation, but the current plan is to use existing roads as much as possible with no upgrading. Short sections of road, however, will have to be cleared to the strafe pit, bomb pad, and borrow-pit areas. About 4 acres of shrub/cypress/gum wetland would be eliminated for construction of the facilities. Also, some areas would be affected by extraction of borrow material. A small area (probably less than 25 acres) outside the target area would be cleared for an electrical line originating at the base and serving the target area facilities. This line would consist of overhead portions (about 2 miles) and underground portions (about 1 mile).

According to calculations made from soils maps prepared by the U.S. Soil Conservation Service (1973), the amount of wetland to be affected by tree removal in the clear-cut area would be between 135 and 227 acres (Table 4.7). Up to 15 acres of these wetlands would be eliminated by construction of facilities. The amount of nonwetland is between 222 and 314 acres. Clearing of vegetation would affect only a small fraction of the total weapons range and should have no particularly serious effect on the population of any plant species. Also, no unique vegetation or habitat type should be seriously affected because none is known to occur on the area to be clear-cut.

4.5.2 Wildlife

Wildlife would be affected by habitat modification and possibly by aircraft noise. The clearing of trees on the target area and the loss

Table 4.7. Areas of vegetation and water regime types to be affected by clearing of the target area[a]

	Acres
Vegetation types	
Shrub, cypress, and black gum wetlands	107.7
Pine flatwoods[b]	237.8
Pine plantation[b]	92.9
Field	11.7
Total	450
Water regime types	
Semipermanently to permanently flooded	16.7
Seasonally flooded	119.7
Saturated or intermittently or temporarily flooded	91.3
Nonwetland	223.3
Total	450

[a]See Sect. 3.5 and Appendix C for description of vegetation types and water regime types.

[b]These categories include some pine-dominated wetlands.

[c]This category includes some areas that are not wetlands according to the National Wetlands Inventory's definition (Cowardin et al. 1979).

of about 20 acres of habitat to facilities would reduce the populations of the wildlife species that prefer forests and possibly increase those that prefer the more open habitats. Currently, much of the habitat on the proposed target area, including the very dense pine plantations and the shrub-choked wetlands, is of relatively low value to game and nongame species. The kinds of species and their population densities in the area after clearing would depend primarily on how the habitat is managed by the Georgia Department of Natural Resources and the Air Force. The only game species whose population is virtually certain to be reduced is the gray squirrel. Populations of deer, rabbit, mourning dove, and bobwhite may increase. The area could also be more favorable for wild turkey, which may be introduced to the area. If more open water areas are made available within the presently shrub-choked wetlands, the wood duck and other waterfowl species and wading birds (e.g., herons and egrets) may also increase in abundance. Managing for wildlife, however, tends to increase the chance of aircraft collisions with birds, such as hawks, vultures, waterfowl, herons, and egrets. Therefore, it is possible that management to encourage wildlife could be de-emphasized, and the habitat could be managed to minimize wildlife populations (Long 1983) if a serious hazard ever becomes evident.

Evidence on the effects of noise indicates that many wildlife species become accustomed to noise and thrive near airfields and other noisy areas having the species' basic habitat requirements (Burger 1983; Fletcher and Busnel 1978). Research on noise effects in general has not shown any reductions in wildlife populations as a result of noise and does not show that jet overflights will reduce any populations at the range.

One of the more significant wildlife concentrations near the range is the heron and egret rookery south of the base. Noise levels in this area are not expected to change because the number of sorties and the flight patterns and elevations over the rookery would not change significantly (Sects. 3.1 and 4.1; Figs. 3.1 and 4.1).

4.5.3 Wetlands Assessment

The nation's wetlands are a matter of concern because of their conversion to nonwetlands by agriculture, urbanization, and other development. Executive Order 11990 requires federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance natural and beneficial values of wetlands. The economic and ecological values of wetlands and human impacts on wetlands have been discussed in a large number of publications, including Darnell (1976), Horwitz (1978), Greeson et al. (1979), and the Office of Technology Assessment (1984).

Wetland conversion is usually accomplished by draining and clearing or by clearing and filling. On the 450-acre target area, wetlands would not be drained, but up to 15 acres of wetlands would be filled to provide sites for the cantonment facilities, towers, strafe pit, and bomb pad. Wetlands on the remainder of the target area would not be

converted to nonwetlands, although all trees would be cut. Clearing the forests might have small effects on the water regimes at the target area, but should not cause a loss of wetland. Harvesting timber in wetlands is practiced in many areas of the United States, and, according to the literature on wetlands, does not have significantly adverse or permanent effects on water regimes. The principal effect at the target area would be the creation of a different type of wetland vegetation and an attendant change in the relative abundances of wildlife species. The target area is not known to contain wetlands with particularly important or unique features.

In addition to the clearing and construction, increased aircraft noise levels may detract from the value of the Grand Bay/Banks Lake wetlands for wildlife production. However, as discussed previously, there is insufficient evidence to show that aircraft noise will greatly reduce wildlife populations. Overall, the proposed range is not expected to have significant permanent impacts on the ecological value of the wetlands in the clear-cut area or the Grand Bay/Banks Lake complex.

4.5.4 Endangered Species

As described in Sect. 3.5.4, the American alligator and the wood stork are the only endangered species that occur with any regularity in the proposed range area. Relatively few wood storks frequent the range, and there is no nearby breeding colony; therefore, relatively few wood storks would be affected by the proposed project. Those that do use the area are presumably accustomed to low-flying aircraft and should continue to use most of the Grand Bay/Banks Lake complex because the overall complex would experience little increase in aircraft activity and noise.

The alligators at the range occur primarily in the more frequently flooded or permanent wetlands, which lie mostly outside the area that would be clear-cut. Some alligators might be present in the clear-cut area and could be adversely affected by clearing operations. However, it is expected that the clearing and aircraft noise would have no significant effect on the vast majority of alligators at Grand Bay/Banks Lake. Pursuant to the Endangered Species Act, formal consultation will be initiated with the U.S. Fish and Wildlife Service concerning impacts on and mitigation for the wood stork and the alligator.

4.6 AQUATIC RESOURCES

Presidential Executive Orders 11988 and 11990 require federal agencies to avoid actions in floodplains and wetlands where practicable, and, if such actions are necessary, to minimize risks and impacts of flooding and harm to floodplain and wetland values. Although part of the area proposed for clear-cutting and construction of target-related facilities is certainly wetland in the context of Executive Order 11990, neither the specific sites of the facilities to be constructed nor the

entire Grand Bay complex appear to qualify as floodplain under Executive Order 11988 (Floodplain Management). At 190 ft MSL or higher, the proposed target area is at least 33 ft above the maximum elevation of the 100-year floodplain for the nearest river, the Alapaha (Price 1985).

The Army Corps of Engineers has already determined that all construction and fill would be contained entirely on high ground (Osvald 1984). Flood Insurance Rate Maps and Flood Hazard Boundary Maps have not been prepared for Grand Bay, but officials of the local office of the Soil Conservation Service (Deriso 1985) and the U.S. Forest Service (Goolsby 1985) doubt that Grand Bay would qualify as a floodplain under Executive Order 11988, anyway. Rather than forming within the floodplain of a stream or other discrete body of water, Grand Bay appears to owe its existence to remarkably flat topography and relatively high rainfall. The nearest major stream, the Alapaha River, flows 5 miles to the east of the proposed site and is about 55 ft lower in elevation. As stated earlier, its floodplain does not encroach into the Grand Bay area. In the vicinity of the proposed facilities, the 100-year water level is unlikely to reach 190 ft MSL (Deriso 1985), somewhat below the elevation of the proposed facilities. In any event, the presence of the facilities would have a negligible effect on the 100-year water level (less than 2 mm). Reduced transpiration as a result of clear-cutting, however, can be expected to affect recharge to the water table in the vicinity of the clear-cut areas. This could cause a local rise in the water table of 1 ft or more (Huff 1985), thereby possibly creating a small amount of additional wetland. The effects of the range development on wetlands are discussed in more detail below.

Most adverse effects on surface waters and their biologic communities would result from clear-cutting and subsequent removal of timber from a maximum of 450 acres of forest and thicket (less than 3% of the total area of the Grand Bay system). Approximately 140 acres to be clear-cut consist of wetland forest (swamp) that is inundated for a significant fraction of the year. This area constitutes about 2% of the total swamp in Grand Bay. Logging-related activities, and, to a lesser extent, other construction activities during the wet season, would cause short-term damage to any aquatic communities in the immediate area subject to vehicular traffic, foot traffic, and haulage of timber. Cessation of these activities would permit partial recovery of these semiaquatic and aquatic ecosystems.

Additional stress on these systems as they currently exist would result from the temporary resuspension of sediments, permanent increase in daily exposure to sunlight, and probable but subtle changes in nutrient cycling induced by removal of trees and shrubs. The impacts of suspended sediments and resedimentation are well documented (Darnell 1976; Sorensen et al. 1977) and include (1) reduced photosynthesis and plant production; (2) smothering of fish eggs, fish larvae, and bottom-dwelling plants and animals; (3) gill damage and increased susceptibility of fish to disease; (4) destruction of spawning beds; and

(5) possible remobilization of any toxic contaminants sequestered in the sediments.

Although the proposed sites for the strafing pit and part of the cantonment area lie in seasonally flooded wetlands according to soil maps published by the U.S. Soil Conservation Service (1973), the U.S. Army Corps of Engineers has determined that a dredge and fill permit under Section 404 of the Clean Water Act will not be required (Osvald 1984).

Sand for the target pads would be removed from borrow pits to be established on-site. If left alone, these pits will almost certainly evolve into seminatural ponds colonized by aquatic plants and animals typical of natural ponds in the area. To reduce the impacts on existing wetlands and upland forests, the borrow pits should be limited to uplands within the area to be clear-cut.

Although cessation of construction and logging would permit partial recovery of these semiaquatic and aquatic ecosystems, community structure and function will be altered because of the loss of trees. From a historical perspective, these changes are hardly significant because the entire Grand Bay system was logged during the earlier part of the century (Connell 1985). If and when Air Force operations cease, the preoperation wetland communities should reestablish themselves over a period of a few decades.

If construction and logging occur during the wetter months (Table 3.5), some export of suspended sediments downstream into Grand Bay Creek may occur, depending on flow, sedimentation rates, and slope. Slope is very slight in Grand Bay, a factor that is expected to prevent significant amounts of sediment from moving very far downstream. Any adverse effects of suspended sediments and siltation that do occur should be temporary.

Once operations begin at the weapons range, sport fishing within the range boundaries would be limited to times when the range is not operating. These limitations would mainly affect fishing in Shiner Pond because it is by far the largest body of open water (69 acres) within the range boundaries. During actual bombing and strafing practice, an occasional stray bomb or 20/30-mm cannon shell might hit in wetland communities, but because these projectiles are small and nonexplosive (except for a small spotting charge equivalent to an 8-gauge shotgun blast in each bomb), they are unlikely to cause any measurable damage.

4.7 SOCIOECONOMIC IMPACTS (Non-Noise)

4.7.1 Agriculture

The operation of the proposed range may have an effect on agriculture if airplanes and helicopters used in crop dusting are delayed or experience difficulty in attaining access to farms within the

restricted airspace. However, cooperation between crop dusters and Moody personnel responsible for range scheduling (Sect. 4.2) would be expected to reduce adverse impacts to agriculture to an insignificant level.

4.7.2 Employment

A construction effort of about 9 months at a cost close to $1 million is estimated. The range would be operated by a contractor. Estimated personnel required are one manager and five workers. Additionally, range operation would create a new air traffic controller job. This would create no significant increase in employment in the area.

4.7.3 Transportation

For reasons of safety, when operations would be conducted at the range, gates would close off access roads to the area. The closing of Shiner Pond Road (unpaved) during operations might present an inconvenience to local residents who use the road to travel east and west between US 221 and GA 125. If access to Shiner Pond Road is closed, a more circuitous route up to 15 miles is necessary to travel between the two highways. The Air Force would install telephone call boxes at the gates on Shiner Pond Road so people can travel across the range when necessary during idle range periods (Sect. 2.1.5).

4.7.4 Economic Base

If the U.S. Forest Service land is transferred to the Air Force, it will no longer be considered entitlement land, for which the U.S. Department of the Interior, Bureau of Land Management, has made annual payments in lieu of taxes to Lanier and Lowndes counties. Lanier County will lose a maximum of $5072 annually from this source, and Lowndes County will be deprived of a maximum of $1933 annually. The counties could lose these payments in any event, however, since these lands would be turned over to the General Services Administration for disposal if the transfer to the Air Force is not made.

Under the provisions of the Military Construction Authorization Act, 1982 (Public Law 97-99), if the Forest Service land is acquired by the Air Force and the timber from the area clear-cut for the range complex is sold, 25% of the net proceeds of the sale is to be paid to the State of Georgia. The state legislature is to expend these funds for the benefit of the public schools and public roads of the county or counties in which the Air Force installation is located. Additional revenue would be produced if the balance of the transferred forest land were thinned and the timber sold.

The revenues of Lanier and Lowndes counties will decrease by about 0.7% and 0.02%, respectively, if the Forest Service land is transferred to the Air Force or any other non-DOI entity. These revenue losses should have a negligible effect on the operation of the respective

county governments. Additionally, each county is to share in state-directed benefits to schools and roads from the sale of timber cleared from the range complex site. Possible future income may be derived from future forest management of the range tract.

4.8 HISTORICAL AND ARCHEOLOGICAL RESOURCES

Construction of the range is not expected to cause any significant damage to historical or archeological resources. Although the investigation and survey of the target area indicated the presence of several sites (Sect. 3.8), those that would be disrupted by clear-cutting of the target area have been adequately investigated. At the sites 9-Ln-ARA-M1, 9-Ln-ARA-M2, and 9-Ln-ARA-M4, artifacts were discovered as isolated items that were not part of any apparent archeological resource; no additional work is deemed necessary for these sites (Wright 1985). The site that has the greatest potential for providing historical and archeological information (9-Ln-ARA-M3) is located close to the strafe target but in an area that will not be clear-cut or disturbed by the construction of the targets (see Figs. 2.3 and 3.4). During the clear-cutting and construction of the range facilities, this site would be marked to ensure that no disruption would occur. After construction, site identification would be removed to reduce the chances for amateur exploitation of the site. Establishment of the Winnersville Range would not preclude future investigation when interest and resources are available.

The multicomponent site, which lies north of Shiner Pond Road near the eastern border of the federal tract (Site A on Fig. 3.6), is not expected to be affected by the range construction activity in the northeastern portion of the target area. Although the western edge of Site A may extend into the target area, extensive clear-cutting is not expected to occur north of Shiner Pond Road (Fig. 2.3).

4.9 MITIGATING MEASURES

To mitigate the effects of construction and operation of the weapons range on terrestrial and aquatic resources, sand borrow areas or pits would be located either on uplands within the zone to be clear-cut or completely outside the Grand Bay system in a nonwetland area. All exposed or disturbed soils would be stabilized as soon as possible with plantings of appropriate vegetation. No mitigating measures for noise impacts are anticipated. Consistent with Air Force policy, the Public Affairs Office at Moody (Phone No. (912) 333-3345) will receive any complaints or claims regarding range operation.

4.10 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Operation of the Winnersville Range would cause several impacts that cannot be avoided. These include:

- Annoyance due to noise. It is estimated that 86 persons living near the range would be "highly annoyed" by the noise levels generated by F-4s training on the proposed range. Noise levels generated by range operation are also expected to reduce the attractiveness of recreation in the vicinity of the range (see Sect. 4.1).

- Accidents. Operation of the weapons range would cause a small increase in the probability that accidents would occur in Lanier or Lowndes counties (see Sect. 4.3).

- Impacts to wetlands. Construction of the weapons range would cause permanent modification of vegetation on up to 20 acres, including perhaps as much as 15 acres of wetlands (see Sect. 4.5).

4.11 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

Construction of the weapons range would produce long-term impacts to environmental productivity by the permanent modification of 20 acres of land that would be used for construction of the cantonment facilities, towers, and targets. Because of the small area that would be affected, these impacts are not considered significant. Other environmental impacts of the range would have minimal impact on long-term productivity.

4.12 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

Construction and operation of the Winnersville Range would not involve any major irreversible or irretrievable commitment of resources. Those resources that would be irreversibly and irretrievably committed include fuel used in construction and a small amount of concrete used for foundations of facilities. Although minor permanent facilities would be constructed, these could be decommissioned and most of the resources reused. If use of the range was discontinued, the natural environment would reestablish itself in most of the areas that would be disturbed, except for small areas occupied by buildings and parking lots.

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This statement was prepared for the Air Force by the Oak Ridge National Laboratory (ORNL), located in Oak Ridge, Tennessee. Much of the background data used in the analyses were supplied by the Air Force.

The ORNL environmental impact assessment task group (listed below) visited the site and environs of the proposed range. Contacts were made with local and state officials and authoritative sources to gather data firsthand. To the extent possible, the task group performed an independent analysis of the impacts of the proposed action to develop and operate the Winnersville Range. Major data provided by the Air Force included the noise contours, range plan, and information on the suitability of siting the range in Echols County.

The individuals involved in this environmental impact assessment, their responsibilities, and their areas of expertise are listed below:

Dr. J. B. Cannon, Ph.D., Mechanical Engineering, served as project manager. He was the principal reviewer for ORNL. Dr. Cannon currently manages nuclear-related projects in the environmental impact assessment area. He has 10 years of experience in environmental impact assessments.

Dr. C. E. Easterly, Ph.D., Physics, was responsible for assessment of the physiological and psychological effects of noise. He specializes in basic research and applied assessments related to human health. Dr. Easterly has worked in this area for more than 12 years and has more than 40 publications.

Mr. G. K. Eddlemon, M.S., Zoology, was responsible for assessment of the potential impacts on aquatic resources. He has nine years of experience in assessment of environmental impacts and the effects of energy technologies on aquatic ecosystems. Mr. Eddlemon has published 25 papers and reports and has contributed to 20 Environmental Impact Statements (EISs) and Environmental Assessments (EAs).

Mr. F. C. Kornegay, M.S., Meteorology, was responsible for assessment of air quality impacts. He conducts research in atmospheric effects of energy technologies. Mr. Kornegay has 10 years of experience in environmental impact assessments and more than 30 publications.

Dr. R. L. Kroodsma, Ph.D., Zoology, was responsible for assessment of the potential impacts on terrestrial resources. He is a terrestrial ecologist and certified wildlife biologist, specializing in environmental impact assessments. Dr. Kroodsma has more than 15 years of experience, has published 20 papers, and has contributed to numerous EISs and EAs.

Ms. L. W. Rickert, B.S., Chemistry, was responsible for the socioeconomic assessments. She has been involved with environmental studies and the preparation of environmental statements for the past 10 years.

Mr. R. D. Roop, M.A., Ecology, was project leader and had responsibility for structuring and overall writing of the statement. He has 10 years of experience with environmental impact assessment and has contributed to 10 EISs and EAs.

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APPENDIX A

(Reserved for Public Comments on the DEIS)

APPENDIX B

DISTRIBUTION LIST FOR DRAFT ENVIRONMENTAL IMPACT STATEMENT

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APPENDIX C

TERRESTRIAL AND WETLAND RESOURCES

Table C.1. Classification of wetlands occurring at Grand Bay

System Subsystem Class Subclass	Description of occurrence at Grand Bay
Riverine	Streams having a low gradient and slow water velocity. Some water flows throughout the year.
Lower Perennial	
Unconsolidated bottom	Vegetative cover is less than 30% and the bottom is at least 25% covered by particles smaller than stones. At Grand Bay, stream bottoms consist of organic matter and productivity is very low. These are black-water creeks (Wharton 1978, p. 29).
Intermittent	Streams containing water for only part of the year.
Streambed	This wetland type includes all intermittent stream systems.
Lacustrine	Shrubs and trees have less than 30% areal coverage and the total area exceeds 20 acres; includes Shiners Pond and open water areas of Banks Lake.
Limnetic	All deepwater areas (greater than 6.6 ft deep).
Unconsolidated bottom	Vegetative cover is less than 30%, and the bottom is at least 25% covered by particles smaller than stones.
Aquatic bed	Dominated by plants that grow below or up to the water surface for most of the growing season in most years.
Littoral	Areas between the shore and a water depth of 6.6 ft.
Unconsolidated bottom	Same as above.
Aquatic bed	Same as above.

Table C.1 (continued)

Palustrine	All nontidal wetlands having greater than 30% areal coverage of trees and shrubs or other persistent emergents.
Aquatic bed	Wetlands dominated by plants that grow up to or below the water surface; at Grand Bay these include portions of Shiner Pond and Banks Lake and small open water areas within the much larger shrub swamps.
Emergent wetland	Wetlands having erect, rooted, herbaceous hydrophytes excluding mosses and lichens, usually dominated by perennial plants that emerge from the water surface.
Scrub-shrub wetland	Wetlands dominated by small trees (scrub) or shrubs less than 20 ft tall.
Broad-leaved deciduous	Such wetlands are not common at Grand Bay.
Needle-leaved deciduous	Swamps dominated by small or stunted cypress. These are not abundant.
Broad-leaved evergreen	These evergreen shrub swamps cover extensive acreages at Grand Bay.
Needle-leaved evergreen	Consisting of young pine trees, these wetland areas are not extensive.
Forested wetland	Wetlands dominated by woody vegetation more than 20 ft tall.
Broad-leaved deciduous	Dominated by black gum, such swamps are common at Grand Bay.
Needle-leaved deciduous	These wetlands are common at Grand Bay and are dominated by bald (pond) cypress.
Broad-leaved evergreen	These wetlands are less extensive in the area than gum or cypress swamps and are dominated by red bay, loblolly bay, and sweet bay.
Needle-leaved evergreen	These swamps, dominated by pond pine and slash pine, are common but less extensive than gum and cypress swamps.

Source: Cowardin, L. M., Carter, V., Golet, F. C., and LaRoe, E. T., 1979. Classification of Wetlands and Deepwater Habitats of the United States, FWS/OBS-79/31, U.S. Fish and Wildlife Service, Washington, D.C.

Table C.2. Vegetation types at Grand Bay and the proposed weapons range[a]

Type	Habitat	Dominant species	Subdominants
Hardwood forest	Upland areas	Live oak	Southern magnolia, water oak
Pine flatwoods and pine plantations	Elevated, relatively dry well-drained areas	Longleaf pine, slash pine	Waxmyrtle, red bay, sawpalmetto, gallberry
Pine wetlands	Occasionally flooded areas	Longleaf pine, slash pine, pond pine	Fetterbush, titi, red maple
Cypress swamp	Frequently flooded areas	Bald (pond) cypress	Sphagnum moss, fetterbush, black gum
Black gum swamp	Frequently flooded areas	Black gum	Sphagnum moss, fetterbush, red maple, cypress
Bay swamp forest	Wet areas	Red bay, sweet bay, large-gallberry, dahoon	Loblolly bay, sphagnum moss, cypress, pine
Shrub wetland	Frequently to permanently flooded areas	Fetterbush, titi, sweet spire, sweet pepper bush, button bush	Cypress, black gum, red bay, pines
Herbaceous prairie wetland	Wet or flooded areas dominated by emergent vegetation	Sedges, panic grass, broom sedge	Virginia chain-fern, water loosestrife, red root
Aquatic bed	Flooded areas	Spatter-dock, floating-heart	Pickerel-weed, pipewort, hard head

[a]The vegetation classification is based on McCaffrey, C. A., and Hamilton, D. B., 1984. "Vegetation Mapping of the Okefenokee Swamp Ecosystem," pp. 201-211 in A. D. Cohen, D. J. Casagrande, M. J. Andrejko, and G. R. Best, eds., The Okefenokee Swamp: Its Natural History, Geology, and Geochemistry, Wetlands Surveys, Los Alamos, N.M.

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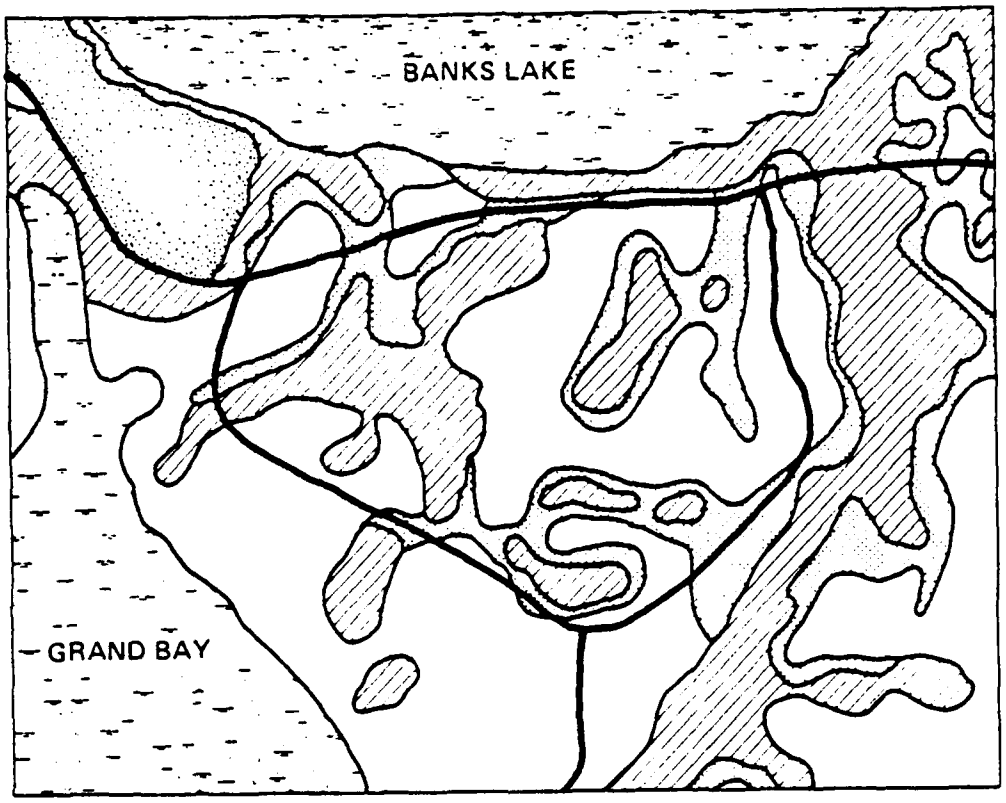

PERMANENTLY FLOODED – SWAMP SOILS AND NONSOIL

SEMIPERMANENTLY TO PERMANENTLY FLOODED – SWAMP SOILS

SEASONALLY FLOODED – JOHNSTON-OSIER-BIBB ASSOCIATION, PELHAM LOAMY SAND, RUTLEDGE LOAMY SAND, PORTSMOUTH LOAM

INTERMITTENTLY FLOODED, TEMPORARILY FLOODED, OR SATURATED (NOT ALL IS NECESSARILY DEFINED AS WETLAND) – ALAPAHA LOAMY SAND

NONWETLAND – BARTH SAND, MASCOTTE SAND, OLUSTEE SAND, LEEFIELD LOAMY SAND, STILSON LOAMY SAND

Figure C.1. The distribution of soil types and water regimes at the proposed weapons range.

APPENDIX D

HISTORICAL AND ARCHEOLOGICAL RESOURCES

In compliance with federal regulations for protection of historic and cultural properties (36 CFR 800 and 36 CFR 66), a background investigation and an initial archeological survey were conducted (Wright 1985). The survey investigated at least 10% of that portion of the target area south of Shiner Pond Road, including the sites of the two towers, the cantonment area, and the bomb and strafe targets; at least 35 acres were surveyed. The background research and field work were carried out during February and March 1985 by Dr. Newell O. Wright, Archaeological Research Associates, Valdosta, Georgia (Wright 1985).

The archeological survey was designed to determine if archeological sites were present within the 450-acre target area and to estimate the significance of cultural resources within the entire range. Neither Georgia's Archeological Site Files nor the National Register of Historic Places listed a record of significant cultural resources near or within the target area. However, the habitat and environmental resources near the target area have presented an exploitable resource for humans since their arrival in the vicinity. The background research indicated that the region in which the proposed range would be established has been occupied by humans through much of the prehistoric past, and evidence of human occupation of the target area during several of the past cultural periods was discovered during the field survey.

Because disturbance of the land surface for the target area could be detrimental to any surviving cultural resources, this vicinity (see Fig. 2.3) was inspected intensively. Examples of major environmental features were also sought and evaluated; these included high and dry areas, the predicted high ground next to bays, and lowland areas adjacent to water sources that would occasionally be flooded.

The target area coincides roughly with a triangle of roads, with Shiner Pond Road to the north and the "loop road" forming the sides of the triangle (Fig. 2.3). The area surveyed consisted of all of the dirt roads, two plowed fields, and all areas of specific impact such as the locations for the bomb and strafe targets and the flank and main towers. Within the target area, the terrain was visually inspected while walking all roads. Ditches, animal burrows, tree falls, and other natural exposures were examined for evidence of cultural material. Where specific construction or ground disturbance is planned, intensive visual scrutiny and shovel testing were conducted.

Artifacts were collected at each of four sites, whose locations are indicated on Fig. 3.5. The sites were assigned provisional site numbers, which will be changed when the state assigns permanent numbers.

At three sites (9-Ln-ARA-M1, 9-Ln-ARA-M2, and 9-Ln-ARA-M4), a total of 12 isolated flakes (by-products of stone tool manufacture) indicative

of human presence were found, but shovel tests revealed no other evidence of past human activity. These three sites were located at the proposed location of the flank tower (9-Ln-ARA-M1), southeast of the site for the main tower (9-Ln-ARA-M2), and in a plowed field between the flank tower and the bomb target (9-Ln-ARA-M4) (Fig. 3.5). The proposed strafe pit was thoroughly searched, but no evidence of prehistoric activity was found. The proposed cantonment area was also searched visually and with shovel tests. Again, no evidence of human activity was found.

Immediately south of Shiner Pond Road, Site 9-Ln-ARA-M3, on relatively high ground adjacent to a Carolina Bay, revealed evidence of repeated human activity. A projectile, possibly dating from a period before 8000 B.C., was found, as well as a point fragment dating from the period 8000 to 1000 B.C. At this site, evidence of a house and associated buildings was also found. Artifacts dating from the last quarter of the 19th century and first quarter of the 20th century were found. The remains are probably those of a farmstead. Because this component of the site is historic, documentation of its past was sought. A title search from 1814 to the present and examination of old road maps and soil surveys revealed that a structure existed on the property in 1908 but was not present when the government took over the land in 1940. The structure was probably built before 1894 and abandoned by 1940.

In addition to the sites discovered in the field survey, previous archeological investigations have identified a multicomponent site (Site A on Fig. 3.5) north of Shiner Pond Road near the eastern border of the federal tract (Wright 1985). The Air Force has initiated consultation with the Georgia State Historic Preservation Office regarding archeological and historic resources on the proposed site.

REFERENCE FOR APPENDIX D

Wright, N. O. 1985. Archaeological Resources of the Weapons Range, Moody Air Force Base, Georgia, Archaeological Research Associates, Report on Investigation 16, Valdosta, Ga.