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DRAFT
ENVIRONMENTAL ASSESSMENT
COMBAT SUPPORT TRAINING COMPLEX
TYNDALL AIR FORCE BASE, FLORIDA
JULY 25, 1989

DEPARTMENT OF THE AIR FORCE
TACTICAL AIR COMMAND

93-24548





**Air Force
Environmental Planning Division
(HQ USAF/CEVP)**

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DRAFT
ENVIRONMENTAL ASSESSMENT
FOR THE
COMBAT SUPPORT TRAINING COMPLEX
TYNDALL AIR FORCE BASE, FLORIDA

July 25, 1989

DEPARTMENT OF THE AIR FORCE
Tactical Air Command
Langley AFB, Virginia

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ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFESC	Air Force Engineering and Services Center
AFR	Air Force Regulation
AFTOX	Air Force Chemical Dispersion Model
AGL	above ground level
BEEF	Base Engineer Emergency Force
BRAAT	Base Recovery After Attack
CCC	Civilian Conservation Corps
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CSTC	Combat Support Training Complex
DNL	Day Night Weighted Average Noise Level
EA	Environmental Assessment
EOD	Explosive Ordnance Disposal
FAC	Florida Administrative Code
FARE	Fare And Readiness
ft	feet
FWS	U.S. Fish and Wildlife Service
gal/day	gallons per day
hr	hour
lbs	pounds
MGD	million gallons per day
min	minute
MSA	Metropolitan Statistical Area
NEPA	National Environmental Policy Act
ORNL	Oak Ridge National Laboratory
PDEA	Preliminary Draft Environmental Assessment
RIBS	Readiness in Base Services
RRR	Rapid Runway Repair
sq. ft.	square feet
TAC	Tactical Air Command
T&E	threatened and endangered

SUMMARY

The U.S. Air Force proposes to relocate and upgrade the Combat Support Training Complex (CSTC) from Eglin Air Force Base (AFB) to Tyndall AFB, near Panama City, Florida. The existing temporary facilities at Eglin AFB are inadequate, and training at Eglin AFB may be terminated because of mission incompatibility. The Air Force would use the CSTC to conduct specialized training for Air Force combat support personnel based in the continental United States. The CSTC would include buildings for classroom education and facilities for field training exercises that would simulate combat conditions. Relocating the CSTC to Tyndall AFB would enable the Air Force to upgrade and continue combat support training for Air Force personnel.

The proposed CSTC site is located in the eastern portion of Tyndall AFB, about 8 miles southeast of the main base complex. Construction of the CSTC would require commitment of approximately 1000 acres, of which about 187 acres would be cleared to build a 6000-ft mock runway, the accompanying taxiways and apron, and a 64-acre cantonment area where Air Force personnel would be housed. The CSTC would employ a permanent staff of about 85 and provide training for up to 350 persons/week, with training exercises scheduled for 38 weeks/year. The personnel receiving training would stay at the CSTC and be trained for 6 days.

Training at the CSTC would focus on the use of specialized equipment for emergency runway repair and how to provide essential services to AFBs under emergency or wartime conditions. Techniques taught would include detection and removal of ordnance, use of camouflage, emergency repair, restoration of systems for communication and other control functions, provision of food service in the field, field sanitation, operation of field laundries, mortuary operations, and training of medical personnel.

This Environmental Assessment (EA) considers the no action alternative, under which a new CSTC facility would not be built. The Air Force would continue to conduct combat support training activities at the existing Field 4 site at Eglin AFB. However, because construction of permanent facilities at Field 4 is not feasible and because Field 4 operations could be terminated (Sect. 2.3.1), this alternative would likely result in a shortfall of combat support training.

Several potential alternative locations for the CSTC were eliminated from further consideration. These included four sites around the periphery of Eglin AFB, a site at Tyndall AFB about 2 miles southeast of the proposed site, and seven sites at various locations in the United States. The Eglin AFB sites were eliminated because they lacked logistic support (i.e., they were located 23-45 miles from the main base where support services and emergency medical care would be available) and because of their distance from Tyndall AFB. The potential site at Tyndall AFB was eliminated because of conflicts with drone operations and impacts to wetlands. The seven sites outside Florida were eliminated as unsuitable.

Tear gas (Agent CS) would be used at the CSTC in daytime exercises simulating chemical warfare. A maximum of three canisters would be used simultaneously at a single location. Modeling of the atmospheric dispersion of such a tear gas release indicates that the maximum concentration of tear gas that would be expected at U. S. Highway 98 or in Allanton would be less than the permissible exposure limit established by the National Institute of Occupational Safety and Health for occupational exposure. Persons in boats on East Bay or Strange Bayou could approach to within about 650 ft of the training area. Potential impacts to such individuals could be eliminated by excluding use of tear gas within a buffer zone of about 1000 ft along the shoreline of East Bay and Strange Bayou.

Construction of the mock runway and taxiways would cause filling of about 8 acres of wetlands, with accompanying impacts to surface and subsurface hydrology, water quality, and aquatic and terrestrial biota. The Air Force would obtain a permit for filling activities in accordance with Sect. 404 of the Clean Water Act. Being flooded only intermittently or seasonally, the non-tidal wetlands that would be destroyed represent relatively low quality aquatic habitat. Higher quality tidal wetlands border East Bay and Strange Bayou within 400-600 ft of the northern portion of the training area. These areas should experience little or no impact from CSTC construction.

Both construction activities and operation of the CSTC have the potential to introduce sediments, oil, grease, and spilled petroleum products into wetlands and water bodies adjacent to the site. The Air Force would obtain a permit from the State of Florida for storm water discharge, and project design would incorporate control facilities to minimize the effects of storm water runoff. However, some introduction of sediments into nearby wetlands and streams would occur because of the explosions used to create craters in the

mock runway. Use of large explosive charges to blast craters for repair exercises would be restricted to the center portions of the the mock runway and would not introduce debris or sediments into East Bay, Strange Bayou, or the high quality wetlands adjacent to these waters.

In addition to direct wetland losses, some wetlands adjacent to the project would experience minor but unavoidable hydrologic and water quality impacts and degradation of aquatic habitat. Under worst-case meteorological conditions that promote deposition of tear gas (high humidity and/or precipitation), very shallow water near the training areas might receive sufficient deposition of tear gas to cause toxicity to sensitive aquatic species. Potential impacts to the high quality wetlands adjacent to East Bay and Strange Bayou could be eliminated by excluding use of tear gas within a buffer zone of about 1000 ft along the shoreline of these waters.

The clearing of about 187 acres of plant and animal habitat would cause a permanent reduction in the wildlife populations of numerous species that live at the proposed site. Operation of the CSTC would also cause reductions in the populations of wildlife species sensitive to human activity, although such impacts would be expected to be relatively minor. The use of tear gas could also adversely affect wildlife in the vicinity of the training area.

Instantaneous noise levels from explosions at the CSTC would be about 90 dBA in Allanton, the closest residences to the proposed site. This noise level could startle some individuals and cause a limited level of annoyance. Because explosions would occur only a few times per week and for brief periods, little adverse noise impact would be anticipated from the proposed action.

The CSTC would be expected to cause minimal impacts to land use and archaeological and historical resources; socioeconomic impacts would also be minor.

1. INTRODUCTION

1.1 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The U.S. Air Force proposes to relocate and upgrade the Combat Support Training Complex (CSTC) from Eglin Air Force Base (AFB), Florida, to Tyndall AFB, a Tactical Air Command (TAC) installation located near Panama City, Florida. The CSTC would be used to conduct specialized training for Air Force combat support personnel based in the continental United States. The Air Force Engineering and Services Center (AFESC) now conducts such training on 1280 acres at Field 4, Eglin AFB, Florida. The existing, temporary facilities at Field 4 are inadequate for a number of required training functions, and effective training is hampered by the lack of permanent facilities. Construction of permanent facilities at Field 4 would conflict with other missions at Eglin AFB. A portion of the Field 4 facility lies within a munitions testing safety zone, and the inhabited portions of the facility are located in an aircraft accident potential zone II. Because of potential hazards to personnel at Field 4 caused by Eglin AFB's testing and flight operations, Eglin officials have requested that combat support training activities be moved from the Field 4 site (see Appendix A). AFESC proposes to construct and operate the CSTC on a new site at Tyndall AFB that lies outside all clear zones and accident potential zones.

Locating the CSTC at Tyndall AFB would provide permanent facilities where required training could be conducted. The permanent facilities would enable AFESC to fill existing voids in training and enhance its quality. Combat support training activities would include a combination of classroom education and field exercises that realistically simulate combat conditions. Such training prepares Air Force personnel for contingency-related, direct combat support roles to be used under wartime and peacetime conditions. Requirements for combat support training are specified in Air Force Regulation (AFR) 360-1 (Airbase Planning & Operation), AFR 93-2 (Contingency Response Planning), AFR 93-3 (Base Engineering Emergency Force), AFR 140-3 (Readiness in Base Services), and AFR 140-6 (Base Service Contingency Planning).

1.2 SCOPE

This Environmental Assessment (EA) has been prepared in accordance with AFR 19-2, "Environmental Impact Analysis Process," and the Council on Environmental Quality (CEQ) "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act" (40 CFR Pts. 1500-1508). The objective of this EA is to determine the magnitude of the environmental impacts of the proposed action. If such impacts are found to be relatively minor, TAC may issue a finding of no significant impact and proceed with the proposed action. If the environmental impacts are found to be significant according to CEQ's criteria (40 CFR Pt. 1508.27), an Environmental Impact Statement must be prepared before TAC may reach a decision regarding the proposed action.

This EA addresses in detail the areas of potentially significant impact, including surface and subsurface water, aquatic ecology, terrestrial ecology, threatened and endangered species, noise, and effects of tear gas dispersal. Minimal attention is given to areas where no significant impact would be expected from the proposed action; such areas are land use, socioeconomic aspects, and archaeological and historic resources.

In preparing this EA, several state and federal agencies have been consulted (Sect. 8). Correspondence with agencies concerning wetlands impacts, threatened and endangered species, and archaeological and cultural resources is included in Appendix B.

2. PROPOSED ACTION AND ALTERNATIVES

2.1 THE PROPOSED ACTION

The proposed action is to relocate and upgrade the CSTC from Eglin AFB to Tyndall AFB. The proposed site is located in the eastern portion of the base, about eight miles from the main base complex (Fig. 1).

2.1.1 The Proposed Facility

Development of the CSTC at the proposed site would require commitment of approximately 1000 acres and construction of a variety of buildings, facilities, and a 6000-ft mock runway with the accompanying apron and taxiways (Table 1). Phase 1 of the project (site development) would begin in FY 1989, and Phase 2 (facility construction) would begin in 1990.

The siting criteria for this facility are as follows:

1. Availability of property. To avoid the expense and delay of property acquisition, the property should be federally owned and, preferably, located on an AFB or reservation. Maximum use of existing unused airfield pavements, facilities, and utilities would be desirable.
2. Proximity to AFESC. The site should be as close as possible to Tyndall AFB, where management and curriculum development for combat support training are located. Proximity to AFESC is desirable because, with the availability of existing Headquarters AFESC facilities, less construction would be necessary at the CSTC, thus lowering costs; additionally, the reduced span of command and control would improve operational efficiency.
3. Potential for logistic support. The site should be located close to Air Force facilities that can provide administrative support, housing for permanent military personnel, medical support, communications, utilities, and other support (e.g., supplies, fuel, equipment and vehicle parts, base exchange, and recreational facilities).
4. Potential for restricting access. The Air Force should be able to control access to the site to prevent unauthorized entry into hazardous areas.

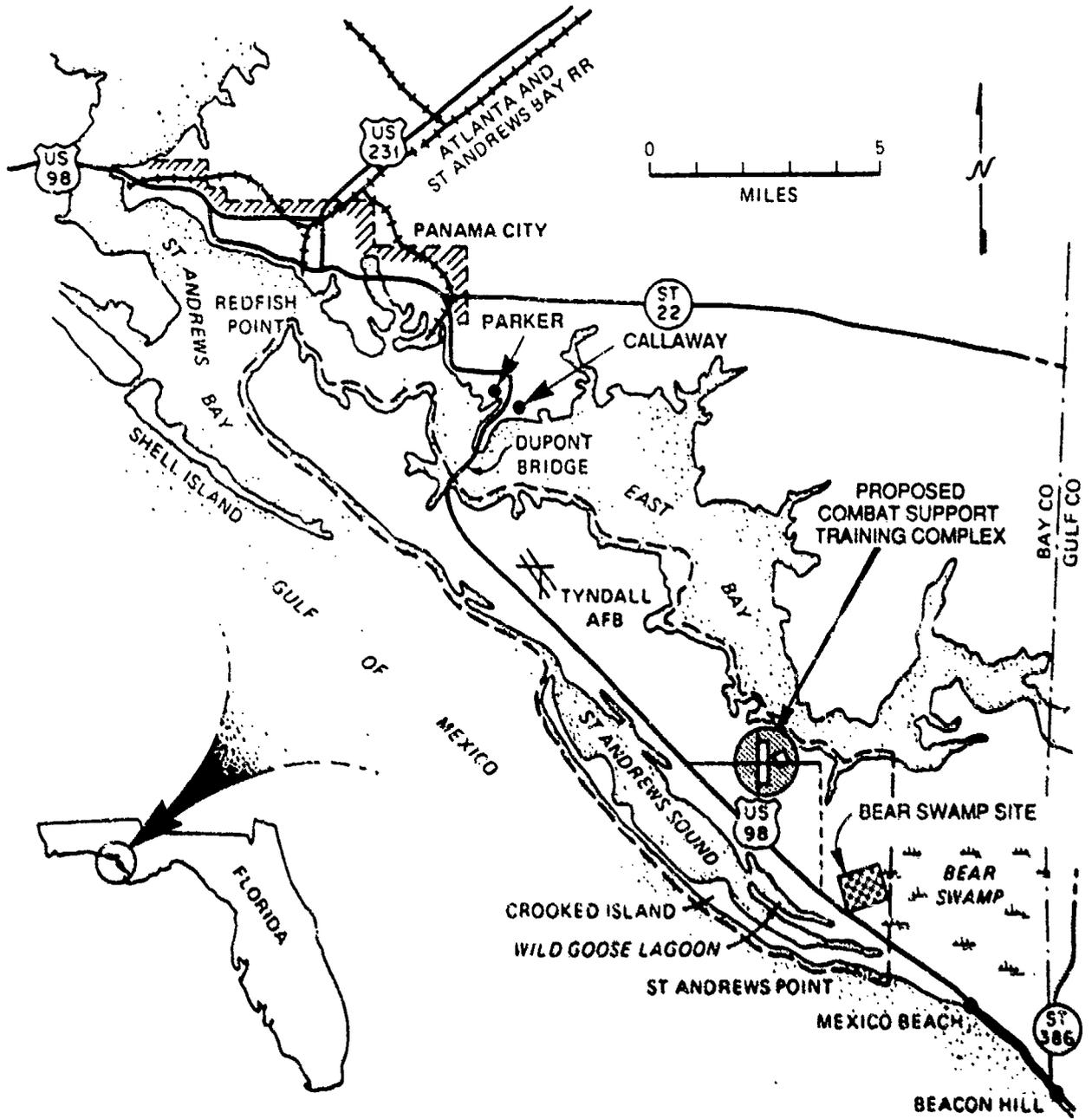


Fig. 1. Location of Tyndall AFB and the proposed Combat Support Training Complex (CSTC).

Table 1. Description of facilities for the proposed Combat Support Training Complex

Facility	Description	Area (sq ft)	Estimated cost (\$)	Capacity
Phase 1				
Combat Support Training Facility	Work includes construction of Base Recovery After Attack (BRAAT) Facility, site development, drainage system, and the following:			
	Mock runway	900,000		
	Apron	15,300		
	Taxiway	567,000		
	Access roads	<u>135,000</u>		
		1,617,300	5,410,000	350 persons/week
Phase 2				
Command and Control Facility	Facility includes Survivable Recovery Center and Damage Control Center	2,500	140,000	40 students 12 staff
Fire Training Facility	Facility will house fire-fighting and rescue vehicles and will include classrooms	7,500	208,000	27 students 4 staff
Central latrine and shower	Concrete masonry unit building with concrete floor	1,750	110,000	332 male students 18 female students
Administrative facility and parking area	Pre-engineered building providing office space, storage, and conference room	9,600	559,000	83 staff
	Parking area	31,500	130,000	100 cars
Miscellaneous training facilities	Three interconnected concrete pads	3,000	17,600	332 male students 18 female students
	Five pre-engineered steel buildings	4,000	88,500	
	Install Survivable Collective Protection System	N/A*	59,600	

Table 1. (continued)

Facility	Description	Area (sq ft)	Estimated cost (\$)	Capacity
Site plan and utilities	Develop site plan; construct power substation and distribution system; drill water supply well, construct water treatment and distribution system; and construct sewer main, pumps, and package treatment plant	NA	506,000	
Parking area and washrack	Two parking areas for Combat Support Training Complex equipment	37,800	19,000	100 vehicles and pieces of specialized equipment
	Shed-covered concrete slab washrack with drain to oil/water separator	1,200	26,000	NA
Vehicle Maintenance Facility	Pre-engineered steel building on concrete foundation for servicing CSTC equipment and vehicles	10,800	408,000	Up to 20 workers
Material storage facilities	Pre-engineered steel shed to store equipment and supplies	4,000	18,000	NA
	Pre-engineered building on concrete slab	9,600	166,000	
	Gravel-based open storage area	13,500	6,300	
Learning Center	Two pre-engineered single-story classroom buildings with concrete foundations. Bldg. A will function as a large briefing room.	9,320	526,000	350 students
Explosive storage facility	Reinforced concrete six-compartment building with concrete foundation, floor, and roof. Security fence and alarm system	410	60,000	NA

^aNA = Not applicable.

The CSTC would include a fenced cantonment area of about 50 acres that would contain classroom buildings, an administrative building and parking area, a washrack and parking area for specialized equipment, a vehicle maintenance facility, storage buildings, open areas for hardback tents and portable food-service equipment, and a central latrine and shower. The only access to the site would be by a paved road from U.S. Hwy 98. The access road to the site would be controlled with a gate; warning signs would be posted along U.S. Hwy 98 to discourage the public from entering the complex. The facility design would include fire protection systems, with a 150,000-gal elevated water storage tank, hydrants, and fire suppression systems. Primary fire response would be provided by the base fire department.

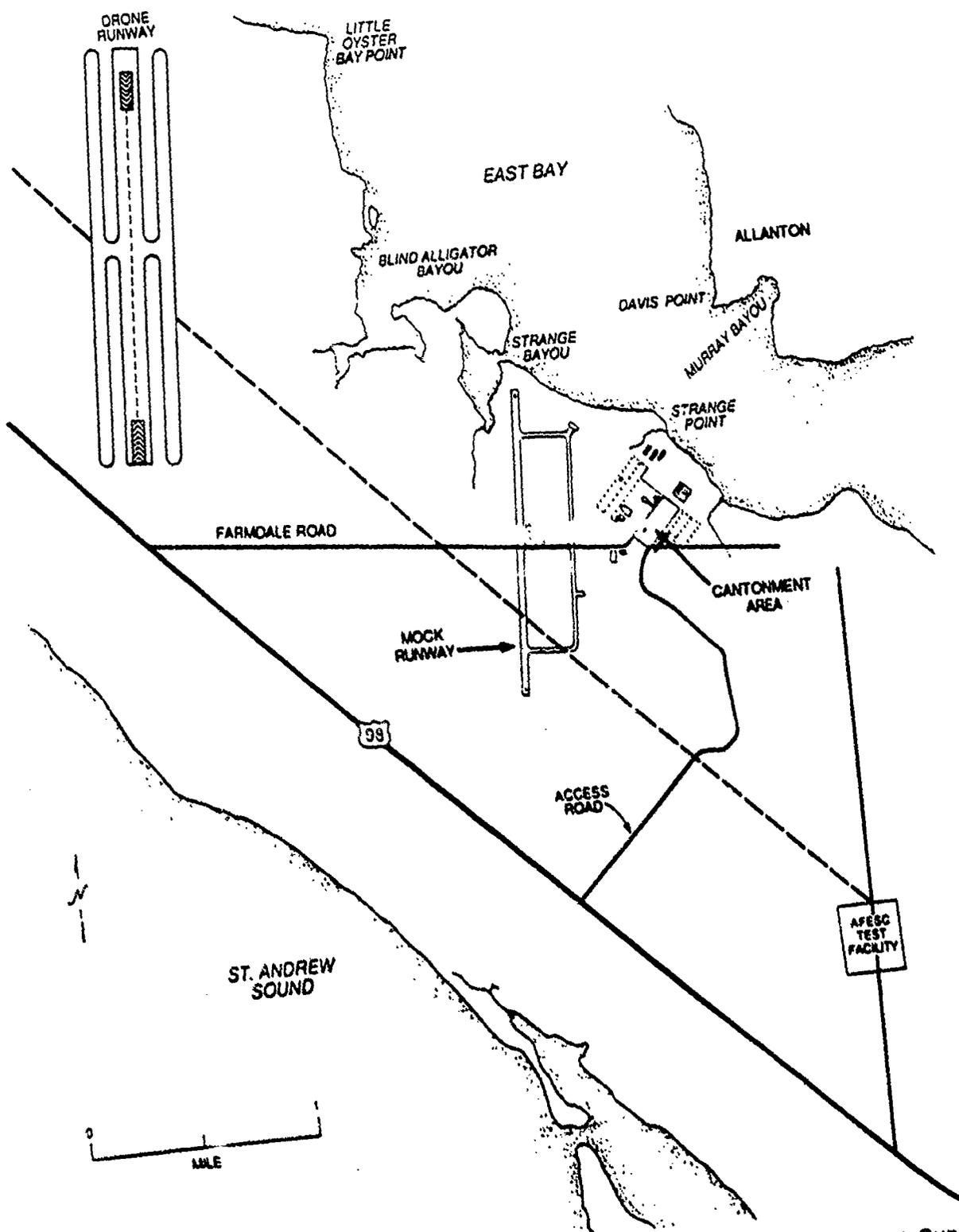
Site development would include installation of a small power substation and distribution system. Water would be supplied by a well dug on the site. Management of waste and hazardous materials from the proposed CSTC is discussed in Sect. 2.1.4.

The layout for the CSTC (Fig. 2) reflects placement of facilities primarily in upland areas to take advantage of natural drainage patterns and to avoid wetlands. The access road would follow an existing roadway. Construction would incorporate the best available management practices to minimize impacts of site runoff; runoff would be routed to grassy swales and control structures prior to discharge into existing drainage pathways.

The proposed layout for the CSTC reflects the need for clear zones surrounding the areas where, as part of CSTC operation, explosives would be used to create runway craters for repair exercises. In accordance with AFR 127-100, the portions of the mock runway where explosions would occur must be at least 1600 ft from unprotected, valuable resources and personnel. Overlapping of clear zones is permitted.

2.1.2 Combat Support Training Activities

The CSTC would be used for training exercises, classroom instruction, and administrative and support activities. The facilities would accommodate a maximum of 350 personnel/week, with training exercises scheduled for 38 weeks/year. Approximately 85 instructors and permanent staff would be assigned to the CSTC, including 2 civilians.



2. Location and preliminary site layout of the proposed Combat Support Training Complex (CSTC) at Tyndall Air Force Base, Florida.

The personnel receiving training would be trained for 6 days and would remain at the CSTC 24 h/day throughout this period.

Training at the CSTC would simulate wartime conditions that would be expected in overseas theaters. Training would consist of classroom exercises conducted primarily within the administrative compound and field training conducted primarily on the mock airstrip and adjacent paved areas. Field training would involve the use of heavy and specialized equipment (see Table 2). Training exercises would be conducted in or adjacent to developed areas and would not involve large-scale off-road activity.

The CSTC would be used to train personnel in techniques for Base Recovery After Attack (BRAAT), including the following types of training: civil engineering activities [Base Engineering Emergency Force (Prime BEEF)], fire fighting, explosive ordnance disposal (EOD), disaster preparedness, base services [Readiness in Base Services (Prime RIBS)], and commissary services [Food And REadiness (Prime FARE)]. The Prime BEEF training program would instruct civil engineering personnel in Harvest Eagle and Rapid Runway Repair scenarios. The Harvest Eagle program would teach techniques for contingency operation, including the use of specialized equipment such as electrical generators, reverse-osmosis water purification units, airfield lighting systems, aircraft arresting systems, and refrigeration units. The Rapid Runway Repair program would teach the use of specialized support equipment and heavy equipment to transport earth and gravel material needed to fill craters in runways. This activity also would involve transportation of various types of crater covers such as aluminum matting, fiberglass-reinforced polyurethane mats, and concrete slabs for repair of craters. Crater covers would be reused for subsequent training events. During each week of training, up to 6 craters would be created by detonating explosive charges containing up to 150 lb of ammonium nitrate and 1.5 gal of diesel fuel. These explosions would occur in rapid succession once each week at a time when flight operations would not be disrupted. Craters formed would be 15-30 ft in diameter and 5-15 ft deep. Because the explosions used to create craters would disperse fill material, only a portion of the fill material could be reused. Approximately 200-250 yd³ of concrete rubble would be used during each week of training activities; this fill would be taken from an on-site stockpile that would be periodically replenished from commercial sources. The craters

**Table 2. General and special purpose equipment to be used at the
proposed Combat Support Training Complex**

Type of equipment	Quantity
Heavy equipment	
Trailers	15
Trucks	22
Loaders	12
Graders	2
Excavators	4
Water distributor	1
Cleaner vacuum	1
Roller vibrators	2
General purpose equipment	
Pickups, buses, vans, etc.	35
Other support equipment	
Fire-fighting vehicles	5
MARV (Mobile Armored Reconnaissance Vehicle)	1
VRE-46 (Communication System)	1
Oracle B (Ordnance Rapid Area Clearance System)	1
Oracle C (system to clear magnetic sensing fuses)	1
RC Exc (Remote Control Excavator)	1
ADAS (Airborne Damage Assessment System)	1
ADAS ground segment	1
MAAS (Mobile Aircraft Arresting System)	1
PALS (Portable Airfield Lighting System)	2
Rapid Runway Repair crew communication	20
Concrete saw sets	3
Screed beams	3
Rapid Runway Repair water pumps	3
Training computers	2
Advanced equipment for BRAAT vehicle	15
NVG (Night Vision Goggles)	15

would be blasted in the mock runway at least 700 ft from the fire training facility and 1600 ft from other unprotected, valuable resources and personnel.

The BRAAT program integrates training of civil engineering, fire fighting, EOD, and disaster preparedness concepts and techniques for wartime base recovery. Fire fighters at the CSTC would practice crash rescue and search and rescue operations under emergency conditions. EOD training would involve use of the Ordnance Rapid Area Clearance system, which involves mechanical removal of simulated ordnance rather than detonation of unexploded live ordnance. Disaster preparedness training would involve techniques for chemical warfare protection, decontamination procedures, and collective protection system operations using the Survivable Collective Protection System. Training operations would involve learning about camouflage methods, explosive ordnance reconnaissance procedures, and command and control of recovery forces associated with the various campaign theaters.

The Prime RIBS training program prepares military forces for wartime and peacetime combat support roles. Food service personnel are trained to use semiperishable foods to prepare wartime subsistence meals using fuel-fired field ranges. Field sanitation and mortuary procedures are taught, including the use of immersion heaters for mess kit cleaning, operation of field laundries, search for and recovery of human remains, processing procedures for shipment of remains, and temporary burial techniques.

The Prime FARE training program trains Air Force Commissary Service personnel in field operations. This includes food storage and distribution and operation of Tactical Field Exchanges to supply field combat personnel with health and hygiene items.

Operation of the CSTC would include weekly use of explosives to create craters in the runway for rapid runway repair exercises. In addition, small explosive devices would be used to simulate detonation of submunitions (e.g., antipersonnel mines) in two training exercises. Fire training includes use of smoke generators that obscure visibility over a limited area during exercises. These generators produce smoke by pouring vegetable oil over a heated surface. One portable smoke generator would be used for exercises, and several training buildings would be equipped with fixed smoke generators. About 1 gal of vegetable oil would be used each week in smoke generators during interior search and rescue training. Firefighting exercises would not involve any live fires or firefighting

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Eglin, although the training is not integrated with other combat support forces. They will be incorporated into the CSTC training scenarios.

Approximately 10 transportation personnel could be integrated within the next 10 years. They would perform expedient repairs to war damaged vehicles.

2.1.4 Waste and Hazardous Materials

The proposed CSTC would generate about 35,000 gal/day of wastewater, primarily from domestic water use. The wastewater from the vehicle washrack would be treated in an oil/water separator and then combined with the domestic wastewater for treatment in a package wastewater treatment plant. Treated wastewater would be disposed of by spray irrigation to the upland areas between the mock runway and the taxiway.

State
Permit

Solid waste such as trash, garbage, rubbish, and refuse that would be generated during construction and operation of the CSTC would be removed from the site and placed in an approved offbase sanitary landfill or municipal or regional waste disposal system. Vehicle maintenance at the CSTC would generate waste oil and other liquid petroleum products that would be removed from the CSTC site and recycled or disposed of in accordance with AFR 19-14.

Storage tanks for fuel or other materials that would be used to operate and maintain equipment at the CSTC would be constructed at the site and used during training exercises. These storage facilities would be built with appropriate containment and/or diversion structures to prevent spilled material from reaching the environment. The Air Force would prepare a Spill Prevention Control and Countermeasures (SPCC) Plan in accordance with AFR 19-1 requirements. This SPCC Plan would be prepared specifically for the CSTC maintenance facility.

2.2 THE NO ACTION ALTERNATIVE

Under the no action alternative, a new CSTC would not be constructed. Combat support training activities would continue at the Field 4 site at Eglin AFB temporarily until Eglin AFB terminated the authority to use Field 4. However, because the Field 4 site could

be shut down and because AFESC cannot expand and upgrade the Field 4 facility (Sect. 2.3.1), this alternative would result in a shortfall of combat support training.

2.3 ALTERNATIVES ELIMINATED FROM DETAILED CONSIDERATION

2.3.1 Expanding Existing Facility (Field 4) at Eglin AFB

AFESC has investigated the feasibility of constructing permanent facilities at Field 4 to meet the need for combat support training. Such construction is not considered feasible for two reasons. First, Eglin AFB's host unit, the Armament Division of the Air Force Systems Command, is responsible for testing munitions within an accompanying safety zone that overlaps a portion of the Field 4 facility. Future testing of more sophisticated munitions with larger safety zones is expected to further complicate the encroachment problem. Construction of permanent facilities would exacerbate the problem and further encroach on this safety zone. Second, inhabited portions of the training site are located in Eglin AFB's aircraft accident potential zone II. As a result of these two conflicts, senior Eglin AFB officials have requested that combat support training activities be moved from the Field 4 site (see Appendix A).

2.3.2 Developing New CSTC at Eglin AFB

Four potential locations for the CSTC within the Eglin Reservation (Fig. 3) were identified and examined: (1) Rock Hill site (at the eastern end of the Eglin Reservation), (2) De Funiak Springs site (also at the eastern end of Eglin), (3) Santa Rosa County site (in the western end of the Eglin Reservation, about 20 miles from Pensacola), and (4) the Basin Bayou site (approximately 22 miles east of the main Eglin complex). Each of these sites is located near the outer edge of the Eglin Reservation and away from areas that are dedicated to Eglin's primary mission of weapons testing.

All of the sites on the Eglin Reservation were considered undesirable based on nonavailability of logistic support and distance from AFESC (see siting criteria in Sect. 2.1). Driving distances from the main Eglin AFB complex vary from about 23 miles to the Basin

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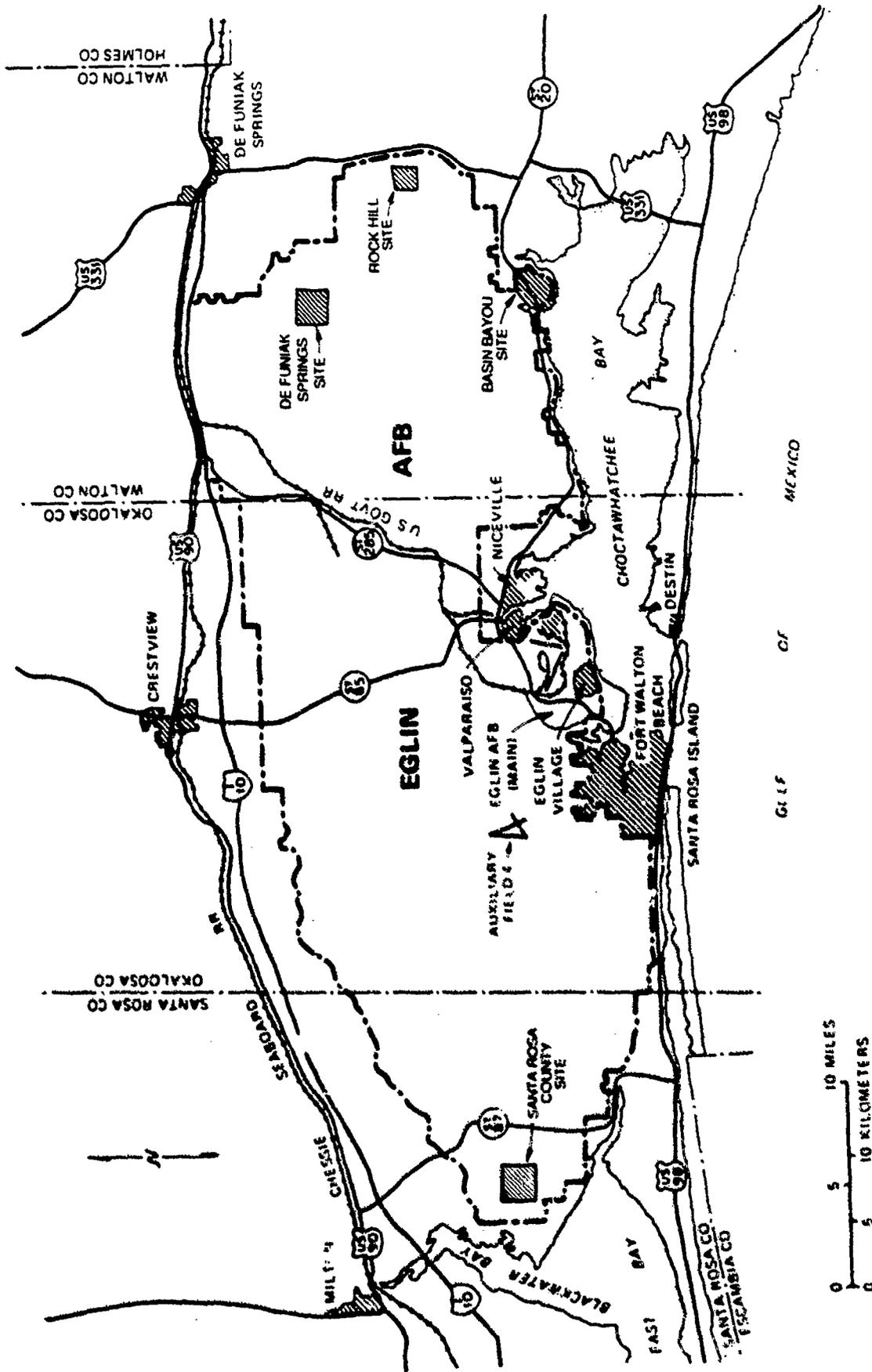
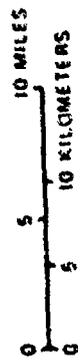


Fig. 3. Potential locations for the Combat Support Training Complex on the Eglin Reservation.



Bayou site to 45 miles to the De Funiak Springs site, distances which would make it substantially more difficult to obtain basic support services and emergency medical attention if needed. At present, the Field 4 facility is approximately 5 miles from the main Eglin AFB complex. In addition, driving distances from Tyndall AFB to the Eglin AFB sites vary from about 60 miles to the Basin Bayou site to 90 miles to the Santa Rosa County site.

In summary, the four potential sites on the Eglin Reservation were undesirable based on their distance from the main Eglin AFB complex and their distance from Tyndall AFB. Therefore, the alternative sites on the Eglin Reservation were not considered further and were eliminated from detailed consideration.

2.3.3 Siting Combat Support Training Complex at Tyndall AFB

Two sites were available at Tyndall—the proposed Farmdale site and the Bear Swamp site (Fig. 4). The Bear Swamp site is located about 2 miles east of the Farmdale site. Most of the Bear Swamp site is managed for pulpwood production. About 50% of the area is wetlands and lies within the 100-year floodplain.

Location of the CSTC at Bear Swamp site would be incompatible with the mission of the large-scale and sub-scale drone operations. The site is located in the destruct zone for damaged large-scale drones and the tail cone recovery area for the sub-scale drones. Because of the wetlands and safety concerns, the Bear Swamp site was eliminated from further consideration.

2.3.4 Other Alternatives

Seven additional sites were considered and eliminated (Fig. 5). These include Indian Springs, Nevada; Wendover, Utah; North Field, South Carolina; Gila Bend, Arizona; Brooks AFB, Texas; Williams AFB, Arizona; and Myrtle Beach AFB, South Carolina. These sites were eliminated for the following reasons:

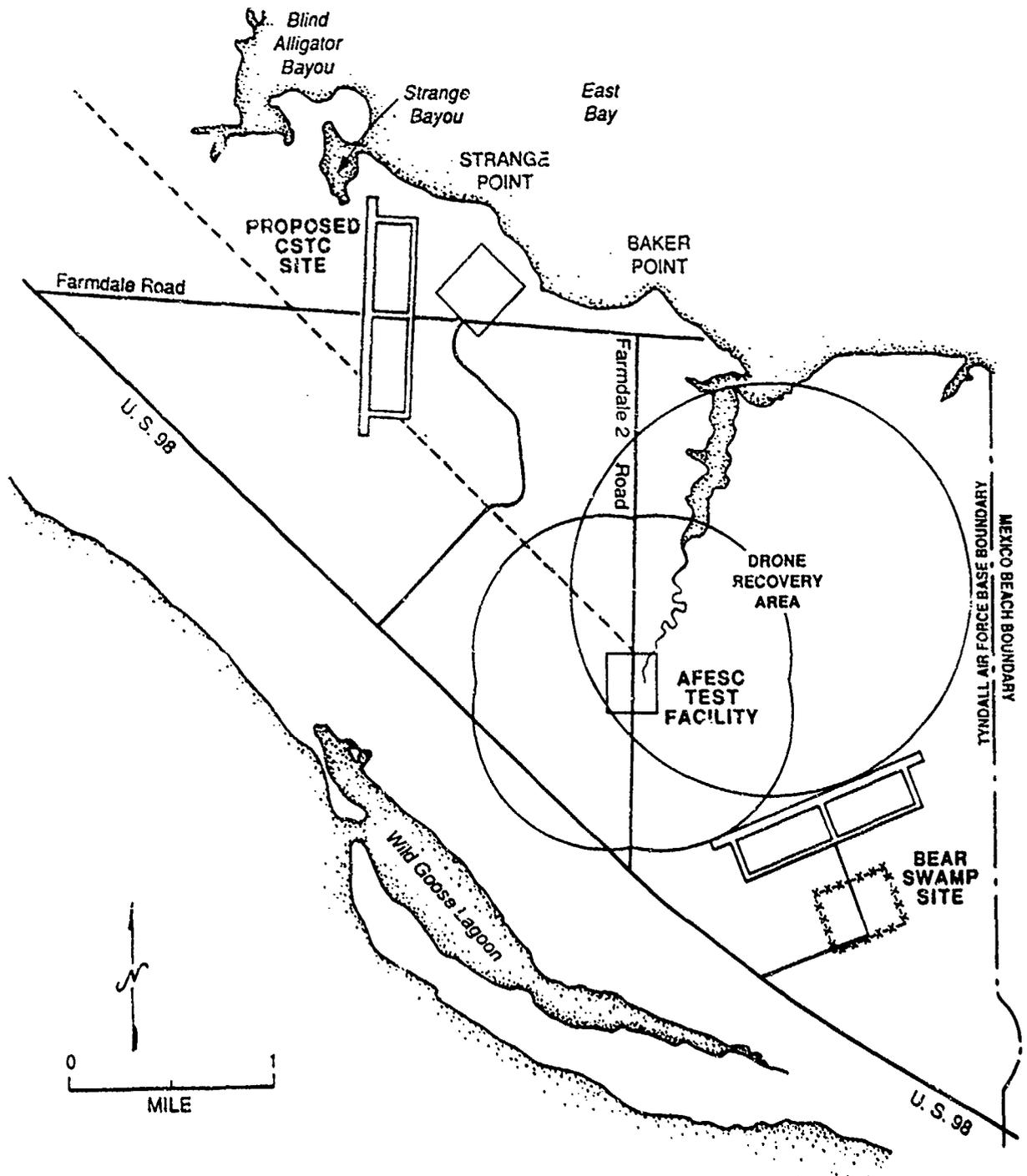


Fig. 4. Location of the Bear Swamp site at Tyndall Air Force Base.

<u>Site</u>	<u>Reasons</u>
Indian Springs, Nevada	Installation's mission incompatible 1999 miles from HQ AFESC
Wendover, Utah (Decker Field)	Airfield used for Red Flag exercises Town too small for 100-person cadre Site is a military/civilian airport (potential problem with explosions) Nearest support Hill AFB, Utah Occasional snow 2048 miles from HQ AFESC
North Field, South Carolina	Incompatible mission with MAC 591 miles from HQ AFESC
Gila Bend, Arizona	Summer temperatures too extreme 1764 miles from HQ AFESC
Myrtle Beach AFB, South Carolina	Only aprons and taxiway available Area too small for explosives 568 miles from HQ AFESC

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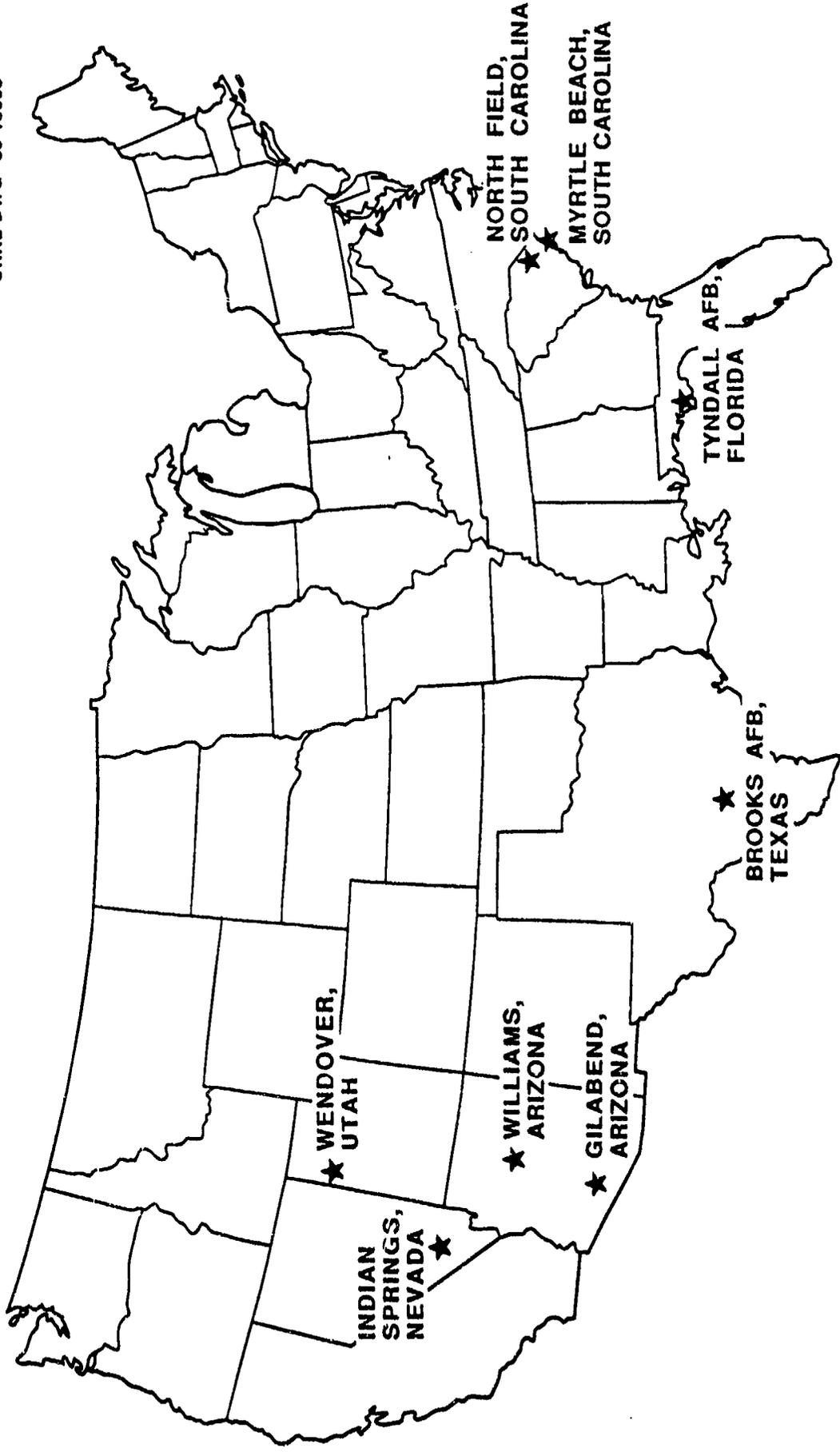


Fig. 5. Locations of other sites considered for the Combat Support Training Complex.

3. AFFECTED ENVIRONMENT

3.1 LAND USE AND SOILS

3.1.1 Land Use

Tyndall AFB occupies 29,115 acres in Bay County, Florida, including 291 noncontiguous acres leased for radar installations and storage. The 1000-acre site proposed for the CSTC lies between Baker Bayou and Strange Bayou in the southeastern part of the base about 8 miles from the Bay County-Gulf County line (Figs. 1 and 2).

The southeastern portion of the base has few developed areas. Large areas have been ditched to drain standing water and enhance the planting and growth of trees. Forest management is conducted for production of pulpwood on 17,894 forested acres of the base, including the proposed site area. Fishing and public hunting of squirrel, deer, and quail is permitted on 18,767 acres.

Neither Bay County, in which Tyndall AFB is located, nor Gulf County, the county closest to the site, is noted for agricultural production. Less than 2% of Bay County and about 8% of Gulf County are classified as suitable for growing crops. Table 3 shows agricultural land use in the two counties. In Bay County itself, about 78% of the land is owned or operated by the military and large land development, oil, and paper companies.

Table 3. Agricultural land use in Bay and Gulf Counties

Area	Total acres	Agricultural land (acres)	Specific agricultural uses (acres)		
			Cropland and range	Land in pasture	Forest
Bay	485,000	410,000	9,200	7,200	394,000
Gulf	358,000	350,000	30,000	15,000	305,000

Source: Shoemeyn, A. H., ed. 1987. *Florida Statistical Abstract, 21st Edition*, The University Presses of Florida, Gainesville, Florida.

In 1984 Bay County had a harvest of 10,751,000 ft³ of softwood products, primarily pulpwood, and Gulf County had a harvest of 19,782,000 ft³ of softwood products, 30% of which was pulpwood and 70% of which was saw/veneer logs (Shoemeyn 1987). Sales of cordwood and permits for fuelwood and Christmas trees on Tyndall AFB amounted to \$120,000 in 1987 and \$127,000 in 1986.

3.1.2 Soils

The proposed site lies in the Hurricane-Chipley-Albany and Rutlege-Allanton-Pickney map units, which occur in nearly level areas and in wet depressions (SCS 1984). The soils of the proposed site are poorly drained or very poorly drained, with the exception of several areas north of Farmdale Road. For most of the proposed site, wetness and/or ponding are severe limitations to such uses of these soils as tree farms, building sites, or sewage lagoons. None of the soils at the proposed site is considered prime farmland.

3.2 WATER

3.2.1 Surface Water

Surface waters near the proposed site include Baker Bayou to the southeast of the cantonment area, an unnamed wetland and bayou to the northwest of the cantonment area, and a wetland and stream feeding Strange Bayou to the west of the runway (Fig. 2). All of these waters drain generally northward into the tidal East Bay, and water levels and quality in the bayous are at least partially controlled by East Bay. The wetlands are generally not tidally influenced, though their water levels fluctuate between wet and dry seasons. The entire site of the proposed runway lies between 9 and 14 ft in elevation, so there is little overall slope. Runoff patterns are not well defined and probably change as water levels change.

Samples were taken on May 5, 1988, to characterize water quality near the site and in the nearby Farmdale Bayou. The samples showed that this bayou has low turbidity, adequate dissolved oxygen to support aquatic life (5 to 11 mg/L), and pH ranging from 5.0 to 7.9. Conductivity in the headwater areas was low but increased dramatically downstream of the borrow pit at the AFESC testing facility where tidal influence was observed. Surface waters in the wetlands are expected to be of high quality because the area has been disturbed little except for logging.

Water use in Bay County is 41.9 million gal/day (MGD). Of this, 12 MGD is from groundwater and the remaining 29.9 MGD is from surface water. In addition to this water use, 264.6 MGD is withdrawn from surface saline sources for cooling electric power generating facilities; this water is returned to its source (Bielby 1987). Water supply at Tyndall AFB is provided by Bay County from Deer Point Lake and is piped to the base across the DuPont Bridge.

3.2.2 Groundwater

The most productive and utilized source of groundwater in the region is the Floridan aquifer. The aquifer ranges in thickness from 50 to >2500 ft and contains potable water to depths of 2000 ft, although the water is generally hard, with hardness of at least 100 mg/L (Cushman et al. 1980). Capacities of wells in the Tyndall AFB area typically range from 4 to 12 gal/min/ft. Wells that are <500 ft deep may have specific capacities of <4 gal/min/ft, while those that are >700 ft deep may have capacities of >15 gal/min/ft (Barr and Wagner 1981). Although the quality is suitable, groundwater in this area is not currently used for irrigation of agricultural crops (Rick McWilliams, N.W. Florida Water Management District, personal communication to V. R. Tolbert, ORNL, March 10, 1988). Tyndall AFB's municipal water supply extends only several miles beyond the main base complex. Small quantities of groundwater are withdrawn to support the minor facilities that exist in the eastern portion of Tyndall AFB.

Groundwater beneath the proposed site ranges from at or near the ground surface, especially during wet periods, to depths of several feet below the surface, depending upon the season and the soil type. During periods when groundwater levels are elevated,

groundwater may seep into the on-site drainage ditches. Groundwater ponding may occur throughout the site, especially in those areas of very poorly drained soils.

3.3 AIR QUALITY

Northwest Florida is primarily residential and rural with little industrial development. The ambient air quality for Bay County is in compliance with the Florida Ambient Air Quality Standards (State of Florida, Title 17-2.300) and the National Ambient Air Quality Standards established by the U.S. Environmental Protection Agency (40 CFR 81.310). Because the site is located near the Gulf coast, the atmosphere is usually well mixed; consequently, pollutants tend to dissipate rapidly and buildup of pollutants is rare.

3.4 BIOLOGICAL AND ECOLOGICAL RESOURCES

3.4.1 Terrestrial Ecology and Wetlands

3.4.1.1 Vegetation

The proposed CSTC site at Tyndall AFB is located in the Southeastern Evergreen Forest Region of the outer West Coastal Plain (Braun 1950). Although longleaf pine and scrub oak forests on upland areas are predominant in this forest region, the CSTC site comprises mostly pine plantations; an old clearcut, sand pine-scrub oak forest; wet pine flatwoods; and titi swamp.

The vegetation of the site was briefly surveyed during a site visit on May 31, 1989. Based on this survey and an aerial photograph having a scale of 660 ft to the inch, the vegetation map shown in Fig. 6 was prepared.

The proposed sites for the runway, taxiway, and cantonment area are occupied mostly by pine plantations and the old clearcut and are located in areas that experience minimal flooding (i.e., outside of the 100-year floodplain as shown in Fig. 7). The old

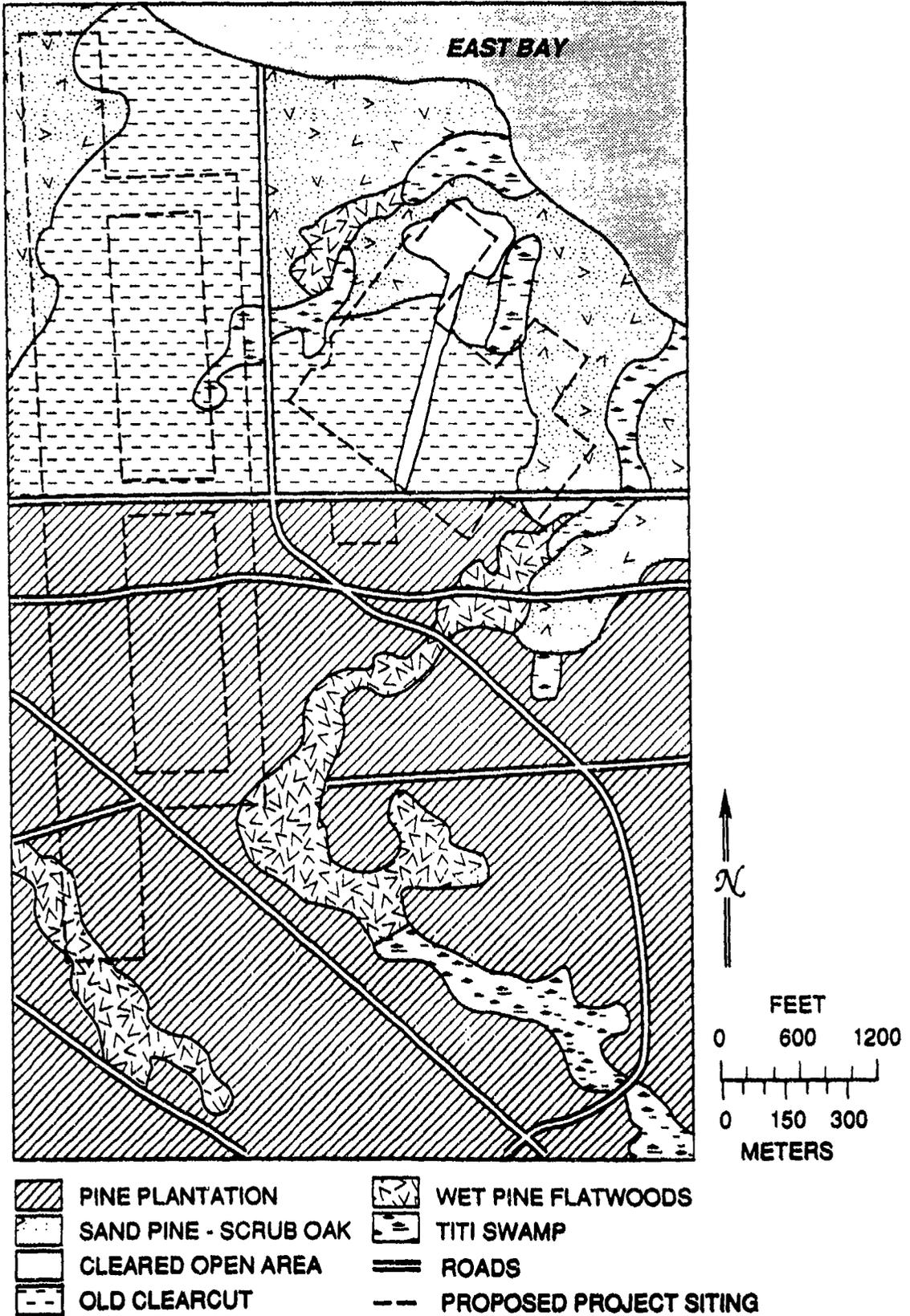


Fig. 6. Vegetation map for the proposed Combat Support Training Complex site. Prepared based on an aerial photograph and a site survey by ORNL staff May 31, 1989. Not all map units were field checked to verify the habitat type designation.

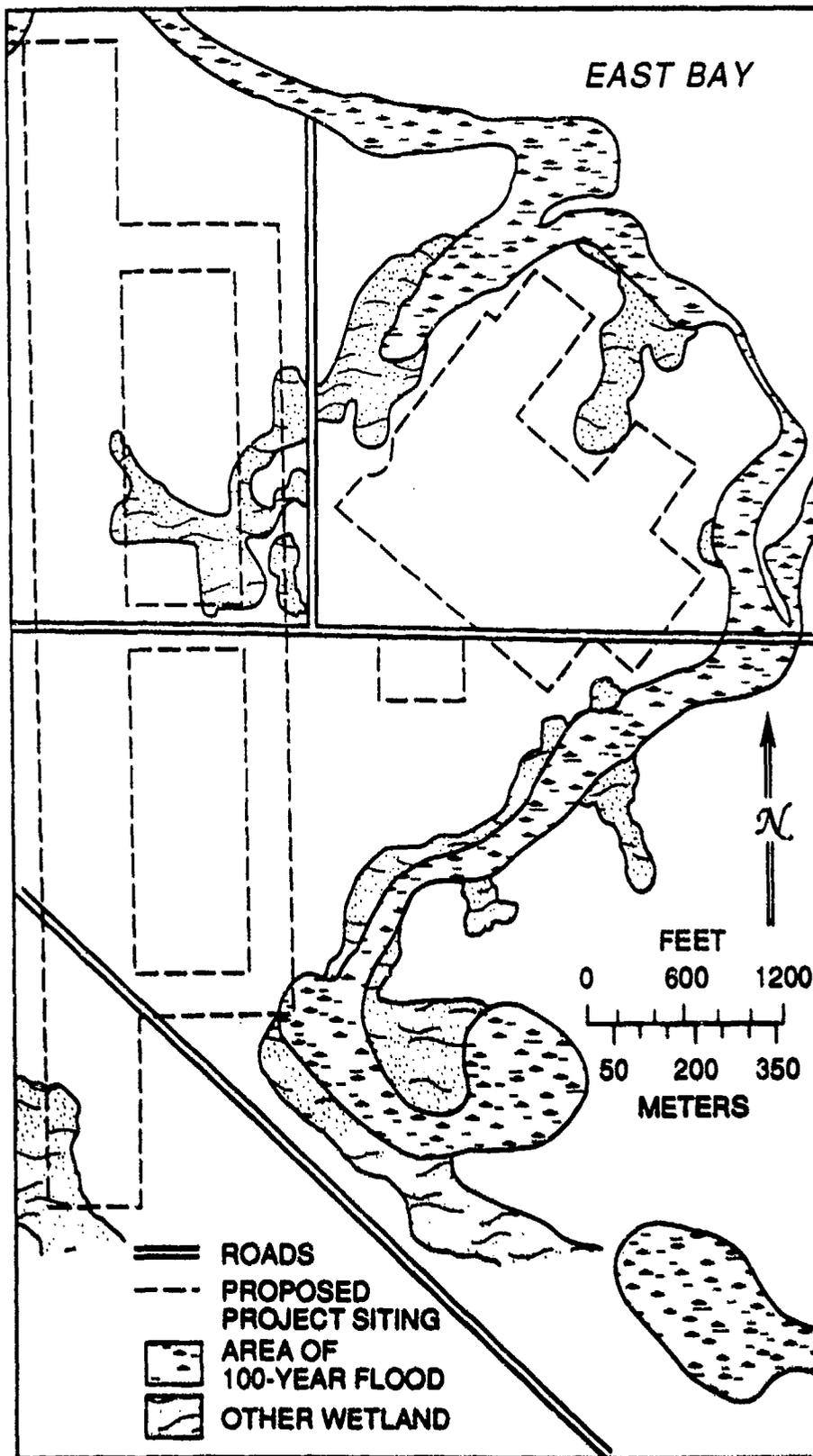


Fig. 7. Floodplains and wetlands on the proposed Combat Support Training Complex site. Area designated as 100-year floodplain is also wetland. Floodplain designation based on Federal Emergency Management Administration, Flood Insurance Rate Map. Wetland designation based on survey of U. S. Army Corps of Engineers.

clearcut consists of an open area of grasses, scattered shrubs or saplings, and scattered pine trees.

Mesic or wet pine flatwoods are located primarily within the 100-year floodplain (Fig. 7). An acre or two of this vegetation type is present at the southern ends of the proposed runway and taxiway. Titi swamps, which usually comprise scattered pines among a dense growth of shrub hardwoods (mostly titi), are present in several areas at the proposed facilities. Approximately 2 acres of titi swamp are within the area proposed for the taxiway and its shoulder (Fig. 6).

Sand pine-scrub oak forest occupies relatively dry habitats and is mostly outside floodplain or wetland areas. Turkey oaks and small live oak trees are present as subdominants in this pine-dominated forest. About 12 acres of this forest type are located in the proposed cantonment area, and about 8 acres are within the proposed runway (Fig. 6).

The National Registry of Natural Landmarks does not list any natural landmark areas located on or near the CSTC site (U.S. National Park Service 1983-85). A survey of significant wetland areas in Florida did not recommend any wetlands on or near the CSTC site for consideration as natural landmarks (Goodwin and Niering 1975).

3.4.1.2 Floodplains and wetlands

The sites for the cantonment area, runway, and taxiway are not located in any floodplain, as shown in Fig. 7, which is based on flood insurance rate maps published by the Federal Emergency Management Agency (revised January 1986). The floodplain areas are currently occupied mostly by wet pine flatwoods and titi swamp.

All of the floodplain identified on the flood insurance map (Fig. 7) is also wetland. None of this floodplain wetland is within the proposed construction sites for CSTC, except for the possibility of about an acre at the southeastern corner of the taxiway. Other wetlands occur outside the floodplain. The vegetation of these nonfloodplain wetlands consists of titi swamp in the northern half of the taxiway site, old clearcut between the taxiway and runway sites, and wet pine flatwoods at the southern end of the runway site.

All wetlands on the CSTC sites are classified as palustrine systems (Cowardin et al. 1979). They appear to be intermittently flooded (i.e., after rain events) or, at most, seasonally flooded. In intermittently flooded wetlands, surface water is usually absent but is present for short periods without seasonal periodicity. In seasonally flooded wetlands, surface water is present for extended periods during wetter seasons of the year (Cowardin et al. 1979). Thus, permanently flooded and semipermanently flooded wetlands are absent on the CSTC sites.

3.4.1.3 Fauna

The vertebrate fauna of the Florida panhandle includes more than 200 species that reside there year-round or, as in the case of migratory birds, only during the nesting season. The proposed site, however, is too small to include all the different habitat types found in the panhandle, and therefore supports only a fraction of the total number of regional species. No systematic sampling of fauna has been performed at the proposed site, and the following description is based on general descriptions for the region.

Thirteen species of turtles, 17 salamander species, and 21 species of frogs and toads occur in the region (Conant 1958). Most of these species are associated with wetlands, and some may occur on the proposed CSTC site. Other fauna of the area include 9 species of lizards, 36 snake species (Conant 1958), 105 bird species that breed in the area (excluding seabirds) (Cook 1969), and 50 species of mammals (Simpson 1964). A few hundred additional bird species migrate through the region during spring and fall (Weston 1965) but nest elsewhere. While many of the panhandle's vertebrate fauna occur in upland areas, many others are associated primarily with wetlands. Due to the lack of permanently flooded or semipermanently flooded wetlands on the site, many vertebrate species associated with wetlands are absent.

Compared with other regions in the eastern United States, the Florida panhandle supports a large number of amphibian and reptilian species because of the warm climate and the abundance of wetlands. The number of mammal and breeding bird species, however, is relatively low (Simpson 1964; Gauthreaux 1978), possibly a result of the dominance of pine forests that support a relatively depauperate fauna (Tramer 1974).

Important game and furbearer animals include the bobwhite, mourning dove, raccoon, striped skunk, red and gray foxes, white-tailed deer, fox squirrel, beaver, eastern cottontail, and marsh rabbit. Deer hunting and small game hunting are allowed on the proposed site and other surrounding areas of Tyndall AFB.

3.4.2 Aquatic Ecology

The aquatic biota of the proposed site and adjacent bayous have not been characterized. The aquatic biota in the bayous, however, should be representative of those typically found in tidal embayments and wetlands: fish species that are tolerant of fluctuations in salinity, surface-active and aquatic macroinvertebrates, and a wide variety of zooplankton and phytoplankton. The bayous have defined channels bordered by broad shallow areas supporting a diverse assemblage of aquatic vegetation ranging from water lilies, possibly water hyacinth, and other surface or submerged aquatic vegetation to rushes, reeds, and other rooted aquatic vegetation to small woody shrubs along the perimeter (site visit, May 5, 1988). The areal extent of and vegetation in the seasonally or intermittently flooded wetland areas of the proposed site are described in more detail in Sect. 3.4.1.

During periods of high rainfall, the project area is drained by surface channels which drain into the bayous. During drier periods, drainage probably occurs by subsurface flow, and the wetlands of the proposed site have little or no standing surface water. Because of the fluctuations in water level of wetlands on the proposed site, the aquatic biota is restricted in most instances to those species that can withstand periods of dryness within the wetlands. These conditions would virtually eliminate the potential for small fish species to survive on the proposed site except possibly in the stream and drainage channels. Because of their ephemeral nature, the wetlands of the proposed site probably exhibit relatively low diversity of aquatic species and low productivity. Similarly, the streams and drainage channels experience low water conditions during portions of the year and for the most part appear to support only limited aquatic life.

Much of the ecology and chemistry of wetlands is determined by hydrological conditions. Rate of flow, seasonality, and duration of flooding are important in determining community structure, productivity, and nutrient cycling (Conner and Day 1980). Conversely,

vegetation, soils, and topography of wetland areas stabilize water regimes. Littlejohn (1977) found that swamp vegetation retarded overland flow and provided more stable water discharge into Naples Bay, Florida. Water stored in wetlands during wet periods is released slowly during dry periods and helps maintain steady flow in receiving water bodies (Hopkinson and Day 1980). This freshwater input is important in maintaining the brackish water gradient in estuaries and is a source of nutrients for downstream habitats (Conner and Day 1980). The importance of this discharge in helping to maintain productivity has been documented for the Appalachicola Bay by Livingston (1978). This bay is a major nursery area and feeding ground for shrimp, crab, and commercial fish. Because of the proximity of St. Andrew Bay to the Appalachicola Bay, it is reasonable to assume that the characteristics of St. Andrew Bay are similar and that this bay is also a major feeding ground.

When swamp systems border or are connected by tributaries to the coastal zone, estuarine-dependent species can use these wetland areas as nurseries (Wharton and Brinson 1978). According to Bass and Cox (1985), the utilization of flooded swamps or woodlands by fish is not well understood but may be very important. In Louisiana, Hinchee (1977) found that swamp and marsh areas served as important habitat for a number of important estuarine species including shrimp, crab, Gulf menhaden, and sea trout; Chambers (1980) found several additional marine species utilizing upper freshwater swamp areas. The euryhaline larval, postlarval, and juvenile marine animals have been shown to migrate far upstream into the swamp area during winter and spring, then move gradually downstream as they grow and as salinity decreases during the summer and fall.

The lower portions of Baker and Strange Bayous appear to have abundant wetland habitat bordering the open water area, and these areas undoubtedly serve as nursery areas for estuarine species. However, it is unlikely that the upper portions of these bayous provide such habitat.

The St. Andrew Bay system, of which East Bay is a part, encompasses four bays of differing salinities, depths, turbidities, and extents of vegetation (Naughton and Saloman 1978). It covers 108 sq. mi. (Pristas and Trent 1978) and generally is characterized by "low freshwater inflow, high salinity, low turbidity, extensive areas of sand flats and submerged spermatophytes" (Orgen and Brusher 1977). The system contains relatively clear water and includes 12.4 sq. mi. of submerged grasses (Brusher and Orgen 1976). Orgen and Brusher

(1977) collected 128 species of fish from the deeper portions of the St. Andrew Bay system. Seine samples collected within St. Andrew Bay estuary and in the shallow waters along adjacent coastal beaches yielded 88 species (Naughton and Saloman 1978). East Bay near the proposed site has harvestable shellfish populations. The locations of shellfish beds change over time.

3.4.3 Threatened and Endangered Species

Information on threatened and endangered (T&E) species, requested from the U.S. Fish and Wildlife Service (FWS) in compliance with Sect. 7 of the Endangered Species Act, is provided in Appendix B. Other information on T&E species was obtained from FWS reports (U.S. FWS 1984, 1987, 1988).

Eighteen plant and animal species in the region are or have been under consideration for inclusion in the federal list of T&E species but as yet have not been proposed for listing (Appendix B). Impacts of the proposed project on these species will be assessed if the species are proposed for listing before project construction.

The following sections address the T&E species listed by the U.S. FWS and additional species listed by Florida (FGFWFC 1988b). Status of these species is summarized in Table 4.

3.4.3.1 Federally listed threatened and endangered species

Four species of endangered sea turtles could occur at Tyndall AFB on the shorelines of the Gulf of Mexico and shorelines of bays off the Gulf. These would not be expected to occur or nest at the proposed site. The area of East Bay near the site is remote from the Gulf of Mexico. No sea turtle nesting is known to occur near the site.

The American alligator, which is listed as threatened in Florida, occurs in river systems, canals, lakes, swamps, bayous, and coastal marshes (U.S. FWS 1988). Because of the lack of semipermanent or permanent wetlands on the site (Sect. 3.4.1.2), the alligator is expected to be rare or absent.

Table 4. Threatened and endangered vertebrate species potentially occurring at Tyndall AFB (excluding sea turtles)^a

Species	Florida	USFWS	Status at Tyndall AFB
American alligator	SSC ^b	T(S/A) ^c	Permanent resident
Eastern indigo snake	T ^d	T	Permanent resident
Ivory-billed woodpecker	E ^e	E	Probably extirpated
Southeastern snowy plover	T	†	Permanent resident
Piping plover	T	T	Winter resident
Arctic peregrine falcon	E	T	Winter resident
Southeastern American kestrel	T	†	Permanent resident
Bald eagle	T	E	Permanent resident
Wood stork	E	E	Permanent resident
Red-cockaded woodpecker	T	E	Permanent resident
Least tern	T	†	Summer resident
Roseate tern	T	T	Summer resident
Florida black bear	T	†	Permanent resident

^aSee FGFWFC (1988) for scientific names of the listed species.

^bSSC = species of special concern

^cT(S/A) = threatened due to similarity of appearance

^dT = threatened

^eE = endangered

†No federal listing

The eastern indigo snake (listed as threatened) is associated primarily with xeric sand ridge habitats such as pine barrens, oak-pine-heath, scrub oak, slash pine-scrub oak, and longleaf pine-scrub oak-wiregrass forests (Diemer and Speake 1981). The indigo snake, like many vertebrate species, commonly uses the den of the gopher tortoise as a retreat. Habitat destruction and the injection of gasoline into tortoise dens to kill rattlesnakes have adversely affected the indigo snake. The principal population areas of indigo snakes are southeastern Georgia and peninsular Florida, although the species also occurs in the Florida panhandle (Diemer and Speake 1981). A small population of gopher tortoises is present on Tyndall AFB, but the indigo snake has not been observed in the vicinity of the proposed site or on the AFB.

The piping plover and roseate tern (both threatened) may occasionally forage along the East Bay shoreline near the site. Bald eagles and Arctic peregrine falcons (listed as endangered and threatened, respectively) may occur as transients at Tyndall AFB. Tyndall AFB has no known eagle nest sites and no habitat near the proposed site that would be particularly important to eagles or peregrines. According to Kale (1978) the bald eagle has nested along East Bay north of Tyndall AFB.

The wood stork, another species that may occur as a transient at the proposed CSTC site, currently nests in swamps in Florida and adjacent southeastern Georgia (Ogden and Patty 1981) but does not nest as far west as Tyndall AFB (U.S. FWS 1988). This species has experienced a severe population decline resulting primarily from human alteration of its wetland feeding habitat. No habitat at the proposed CSTC site would be particularly important to this species for nesting or feeding.

The red-cockaded woodpecker is a permanent resident in many scattered localities in the southeastern region, including the Florida panhandle (Wood 1983). It nests in mature open pine woods typically having pine trees 60 years old or older with red-heart disease, providing nest cavities. As of 1983, Tyndall AFB apparently had no colonies (Lennartz et al. 1983), and no colony has been observed since that time by Tyndall wildlife management staff. The woodpecker has occurred near Tyndall AFB, however, on the Point Washington Wildlife Management Area (Wood and Wenner 1983). A distribution map in the *Southeastern Endangered Species Notebook* (U.S. FWS 1988) shows the red-cockaded woodpecker to be absent in Bay County.

Several other species are listed as threatened by the state of Florida: the gopher tortoise and the Florida gopher frog, which uses gopher tortoise burrows, inhabit sand pine scrub and sandhill communities on bluejack and turkey oak ridges (McDiarmid 1978). These habitat types are absent on the proposed CSTC site, and the tortoise and frog have not been observed. The two stands of relatively dry pine flatwoods on the proposed site may be possible habitat for these species.

Information available (U.S. FWS 1988) does not show the presence of federally listed aquatic threatened or endangered species in water bodies draining the proposed site.

3.4.3.2 State listed species

The black bear (threatened) occurs in the Florida panhandle, including Bay County and the eastern end of Tyndall AFB, where its preferred habitat is titi swamp of dense shrubs and small trees (Layne 1978). The main bear population of the Florida panhandle is in that portion of Bay County north of East Bay and in Gulf County and other counties to the east. Thus, the proposed site lies at the edge of the range of this bear population. South of East Bay, Tyndall AFB facilities form a western barrier to the local bear population.

The southeastern snowy plover (endangered), American oystercatcher (threatened), and least tern (threatened) probably occur along shorelines at Tyndall AFB and may occasionally forage along the East Bay shoreline near the site. The American kestrel or sparrow hawk (threatened) occurs throughout Florida but prefers clearings or open pine forests. Although the old clearcut may be suitable habitat, the kestrel is not known to nest there.

Two species of special concern are known to occur on the CSTC site: the gopher tortoise and the osprey. The gopher tortoise inhabits dry, well-drained soils of sand pine woods, other xeric habitat types, and successional stages leading to such habitat types (McDiarmid 1978). Tortoises and their burrows have been observed on or in the vicinity of the CSTC site, which provides suitable habitat, including sand pine woods and old clearcut. Ospreys nest adjacent to the site on two artificial platforms that have been constructed

specifically for these birds. They are fish-eating raptors, and those nesting near the site hunt for prey over East Bay. Ospreys are known for their tolerance of human activity.

Many plant species are listed as threatened or endangered by the Florida Department of Agriculture and are protected by Florida law (FGFWFC 1988b). Some of these species may occur on the CSTC site. Florida law prohibits persons from collecting these plants from another person's property without appropriate permits. However, landowners are not required to obtain permits to engage in activities on their own property that would be harmful to these species. Thus, the plant-protection laws do not apply to Air Force construction on the CSTC site (Preservation of Native Flora of Florida Act, Section 581.185-187, Florida Statutes).

3.5 NOISE

The proposed site for the CSTC is undeveloped, and the major source of anthropogenic noise at the site is the overflight of aircraft approaching or departing Tyndall AFB's runways. Other sources of noise include traffic on U.S. Hwy 98 (located about one-half mile from the proposed CSTC) and forest management activities.

As aircraft prepare for their final approach to Tyndall AFB's runways, they sometimes fly over the proposed CSTC site at about 1000 ft or more above ground level (AGL). Departing aircraft climb rapidly and frequently turn before flying over the proposed site; if they do not turn, their altitude usually exceeds 2000 ft AGL. Tyndall AFB's Air Installation Compatible Use Zone planning document indicates that the proposed CSTC site has a day-night average noise level (DNL) <65 dB. The DNL is an energy-averaged noise level measured over 24 h, with a 10-dB penalty applied to nighttime (10 p.m. to 7 a.m.) sound levels to account for increased annoyance by noise during the night hours.

3.6 SOCIOECONOMICS

3.6.1 Population

Bay County has an estimated 1986 population of 122,300, an increase of 25% over its 1980 population level. Gulf County's estimated 1986 population of 11,700 represents a 10.1% increase from its 1980 level of 10,658 (U.S. Bureau of the Census 1987). Callaway and Parker, the two cities closest to Tyndall AFB in Bay County, have experienced 53% and 9% growth rates, respectively, from 1980 to 1985. Allanton, the populated area closest to the proposed site, had a population of 100 in 1980.

The population of the AFB has remained fairly constant. In FY 1987 3811 officers, enlisted men, and military trainees were living on base, in addition to 4125 dependents. Off base there were 7465 officers, enlisted men, military trainees, and dependents.

3.6.2 Labor Force

Construction labor for the proposed project would probably be drawn from the area known as the Panama City Metropolitan Statistical Area (MSA), which consists of Bay County in its entirety. The average available labor force for 1987 was 57,547, with an annual average unemployment rate of 9.4%. For 1986 the annual average labor force available was 56,408, and the annual average unemployment rate was 9.7%. Unemployment rates were highest in the period October through February for both years (Florida Department of Labor and Employment Security 1988).

Data from the Florida Department of Labor and Employment Security (1987) for the second quarter of 1987 indicated that 475 contract construction firms employed an average of 3552 persons during this three-month period in Bay County. The services category, which includes lodging places; personal services; repair services; garages; amusement and recreation services; medical and health services; and legal, educational, and social services, employed an average of 10,600 persons in 1043 establishments in this same period.

3.6.3 Housing

In 1980 there were 40,426 year-round housing units in the Panama City MSA, 86% of which were occupied (U.S. Bureau of the Census 1987). In the period 1981 to 1986, 5781 single family units and 9097 multifamily units were constructed in Bay County. Callaway built 1839 units in this period; Parker, Cedar Grove, and unincorporated Bay County added 7280 units; Panama City itself added 1588 units (Bay County Committee of 100 1986). At present, there is an abundance of rental housing in the area, although there is a waiting list for base housing for families.

3.6.4 Traffic

U.S. Highway 98 passes through Tyndall AFB in a northwesterly-southeasterly direction. The Florida Department of Transportation maintains two traffic counting stations along this highway, one located about midway through the base and the other just across the DuPont Bridge in Parker. The bridge is the only means of access to Tyndall AFB from the north. In 1987 the annual average daily traffic at the Parker station was 14,000 going east and 13,300 going west. At the station midway on the base, the annual average daily traffic was 6940 counted in each direction (southeast and northwest) (Florida Department of Transportation 1987).

3.7 ARCHAEOLOGICAL AND HISTORIC RESOURCES

The *National Register of Historic Places* maintained by the U.S. National Park Service lists only one site in Bay County in Panama City (U.S. National Park Service 1972-88).

In 1984 the U.S. Air Force sponsored a cultural resources investigation of Tyndall AFB by New World Research, Inc. (Thomas and Campbell 1985). The goal of the investigation was to locate 70 archaeological sites that had been identified in an earlier survey (Knudsen 1979). Fifty-nine of these sites were located, and 29 new sites with high probability of archaeological significance were added.

Available evidence shows cultural activity in the Tyndall area as far back as the Santa Rosa/Swift Creek Periods (ca. 100 AD). Significant areas are typically found along the shorelines and banks of inlets and bayous. Figure 8 shows the proposed CSTC site and the nearby areas of high archeological significance found in the 1984 survey. The sites coded "8By" are the previously identified sites; those coded "NWR" are new sites located by New World Research. The sites identified in the 1984 survey have been listed with the Florida Department of Archaeology, History and Record Management but have not been proposed for listing in the *National Register of Historic Places* for protection under the National Historic Preservation Act of 1966.

The shoreline area in the vicinity of the proposed CSTC was surveyed by New World Research, and several previously identified sites were located. The site on the shoreline identified as 8By29 lies closest to the cantonment area, but does not lie within the proposed construction area. Identification and management of cultural resources sites is a continuing program at Tyndall AFB. All cultural sites are left undisturbed until consultations with the State Historic Preservation Officer are complete and the sites in question declared not significant.

3.8 WASTE AND HAZARDOUS MATERIALS

The proposed site for the CSTC has been used for pulpwood production. The cantonment area has also been used for local PRIME BEEF contingency training exercises. However, no areas are known to have been used for solid or hazardous waste disposal, fuel storage, or sewage disposal.

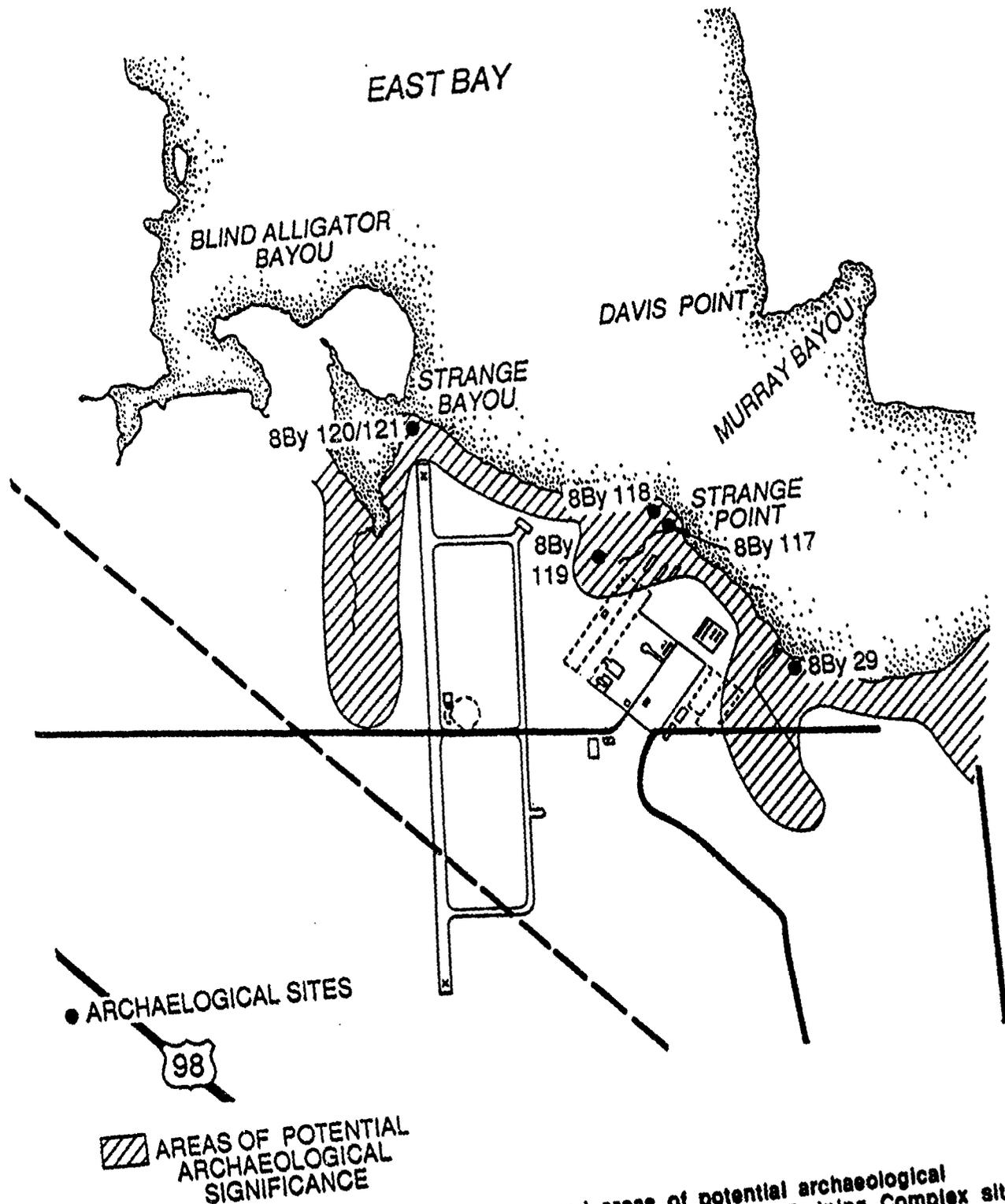


Fig. 8. Archaeological sites (dots) and areas of potential archaeological significance (shaded area) near the proposed Combat Support Training Complex site. Source: Modified from Thomas, P. M. and L. J. Campbell 1985. *Cultural resources investigation at Tyndall Air Force Base, Bay County, Florida*, Report of Investigations No. 84-4, Prepared by New World Research, Inc., for Tyndall AFB, Florida.

4. ENVIRONMENTAL CONSEQUENCES

4.1 LAND USE

Approximately 1000 acres would be removed from the installation forestry and wildlife management programs for the life of the CSTC. This represents about 5% of the total installation land available (approximately 18,000 acres) for these programs. In its current condition, this tract is not considered critical or of special value to either program.

Timber management would be excluded after operation of the CSTC begins. However, approximately 100 acres would have to be cleared prior to the start of construction, and sale of the timber in that tract would be encouraged. Furthermore, harvesting of merchantable timber from throughout the tract could take place up to the date of initial operation.

Although hunting would not be permitted on it, a substantial portion of the tract would remain in its current condition, and continue to serve as suitable habitat for a variety of animals, including game species.

4.2 WATER QUALITY

Site preparation and construction would require clearing and filling of areas for the mock runway, taxiways, and cantonment area (Fig. 2). These activities would expose erodible soils to rainfall and could result in sediment transport into nearby wetlands, swamps, drainage ditches, bayous, and the East Bay portion of St. Andrews Bay. Use of best available methods for erosion control (e.g., berms, erosion fences, and sedimentation basins) would minimize sediment transport off-site. A permit would be obtained from the Florida Department of Environmental Regulation (DER) for dredge and fill activity at the site (Sect. 5.3). The effects on water quality from soil mobilization would depend upon the amount of sediment reaching wetlands and waterways. Transport would depend on the intensity of rainfall during and after construction, the effectiveness of the control measures used, and the distance of the construction areas from wetlands, drainageways, and streams.

Because of the shallow nature of the groundwater and the low elevation of the site, earth fill would be required to raise the elevation of areas for the proposed facilities. Filling areas on the site could result in long-term changes in the flow patterns of surface water adjacent to the proposed site and could affect water quality at the proposed site. Because of the low gradient of the surface at the site, and because wetlands, which surround much of the proposed construction areas, serve as sediment and pollutant traps, any moderate erosion or pollution problems arising from construction would not be expected to reach or affect the open tidal waters of the bayous or East Bay.

Potential impacts to water quality as the result of operation of the proposed training facility could occur from the accidental release of materials such as gasoline, diesel fuel, or other petroleum products into the environment. Erosion and transport of sediment from the sand and gravel piles used for runway repair training could affect surface water quality both on and off the site. The project would incorporate measures to reduce the chance for accidental spills of petroleum products and transport of sediment. However, as with any project of this scope, water quality in the vicinity would be affected to some degree.

Water quality at the site could also be affected by the use of tear gas (Agent CS, Sect. 2.1.2) during training. The proposed action includes the release of 0.68 kg of CS per weekly training exercise, or about 35 kg per year. The agent would be dispersed over an area that would depend on atmospheric conditions (Sect. 4.3), but some of the agent would be deposited on the ground and water surface in the vicinity of the training area.

Upon deposition to water, CS slowly hydrolyzes (breaks down chemically through reaction with water) to form o-chlorobenzaldehyde and malononitrile (Keller et al., 1986). The approximate half-life (time for CS concentrations to be reduced by one-half) in water at 25° is 2 days. The malononitrile that is formed by hydrolysis of CS is very toxic, but it also hydrolyzes. The rate at which malononitrile hydrolyzes is unknown. Malononitrile is soluble and is not expected to become attached to particles (U.S. EPA 1986).

Under most conditions of use, it is expected that CS would be widely dispersed in the atmosphere so that the trace amounts that would be deposited on the ground surface or onto water bodies would not cause any toxicity. However, under conditions of high humidity, mist, or very light rain, tear gas might be deposited in the immediate vicinity of the training site.

If the conservative assumption is made that all the CS is deposited within a 150-m (500-ft) radius from where it is released, the deposition rate would be about 10 mg/m² per weekly training exercise. If the further conservative assumption is made that the half-life of CS and its toxic hydrolysis products (especially malononitrile) is 28 days, then the cumulative concentration resulting from this deposition rate onto a 0.1 m deep water body would be 0.6 mg/L. (Although the breakdown rate for malononitrile is unknown, it can be assumed that other environmental factors such as dilution and microbial decomposition would act to disperse malononitrile within 28 days.)

Concentrations would be less than 0.6 mg/L if CS disperses over a wider area, has a shorter half life, or is deposited onto deeper water than assumed previously. Under the same conditions as above, except using a half-life of 14 days, the concentrations would be 0.3 mg/L. Under the same conditions as in the preceding assumption except assuming that CS is deposited within a 500-m (1600-ft) radius, the concentration would be 0.05 mg/L. On the other hand, these concentration estimates do not consider CS washed into water following deposition to land, which would cause higher concentrations.

The aquatic toxicity of CS and its hydrolysis products has been measured for rainbow trout, a fairly sensitive species not found in warm waters such as those at Tyndall AFB, and for the mummichog, a more hardy species that is found in some Florida estuaries. Toxicity of CS to rainbow trout occurred at concentrations of 0.1 mg/L under exposures of 4 days (Abram and Wilson 1979), and toxicity to mummichog occurred at about 3.9 mg/L (Pearson and Renne 1975). These values indicate that under adverse conditions (rapid deposition of CS onto shallow waters during conditions in which hydrolysis is slow) the use of CS at the proposed site might have toxic effects on sensitive aquatic species.

Stormwater from the CSTC would be discharged to grassy swales. Depending on the ground elevation and the drainage patterns after construction of the facility, the swales could serve as major sources of groundwater recharge. During periods of heavy rainfall and stormwater discharge, the swales would discharge through control structures to the existing drainage pathways of adjacent wetlands.

There is very little slope at the proposed site, so runoff patterns are poorly defined and irregular. The proposed runway, taxiways, apron, and roads would cover approximately 37 acres. Runoff from these areas would be rapid in comparison with runoff rates for the

undisturbed site. However, these paved areas are a small portion of the approximately 1000-acre site, so overall changes in runoff rates from the site are expected to be minor.

The withdrawal of about 35,000 gal/day of groundwater for operation of the CSTC is not expected to cause a major impact to groundwater hydrology. Because shallow groundwater at the site lies just below the surface, impacts of the project to surface waters may also affect subsurface waters. Small concentrations of CS agent and its hydrolysis products may enter the shallow groundwater. However, because no use is made of this aquifer between the site and the surface waters to which it drains and because small volumes of CS agent will be used, CS contamination of the groundwater is not expected to be a significant impact.

Wastewater generated by domestic use and other sources at the CSTC would be treated at the proposed facility. Wastewater from the vehicle washrack would receive pretreatment in an oil/water separator prior to being combined with sanitary wastewater. The wastewater treatment facility proposed for the CSTC would be either a secondary or advanced secondary package treatment facility (David Hemphill, Baskerville-Donovan, personal communication to V. R. Tolbert, ORNL, January 17, 1989). The proposed method of wastewater disposal from this facility would be spray land application. The approximately 35,000 gal/day of treated wastewater generated would contribute to groundwater recharge. This discharge would be by permit from DER under FAC 17-6 (Sect. 5.2).

43 AIR QUALITY

Construction of CSTC would result in minor, short-term impacts to air quality from construction vehicle emissions and from clearing and burning that would be required to prepare the site for construction. There would be minor air quality impacts from operation of a CSTC as a result of emissions from vehicles and support equipment and, to a lesser extent, from movement of fill material for runway repair. Impacts from both construction and operation of the CSTC could be minimized by mitigation efforts such as dust suppression, vehicle maintenance, and vegetation burial rather than burning during construction.

The tear gas (Agent CS) released during field exercises conducted at the CSTC would form a surface level cloud that would migrate from the training area and disperse into the atmosphere. Wildlife along the edges of the training area could be exposed to CS gas. Locations where the public could be exposed include U.S. Hwy 98, about 750 m (2500 ft) from the extreme southern end of the mock runway, and Davis Point, across East Bay (see Fig. 2) about 1100 m (3600 ft) from the northeast corner of the training area. Persons in boats on East Bay or in Strange Bayou could approach to within about 200 m (650 ft) of the northernmost portion of the training area. As a means of quantifying the potential impact to wildlife and the general public, an air dispersion model was used to estimate maximum concentrations within 100 m of the training area (to indicate the levels of exposure for wildlife), at U.S. Hwy 98, and at Davis Point. The concentrations are compared with guideline values to assess the degree of impact.

The modeling of tear gas dispersion was based on the following facts and assumptions regarding tear gas usage:

1. Tear gas would be used in the training exercises to test the ability of trainees to perform a rapid runway repair task under stressful conditions (simulated chemical attack). Upon a simulated gas attack, trainees would put on their gas masks and continue to work.
2. Tear gas would be used only in sufficient quantities to cause irritation to those individuals who have not properly fitted their gas masks.
3. A tear gas canister contains 8 oz (0.227 kg) of CS, which is released at a relatively constant rate for 4-5 min. For dispersion modeling, a 4-min release period was assumed.
4. The quantity of tear gas used would depend on meteorological conditions. A single canister is sometimes sufficient for a training exercise if winds are calm or light. Under such conditions one canister produces a cloud with an initial diameter of about 40 ft. If the wind disperses the cloud rapidly, additional canisters would be used.
5. For dispersion modeling it was conservatively assumed that 3 canisters (0.68 kg) would be used simultaneously at a single location. (In actual practice, if multiple canisters were used at once, they would be separated by at least 40 ft; operators would wait at least 5 min before detonating additional canisters at a given location.)

The AFTOX (Air Force Toxic Chemical Dispersion Model) atmospheric dispersion model (Kunkel 1986) was used to estimate maximum concentrations downwind of a tear gas release. The model was run for several scenarios to determine a range of concentrations as a function of meteorological conditions. For this type of release, maximum concentrations

in the ambient air would occur at ground level regardless of meteorological conditions. The AFTOX model also incorporates a factor, roughness length, to reflect the influence of vegetation and obstacles on dispersion. Appropriate roughness length factors were used to reflect the presence of short grass within 100 m of the training area, the presence of forest between the training area and U.S. Hwy 98, and the presence of open water between the training area and Davis Point.

Table 5 displays maximum concentrations estimated for four scenarios. The concentrations vary significantly depending on atmospheric conditions. Highest concentrations are obtained for a stable atmosphere (i.e., extremely limited atmospheric mixing) with light winds; conversely, lowest concentrations are obtained for unstable conditions (i.e., strong atmospheric mixing) with light winds. Interestingly, the model predicts higher concentrations of tear gas at Davis Point than at U.S. Highway 98, even though the distance to Davis Point is greater, because of the absence of obstacles (e.g., trees) to promote dispersion as the plume crosses East Bay.

The maximum concentrations predicted by AFTOX (Table 5) can be compared with guideline values (Table 6) to evaluate potential impacts. CS can incapacitate a person in about 20 s at concentrations of 12-20 mg/m³. The American Conference of Governmental Industrial Hygienists (ACGIH) (1986) has established a range of 1-5 mg/m³ as a median effective concentration that produces eye irritation. The irritation associated with this level of exposure ceases within 5-10 min of exposure to fresh air. The National Institute for Occupational Safety and Health (NIOSH) (1985) has set 2 mg/m³ as the concentration that is immediately dangerous to life and health (IDLH) with respect to respiratory irritation. This represents the maximum concentration from which one could escape within 30 minutes without any irreversible health effects. NIOSH (1985) has also set 0.4 mg/m³ as the permissible exposure limit (PEL) for occupational exposure (8 hours/day, 40 hours/week). For the purpose of evaluating impacts of brief exposure to the public, it is conservatively assumed that the PEL is a safe level. The model results (Table 5) indicate that the highest concentrations of tear gas would be expected under stable atmospheric conditions: such conditions, which require the absence of solar radiation and convective mixing, occur mostly at night and sometimes at dusk or dawn. Training exercises using tear gas at the CSTC would be conducted during the midday hours. Under neutral or unstable atmospheric

Table 5. Maximum concentrations of tear gas estimated for various locations downwind of a 0.68-kg release for varying meteorological conditions

Scenario	Atmospheric conditions	Wind speed (m/s)	Maximum concentration (mg/m ³)		
			At a distance of 100 m ^a	U.S. Hwy. 98 ^b (750 m distant)	Davis Point ^c (1100 m distant)
1	Stable ^d	1	47	0.22	0.83
2	Neutral	1	22	0.094	0.33
3	Neutral	6	3.6	0.028	0.091
4	Unstable	1	3.3	0.014	0.039

^aRoughness length of 3 cm was used to reflect the presence of short grass within 100 m of the training area.

^bRoughness length of 100 cm was used to reflect the presence of forest between training area and U.S. Hwy 98.

^cRoughness length of 1 cm was used to reflect the presence of open water between the training area and Davis Point.

^dStable conditions occur mostly at night and sometimes at dawn or dusk and would not occur during midday when tear gas exercises would be conducted.

Table 6. Dose response data for exposure to tear gas (Agent CS)

Effect	Concentration	Reference
Eye irritation		
Threshold	0.004 mg/m ³	ACGIH ¹
Median effective concentration	1-5 mg/m ³	ACGIH
Respiratory irritation		
Permissible exposure limit (PEL)	0.4 mg/m ³	NIOSH ²
Immediately dangerous to life and health (IDLH)	2.0 mg/m ³	NIOSH
Incapacitation	12-20 mg/m ³ for 20 sec	Army ³
Median lethal dose	61,000 mg/m ³ for 1 min	Army

¹American Conference of Governmental Industrial Hygienists, Inc. 1986. *Documentation of the Threshold Limit Values and Biological Exposure Indices*, 5th ed., Washington, DC.

²National Institute for Occupational Safety and Health 1985. *Pocket Guide to Chemical Hazards*, U.S. Department of Health and Human Services, Washington, DC.

³U.S. Department of the Army 1975. *Military Chemistry and Chemical Compounds*, Army Field Manual FM 3-9.

conditions (the conditions expected at times when tear gas would be used), the model predicts that persons at U.S. Hwy 98 and Davis Point would not be exposed to tear gas concentrations higher than the PEL (the 0.4-mg/m³ NIOSH exposure limit.) Because of the conservative assumptions incorporated into the modeling, actual exposures of people at these locations would probably be substantially less than the model predictions. At these locations some individuals might experience slight eye irritation, but no significant adverse impacts would be anticipated. Passengers in moving vehicles on Hwy 98 would be expected to have a substantially lower likelihood of irritation because of the short exposure time.

Under the scenario modeled (3 canisters of tear gas used simultaneously in the same location), concentrations within 100 m of the point of release would be sufficient to cause substantial eye irritation or incapacitation. Persons in boats in East Bay or Strange Bayou could approach within 200 m of the training area and might also be exposed to highly irritating doses of tear gas. Impacts to persons in boats could be eliminated by excluding use of tear gas within a buffer zone of about 300 m (1000 ft) along the shoreline of East Bay and Strange Bayou.

4.4 BIOLOGICAL AND ECOLOGICAL IMPACTS

4.4.1 Terrestrial Ecology and Wetlands

4.4.1.1 Construction

Impacts on terrestrial biota would occur during both the construction and operation phases, but the principal source of impact would be the loss of habitat resulting from construction of new facilities.

Development of the CSTC at the proposed site would require commitment of approximately 1000 acres. About 187 acres of plant and animal habitat could eventually be cleared for the CSTC (Table 7). Approximately 123 acres would be cleared for the mock runway, taxiways, and their shoulders and buffer strips. The cantonment area occupies approximately 64 acres, but not all of this acreage would be initially cleared for the project

Table 7. Potential habitat loss (acres) due to CSTC project^a

Habitat type	Runway and taxiway ^b	Cantonment area	Runway/taxiway islands
Pine plantation	57.5	4.9	30.5
Sand pine-scrub	16.6	14.7	0
Old clearcut	42.6	36.5	29.8
Wet pine flatwoods	4.0	0	0
Titi swamp	2.3	0	0.7
Open area	0	7.9	0
Total	123.0	64.0	61.0

^a A small amount of habitat (perhaps 10 acres) would be lost as an indirect impact of the CSTC project when the PRIME BEEF facility relocates to another site on Tyndall AFB.

as proposed. Some of this acreage that is not initially cleared would probably be cleared as additional training needs are identified after project operation has begun.

The clearing would reduce the acreage of plant communities and wildlife habitat at the site and would result in a reduction of wildlife populations. Although the more mobile wildlife would be able to flee the area of construction without immediate adverse effects, the effect within a few years would be a permanent reduction of most wildlife populations due to habitat loss (Kroodsma 1985). A large diversity of native animal species as well as plant species currently present at the proposed site (as described in Sect. 3.5) would experience reduced populations, while a few common species (e.g., starling, house mouse) might gain habitat and become more abundant. Because of the presence of facilities and human-related disturbances during facility operation, some additional population reduction could occur in nearby uncleared areas as a result of animal avoidance of these areas.

Floodplain and wetland habitats of pine flatwoods, titi swamp, and pine plantation would be impacted on the proposed CSTC site. Wetland areas on the CSTC sites were mapped during field surveys by the U.S. Corps of Engineers as requested by the Air Force in compliance with Sect. 404 of the Clean Water Act. The Air Force would apply for a permit from the Corps to fill the wetland areas required for the proposed project. A total of about 8 acres of wetlands would be directly affected. These wetlands comprise

approximately 4.0 acres of wet pine flatwoods, 2.3 acres of titi swamp, and 1.7 acres of pine plantations located in wetland areas. In addition to these wetlands, a wetland area of about 6 acres lies in the area between the mock runway and taxiways. This wetland could be adversely affected by possible drainage changes associated with the proposed runway and taxiway. Tyndall contains a total of about 8100 acres of wetlands. Wetland losses of 8 acres would represent 0.1% of Tyndall's total wetlands.

The President's Executive Order 11990 on the Protection of Wetlands requires that federal agencies consider the impacts of their activities on various wetland values. Table 8 lists these values and gives ratings of the relative value of the wetlands on the proposed CSTC site. Construction of the proposed project would adversely affect these wetland values. Therefore, to the extent possible the project layout has been designed to locate facilities outside of wetlands.

4.4.1.2 Operation

Operational impacts could be caused by noise from heavy equipment and explosions (Sect. 4.5), emissions to the air, release or disposal of liquid and solid wastes, and offroad operation of vehicles. The possible noise impact of principal concern is a reduction in wildlife populations in noise-affected areas near the CSTC facility. Reduced populations could result from wildlife avoidance of noise-affected areas or from reduced reproductive success or reduced recruitment of wildlife in the affected area. Many studies have shown, however, that numerous wildlife species rapidly become accustomed to noise and maintain viable populations in noisy areas (Fletcher and Busnell 1978; Ellis 1981; Shotton 1982; Burger 1983). Because of this habituation of wildlife to noise and because high average noise levels (other than from aircraft that fly over the site) would be limited to areas adjacent to the facilities (Sect. 4.5), any reductions in wildlife populations near the CSTC facility should be minimal.

Emissions other than tear gas (CS) would have no significant effect on air quality at the CSTC (Sect. 4.3) and thus would have no significant effect on plant or animal populations. Training exercises using CS would be conducted weekly at CSTC. Use of tear

**Table 8. Ratings of the relative value of wetlands on the proposed
Combat Support Training Complex site^a**

Criterion	Value
Water supply	Low
Water quality maintenance	Average
Water recharge and discharge	Average
Pollution abatement	Average
Flood and storm hazard reduction	Low
Sediment and erosion control	Average
Hydrologic utility	Low
Flora	Average to High
Wildlife	Average to High
Fish	Low
Timber	Average
Food and fiber resources	Low
Recreational use	Average
Scientific and cultural use	Average

^aRatings are based on subjective judgment of the value of the site's wetlands compared with the value of wetlands in general.

gas would produce concentrations of 12-20 mg/m³ in the training area; this is the concentration that can cause incapacitation of persons with a 20-s exposure.

The CS concentrations that would occur at CSTC are expected to be too low to significantly affect terrestrial or herbaceous vegetation. CS concentrations of 60,000 to 120,000 mg/m³ have been observed to cause significant leaf damage.

A comprehensive review of CS literature was prepared by the Air Force to assess CS's environmental toxicity (Keller, Elves, and Bonnin 1986). This report indicates that the existing literature is insufficient to predict whether or not CS would have impacts on wildlife at CSTC. No literature on wildlife effects was reported that dealt with CS concentrations approximating those that would occur at CSTC. For humans, the threshold for eye irritation is 0.004 mg/m³, and an effective concentration is considered to be 1-5 mg/m³. OSHA has established a CS level of 2 mg/m³ as being IDLH. Compared with these values, CS levels at CSTC would be high and could have adverse effects on wildlife. Intermittant exposure of the habitat surrounding the CSTC to tear gas would be expected to cause wildlife to avoid the area and would diminish the value of the area as wildlife habitat.

Sanitary wastes and all other liquid wastes would be routed to a waste treatment plant on the site. Treated wastewater would be disposed of by spray irrigation to the upland areas between the mock runway and the taxiway. Thus, liquid and solid waste treatment and disposal should not adversely affect terrestrial biota.

No offroad operation of vehicles is planned in uncleared areas at the proposed CSTC site. Offroad operation would occur primarily near the CSTC runway and, therefore, would affect only a small portion of the area to be cleared for facilities and operations. Thus, vegetation and animal life outside the cleared areas would not be significantly affected by offroad vehicles.

4.4.2 Aquatic Ecology

Construction of the CSTC would destroy about 8 acres of the wetlands present on the proposed site (Sect. 4.4.1.1). Because the wetlands at the proposed project are flooded only intermittently or seasonally and because migration of fish and estuarine organisms from East Bay to the project area would be limited (see Sect. 3.4.2), the aquatic biota on the site

are probably restricted at most times to relatively few common species. However, the potential does exist for aquatic biota to occur in the drainage ways in the site vicinity and for these biota to occur in the wetland areas during periods of high water levels and high flow. Although the project would be designed to minimize hydrological alterations and adverse water quality impacts, some localized adverse effects to aquatic biota would be expected. For example, aquatic resources could be affected by sediment interference with photosynthesis by plants and phytoplankton, as well as sediment deposition onto the food sources of aquatic biota (Hynes 1970). It is unlikely that adverse effects on aquatic biota would extend to the adjacent tidal bayous.

No effects to shellfish in East Bay are expected. The distance from the site of the proposed construction and mitigation measures to preclude extensive erosion should prevent the discharge of sufficient sediment to damage shellfish beds. Any releases of toxic compounds are expected to be too small, when diluted in East Bay, to cause toxic effects.

Treated wastewater discharged to a spray irrigation system would contribute to groundwater recharge and/or surface flows. This discharge would help maintain existing wetlands near the training area. Positive impacts could result to aquatic habitat if these systems received a fairly constant freshwater input.

The conservative estimate of water quality impacts from the use of Agent CS in Sect. 4.2 indicates that during adverse conditions, concentrations of CS that cause toxic effects to sensitive aquatic species could occur. Actual effects would depend on atmospheric conditions when CS is released, the location of the release, the distance to surface waters, and the amounts of runoff and water present. Deposition of CS to East Bay is expected to have no toxic effects due to the large volume of water into which the CS would be diluted. Any impacts to shallow areas of East Bay or Strange Bayou could be mitigated by excluding use of tear gas within a buffer zone of about 300 m (1000 ft) along the shoreline.

4.4.3 Threatened and Endangered Species

Correspondence with the FWS (Appendix B) has indicated that no species listed as threatened or endangered by the FWS (Sect. 3.4.3) is likely to be adversely affected by the proposed project. The alligator, currently listed as threatened, appears to be scarce or

absent at the site due to the lack of permanent or semipermanent wetlands. Alligator populations have recovered substantially since harvest of the animal for its hide has been controlled.

The piping plover and roseate tern may occasionally forage along the margin of East Bay adjacent to the CSTC. If present, these species could be adversely affected by release of tear gas during training exercises. Such impacts could be minimized by excluding use of tear gas within a buffer zone of about 1000 ft along the shoreline of East Bay. Other federally listed species that may occur at the site are the Arctic peregrine falcon and bald eagle. They do not nest there but may occur rarely as transients and, therefore, should not be significantly affected. Other listed species are not believed to occur at the site (Sect. 3.4.3) and should not be affected.

The black bear, listed as threatened by the state of Florida, occurs in eastern portions of Tyndall AFB. Its statewide populations have been significantly reduced due to a history of steady habitat losses (Layne 1978). Construction of the CSTC facilities would result in additional loss of habitat that is at the margin of the bear's geographic range. The CSTC site comprises primarily pine plantation and an old clearcut with some existing facilities, and does not appear to be particularly important to the bear. Other species listed as threatened by the state of Florida are not believed to be present on the site (Sect. 3.4.3).

Two species that occur on the site, the gopher tortoise and the osprey, are listed as species of special concern by Florida. The tortoise would experience habitat loss and possibly some mortality as a result of injuries from construction vehicles/equipment and offroad vehicles involved in CSTC training exercises. The osprey, which feeds primarily on fish, nests on artificial nesting platforms at the north edge of the site and could be disturbed by CSTC training activities and adversely affected by release of tear gas.

4.5 NOISE

Noise at the CSTC would be produced by explosions and by the operation of heavy construction equipment and specialized training equipment. CSTC personnel would use explosives to produce craters in the mock runway and for training exercises. Runway craters would be produced by detonating 50-150 lb of an ammonium nitrate/diesel fuel mixture. Six

such explosions in rapid succession would occur once per week. Smaller explosions would be used in training related to EOD. These exercises typically would occur on two occasions per week and would involve multiple detonations of devices containing about 3 lb of explosive to produce ground bursts.

In order to determine the noise levels that the public would hear, the Air Force conducted measurements of the noise generated by crater detonations and smaller explosions at the Field 4 Contingency Training Facility (Appendix C), summarized as follows:

Type of explosion	Distance	
	2,000 ft	11,000–13,000 ft
Craters	102-110 dBA	inaudible
Simulated submunitions	104-110 dBA	71-75 dBA

Explosions at the proposed CSTC site would occur in the center areas of the mock runway. The distance from this area to the nearest residences (across East Bay in Allanton, see Fig. 2) is about 5,000 ft (1 mile).

The propagation of noise varies with temperature, humidity, terrain, presence of trees, and other environmental conditions. Measurements of noise levels from explosions essentially identical to those that would occur at the CSTC suggest that residents of Allanton would experience instantaneous noise levels of about 90 dBA (based on interpolation between measured noise levels). The noise produced by the explosions could startle some individuals and cause a limited level of annoyance. However, because these noise levels would occur only a few times per week, very little adverse noise impact would be anticipated from the proposed action.

4.6 SOCIOECONOMICS

4.6.1 Population

Approximately 85 instructors and permanent staff would be assigned to the CSTC, 2 of whom would be civilian employees. An addition of about 85 personnel to the present base work force of about 6800 would represent an increase of <1% and should create no adverse impact on available facilities. Civilian employees could easily be absorbed in the local populations.

4.6.2 Labor Force

There should be no difficulty in supplying the labor force for construction at the proposed site. The Panama City MSA, the most probable source of labor, had an unemployment rate in 1987 ranging from 7.4 to 13.1%. There are 475 contract construction industries in Bay County, the location of the Panama City MSA (Florida Department of Labor and Employment Security 1987).

4.6.3 Housing and Property Values

There are abundant rental apartments and houses near Tyndall AFB (Sect. 3.6.3). However, Tyndall AFB has a waiting list for on-base family housing. The CSTC would cause approximately 85 new permanent personnel to relocate in the region of Tyndall AFB and Panama City. Because most of these personnel are military, a small increase in the demand for on-base family housing might occur. However, because ample off-base housing is available, no significant impact on the availability of housing for the region would be expected. The CSTC would accommodate the training of approximately 350 officers and airmen per week for 38 weeks/year, or about 13,300 persons. Personnel undergoing training would be housed at the CSTC site and would not exert any demand on local housing.

Construction and operation of the CSTC would be expected to have no measurable effect on off-base land values. The populated area nearest to the training area is Allanton.

located about 1 mile away. Residents in Allanton might occasionally be able to smell tear gas from exercises at the CSTC. On rare occasions, individuals might experience slight eye irritation because of tear gas (Sect. 4.3). Explosions would occur only a few times per week and would generate instantaneous noise levels of about 90 dBA (Sect. 4.5). Neither of these possible impacts would cause measurable effects on land value in this area.

4.6.4 Traffic

There would be increased traffic on U.S. Hwy 98 caused by vehicles (concrete mixers, asphalt trucks, and heavy equipment) bringing construction materials to the site. If a construction force of less than 100 workers, all coming from the Panama City area, were assumed, the average daily traffic count at the Parker station would increase at most by about 0.2 to 0.7% in the eastern direction and by 0.2 to 0.8% in the western direction, depending on whether or not workers carpooled or drove to work individually. At the station midway through the base, the two-way average daily traffic would increase by 0.7 to 3%. When construction of all improvements was completed and the complex was ready for use, the weekly transportation of 350 personnel to and from the site would add only minimally to the traffic in the area.

Traffic on U.S. Hwy 98 would not need to be halted when explosives or tear gas were used at the CSTC. The amounts of explosives used at the CSTC are small, ranging from 3-lb explosive devices to 50- to 150-lb charges of ammonium nitrate/diesel fuel mixture. These explosions would have no impact on traffic on public roads.

4.6.5 Safety

Operations at the proposed CSTC would not be expected to cause any significant threat to public safety. U.S. Hwy 98 allows public access as close as 2500 ft to the training areas. The portion of Farmdale Road closest to the mock runway would be destroyed or blocked to eliminate access to the site by this route. A gate on Farmdale Road would prevent persons from approaching closer than 1600 ft to the training area. Public entry to the CSTC would be blocked by a gate on the access road from U.S. Hwy 98. Signs

prohibiting entry would be posted along U.S. Hwy 98. Such signs would indicate the presence of explosion hazards and that the area was off-limits to hunting. Signs informing hunters of hazards would also be placed at the periphery of the training area.

As noted in Sect 4.3, exercises involving use of tear gas would result in minimal risk resulting from public exposure to tear gas at U.S. Hwy 98 and Allanton (near Davis Point). Potential hazards to boaters could be eliminated by excluding use of tear gas from a buffer zone of about 1000 ft along East Bay and Strange Bayou. Operations at the CSTC would not pose any extraordinary fire hazards other than those normally associated with a typical air base (i.e., structural fires or grass fires). The facility's design would include fire safety systems, and primary fire response would be provided by the Tyndall AFB fire department.

4.7 ARCHAEOLOGICAL AND HISTORIC RESOURCES

The Florida State Historic Preservation Office (SHPO) has stated that a review of the Florida Master Site File indicated no significant archaeological and/or historical sites present within the project area (G. W. Percy, Florida Department of State, Division of Historical Resources and State Historic Preservation Officer (SHPO), letter to L. W. Rickert, ORNL, July 6, 1989). Because of the project location and nature it is considered unlikely that any such sites would be affected. The SHPO indicated that the project may proceed without further involvement with the agency.

5. REGULATORY REVIEW

5.1 AIR PERMITS

Operations at the proposed CSTC would not require any air permits. Release of tear gas during training exercises would not be subject to regulation under Florida rules unless it posed a threat to public health (Bill Thomas, Florida Bureau of Air Quality Management, personal communication to R. D. Roop, ORNL, February 16, 1989).

5.2 WATER PERMITS

Water use, wastewater treatment and disposal, stormwater management, and dredge and fill activities are regulated under the state of Florida Administrative Code (FAC). The Air Force would obtain permits from the Florida Department of Environmental Regulation (DER) for various aspects of the CSTC.

Permits from the appropriate water management district are required for water supply withdrawal and construction of water treatment facilities (FAC 17-22; Public Drinking Water Systems). This section of the Code describes the permit application process and specifies that permits are valid for 1 year from the date of issuance and must be renewed yearly. The well proposed for the CSTC to provide 35,000 gal/day for consumption would be included as part of the Tyndall AFB Consumptive Use Permit, subject to approval by the Northwest Florida Water Management District. According to Guy Gowan, Northwest Florida Water Management District (personal communication to V. R. Tolbert, ORNL, January 23, 1989), the proposed volume of water to be withdrawn is not an unreasonable amount; the decision to approve the withdrawal would be made when a permit application is received.

Wastewater discharge is covered under several required permits: (1) stormwater (FAC 17-25), (2) wastewater collection (FAC 17-6), and (3) wastewater treatment (FAC 17-22). The CSTC would be a new facility and would require a stormwater permit

from Florida DER. The present proposal is to discharge stormwater to grassy swales which will discharge through control structures to existing wetlands

The proposed method of wastewater treatment is by either secondary or advanced secondary treatment; however, a final decision on the method has not yet been made (David Hemphill, Baskerville-Donovan, Engineers, personal communication to V. R. Tolbert, ORNL, January 18, 1989). Discharge of wastewater is covered by permit from Florida DER under FAC 17-22. The current plan is to discharge wastewater by spray irrigation (David Hemphill, Baskerville-Donovan, Engineers, personal communication to V. R. Tolbert, ORNL, January 17, 1989). According to Richard Sublett, Florida DER, Panama City (personal communication to V. R. Tolbert, ORNL, January 23, 1989), both land application of wastewater by spraying and by discharge to tile drain fields or ponds have been permitted in the past. Previous attempts to dispose of wastewater by spray irrigation at Tyndall were unsuccessful; consequently, DER will carefully review the permit application for CSTC (Richard Sublett, Florida Department of Environmental Regulation, Panama City, personal communication to V. R. Tolbert, ORNL, January 23, 1989).

5.3 OTHER REGULATORY REQUIREMENTS

Dredge and fill activities for the construction of the CSTC would require permits issued by the U.S. Army Corps of Engineers and the Florida DER. These permits are obtained through a coordinated permitting process from the Florida DER.

Before anyone may engage in an activity that would harm a listed animal species, a permit is required from the Florida Game and Fresh Water Fish Commission (FGFWFC 1938a). The Air Force must consult with the Commission to determine the need for a permit in regard to possible project effects on the black bear. The Air Force would also consult with regard to animal species listed as "species of special concern" (SSC), which are also covered by the permit regulations. This consultation is currently underway.

6. MITIGATION AND MONITORING

Adverse impacts that could result from the use of tear gas (Agent CS) in the northern portion of the training area include the following: (1) persons in boats on East Bay or Strange Bayou could be exposed to highly irritating or incapacitating levels of tear gas, (2) the value of wildlife habitat along the shore of East Bay or Strange Bayou would be substantially reduced because of tear gas releases and (3) tear gas could be deposited in the wetland areas adjacent to East Bay or Strange Bayou, possibly causing concentrations in very shallow waters that would be toxic to sensitive species. These impacts could be eliminated by excluding use of tear gas within a buffer zone of about 1000 ft along the shoreline of East Bay and Strange Bayou.

As discussed in Sect. 4.4.1, the loss of about 8 acres of wetlands and degradation of adjacent wetland areas could adversely affect a wide variety of resources (see Table 8). Two types of mitigation could be used. First would be to substantially modify the facility design in ways (described below) that would reduce impacts to wetlands well below that which could be achieved by merely refining the existing design. When facility design has been modified to the maximum extent practicable, another alternative would be the creation of wetland areas and/or enhancing existing wetlands.

Mitigation of wetland impacts through substantial facility modifications would probably require some reduction in the CSTC's overall functionality. For instance, wetland losses could be reduced by decreasing the length of the mock runway. If the southern end were shortened by about 700 ft, about 2 acres of wetland loss could be avoided. Changing the configuration of the taxiway at the southeast corner would also avoid loss of a small area. Such a modification would involve a loss of realism in training exercises. The decision on whether to use this form of mitigation would require the balancing of wetland values against the loss of function that might occur in CSTC operations as a result of design compromises.

Efforts to create new wetlands and/or enhance existing wetlands would involve consideration of the various values of wetlands, (e.g. hydrological, biological, ecological, recreational, scientific, cultural and other values). As indicated in Table 8, the wetlands

subject to elimination are probably most valuable as habitat for plants and wildlife; they are also important for water recharge, pollution abatement, sediment control, timber resources, and recreational, scientific, and cultural uses.

One possibility for mitigation would be wetland creation, which could be accomplished by lowering the grade adjacent to an existing wetland area so that the area would be intermittently flooded. Wetland plants could be planted in the newly created area or native species could simply be allowed to colonize the area. Wein (1989) stresses the importance of understanding local hydrology in designing newly created wetlands and offers the following guidelines for wetland creation: (1) consult experts in the field of wetland restoration, (2) consider hydrology, substrate, and plants in design, (3) use a reference wetland to establish design and success criteria, (4) develop clear, concise, achievable goals, and (5) determine and document the accomplishment of these goals.

Another mitigation alternative would be enhancement of existing wetland areas. As noted in Sect. 3.4.1.2, the highest quality wetlands in the vicinity of the of the proposed CSTC are those associated with the larger bayous such as Strange Bayou, Blind Alligator Bayou, and Farmdale Bayou. These tidal wetlands adjacent to East Bay provide nursery areas for estuarine and marine species, including commercially valuable species of fish and shellfish. Enhancement of these areas could be achieved by implementing one or more of the following administrative actions: (1) establishing and enforcing land use plans which provide a substantial buffer around wetland areas and within which no development or forest management would occur; (2) designation of high quality wetlands and the adjacent waters as "aquatic preserves" that would be administratively protected; and (3) eliminating or restricting public and Air Force access to wetland areas that provide habitat for sensitive wildlife species. An alternative for wetland enhancement would be Air Force acquisition and protection of privately owned wetlands that might be subject to commercial development or exploitation.

Wetland mitigation plans would be developed in consultation with the U.S. Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the Florida Game and Fresh Water Fish Commission; each agency's approval of these plans would be obtained prior to initiation of the project. The plans would be consistent with Executive Order 11990 on the protection of wetlands and with the Wetlands Action

Plan (U.S. EPA 1989), the goal of which is to achieve no overall net loss of the nation's remaining wetland base as defined by acreage and function.

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8. AGENCY INPUT

8.1 FEDERAL AGENCIES

U.S. Fish and Wildlife Service, Endangered Species Field Office, Jacksonville, Florida.

8.2 STATE AGENCIES

Florida Department of Environmental Regulation, Bureau of Air Quality Management, Tallahassee, Florida.

Florida Department of Environmental Regulation, Regional Office, Panama City, Florida.

Florida Game and Freshwater Fish Commission, Tallahassee, Florida.

Florida State Historic Preservation Office, Bureau of Historic Preservation, Division of Archives, History and Records.

Northwest Florida Water Management District, Tallahassee, Florida.

9. LIST OF PREPARERS

<u>Name</u>	<u>Degree</u>	<u>Organization</u>	<u>Years of experience</u>	<u>Area of responsibility</u>
R. L. Kroodsma	Ph.D., Zoology	ORNL	17	Terrestrial ecology, wetlands
R. L. Miller	M.S., Meteorology	ORNL	12	Air quality
L. W. Rickert	B.S., Chemistry	ORNL	9	Socioeconomics, land use, and archaeological and historical resources
S. F. Railsback	M.S. Environmental Engineering	ORNL	8	Water quality
R. D. Roop	M.A., Ecology	ORNL	17	Project leader, noise
V. R. Tolbert	Ph.D., Ecology	ORNL	10	Aquatic ecology

APPENDIX A:
Letter regarding Permanent Construction
at Eglin Auxilliary Field 4



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS ARMAMENT DIVISION (AFSC)
EGLIN AIR FORCE BASE, FLORIDA 32842-6000

[Handwritten mark]

REPLY TO
ATTN OF: CS

5 March 1985

SUBJECT: Permanent Construction at Eglin Auxiliary Field 4

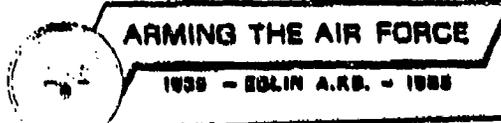
TO: AFESC/CC
Tyndall AFB FL 32403

1. At the time it was proposed that rapid runway repair training be conducted at Eglin Auxiliary Field 4 it was clearly understood that the specific location was desirable from your standpoint because of the availability of runways which could be damaged and repaired as part of your efforts. It was additionally recognized that the location was undesirable from the standpoint of possible impact on AD test missions because of the proximity of the location to munition test safety footprints and the location's position within AICUZ Accident Potential Zone (APZ) II. For these reasons the Armament Division acquiesced to the training site with the clear provisos that only temporary and minimum facilities would be utilized and that on occasion it might be necessary to evacuate the site. From the information available the type and extent of training presently accomplished at Eglin Auxiliary 4 are markedly expanded from those originally agreed upon.

2. The Armament Division can not agree to the construction of permanent facilities at the Auxiliary Field 4 site because of the significant probability of adverse impact on accomplishment of our mission in the future,, the deleterious effect of such action on our ability to defend special requests for encroachment on the part of other agencies, and in light of the location within APZ II. The Armament Division is willing to participate in your survey of other possible training sites, including Eglin, for relocation and construction of permanent facilities.

[Handwritten signature of Larry G. Ellis]

LARRY G. ELLIS, Colonel, USAF
Chief of Staff



Atch 4

APPENDIX B:
Correspondence with State and Federal Agencies

D-3

FLORIDA GAME AND FRESH WATER FISH COMMISSION

THOMAS L. HIRES, SR.
Chairman, Lake Wales

MRS. GILBERT W. HUMPHREY
Vice-Chairman, Miccosukee

WILLIAM G. BOSTICK, JR.
Winter Haven

C. TOM RAINEY, D.V.M.
Miami

DON WRIGHT
Orlando

ROBERT M. BRANTLY, Executive Director
ALLAN L. EGBERT, Ph.D., Assistant Executive Director



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April 12, 1988

Mr. Roger L. Kroodsmma
Environmental Sciences Division
Bldg. 1505, MS-738
Oak Ridge National Laboratory
P.O. Box X
Oak Ridge, Tennessee 37831

Re: Tyndall AFB construction
Bay County

Dear Mr. Kroodsmma:

The Office of Environmental Services of The Florida Game and Fresh Water Fish Commission has reviewed the referenced notice and offers the following comments.

The U.S. Air Force proposes to construct a Combat Support Training Center at Tyndall AFB. The project would involve covering approximately 40 acres of pine flatwoods with impervious material such as concrete and buildings. An unknown quantity of pine flatwoods would also be disturbed by the construction and operation of the facility, which would involve blowing up a runway several times a week. The entire area to be disturbed is in an area which has no facilities at this time, but is in the glide path of the main runways approximately 7 miles away.

The project area is primarily wet pine flatwoods dominated by slash pine and titi. Large numbers of pitcher plants (trumpets) and sundews are also found in the wetter areas which encompass a large part of the area. At the time of our on-site visit on 5 April 1988, an exact location had not been determined; therefore, only the general vicinity is known. However, it seems probable that the U.S. Army Corps of Engineers will claim jurisdiction over a large part of the project area.

Mr. Roger L. Kroodsmma
April 12, 1988
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The destruction of such a large wetland habitat in a relatively undisturbed area will undoubtedly have a negative impact on wildlife resources in the area. The addition of approximately 40 acres of impervious area will also significantly increase the amount and decrease the quality of stormwater runoff from the area. The pine flatwoods in the project site and the surrounding area both appear to be in need of management which could increase their value to wildlife in the area. Therefore, we would like to see the environmental assessment deal with the increased management of existing habitat in order to offset any losses of habitat from the project. We also believe stormwater management should be addressed in the assessment in order to prevent offsite impacts to water quality in St. Andrew Sound and East Bay. When a definitive site for the proposed project is agreed upon, we would like to inspect the site and discuss possible options with all parties involved. We also suggest that the U.S. Army Corps of Engineers be present to determine their jurisdictional boundaries.

We appreciate the opportunity to comment on this project. Please contact us when we may be of further assistance.

Sincerely,


Bradley J. Hartman
Director, Office of
Environmental Services

BJH/LE



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Field Office
1612 June Avenue
Panama City, Florida 32405-3721

April 19, 1988

Mr. Roger L. Kroodsma
Environmental Sciences Division
Bldg. 1505, MS-038
Oak Ridge National Laboratory
Post Office Box X
Oak Ridge, Tennessee 37931

Re: FWS log 4-P-88-027

Dear Mr. Kroodsma:

Your letter of March 15, 1988, to the Endangered Species Field Office, Jacksonville, Florida, has been transmitted to the Panama City Field Office. The Fish and Wildlife Service has reorganized throughout the southeast, therefore, the Panama City Field Office will handle endangered species information requests and Section 7 consultations for the Florida panhandle.

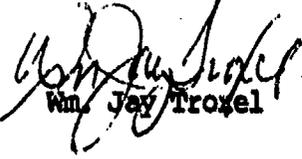
Regarding your information request, the Service coordinated an onsite evaluation of the proposed site with Florida Game and Fish, National Marine Fisheries Service and Tyndall AFB. The proposed site is primarily a slash pine plantation, but several areas are functional wetland communities, mostly titi (Cliftonia monophylla and Cyrilla racemiflora) and possibly some cypress.

Observations throughout the area did not indicate the presence of any federally listed endangered and/or threatened species; however, the Eastern indigo snake and a few raptors (bald eagle and peregrine falcon) may frequent the area. Enclosed for your reference is a listing of endangered and threatened species that may or are likely to occur at Tyndall AFB.

I hope this information is sufficient for your needs. In addition, I would suggest that you contact the U.S. Army Corps of Engineers, Regulatory Branch, regarding federal wetland jurisdiction and permit requirements.

We appreciate the opportunity to provide this information.

Sincerely yours,


Wm. Jay Troxel

Threatened and endangered Species observed or likely to occur at Tyndall AFB, Florida (Wood 1987; U.S. Fish and Wildlife Service 1986; Pritchard 1978).

Scientific Name	Common Name	Station Status	Status		Habitat
			FGFWFC	USFWS	
AMPHIBIANS AND REPTILES					
<u>Alligator mississippiensis</u>	American Alligator	P	SSC	T(S/A)	10,12,13,14,16,17
<u>Caretta caretta caretta</u>	Atlantic Loggerhead	M	T	T	1,19
<u>Dermochelys coriacea</u>	Atlantic Leatherback	PM	E	E	1,19
<u>Drymarchon corais couperi</u>	Eastern Indigo Snake	R	T	T	1,2,3,4,5,7,8,9,10,11,12,13,14
<u>Gopherus polyphemus</u>	Gopher Tortoise	P	SSC	UR2	1,4,5
<u>Rana areolata aesopus</u>	Florida Gopher Frog	R	SSC	UR2	3,4,5,16
<u>Lepidochelys kemp</u>	Atlantic Ridley Seaturtle	M	E	E	1,19
<u>Chelonia mydas</u>	Green Seaturtle	PM	E	E	1,19
FISH					
<u>Acipenser oxyrhynchus desotoi</u>	Gulf Sturgeon	SR	SSC	UR2	17,19
MAMMALS					
<u>Mustela vison lutensis</u>	Florida Mink	P	-	UR2	13
<u>Plecotus rafinesquii</u>	Southeastern Big-eared Bat	P	-	UR2	7
<u>Ursus americanus floridanus</u>	Florida Black Bear	P	T	UR2	1,2,3,4,5,6,7,8,9,10,12,14,20
BIRDS					
<u>Campephilus principalis</u>	Ivory-billed Woodpecker	N/A	E	E	6,7,9,10
<u>Charadrius alexandrinus tenuirostris</u>	Southeastern Snowy Plover	P	T	UR2	1,21
<u>Charadrius melodus</u>	Piping Plover	M	T	T	21
<u>Dendroica dominica stoddardi</u>	Stoddard's Yellow-throated Warbler	P	-	UR2	1,5,9

Con't

Scientific Name	Common Name	Station Status	Status		Habitat
			FGFWFC	USFWS	
<u>Egretta thula</u>	Snowy egret	R	SSC	-	12,13,14, 16,17,21
<u>Falco peregrinus tundrius</u>	Arctic Peregrine Falcon	M	E	T	1,2,6,12, 13,14,21
<u>Haematopus palliatus</u>	American Oystercatcher	R	SSC	-	1,13,21
<u>Picoides borealis</u>	Red-cockaded Woodpecker	P	T	E	3,5,6
<u>Sterna antillarum</u>	Least Tern	R	T	-	1,19,21
<u>Haliaeetus leucocephalus</u>	Bald Eagle	M	T	E	1,3,4,5,6,7, 10,12,13,14
PLANTS					
<u>Gentiana pennelliana</u>	Wiregrass Gentian	P	-	UR5	2,3
<u>Hedeoma graveolens</u>	Mock Pennyroyal	P	-	UR1	3,5
<u>Hypericum lissophloeus</u>	Smooth-barked St. John's-wort	N/A	-	UR2	16
<u>Lupinus westianus</u>	Gulf Coast Lupine; Panhandle lupine	P	-	UR5	1
<u>Macbridea alba</u>	White Birds-in-a-nest	P	-	UR2	2,3
<u>Oxypolis greenmanii</u>	Giant Water Dropwort; Giant Water Cowbane	P	-	UR2	3,10
<u>Polygonella macrophylla</u>	Large-leaved Jointweed	R	T	UR1	5
<u>Rhododendron austrinum</u>	Orange azelea; Florida azelea	P	-	UR5	6,7
<u>Verbesina chapmanii</u>	Chapman's Crown Beard	P	-	UR2	2,3
<u>Xyris longisepala</u>	Karst Pond Yellow-eyed Grass; Kral's yellow-eyed Grass	P	-	UR5	16
<u>Rhododendron chapmanii</u>	Chapman's Rhododendron	N/A	-	E	5

Habitat

1. Coastal Strand
2. Dry Prairies
3. Pine Flatwoods
4. Sand Pine Scrub
5. Longleaf Pine - Xerophytic Oak Woodland
6. Mixed Hardwood Pine
7. Hardwood Hammock
8. Tropical Hammock
9. Hardwood Swamps
10. Cypress Swamps
11. Scrub Swamps
12. Mangrove Swamps
13. Coastal Marshes
14. Freshwater Marshes & Wet Prairies
15. Sphagnum Bogs
16. Ponds & Lakes
17. Streams & Rivers
18. Subterranean Waters
19. Marine Environments
20. Scrub Cypress
21. Sand, Mud Flats

Sta	Station Status
R	Resident
M	Migrant
SR	Suspected resident
P	Possible resident, due to habitat availability, survey required
U	Unknown, survey required
N/A	Not expected to occur

Status

E	Endangered
T	Threatened
T(S/A)	Threatened due to similarity of appearance
SCC	Species of special concern
UR1	Under review for federal listing, with substantial evidence in existence indicating at least some degree of biological vulnerability and/or threat.
UR2	Under review, but substantial evidence vulnerability and/or threat is lacking.
UR5	Still formally under review for listing, but no longer considered for listing because it is more widespread or abundant than previously believed.

OAK RIDGE NATIONAL LABORATORY

OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37831

June 3, 1988

Mr. Wm. Jay Troxel
U.S. Fish and Wildlife Service Field Office
1612 June Avenue
Panama City, FL 32405-3721

Dear Mr. Troxel:

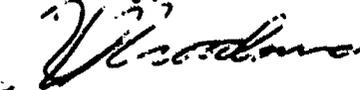
Thank you for your letter of April 19, 1988 informing me of threatened and endangered species that may occur in the vicinity of the proposed site for the Combat Support Training Center on Tyndall AFB (FWS log 4-P-88-027).

In accordance with the Endangered Species Act (50 CFR 402.12), this letter provides written notification of our decision on whether or not to prepare a biological assessment for the threatened or endangered species. We do not currently intend to prepare a biological assessment, for the reasons listed below for each species. The species are from the list provided in your April 19 letter, but do not include those species that have not been proposed for listing as threatened or endangered.

American alligator -- the site has no permanent or semi-permanent wetlands that would provide good habitat
Atlantic loggerhead -- the site is not near the coast or coastal bays, and the facility would not release significant amounts of liquid effluents
Atlantic leatherback -- same as for Atlantic loggerhead
Atlantic Ridley seaturtle -- same as above
Green seaturtle -- same as above
Eastern indigo snake -- not believed to be present on the site
Ivory-billed woodpecker -- not believed to be present
Piping plover -- not believed to occur on the site, because the site lacks shoreline habitat
Peregrine falcon -- not believed to occur on the site, because the site lacks suitable habitat
Red-cockaded woodpecker -- not known to occur on the site
Bald eagle -- not known to occur on the site
Chapman's rhododendron -- not known to occur on the site.

We look forward to your concurrence with or revision of this determination. A general description of the biota of the site is provided for your reference, and, as you wish, your comment.

Sincerely,



Roger L. Kroodsmas
Environmental Sciences Division MS-038
Phone: 615/574-7310



United States Department of the Interior
FISH AND WILDLIFE SERVICE

Field Office
 1612 June Avenue
 Panama City, Florida 32405-3721

June 14, 1988

Mr. Roger L. Kroodsmas
 Environmental Sciences Division
 Building 1505, MS-038
 Oak Ridge National Laboratory
 Post Office Box X
 Oak Ridge, Tennessee 37831

Re: FWS Log No. 4-P-88-027
 Combat Support Training Center
 Tyndall Air Force Base
 Bay County, Florida

Dear Mr. Kroodsmas:

This responds to your letter of June 3, 1988, in accordance with Section 7 of the Endangered Species Act of 1973, as amended, on the above referenced project.

The U.S. Air Force proposes to construct the Combat Support Training Center on Tyndall Air Force Base land. The site is primarily mesic or wet pine flatwoods and pine plantations. The work will involve the construction of a runway, roads and support buildings. The Service has been informed that this is a training facility without fixed-wing traffic.

The Service has evaluated the proposed action and has concluded that the impacts to the environment and endangered and threatened species are minimal. Therefore, in light of the limited impact on threatened and endangered species we concur in your determination of "no effect". However, we do recommend that only those areas necessary for training, roads and buildings be cleared of vegetation.

This does not constitute a biological opinion described under Section 7 of the Endangered Species Act. It does, however, fulfill the requirements of the Act and no further action is required. If modifications are made in the project or if additional information involving potential impacts on listed species become available, please notify our office.

Sincerely,

James M. Barkuloo
 Project Leader

OAK RIDGE NATIONAL LABORATORY

OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX 2008
OAK RIDGE, TENNESSEE 37831

July 25, 1989

Mr. Wm. Jay Troxel
U.S. Fish and Wildlife Service
1612 June Avenue
Panama City, Florida 32405-3721

Dear Mr. Troxel:

On April 19, 1988, you sent me a letter (Re: FWS log 4-P-88-027) with a list of endangered species concerning construction of the proposed Combat Support Training Complex (CSTC) on Tyndall Air Force Base. After consideration of environmental factors, the Air Force has changed the proposed location of the facility to a site approximately 3 miles northwest of the old site.

Three maps are enclosed, one showing the new site location, one providing a vegetation map, and the third showing floodplains and wetland boundaries determined by the U.S. Corps of Engineers. Also enclosed are a draft description of the flora and fauna of the proposed site and a draft analysis of impacts on threatened and endangered species.

We request that you notify us of any species that have become listed as threatened or endangered (or proposed for listing) since your April 1988 letter and/or any others that could occur in the new CSTC project area.

We also wish to take this opportunity to provide, in accordance with Endangered Species Act regulations (50 CFR 402.12), written notification of our decision on whether or not to prepare a biological assessment for the threatened or endangered species listed in your April 1988 letter. We do not currently intend to prepare a biological assessment, for the reasons listed below for each species.

- American alligator -- the new proposed site has no permanent or semi-permanent wetlands that would provide good habitat
- Atlantic loggerhead -- although the site is located adjacent to East Bay, shoreline habitat will not be impacted by the proposed project, and the shorelines in this area are not believed to provide nesting habitat for this turtle
- Atlantic leatherback -- same as for Atlantic loggerhead
- Atlantic Ridley seaturtle -- same as above
- Green seaturtle -- same as above
- Eastern indigo snake -- not believed to be present on the site or in the vicinity
- Ivory-billed woodpecker -- not believed to be present

Mr. Wm. Jay Troxel

B-12

-2-

July 25, 1989

Piping plover -- If this species occurs along the shoreline at the site, it could be affected by tear gas used during training exercises. Field surveys for this species will be conducted if necessary and a biological assessment will be prepared if the plover is observed.

Peregrine falcon -- not believed to occur on or near the site

Red-cockaded woodpecker -- not believed to occur on the site or on Tyndall AFB

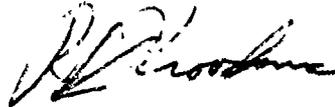
Bald eagle -- not known to occur on or near the site

Chapman's rhododendron -- not known to occur on the site.

We look forward to your concurrence with or revision of this determination.

The range of the threatened roseate tern apparently includes shoreline areas near Tyndall AFB. Therefore, if field surveys are necessary, they would include the tern as well as the piping plover. We would welcome any comments or suggestions you may have on the necessity for or conduct of such surveys.

Sincerely,



Roger L. Kroodsmas
Environmental Sciences Division
Bldg. 1505, MS-6038
Phone: 615-574-7310

RLK:lse

Enclosures

OAK RIDGE NATIONAL LABORATORY

OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX 2008
OAK RIDGE, TENNESSEE 37831

July 25, 1989

Mr. Bradley J. Hartman, Director
Office of Environmental Services
Florida Game and Freshwater Fish Commission
620 South Meridian Street
Tallahassee, Florida 32399-1600

Dear Mr Hartman:

On April 12, 1988, you sent me a letter concerning construction of the proposed Combat Support Training Complex (CSTC) on Tyndall Air Force Base. After consideration of environmental factors, the Air Force has changed the proposed location of the facility to a site approximately 3 miles northwest of the old site.

Three maps are enclosed, one showing the new site location, one providing a vegetation map, and the third showing floodplains and wetland boundaries determined by the U.S. Corps of Engineers. Also enclosed is a draft description of the flora and fauna of the proposed site, including threatened and endangered species and species of special concern.

We request any comments you may wish to provide on the new site and identification of any additional threatened or endangered species that should be considered. We would also appreciate a determination of whether the Air Force needs to apply for permits regarding potential impacts on threatened species and species of special concern (i.e., black bear, gopher tortoise, osprey).

Sincerely,



Roger L. Kroodsmma
Environmental Sciences Division
Bldg. 1505, MS-6038
Phone: 615-574-7310

RLK:lsc

Enclosures



FLORIDA DEPARTMENT OF STATE

Jim Smith

Secretary of State

DIVISION OF HISTORICAL RESOURCES

R.A. Gray Building

500 South Bronough

Tallahassee, Florida 32399-0250

Director's Office

Telecopier Number (FAX)

(904) 488-1480

(904) 488-3353

July 6, 1989

Ms. Loutillie W. Rickert
 Oak Ridge National Laboratory
 Energy Division
 Building 4500N, MS 6200
 P.O. Box 2008
 Oak Ridge, Tennessee 37831

In Reply Refer To:
 Laura A. Kannerer
 Historic Sites Specialist
 (904) 487-2333
 Project File No. 891540

RE: Cultural Resource Assessment Request
 Tyndall Air Force Base Combat Support Training Complex, TYN 89-3023
 Sections 24, 25 and 36, T05S-R12W
 Bay County, Florida

Dear Ms. Rickert:

In accordance with the procedures contained in 36 C.F.R., Part 800 ("Protection of Historic Properties"), we have reviewed the above referenced project(s) for possible impact to archaeological and historical sites or properties listed, or eligible for listing, in the National Register of Historic Places. The authority for this procedure is the National Historic Preservation Act of 1966 (Public Law 89-665), as amended.

A review of the Florida Master Site File indicates that no significant archaeological and/or historical sites are recorded for or considered likely to be present within the project area. It is the opinion of this agency that because of the project location and/or nature it is considered unlikely that any such sites will be affected. Therefore, it is the judgment of this office that the proposed project will have no effect on any sites listed, or eligible for listing, in the National Register of Historic Places, or otherwise of national, state, or local significance. The project may proceed without further involvement with this agency.

If you have any questions concerning our comments, please do not hesitate to contact us. Your interest and cooperation in helping to protect Florida's archaeological and historical resources are appreciated.

Sincerely,

George W. Percy, Director
 Division of Historical Resources
 and

State Historic Preservation Officer

GNP/lak

APPENDIX C:
Noise Measurements of Training Explosions at
Field 4, Eglin Air Force Base



DEPARTMENT OF THE AIR FORCE
 HEADQUARTERS AIR FORCE ENGINEERING AND SERVICES CENTER
 TYNDALL AIR FORCE BASE FL 32403-6001

REPLY TO
 ATTN OF: RDVW

SUBJECT: Noise Measurements at Auxiliary Field 4

20 OCT 1988

TO: 1Lt James Dunne
 AFSC Regional Hospital Eglin/SGPB
 Eglin AFB FL 32542-5300

1. The Air Force Engineering and Services Center, Detachment 2, will be moving from Auxiliary Field 4, Eglin AFB to Tyndall AFB FL. An Environmental Assessment (EA) for the construction of the facility at Tyndall AFB is being prepared in accordance with AFR 19-2. Noise caused by explosions at Detachment 2 is being evaluated in the EA. Field measurements of this noise are required for the evaluation.
2. This letter formalizes my telephone request to you on 17 Oct 88. Would you please take measurements of the noise at exactly 2000 feet and 3 miles from the explosions? If possible, the 2000-foot measurement should be made over a relatively flat, cleared region so the sound is not dampened by the terrain or trees. The 3-mile measurement should be made over terrain which is similar to Tyndall's (i.e., relatively flat terrain with pine trees). The relative humidity, ambient temperature, description of weather, time of day, and size of detonation should be noted with the noise data.
3. MSgt Mace from Detachment 2, at Eglin AFB, will be contacting you to coordinate this activity. If you have any questions or need additional information, please contact him at extension 29149, or myself at AUTOVON 523-4628.
5. Your help with this matter will be greatly appreciated. If you cannot support this request, please tell me quickly. These measurements may delay submittal of the EA.

Michael G. Elliott

MICHAEL G. ELLIOTT, 1Lt, USAF, BSC
 Unit Environmental Coordinator

cc: Capt Tom Quasney, AFESC/DEOT
 MSgt Mace, AFESC/Detachment 2
 Mr Gary Jacks, AFESC/DEMM
 Mr Dick Roop, ORNL

DEPARTMENT OF THE AIR FORCE
Air Force Systems Command Regional Hospital Eglin (AFSC)
Eglin Air Force Base, Florida 32542-5300

FROM: SGPB (SSgt Kauffman, 2-5873)

14 November 1988

SUBJECT: Noise Measurements at Auxiliary Field 4 (Your Ltr,
21 Oct 88)

TO: Hq AFESC/RDVW (Attn: Lt Elliot)

1. We performed a noise survey at the Air Force Engineering and Services Center, Detachment 2, Auxiliary Field 4 on 8 and 10 November 1988. The purpose of this survey was to determine the noise levels from the detonation of explosives at 2000 feet and 3 miles.

2. Instrumentation Used:

a. General Radio Sound Level Meter and Analyzer, Model 1982.

1) Serial Number 4901, calibrated on 15 July 1988.

2) Serial Number 4923, calibrated on 25 July 1988.

b. General Radio Sound Level Calibrator, Model Number 1562-A
Serial Number 11642, calibrated on 7 January 1988.

3. Findings:

a. At 0815 hours, on the day of the crater detonations, the sky was clear, the relative humidity was 78%, and the temperature was 72 degrees fahrenheit. The following measurements were taken:

1) At three separate locations, fifty pounds (lb) of explosives were placed three feet below the surface. These were then detonated simultaneously. The measured noise level at 2000 feet was 110 decibels, A weighted (dBA).

2) At two separate locations, 150 lbs of explosives were placed eight feet below the surface. These two were detonated in close proximity to each other. The noise level at 2000 feet was 102 dBA.

3) Measurements were also taken 2.2 to 2.5 miles south of the point of detonation. For all of these shots, no noise levels above background were measured: the individual could not hear the detonations from his location.

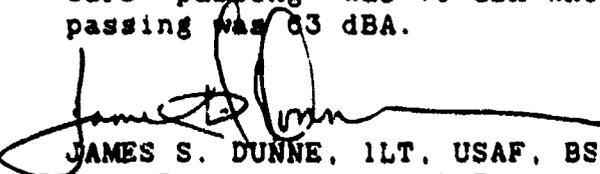
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b. At 0830 hours, on the day of the munitions disposal operation the sky was cloudy, the relative humidity was 93%, and the temperature was 68 degrees fahrenheit. The following measurements were taken:

1) At four separate locations, three pounds (1b) of explosives were placed at surface level. These were then detonated separately. The measured noise levels at 2000 feet were 107, 107, 106, and 104 decibels, A weighted (dBA).

2) At two separate locations, three pounds (1b) of explosives were placed at surface level. These were then detonated simultaneously. The measured noise level at 2000 feet was 110 decibels, A weighted (dBA).

3) Measurements taken approximately 2 miles north of the point of detonation were 75, 72, 71 dBA. The first explosion and the simultaneous explosion were not recorded due to equipment/operator error. Measurements were also taken of background with and without cars passing. The noise levels with cars passing was 75 dBA while the noise level without the cars passing was 63 dBA.


JAMES S. DUNNE, 1LT, USAF, BSC
Base Bioenvironmental Engineer

cc: Capt Quasney, AFESC/DEOT
MSgt Mace, AFESC/Det 2
Mr Jacks, AFESC/DEMM
Mr Roop, ORNL