Integrated Natural Resources Management Plan
Naval Support Activity Mid-South
Millington, Tennessee

INRMP

2021 Update

# Integrated Natural Resources Management Plan
# Naval Support Activity Mid-South
# Millington, Tennessee

## 2021 Update


Prepared By:

**Department of the Navy**
Naval Facilities Engineering Command Southeast

# INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

# NAVSUPPACT MID-SOUTH, TENNESSEE

**Prepared for:**

**NAVSUPPACT Mid-South**
**5722 Integrity Drive**
**Millington, Tennessee 38054-5045**


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**Updated 2021**

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# NAVAL SUPPORT ACTIVITY MID-SOUTH
# MILLINGTON, TENNESSEE

# INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN (INRMP) – 2021 OPERATIONS AND EFFECT CONCURRENCE

**This Integrated Natural Resource Management Plan (INRMP) provides for natural resources management at Naval Support Activity (NSA) Mid-South in Millington, Tennessee. The Sikes Act and Department of Defense instruction require that annual and 5-year operation and effect reviews of INRMPs occur with the U.S. Fish and Wildlife Service (USFWS) and the state fish and wildlife agency. Representatives of the Navy, USFWS, and the Tennessee Wildlife Resource Agency (TWRA) participate annually in the NSA Mid-South INRMP and Natural Resources Metric review. By signing below, the USFWS and TWRA concur that the management actions prescribed in the INRMP will contribute to the conservation and rehabilitation of installations natural resources.**

| | |
|---|---|
| **Commanding Officer,<br>Naval Support Activity Mid-South** | **(Date)** |
| **U.S. Navy Regional Environmental Coordinator** | **(Date)** |
| **Natural Resources Manager,<br>Commander Navy Region SE** | **(Date)** |
| **Natural Resources Manager,<br>Naval Support Activity, Mid-South** | **(Date)** |
| **U.S. Fish and Wildlife Service** | **(Date)** |
| **Tennessee Wildlife Resource Agency** | **(Date)** |

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DEPARTMENT OF DEFENSE
DEPARTMENT OF THE NAVY

FINDING OF NO SIGNIFICANT IMPACT (FONSI) FOR THE IMPLEMENTATION OF AN INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN FOR NAVAL SUPPORT ACTIVITY MID-SOUTH, MILLINGTON, TENNESSEE

Pursuant to Council on Environmental Quality (CEQ) regulations (40 CFR parts 1500-1508) implementing procedural provisions of the National Environmental Policy Act (NEPA), the Department of the Navy gives notice that an Environmental Assessment (EA) has been prepared and an Environmental Impact Statement (EIS) is not required for the implementation of an Integrated Natural Resources Management Plan (INRMP) for Naval Support Activity (NAVSUPPACT) Mid-South, Millington, Tennessee.

The proposed action is to modify the existing natural resources management practices at the NAVSUPPACT Mid-South to develop and implement an INRMP consistent with the military use of the property and the goals and objectives established in the Sikes Act Improvement Act (SAIA). The goal of the proposed action is to implement an ecosystem-based program that provides for conservation and rehabilitation of natural resources in a manner that is consistent with the military mission; integrates and coordinates all natural resources management activities; and provides for sustainable multipurpose uses of natural resources. The proposed action focuses on a five-year planning period, which is consistent with the time frame mandated by the SAIA.

The following management alternatives were considered for the proposed action: the "no action" alternative and the proposed INRMP. The "no action" alternative would continue implementing the objectives and strategies under the existing natural resources management program and therefore, would not fulfill the goals and objectives established in the SAIA. For this reason, the "no action" alternative was rejected. The proposed INRMP would implement resource-specific management measures, which would enable NAVSUPPACT Mid-South to manage effectively the use and condition of natural resources located on the installation to protect the natural setting. Examples of these measures include protection and enhancement of wetlands, forest maintenance, surveying biological resources and invasive species, and installation of nest boxes.

There will be no significant impacts upon any federally listed threatened or endangered species, wetlands, or archeological or historic resources. No federally proposed or listed endangered or threatened species are known to exist within the NAVSUPPACT Mid-South. A wetlands management plan would be developed to conserve and enhance the eleven wetlands identified on the installation. The areas involved in the proposed action have been previously disturbed and have low potential for archeological resources. There will be no significant impacts upon water quality or air quality. The development of a water quality sampling and monitoring program and a stormwater management plan would be beneficial for water quality protection. The proposed action does not involve activities that would contribute to changes in existing air quality. Additionally, there will be no disproportionately high and adverse human health or environmental effects on minority and low-income populations, nor any disproportionate

environmental health or safety risks on children. Since the proposed INRMP includes measures designed to protect, enhance and restore natural resources at the NAVSUPPACT Mid-South, there are expected to be beneficial impacts from the proposed action.

Based on the information gathered during the preparation of the EA, the Department of the Navy finds that the proposed implementation of an INRMP for NAVSUPPACT Mid-South will not significantly impact human health or the environment.

The EA addressing this action may be obtained from: Naval Support Activity Mid-South, Environmental Division, 5722 Integrity Drive, Millington, Tennessee, 38054-3045. A limited number of copies of the EA are available to fill single copy requests.

20 Dec 01
Date

Kimberley B. DePaul
Head, Environmental Planning and NEPA Compliance
Environmental Protection, Safety and Occupational Health Division
Deputy Chief of Naval Operations (Logistics)

# EXECUTIVE SUMMARY

This Integrated Natural Resources Management Plan (INRMP) was developed for Naval Support Activity Mid-South (NAVSUPPACT Mid-South) and Office of the Chief of Naval Operations in accordance with Chief of Naval Operations Instruction (OPNAVINST) 5090.1E Chapter 12, *Natural Resources Conservation*, September 2019, and Chief of Naval Operations (CNO) letter 5090 Ser N45D8U589016 September 25, 1998, and the *Sikes Act Improvement Act* (SAIA) (*16 United States Code 670a et seq.*). This INRMP describes the Installation and its surrounding environment and presents various management practices designed to mitigate potential negative impacts and enhance the positive effects of the Installation's mission on regional ecosystems. These management actions are balanced against the requirements of NAVSUPPACT Mid-South to accomplish its mission at the highest possible level of efficiency. To accurately assess the Installation's influences, analyses were conducted to determine the physical and biotic nature of NAVSUPPACT Mid-South and its surrounding environment, as well as the operational activities.

This INRMP is a guide for the management and stewardship of all natural resources present on NAVSUPPACT Mid-South, while ensuring the successful accomplishment of the Installation's mission. A multiple-use, ecosystems management approach was used to conserve biodiversity and environmental quality by efficiently managing natural resources while successfully executing mission-oriented activities.

This INRMP was developed using an interdisciplinary approach and information gathered from numerous Installation organizations. Information and guidance were also solicited from a variety of federal, state, and local agencies to create an interdisciplinary document that protects natural ecosystem form and function and the military operational mission. A Task Force was formed, consisting of representatives from the following Federal, state, and local regulatory agencies and groups: U.S. Fish and Wildlife Service (USFWS), U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), U.S. Army Corps of Engineers (USACE) - Memphis District, Tennessee Wildlife Resources Agency (TWRA), Tennessee Department of Environment and Conservation (TDEC), and Tennessee Forestry Commission (TFC). Coordination and correspondence with these agencies is documented and satisfies the SAIA, which requires the preparation of an INRMP in cooperation with the USFWS and the appropriate state fish and wildlife agency (e.g., TWRA). The resulting INRMP must reflect the mutual agreement of the parties regarding conservation, protection, and management of fish and wildlife resources.

The maintenance and enhancement of biodiversity is particularly important in natural resources management and is accomplished through the implementation of specific management practices identified in this INRMP. Biodiversity is simply defined as "the variety of life and its processes." Biodiversity can be applied on four basic levels: genetic diversity, species richness, ecosystem diversity, and landscape diversity. Genetic diversity refers to the variation of genetic material within a species that influences different characteristics among individuals or populations. Species richness refers to the number of different kinds of species within a given area. Ecosystem diversity refers to the variety of ecosystems across a given landscape. Landscape diversity refers to the variation of the ecosystems that interact across a large area. This INRMP will conserve and perpetuate biodiversity by protecting habitats that support the variety of life and its processes.

This INRMP presents practicable alternatives that ensure minimal impact on the Installation's mission(s) while providing for the management and stewardship of natural resources as well as the conservation and enhancement of existing ecosystems on the Installation. Consequently, in some cases, the implementation of some of these management actions sacrifices the improvement of the Installation's natural resources in deference to the safety and efficiency of the operational mission.

Throughout the development of this INRMP, management issues, referred to as "topics of concern," were identified in a number of natural resources subject areas. Some of these topics of concern could have an adverse impact on the Installation's future planning operations. The potential negative impacts range from delays in the construction of new buildings to forest fires that extend into the neighboring community. One of the purposes of this INRMP is to identify goals and objectives for the Installation to obtain workable and useful solutions for each topic of concern.

The goals and objectives of the INRMP were updated in 2021 to accommodate the improved focus of natural resources management on NAVSUPPACT Mid-South following two decades of successful INRMP implementation. The overriding goals for this INRMP are to:

Goal 1: Protect and maintain the ecosystem at NAVSUPPACT Mid-South through the continuation and enhancement of ecologically appropriate and beneficial land use and management practices, while ensuring the continuation of the military mission.

Goal 2: Protect and enhance forest resources by practicing ecologically-sound forest management, leading to sustained yield of quality forest products, watershed protection, and wildlife habitat.

Goal 3: Protect, maintain, and restore native communities for plant and animal life while improving the quality of life and ensuring the continuation of the military mission.

Goal 4: Protect and conserve the ecological value and diversity of natural resources at NAVSUPPACT Mid-South by fostering knowledge of adaptive ecosystem management and natural resources on the Installation.

Goal 5: Provide facilities and implement programs that encourage outdoor recreation and educational use of natural resources on NAVSUPPACT Mid-South, and improve the quality of life for user groups.

From these goals, objectives and management actions were identified that structure this INRMP's guidance, which are listed in Section 5. However, each of the management strategies described in this INRMP are monitored so that modifications can be made during implementation as conditions change. Figure ES-1 depicts the composite natural resources constraints at NAVSUPPACT Mid-South.

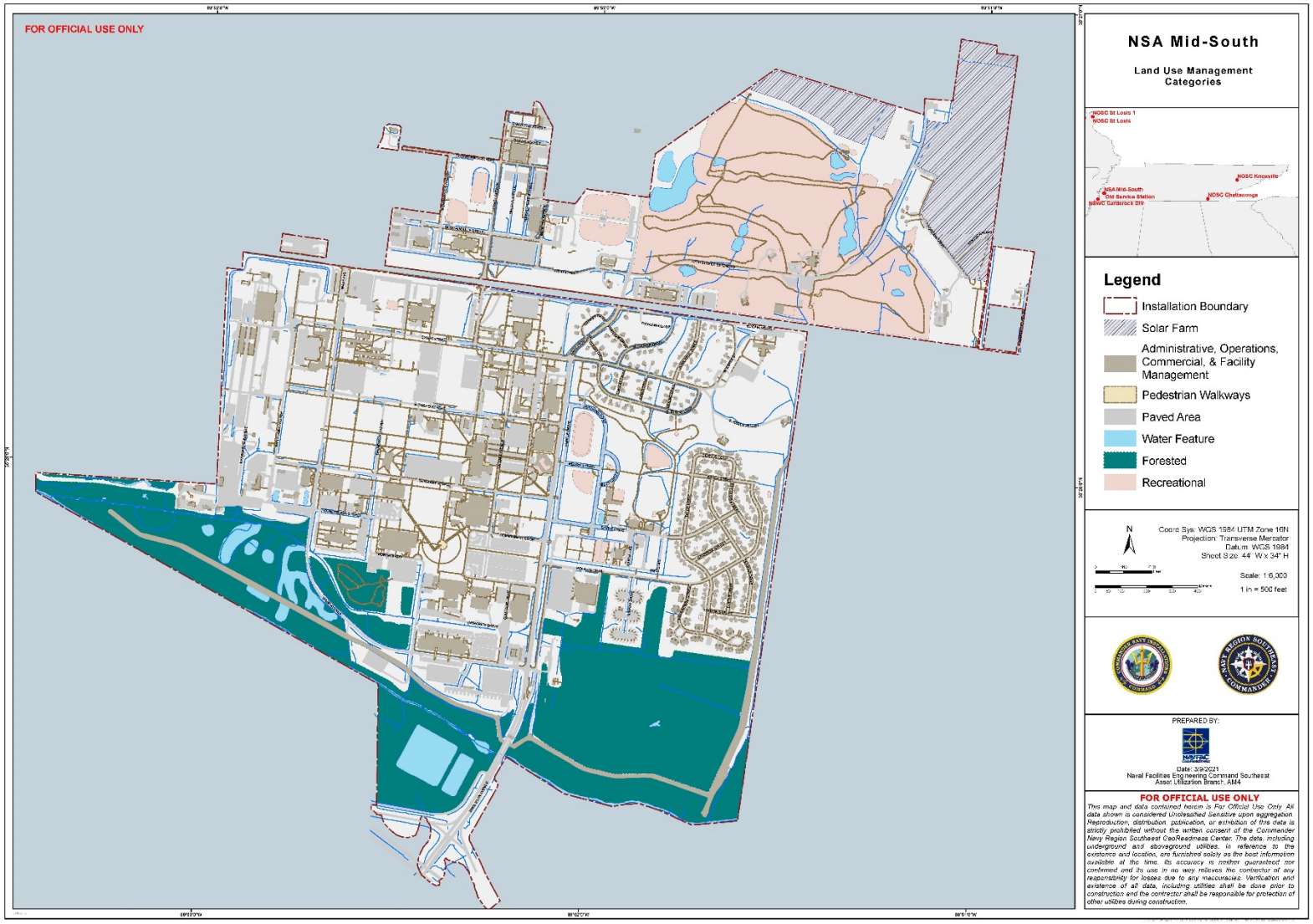


**Figure ES-1. Composite Natural Resources Constraints at NAVSUPPACT Mid-South**

**Species Management**

The natural resource actions described in this INRMP are for the benefit of the plants, animals, and ecosystems occurring on NAVSUPPACT Mid-South. Special attention is devoted to rare, threatened, and endangered species, and their habitats, through management actions referenced in Table ES-1. These actions are long-term conservation measures that provide benefits for terrestrial and aquatic habitats on the Installation. Management actions such as erosion control and stormwater control, for example, control sediment and pollutant runoff to protect water quality. Actions such as invasive plant and noxious weed management help protect habitat and maintain resources for native species.

**Table ES-1. Habitat Management Actions at NAVSUPPACT Mid-South**

| Habitat Management Actions | Section |
|---|---|
| Wetlands Management | 6.1.1 |
| Erosion Control | 6.1.2 |
| Stormwater and Water Quality Control | 6.1.3 |
| Floodplains Management | 6.1.4 |
| Landscaping and Grounds Maintenance | 6.1.5 |
| Pest Management | 6.1.6 |
| Invasive Plant and Noxious Weed Management | 6.1.7 |
| Urban Forestry | 6.1.8 |
| Natural Resources Training | 6.1.9 |
| Forest Management | 6.2 |
| Fisheries Management | 6.3.1 |
| Management of Non-Game Wildlife Species | 6.3.2 |
| Rare, Threatened, and Endangered Species | 6.3.3 |
| Geographic Information Systems | 6.4 |
| Outdoor Recreation and Public Access | 6.5 |

The "Rare, Threatened, and Endangered" section of this INRMP (Section 6.3.3) includes additional concerns, objectives, actions, and projects for the benefit and long-term conservation of rare, threatened, and endangered species potentially found on the Installation. Animal and plant species explicitly accounted for in this INRMP are:

- American ginseng (*Panax quinquefolia*) - plant
- Bewick's wren (*Thyromanes bewickii*) - bird
- Blue sucker (*Cycleptus elongates*) - fish
- Copper iris (Iris fulva) - plant
- Featherfoil (*Hottonia inflate*) - plant
- Indiana bat (*Myotis sodialis*) - bat
- Interior least tern (*Stema antillarum*) - bird

- Lark sparrow (*Chondestes grammacus*) - bird
- Monarch butterfly (*Danaus plexippus*) - butterfly
- Nodding rattlesnake-root (*Prenanthes crepidinea*) - plant
- Northern long-eared bat (*Myotis septentrionalis*) - bat
- Northern pinesnake (*Pituophis melanoleucus melanoleuccus*) –snake
- Peregrine Falcon (*Falco peregrinus*) - bird
- Red starvine (*Schisandra glabra*) - plant
- Reniform sedge (*Carex reniformis*) - plant
- Turgid-blossom (*Epioblasma turgidula*) - mussel

**Review and Update of the INRMP**

The SAIA specifies that INRMPs be reviewed as to "operation and effect" on a regular basis, but not less often than 5 years, to ensure it is being implemented to meet the requirements of SAIA and contributes to the conservation and rehabilitation of natural resources. This INRMP was first completed in 2001. It is reviewed annually and updated as needed to reflect conservation measures for any new species-at-risk, incorporate new data resulting from completed natural resources projects, and include recommendations from conservation partners.

Section 7, Table 7-1, lists projects, their implementation schedule, and comments relevant to each project. This INRMP remains a relevant guide for management and stewardship of natural resources.

**Accomplishments of the INRMP**

Implementation of the management actions described in Section 6 and the projects described in Section 7 have resulted in numerous accomplishments to conserve and enhance natural resources at NAVSUPPACT Mid-South. Past accomplishments achieved through the implementation of each INRMP Project are described in Section 7.

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# 1.0 INTRODUCTION

## 1.1 Purpose and Goals of the Plan

This Integrated Natural Resources Management Plan (INRMP) has been developed for use by Naval Support Activity (NAVSUPPACT) Mid-South and the Department of the Navy (DoN) in accordance with the Sikes Act Improvement Act (SAIA) (*16 United States Code* [U.S.C.] *670a et seq*), Department of Defense Instruction (DoDI) 4715.3 (*Environmental Conservation Program*), and Navy instructions Chief of Naval Operations Instruction (OPNAVINST) 5090.1E - Chapter 12 (*Natural Resources Conservation*), and Naval Facilities Instruction (NAVFACINST) P-73, (*Natural Resources Management Procedural Manual*).

This INRMP integrates all aspects of natural resources management with the rest of the Installation's mission, and is therefore the primary tool for managing the Installation's ecosystems while ensuring the successful accomplishment of the military mission at the highest possible levels of efficiency. The INRMP also specifies various management practices, in compliance with Federal, state, and local standards, designed to mitigate negative impacts and to enhance the positive effects of the Installation's mission on local ecosystems.

NAVSUPPACT Mid-South INRMP goals are consistent with the Department of Defense (DoD) "Ecosystem Management Policy Directive," issued in 1994, by the Deputy Undersecretary of Defense (Environmental Security), which states that military installations shall use ecosystem management as the basis for future management of DoD lands and waters. The directive specifies five key elements of ecosystem management:

**Ecological approach** — DoD will continue to shift its focus from protection of individual species to management of ecosystems.

**Partnerships** — DoD will form partnerships to achieve shared goals. Ecosystems cross political boundaries, making the need for cooperation, coordination, and partnerships essential for managing ecosystems.

**Participation** — Public involvement, communication, and incorporation of public needs and desires into management decisions will be emphasized.

**Information** — The best available scientific and field-tested information will be used in making decisions and selecting the most appropriate technologies in management of natural resources.

**Adaptive management** — Resources managers will incrementally implement adaptive management techniques as they become known through the dynamic process of applying the best available commercial and scientific data.

Specific management practices identified in this INRMP were developed to enhance and maintain biological diversity within the Installation. Specifically, management practices should (1) minimize habitat fragmentation and promote the natural pattern and connectivity of habitats; (2) protect native species and discourage non-native, exotic species; (3) protect rare and ecologically important species; (4) protect unique or sensitive environments; (5) maintain or mimic natural processes; (6) protect genetic diversity; (7) restore ecosystems, communities, and species; and (8)

monitor biodiversity impacts. However, each of the management strategies described in this INRMP are monitored so that modifications can be made during implementation.

Biodiversity is defined as "the variety of life and its processes" and can be defined on four basic levels: genetic diversity, species richness, ecosystem diversity, and landscape diversity. Genetic diversity refers to the variation of genetic material within a species that influences different characteristics among individuals or populations. Species richness refers to the number of different kinds of species within a given area. Ecosystem diversity refers to the variety of ecosystems that interact across a large land area. By protecting habitats that support the greatest variety of life, this INRMP helps perpetuate viable, sustainable populations of native species and communities.

The comprehensive planning process will incorporate the concerns presented in this INRMP, so that the growth of the Installation can progress in a manner consistent with, and complementary to, the objectives of DoN with regard to the protection of natural resources.

## 1.2 Management Philosophy

The Navy is a national leader in environmental and natural resources stewardship, and must ensure the vitality of natural resources in order to achieve its military mission. Maintaining ecosystem integrity is crucial to that vitality. To that end, this INRMP takes a dynamic, integrated approach to ecosystem management, undergoing continued updates and blending various management strategies to achieve effective management.

A variety of Federal, state, and local agencies and groups contributed to the creation of this INRMP, first published in 2001. Their focus was to create an interdisciplinary document that protects natural ecosystems in support of the military operational mission. In addition to numerous Installation and Navy personnel, contributors to that first version of this INRMP included: the U.S. Fish and Wildlife Service (USFWS), U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), U.S. Army Corps of Engineers (USACE) — Memphis District, Tennessee Wildlife Resources Agency (TWRA), Tennessee Department of Environment and Conservation (TDEC), and Tennessee Forestry Commission (TFC).

Since the initial creation of the INRMP, representatives from the USFWS and the TWRA have met at least annually with Installation personnel to review the INRMP and ensure it remains updated to reflect the most recent management accomplishments and recommendations. This is required by the SAIA so the INRMP continually reflects the mutual agreement of those parties with regard to conservation, protection, and management of fish and wildlife resources.

This INRMP presents practicable alternatives that allow for the protection and enhancement of natural resources and conservation of existing ecosystems, while minimizing impacts to the Installation's mission(s). Consequently, the implementation of some of these alternatives will sacrifice improvement of the Installation's natural resources in deference to the safety and efficiency of the mission.

## 1.3 Authority

This INRMP is developed under, and proposes actions in accordance with, applicable DoD and DoN policies, directives, and instructions. Authority for the development of this INRMP is provided by OPNAVINST 5090.1E, Chapter 12 *(Natural Resources Conservation*), and NAVFACINST P-73, *(Natural Resources Management Procedural Manual*). *Guidelines for Preparing Integrated Natural Resources Management Plans for Naval Installations* dated September 1998 (promulgated by Chief of Naval Operations [CNO] letter 5090 Ser N45D/8U589016 of 25 September 1998 [CNO 1998a]) provides the necessary direction and instructions for preparing an INRMP (CNO 1998b). Issues are addressed in this Plan using guidance provided under DoDI 4715.3 — *Environmental Conservation Program*, DoDI 7310.5 — *Accounting for Sale of Forest Products*, and DoD Directive 4700.4 — *Natural Resources Management Program*. DoD Directive 4700.4 provides direction for DoD bases in establishing procedures for multiple-use management of natural resources. The SAIA and Public Law (P.L.) 86-797, as implemented by DoDI 4700.4, requires all DoD lands be managed for multiple uses and that INRMPs be developed for all military installations which contain land and water areas suitable for the conservation and management of fish and wildlife resources. Appendix C lists and describes the applicable regulations utilized in preparation of this INRMP (CNO 1998a, 1998b, 1998c; U.S. Navy 2014).

## 1.4 Use and Organization of the Plan

NAVSUPPACT Mid-South decision-makers refer to this INRMP to help eliminate and reduce the potential negative impacts of projects and training on natural resources. It is a living document that, updated periodically to integrate new natural resource management strategies and accomplishments. Proper utilization of this INRMP for the conservation of natural resources supports the ability of the Installation to perform its mission. The INRMP was written in accordance with all applicable DoD and DoN policies, directives, and instructions, and has been reviewed and approved by the NAVSUPPACT Mid-South INRMP partners.

This INRMP consists of seven sections that describe fundamental characteristics of the Installation. Section 1 describes the authority, purpose, and goals of the INRMP. The location of NAVSUPPACT Mid-South and its mission are described in Section 2. The Installation's physical environment is described in Section 3, while Section 4 describes the Installation's biotic environment. Section 5 presents the goals and objectives of the INRMP, natural resources management program elements are presented in Section 6, and Section 7 lists and descibes the projects used to implement this INRMP. Section 8 lists the references used during the preparation of the INRMP.

Acronyms, terms, and definitions of land management categories used in this INRMP are defined in Appendix A. Environmental documentation prepared in support of this INRMP, such as correspondence with Federal and state natural resources agencies, is presented in Appendix B. The Natural Resources Database, which lists lists and describes the applicable environmental regulations, is presented in Appendix C. In addition, a portion of the database has been developed o index relevant plans that may be useful to Installation personnel. Appendix D provides a distribution list of natural resources shareholders and partners specific to NAVSUPPACT Mid-South.

## 1.5 Approvals and Revisions

Pursuant to the requirements of SAIA, this INRMP reflects the mutual agreement of the NAVSUPPACT Mid-South Natural Resources Manager, Installation Program Manager, Naval Facilities Engineering Command (NAVFAC) SE core biologists, USFWS, and TWRA. All changes to this Plan are initiated by the NRM and approved by all the partners. Any updated version of the INRMP must be signed by the Installation's Commanding Officer (CO) to initate its implementation.

This INRMP is updated regularly and is reviewed no less than every 5 years in cooperation with USFWS and TWRA for operation and effect. Updates ensure that natural resources management practices remain appropriate for current conditions at the Installation. Larger revisions would be made if there were a modification to the Installation's mission or land holdings, or there is a substantial change to the Installation's natural resources.

## 1.6 Responsible and Interested Parties

The INRMP ensures the implementation of year-round, cost-effective management activities and projects that meet the requirements of NAVSUPPACT Mid-South. Professionally trained natural resource management staff and natural resources enforcement implement this INRMP on behalf of the Installation CO. SAIA Section 670g, defines a "professional" as one who has an undergraduate degree or graduate degree in a natural resource related science. The NAVSUPPACT Mid-South NRM has been delegated responsibility for the Plan's successful implementation.

The USFWS and TWRA provide technical assistance to NAVSUPPACT Mid-South. These agencies alert the NAVSUPPACT Mid-South Natural Resources Manager when species near the Installation are added to the Federal or state Endangered Species lists, provide expert advice for species and habitat conservation, and may support NAVSUPPACT Mid-South personnel during scheduled wildlife and vegetation surveys.

## 1.7 NAVSUPPACT Mid-South Roles and Responsibilities

### *1.7.1 Commanding Officer*

The Commanding Officer is directly responsible for operating and maintaining NAVSUPPACT Mid-South. The Commanding officer is personally liable for noncompliance with environmental laws. Thus, the Commanding Officer has a personal interest in ensuring that this INRMP is properly implemented.

### *1.7.2 Environmental Director*

The Environmental Director is responsible for ensuring that activities associated with the implementation of this Plan adhere to applicable Federal, state, local, and Navy environmental regulations and guidelines. Deviation from the projects proposed in this Plan will be independently reviewed by the NAVFAC SE. The Environmental Director is also responsible for assigning a Natural Resources Manager to ensure that this staff member receives training adequate for the implementation of this INRMP. The Environmental Director will be part of the INRMP Working Group.

### *1.7.3 Installation Natural Resources Manager*

The NAVSUPPACT Mid-South Natural Resources Manager, under the direction of the Environmental Director, is responsible for establishing and implementing a conservation education program to instruct Installation personnel on the protection and enhancement of the biological diversity on

NAVSUPPACT Mid-South. The Natural Resources Manager directs most of the ongoing natural resources management activities presented in this Plan. However, several management activities (e.g., Pest Management) fall under the responsibilities listed for other Installation organizations. The NAVSUPPACT Mid-South Natural Resources Manager will act as a technical point-of-contact for those activities the manager is not directly responsible for implementing.

### *1.7.4 Public Works Officer*

The Public Works Officer plans, budgets, approves, and oversees all maintenance, environmental, and construction activities performed on the Installation. All projects or management activities proposed in this Plan will be approved by the Installation Public Works Officer to ensure that (1) funding is available and (2) these projects are complimentary to the Installation comprehensive planning process. The Public Works Officer will be part of the INRMP Working Group.

### *1.7.5 Public Affairs Office*

The Public Affairs office is responsible for the coordination of access for public events at the Installation. Public facilities/recreation land use is oriented to providing recreational opportunities to assigned Installation personnel, members of reserve components and their families, active and retired military, and civil service personnel. The military mission and the amount of resources on the Installation allow limited public recreational use of the Installation. The Public Affairs office will be represented on the INRMP Working Group.

### *1.7.6 Planning Office*

The Planning Office is responsible for all land use planning that occurs at NAVSUPPACT Mid-South. Many of these INRMP management actions involve land use planning actions that will be implemented by this office through coordination with the NAVSUPPACT Mid-South Natural Resources Manager. The Base Planning Office has the added responsibility of coordinating with the City of Millington on the current development of the West Tennessee Regional Development Center. The Base Planning Office will be part of the INRMP Working Group to ensure that all personnel responsible for implementing this INRMP are aware of plans of the West Tennessee Development Center.

### *1.7.7 Base Operating Services*

The NAVSUPPACT Mid-South BOS contractor, under the guidance of the Public Works Officer, is responsible for all grounds maintenance activities on the Base (NAVSUPPACT Mid-South 1997). Operations and maintenance will also periodically review the type of grounds maintenance equipment to determine if new or additional equipment is needed for the proper maintenance of the Base's landscapes. A representative from the BOS contractor staff will be part of the INRMP Working Group.

### *1.7.8 Office of MWR*

NAVSUPPACT Mid-South office of MWR is responsible for provision and maintenance of outdoor recreation opportunities. The MWR office will be part of the INRMP Woring Group to ensure proper planning, maintenance, and identification of recreational activities on the Installation.

### *1.7.9 Resident Officer in Charge of Contracting*

The ROICC is responsible for updating or revising applicable contracts in order to implement the adaptive management strategies identified in this Plan. Contracts will be modified during the next re-bid cycle. The ROICC will be part of the INRMP Working Group.

### *1.7.10 Security Police*

Security Police are responsible for overall Installation security. In addition, Security Police are responsible for the enforcement of all Federal, state, and local fish and game laws on the Installation, and coordinating access for state game wardens to assist in these activities. A representative from Security Police will be part of the INRMP Working Group.

# 2.0 NAVSUPPACT MID-SOUTH LOCATION AND MISSION

Current and historic information pertaining to land uses at NAVSUPPACT Mid-South and in the surrounding communities is necessary to properly manage natural resources and assess future management activities. This section describes the location of NAVSUPPACT Mid-South and the surrounding community, and describes the natural resources associated with the area. A brief history of the Naval Station and its current mission is also presented.

## 2.1 Location and Surrounding Area

NAVSUPPACT Mid-South is located in the northern portion of Shelby County, Tennessee. The Installation is within the city limits of Millington, which is located approximately 18 miles northeast of Memphis, Tennessee and 13 miles east of the Mississippi River. A location map is provided as Figure 2-1 and shows the Installation's relationship to Memphis and the surrounding region. Shelby County is the western most county in Tennessee, bordered by the Mississippi River and the State of Arkansas on the west and the State of Mississippi on the south. Immediately adjacent to the Installation is the Millington Municipal Airport, an industrial park, and a Federal prison camp.

Most of the regional development is typified by mixed residential and commercial land use interspersed with recreational attractions. Natural areas are in the area offer outdoor recreation opportunities such as hiking, canoeing, and swimming. NAVSUPPACT Mid-South also provides housing, recreation, and family services for Navy personnel.

The terrain of the area is flat to gently rolling, and is drained by a series of engineered open ditches and natural drainages that empty into Big Creek Drainage Ditch. Big Creek Drainage Ditch is a channelized tributary of the Loosahatchie River that helps disperse precipitation. This engineered drainage system is needed because of the limited topographic relief of the region. NAVSUPPACT Mid-South comprises approximately 1,470 acres of urban and semi-improved land. This area is heavily developed and contains no unique or critical habitats. Habitat present along the Big Creek Drainage Ditch provides a greater diversity of habitats for wildlife than in the surrounding land area. The bottomland hardwood forest located adjacent to Big Creek Drainage Ditch represents the major area of natural vegetation remaining at NAVSUPPACT Mid-South.

## 2.2 Installation History

Prior to its commission as a Naval Air Reserve Base in September 1942, the Millington site operated as an Army Aviation Field named Park Field. Park Field was originally operated under a private land lease initiated in November 1917 to provide an aviation school for World War I pilots. When World War I ended in November 1918, training ceased at Park Field. The land lease continued for aircraft and parts storage until the federal government purchased the land in March 1920. During the 1920s, many buildings were decommissioned, demolished, and replaced by cropland. Aviation resumed at Park Field in 1928 through a land lease from the United States Government to a private aviation school (NAVSUPPACT Mid-South 2000a).

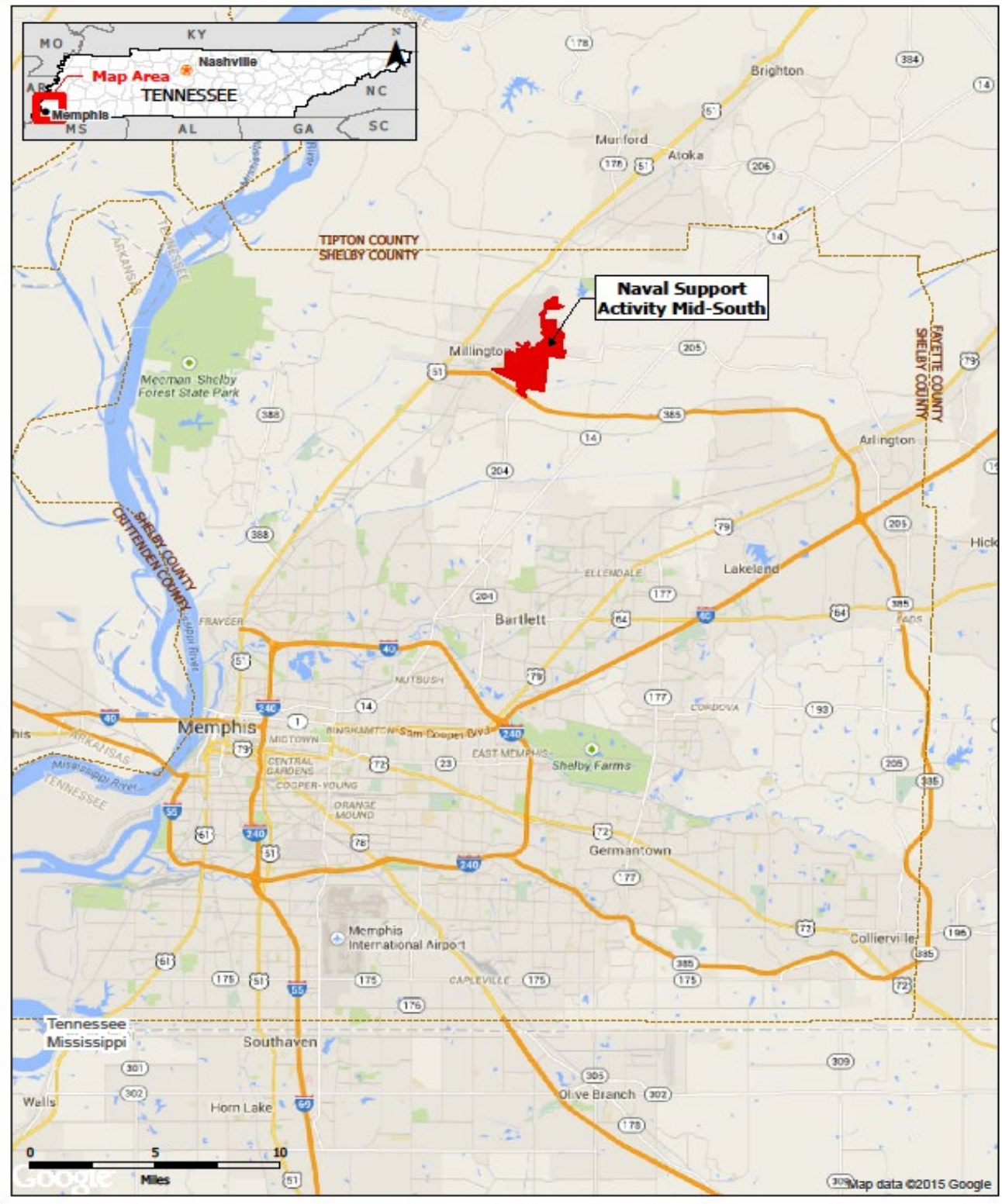



**Figure 2-1. NAVSUPPACT Mid-South and the Surrounding Region**

During the 1930s, Park Field served as a transient camp for unemployed workers displaced by the Great Depression. The Resettlement Administration took over the land in 1937 and developed model farms to teach modern horticultural and animal husbandry techniques. This response to the Great Depression aimed to increase the agricultural and economic productivity of the region. The land remained under the jurisdiction of the Resettlement Administration until the beginning of World War II (NAVSUPPACT Mid-South 2000a).

In 1942, DoN commissioned Park Field as a Naval Air Reserve Base (NARB) and the Naval Air Technical Training Center (NATTC) was established. The principal mission of the NARB was to train aviation cadets in flying proficiently during World War II while the NATTC provided technical training in operations, maintenance, and repair of aircraft and associated equipment. During its peak, NATTC trained approximately 20,000 Navy and Marine students annually (NAVSUPPACT Mid-South 2000a). Following the conversion to a mission with aviation training as its core responsibility, the Installation was reassigned as Naval Air Station (NAS) Memphis.

The 1993 Base Realignment and Closure (BRAC) Commission directed the realignment of NAS Memphis. The aviation component was moved to Pensacola, and the Bureau of Personnel (BUPERS) was relocated to NAS Memphis, significantly decreasing the aviation training mission of the base and increasing its administrative and personnel support role. The 1995 BRAC continued this transformation with several major administrative commands, including Commander, Navy Recruiting Command (CNRC or NRC) and Naval Personnel Research and Development Center (NPRDC) relocating to NAS Memphis. The aviation role of the base was discontinued permanently when the installation was re-designated NSA Memphis in 1995. The name was changed again to NSA Mid-South on 1 October 1998 to more closely identify the base's mission requirements and to reflect the Navy's approach to regionalization.

In December 1999, the land and buildings associated with the airfield were formally transferred to the City of Millington. In addition, the 100 acres at the old Naval Hospital site was transferred to the Bureau of Prisons, and land that had been the site of the new Naval Hospital was transferred to the University of Memphis for a North Shelby Campus. Approximately 1,400 acres were retained for continued Navy use. Since 1996, almost 2.2 million square feet of excess facilities, including former training facilities, housing, and recreation buildings, have been demolished.

Today, NSA Mid-South operates and functions with approximately 6,100 enlisted and officer personnel, civilians, and full-time contract personnel who provide all essential logistic and operational support to the commands and activities onboard. NSA Mid-South also serves as the Navy Human Resources Center of Excellence, providing manpower and career management for all Navy personnel worldwide.

## 2.3 Current Military Missions

The mission of the Installation is to provide the highest quality command and community support services, public safety, and facility management services to tenant commands and people who live, work, and visit the base. NAVSUPPACT Mid-South conducts these operations to improve the readiness and mission of DoN. The management objectives presented in this INRMP stress the preservation of ecosystem function and value, which occurs over a long time frame.

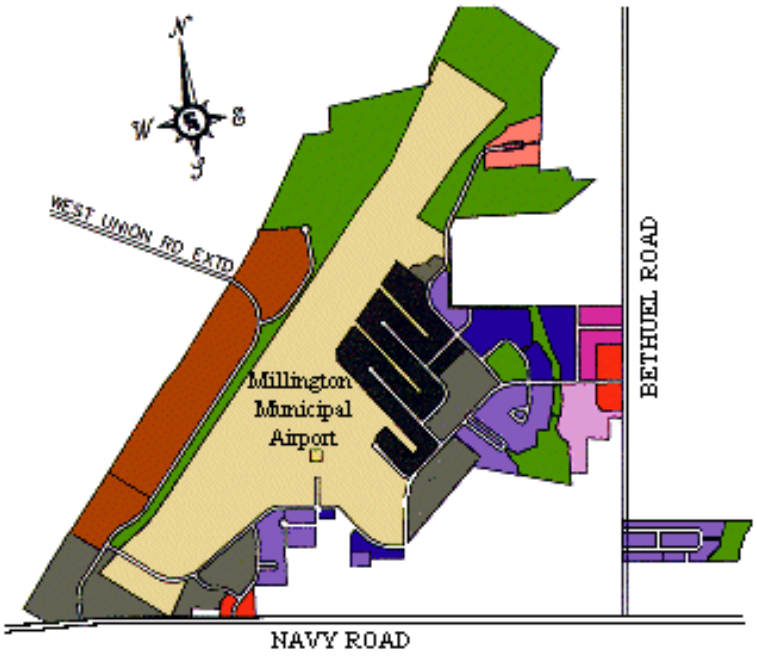
Tenants currently operating out of NSA Mid-South are from a variety of DoD departments. The five largest commands of the United States Navy include, Navy Personnel Command, Navy Operation Support Center, Navy Recruiting Command, CNIC Detachment Millington, and Navy Manpower Analysis Center. Other DoD tenants include the Army Corps of Engineers Finance Center, Defence Contract Management Agency, U.S. Air Force Recruiting, U.S. Army Reserve, U.S. Marine Corps Reserve, and Joint Reserve Intelligence Center Memphis. There are a variety of non DoD entities and contractors operating on the Installation. These include food services, retail services, and base operational support service contractor.

## 2.4 Land Use

The area surrounding and comprising NAVSUPPACT Mid-South consists of developed communities interspersed with natural areas. Current and historic information pertaining to land uses on the Installation and in the surrounding communities is necessary to properly manage natural resources and assess future management activities. This section describes land uses associated with the surrounding community, as well as with NAVSUPPACT Mid-South.

### *2.4.1 Surrounding Land Use*

Land uses around the installation are agricultural, commercial, and industrial, but could be best characterized as developed urban land. The Installation is neighbored by the Millington Municipal Airport to the north, a hospital to the east, and the Big Creek Drainage Ditch to the south. Also north of the Installation is the small town of Kerrville. To the west is the City of Millington with a population of approximately 10,176. The West Tennessee Regional Business Center, developed on land transferred from the Navy in the 1993 BRAC, is a multi-modal regional business park (Figure 2-2).




| LAND USE | ACRES |
|---|---|
| Millington Municipal Airport | 448 |
| Airport Related Light Industrial | 111 |
| Rail Served Industrial | 230 |
| General Light Industrial | 175 |
| Retail / Commercial | 20 |
| Corporate Office | 30 |
| Professionsal Office | 158 |
| Office / Showroom | 53 |
| Office / Campus | 33 |
| Conference / Convention Center | 20 |
| Land Reserver Greenbelt | 623 |
| TOTAL ACRES | 1901 |

Source: City of Millington 2001

**Figure 2-2. Proposed Land Use for the West Tennessee Regional Business Center Immediately Adjacent to NAVSUPPACT Mid-South**

### *2.4.2 NAVSUPPACT Mid-South*

NAVSUPPACT Mid-South is managed as improved and semi-improved space, separated into nine categories: administrative, operations, recreation, facility management, commercial, housing, forestry, open space, and lease. Table 2-1 provides a brief description of land use categories at the Installation. The land uses on NAVSUPPACT Mid-South are depicted in Figure 2-3.

**Table 2-1. Description of the Land Use Categories Found on NAVSUPPACT Mid-South**

| Land Use Category | Approximate Acreage/Brief Description |
|---|---|
| Administration | 20 acres of administrative buildings operated by NAVSUPPACT Mid-South and other DoD entities such as Army Reserve and Army Corps Finance. |
| Operations | 7 acres of Public Works facilities, base exchange, public safety, warehouses (including Defense Reutilization Marketing Office), and human services. |
| Recreation | Over 240 acres of softball fields, a football field, a golf course, tennis courts, gymnasium, and a several miles of running trails. |
| Facility Management | 3 acres of utilities, a fire station, water control and storage; these facilities ensure the operation and maintenance of NAVSUPPACT Mid-South. |
| Commercial | Approximately 2 acres of private, non-Navy operations. It includes a filling station, a club complex/food court, a carwash, a credit union, a flying club, and Navy Inns. |
| Housing | 193 acres comprising a RV Park, officers' quarters, and a residential area. |
| Forestry | 251 acres on "non-commercial" forestry lands available for periodic sale, not annual. Managed to maintain scenic values and reduce maintenance costs. |
| Solar Farm | 72 acres leased out for solar voltaic system. |
| Open Space | Approximately 432 acres of improved open spaces which is primarily in the form of mowed grass. Managed as an aesthetic amenity. |
| Paved Surfaces | 216 acres of paved surfaces, parking lots, roads, side walks, laydown areas. |

Administration areas include administration offices, the Supply Department/Supply Purchasing, NAVSUPPACT Mid-South Headquarters, Navy Reserve - Navy Recruiting Command, Army Reserve, and the Army Corps Finance Center. The vegetation of these areas is typical of the landscaping associated with improved grounds. Ornamental grasses, shrubs, and trees dominate the landscape within the administrative areas of NAVSUPPACT Mid-South.

Approximately 7 acres at NAVSUPPACT Mid-South are managed for operational land uses. These areas include an automotive hobby shop, Public Works Department facilities, hazardous materials storage, base exchange, the Navy Inns and Lodge, and human services (including family services, youth center, teen center, child development center, the theater, legal services, and chapel). The vegetation adjacent to these facilities is landscaped using ornamental grasses, shrubs, and trees that are found on the improved grounds.

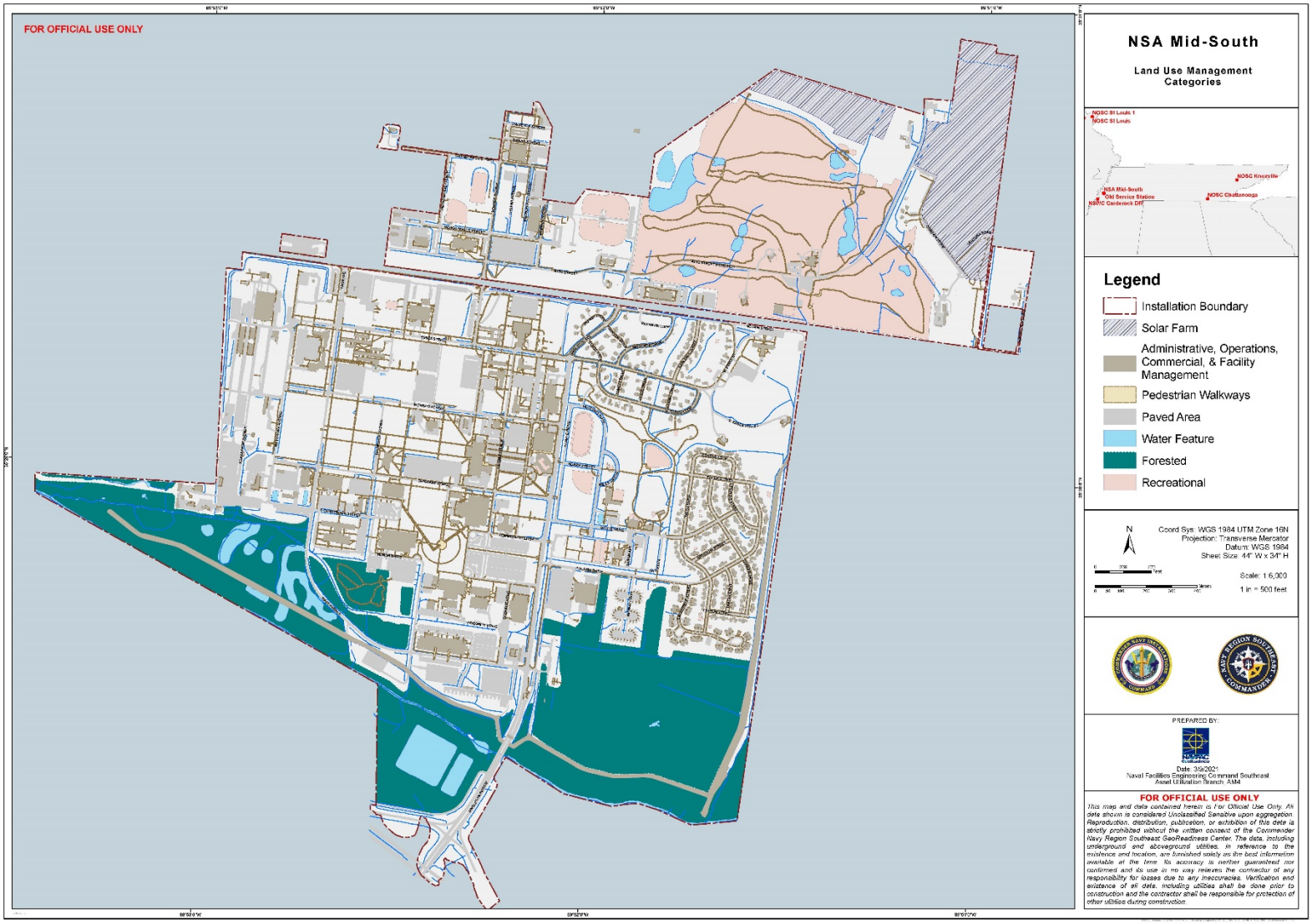



**Figure 2-3. Land Use Management Categories at NAVSUPPACT Mid-South**

Commercial facilities occupy approximately 2 acres at NAVSUPPACT Mid-South. These facilities are not operated by Navy; they generate revenue for private operations. A Subway restaurant, filling station, club complex/food court, car wash, commissary, credit union, and private flying club are all located on the Installation. Landscaped grasses and shrubs typify these facilities.

Approximately 3 acres of land at NAVSUPPACT Mid-South are used for facilities management. These areas support the operation and maintenance of the Installation functions and include utilities such as the sewer pumping station, and telephone and utility switches. The Public Works Department, fire station, pesticide control, shops, water plant pumps, filters, aerators, and storage are also in these areas. Ornamental grasses, shrubs, and trees are the typical landscape.

Approximately 193 acres of land at the Installation are managed as residential grounds. Housing areas include the RV park, residential areas, and officers' quarters (Bachelor Enlisted Quarters, Married Enlisted Quarters, Married Officers Quarters, etc.). These areas are landscaped, but are also characterized by urban forests and border on forested areas.

Outdoor recreational facilities at NAVSUPPACT Mid-South comprise 240 acres on the Installation. These lands are not heavily landscaped and include softball fields, a golf course, wading pools, tennis courts, and a running trail. Other indoor recreational facilities include fitness facilities and a gymnasium.

NAVSUPPACT Mid-South has approximately 251 acres of land managed under a multiple-use forestry paradigm. The *Forestry Section of the Natural Resources Plan* provides guidance for managing these "non-commercial" forestry lands. "Non-commercial" forestry lands produce only periodic sales versus annual sales, and the *Forestry Section* calls for management to maintain scenic values and reducing grounds maintenance costs (SOUTHDIV NAVFACENGCOM 1995b). A comprehensive analysis of the management concerns is detailed in Section 6.9 of this INRMP.

Approximately 72 acres of Navy land on the north side is leased out to a solar facility developer. The lease of the property is for the construction, operation, and maintenance of a solar photovoltaic system. Project was completed in 2019 with the estimated lease period of 37 years. Landscape consist of solar voltaic panels with grass cover. Property is maintained by ocassional mowing and grazing.

Approximately 216 acres of paved surfaces. Includes sidewalks, parking areas, and laydown yards.

The remaining land at NAVSUPPACT Mid-South is managed as improved open space. This land comprises approximately 460 acres that must be intensively maintained for up to 9 months out of the year. While the semi-improved open spaces require a significant amount of maintenance, they provide amenity to employees and residents at NAVSUPPACT Mid-South through their aesthetic and recreational value. Required maintenance of these areas is specified in the Base Operating Service Contract.

## 2.5 Proximity of the Activity to Local Natural Areas

The Meeman-Shelby Forest State Park is the largest local natural area in proximity to NAVSUPPACT Mid-South. This 13,467-acre state park is a Wildlife Management Area located on the Mississippi

River, approximately 10 miles west of the Installation. The park provides wildlife habitat for deer (*Odocoileus* sp.), turkey (*Meleagris gallopavo*), beaver (*Castor canadensis*), and over 200 species of birds. Approximately two-thirds of the park is bottomland hardwood forest composed of large oak (*Quercus* sp.), cypress (*Taxodium* sp.), and tupelo (*Nyssa* sp.). The Meeman-Shelby Forest State Park offers lakes for boating and fishing, 20 miles of hiking trails, paved bike trails, and camping opportunities.

The Mississippi River floodplain bottomland forest once extensively covered the areas where Millington, Tennessee and NAVSUPPACT Mid-South are currently located. It remains a major migration corridor for waterbirds, shorebirds, raptors and songbirds. Forty percent of North America's waterfowl and shorebirds use the Mississippi flyway to move between their breeding grounds in the north and their wintering areas along the Gulf Coast or in South America (U.S. Environmental Protection Agency 1997). The floodplain forest is also home to a large variety of amphibians, reptiles, birds and mammals. The floodplain temporarily stores and moves excess water from the river during the spring thaw or following heavy rains. Therefore, the tree species must withstand extended periods of flooding and adapt to widely different growing conditions ranging from wet to dry (U.S. Environmental Protection Agency 1997). Flooding is the major force responsible for maintaining the rich biodiversity of plants, fish, and wildlife associated with the Mississippi River. Little of the floodplain forest remains adjacent to NAVSUPPACT Mid-South, but the Installation's biodiversity is affected by the proximity to this ecosystem.

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# 3.0 GENERAL PHYSICAL ENVIRONMENT

This section describes the general physical environment of NAVSUPPACT Mid-South, including climate, grounds categories, topography, geology, soils, watersheds, and drainage patterns.

## 3.1 Climate

Southwest Tennessee has a humid, semitropical climate resulting mostly from prevailing southerly winds. These winds are of relatively low velocities; wind speeds less than 12 miles per hour (mph) occur approximately 74 percent of the time, while speeds in excess of 25 mph occur approximately 1 percent of the time (NAVSUPPACT Mid-South 1998). Temperatures are moderate throughout the year, although the area is vulnerable to cold air intrusions from the Great Plains and Canada (SOUTHDIV NAVFACENGCOM 1995a). The area averages 61 days per year with maximum temperatures above 90 degrees Fahrenheit (°F), and 43 days with minimum temperatures under 32 °F. On average, the hottest month of the year is July when temperatures average 82.7 °F and the coldest month of the year is January when temperatures average 41.2 °F (National Weather Service Memphis , TN Normal Value Period 1982 - 2010).

Precipitation at NAVSUPPACT Mid-South is heaviest in the winter and early spring when numerous low-pressure systems move through the area. Average annual precipitation at the Installation is approximately 53.68 inches. The most rainfall occurs in December, averaging 5.74 inches, while August receives the least rain, averaging 2.88 inches. Snowstorms in the Memphis area occur infrequently with an average annual snowfall of approximately 3.8 inches. Freezing rain and ice storms occur once or twice each year (National Weather Service Memphis , TN Normal Value Period 1982 - 2010).

## 3.2 Grounds Categories

NAVSUPPACT Mid-South is predominantly managed as improved and semi-improved space. All grounds on the Installation are grouped in four categories based on operational needs and the intensity of maintenance required. Of the approximately 1,470 acres managed by DoN, approximately 287 acres are considered improved. This includes grounds on which development and maintenance are performed for aesthetic purposes. Lawns, planted trees, and planted shrubs surround the buildings in these areas.

Approximately 188 acres are considered semi-improved lands, areas where mowing is performed at a reduced schedule or maintained to prevent erosion, control weeds and brush, and to reduce fire hazard. Semi-improved areas include some open fields, road shoulders, ditch slopes, drainage canals, ditches and swales.

Approximately 251 acres on NAVSUPPACT Mid-South are considered unimproved and are dominated by the forested lands on the southern portion of the Installation located adjacent to Big Creek Drainage Ditch (NAVSUPPACT Mid-South 1993). These forests produce a yield only periodically and are, therefore, not a large source of income for the Installation. The forests are managed to maintain ecological health and scenic value, and to reduce grounds maintenance costs. The unimproved areas of the Installation also include open water found on the golf course and associated with wetlands.

Table 3-1 provides a brief description of the land use categories found on the Installation. Figure 3-1 is a map depicting existing land use at NAVSUPPACT Mid-South.

**Table 3-1**
**Brief Description of the Grounds Categories Found at NAVSUPPACT Mid-South**

| Grounds Category | Approximate Acreage/Brief Description |
|---|---|
| Improved | This land consists of approximately 290 acres of buildings, lawns, planted trees, and planted shrubs surrounding the buildings of the Installation. These lands require intense maintenance for beautification purposes. |
| Semi-improved | This land consists of 188 acres and includes some open fields, road shoulders, ditch slopes, drainage canals, ditches, and swales. It requires either reduced mowing frequency or areas where maintenance is performed for erosion and weed control only. |
| Unimproved | This land use consists of 206 acres and includes the bottomland hardwood forest, loblolly pine forests, and open water on the Installation. The forestry lands are managed through the established forestry management procedures. |

## 3.3 Topography and Geology

### *3.3.1 Physiography and Topography*

The Memphis area, including NAVSUPPACT Mid-South, occupies portions of two major subdivisions of the Coastal Plain physiographic province. To the west, and closest to the Mississippi River, the Mississippi Alluvial Plain is characterized by deposits of sand, silt, clay, and gravel, and is a productive agricultural area. Elevations in the Mississippi Alluvial Plain range between 180 and 230 feet above mean sea level (msl). East of the Mississippi River is the Gulf Coastal Plain, which is characterized by gently rolling to steep topography resulting from erosion of Quaternary and Tertiary sands, silts, clays, gravel, and loess. Elevations in this subdivision range from 190 to 470 feet above msl (SOUTHDIV NAVFACENGCOM 1998).

The topography of NAVSUPPACT Mid-South slopes downward from northeast to southwest toward Big Creek Drainage Ditch. Much of the activity lies between 260 and 270 above msl and the topography is characteristic of a relatively flat alluvial plain. The majority of the Installation has a slope of 1-to-5 percent. Most of the Installation has been cleared for institutional use (SOUTHDIV NAVFACENGCOM 1995a; U.S. Geological Service [USGS] 1997).

### *3.3.2 Geology*

NAVSUPPACT Mid-South is located within the north-central Mississippi Embayment, a broad syncline that plunges southward along an axis that approximates the Mississippi River (USGS 1997). The geology and hydrogeology consists of a thick sequence of unconsolidated Quaternary and Tertiary sediments. This sequence comprises the Wilcox Group, Claiborne Group, Terrace Deposits, and the surficial Loess deposits. Loess deposits are windblown sediments comprised of silt, silty clay, clay, and minor amounts of sand. Two major aquifer systems are included in this sequence: the Fort Pillow Formation (Wilcox Group) and the Memphis Sand Formation (Lower Claiborne Group). These aquifers provide approximately 95 percent of the municipal and industrial water supplies for the Memphis and Shelby County areas (NAVSUPPACT Mid-South 1996; USGS 1997). The central Mississippi Valley is the most earthquake prone region of the United States east of the Rocky Mountains. Scientists refer to the part of the region in which most quakes occur as the New Madrid

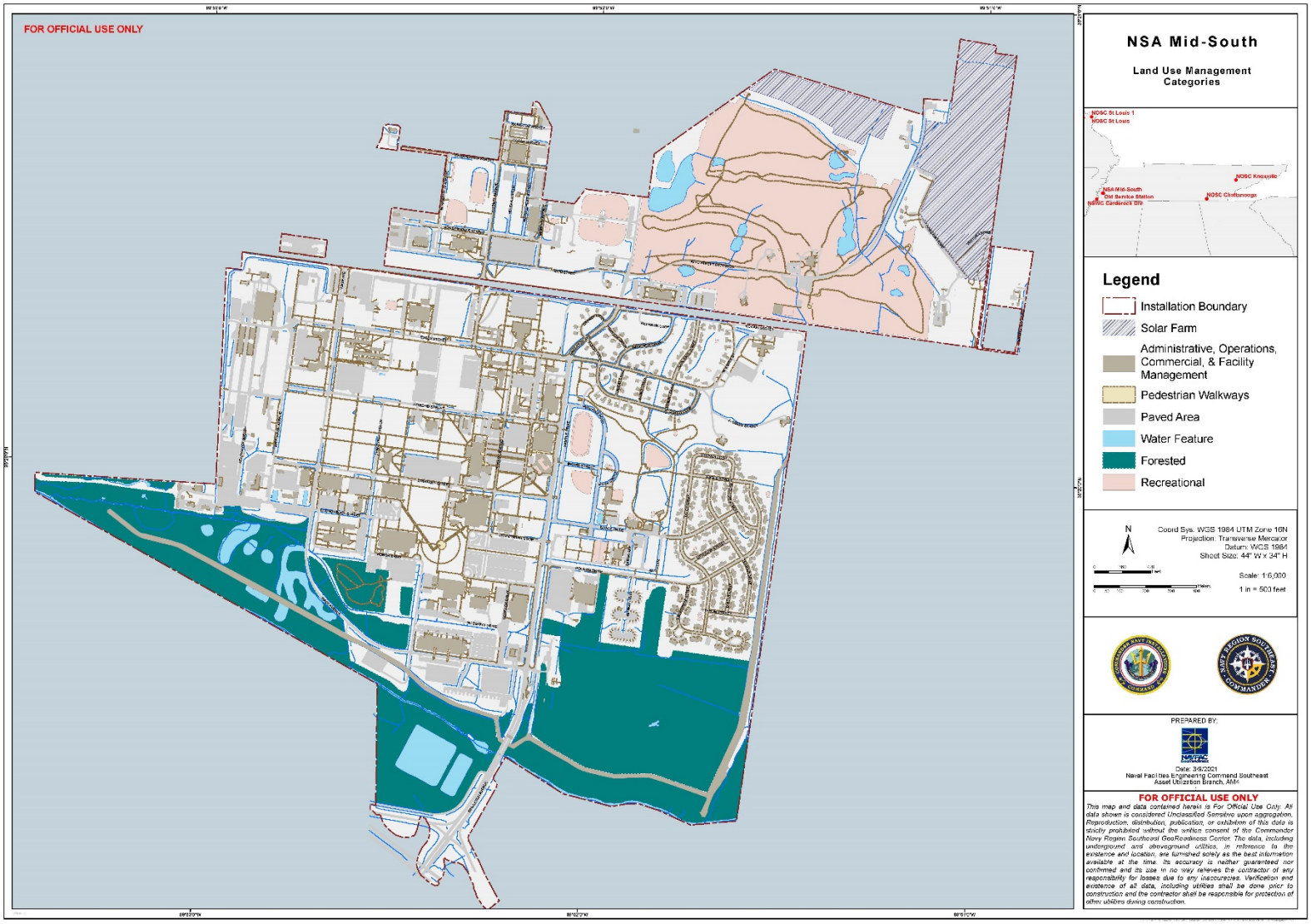



**Figure 3-1. Existing NAVSUPPACT Mid-South Grounds Category**

seismic zone. It lies within the central Mississippi Valley, extending from northeast Arkansas through southeast Missouri, western Tennessee, and western Kentucky to southern Illinois. Historically, this area has been the site of some of the largest earthquakes in North America. In the winter of 1811-1812, three earthquakes occurred in this region, all with magnitudes greater than 8.0 on the Richter Scale, dramatically altering the landscape. Two other major-damage level earthquakes have occurred since then and seismic instruments regularly document earthquakes in the New Madrid seismic zone (about 150 per year), although most are too small to be felt (USGS 1995; USGS 1996; Center for Earthquake Research and Information 2001). Earthquake information, maps, and probability forecasts are available on-line from the Center for Earthquake Research and Information at the University of Memphis (http://www.ceri.memphis.edu/).

## 3.4 Soils

The USDA's Soil Conservation Service (renamed the NRCS) mapped and classified the Installation's soils in 1970. Two major native soil associations were identified in the vicinity of NAVSUPPACT Mid-South: the Falaya-Waverly-Collins Association, characterized by long, wide, flat bottoms along streams that meander through rolling uplands, and the Memphis-Granada-Loring Association, characterized by broad, rolling, low-lying hills dissected by numerous small drainages.

Disturbed soils are the dominant soil types at the Installation. These soils include Graded land silty materials (Gr) and Filled land silty soils (Fs), and consist of materials that have been moved or graded in preparation of the industrial and residential development at NAVSUPPACT Mid-South. These graded and filled soil types have displaced most of the native soils of the Installation. Prior to grading, Grenada, Loring, and Memphis soils were the predominant soil types in the area. However the original soil profile has been so disturbed that these soils cannot be identified (SOUTHDIV NAVFACENGCOM 1995a).

Table 3-2 further describes the properties of soil types present on NAVSUPPACT Mid-South. Figure 3-2 depicts the locations of the soil associations at and in the vicinity of NAVSUPPACT Mid-South.

**Table 3-2**
**Properties of the Soil Types Found at NAVSUPPACT Mid-South**

| Name | Type | Drainage | Properties | Slope (percent) |
|---|---|---|---|---|
| Calloway (Ca) | Silt loam | Somewhat poorly drained | Seasonally high water table perched above fragipan. Slopes are low and surface runoff is slow. Permeability is slow. | 0 to 5 |
| Falaya (Fm) | Silt loam | Somewhat poorly drained | Somewhat poorly drained soil that is flooded during winter and spring, but usually not for more than a few hours. Permeability is moderately slow to moderate. | 0 to 2 |
| Filled land (Fs) | Silty | | Soil material that has been moved for the purpose of leveling and building up sites. Moderately slow to moderate permeability, and high water-holding capacity. | 1 to 5 |
| Graded Land (Gr) | Silty | | Soil materials that have been moved and graded in preparation for development. Consist of Grenada, Loring, and Memphis soils so disturbed that they cannot be identified. Moderately slow to moderate permeability. | 1 to 5 |
| Grenada (GaB, GaB2) | Silt loam | Moderately Well Drained | Very deep soil with a fragipan. Above and below fragipan permeability is moderately slow to moderate. Available water capacity is low in the fragipan and highest in the surface layer. | 0 to 2 |
| Loring (LoB2, LoC2, LoD2) | Silt loam | Well Drained | Nearly level to strongly sloping soil with a weak fragipan. Farmed soils that are mixtures of surface and subsurface layers in certain areas. Has a medium water-holding capacity. | 0 to 20 |
| Memphis (MeB, MeD2, MeE, MeF3) | Silt loam | Well Drained | Very deep, friable soils. Permeability is moderately slow to moderate. Surface runoff is medium to very high. Available water capacity is high. | 2 to 5 |
| Waverly (Wv) | Silt loam | Poorly Drained | Nearly level, deep soils. Water table is less than 1.0 foot during winter and spring; areas in depressions are ponded during wet seasons. | 0 to 2 |

Source: Sease et al. 1970

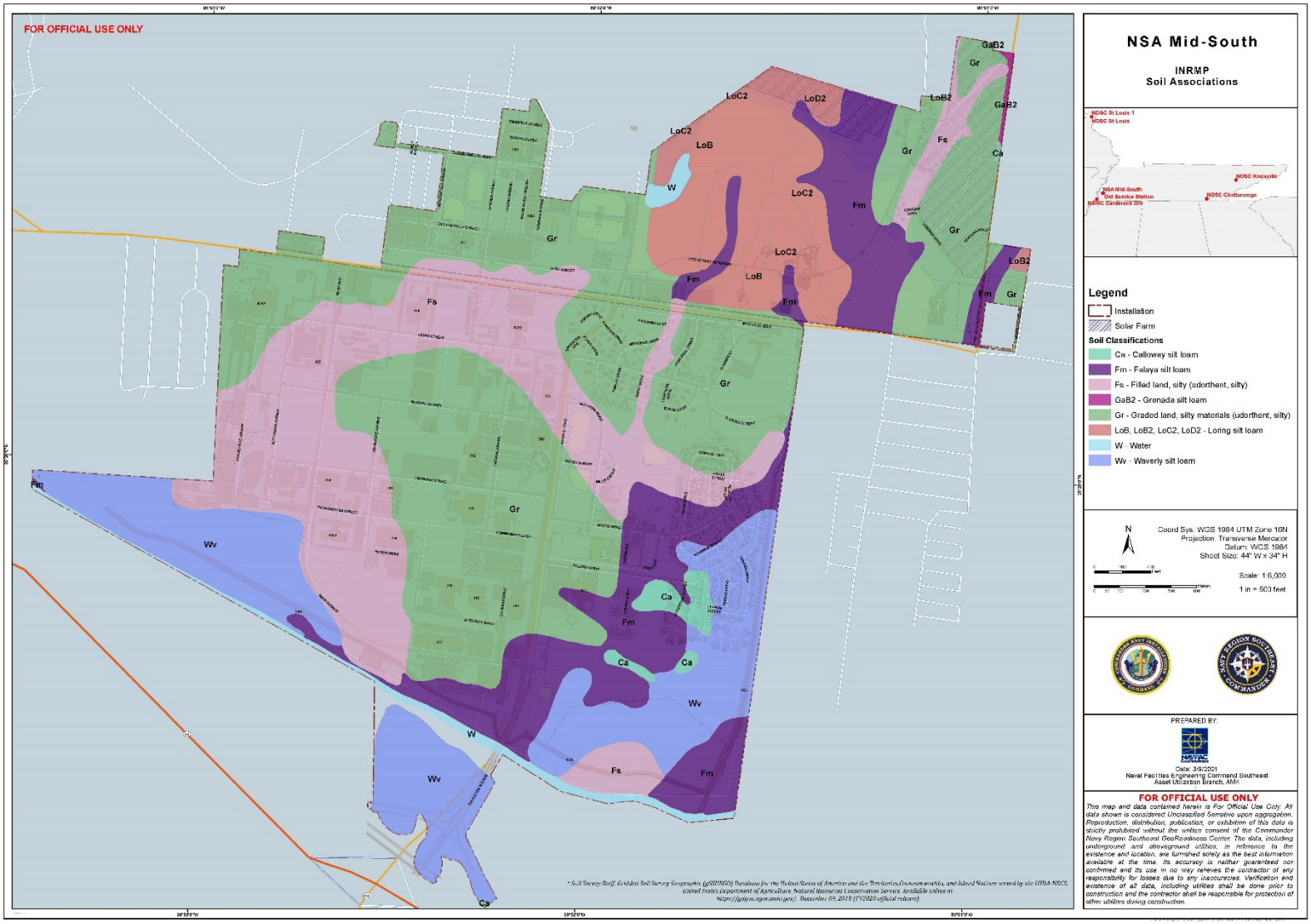



**Figure 3-2 Locations of the Soil Associations Present on NAVSUPPACT Mid-South**

## 3.5 Water Resources

### *3.5.1 Surface Water*

Surface water features at NAVSUPPACT Mid-South include streams, ponds, lakes, and wetlands. The hydrology of all surface water features on the Installation has been significantly modified throughout the life of the Installation. Theses surface water features are illustrated in Figure 3-3.

One major stream runs through the Installation. This stream, Big Creek Drainage Ditch, is an engineered waterway that drains the majority of the surface water runoff on the Installation. Big Creek Drainage Ditch follows the majority of the southern boundary of the Installation and services storm water attenuation through a series of natural drainages, open ditches, small streams, stormwater culverts, and stormwater collection pipes (NAVSUPPACT Mid-South 1996).

While Big Creek Drainage Ditch is the major outflow on the Installation, numerous other stormwater outflows occur. All outfalls are permitted under a DoN group National Pollution Discharge Elimination System permit application for stormwater outfalls at Navy facilities (SOUTHDIV NAVFACENGCOM 1998). No monitoring is required under the current permitting system. However, systematic sampling is carried out according to stipulations of the pollution prevention plan.

USFWS National Wetlands Inventory maps, which were prepared primarily by stereoscopic analysis of high-altitude aerial photographs, were used during a 1994 survey of NAVSUPPACT Mid-South wetlands (Merritt and Carter 1994). This survey included areas north of Navy Road that were owned by NAVSUPPACT Mid-South, but have since been transferred to the City of Millington. Additional USFWS mapping was carried out in 2009.

Nine freshwater ponds are found on NAVSUPPACT Mid-South. These are man-made, either by impoundment or excavation. Of the nineponds (Ponds 12, 25, 26, 27, 28, 30, 31, 32, and 33 on Figure 3-3) all are located on the golf course north of Navy Road. These ponds total approximately 9.25 acres and are used for storing irrigation water, provide course hazards, as well as, habitat for a variety of wildlife species. They are influenced by human activity associated with management of the golf course.

Four ponds (20, 21, 22 and 34) are permanent stormwater controls. Ponds 20 and 22 are bioretention ponds associated with the runoff from the Marine Reserve Center. These ponds are designed to retain the first one inch of rain event. Ponds contain Paper Birch and Cypress trees along with various ornamental shrubs. Ponds 21 and 34 are dry detentions pond that remain dry except during rain events. Grass vegetation lines the bottom of these ponds.

Wetlands 8, 15, 16, and 17, as depicted in Figure 3-3, are remnants of the Big Creek wetland complex. These wetlands are completely isolated except during times of significant flooding. Dominant tree species associated with these wetlands include red maple (*Acer rubrum*), American sycamore (*Plantanus occidentalis*), shellbark hickory (*Carya laciniosa*), green ash (*Fraxinus pennsylvanica*), and sweetgum (*Liquidambar styraciflua*). Shrubs in this area are typified by northern spicebush (*Lindera benzoin*) and giant cane (*Arundinaria gigantea*). The herbaceous layer of this complex of four wetlands is characterized by lizard's tail (*Saururus cernuus*) and a variety of *Scirpus* species. Oxidized root channels were found in the upper 12 inches of soil in each of the four wetlands. The mapped soil series in this wetland complex is Waverly silt loam (Merritt and Carter 1994).

Figure 3-3 shows the location of wetland 10 adjacent to Big Creek Drainage Ditch. It is an open water wetland that is seasonally inundated, and approximately 1 acre in size. It may have been created during the construction of the levy that provides flood protection to the Installation and the City of Millington. Past reports have identified this wetland as being flooded year round; however, a survey conducted in fall of 2000 by engineering-environmental Management, Inc. ($e^2M$) biologists found no evidence of sapric organic matter that would qualify this as a wetland that is inundated year round. This wetland has a vegetative community structure similar to that of wetlands 8, 15, 16, and 17 and is also in the Waverly silt loam soil class.

Wetland 19 is located in the vicinity of wetlands 8, 15, 16, and 17 adjacent to Big Creek Drainage Ditch, as shown in Figure 3-3. It is an old meander scar remnant from the natural course of Big Creek and comprises 1.57 acres (Merritt and Carter 1994). The tree layer surrounding this wetland consists of American sycamore, red maple, and other hardwood species. This wetland is also in the Waverly silt loam soil series. There is no longer any direct surface hydrological connectivity between wetland 19 and Big Creek due to the construction of man-made dikes that protect the Installation from flooding.

Wetlands 2 and 6, as depicted in Figure 3-3, are abandoned settlement basins separated by an earthen berm. These areas have reclamation potential for a variety of uses, including recreational fishing habitat or addition of natural wetland plant species. These two wetlands are inundated with water for most of the year with the exception of the driest periods. The engineered systems that once took advantage of natural processes using wetland plants, soil, and microorganisms to remove contaminants from wastewater effluent are no longer present on the site. Vegetation extends up from the water's edge in rings of various stages of succession with sedges (*Carex* sp.), and rice cutgrass (*Leersia oryzoides*) extending into an edge habitat bordering the upland hardwood forest. Species common to this transition zone include Solidago species, eastern cottonwood (*Populus deltoides*), persimmon (*Diospyros virginiana*), and poison ivy (*Toxicodendron radicans*).

Wetlands 9 and 13, as shown on Figure 3-3, are classified as Palustrine Scrub/Shrub wetland (Cowardin et al. 1979) and encompasses 0.40 acre. The dominant plant species include green ash, American sycamore, and hackberry (*Celtis occidentalis*). The shrub layer is dominated by boxelder (*Acer negundo*). Rushes (*Juncus* sp.) are dominant in the herbaceous layer. Peppervine (*Ampelopsis arborea*) and poison ivy are the dominant woody vines. The site has been mapped by USDA NRCS as a hydric soil series, Waverly silt loam. This wetland complex has been significantly modified by channelization of Big Creek, man-made levees, and a road built adjacent to the area (Merritt and Carter 1994).

Wetlands 4, 11, 20, 21, 22, and 24, as shown on Figure 3-3, are associated with the ponds on the golf course north of Navy Road. They equal approximately 6.3 acres in size and are manmade.

Wetlands 1 and 3 as shown on figure 3-3 are two small water features that are located within a much larger wetlands buffer boundry in the far southwest section of property. A heavily eroded stream channel cuts through this area before entering Big Creek to the west. The area is heavily forested with with the dominant canopy species of sycamore, eastern cottomwood, willow oak, and water oak. Understory is dominated by papaw, red maple and red buckeye.

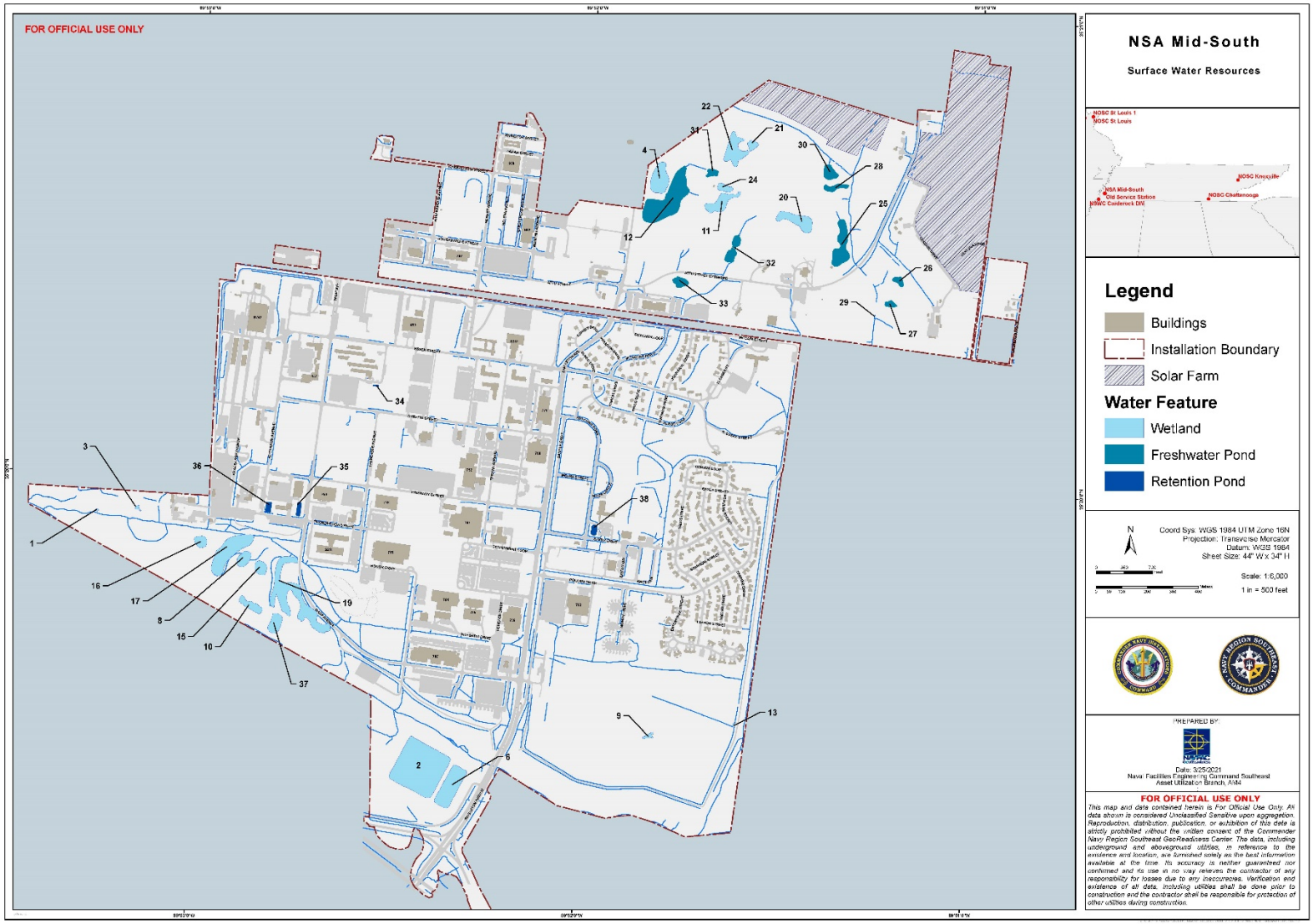



**Figure 3-3. Surface Water Resources on NAVSUPPACT Mid-South**

### *3.5.2 Groundwater*

The following hydrogeological units are present near NAVSUPPACT Mid-South:

1) The Memphis Sand aquifer consists primarily of a thick body of sand that includes subordinate layers of clay and silt at various horizons. It lies from 350 to 1,100 feet below ground and has an average depth of 500 feet. This is a regional aquifer that underlies portions of Tennessee, Missouri, Kentucky, and northeastern Arkansas. Since the first artesian well was drilled in 1887, the level of the Memphis sand aquifer has dropped only 125 feet. With an average aquifer thickness of 500 feet, the drop in the Memphis sand aquifer is an extremely small amount (SOUTHDIV NAVFACENGCOM 1995a).

2) The Fort Pillow Sand aquifer consists of sand and some clay. It ranges in thickness from 0 to 1,500 feet and was once used as the second principal aquifer for water supply to the City of Memphis. This aquifer is also the primary water source used by some industries in Memphis and the City of Millington (SOUTHDIV NAVFACENGCOM 1998).

3) The alluvium and fluvial deposits that comprise the shallow water table aquifers are found along the Big Creek Drainage Ditch at NAVSUPPACT Mid-South. The alluvium is part of the surficial aquifer; however, it is not known to supply water to any existing wells on NAVSUPPACT Mid-South or in the surrounding community.

4) The Jackson Formation, the Cockfield Formation, and the Cook Mountain Formation in the upper part of the Claiborne Group comprise the Jackson/upper-Claiborne confining unit.

# 4.0 GENERAL BIOTIC ENVIRONMENT

This section describes the general biotic environment of NAVSUPPACT Mid-South and the surrounding area, including the historic and current native vegetative cover, lawn and landscaped areas, the native fauna, and of the fisheries and wildlife habitats present on the Installation.

## 4.1 Current Vegetative Cover

NAVSUPPACT Mid-South is located at the junction of three vegetative ecoregions, as described by Bailey (1995). These include the Southern Mixed Forest Province, the Lower Mississippi Riverine Province, and the Eastern Broadleaf Forest (Continental) Province. However, the three ecoregions described below bear little resemblance to their native form at NAVSUPPACT Mid-South.

The Southern Mixed Forest Province consists of medium-tall to tall forests with broadleaf deciduous and coniferous trees. The majority of the stands are made up of loblolly pine (*Pinus taeda*), shortleaf pine (*Pinus echinata*), and other southern yellow pine species. Species associated with the Southern Mixed Forest Province include oak, hickory (*Carya* sp.), sweetgum, blackgum (*Nyssa sylvatica*), red maple, and winged elm (*Ulmus alata*). Dominant native grasses are bluestem (*Andropogon* sp.), panic grass (*Panicum* sp.), and broadleaf uniola (sea oats; *Uniola latifolia*), dogwood (*Cornus* sp.), viburnum (*Viburnum* sp.), blueberry (*Vaccinium* sp.), American beautyberry (*Callicarpa americana*), yaupon holly (*Ilex vomitoria*), and numerous woody vines (Bailey 1995). Shelby County is a botanically diverse area with approximately 722 species of known vascular plants (Chester et al. 1993). While NAVSUPPACT Mid-South itself does not have high species richness, Shelby County ranks in the top quartile of Tennessee counties for botanical diversity.

The Eastern Broadleaf (Continental) Province is dominated by broadleaf deciduous forest. This province differs from the Southern Mixed Forest Province in receiving less precipitation, which favors the drought-resistant oak-hickory association. Although other forests have oak and hickory associations, only this particular ecoregion has both species in abundance. The oak-hickory forest is medium-tall to tall, becoming savanna-like in its northern reaches. The forest understory is usually well developed, often with flowering dogwood (*Cornus florida*). Other understory species in the Eastern Broadleaf Province include sassafras (*Sassafras albidum*) and hophornbeam (*Ostrya virginiana*). The shrub layer is distinct, with some evergreens and many wildflower species. Wetter sites typically feature an abundance of American elm (*Ulmus americana*), tulip poplar (*Liriodendron tulipifera*), and sweet gum (Bailey 1995).

Prior to cultivation, the Lower Mississippi Riverine Forest Province was covered by bottomland deciduous forest with abundant green ash, Carolina ash (*Fraxinus caroliniana*), elm (*Ulmus* sp.), eastern cottonwood, sugarberry (*Celtis laevigata*), sweetgum, and water tupelo (*Nyssa aquatica*), as well as oak and baldcypress (*Taxodium distichum*). Pecan (*Carya illinoinensis*) is also present, associated with American sycamore, American elm, and roughleaf dogwood (*Cornus drummondii*). Vines are prolific along streams and drainages (Bailey 1995).

The natural landscape, including the vegetative cover, hydrology, soil associations, and topography at NAVSUPPACT Mid-South has been drastically altered from its historic form and function. The Installation is characterized by buildings, paved roadways and parking lots, mowed grasses, and scattered trees. Common Bermuda grass (*Cynodon dactylon*) is the dominant grass on the improved

areas, while Johnson grass (*Sorghum halepense*), a state Invasive Exotic Plant Species, dominates the semi-improved areas and the periphery of the unimproved areas on the Installation. Other vegetation in the semi-improved and unimproved areas include native range-type grasses (*Andropogon* sp.), partridge pea (*Chamaecrista nictitans*), upland hardwoods including willow oak (*Quercus phallus*), sugar maple (*Acer saccharum*), river birch (*Betula nigra*), loblolly pine, and the invasive Sericea lespedeza (*Lespedeza cuneata*) (SOUTHDIV NAVFACENGCOM 1995a; NAVSUPPACT Mid-South 1993). Photograph 4-1 is a photograph of *Sericea lespedeza* photographed growing in the semi-improved areas under the power lines on the western boundary of the Installation.

**Photograph 4-1 Sericea lespedeza at NAVSUPPACT Mid-South**

The major area of natural vegetation at NAVSUPPACT Mid-South is the bottomland hardwood forest lining the Big Creek Drainage Ditch and the loblolly pine stands north of the earthen flood berm. The vegetative composition of the bottomland hardwood forest includes an overstory consisting of cottonwood, American sycamore, green ash, water hickory (*Carya aquatica*), pignut hickory (*Carya glabra*), Shumard oak (*Quercus shumardii*), boxelder, sweet gum, black willow (*Salix nigra*), dogwood, basswood (*Tilia americana*), and buckeye (*Aesculus* sp.). Green ash and water hickory dominate where depressions occur, whereas species of oaks, hickories, and sweet gum are common at higher elevations (SOUTHDIV NAVFACENGCOM 1995b). Specific cover type and timber harvest information are included in Section 6.5 of this INRMP.

A comprehensive list of plants observed on NAVSUPPACT Mid-South is presented in Table 4-1.

**Table 4-1. Plant Species Identified on NAVSUPPACT Mid-South during the 2006 Vegetation Survey**

| Species Name | Common Name | Area 1a | Area 1b | Area 2 | Area 3a | Area 3b | Area 4a | Area 4b | Area 5a | Area 5b | Area 6 | Area 7 | Area 8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Acanthacea** | | | | | | | | | | | | | |
| *Justicia ovata var. lanceolata* | Looseflower water-willow | | | | | | | | | ● | | | |
| **Aceraceae** | | | | | | | | | | | | | |
| *Acer negundo* | Boxelder | ● | ● | ● | ● | ● | ● | | ● | | | ● | |
| *Acer rubrum* | Red maple | ● | | | ● | | ● | ● | ● | | | ● | |
| *Acer saccharinum* | Silver maple | ● | | ● | | | | | | | | ● | |
| *Acer sacharum* | Sugar maple | ● | | | | | | | ● | | | | |
| **Anacardiaceae** | | | | | | | | | | | | | |
| *Rhus copallinum var. latifolia* | Winged sumac | | ● | ● | | | | ● | | | | | |
| *Rhus glabra* | Smooth sumac | | ● | ● | | | | ● | | | | | |
| *Toxicodendron radicans* | Poison ivy | ● | ● | ● | ● | | ● | ● | ● | | | ● | |
| **Anonaceae** | | | | | | | | | | | | | |
| *Asimina triloba* | Pawpaw | ● | | | ● | | | | ● | | | | |
| **Apiaceae** | | | | | | | | | | | | | |
| *Hydrocotyle umbellata* | Manyflower marsh pennywort | | | | | ● | | | | | | | |
| **Aquifoliaceae** | | | | | | | | | | | | | |
| *Ilex opaca* | American holly | ● | ● | | | | | | | | | | |
| **Araceae** | | | | | | | | | | | | | |
| *Arisaema dracontium* | Green dragon | | | | | | | | ● | | | | |
| **Araliaceae** | | | | | | | | | | | | | |
| *Aralia spinosa* | Devil's walking stick | | ● | | | | | ● | | | | | |
| ***Asplenaceae*** | | | | | | | | | | | | | |
| *Asplenium platyneuron* | Ebony spleenwort | ● | | | | | | | | | | | |
| **Asteraceae** | | | | | | | | | | | | | |
| *Ageratina altissima* | White snakeroot | ● | | | | | | | | | | | |
| *Ambrosia bidentata* | Ragweed | | ● | ● | | | | | | | | ● | |
| *Cirsium discolor* | Field thistle | | | | | | | | | | | ● | |
| *Conoclinium coelestinum* | Blue mistflower | | ● | | | | | | | | | | |
| *Erigeron philadelphicus* | Philadelphia fleabane | ● | | | | | | | | | | | |
| *Eupatorium serotinum* | Late flowering thoroughwort | ● | | | | | ● | | | | | | |
| *Eupatorium perfoliatum* | Boneset | ● | | | | | | | | | | | |

**Table 4-1. Plant Species Identified on NAVSUPPACT Mid-South during the 2006 Vegetation Survey**

| Species Name | Common Name | Area 1a | Area 1b | Area 2 | Area 3a | Area 3b | Area 4a | Area 4b | Area 5a | Area 5b | Area 6 | Area 7 | Area 8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Lactuca floridana* | Woodland lettuce | ● | | | | | | | | | | | |
| *Mikania scandens* | Climbing hempweed | ● | | ● | | | | | | | | | |
| *Pluchea camphorata* | Stink weed | ● | | | | | | | | ● | | | |
| *Solidago canadensis* | Goldenrod | ● | ● | | | | ● | | | | | ● | |
| *Symphyotrichum pilosum* | Oldfield aster | ● | ● | | | | ● | | | | | ● | |
| *Xanthium strumarium* | Cocklebur | ● | | | | | | | | ● | | | |
| **Betulaceae** | | | | | | | | | | | | | |
| Carpinus caroliniana | Ironwood | | | | ● | | | | ● | | | | |
| Ostrya virginiana | Hophornbeam | | | | | | | | ● | | | | |
| Bignoniaceae | | | | | | | | | | | | | |
| Campsis radicans | Trumpet vine | ● | ● | ● | ● | | ● | | ● | | | ● | |
| **Caprifoliaceae** | | | | | | | | | | | | | |
| Lonicera japonica | Japanese honeysuckle | ● | ● | ● | ● | | ● | | ● | | | ● | |
| Sambucus canadensis | American elder | ● | ● | | | | ● | | ● | | | | |
| **Caryophyllaceae** | | | | | | | | | | | | | |
| *Cerastium fontanum* | Mouse-ear chickweed | ● | | | | | | | | | | | |
| *Stellaria pubera* | Star chickweed | | | | | ● | | | | | | | |
| **Commelinaceae** | | | | | | | | | | | | | |
| *Commelina virginica* | Virginia dayflower | | | | ● | | | | ● | | | | |
| *Tradescantia virginiana* | Virginia spiderwort | | | | | | | | ● | | | | |
| **Convolvulaceae** | | | | | | | | | | | | | |
| Ipomoea lacunose | White star | ● | | | | | | | | | | | |
| **Cornaceae** | | | | | | | | | | | | | |
| *Cornus drummondii* | Roughleaf dogwood | ● | ● | ● | | | ● | ● | ● | | | ● | |
| **Crassulacea** | | | | | | | | | | | | | |
| *Penthorum sedoides* | Ditch stonecrop | | | | | | | | | ● | | | |
| **Cupressaceae** | | | | | | | | | | | | | |
| *Juniperus virginiana* | Eastern red cedar | ● | | ● | | | ● | | ● | | | ● | |
| **Cyperaceae** | | | | | | | | | | | | | |
| *Carex sp.* | Sedge | ● | ● | | | | | | ● | ● | | ● | |
| *Carex lupulina* | Hop sedge | ● | | | | | | | | | | | |
| *Cyperus odoratus* | Fragrant flatsedge | | | | | | ● | | | ● | | | |

**Table 4-1. Plant Species Identified on NAVSUPPACT Mid-South during the 2006 Vegetation Survey**

| Species Name | Common Name | Area 1a | Area 1b | Area 2 | Area 3a | Area 3b | Area 4a | Area 4b | Area 5a | Area 5b | Area 6 | Area 7 | Area 8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Eleocharis engelmannii* | Engelmann's spikerush | | | | | | | | | ● | | ● | |
| **Ebenaceae** | | | | | | | | | | | | | |
| *Dyospyros virginiana* | Persimmon | ● | | ● | | ● | ● | | ● | | | ● | |
| **Equisetaceae** | | | | | | | | | | | | | |
| *Equisetum hyemale* | Scouringrush horsetail | ● | | ● | | | | | | | | | |
| **Fabaceae** | | | | | | | | | | | | | |
| *Albizia julibrissin* | Mimosa | ● | ● | ● | | | ● | | | | | | |
| *Chamaecrista fasciculate* | Partidge pea | | | | | | | | | | | ● | |
| *Gleditsia triacanthos* | Honeylocust | | | | | ● | | | ● | | | | |
| *Robinia psuedoaccacia* | Black locust | | | ● | | | | | | | | ● | |
| **Fagaceae** | | | | | | | | | | | | | |
| *Quercus falcata* | Southern red oak | ● | | | ● | | | | | | | | |
| *Quercus michauxii* | Swamp chestnut oak | | | | ● | | | | ● | | | | |
| *Quercus nigra* | Water oak | ● | ● | ● | ● | | ● | ● | ● | | | ● | |
| *Quercus pagoda* | Cherrybark oak | | | | | | | | ● | | | | |
| *Quercus phellos* | Willow oak | ● | ● | | | | ● | ● | ● | | | ● | |
| *Quercus shumardii* | Shumard oak | | | | ● | | ● | | ● | | | | |
| *Quercus velutina* | Black oak | | ● | | | | | | | | | | |
| **Geraniaceae** | | | | | | | | | | | | | |
| *Geranium carolinianum* | Carolina cranesbill | ● | | | | | | | | | | | |
| **Hammamelidaceae** | | | | | | | | | | | | | |
| *Liquidambar styraciflua* | Sweetgum | ● | ● | ● | ● | ● | ● | ● | ● | | | ● | |
| **Hippocastanaceae** | | | | | | | | | | | | | |
| *Aesculus pava* | Red buckeye | | | | ● | | | | ● | | | | |
| **Juglandaceae** | | | | | | | | | | | | | |
| *Carya alba* | Mockernut hickory | | | | ● | | ● | | ● | | | | |
| *Carya ovata* | Shagbark hickory | | | | ● | | | | | | | | |
| *Juglans nigra* | Black walnut | | | | | | ● | | ● | | | | |
| **Juncaceae** | | | | | | | | | | | | | |
| Juncus effuses | Soft rush | ● | ● | | | ● | | | | ● | | | |
| **Lamiaceae** | | | | | | | | | | | | | |

**Table 4-1. Plant Species Identified on NAVSUPPACT Mid-South during the 2006 Vegetation Survey**

| Species Name | Common Name | Area 1a | Area 1b | Area 2 | Area 3a | Area 3b | Area 4a | Area 4b | Area 5a | Area 5b | Area 6 | Area 7 | Area 8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Glechoma hederacea | Ground ivy | ● | | | | | | | | | | | |
| **Lauraceae** | | | | | | | | | | | | | |
| *Cocculus carolinus* | Carolina snailseed | ● | | | | | | | | | | | |
| *Lindera benzoin* | Spicebush | | | | ● | | | | ● | | | | |
| *Sassafras albidum* | Sassafras | | | | ● | | | | | | | ● | |
| **Liliaceae** | | | | | | | | | | | | | |
| *Allium vineale* | Wild garlic | ● | | | | | | | | | | | |
| **Magnoliaceae** | | | | | | | | | | | | | |
| *Liriodendron tulipifera* | Tulip tree | ● | | | | ● | | ● | ● | | | | |
| **Menispermaceae** | | | | | | | | | | | | | |
| *Calycocarpum lyoni* | Cupseed | ● | | | | | | | | | | | |
| **Moraceae** | | | | | | | | | | | | | |
| *Broussonetia papyrifera* | Paper mulberry | ● | | | | | ● | | ● | | | | |
| *Morus alba* | White mulberry | ● | | | | | ● | | ● | | | | |
| *Morus rubra* | Red mulberry | ● | ● | | ● | | ● | | ● | | | | |
| **Oleaceae** | | | | | | | | | | | | | |
| *Fraxinus americana* | White ash | ● | | | | ● | ● | | | ● | | | |
| *Fraxinus pennsylvanica* | Green ash | ● | ● | ● | ● | | ● | ● | ● | | | ● | |
| *Ligustrum sinense* | Chinese privet | ● | ● | ● | ● | | ● | ● | ● | | | ● | |
| **Onagraceae** | | | | | | | | | | | | | |
| *Ludwigia alternifolia* | Seedbox | | | | | ● | | | | ● | | | |
| *Ludwigia peploides* | Floating primrose-willow | | | | | | | | | ● | | | |
| **Ophioglossaceae** | | | | | | | | | | | | | |
| *Botrychium virginianum* | Rattlesnake fern | ● | | | | | ● | | | | | | |
| **Passifloraceae** | | | | | | | | | | | | | |
| *Passiflora incarnate* | Purple passionflower | | | | | | | | | | | ● | |
| **Phytolaceae** | | | | | | | | | | | | | |
| *Phytolacca americana* | Pokeweed | ● | ● | ● | | | ● | | | | | ● | |
| **Pinaceae** | | | | | | | | | | | | | |
| Pinus taeda | Loblolly pine | ● | ● | ● | | | ● | ● | | | ● | ● | ● |

**Table 4-1. Plant Species Identified on NAVSUPPACT Mid-South during the 2006 Vegetation Survey**

| Species Name | Common Name | Area 1a | Area 1b | Area 2 | Area 3a | Area 3b | Area 4a | Area 4b | Area 5a | Area 5b | Area 6 | Area 7 | Area 8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Platanaceae** | | | | | | | | | | | | | |
| *Platanus occidentalis* | Sycamore | ● | ● | | ● | ● | ● | | ● | | | | |
| **Poaceae** | | | | | | | | | | | | | |
| *Andropogon virginicus* | Broomsedge bluestem | | ● | | | | ● | | | | | ● | |
| *Arundinaria gigantea* | Giant cane | | | | ● | | | | ● | | | | |
| *Chasmanthium latifolium* | Indian wood oats | ● | | | | | | | | | | | |
| *Cynodon dactylon* | Bermuda grass | | | | | | ● | | | | | | |
| *Dichanthelium laxiflorum* | Openflower rossette grasses | ● | ● | ● | | | | | ● | | | | |
| *Echinochloa crus-galli* | Barnyard grass | | | | | ● | | | | ● | | | |
| *Elymus canadensis* | Canada wildrye | ● | | | | | | | | | | | |
| *Leersia oryzoides* | Rice cutgrass | | | | | ● | | | | | | | |
| *Phalaris arundinacea* | Canary grass | ● | ● | | | | ● | | | | | | |
| *Setaria pumila* | Yellow foxtail | | | | | | ● | | | | | ● | |
| *Sorgham halepense* | Johnson grass | ● | ● | | | | | | | | | ● | |
| *Sporobolus junceus* | Pineywoods dropseed | | ● | | | | | | | | | | |
| **Polygonaceae** | | | | | | | | | | | | | |
| *Brunnichia ovata* | Ladies' eardrops | | | | | | | | ● | | | | |
| *Polygonum hydropiperoides* | Swamp smartweed | | ● | | | ● | | | | | | ● | |
| *Polygonum pennsylvanicum* | Pennsylvania knotweed | ● | ● | | | ● | | | | ● | | | |
| *Rannunculaceae* | | | | | | | | | | | | | |
| *Clematis virginiana* | Virgin's bower | | | | | | | | | | | ● | |
| *Ranunculus* sp. | Buttercup | ● | | | | | | | | | | | |
| **Rhamnaceae** | | | | | | | | | | | | | |
| *Berchemia scandens* | Alabama supplejack | ● | | | ● | | | | | | | | |
| **Rosaceae** | | | | | | | | | | | | | |
| *Prunus serotina* | Black cherry | ● | ● | | ● | | | | | | | ● | |
| *Pyrus calleryana* | Pear | ● | | | | | | | | | | ● | |
| *Rosa multiflora* | Multiflora rose | ● | | ● | | | | | | | | ● | |
| *Rubus flagellaris* | Northern dewberry | ● | | | ● | | ● | | | | | | |
| *Rubus trivialis* | Southern dewberry | ● | ● | ● | | | ● | | ● | | | ● | |
| **Rubiaceae** | | | | | | | | | | | | | |
| *Mitchella repens* | Partridge berry | | | | | | ● | | ● | | | | |

**Table 4-1. Plant Species Identified on NAVSUPPACT Mid-South during the 2006 Vegetation Survey**

| Species Name | Common Name | Area 1a | Area 1b | Area 2 | Area 3a | Area 3b | Area 4a | Area 4b | Area 5a | Area 5b | Area 6 | Area 7 | Area 8 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Salicaceae** | | | | | | | | | | | | | |
| *Populus deltoides* | Cottonwood | ● | | ● | ● | | ● | | ● | | | ● | |
| *Salix nigra* | Black willow | ● | | ● | | | ● | | ● | ● | | ● | |
| **Saururaceae** | | | | | | | | | | | | | |
| *Saururus cernuus* | Lizard's tail | | | | | | | | ● | | | | |
| **Smilacacea** | | | | | | | | | | | | | |
| *Smilax bona-nox* | Saw greenbrier | ● | | | ● | | | | | | | | |
| *Smilax glauca* | Cat greenbrier | ● | | | | | | | | | | | |
| *Smilax rotundifolia* | Common greenbrier | ● | ● | | | | | | ● | | | | |
| **Ulmaceae** | | | | | | | | | | | | | |
| *Celtis laevigata* | Sugarberry | ● | ● | | ● | | ● | | ● | | | | |
| *Celtis occidentalis* | Hackberry | ● | | ● | | | ● | | | | | | |
| *Ulmus americana* | American elm | ● | ● | ● | ● | | ● | | | | | | |
| *Ulmus rubra* | Slippery elm | ● | ● | | | | | | ● | | | | |
| **Urticaceae** | | | | | | | | | | | | | |
| *Boehmeria cylindrica* | False nettle | ● | ● | | ● | | ● | | ● | ● | | | |
| *Laportea canadensis* | Canadian wood nettle | | | | ● | | | | | | | | |
| *Pilea pumila* | Canadian clearweed | | | | ● | | | | | | | | |
| *Urtica dioica* | Stinging nettle | ● | | | ● | | | | | | | | |
| *Tragia cordata* | Heartleaf noseburn | | | | ● | | | | | | | | |
| **Violaceae** | | | | | | | | | | | | | |
| Viola sororia | Common blue violet | ● | | | | | | | ● | | | | |
| **Vitaceae** | | | | | | | | | | | | | |
| *Ampelopsis arborea* | Peppervine | ● | ● | | | | | | | ● | | | |
| *Parthenocissus quinquefolia* | Virginia creeper | ● | | ● | ● | | ● | | ● | | | ● | |
| *Vitis palmata* | Catbird grape | ● | ● | | | | ● | | ● | | | | |

**Note:** Area 1a to Area 8 pertain to different unimproved and semi-improved portions of the installation, generally situated from south-to-north. See Ensafe 2006b for an applicatble map.
● — Denotes that the species was observed

## 4.2 Lawn and Landscaped Areas

The lawn and landscaped areas at NSA Mid-South are managed in accordance with the Base Operating Service Contract (BOSC). The Contractor provides routine grounds maintenance and landscaping services for the vast majority of improved grounds, excluding the golf course and a few tenants of NSA Mid-South that are not part of contract (Moral Welfare and Recreation [MWR] provides maintenance of golf course, RV park, and rental housing). The BOSC provides guidance on mowing frequencies, weed control, pruning, and landscaping for the improved and semi-improved areas at the activity. Tree and shrub selections for plantings are outlined in the Land Management Section of the Natural Resources Management Plan as well. Tables 4-2 and 4-3 summarize the tree and shrub selections by type, size, use and area used at NAVSUPPACT Mid-South. Several of these species recommended to be planted in the Land Management Section of the Natural Resources Plan at NAVSUPPACT Mid-South have been identified by *Desirable Native Plants for Millington N.A.S.* (Touliatos undated) as species that should never be planted as landscape plants in Tennessee. This discrepancy and others are further described in Section 6.4. This plan also calls for the protection of natural vegetation through incorporation of soil, water, and vegetative conservation requirements in the preliminary engineering, design, and construction of new facilities and alterations (NAVSUPPACT Mid-South 1993).

**Table 4-2. Tree Selections Currently Used for Landscape Planting at NAVSUPPACT Mid-South**

| Common Name | Scientific Name | Size | Use | Type Area |
|---|---|---|---|---|
| Crape myrtle | *Logerstroemia indica* | Small | Summer flower | Sun |
| Dogwood | *Cornus florida* | Small | Flower | Partial Sun |
| Flowering crab apple | *Malus hybrida* | Small | Flower | Sun |
| Flowering (Bradford) pear | *Pyrus calleryana* | Small | Shade & Flower | Sun |
| Palmetto | *Sabel palmetto* | Small | Ornamental | Sun |
| River Birch | *Betula nigra* | Small | Ornamental | Partial Shade |
| Loblolly pine | *Pinus taeda* | Large | Shade | Sun and Partial Shade |
| Red maple | *Acer rubrum* | Large | Shade | Sun and Shade |
| Live oak | *Quercus virginiana* | Large | Shade | Sun and Partial Shade |
| Willow oak | *Quercus phellos* | Large | Shade | Sun |
| Yellow popular | *Liriodendron tulipifera* | Large | Shade | Sun |
| Laurel oak | *Quercus larifolia* | Large | Shade | Sun or Partial Shade |

**Notes:** Size Small = 10 feet to 40 feet tall
Large = 40 feet tall or more
**Source:** Adapted from NAVSUPPACT Mid-South 1993

**Table 4-3. Shrub Selections Currently Used for Landscape Planting at NAVSUPPACT Mid-South**

| Common Name | Scientific Name | Size | Use | Type Area |
|---|---|---|---|---|
| Bar Harbor juniper | *Juniperus horizontalis 'bar harbor'* | Small | Ground Cover | Full Sun |
| Barberry | *Berberis thunbergii* | Small | Landscape | Sun and Partial Shade |
| Dwarf pittosporum | *Pittasporum tabira 'Whellers Dwarf'* | Small | Foundation, Planting | Sun |
| Hybrid azalea | *Azalea hybrida* | Small | Landscape | Partial Shade |
| Dwarf yaupon | *Ilex vomitoria nana* | Small | Landscape | Sun |
| Heller's Japanese holly | *Ilex crenata 'Helleri'* | Small | Foundation | Sun |
| Indian hawthorn | *Raphiolepis indica* | Small | Landscape | Sun and Shade |
| Dwarf burford holly | *Ilex cornuta 'burfordii nana'* | Medium | Foundation, Screen | Sun |
| Japanese boxwood | *Buxus microphylia japonica* | Medium | Foundation, Border | Sun and Shade |

**Table 4-3, continued.**

| Common Name | Scientific Name | Size | Use | Type Area |
|---|---|---|---|---|
| Littleleaf Japanese holly | *Ilex crenata'microphylla'* | Medium | Specimen, Background | Sun and Shade |
| Wintergreen barberry | *Berberis julianae* | Medium | Specimen, Background | Sun and Partial Shade |
| Cleyera | *Cleyera japonica* | Large | Specimen, Borders | Partial Shade |
| Fraser photinia | *Photinia fraserl* | Large | Foundation, Specimen, Screen | Sun |
| Indian azalea | *Azalea indica* | Large | Landscape | Sun and Shade |
| Ligustrum | *Ligustrum lucidium* | Large | Foundations, Accent, Screens | Sun and Partial Shade |
| Pittosporum | *Pittosporus tobira* | Large | Foundations, Accent, Screens | Sun and Shade |
| Podocarpus | *Podocarpus macrophyllus maki* | Large | Foundation | Sun and Shade |
| Viburnum | *Viburnum macrophylla* | Large | Foundation, Specimen | Sun |
| Wax myrtle | *Myrica corifera* | Large | Specimen, Borders | Sun and Partial Shade |

**Notes:** Size Small = 4 feet to 6 feet tall Medium = 4 feet to 6 feet tall Large = 6 feet to 12 feet tall
**Source:** Adapted from NAVSUPPACT Mid-South 1993

The Land Management Section of the Natural Resources Management Plan also contains a Ground Maintenance Plan of Operations that provides guidance for reducing expenditures and controlling pollution. This Plan of Operations calls for covering of all bare ground areas with grass to control sedimentation of streams and wetlands, which is considered non-point source pollution. The use of herbicides is limited to areas where the slope of a road shoulder or drainage ditch is too steep for mowing; however these herbicides must be selectively used and must not destroy vegetation to the point that erosion control is lost (NAVSUPPACT Mid-South 1993).

## 4.3 Native Fauna on the Installation

The bottomland forest habitat of the Big Creek Drainage Ditch and its associated wetlands provides the most extensive natural wildlife habitat at the site for wildlife to reside. The agricultural fields are surrounded by overgrown areas and timberland, providing adequate habitat for white-tailed deer (*Odocoileus virginianus*). Populations of quail and rabbit exist around the agricultural fields and the old abandoned, overgrown farms surrounding the airfield at Millington Municipal Airport (Merritt 1996).

### *4.3.1 Birds*

Avifauna surveys have been conducted NAVSUPPACT Mid-South at various times (Merritt and Bingham 1997, TDEC 2001, EnSafe 2006a, GSRC 2016). Most bird species at the Installation are generalists that have adapted to the urban campus-like environment. Seventy avian species were observed during the most recent survey at the Installation in 2015-16 (GSRC 2016), and an additional 25 species were observed during previous surveys, as presented in Table 4-4.

Although not listed in Table 4-4, raptors such as the eastern screech owl and great-horned owl do winter in Shelby County, and the bald eagle (*Haliaeetus leucocephalus*) and peregrine falcon (*Falco peregrinus*; federally-endangered) are considered transient species in the area (USFWS 1993).

Waterfowl species are limited in number at NAVSUPPACT Mid-South because of the lack of habitat in the campus-like setting. The bottomland hardwoods associated with the Big Creek Drainage Ditch provides some habitat, as do the golf course ponds, but other ponds and lakes in the region are preferred by waterfowl.

**Table 4-4. Bird Species Observed at NAVSUPPACT Mid-South in 2015-16**

| Common Name | *Scientific name* | Spring | Fall |
|---|---|---|---|
| American coot [P] | *Fulica americana* | | |
| American crow | *Corvus brachyrhynchos* | X | X |
| American goldfinch [P] | *Carduelis tristis* | | |
| American kestrel | *Falco sparverius* | X | X |
| American robin | *Turdus migratorius* | X | X |
| Bank swallow | *Riparia riparia* | X | |
| Barn swallow | *Hirundo rustica* | X | X |
| Belted kingfisher | *Megaceryle alcyon* | X | X |
| Blue jay | *Cyanocitta cristata* | X | X |
| Blue-gray gnatcatcher | *Polioptila caerulea* | X | |
| Blue-winged teal | *Anas discors* | X | |
| Brewer's blackbird | *Euphagus cyanocephalus* | X | |
| Brown creeper [P] | *Certhia americana* | | |
| Brown thrasher | *Toxostoma rufum* | X | X |
| Brown-headed cowbird | *Molothrus ater* | X | |
| Bufflehead [P] | *Bucephala albeola* | | |
| Canada goose | *Branta canadensis* | X | X |
| Carolina chickadee | *Poecile carolinensis* | X | X |
| Carolina wren | *Thryothorus ludovicianus* | X | X |
| Cedar waxwing | *Bombyclilla cedrorum* | X | |
| Chimney swift | *Chaetura pelagica* | | X |
| Chipping sparrow | *Spizella passerine* | X | |
| Common flicker [P] | *Colaptes auratus* | | |
| Common goldeneye | *Bucephala clangula* | X | |
| Common grackle | *Quiscalus quiscula* | X | |
| Common snipe [P] | *Capella gallinago* | | |
| Common yellowthroat [P] | *Geothlypis trichas* | | |
| Cooper's hawk | *Accipiter cooperii* | X | |
| Dark-eyed junco [P] | *Junco hyemalis* | | |
| Downy woodpecker | *Picoides pubescens* | X | X |
| Eastern belted kingfisher [P] | *Ceryle alcyon* | | |
| Eastern bluebird | *Sialia sialis* | X | X |
| Eastern kingbird | *Tyrannus tyrannus* | X | X |
| Eastern meadowlark | *Sturnella magna* | X | X |
| Eastern phoebe | *Sayornis phoebe* | X | X |
| Eastern towhee | *Pipilo erythrophthalmus* | X | X |
| Eastern wood-pewee | *Contopus virens* | X | X |
| Eurasian collared-dove | *Streptopelia decaocto* | X | X |
| European starling | *Sturnus vulgaris* | X | X |
| Field sparrow | *Spizella pusilla* | X | X |
| Fox sparrow [P] | *Passerella iliaca* | | |
| Golden-crowned kinglet [P] | *Regulus satrapa* | | |
| Grasshopper sparrow [P] | *Ammodramus savannarum* | | |
| Gray catbird | *Dumetella carolinensis* | | X |
| Graylag goose | *Anser anser* | X | X |
| Great blue heron | *Ardea herodias* | X | X |

**Table 4-4. Bird Species Observed at NAVSUPPACT Mid-South in 2015-16**

| Common Name | *Scientific name* | Spring | Fall |
|---|---|---|---|
| Great egret | *Ardea alba* | X | |
| Green heron | *Butorides virescens* | X | |
| Hairy woodpecker | *Picoides villosus* | X | X |
| Hermit thrush [P] | *Catharus guttatus* | | |
| Hooded merganser [P] | *Lophodytes cucullatus* | | |
| House finch | *Haemorhous mexicanus* | X | |
| House sparrow | *Passer domesticus* | X | |
| Indigo bunting | *Passerina cyanea* | X | |
| Killdeer | *Charadrius vociferus* | X | X |
| Loggerhead shrike [P] | *Lanius ludovicianus* | | |
| Mallard | *Anas platyrhynchos* | X | X |
| Merlin [P] | *Falco columbarius* | | |
| Mississippi kite [P] | *Ictinia mississippiensis* | | |
| Mourning dove | *Zenaida macroura* | X | X |
| Northern cardinal | *Cardinalis cardinalis* | X | X |
| Northern flicker | *Colaptes auratus* | X | X |
| Northern harrier | *Circus cyaneus* | X | |
| Northern junco [P] | *Junco hyemalis* | | |
| Northern mockingbird | *Mimus polyglottos* | X | X |
| Orange-crowned warbler | *Oreothlypis celata* | | X |
| Osprey | *Pandion haliaetus* | X | |
| Pied-billed grebe | *Podilymbus podices* | X | |
| Pileated woodpecker | *Dryocopus pileatus* | X | X |
| Pine siskin [P] | *Carduelis pinus* | | |
| Prothonotary warbler | *Protonotaria citrea* | X | |
| Purple martin | *Progne subis* | X | |
| Red-bellied woodpecker | *Melanerpes carolinus* | X | X |
| Red-headed woodpecker [P] | *Melanerpes erythrocephalus* | | |
| Red-shouldered hawk | *Buteo lineatus* | X | X |
| Red-tailed hawk | *Buteo jamaicensis* | X | X |
| Red-winged blackbird | *Agelaius phoeniceus* | X | |
| Rock dove [P] | *Columba livia* | | |
| Ruby-crowned kinglet | *Regulus calendula* | X | |
| Ruddy duck [P] | *Oxyura jamaicensis* | | |
| Savannah sparrow | *Passerculus sandwichensis* | X | |
| Solitary sandpiper | *Tringa solitaria* | X | |
| Song sparrow | *Melospiza melodia* | X | |
| Summer tanager [P] | *Piranga rubra* | | |
| Swainson's thrush | *Catharus ustulatus* | | X |
| Tree swallow | *Tachycineta bicolor* | X | |
| Tufted titmouse | *Baeolophus bicolor* | X | X |
| Turkey vulture | *Cathartes aura* | X | X |
| White-breasted nuthatch | *Sitta carolinensis* | X | |
| White-crowned sparrow | *Zonotrichia leucophrys* | X | |
| White-eyed vireo | *Vireo griseus* | X | X |
| White-throated sparrow | *Zonotrichia albicollis* | X | |
| Wild turkey [P] | *Meleagris gallopavo* | | |
| Wood duck [P] | *Aix sponsa* | | |
| Yellow-rumped warbler | *Setophaga coronate* | X | X |

**Table 4-4. Bird Species Observed at NAVSUPPACT Mid-South in 2015-16**

| Common Name | *Scientific name* | Spring | Fall |
|---|---|---|---|

Sources: Merritt and Bingham 1997, TDEC 2001, EnSafe 2006a, GSRC 2016

X – *denotes season(s) in which the species was observed*

P – *denotes the species was not observed in 2015-16, but was observed during at least one other survey on the Installation*

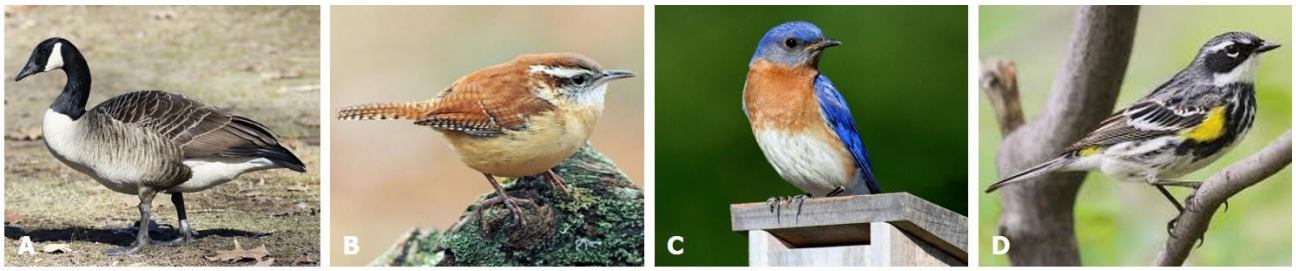



Photo source: allaboutbirds.org

**Photograph 4-2**
**Representative Avifauna at NAVSUPPACT Mid-South. (A) Canada goose, (B) Carolina chickadee, (C) Eastern bluebird, (D) Yellow-rumped warbler.**

### *4.3.2 Reptiles and Amphibians*

Reptiles observed at NAVSUPPACT Mid-South since 2006 are included in Table 4-5 (EnSafe 2006a). Less common reptilian and amphibian species that occur at or within the vicinity of the Installation include the state-threatened northern pinesnake *(Pituophis melanoleucus)*, the alligator snapping turtle *(Macroclemys temmincki)*, the mole salamander *(Ambystoma talpoideum)*, and the barking treefrog *(Hyla gratiosa)* (Merritt 1996). Photograps 4-3 illustrates four herpetofauna species observed at NAVSUPPACT Mid-South.

**Table 4-5. Reptiles and Amphibians Identified at NAVSUPPACT Mid-South**

| **Common Name** | ***Scientific Name*** | | **Common Name** | ***Scientific Name*** |
|---|---|---|---|---|
| ***FROGS*** | | | ***SNAKES*** | |
| American bullfrog | *Lithobates catesbeiaus* | | *Black rat snake* | *Pantherophis obsoleta* |
| American toad | *Anaxyrus americanus* | | *Bronze frog* | *Lithobates clamitans* |
| Bullfrog | *Lithobates catesbeiana* | | *Brown water snake* | *Nerodia taxispilota* |
| Gray tree frog | *Hyla versicolor* | | *Cottonmouth* | *Agkistrodon piscivorus* |
| Green tree frog | *Hyla cinerea* | | *Green water snake* | *Nerodia cyclopion* |
| Northern cricket frog | *Acris crepitans crepitans* | | *Hognose snake* | *Heterodon platirhinos* |
| Pickerel frog | *Lithobates palustris* | | *Midland water snake* | *Nerodia sipedon pleuralis* |
| Southern cricket frog | *Acris gryllus gryllus* | | *Northern water snake* | *Nerodia sipedon sipedon* |
| Southern leopard frog | *Lithobates utricularia* | | *Southern copperhead* | *Agkistrodon contortrix* |
| Spring peepers | *Pseudacris crucifer* | | *Yellowbelly water snake* | *Nerodia erythrogaster flavigaster* |
| ***LIZARDS*** | | | ***TURTLES*** | |
| Ground skink | *Scincella lateralis* | | *Eastern box turtle* | *Terrapene carolina* |
| ***SALAMANDERS*** | | | *Eastern spiny softshell* | *Trionyx spiniferus spiniferus* |
| Spotted salamander | *Ambystoma maculatum* | | *Midland smooth softshell* | *Apalone mutica mutica* |
| | | | *Red-eared slider* | *Trachemys scripta* |
| | | | *Snapping turtle* | *Chelydra serpentina* |


**Photograph 4-3**
**Representative Herpetofauna at NAVSUPPACT Mid-South. (A) Green tree frog, (B) Spotted salamander, (C) Juvenile southern copperhead, (D) Eastern spiny softshell.**

### *4.3.3 Mammals*

The geographic range maps reviewed on the Tennessee Animal Biogeographic System (TWRA 2002) database document 51 species of mammals occurring in western Tennessee that could potentially occur on or near NAVSUPPACT Mid-South. A survey in 2005-06 identified 11 species on the Installation (EnSafe 2006a), but subsequent bat surveys and anecdotal observations increased the number of confirmed mammal species to 21 (Table 4-6).

**Table 4-6. Mammals Identified at NAVSUPPACT Mid-South**

| Common Name | *Scientific Name* | | Common Name | *Scientific Name* |
|---|---|---|---|---|
| ***BATS*** | | | ***CANINES*** | |
| Big brown bat | *Eptesicus fuscus* | | Coyote | *Canis latrans* |
| Eastern red bat | *Lasiurus borealis* | | Red fox | *Vulpes fulva* |
| Evening bat | *Nycticeus humeralis* | | ***OTHER*** | |
| Southeastern bat | *Myotis austroriparius* | | Beaver | *Castor canadensis* |
| Tricolored bat | *Perimyotis subflavus* | | Eastern cottontail | *Sylvilagus floridanus* |
| ***RODENTS*** | | | Muskrat | *Ondatra zibethicus* |
| Beaver | *Castor canadensis* | | Mink | *Mustella vison* |
| Eastern chipmunk | *Tamias striatus* | | Nine-banded armadillo | *Dasypus novemcinctus* |
| Eastern gray squirrel | *Sciurus carolinensis* | | Opossum | *Didelphis marsupialis* |
| Fox squirrel | *Sciurus niger* | | Raccoon | *Procyon lotor* |
| Mouse | unknown spp. | | White-tailed deer | *Odocoileus virginianus* |
| Short-tailed shrew | *Blarina brevicauda* | | | |

Carnivores: The carnivores known to occur at NAVSUPPACT Mid-South are the coyote (*Canis latrans*), mink (*Mustella vison*), and raccoon (*Procyon lotor*). These carnivores may be an important component to the Installation's local ecosystems. They prey on rodents, rabbits, and insects, providing a natural means of controlling potential pest populations. Removal of high-level predators can contribute to cascading effects throughout the ecosystem.

Bats: A mist-net survey conducted in 2009 for bats captured a single eastern red bat (*Lasiurus borealis*) at the Installation (EnSafe 2009). A more comprehensive survey in 2016 captured 37 bats of 5 species, the most frequently captured species being the eastern red bat and evening bat (*Nycticeus humeralis*). The other three species captured were the big brown bat (*Eptesicus fuscus*), southeastern bat (*Myotis austroriparius*), and tricolored bat (*Perimyotis subflavus*) (Carver 2016). No federally- or state-listed bat species were captured during either survey.


**Photograph 4-4**
**Representative Mammals at NAVSUPPACT Mid-South.**
**(A) Eastern red bat, (B) Short-tailed shrew, (C) Beaver, (D) Raccoon.**

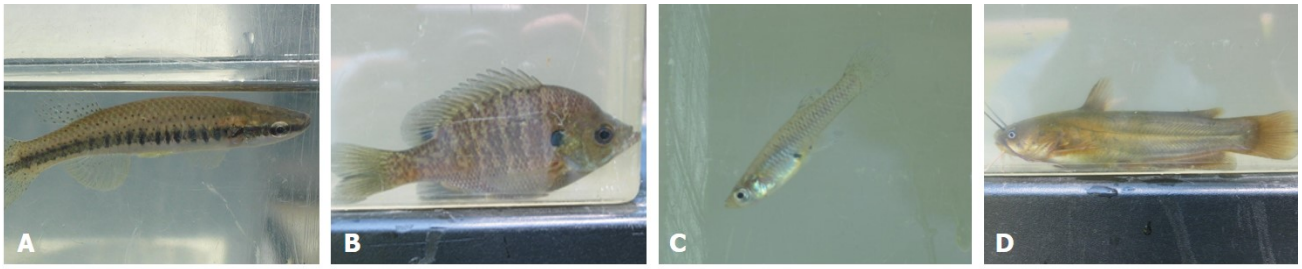
### *4.3.4 Game Animals*

Small game animals including squirrel, rabbit, quail, and dove were hunted on the north side of the NAVSUPPACT Mid-South during the 1980s, until hunting was terminated for safety reasons. A population census for small game animals has not been performed, but there are huntable populations of quail and rabbit around the agricultural fields and the old abandoned farms that are overgrown surrounding the airfield at Millington Municipal Airport (Merritt 1996).

Big game animals at NAVSUPPACT Mid-South are limited to white-tailed deer, which are primarily observed around the the nearby agricultural fields and the beaver-dam impoundment adjacent to the forested areas of NAVSUPPACT Mid-South. The white-tailed deer population has not been formally inventoried, but they are regularly seen on the Installation. Hunting management guidelines have been proposed but not yet approved.

### *4.3.5 Fish*

Table 4-7 presents the fish species identified at NAVSUPPACT Mid-South in 2005-06 (EnSafe 2006a). Surface water on most of NAVSUPPACT Mid-South installation ultimately drains into Big Creek Drainage Canal through tributary streams and ditches. Impacts include bridge crossings, channel clearing, riprap for bank stabilization, and a reduced or nonexistent riparian zone associated with the campus environment landscaping. These types of impact have reduced the diversity of stream habitats and reduced the diversity of fish species normally found utilizing them.




**Photograph 4-5**
**Representative Fishes at NAVSUPPACT Mid-South.**
**(A) Backspotted topminnow, (B) Bluegill, (C) Mosquitofish, (D) Yellow bullhead.**

**Table 4-7. Fishes Identified at NAVSUPPACT Mid-South**

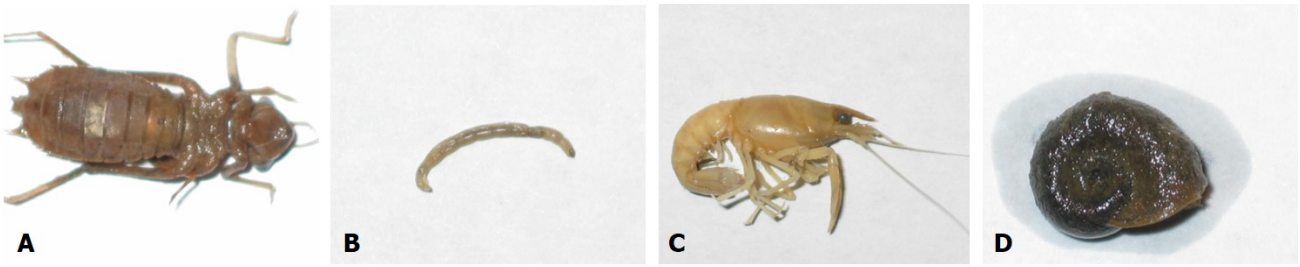
| Common Name | *Scientific Name* |
|---|---|
| Blackspotted topminnow | *Fundulus olivaceus* |
| Blackstripe topminnow | *Fundulus notatus* |
| Bluegill | *Lepomis macrochirus* |
| Carp | *Cyprinus carpio* |
| Creek chubsucker | *Erimyzon oblongus* |
| Green sunfish | *Lepomis cyanellus* |
| Largemouth bass | *Micropterus salmoides* |
| Mosquitofish | *Gambusia affinis* |
| Red shiner | *Cyprinella lutrensis* |
| Yellow bullhead | *Ameiurus natalis* |

### *4.3.6 Benthic Macro-Invertebrates*

The benthic macro-invertebrate survey in 2005-06 took a cursory look at the aquatic invertebrates found to occur within the streams, ditches, lakes, and wetlands on NAVSUPPACT Mid-South (EnSafe 2006a). The depth and degree of effort required to identify invertebrates to a genus/species level was beyond the scope of that survey. Therefore, specimens collected were identified only to family level when possible. This survey established a baseline data of the organisms that form part of the food web for various mammals, birds, amphibians, reptiles, and fish that utilize the aquatic habitat on the Installation. Table 4-8 lists the 20 invertebrates identified during this survey, arranged alphabetically by phylum, class, order, and family.

**Table 4-8. Benthic Macro-Invertebrate Species Identified in Survey Areas**

| Common Name | Phylum\Class\Order\Family |
|---|---|
| Aquatic worms | *Annelida\|Oligochaeta* |
| Leeches | *Annelida\|Hirudinea* |
| Spreadwinged damselflies | *Arthropoda\|Insecta\|Odonata\|Zygoptera\|Lestidae* |
| Skimmer dragonflies | *Arthropoda\|Insecta\|Odonata\|Anisoptera\|Libellulidae* |
| Crawling water beetles | *Arthropoda\|Insecta\|Coleoptera\|Haliplidae* |
| Predaceous diving beetles | *Arthropoda\|Insecta\|Coleoptera\|Dytiscidae* |
| Water boatmen | *Arthropoda\|Insecta\|Hemiptera\|Corixidae* |
| Water striders | *Arthropoda\|Insecta\|Hemiptera\|Gerridae* |
| Caddisflies | *Arthropoda\|Insecta\|Trichoptera\|* |
| Small squaregill mayflies | *Arthropoda\|Insecta\|Ephemeroptera\|Caenidae* |
| Little stout crawler mayflies | *Arthropoda\|Insecta\|Ephemeroptera\|Leptohyphidae* |
| Non-biting midges | *Arthropoda\|Insecta\|Diptera\|Chironomidae* |
| Crayfishes | *Crustacea\|Decapoda\|* |
| Shrimp | *Crustacea\|Malacostraca\|Decapoda* |
| Aquatic sowbugs | *Crustacea\|Malacostraca\|Isopoda\|Asellidae* |
| Planorbid snail | *Mollusca\|Gastropoda\|Pulmonata\|Planorbidae* |
| Physid snail | *Mollusca\|Gastropoda\|Pulmonata\|Physidae* |
| Pleurocerid snail | *Mollusca\|Gastropoda\|Prosobranchia\|Pleuroceridae* |
| Asian clams | *Mollusca\|Bivalvia\|Veneroida\|Corbiculidae* |
| Fingernail clams | *Mollusca\|Bivalvia\|Veneroida\|Sphaeriidae* |




**Photograph 4-6**
**Representative Benthic Macro-Invertebrates at NAVSUPPACT Mid-South.**
**(A) Skimmer dragonfly larva, (B) Midge larva, (C) Shrimp, (D) Planorbid snail.**

## 4.4 Rare, Threatened, and Endangered Species

Based on the results of previous surveys and a review of TDEC NHIP database records, 16 special status species have have potential to occur on NAVSUPPACT Mid-South (Table 4-9), but the monarch butterfly is the only one of these to have been confirmed on the installation.

**Table 4-9. Federal and State-Listed Threatened and Endangered Species that Have the Potential to Occur on NAVSUPPACT Mid-South**

| Scientific Name | Common Name | Occurrence Likelihood | LEGAL STATUS | |
|---|---|---|---|---|
| | | | Federal | State |
| **BIRDS** | | | | |
| *Chondestes grammacus* | Lark sparrow | PR | NA | T |
| *Falco peregrinus* | Peregrine falcon | UM | NA | E |
| *Sterna antillarum* | Interior least tern | UV | E | E |
| *Thyromanes bewickii* | Bewick's wren | PR | NA | T |
| **MAMMALS** | | | | |
| *Myotis sodalis* | Indiana bat | PM | E | E |
| *Myotis septentrionalis* | Northern long-eared bat | UM | T | NA |
| **REPTILES** | | | | |
| *Pituophis melanoleucus melanoleucus* | Northern pinesnake | LR | NA | E |
| **INVERTEBRATES** | | | | |
| *Epioblasma turgidula* | Turgid blossom | UR | E | E |
| *Danaus plexippus* | Monarch butterfly | M | Petitioned | NA |
| **FISH** | | | | |
| *Cycleptus elongatus* | Blue sucker | UR | NA | T |
| **PLANTS** | | | | |
| *Carex reniformis* | Reniform sedge | UR | NA | S |
| *Hottonia inflata* | Featherfoil | UR | NA | S |
| *Iris fulva* | Copper iris | PR | NA | T |
| *Panax quinquefolia* | American ginseng | UR | NA | S-CE |
| *Prenanthes crepidinea* | Nodding rattlesnake-root | PR | NA | S |
| *Schisandra glabra* | Red starvine | PR | NA | T |

**Notes:** CE: Commercially exploited E: Endangered L: Likely M: Migrant NA: Not Applicable P: Possible
R: Resident S: Special Concern T: Threatened U: Unlikely V: Visitor

### *4.4.1 Rare, Threatened, and Endangered Animals*

**RTE Birds.** None of the four bird species listed in Table 4-9 and described below have been observed on NAVSUPPACT Mid-South. The loggerhead shrike (*Lanius ludovicianus*), which is not federally- or state-listed is considered a species in need of state management and has been identified on the installation (EnSafe 2006a).

- **Lark sparrow (*Chondestes grammacus*):** State-threatened. Not yet observed. The lark sparrow breeds in Shelby County and utilizes early successional stages in a variety of upland forest types. Their diet consists of seeds of a variety of forbs and grasses, as well as small invertebrates, especially grasshoppers. Lark sparrows typically feed on the ground, often in small flocks. Eggs are laid in April to July and clutch size ranges from three to six (Association for Biodiversity Information 2000; Merritt and Bingham 1997). Breeding habitat usually consists of open areas with scattered bushes and trees, prairie, forest edge, cultivated areas, orchards, fields with bushy borders, and savanna. The lark sparrow usually nests on the ground near a plant or bush and sometimes nests in a low tree or bush. Lark sparrows may use the old nests of other birds such as mockingbirds (*Mimus polyglottos*) and thrashers (*Toxostoma* sp.) (Association for Biodiversity Information 2000).

- **Peregrine falcon (*Falco peregrinus*):** State-endangered. Not yet observed. Peregrine falcons are highly migratory and use isolated areas of wildlife habitat as prime feeding grounds due to the concentration of prey species. Peregrine falcons migrate during daylight hours. When not breeding, they occur in areas where prey concentrate, including farmlands, marshes, lakeshores, river mouths, tidal flats, dunes and beaches, broad river valleys, cities, and airports. Nesting habitat commonly consists of tall cliffs containing potholes, ledges, and small caves located near water sources. The installation does provide habitat for the peregrine falcon. Other than intermittent migrant individuals, the bird has little likelihood of occurring on the iinstallation.

- **Interior least tern (*Sterna antillarum*):** Federally- and state-endangered. Not yet observed. Least terns are migratory birds that use barren to sparsely vegetated sandbars along rivers to nest in small colonies from May to August. They often fly up to two miles to forage at river sites. The chicks leave the nest only a few days after hatching, but the adults continue to care for them, leading them to shelter in nearby grasses and bringing them food. The terns hover over and dive into standing or flowing water to catch small fish. Least terns are unlikely to travel as far inland from the Mississippi River to NAVSUPPACT Mid-South and it is doubtful they occupy the site, especially because it lacks breeding habitat (Merritt and Bingham 1997).

- **Bewick's wren (*Thryomanes bewickii*):** State-threatened. Not yet observed. The Bewick's wren historically bred and resided in Shelby County. It generally occurs at higher elevations of the Appalachians in farmyards, brushy places, openings and edges of woodlands, and overgrown fields. Breeding habitat includes a variety of open country containing shrubs, saplings, and brush piles (The Nature Conservancy [TNC] 1999). Bewick's wren nests near the ground in almost any cavity where a nest can be built. Wintering habitat is composed of brushy places in open country, particularly near sheds or barns. Bewick's wren eats insects,

insect eggs and larvae, and other invertebrates gleaned from shrubs, saplings, and tall herbs (Merritt and Bingham 1997).

**RTE Mammals.** According to the USFWS Information for Planning and Consultation (IPAC) website, two federally-threatened mammal species could potentially be found at NAVSUPPACT Mid-South, the Indiana bat (*Myotic sodalist*) and the northern long-eared bat (*Myotis septentrionalis*). Neither of those species has been identified during bat surveys on the Installation (Ensafe 2006a; Carver 2016).

- **Indiana bat (*Myotis sodalis*):** Federally-threatened. Not yet observed. Indiana bats have strong site fidelity to summer colony areas, roosts, and foraging habitat. They are found in caves, under bridges, in old buildings, under tree bark, and in hollow trees. Females have been documented returning to the same roosts from one year to the next (Humphrey et al. 1977; Gardner et al. 1991a; Gardner et al. 1991b). Indiana bats forage over streams, preferring those with large, overhanging trees. They feed strictly on flying insects. Indiana bats are migratory. Approximately 85 percent of the known population hibernates in just seven caves. They mate in the fall and hibernate from October to April. Caves containing Indiana bats should not be entered during this time, as disturbance of hibernating bats is a major cause of the species' decline. Young are born in June and July. Females and their young roost in small colonies (50 to 100 individuals) under tree bark during the summer months. There are no caves at NAVSUPPACT Mid-South so Indiana bats will not hibernate on the installation. However, potential feeding habitat does exist along the Big Creek Drainage Ditch and the forested uplands on the south side of Navy Road (Merritt 1996).

- **Northern long-eared bat (*Myotis septentrionalis*):** Federally-threatened. Not yet observed. The range of the northern long-eared bat includes 39 states. White-nose syndrome, a fungal disease known to affect bats, is currently the predominant threat to this species, especially throughout the northeast U.S., where the species has declined by up to 99 percent from previous levels at many hibernation sites. During summer, northern long-eared bats roost underneath bark, in cavities, and in crevices of live and dead trees. Northern long-eared bats spend winter hibernating in caves and mines with large passages and entrances, constant temperature, and high humidity with no air currents. Northern long-eared bats emerge at dusk to fly through the understory of forested hillsides and ridges feeding on insects. Breeding begins in late summer. Pregnant females migrate to summer areas where they roost in small colonies and give birth to a single pup. Maternity colonies with young generally have 30 to 60 bats, although larger maternity colonies have been observed. Adult northern long-eared bats can live up to 19 years.

**RTE Repitles.** Surveys for rare, threatened, and endangered species in 2016 and 2020 targeted the northern pine snake (*Pituophis melanoleucus melanoleucus*), a state-listed threatened reptile, but did not identify any individuals. The installation was found to lack the open pine-oak habitat with deep sandy soils that is essential to this species (GSRC 2016; LG2ES 2020).

- **Northern pinesnake (*Pituophis melanoleucus melanoleucus*)**: State-threatened. Not yet observed. Northern pinesnakes prefer pine woods and open sandy fields with large clumps of vegetation. Northern pinesnakes are burrowers so the sandy substrate is essential to their successful breeding. Within these generalized habitats, northern pinesnakes nest in select

open sandy clearings with little ground cover. They may be found more often in open, human disturbed sections of pine and pine-oak forests. Summer den sites can also be found in clearings near fallen logs. They also inhabitat existing mammal burrows. Winter hibernacula are located in nearby areas, providing more vegetation cover and leaf litter. Female snakes deposit their eggs in massive burrows they create in the sand. These burrows can be as deep and long as five feet. They may nest communally; however, data is limited and it is uncertain what cues bring females together to nest. They are not usually aboreal, but pinesnakes can climb trees, suggesting they reside in wooded areas to gain access to birds, eggs, and hatchlings. Though northern pinesnakes drink large quantities of water, they are rarely found near wetland environments (Camby 1999).

**RTE Invertebrates.** The 2016 and 2020 surveys included a targeted search for the monarch butterfly, which has been petitioned for federal listing. A single individual was identified in 2016 and two individuals in 2020. The species associates with milkweed, thistle, and buttonbush plants (GSRC 2016; LG2ES 2020).

- **Monarch butterfly (*Danaus plexippus*):** Federally-petitioned for listing. Confirmed on the installation. On December 31, 2014, the USFWS determined that a petition to list the monarch butterfly as endangered or threatened under the ESA was warranted (USFWS 2014a). The USFWS is conducting a status review for the species. Monarch butterflies are found throughout the U.S. and many monarchs migrate over 3,000 miles between the U.S., Mexico, and Canada. Threats to the monarch include habitat loss, particularly the loss of milkweed (*Asclepias* spp.), the monarch caterpiller's sole food source, and mortality resulting from pesticide use. Monarch butterfly populations have declined significiantly in recent years.

**RTE Fish.** Besides a survey in 2005-06 (EnSafe 2006a), fish have not been included in any survey or monitoring efforts at NAVSUPPACT Mid-South, and no state- or federally-listed species have been identified.

- **Blue sucker (*Cycleptus elongatus*):** State-threatened. Not yet observed. The blue sucker occupies drainages throughout much of the central U.S. from New Mexico to Pennsylvania. Habitat includes the largest rivers and lower parts of major tributaries and the fish migrate upstream to spawn on riffles. Usually the blue sucker occurs in channels and flowing pools with moderate currents and in some impoundments. Adults probably winter in deep pools, while young occupy shallower and less swift water than adults. Spawning occurs in deep riffles with cobble and bedrock substrate. This species is a bottom feeder and eats insects, crustaceans, and plant material, including algae.

### *4.4.2 Rare, Threatened, and Endangered Plants*

No federal- or state-listed threatened, endangered, or plant species of state concern have been observed on NAVSUPPACT Mid-South during the onsite field surveys published in 1997, 2006, 2016, and 2020 (Merritt and Bingham 1997; Ensafe 2006b; GSRC 2016b; LG2ES 2020).

Table 4-10 lists the rare plant species that were targeted in 2016, but none of them were observed.

**Table 4-10. Rare Plant Species Targeted at NAVSUPPACT Mid-South During the 2016 Survey**

| Species Name | Common Name | State Status | Habitat Type |
|---|---|---|---|
| *Carex reniformis* | Reniform sedge | S | rich bottomland woods |
| *Hottonia inflata* | Featherfoil | S | shallow pools, ditches, swamps, and lakes |
| *Iris fulva* | Copper Iris | T | shallow water in swamps, marshes, sloughs |
| *Panax quinquefolia* | American Ginseng | S-CE | shady, undisturbed, mesic sites |
| *Prenanthes crepidinea* | Nodding rattlesnake root | E | moist woods, rich thickets, openings |
| *Schisandra glabra* | Red starvine | T | rich, forested bottomlands or bluffs of creeks and rivers with understory trees |

**Notes:** CE — listed because of commercial exploitation
E — listed as endangered by the state of Tennessee
S — listed as a species of special concern in the state of Tennessee
T — listed as threatened by the state of Tennessee

The following actions are recommended to ensure compliance with federal and state regulations for the protection of threatened or endangered species or species of state concern:

- Threatened and endangered species surveys should be completed on a routine basis (i.e., every 5 to 7 years) at NAVSUPPACT Mid-South. Routine surveys will determine if any newly listed species in Shelby or Tipton counties occur within NAVSUPPACT Mid-South.
- Spring and summer vegetation surveys are recommended to be able to develop a more comprehensive list of plant species present in unimproved and semi-improved areas within NAVSUPPACT Mid-South.
- No active vegetation management is needed at this time within unimproved or semi-improved areas at NAVSUPPACT Mid-South in order to ensure compliance with federal and state regulations for the protection of threatened or endangered species or species of state concern.

## 4.5 Invasive, Exotic, and Noxious Plants

The Southeast Exotic Pest Plant Council (SE-EPPC) maintains an Invasive Exotic Pest Plants list for states throughout the southeast United States, including Tennessee. The SE-EPPC ranks invasive/exotic species of vascular plants in three categories, Rank 1 through Rank 3, and maintains a 'Watch List.' The categories are described as follows:

- **Rank 1. "Severe Threat":** Exotic plant species that possess characteristics of invasive species and spread easily into native plant communities, displacing native vegetation; includes species that are or could become widespread in Tennessee.
- **Rank 2. "Significant Threat":** Exotic plant species that possess some invasive characteristics but have less impact on native plant communities; may have the capacity to invade natural communities along disturbance corridors and to spread from stands in disturbed sites into undisturbed areas, but to a lesser degree than Rank 1.
- **Rank 3. "Lesser Threat":** Exotic plant species that seem to principally spread and remain in disturbed corridors, not readily invading natural areas; also some agronomic weeds.

As noted above, Johnson grass and *Sericea lespedeza*, which occur throughout the semi-improved and unimproved areas on the Installation, are listed by the SE-EPPC as an Invasive Exotic Pest Plants in Tennessee (SE-EPPC 1996). Both species are considered Rank 1 and management procedures are outlined in Table 4-12. A third exotic plant species, Japanese barberry (*Berberis thunbergii*), has been used as an ornamental shrub in landscaped areas of the Installation. This species has been removed from the list of shrub selections for plantings.

Control recommendations for invasive, exotic, and noxious plant species observed are provided in Table 4-11.

**Table 4-11. Control Recommendations for Invasive Plants**

| Scientific Name | Common Name | TNEPPC * Ranking | Control Recommendations |
|---|---|---|---|
| *Ailanthus altissima* | Tree of heaven | Rank 1: Severe Threat | — Saw or cut stems in growing season and apply concentrated herbicide to exposed surfaces immediately after cutting.<br>— Re-inspect in spring (April to mid May) to assess effectiveness and plan the next treatment.<br>— Apply Glyphosate or Triclopyr, 50 percent solution of herbicide and 50 percent water, to the exposed surfaces making sure to cover the outer 20 percent of the stump. |
| *Albizia julibrissin* | Mimosa | Rank 1: Severe Threat | — Saw or cut stems in growing season and apply concentrated herbicide to exposed surfaces immediately after cutting.<br>— Re-inspect in spring (April to mid May) to assess effectiveness and plan the next treatment.<br>— Apply Glyphosate or Triclopyr, 50 percent solution of herbicide and 50 percent water, to the exposed surfaces making sure to cover the outer 20 percent of the stump. |
| *Dioscorea opposita* | Air potato, Chinese yam | Rank 1: Severe Threat | — Spray all leaves with a 2 percent solution of Glyphosate or Triclopyr during growing season.<br>— Re-inspect in thirty days. |
| *Elaeagnus umbellata* | Autumn olive | Rank 1: Severe Threat | — Traverse the area with a hand crew or small machines to pull or stump cut all the plants found.<br>— Treat the individual stump cut plants immediately with the appropriate concentrated herbicide.<br>— Apply Glyphosate or Triclopyr, 50 percent solution of herbicide and 50 percent water, to the cut sump making sure to cover the outer 20 percent of the stump.<br>— Re-inspect in spring (April to mid May) to assess effectiveness and plan the next entry. |
| *Euonymus fortunei* | Winter creeper | Rank 1: Severe Threat | — Apply Glyphosate or Triclopyr, 50 percent solution of herbicide and 50 percent water, to the cut sump making sure to cover the outer 20 percent of the stump.<br>— Re-inspect in spring (April to mid May) to assess effectiveness and plan the next entry. |
| *Lagerstrochnia indica* | Crape myrtle | Not listed | — Saw cut stems in growing season and apply concentrated herbicide to cut stumps immediately after cutting.<br>— Re-inspect in spring (April to mid May) to assess effectiveness and plan the next entry. |

| Scientific Name | Common Name | TNEPPC * Ranking | Control Recommendations |
|---|---|---|---|
| *Lespedeza cuneata sericea* | Lespedeza | Rank 1: Severe Threat | — Apply Glyphosate or Triclopyr, 50 percent solution of herbicide and 50 percent water, to the cut sump making sure to cover the outer 20 percent of the stump.<br>— A squirt bottle may be used for spot treatment or individual stumps can be painted by hand using a sponge applicator.<br>— Treatment should be in late winter when most native vegetation is dormant.<br>— Re-inspect the following spring (April to mid May) to assess effectiveness and plan the next entry. |
| *Lespedeza striota kobe* | Lespedeza | Not listed | — Apply broadcast application of wide spectrum herbicide and a grass killer such as Select around the first of August. Re-apply in three weeks to ensure complete kill. In 2 weeks, re-seed with lawn-type fescue and mulch with straw.<br>— Apply Glyphosate or Triclopyr plus Select and a non-ionic surfactant using a 2 percent solution of herbicide and water. |
| *Ligustrum sinense* or *Ligustrum vulgare* | Privet | Rank 1: Severe Threat | — Apply broadcast application of wide spectrum herbicide and a grass killer such as Select around the first of August. Re-apply in three weeks to ensure complete kill. In 2 weeks, re-seed with lawn-type fescue and mulch with straw.<br>— Apply Glyphosate or Triclopyr plus Select and a non-ionic surfactant using a 2 percent solution of herbicide and water. |
| *Lonicera japonica* | Japanese honeysuckle | Rank 1: Severe Threat | — Traverse the area with a hand crew or small machines to pull or stump cut all the plants found.<br>— Treat the individual stump cut plants immediately with the appropriate concentrated herbicide.<br>— Apply Glyphosate or Triclopyr, 50 percent solution of herbicide and 50 percent water, to the cut sump making sure to cover the outer 20 percent of the stump.<br>— Re-inspect in spring (April to mid May) to assess effectiveness and plan the next entry. |
| *Lonicera maackii, Lonicera morrowii, Lonicera x bella,* or *Lonicera tatarica* | Tatarian honeysuckle | Rank 1: Severe Threat | — Traverse the area with a hand crew or small machines to pull or stump cut all the plants found.<br>— Treat the individual stump cut plants immediately with the appropriate concentrated herbicide.<br>— Apply Glyphosate or Triclopyr, 50 percent solution of herbicide and 50 percent water, to the cut sump making sure to cover the outer 20 percent of the stump.<br>— Re-inspect in spring (April to mid May) to assess effectiveness and plan the next entry. |
| *Morus alba* | White mulberry | Not listed | — Saw cut stems in growing season and apply concentrated herbicide to cut stumps immediately after cutting.<br>— Re-inspect in spring (April to mid May) to assess effectiveness and plan the next entry.<br>— Apply Glyphosate or Triclopyr, 50 percent solution of herbicide and 50 percent water, to the cut sump making sure to cover the outer 20 percent of the stump. |

| Scientific Name | Common Name | TNEPPC * Ranking | Control Recommendations |
|---|---|---|---|
| *Rosa multiflora* | Multi-flora rose | Rank 1: Severe Threat | — Traverse the area with a hand crew or small machines to pull or stump cut all the plants found.<br>— Treat the individual stump cut plants immediately with the appropriate concentrated herbicide.<br>— Apply Glyphosate or Triclopyr, 50 percent solution of herbicide and 50 percent water, to the cut sump making sure to cover the outer 20 percent of the stump.<br>— Re-inspect in spring (April to mid May) to assess effectiveness and plan the next entry. |
| *Prunus serrulata Lindl.* | Japanese flowering cherry | Not listed | — Saw cut stems in growing season and apply concentrated herbicide to cut stumps immediately after cutting.<br>— Re-inspect in spring (April to mid May) to assess effectiveness and plan the next entry.<br>— Apply Glyphosate or Triclopyr, 50 percent solution of herbicide and 50 percent water, to the cut sump making sure to cover the outer 20 percent of the stump. |
| *Pueraria montana* | Kudzu | Rank 1: Severe Threat | — Pull up plants or cut stems in growing season and apply concentrated herbicide to cut stumps immediately after cutting.<br>— Apply Glyphosate or Triclopyr, 50 percent solution of herbicide and 50 percent water, to the cut sump making sure to cover the outer 20 percent of the stump.<br>— An alternative is the use of the product Transline, a legumicide. Apply 2/3 to 1 1/3 pints in at least 5 gallons of water per acre.<br>— The label states that "applications are most effective between late-June and early-October as long as the kudzu is actively growing and not under drought stress. The ideal time to apply is during vigorous growth and just prior to or during flowering."<br>— Re-inspect in spring (April to mid May) to assess effectiveness and plan the next entry. |
| *Pyrus calleryana* | Bradford pear | Not Ranked | — Saw cut stems in growing season and apply concentrated herbicide to cut stumps immediately after cutting.<br>— Re-inspect in spring (April to mid May) to assess effectiveness and plan the next entry.<br>— Apply Glyphosate or Triclopyr, 50 percent solution of herbicide and 50 percent water, to the cut sump making sure to cover the outer 20 percent of the stump. |
| *Toxicodendron radicans* | Poison ivy | Not listed | — Spray apply Glyphosate or Triclopyr mixed with water, according to directions, when it is fully leafed out.<br>— Pick a day with little or no wind, and no prediction of rain within 24 hours.<br>— Heavily spray leaves and vines when growing on the ground or on a wall.<br>— "Paint" herbicide on vines climbing up trees to prevent damage to the tree. |
| *Trifolium dubuim* | Hop clover | Not listed | — Apply broad-leaf herbicide that will not damage grass. |
| *Trifoluim repens* | White clover | Not listed | — Apply broad-leaf herbicide that will not damage grass. |
| *Sorghum halepense* | Johnson grass | Rank 1: Severe Threat | — Apply broadcast application of wide spectrum herbicide and a grass killer such as Select around the first of August. Re-apply in 3 weeks to ensure complete kill. In 2 weeks, re-seed with lawn-type fescue and mulch with straw.<br>— Apply Glyphosate or Triclopyr plus Select and a non-ionic surfactant using a 2 percent solution of herbicide and water. |
| *Agavaceae* spp. | Yucca | Not listed | — Apply broad-leaf herbicide that will not harm native vegetation. |

| Scientific Name | Common Name | TNEPPC * Ranking | Control Recommendations |
|---|---|---|---|
| *Pyracantha* spp. | Firethorn | Not listed | — Apply broad-leaf herbicide that will not harm native vegetation. |
| *Pinus virginiana* | Virginia pine | Not listed | — Saw cut stems in growing season and apply concentrated herbicide to cut stumps immediately after cutting.<br>— Re-inspect in spring (April to mid May) to assess effectiveness and plan the next entry.<br>— Apply Glyphosate or Triclopyr, 50 percent solution of herbicide and 50 percent water, to the cut sump making sure to cover the outer 20 percent of the stump. |
| *Nandina domestica* | Sacred bamboo | Rank 2: Significant Threat | — Traverse the area with a hand crew or small machines to pull or stump cut all the plants found.<br>— Treat the individual stump cut plants immediately with the appropriate concentrated herbicide.<br>— Apply Glyphosate or Triclopyr, 50 percent solution of herbicide and 50 percent water, to the cut sump making sure to cover the outer 20 percent of the stump.<br>— Re-inspect in spring (April to mid May) to assess effectiveness and plan the next entry. |

*** TNEPPC** = Tennessee Exotic Pest Plant Council

**Reniform sedge (*Carex reniformis*):** Reniform sedge is a state species of concern. This small, grass-like perennial is uncommon throughout much of the southeast U.S. in rich bottomland forest habitats.

**Featherfoil (*Hottonia inflata*):** Featherfoil is a state species of concern. This small aquatic plant occurs sporadically throughout the southeast U.S. The species inhabits shallow pools, ditches, swamps, lakes, and beaver ponds with consistent and shallow water levels.

**Copper iris (*Iris fulva*):** Copper iris is a state threatened species found in the shallow water part of swamps, marshes and sloughs. It has a stout rhizome (nearly horizontal root system) and laterally flattened leaves. The flowers are red, coppery red, or bronze and bloom from May to June.

**American ginseng (*Panax quinquefolius*):** American ginseng is a state species of concern due to commercial exploitation. This low-growing perennial occurs in rich deciduous forests from the U.S. Midwest to Maine.

**Nodding rattlesnake root (*Prenanthes crepidinea*):** State-listed as endangered, the nodding rattlesnake root is found in moist woods, rich thickets, and openings. It is a perennial herb that has milky juice and tuberous, thickened roots. The flowers are cream color and appear from August to September (Merritt and Bingham 1997).

**Red starvine (*Schisandra glabra*):** Red starvine is listed as threatened by the State of Tennessee. This plant inhabits rich, forested bottomlands or the bluffs of creeks and rivers, growing chiefly over understory trees. It is often found mixed mesophytic forests, growing over American beech (*Fagus grandifoiia*), hickory, and tulip poplar. Red starvine is an early deciduous, smooth, woody vine with football shaped leaves that alternate very close together. It climbs by twining, but can also be found trailing on the ground forming patches. The flowers are pale green on the outside and red to pink on the inside. Red starvine blooms from mid April to June, and its leaves have a sweet scent when crushed.

## 4.11 Wildlife and Fisheries Habitat

The natural and managed vegetation on the Installation provide a diversity of habitats for fish and wildlife species. In general, populations of individual species do not occur at substantial numbers because the available wildlife habitat is marginal in meeting the life requirements of wildlife species. Available upland wildlife habitat is primarily limited to the loblolly pine and hardwood forests on the southern portion of the installation. This forest is adjacent to Big Creek Drainage Ditch, which provides an excellent corridor for wildlife dispersal into off-Installation areas.

Big Creek Drainage Ditch provides excellent habitat for beaver and muskrat. As additional beaver impoundments are created, the muskrat habitat improves in the drainage. Suitable browse is available to these rodent species due to the high concentration of edge habitat along the drainage.

Additional urban wildlife habitat is available throughout the Installation in the form of landscape plantings, man-made ponds and associated vegetative buffer, drain culverts, and open drainages. This urban wildlife habitat is marginal habitat for most mammalian species, but does provide excellent habitat for reptile, amphibian, and avian species.

Fisheries habitat consists of Big Creek Drainage Ditch and the small man-made ponds on the Installation. No fishing is currently allowed on the Installation due to the limited availability of fisheries resources. Known fish species include bluegill sunfish (*Lepomis macrochirus*), redear sunfish (*L. microlophus*), green sunfish (*L. cyanellus*), channel catfish (*Ictalarus punctatus*), black bullhead (*Ameiurus melas*), and yellow bullhead (*A. natalis*). The adjacent Navy Lakes Lease Area, which is leased by NAVSUPPACT Mid-South from the City of Millington, provides fishing opportunities to NAVSUPPACT Mid-South personnel, families and the adjacent community.

# 5.0 NATURAL RESOURCES MANAGEMENT GOALS AND OBJECTIVES

This INRMP identifies goals and objectives for ecosystem management, and presents the means to accomplish them, as well as the methodologies to monitor results. This INRMP is the mechanism through which both ecosystem management and biodiversity conservation will be accomplished on NAVSUPPACT Mid-South in agreement with the successful accomplishment of the Installations' military mission.

Management objectives established in this INRMP were developed by thoroughly evaluating the natural resources present on NAVSUPPACT Mid-South. In accordance with OPNAVINST 5090.1E — Chapter 12 and the principles of adaptive ecosystem management, subject areas were identified and management alternatives developed by an interdisciplinary team of ecologists, biologists, geologists, planners, and environmental scientists. This section presents the preferred management alternatives based on the professional opinions of NAVSUPPACT Mid-South Natural Resources Manager, USFWS, TWRA, and NAVFAC Southeast. Through these evaluations, a set of natural resources planning and management goals and objectives have been established that represent the most current theories on adaptive ecosystem based planning. These goals and objectives support the operational mission at NAVSUPPACT Mid-South, which is the primary driver for all facets of natural resources management. Ecosystem management provides a means for DoN to both conserve biodiversity and to provide high quality military readiness. The INRMP is a mechanism through which NAVSUPPACT Mid-South can maintain sustainable land use through ecosystem management.

Goal 1: Protect and maintain the ecosystem at NAVSUPPACT Mid-South through the continuation and enhancement of ecologically appropriate and beneficial land use and management practices, while ensuring the continuation of the military mission.

Objectives:

1.1 Ensure compliance with environmental legislation, regulations, and guidelines.

1.2 Ensure that land use and natural resource planning decisions sustain the mission of NAVSUPPACT Mid-South and seek to resolve land use conflicts by integration with other planning processes.

1.3 Incorporate the concept of ecosystem management into all planning and management processes.

1.4 Implement management strategies with consideration of ecological units and timeframes.

1.5 Work with surrounding landowners to accomplish ecosystem-based management and encourage cooperative efforts on adjacent lands.

1.6 Manage for no net loss of wetland and floodplain acreage, functions, and values.

1.7 Remain in compliance with USACE and Tennessee Division of WPC wetlands regulations.

1.8 Minimize the operational impact of NAVSUPPACT Mid-South missions on wetlands and floodplains.

1.9 Maintain healthy, functional wetlands that can sustain minor operational influences and inadvertent encroachments.

1.10 Maximize floral and faunal diversity of wetland communities in the ecosystem.

1.11 Reduce and control nutrient and sediment inputs that degrade water quality into the watershed.

1.12 Minimize non-point source pollution of surface water through the implementation of best management practices.

1.13 Retain and restore vegetation buffers on waterways and riparian corridors.

1.14 Maximize the use of regionally native plant species and avoid introducing invasive, exotic, and noxious species in re-vegetation and landscaping activities.

1.15 Reduce chemical usage and maintenance inputs in terms of energy, water, manpower, equipment, and chemicals.

1.16 Control pest and invasive, exotic, and noxious species on the Installation.

1.17 Ensure the orderly and scientific management of urban trees on NAVSUPPACT Mid-South to the extent compatible and consistent with the mission.

Goal 2: Protect and enhance forest resources by practicing ecologically-sound forest management, leading to sustained yield of quality forest products, watershed protection, and wildlife habitat.

Objectives:

2.1 Implement sound silvicultural practices that promote biodiversity, ecosystem function, and disease control.

2.2 Stabilize and prevent degradation of natural resources that have been, or may be, impacted by wildland fires and fire management activities.

2.3 Prescribe burn to reduce potential wildland fire hazards and enhance ecosystem function.

2.4 Protect the forest-related real estate investment of the U.S. Government from unnecessary depreciation and depletion.

2.5 Support an optimal mix of consumptive and non-consumptive uses and value within the Installations' forests.

2.6 Maintain forests in a condition that minimizes threats to safety and human health.

Goal 3: Protect, maintain, and restore native communities for plant and animal life while improving the quality of life and ensuring the continuation of the military mission.

Objectives:

3.1 Manage NAVSUPPACT Mid-South on a regional ecosystem-based approach that manages sensitive species and their associated ecosystems while protecting the operational functionality of the missions of the Installation.

3.2 Ensure compliance with environmental legislation, regulations, and guidelines governing fish and wildlife.

3.3 Manage based on an ecosystem management approach, rather than using a single species paradigm.

3.4 Restore and maintain a diversity of wildlife in areas on the Installation in a manner that mitigates conflict with the military mission.

3.5 Support multiple non-consumptive uses of wildlife and provide habitat enhancement for nongame species, including neotropical migratory birds.

3.6 Employ a systematic approach to managing wildlife resources, utilizing assessments, inventories, monitoring, modeling, and management.

3.7 Minimize wildlife-related health risks, safety risks, and environmental damage.

3.8 Maintain and strengthen partnerships with agencies and groups involved in wildlife management.

Goal 4: Protect and conserve the ecological value and diversity of natural resources at NAVSUPPACT Mid-South by fostering knowledge of adaptive ecosystem management and natural resources on the Installation.

Objectives:

4.1 Collect, store, and maintain data about historical conditions and trends, and current status, for critical indicators of ecological integrity and sustainability.

4.2 Use GIS information to guide natural resources management.

4.3 Provide the staffing, training, budgeting and technology support to ensure successful implementation of the INRMP.

4.4 Conduct annual meetings in cooperation with the USFWS and TWRA to review and update the INRMP.

4.5 Identify natural resources and operational actions that compromise the function and composition of ecosystems, and develop remedies through adaptive management.

4.6 Gain an increasing understanding of ecosystem dynamics in an effort to prevent and respond to threats.

4.7 Continue collaborative partnering to protect and conserve the natural resources on the Installation, maintain environmental compliance, and enhance NAVSUPPACT Mid-South's ability to meet its mission critical objectives.

4.8 Network with local community and conservation organizations, and coordinate natural resources activities as practicable.

4.9 Incorporate regional ecosystem issues and advancements into management decisions on NAVSUPPACT Mid-South to conserve biodiversity.

Goal 5: Provide facilities and implement programs that encourage outdoor recreation and educational use of natural resources on NAVSUPPACT Mid-South, and improve the quality of life for user groups.

Objectives:

5.1 Support sustainable, multiple-use human activities.

5.2 Provide quality outdoor recreation experiences while sustaining ecosystem integrity.

5.3 Ensure that outdoor recreation activities are not in conflict with mission priorities.

5.4 Continue to restrict all types of off-road vehicles from utilizing Installation grounds.

5.5 Develop additional recreational facilities, trails, and interpretive centers to support present and future natural resources-based outdoor recreation participants at NAVSUPPACT Mid-South.

Specific management issues have been identified in a number of subject areas that affect the natural resources present on and immediately adjacent to NAVSUPPACT Mid-South. These goals and objectives guide the identification of actions that Installation managers can implement to obtain workable and useful solutions for each management issue identified. The following section, "Program Elements" lays out the Installation's approach for addressing these issues. Additionally, a listing of the INRMP Projects designed to meet the above goals and objectives is provided in Section 7, *INRMP Implementation*.

# 6.0 PROGRAM ELEMENTS

This INRMP takes an ecosystem approach to managing the natural resources of NAVSUPPACT Mid-South. All appropriate ecosystem components are integrated by their function. Ecosystem management is emphasized because the mission of DoN is inextricably linked to local, regional, and global ecological integrity. Sustaining ecosystem integrity is also the best way to protect biodiversity, ensure sustainable use, and minimize the effort and cost of management. Native and natural communities, and the processes that sustain them, are unique expressions of the evolutionary and geological histories that are essential to sustaining current system function and resilience. While habitat with the potential to dramatically alter ecosystem form and function is limited at NAVSUPPACT Mid-South, it is still a priority of this Installation to manage according to this paradigm.

Appropriate NAVSUPPACT Mid-South personnel need to be informed of the ecosystem management objectives established by the environmental management office. The NAVSUPPACT Mid-South Environmental Director and Natural Resources Manager will promote discussion with Installation Command and pertinent stakeholders about incorporating ecosystem management philosophy into command decisions and natural resources planning. Part of this process will include education of Installation personnel in established ecosystem management goals and objectives.

Adjacent land users have the potential to directly affect Installation plans, programs, and activities, so the needs of adjacent landowners (e.g., West Tennessee Regional Development Center, agricultural lands, etc.) need to be considered in the application of the management actions identified in this INRMP. The West Tennessee Regional Business Center is a significant center of commerce and employment in the region and affects the community in ways that have high potential to impact natural resources. The greater Millington area economic activity is partially fueled from its proximity to Memphis, and increased commercial use and transportation volume in the area may have impacts on the ecosystems and environmental health in the region. NAVSUPPACT Mid-South planning staff must therefore remain active participants in all off-Base development activities that may directly or indirectly impact the Installation's military missions.

The management actions described in this INRMP benefit the plants, animals, and ecosystems occurring on NAVSUPPACT Mid-South. Special attention is given to rare, threatened, and endangered (RTE) species, and their habitats. The management actions are long-term conservation measures that provide benefits for terrestrial and aquatic habitats on the installation. Management actions such as soil conservation and storm water control, for example, limit sediment and pollutant runoff to protect water quality. Forestry actions such as prescribed burning, thinning, and reforestation help to establish healthy pine stands and herbaceous low-lying vegetation.

This section discusses natural resources management at NAVSUPPACT Mid-South by dividing it into four components: land management, forestry, fish and wildlife, and outdoor recreation. These components are further divided into sub-components (for example, land management addresses wetlands, erosion control, stomrwater and water quality, floodplains, grounds maintenance, and urban forestry).

## 6.1 Land Management

Installation grounds maintenance, erosion control, and landscaping activities are performed under the direction of the Public Works Officer by BOS contractor through an Annual Grounds Maintenance Plan of Operations. This plan establishes scheduling, budgeting, and implementation for all land management activities at NAVSUPPACT Mid-South. Grounds maintenance activities performed at NAVSUPPACT Mid-South consist of road maintenance, maintenance of drainage ditches, control of pest species, lawn care, landscaping, erosion control, and other maintenance. Fertilizer is only applied at the golf course, and it does not contain phosphates. Pesticides are used on a case-by-case basis.

In the process of identifying grounds maintenance and land management actions, a list of objectives was generated that were used to create ecologically sustainable management objectives (Table 6-1).

**Table 6-1. The Land Management Goal and Objectives**

Goal 1: Protect and maintain the ecosystem at NAVSUPPACT Mid-South through the continuation and enhancement of ecologically appropriate and beneficial land use and management practices, while ensuring the continuation of the military mission.

Objectives:

1.1 Ensure compliance with environmental legislation, regulations, and guidelines.

1.2 Ensure that land use and natural resource planning decisions sustain the mission of NAVSUPPACT Mid-South and seek to resolve land use conflicts by integration with other planning processes.

1.3 Incorporate the concept of ecosystem management into all planning and management processes.

1.4 Implement management strategies with consideration of ecological units and timeframes.

1.5 Work with surrounding landowners to accomplish ecosystem-based management and encourage cooperative efforts on adjacent lands.

1.6 Manage for no net loss of wetland and floodplain acreage, functions, and values.

1.7 Remain in compliance with USACE and TDEC DWR wetlands regulations.

1.8 Minimize the operational impact of NAVSUPPACT Mid-South missions on wetlands and floodplains.

1.9 Maintain healthy, functional wetlands that can sustain minor operational influences and inadvertent encroachments.

1.10 Maximize floral and faunal diversity of wetland communities in the ecosystem.

1.11 Reduce and control nutrient and sediment inputs that degrade water quality into the watershed.

1.12 Minimize non-point source pollution of surface water through the implementation of best management practices.

1.13 Retain and restore vegetation buffers on waterways and riparian corridors.

1.14 Maximize the use of regionally native plant species and avoid introducing invasive, exotic, and noxious species in re-vegetation and landscaping activities.

| | |
|---|---|
| 1.15 | Reduce chemical usage and maintenance inputs in terms of energy, water, manpower, equipment, and chemicals. |
| 1.16 | Control pest and invasive, exotic, and noxious species on the Installation. |
| 1.17 | Ensure the orderly and scientific management of urban trees on NAVSUPPACT Mid-South to the extent compatible and consistent with the mission. |

The following subsections describe management approaches for wetlands, erosion, stormwater and water quality, floodplains, grounds maintenance, invasive plants and noxious weeds, and urban forestry at NAVSUPPACT Mid-South. NAVSUPPACT Mid-South will refer to a NAVFAC SE biologist for assistance with specific land management issues.

### *6.1.1 Wetlands Management*

The USACE defines wetlands as "those areas that are inundated or saturated with ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (*33 Code of Federal Regulations [CFR] 328*). Wetlands are an important natural system because of the diverse biological and hydrologic functions they perform. These functions may include water quality improvement, groundwater recharge, pollution treatment, nutrient cycling, provision of wildlife habitat and niches for unique flora and fauna, stormwater storage, and erosion protection.

Wetlands are protected as a subset of the "waters of the United States." under Section 404 of the Clean Water Act (CWA). The term "waters of the United States." has broad meaning under the CWA and incorporates deep water aquatic habitats and special aquatic habitats (including wetlands). "Jurisdictional" waters of the United States are areas regulated under the CWA and may include intermittent streams, vernal pools, and "other" waters that, if degraded or destroyed, could affect interstate commerce. Recent Supreme Court rulings have removed wetlands that are hydrologically isolated (no surface or strong sub-surface connection to other waters that flow to navigable waters of the United States) from USACE jurisdiction.

#### *Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Wetlands*

- Clean Water Act: Section 401 Water Quality Certification, 1986, 33 U.S.C. 1341, requires that states certify compliance of federal permits or licenses with state water quality requirements and other applicable state laws. Under Section 401, states have authority to review any federal permit or license that may result in a discharge to wetlands or other waters under state jurisdiction to ensure that the actions would be consistent with the state's water quality requirements.
- Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, 33 U.S.C. 1251, prohibits the discharge of dredged or filled materials into waters of the United States, including wetlands, without first obtaining a permit from USACE (Section 404 of the CWA).
- Executive Order 11990, 24 May 1977, as amended, requires government agencies, in carrying out agency actions and programs affecting land use, to provide leadership and take action to

minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

- Executive Order 13112, 3 February 1999, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.
- OPNAVINST 5090,1C, 24-7(c) discusses natural resources management relating to wetland management.

Section 404 of the CWA authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill materials into the waters of the United States, including wetlands. Therefore, even an inadvertent encroachment into wetlands or other "waters of the United States" that results in displacement or movement of soil or fill materials, has the potential to be viewed as a violation of the CWA if an appropriate permit has not been issued by the USACE. The USACE has primary jurisdictional authority to regulate wetlands and waters of the United States.

Section 401 of the CWA gives the State board and regional boards the authority to regulate through water quality certification any proposed federally permitted activity that may result in a discharge to water bodies, including wetlands. The State may issue certification, with or without conditions, or deny certification for activities that may result in a discharge to water bodies. The State of Tennessee issues Section 401 permits under the authority of the Tennessee Water Quality Control Act (*TCA §69-3-108*). These permits are issued by the TDEC Division of Water Resources (DWR). The permitting process is described in the flow chart depicted in Figure 6-1. Aquatic Resource Alteration Permits (ARAP) are required for any alteration of state water, including wetlands that do not require a federal permit. Examples of stream alteration activities that require a permit from TDEC DWR include:

- Dredging, widening, straightening or bank stabilization
- Levee construction if excavation or fill of stream channel is involved
- Water withdrawals
- Flooding, excavation, draining, and filling a wetland
- Bridge construction

Some activities may also qualify for a general permits for specific stream alterations that cause minimal impact to water quality. General permits are issued on a nationwide, regional, or state basis for particular categories of activities. The general permit process eliminates individual review and allows certain activities to proceed with little or no delay, provided that the general or specific conditions for the general permit are met. The following activities are eligible for a general permit, but details of each project must be shared with the TDEC DWR to ensure it qualifies:

- Construction of boat launching ramps
- Alteration of wet weather conveyances
- Construction of road crossings of waters
- Debris removal from streams
- Bank Stabilization
- Herbicide application in aquatic systems

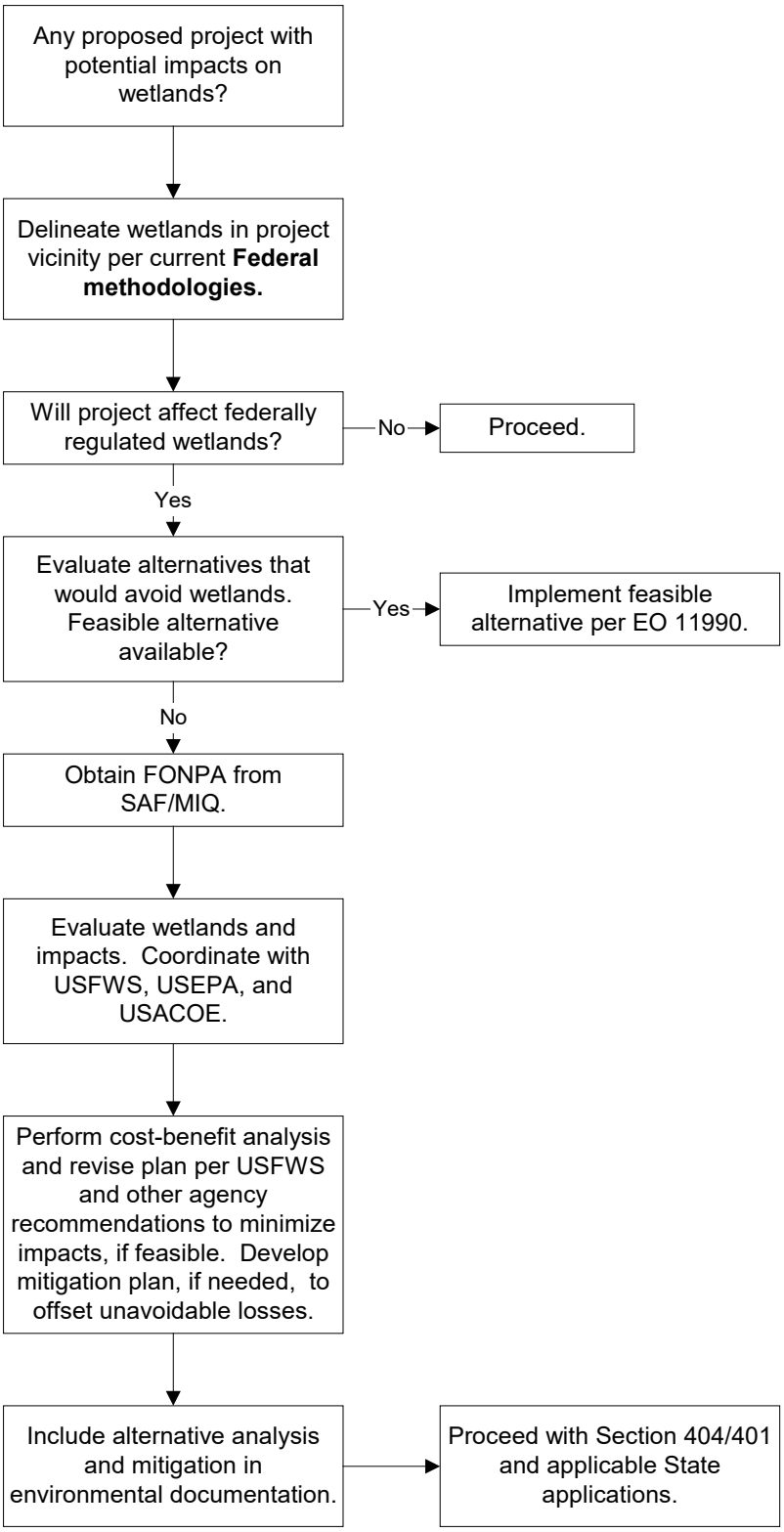



**Figure 6-1. Wetlands Permit Process**

All Section 404 permits from USACE must include Section 401 Certification from TDEC DWR. General permitted activities can begin work immediately provided they comply with the specific requirements stated in each of the general permits, but the Navy must submit a Notice of Intent, using the Application for Aquatic Resource Alteration Permits (CN-0191) three weeks prior to beginning any work. The application for an ARAP is available from TDEC DWR electronically at:

https://www.tn.gov/content/dam/tn/environment/water/water-public-notices/ppo_water_2020-07-08-dwr-nr-g-06-complete-arap-application-requirements-for-habitat-alterations.pdf

If the activity cannot be accomplished under the conditions of the general permit, an individual ARAP will be required.

For individual permits, applicants must also submit an ARAP and the proper fee at least three months before starting any activity. The form requires submission of the following to TDEC DWR:

- Name, address, and phone number of the applicant
- The Federal license or permit for which certification is requested
- A description of the project or activity that is expected to result in a discharge into the waters of the State
- All water quality data, reports, and analyses that describe the existing and projected water quality for those waters affected by the project
- Mitigation measures, if any, to be used to minimize or prevent adverse water quality impacts, including water quality monitoring.

Wetlands are also protected under Executive Order (EO) 11990 — *Protection of Wetlands* (*43 FR 6030),* the purpose of which is to reduce adverse impacts associated with the destruction or modification of wetlands. CNO Environmental Protection, Safety, and Occupational Health Division (N45) would prepare a Finding of No Practicable Alternative (FONPA) and the Secretary of the Navy (SECNAV) approves it before any action within Federal wetlands may proceed. In preparing a FONPA, the Installation must consider the full range of practicable alternatives that will meet justified program requirements to ensure they are within legal authority of DoN, meet technology standards, are cost-effective, do not result in unreasonable adverse environmental impacts, and other pertinent factors. When the practicality of alternatives has been fully assessed, only then should a statement regarding the FONPA be made into the associated Finding of No Significant Impact (FONSI) or Record of Decision (ROD).

As a result of the previously cited Federal and state regulations, DoN is responsible for identifying and locating Jurisdictional waters of the United States (including wetlands) occurring on DoN bases where these resources have the potential to be impacted by base activities. Such impacts could include construction of roads, buildings, runways, taxiways, navigation aids, and other appurtenant structures or activities as simple as culvert crossings of small intermittent streams, riprap placement in stream channels to curb accelerated erosion, and incidental fill and grading of wet depressions.

Although wetlands maps may be available, confirmation of the location and extent of the wetlands at a project area is necessary to ensure that inadvertent violations do not occur. Confirmation is also

necessary to ensure that appropriate permits are obtained before encroachments occur in areas that cannot be avoided.

### *Long-Term Wetland Management*

The long-term management concept for the protection and enhancement of wetlands on NAVSUPPACT Mid-South will include DoN's policy of *no net loss* of wetlands, and will be to maintain and develop vegetative buffers extending 100 feet around wetland areas, except where sufficient acreage is not available as determined by the NRM. A minimum buffer width of 100 feet is required to provide the basic physical and chemical buffering needed to reduce siltation into the wetland, retain the natural attenuation and filtering capacity of the wetland, and maintain the wetland's biological communities. Buffers will not be removed if any portion of the buffer is less than 100 feet wide or if the result would be a buffer width less than 100 feet.

In areas where insufficient acreage is available for buffering or greater protection is needed, other appropriate measures will be employed, including (1) redirecting, discouraging, or prohibiting pedestrian and pet access to the wetland or buffer area by the placement of hedges, fences, or signs; and (2) planting vegetated filter strips (swaths of land planted with grasses and trees) to intercept uniform sheet flows of runoff before the runoff reaches a wetland. NAVSUPPACT Mid-South will use these methods individually or in combination along the perimeters of wetlands.

### *Ecosystem Management and Wetlands*

Proper wetlands management is an essential component of ecosystem management because it preserves, enhances, and creates habitat for a variety of wildlife species, while providing aesthetic and educational values. Changes to hydrology, geochemistry, substrate, and species composition may impair the ability of a wetland to function properly. Such alterations can affect the ability of the wetland to filter excess sedimentation and nutrients from surface water, resulting in deteriorated surface water quality. Vegetative buffers between wetland and upland vegetative communities will help maintain and improve water quality by filtering sediments and other pollutants from runoff prior to discharge into the wetland. Vegetative buffers also will provide habitat for a diversity of wetland and upland species.

### *Military Mission*

NAVSUPPACT Mid-South activities detrimental to wetland functions can affect the military mission by placing the Installation at odds with TDEC. Proper wetland management improves water quality for MWR and outdoor recreational activities, which helps maintain the morale of personnel assigned to the Installation. Proper wetland management also helps mitigate the effects of flooding, which could pose a threat to the continuation and location of training activities.

### *Wetland Management Strategies*

- Maintain 100-foot buffers around wetlands. Where it is determined that a wetland has, or could have, significant habitat value, or where current activities adjacent to a wetlands area are causing noticeable adverse impacts on the habitat, remedial actions and buffers of more than 100 feet will be considered. Activities within buffer zones are limited to those that would cause little or no impact on or disturbance to the wetlands. In cases where established

activities already occur within buffers and cannot be reasonably changed, those wetlands are subject to increased monitoring.

- Plan development and training to avoid wetlands impacts to the maximum extent possible and mitigate unavoidable impacts on wetlands functions.
- Review operations and maintenance programs that potentially affect wetlands, and develop procedures and guidelines to avoid the loss of wetlands functions.
- Pursue water quality management procedures that protect wetlands from excessive nonpoint source runoff.
- Evaluate general vegetative characteristics of wetlands to determine where potential future control of invasive species could result in measurable habitat value enhancement.
- Post signage at known wetland locations to alert Installation and visiting personnel and to protect wetlands from inadvertent encroachments.
- Continue to evaluate the stormwater management program and activities contributing to stormwater runoff and pollutant loading in stormwater runoff, and implement BMPs to minimize stormwater pollution;
- Continue to develop a soil erosion control management plan, and reduce the rate of soil erosion through the implementation of long-term measures and projects;
- Continue to use Integrated Pest Management (IPM) techniques in pest management programs and emphasize the use of pesticides with low toxicity and low application rates;
- Inventory wetlands and assess their function and quality as warranted, promote buffers for all wetlands, and ensure land use and land management practices that will not adversely affect wetland resources;
- Continue using BMPs for forest management activities to ensure watershed protection;
- Review and monitor proposed activities for impact avoidance to the attenuation capacity of the 100-year floodplain. If it is determined that development is necessary within the 100-year floodplain to support the military mission, development shall first be located in the previously disturbed areas of the floodplain;
- Ensure implementation of policies that minimize adverse impacts to ecosystem resources from land disturbance activities;
- Continue to implement programs and activities for the protection and enhancement of habitat for threatened and endangered animal and plant species; and
- Continually verify that natural resources personnel obtain proper training and certifications.

### *Projects Related to Wetlands*

- Vegetative Community Survey (Project 4 in Section 7);
- Invasive Species Management (Project 6 in Section 7);
- Species Habitat Assessment and Management (Project 8 in Section 7); and
- NSA Mid-South INRMP (Project 10 in Section 7).

**Additional Sources of Information**

TDEC Division of Water Resources
312 Rosa L. Parks Avenue, 11th Floor
Nashville,TN 37243
https://www.tn.gov/content/tn/environment/program-areas/wr-water-resources-home.html

Jimmy Smith
Natural Resources Unit Manager
TDEC Division of Water Resources
615-532-0191; Jimmy.R.Smith@tn.gov

USACE – Memphis District
Wetlands and Waters of the U.S., Regulatory Division
https://www.mvm.usace.army.mil/About/Offices/Regulatory/
901-544-3471

USFWS, National Wetlands Inventory, Regional Wetlands Coordinator, Region 4
https://www.fws.gov/wetlands/nwi/rwc4.html

EPA, Water: Wetlands
https://www.epa.gov/wetlands

Environmental Law Institute
http://www.eli.org/

Society of Wetland Scientists
http://www.sws.org

Society for Ecological Restoration
http://www.ser.org

### *6.1.2 Erosion Control*

Land-disturbing and draining activities on and adjacent to the Installation may cause erosion and sedimentation if disturbed areas are not protected by adequate controls and standards. Specifically, areas along drainage canals are sluffing due to steep slopes and scalping by lawn care machinery, and areas associated with construction are in need of additional E&S measures. As seen in Photograph 6-1, scalping is occurring as mowing machinery attempts to control vegetation growth in drainages. Exposed channel slopes are also susceptible to erosion, as depicted in Photograph 6-2. In addition, stormwater on the Installation may flow at an accelerated velocity due to the large amount of impervious surface area comprising NAVSUPPACT Mid-South. Locations of severe erosion on the Installation are depicted in Figure 6-2.

Erosion and sedimentation can be reduced through implementation of the Stormwater Pollution Prevention Plan, Best Management Practices (BMPs), calculated management activities that reduce sediment inputs into the Installations' waterways, and the development and implementation of a Stormwater Management Program.

**Photograph 6-1. Erosion in channels within mowed areas on the Golf Course**

**Photograph 6-2. Erosion of along the banks of the Southwest Channel**

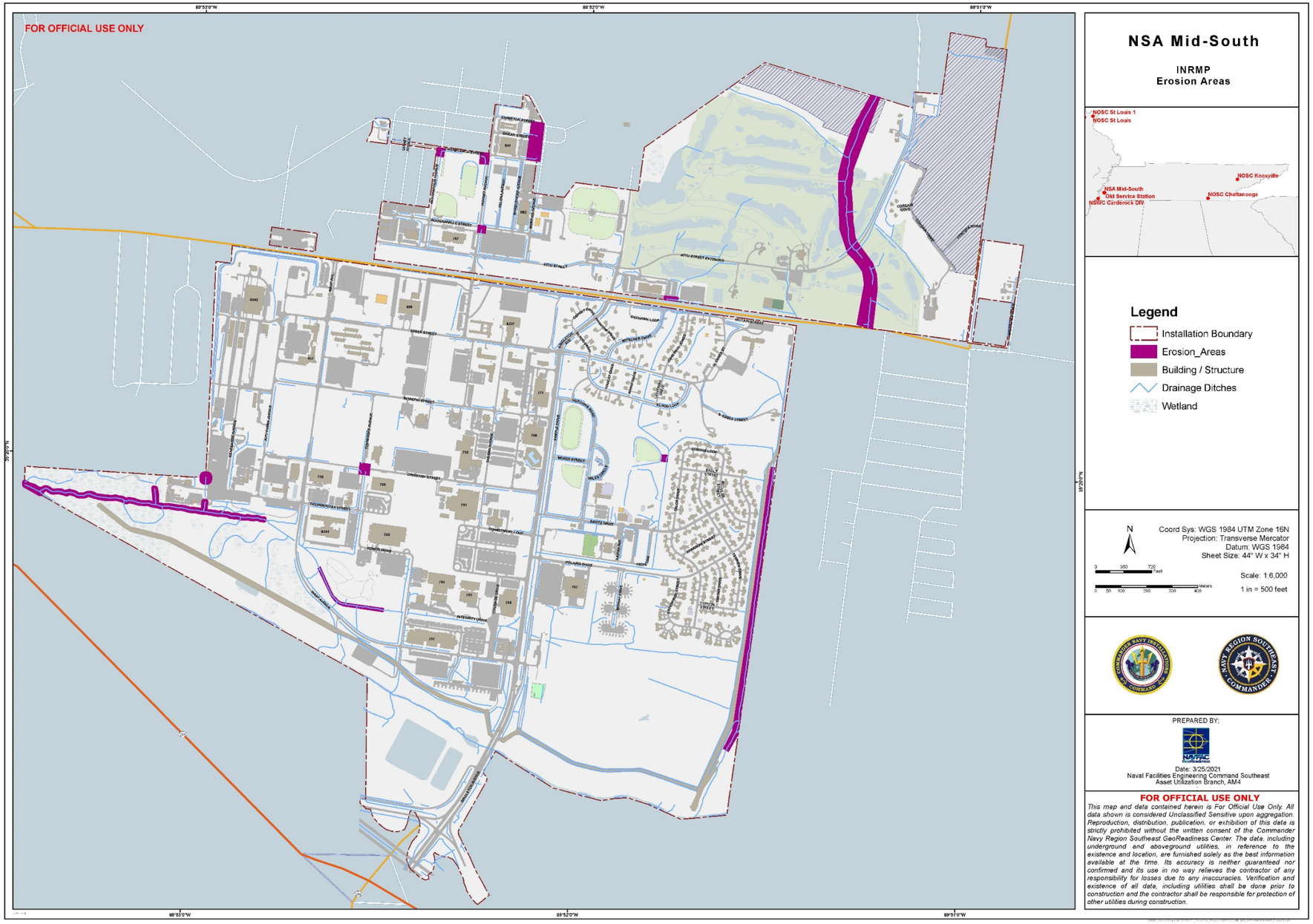



**Figure 6-2. Location of Severe Erosion on NAVSUPPACT Mid-South**

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### *Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Erosion Control*

- Soil Conservation Act, 16 U.S.C. 590(a) et seq., provides for soil conservation practices on federal lands.
- Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, 33 U.S.C. 1251, regulates the dredging and filling of wetlands and establishes procedures for identifying and regulating nonpoint sources of polluted discharge, including turbidity, into waterways.
- Clean Water Act (CWA), Section 402: National Pollutant Discharge Elimination System (NPDES) Program, 2002, 33 USC 1251, controls direct discharges into navigable waters. NPDES permits, issued by either the EPA or an authorized state or tribe, contain industry-specific technology-based limits and establish pollutant monitoring and reporting requirements.
- CWA Section, Section 401, requires an applicant for a federal license or permit to provide a certification that any discharges from the facility will comply with the CWA, including water quality standard requirements.
- CWA Section, Section 404, establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands.
- Rivers and Harbors Act, requires authorization from the USACE for the construction of any structure in or over any navigable water of the United States and the excavation, dredging, and deposition of material in these waters or any obstruction or alteration in a navigable water.
- Executive Orders 11989 and 12608, close areas to off-road vehicles where soil, wildlife, or other natural resources may be adversely affected.
- Executive Order 13112, 3 February 1999, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems. Vegetative buffers and landscaping to control soil erosion must comply with this executive order.
- OPNAVINST 5090.1E, 12-3.8(d), discusses natural resources management relating to soil conservation management.

### *Longterm Management*

The long-term management concept for erosion and sedimenaton control is to identify and understand the suitability and sustainability of a soil unit for a proposed action. The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil surveys may be used to identify the potential applicability and limitations of each soil unit for land use activities. Land uses include forestry, building construction, recreational, and wildlife habitat. Soils maps for Shelby County are available through the USGS Soil Surface Geographic Database (SSURGO) website (see Additional Sources of Information at the end of this section). Soil survey information can be obtained from the NRCS. To minimize soil erosion, NAVSUPPACT Mid-South will:

- Continue the use of BMPs to control soil erosion. In addition, NAVSUPPACT Mid-South will implement the six principles for soil conservation and erosion management presented in Smoot and Smith (1999):

1. Minimize areas of disturbance;
2. Stabilize and protect disturbed areas from raindrop and runoff energies as soon as practicable;
3. Minimize runoff velocities;
4. Protect disturbed areas from adjacent area runoff;
5. Retain sediment within construction sites; and
6. Reduce exposure time.

- Take into account erosion control measures for forest areas and for forestry reforestation and timber stand improvement actions;
- Evaluate areas on the Installation for erosion control problems;
- Reduce mowing and increase grass height and coverage;
- Maintain good ground cover through proper fertilization to prevent weed invasion and erosion; and
- Control potential erosion control problems using the following methods:
  1. Use vegetative and structural protective covers (e.g., permanent seeding, groundcover);
  2. Use sediment barriers (e.g., straw bales, silt fence, brush);
  3. Create sediment detention ponds and basins (e.g., sediment traps and basins);
  4. Implement stream and shore bank protection (e.g., riprap);
  5. Construct pervious surface walkways in areas of high pedestrian traffic;
  6. Restrict vehicular traffic to all off-road areas;
  7. Construct water conveyances (e.g., slope drains, check dam inlet and outlet protection); and
  8. Implement temporary construction and road stabilization practices (e.g., placement of stone and geotextile fabrics [Smoot and Smith 1999]).

### *Ecosystem Management*

Erosion control is an essential component of the ecosystem management concept. Soils are particularly susceptible to erosion from uncontrolled stormwater runoff and may discharge into water bodies from point and nonpoint sources. Sediments in stormwater runoff have the capacity to obstruct drainage infrastructure and to reduce the volume capacity of wetlands, potentially resulting in damaging flood conditions. Turbidity pollution, derived from soil erosion, may also affect surface water quality in adjacent freshwater, and estuarine environments.

### *Military Mission*

Erosion can undermine roads and runways, potentially affecting the military mission. It can also increase sediment loading in stormwater runoff, which increases turbidity and reduces water quality in surrounding waters, violating environmental laws and placing the Installation at odds with TDEC.

### *Erosion Control Management Strategies*

- Enhance the existing Stormwater Pollution Prevention Plan to specify the Installation, maintenance, inspection and repair of erosion control measures on NAVSUPPACT Mid-South. The enhanced Plan should focus on erosion and sedimentation BMPs for the drainage ditches. As part of the Plan, areas currently exhibiting erosion will be identified and prioritized prior to rehabilitation efforts (Figure 6-1). An example of inadequate erosion control measures are shown in Photographs 6-1 and 6-2. All earth-moving activities (including contractor operations) are required to comply with the specifications of this Plan.
- Adhere to the Stormwater Management Plan. This plan would provide engineered solutions to retain or slow the speed of stormwater exiting the Installation, and thereby reduce the amount of erosion and sedimentation occurring within the Installation's drainage ditches.
- Adhere to all applicable construction BMPs. In addition, the current Stormwater Pollution Prevention education program will continue.
- Continue revegetation of exposed soils using native species.
- Inventory wetlands and assess their function and quality as warranted, promote 100-foot buffers for all wetlands, and ensure land use and land management practices that will not adversely affect wetland resources;
- Implement BMPs to minimize stormwater pollution;
- Continue using BMPs for forest management activities to ensure watershed protection;
- Review and monitor proposed activities for impact avoidance to the attenuation capacity of the 100-year floodplain. If it is determined that development is necessary within the 100-year floodplain to support the military mission, development shall first be located in the previously disturbed areas of the floodplain;
- Ensure implementation of policies that minimize adverse impacts to ecosystem resources from land disturbance activities; and
- Continually verify that natural resources personnel obtain proper training and certifications.

### *Projects Related to Erosion Control*

- Vegetative Community Survey (Project 4 in Section 7);
- Invasive Species Management (Project 6 in Section 7);
- Species Habitat Assessment and Management (Project 8 in Section 7); and
- NSA Mid-South INRMP (Project 10 in Section 7).

### *Additional Sources of Information*

USDA Natural Resources Conservation Service in Tennessee
https://www.nrcs.usda.gov/wps/portal/nrcs/site/tn/home/

NPDES Stormwater Pollution Prevention Plans
https://www.epa.gov/npdes/developing-stormwater-pollution-prevention-plan-swppp

USDA Soil Survey Geographic (SSURGO) Database
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/office/ssr12/tr/?cid=nrcs142p2_010596

The National Soil Erosion Research Laboratory
https://www.ars.usda.gov/midwest-area/west-lafayette-in/national-soil-erosion-research/

### *6.1.3 Stormwater and Water Quality Control*

Stormwater runoff is precipitation that falls onto surfaces such as rooftops, streets, and the ground, and is not absorbed or retained by that surface, collecting volume and velocity as it flows off. Stormwater runoff management addresses measures to reduce runoff and pollutants, and to control discharge from point and nonpoint sources. Nonpoint source pollution is the polluting of surface water and groundwater resources by diffuse sources, rather than by discreet, identifiable point sources. Point and nonpoint source pollutants are commonly associated with land use. These pollutants routinely include sediments from land disturbance, pesticides and nutrients from urban lawns and landscaping, and oil, grease, heavy metals, and other toxic materials from streets, rooftops, and parking lots. Stormwater runoff is the most common transport mechanism for nonpoint source pollution. The majority of pollutant loading occurs during and immediately after storm events.

As development increases at NAVSUPPACT Mid-South, the control of stormwater drainage is an increasingly important aspect of water quality control. More impermeable surface area (less land available for absorption and filtration) translates to faster runoff rates and increased pollution loads. More development means more land clearing and landscaping activities that require appropriate stormwater management practices. It is especially important to have proper stormwater management when developed areas are in close proximity to surface water bodies.

#### *Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Stormwater and Water Quality Control*

- Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, 33 U.S.C. 1251, regulates the dredging and filling of wetlands and establishes procedures for identifying and regulating nonpoint sources of polluted discharge, including turbidity, into waterways.
- Executive Order 11990, 24 May 1977, as amended, directs the preservation and enhancement of wetlands.
- Oil Pollution Act of 1990 (OPA 90), 33 U.S.C. 2701, requires planning for, rescue of, minimization of injury to, and assessment of damages or injury to fish and wildfire resources from the discharge of oil.
- Comprehensive, Environmental Response, Compensation and Liability Act, 42 U.S.C. 9601 et seq., authorizes Natural Resources Trustees to recover damages for injury to, destruction of or loss of natural resources resulting from the release of a hazardous substance.
- CWA, Section 402 NPDES Program, 2002, 33 USC 1251, controls direct discharges into navigable waters. NPDES permits, issued by either the EPA or an authorized state or tribe, contain industry-specific, technology-based and water-quality-based limits and establish pollutant monitoring and reporting requirements.

- CWA, Section 401, requires an applicant for a federal license or permit to provide a certification that any discharges from the facility will comply with the CWA, including water quality standard requirements.
- CWA, Section 404, establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands.
- OPNAVINST 5090.1E, 12-3.8(f), discusses natural resources management relating to nonpoint source pollution.
- OPNAVINST 5090.1E, Chapter 39, establishes requirements, guidelines and standards for the assessment of damages arising from the release of oil or hazardous substances.

**Long-Term Management**

NAVSUPPACT Mid-South will implement programs to reduce pollutant loading and stormwater runoff into wetlands and water bodies. Wetland quality and wildlife habitat will benefit from the reduction of stormwater and pollutant loading. NAVSUPPACT Mid-South has a Stormwater Management Plan, and will operate under the following management guidelines for stormwater runoff and water quality control:

1. NAVSUPPACT Mid-South will prevent pollutant loading in stormwater by operating under its Facility Response Plan, HW Management Program, and Stormwater Management Program;
2. NAVSUPPACT Mid-South will manage stormwater runoff from new development to achieve *no net increase* in stormwater discharge volume from the Installation, unless there are no means to do so that will meet the military mission;
3. NAVSUPPACT Mid-South will continue to provide stormwater retention by developing and enhancing stormwater ponds. Stormwater ponds often function as wetlands and can provide ideal growing conditions for emergent wetland vegetation, which may be useful in pollutant removal;
4. NAVSUPPACT Mid-South will consider, where feasible, retrofitting stormwater infrastructure to provide natural infiltration of stormwater (e.g., grass swales, shallow retention ponds adjacent to intakes), or to increase detention time prior to discharge;
5. NAVSUPPACT Mid-South will use natural and created buffers around new stormwater ponds to provide wildlife habitat, reduce impacts associated with runoff, filter sediments and sediment-bound pollutants, and facilitate infiltration prior to discharge into water bodies. Reducing sediment loading will increase the longevity of the retention ponds and further reduce maintenance costs;
6. NAVSUPPACT Mid-South will use permeable alternatives to impervious surfaces; for example, wood decks instead of concrete patios, grass swales instead of concrete;
7. To help protect water quality, NAVSUPPACT Mid-South continues to inventory its use of pesticides and fertilizers and assess alternatives to reduce the use of mineral fertilizers and pesticides. NAVSUPPACT Mid-South will continue to use a combination of organic and mineral fertilizers to minimize the potential for nutrient loading in stormwater runoff while ensuring the growth of landscaping and grass cover on the Installations. NAVSUPPACT

Mid-South will continue to use pesticides with lower toxicity levels and to apply them at reduced rates;

- The use of organic matter to provide nutrient material will be considered. Organic matter consists of the wastes and remains of plants and animals. Organic matter is the nutrient of choice because it improves soil composition and structure by making soil more resistant to erosion by stormwater runoff. Other benefits from increasing the organic matter content of soil include better soil aeration and temperature control, increased water holding and nutrient retaining capacities, and a steady supply of nutrients to plants;
- Mineral fertilizers are materials, either natural or manufactured, containing nutrients essential for the normal growth and development of the plants. Mineral fertilizers include both fast and slow-release fertilizers, and will be used as a supplement to organic matter for the growth and development of landscaping and grass cover;
- Where feasible, slow-release fertilizers will be the mineral fertilizer of choice, and will be used, after consultation with the NRM, in combination with organic matter when it is impractical to only use organic matter. Slow-release mineral fertilizers are released throughout the season, thereby reducing the amount of waste by leaching and reducing the potential for surface water contamination. Other benefits of using slow-release fertilizers are the reduced application frequency and the minimization of fertilizer burn;
- A blended fast and slow-release mineral fertilizer will be used in areas where the following conditions are met: (1) areas of size where the use of organic material is impractical, and (2) areas where there is no potential for the discharge of fertilizer into surface water bodies; and
- Fertilizers and pesticides will not be applied before or during rain events due to the strong likelihood of runoff. Fertilizers and pesticides will be applied during maximum plant uptake periods to minimize leaching.

### *Ecosystem Management*

The effective management of stormwater and water quality is essential to realize the ecosystem management concept. Implementation of BMPs in developed, semi-developed, and unimproved areas will help protect water quality and habitat for aquatic life. BMPs address the reduction of sedimentation, nutrient overloading, bacterial and parasitic pests, and harmful chemicals in stormwater. Construction of any new stormwater ponds in accordance with the stormwater and water quality management concept will increase wildlife habitat and reduce the potential for additional discharge from new development.

### *Military Mission*

Improper stormwater management could lead to increased flooding on NAVSUPPACT Mid-South properties, altering the timing and location of training. It can also lead to increased erosion, and sedimentation into water bodies, which increases turbidity and reduces water quality in surrounding waters, violating environmental laws and placing the Installation at odds with TDEC.

### *Stormwater and Water Quality Control Management Strategies*

- Continue to evaluate the stormwater management program and activities contributing to runoff and pollutant loading, and implement BMPs to minimize stormwater pollution;
- Reduce the rate of soil erosion through the implementation of long-term measures and projects;
- Continue to use Integrated Pest Management (IPM) techniques in pest management programs and emphasize the use of pesticides with low toxicity and low application rates;
- Implement BMPs to minimize stormwater pollution;
- Promote 50-to-100 foot buffers for all wetlands, and ensure land use and land management practices that will not adversely affect wetland resources;
- Continue using BMPs for forest management activities to ensure watershed protection;
- Review and monitor proposed activities for impact avoidance to the attenuation capacity of the 100-year floodplain. If it is determined that development is necessary within the 100-year floodplain to support the military mission, development shall first be located in the previously disturbed areas of the floodplain;
- Ensure implementation of policies that minimize adverse impacts to ecosystem resources from land disturbance activities, including off-road vehicular traffic;
- Continue to establish a program to prevent further degradation of pond and lake shorelines;
- Continue to implement programs and activities for the protection and enhancement of habitat for threatened and endangered animal and plant species; and
- Continually verify that natural resources personnel obtain proper training and certifications.

### *Projects Related to Stormwater and Water Quality Control*

- Vegetative Community Survey (Project 4 in Section 7);
- Invasive Species Management (Project 6 in Section 7);
- Species Habitat Assessment and Management (Project 8 in Section 7); and
- NSA Mid-South INRMP (Project 10 in Section 7).

### Additional Sources of Information

NPDES Stormwater Pollution Prevention Plans
http://cfpub.epa.gov/npdes/stormwater/swppp.cfm

EPA Office of Wetlands, Oceans, and Watersheds
http://water.epa.gov/aboutow/owow/

USGS Water Resources Programs
http://water.usgs.gov/programs.html

USGS Tennessee Water Science Center
https://tn.water.usgs.gov/about/office.html

Environmental Law Institute
www.eli.org

Nonpoint Source Pollution of Surface Waters
*http://water.epa.gov/aboutow/owow/*

### *6.1.4 Floodplains Management*

Floodplains are defined as areas adjoining inland or coastal waters that are prone to flooding. These areas must be reserved to discharge the 100-year flood without cumulatively increasing the water surface elevation more than a designated height. When a floodplain is established, no additional obstruction (e.g., a building) should be placed in the floodplain that will increase the 100-year floodwater surface elevation.

EO 11988, *Floodplains Management* requires all Federal agencies to provide leadership and take action to reduce the risk of flood loss; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values of floodplains when acquiring, managing, or disposing of Federal lands. CNO N45 or another designated official must sign an FONPA before any action within a floodplain may proceed. When the practicality of alternatives has been fully assessed, only then should a statement regarding the FONPA be made into the associated FONSI or ROD.

In addition, if action is taken that permits an encroachment within the floodplain that alters the flood hazards on a National Flood Insurance Rate Map (FIRM) (i.e., changes to the floodplain boundary), NAVSUPPACT Mid-South must submit an analysis reflecting those changes to the Federal Emergency Management Agency (FEMA). FEMA headquarters can be contacted at (202) 646-3461 to obtain booklet MT-2, *Revisions to National Flood Insurance Program Maps,* for further guidance. Large portions of the Installation are included in the 100-year flood zones established by FEMA. Appropriate actions will be taken to ensure appropriate Federal and state regulations are followed for all construction and obstructions to the floodplain

The major objective of floodplains management is to minimize the impact that NAVSUPPACT Mid-South missions have on floodplains and, by extension, wetlands. To maximize floodplain functionality, NAVSUPPACT Mid-South natural resources staff strive to maintain healthy, functional wetlands that can sustain minor operational influences outside indirect infringement of wetlands. When possible, it is the goal to enhance wetland functions to create wetlands that maximize the values that wetlands have to the ecosystem and to society (floodwater retention, water quality protection, etc.). It is also the goal to maximize floral diversity of wetland communities, which, in turn, maximizes the faunal diversity of the ecosystem.

To meet the goals of wetland and floodplain management, the following subsections present several management issues that compromise achieving particular goals and presents objectives and management actions designed to meet the goal.

#### *Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Floodplains*

- Executive Order 11988, Floodplain Management, 24 May 1977, requires federal service agencies to avoid construction or management practices that will adversely affect Floodplains,

unless it is found that there is no practical alternative and the proposed action has been designed to minimize harm to or within the Floodplain.

- OPNAVINST 5090.1E, 12-3.8(c), discusses natural resources management relating to Floodplain management.

### *Long-Term Management*

NAVSUPPACT Mid-South will avoid construction or management practices that will adversely affect the attenuation capacity of the 100-year floodplain unless it finds that: (1) there is no practical alternative, or (2) the proposed action has been designed to minimize harm to or within the floodplain. Preferred sites for development will be outside the 100-year floodplain. If there is no suitable location outside the 100-year floodplain that will satisfy the need of the military mission (for example, proximity to dependent function), preferred sites for development will be within previously disturbed areas of the 100-year floodplain. NAVSUPPACT Mid-South will evaluate alternatives and techniques for controlling and reducing the potential for flood damages for all development within the 100-year floodplain. NAVSUPPACT Mid-South will evaluate the use of the county's floodplain regulation as guidance for development in the floodplain.

### *Ecosystem Management*

Proper management of the 100-year Floodplain is an essential ecosystem management concept. Floodplains perform important natural functions, including temporary storage of floodwaters, moderation of peak flows, maintenance of water quality, groundwater recharge, and erosion prevention. Floodplains also provide habitat for wildlife, recreational opportunities, aesthetic benefits, and areas of archaeological significance.

### *Military Mission*

Inappropriate floodplain management practices have the potential to decrease the flood attenuation capacity of the floodplain and increase the amount and rate at which flooding occurs. Flooding has the potential to adversely affect necessary infrastructure components of the military mission.

### *Floodplains Management Strategies*

- Review and monitor proposed activities for impact avoidance to the attenuation capacity of the 100-year floodplain. If it is determined that development is necessary within the 100-year floodplain to support the military mission, development shall first be located in the previously disturbed areas of the floodplain;
- Continue to evaluate the stormwater management program and activities contributing to stormwater runoff and pollutant loading in stormwater runoff, and implement BMPs to minimize stormwater pollution;
- Reduce the rate of soil erosion through the implementation of long-term measures and projects;
- Implement BMPs to minimize stormwater pollution;
- Promote 100 foot buffers for all wetlands, and ensure land use and land management practices that will not adversely affect wetland resources;

- Continue using BMPs for forest management activities to ensure watershed protection;
- Ensure implementation of policies that minimize adverse impacts to ecosystem resources from land disturbance activities;
- Continue to establish a program to prevent further degradation of pond and lakes shorelines; and
- Continually verify that natural resources personnel obtain proper training and certifications.

### *Projects Related to Floodplains Management*

- Vegetative Community Survey (Project 4 in Section 7);
- Invasive Species Management (Project 6 in Section 7);
- Species Habitat Assessment and Management (Project 8 in Section 7); and
- NSA Mid-South INRMP (Project 10 in Section 7).

### *Additional Sources of Information*

FEMA Floodplain Management Publications
http://www.fema.gov/plan/prevent/floodplain/publications.shtm

USFWS Floodplain Management
http://www.fws.gov/policy/613fw1.html

## *6.1.5 Landscaping and Grounds Maintenance*

Landscaping and grounds maintenance is defined here as landscaping design and construction practices intended to benefit the environment and to generate long-term cost savings. Such practices include using native species, which will reduce the need for irrigation and fertilization, stabilize soil, and improve wildlife habitat. Grounds maintenance is provided by a contractor through the Facilities Department.

Landscaping practices should minimize costs associated with maintenance, specifically mowing. Reduction the mowing frequency of maintained areas reduces operational costs by lowering man-hours, wear on machinery, and use of fuel. Conversion of some of the lawn areas not utilized by the current mission to wildflowers, old field, or forest would minimize operational costs while providing additional habitat for native flora and fauna.

### *Benefits of Effective Landscaping and Grounds Maintenance*

Effective landscaping and grounds maintenance minimizes capital costs by:

- preserving existing vegetation during construction in order to reduce the need for new plant materials;
- using native groundcover and shrubs instead of turf wherever possible to reduce maintenance and irrigation requirements;
- using plant materials to reduce solar loading and glare on buildings, to block winter winds, and to channel winds to enhance summer breezes;

- using plant material instead of expensive manmade controls for controlling erosion; and
- using plant barriers and screens instead of architectural screens;

Effective landscaping and grounds maintenance maintains ecological balance within the region by:

- preserving environmentally sensitive areas with high value flora and fauna;
- preserving existing plant materials unless clearing is necessary to allow construction;
- revegetating disturbed areas with indigenous plant materials that promote wildlife habitat; and
- incorporating physical site constraints, such as soils, topography, drainage, and vegetation, into design decisions so as to disturb as little of the ecological balance as possible.

Effective landscaping and grounds maintenance contributes to engineering solutions by:

- using wide, shallow drainage channels planted with native grasses instead of closed systems;
- combining water features with natural drainage systems to provide retention, aesthetic interest, and climatological control;
- breaking up parking lots with planted medians to reduce solar heat buildup and glare; and
- replanting disturbed areas immediately to minimize erosion and runoff.

Effective landscaping and grounds maintenance enhances the living environment and the aesthetic qualities of NAVSUPPACT Mid-South by:

- creating an identity and sense of place that is indigenous to the environment, and by reducing negative impacts to the greatest degree possible;
- reducing monotonous and repetitive views by creating softer, more natural, cleared woods edges;
- creating and reinforcing outdoor spaces that give a distinctive identity and setting to each area and function;
- enhancing and controlling the site microclimate (wind, humidity, and temperature);
- humanizing and minimizing large paved areas to prevent extensive heat buildup and visual monotony;
- providing seasonal color for interest, variety and focal points; and
- using native materials and local building practices to achieve design continuity and harmony.

### *Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Landscaping and Grounds Maintenance*

- Executive Order 13148, 21 April 2000, Section 207, requires implementing landscaping practices that are intended to benefit the environment and generate long-term cost savings.

- Executive Order 13112, 3 February 1999, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.
- The President's April 16, 1994, Memorandum on Environmentally Beneficial Landscaping, requires implementing landscaping practices that are intended to benefit the environment and generate long-term cost savings.
- Federal Insecticide, Fungicide and Rodenticide Act, 7 U.S.C. 136, governs the use and application of pesticides in natural resources management programs.
- Federal Water Pollution Control Act as amended by the CWA of 1977, 33 U.S.C. 1251, prohibits the discharge of dredged or filled materials into waters of the United States, including wetlands, without first obtaining a permit from USACE (Section 404 of the CWA).
- OPNAVINST 5090.1E, 12-3.8(e), discusses natural resources management relating to environmentally and economically beneficial landscaping.
- DODINST 7310.5, administers the reimbursement of costs related to managing forest resources for timber production. Under this regulation, only expenses related to the maintenance of timber for commercial sales are reimbursed.

### *Long-Term Management*

Executive Order 13148 of 21 April 2000, Section 207 calls for landscaping practices that benefit the environment and generate long-term cost savings at federal facilities. The EO provides the following guidelines to be followed when cost-effective and to the extent practicable:

- Use regionally native plants for landscaping;
- Design, use, or promote construction practices that minimize adverse effects on the natural habitat;
- Take measures to prevent pollution (i.e. reduce fertilizer and pesticide use);
- Implement water-efficient practices; and
- Promote awareness of environmental and economic benefits of native landscaping.

NAVSUPPACT Mid-South will landscape by xeriscaping around all newly-constructed buildings and other facilities to create relatively low maintenance and low cost landscapes and reduce the need for intensive labor (i.e., hand trimming and bed maintenance). Xeriscaping will also be phased into existing landscaped areas. Xeriscaping offers a viable alternative to the typically high-volume water requirements of other landscaping approaches by conserving water through creative landscaping. Xeriscaping uses native plants, which are adapted to local climatic conditions and variations, generally resistant to drought, disease, and pests, and require less water than non-native species. The potential benefits of xeriscaping include reduced water use (typically from 30 to 80 percent), reduced heating and cooling costs from placement of appropriate tree species, decreased stormwater and irrigation runoff, fewer pesticide and fertilizer applications, less yard waste, increased habitat for plants and animals, and lower labor and maintenance effort and thus costs. Xeriscaping incorporates seven principles (Xeriscape Colorado, Inc., 1999):

1. Planning and design for water conservation and beauty;

2. Creating practical turf areas using manageable sizes, shapes, and appropriate grass species;
3. Selecting plants with low water requirements and grouping plants with similar water needs, then experimenting to determine how much and how often to water the plants;
4. Using soil amenities, such as compost or manure, appropriate to site and plant needs;
5. Using mulches, such as wood chips, to reduce evaporation and reduce soil temperatures;
6. Irrigating efficiently with properly designed systems (including hose-end equipment) and by applying the right amount of water at the right time; and
7. Maintaining the landscape by mowing, weeding, pruning, and fertilizing properly. Grass mowing should not be excessive and should be based on height rather than by arbitrarily specified time intervals.

NAVSUPPACT Mid-South will evaluate current landscaping practices to determine how effective the principles of xeriscaping would be in improving existing conditions. NAVSUPPACT Mid-South will determine: (1) if implementation of xeriscaping principles will provide sufficient benefits to justify any additional cost, (2) if the implementation of certain principles may achieve the desired results, or (3) if continuation of existing conditions will achieve desired results. NAVSUPPACT Mid-South will monitor the success of integrating the principles of xeriscaping with existing landscaped areas and adjust management practices as warranted.

Grounds maintenance at NAVSUPPACT Mid-South will be accomplished using the following guidelines:

- Avoid excessive mowing. Grass mowing should be scheduled on the basis of height, rather than by arbitrarily specified time intervals, if practicable;
- Maintain good ground cover through proper fertilization to prevent erosion. If erosion occurs, it will be addressed and corrected as soon as possible;
- Maintain healthy lawns to prevent insect infestations and disease; and
- Minimize hand trimming.

Grounds maintenance personnel will contact the NRM for technical advice prior to tree and shrub pruning, fertilization, grass replacement, species selection, new landscape projects, and new irrigation projects. Pesticide and fertilizer applications during landscaping and grounds maintenance shall be consistent with the long-term management concepts pertaining to pesticides and fertilizers in Sections 5.1.7 and 5.3.4.

### *Ecosystem Management*

Beneficial landscaping through construction and design practices is consistent with an ecosystem management approach because it reduces the need for irrigation, pesticides, and fertilizers and relies on the functions and characteristics of native plant species. The use of native species also is recommended for the reduction and control of invasive species. Reducing irrigation, fertilizer, and pesticide demand reduces costs associated with grounds maintenance and reduces pollutant loading to stormwater runoff and surrounding surface waters and aquatic communities.

### *Military Mission*

Inappropriate landscaping and grounds maintenance practices (e.g., excessive use or application of inappropriate pesticides) may potentially affect water quality and federally and state-designated endangered or threatened species, resulting in regulatory actions by agencies such as the USFWS, TDEC, or USACE, which could threaten the military mission of NAVSUPPACT Mid-South. In addition, appropriate landscaping and maintenance practices improve quality of life.

### *Landscaping and Grounds Mainetance Management Strategies*

- Educate grounds maintenance personnel on the principles of landscaping discussed in this INRMP;
- In cooperation with the Public Works Officer, identify improved grounds for conversion to semi-improved acreage. Parcels should be chosen based on their current cover type, slope, and aspect to ensure that healthy grasslands can subsist with minimal physical manipulation to the site;
- Manage converted semi-improved grounds in the same manner that adjacent unimproved acreage is managed (e.g., forested, wetlands, etc.);
- Ensure that regionally native species are selected for landscape plantings;
- The most effective and aesthetically pleasing alternative to reduce operational cost associated with conversion of lawn areas is to create a grassland containing wildflower species. However, commercial wildflower mixes from the shelf shall not be purchased because they contain many species of exotic plants that would prove problematic for Installation maintenance and for the local grassland communities;
- Continue to follow urban forestry management practices to enhance wildlife habitat and aesthetics in developed areas;
- Apply xeriscaping principles using native species for new landscaping, and phase in these principles for existing landscapes;
- Continue the current invasive and exotic species management strategy;
- Review and monitor proposed activities for impact avoidance to the attenuation capacity of the 100-year floodplain. If it is determined that development is necessary within the 100-year floodplain to support the military mission, development shall first be located in the previously disturbed areas of the floodplain;
- Continue to evaluate the stormwater management program and activities contributing to stormwater runoff and pollutant loading in stormwater runoff, and implement BMPs to minimize stormwater pollution;
- Implement BMPs to minimize stormwater pollution;
- Promote 100 foot buffers for all wetlands, and ensure land use and land management practices that will not adversely affect wetland resources; and
- Continually verify that natural resources personnel obtain proper training and certifications.

### *Projects Related to Landscaping and Grounds Maintenance*

- Vegetative Community Survey (Project 4 in Section 7);
- Invasive Species Management (Project 6 in Section 7);
- Forestry Urban Tree Assessment and Monitoring (Project 7 in Section 7);
- Species Habitat Assessment and Management (Project 8 in Section 7); and
- NSA Mid-South INRMP (Project 10 in Section 7).

### *Additional Sources of Information*

Principles of Xeriscape Design
https://wateruseitwisely.com/100-ways-to-conserve/landscape-care/principles-of-xeriscape-design/

American Water Works Association, WaterWiser
http://www.awwa.org/waterwiser/

## *6.1.6 Pest Management*

Prevention of damage to natural resources is an important objective of pest management. Natural resources damage can result from infestations of damaging insects or insect larvae, infestation of facilities by rodents and cockroaches, and permitting feral domestic animals, such as cats and dogs, to roam the Installation.

Insects that can damage natural resources at NAVSUPPACT Mid-South include pests of ornamental plants, conservation plantings, and landscaped areas. Ornamental plants can be infested by the larval stages of insects that voraciously consume their foliage and construct nests in the foliage in a manner that can kill entire sections of the affected plant. Insects that cause this type of damage are tent caterpillars (*Malacosoma* spp.) and fall webworm (*Hyphantria cunea*). Ornamental plants also can become infested with sucking insects, such as scale insects and aphids that deprive the plants of strength to the point that they are weakened and might die.

Pests and nuisancel wildlife causes inconveniences to humans, threatens health and safety of human populations, and has the potential to cause property damage. Effects can be relatively minor, such as reducing the aesthetic qualities of an area, or major, such as damaging landscaped areas, damaging property, and causing personal injury. Nuisance wildlife also may act as vectors for human disease.

Integrated Pest Management (IPM) is an acceptable, environmentally responsible, and economically practical method of controlling pest animal populations. IPM incorporates a variety of cultural, biological, and chemical methods to efficiently manage pest populations while lowering dependence on chemical controls. A number of animal pests occur on NAVSUPPACT Mid-South, including fire ants, cockroaches, termites, tent caterpillars, fall webworms, and other invertebrates, and the control of these pests is an integral part of ecosystem management practices.

### *Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Pest Management*

- Endangered Species Act, 16 U.S.C. 35, 32 CFR 190, provides for the identification and protection of threatened and endangered species of fish, wildlife, and plants and their critical habitats. It requires federal agencies to ensure that no agency action is likely to jeopardize the continued existence of a threatened or endangered species.
- EO 13112, 3 February 1999, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.
- OPNAVINST 5090.1E, 12-3.10, discusses Navy policy regarding invasive species.
- FIFRA, 7 U.S.C.136, states that a pesticide that is federally registered by the EPA is not legal for use until it is also registered by the individual state.
- Forest Pest Suppression Memorandum of Agreement between the Department of Agriculture and DOD, 11 December 1990, is the planning, coordination, and execution of field operations to prevent and suppress damaging forest insects and disease outbreaks.
- OPNAVINST 5090.1e, Chapter 12, discusses the use of pesticides on Navy installations.
- Armed Forces Pest Management Board, Technical Information Memorandum No. 37, presents guidelines for reducing feral cat populations on military installations in the U.S.
- CNO Policy Letter (Ser. N456M/1U595820), 10 Jan 2002, requires Navy commands to institute proactive pet management procedures to prevent the establishment of feral cat and dog populations.
- OPNAVINST 5090.1E, 12-3.10(b), discusses Navy policy regarding feral cat and dog control, and explicitly prohibits the use of Trap-Neuter-Release and similar programs.

### *Long-Term Management*

NAVSUPPACT Mid-South would use IPM practices to control pests occurring on properties. The primary pests include tent caterpillars, fall webworms, fire ants, mosquitoes, cockroaches, termites, and biting flies. Because of the technical nature of this program, NAVSUPPACT Mid-South would utilize sources of technical information, such as university researchers, to remain advised of current IPM techniques. Additionally, Installation grounds managers would be provided with continual training and education on the most recent IPM techniques and issues. Integrated pest management practices form a total management system which includes chemical, cultural, biological, genetic, and mechanical controls.

- **Chemical Controls** often form part of an IPM strategy. The key is to use the pesticides to complement, rather than hinder, other strategy elements and to limit negative environmental effects. It is also important to understand the life cycle of a pest so that the pesticide can be applied when the pest is at its most vulnerable, and to achieve maximum effect at minimum levels of pesticide. Chemical controls include the following:
  - *Conventional*: include carbamates, chlorinated hydrocarbons, some botanicals and analogs, new compounds; and

    - *Biorational*: include pheromones, antifeedants, heat/cold, minerals, oils, some botanicals, and microbials
- **Cultural Controls** include plant variety and site selection rotations, cultivations, and sanitation. These control measures are often referred to as the older forms of pest control.
- **Biological Controls** maintain pests at levels that do not cause great economic or aesthetic losses. The principle behind biological pest control is that a given pest can be killed by predators, parasites, or pathogens. By introducing or encouraging such adversaries, the population of pest organisms should decline. There are three general approaches to biological pest control: importation, augmentation, and conservation.
    - *Importation* involves importing a specific organism to control another; however, there are dangers with this approach. This method requires extensive research before a control organism is released in order to determine whether it will attack species other than the pest species.
    - *Augmentation* consists of manipulating existing natural enemies to increase their effectiveness. This can be achieved by mass production and periodic release of natural enemies of the pest, and by genetic enhancement of the enemies to increase their effectiveness at control.
    - *Conservation* involves identifying and modifying factors that may limit the effectiveness of the natural enemy. In some situations, this may include reducing the application of pesticides, as pesticides may kill predators as well as killing pests. Sometimes part of a crop area is left untreated so that natural enemies will survive and recolonize the treated areas.
- **Genetic Controls** include the transfer of resistance genes into a plant, or the engineering of a disadvantageous trait in the pest, then releasing modified individuals into the pest control area. Another method is the introduction of sterile members of the pest species.
- **Physical or Mechanical Controls** alter environmental factors in a way that reduces pest populations. These controls may be performed by the individual groundskeeper; examples include crop rotation and pruning. Another physical control method, sometimes called "mating disruption," involves the use of sex pheromones produced by females to attract males for mating. Many of these pheromones are reproduced synthetically in the laboratory and are available commercially.

A long-term management policy of public awareness (e.g., informing employees and visitors) for wildlife-related diseases focuses on, but is not limited to, the following issues:

- Knowledge of the diseases in the area and the specific times of year that present the greatest risk of exposure;
- Knowledge of and recognition of early symptoms of diseases and the condition of exposure;
- The use of extreme caution when approaching or handling a wild or feral animal, especially one that looks sick or abnormal;
- The use of protective measures against fungal diseases where there is an accumulation of animal feces (e.g., under a bird roost);

- Protection from vector-borne disease in high-risk areas using measures such as mosquito or tick repellent, and wearing special clothing; and
- Reduction in host populations and their ectoparasites.

In the event that NAVSUPPACT Mid-South identifies a wildlife conflict, a damage control program will be established. The program will have four parts (Dolbeer *et al*. 1994):

1. **Problem definition** to determine the species and number of animals causing the problem, the amount of loss or nature of the conflict, and other biological and social factors related to the problem;
2. **Ecology of the problem species** to understand the life history of the species, especially in relationship to the conflict;
3. **Control method** takes the information gained from parts 1 and 2 and develops an appropriate management program to alleviate or reduce the conflict; and
4. **Evaluation of control** assesses the reduction in damage in relation to costs and impact of the control on target and non-target populations and the environment.

### *Ecosystem Management*

An integrated ecosystem approach compliant with the SAIA, as amended, is used to manage habitats for wildlife. Safety and health issues must be considered when developing management plans to control nuisance wildlife.

### *Military Mission*

Nuisance wildlife and the outbreak of disease on NAVSUPPACT Mid-South could pose a threat to implementation of the military mission through the infection of military personnel and the consequent limitation of access to areas of the Installation to control a problem. Structural damage to military infrastructure from infestation could also result in delays and costs to operations.

### *Pest Management Strategies*

- Continue to use Integrated Pest Management (IPM) techniques in pest management programs and emphasize the use of pesticides with low toxicity and low application rates;
- Monitor and forecast pest populations to determine whether insect infestations are present, and if so, the type of pests, degree of infestation (small, medium, or large), and the size of the area or number of plants under attack;
- Educate residents of NAVSUPPACT Mid-South about the ecological and health benefits of keeping pet cats indoors and eliminating resident populations of feral cats;
- Use BMPs for pesticide management, such as:
    - complying with all legal requirements for pesticide use,
    - using appropriate tools for spraying,
    - calibrating sprayers,
    - obtaining required education, Pesticide Application Training regarding pesticide use,

  - ensuring proper pesticide handling and storage,
  - adhering to worker protection standards,
  - practicing drift reduction techniques, and
  - considering special circumstances, off-site impacts, proximity to urban areas, and endangered species.
- Ensure implementation of policies that minimize adverse impacts to ecosystem resources from land disturbance activities;
- Continually verify that natural resources personnel obtain proper training and certifications.
- Monitor and forecast pest populations to determine whether insect infestations are present, and if so, the type of pests, degree of infestation (small, medium, or large), and the size of the area or number of plants under attack; and
- Educate residents of NAVSUPPACT Mid-South about the ecological and health benefits of keeping pet cats indoors and eliminating resident populations of feral cats.

### *Projects Related to Pest Management*

- Nuisance Animal Control (Project 1 in Section 7);
- Invasive Species Management (Project 6 in Section 7);
- Forestry Urban Tree Assessment and Monitoring (Project 7 in Section 7); and
- NSA Mid-South INRMP (Project 10 in Section 7).

### *Additional Sources of Information*

Wildlife damage and diseases information provided by the University of Nebraska Cooperative Extension Service, Great Plains Agricultural Council, and the USDA
http://www.ces.ncsu.edu/nreos/wild/wildlife/wdc/index.html

Nuisance Wildlife Control Information
http://www.aphis.usda.gov/ws

USGS National Wildlife Health Center Web
http://www.nwhc.usgs.gov/

Wildlife Disease/Health Related Links
http://wildlifedisease.nbii.gov/

National Integrated Pest Management Network
http://webipm.ento.vt.edu/ipm-www/nipmn/nipmn_presentation/nipmnhome.html

Biological Control Virtual Information Center
http://cipm.ncsu.edu/ent/biocontrol/

## *6.1.7 Invasive Plant and Noxious Weed Management*

Natural resources management objectives at NAVSUPPACT Mid-South include control of exotic, invasive, and noxious plants to prevent damage to natural habitats. Four primary control strategies are used in controlling invasive plant species and noxious weeds: mechanical and physical control

(physical removal or exclusion), cultural control (altering the environment to make it less suitable or attractive), biological control (use of other organisms for control), and chemical control (use of herbicides).

Noxious or invasive weeds and exotic plants are a pervasive problem through the terrestrial landscape at NAVSUPPACT Mid-South. Noxious plant species that occur on NAVSUPPACT Mid-South include Sericea lespedeza, Johnson grass, and Japanese barberry.

- ***Sericea lespedeza*** is an invasive herb. Native to eastern Asia, federal and state agencies facilitated the spread of this plant by using it for bank stabilization, soil improvement, and forage cover. *Sericea lespedeza* threatens open areas such as meadows, open woodlands, and wetland borders. This plant colonizes eroded, sterile soils, but is shade-intolerant. It crowds out native plants and develops an extensive seed bank in the soil ensuring its long residence at a site. Established, dense stands of sericea lespedeza suppress native flora and its high tannin content makes it unpalatable to native wildlife and livestock (NPS 1998). **Treatment:** Mechanical and chemical methods are the most effective management options for *Sericea lespedeza*. Mowing plants in the flower bud stage for two or three consecutive years may reduce the vigor of sericea lespedeza and control further spread. Plants should be cut as close to the ground as possible and impacts on adjacent native plants will be minimized to the greatest extent possible. Chemical treatment will be incorporated prior to the flowering stage, which begins late July. Manufacturers recommend herbicide application of triclopyr (Garlon or Grazon) or clopyralid (Lontrel) in early-to-mid-summer. These should be applied during the vegetative stage prior to branching or during flowering, covering the leaves and stems to the point of runoff. These herbicides are not labeled for use in wet areas or adjacent to streams. Manufacturers recommend the use of glyphosate (Round-Up) for such sites, so it should be considered for eradicating *Sericea lespedeza* in areas near Big Creek Drainage Ditch and other wet areas at NAVSUPPACT Mid-South (NPS 1998).

- **Johnson grass** is considered to be one of the ten worst weeds in the world. It thrives in disturbed soils and is adapted to a large range of conditions, but its ideal environment is the subtropics where it is warm and humid with summer rainfall. NAVSUPPACT Mid-South provides suitable habitat for the proliferation of Johnson grass. Johnson grass has a massive creeping horizontal rhizome. Coupled with its ability to produce an abundance of dormant seeds, this plant can survive severe conditions. A single Johnson grass plant can produce up to 300 feet of rhizomes in one month, and 10 bushels of seed can be produced on one acre in a single growing season. The rhizome system gives this grass a competitive edge over other grass species, especially because it regenerates very easily when cut into small pieces. This makes it exceptionally difficult to completely eradicate Johnson grass. Other factors that give Johnson grass a competitive edge include its size and early-season growth. There is also limited evidence that Johnson grass produces a protein that can inhibit seed germination and seedling development in other plant species (TNC 1993). **Treatment:** The best time to implement control techniques for Johnson grass is during the first 2 weeks of growth when rhizome development has not yet begun and when carbohydrate supply is at its lowest concentration. A combination of mowing, tilling, and herbicide applications may provide adequate control of Johnson grass and has better results than using just one of the techniques. The use of soil-active herbicides should not be implemented due to residual

activity. Two foliar sprays, glyphosate (Round-Up) and dalapon (Dowpon), are mildly toxic and decay rapidly in the soil, making them useful in controlling Johnson grass. Glyphosate is recommended for use in natural and non-agricultural sites and may be suitable for application at NAVSUPPACT Mid-South. Multiple applications are required annually for many years. Dalapon, when applied at either the late boot stage or the early growth stage prior to blooming, has been successful in eliminating regrowth (TNC 1993).

- **Japanese barberry:** is an invasive shrub species introduced to the United States from Japan. This shrub is used for ornamental purposes because of its scarlet fruit and orange autumn foliage. However, Japanese barberry easily invades oak woodlands, suppressing the growth of native herbs in many ecological communities. It can survive and grow under an extrememly wide range of light and soil moisture conditions. Japanese barberry is typically found in locations of partial sunlight such as in edge habitat, but is also found along roadsides, old fields, and open woods. Birds and rabbits will often eat the fruits, helping to disperse the seeds. The branches of the Japanese barberry establish new roots when they touch the ground, allowing single plants to become quite large (CTDEP 1999). **Treatment:** The most effective method for controlling Japanese barberry is mechanical. Removal by cutting, hand pulling, or digging should be accomplished in areas where there are only a few plants. This should be done in early spring because this shrub is one of the first to leaf out, making identification easier. A hoe, weed wrench, or mattock can be used to uproot the bush and all connected roots. Herbicides should only be used when mechanical removal is too difficult (when shrubs are in rock piles for example). Triclopyr (Garlon or Grazon) has been used as a cut-stump treatment with success. Shrubs should be cut down to a stump and triclopyr applied to the top of the stump. However, triclopyr should not be used in wet areas or areas adjacent to streams. Other herbicides labeled for brush control, such as glyphosate (Round-Up), may also prove effective, but this is a non-selective herbicide that can kill native species, so applications should be performed during late fall or early spring when most native plants are dormant (CTDEP 1999).

### *Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Invasive Plant and Noxious Weed Management*

- Federal Noxious Weed Act of 1974, 7 U.S.C. 2801 et. seq., provides for the control and eradication of noxious weeds and their regulation in interstate and foreign commerce.
- Executive Order 13112, 3 February 1999, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.
- Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. 136, requires that all pesticides, whether for commercial or private use, be applied in accordance with product labeling and that containers are properly disposed of. EPA is responsible under FIFRA for the registration of all pesticide active ingredients used in the United States.
- Federal Plant Pest Act, 7 U.S.C. 150a et seq., regulates the importation and interstate movement of plant pests and authorizes the Secretary of Agriculture to take emergency measures to destroy infected plants or materials.
- OPNAVINST 5090.1E, 12-3.10, discusses natural resources management relating to the control of noxious weeds and invasive species.

### *Long-Term Management*

Invasive and exotic species will be managed through the removal of the species and restrictions on the introduction of the species to NAVSUPPACT Mid-South in accordance with Executive Order 13112. The Installation will survey the extent of invasive and exotic species on all properties and schedule removal. This plan will be implemented to control invasive and exotic species to acceptable levels. The NRM will screen all lists of landscaping plants proposed for NAVSUPPACT Mid-South to ensure invasive and exotic species are not used.

The use of herbicides for removal of invasive and exotic species will be conducted in accordance with federal and state laws regulating the use of pesticides. According to the EPA, a pesticide "is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest. Pests can be insects, mice and other animals, unwanted plants (weeds), fungi, or microorganisms like bacteria and viruses; the term pesticide also applies to herbicides, fungicides, and various other substances used to control pests". Under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA; 7 U.S.C. 136), pesticides are registered at the federal level and by individual states. Therefore, a particular pesticide product that is federally registered by the EPA is not legal for use until it is also registered by the individual state. FIFRA allows individual state registrations to be more restrictive than federal registrations, but not less so.

Pesticides will be applied by skilled, DoD-certified workers and according to label instructions to ensure their application does not contaminate surface waters or affect flora and fauna. Careful prescription of the type and amount of chemical to be applied and the use of buffer areas around surface waters will also help prevent misdirected application or deposition. NAVSUPPACT Mid-South will use pesticides with lower toxicity and apply them at rates below those specified on the label, when it is believed that such modifications can adequately address the problem. NAVSUPPACT Mid-South will also consider the applicability of non-pesticide removal methods, which could be implemented through the use of volunteer groups. Properly fertilizing turf to encourage the growth and strength of desirable plants would also reduce the growth of weeds.

### *Ecosystem Management*

The management of exotic and invasive species is a fundamental component of the ecosystem management concept. Invasive species typically out-reproduce native species and have a propensity to spread into unstable or disturbed areas (e.g., highway and utility rights-of-way, site disturbance areas, ponds, and wetland areas). Therefore, the control of invasive flora species and replacement with native species at NAVSUPPACT Mid-South is essential to protect and enhance biodiversity, and for the proper functioning of wetlands as water storage and purifying systems.

### *Military Mission*

Invasive species have a propensity to spread rapidly, potentially creating hazardous situations when they interfere with infrastructure systems (e.g., along and around roadway intersections and electric distribution lines and substations).

### *Management Strategies*

- Continue current invasive and exotic species management strategies that involve surveys of NAVSUPPACT Mid-South to determine the extent of exotic and invasive species and appropriate control methods, including time of year for removal, and pesticide application rates;
- Consult the Pest Management Plan to determine removal methods. Consider non-herbicide removal methods and using herbicides with lower toxicity and applied at reduced rates;
- Consult with foresters and fish and wildlife biologists at NAVFAC SE, as well as with federal, state, and county wildlife biologists, foresters, and land managers, for identification of invasive and exotic species, and for appropriate, effective measures to protect fish and wildlife;
- Identify individuals and groups that could contribute to the control effort;
- Maintain a program for the eradication and control of invasive and exotic species and prohibit the planting of such species as part of NAVSUPPACT Mid-South's Grounds Maintenance Plan. Develop a monitoring and removal program for problem areas;
- Continue to follow urban forestry management techniques and implement projects to enhance wildlife habitat and aesthetics in developed areas;
- Apply xeriscaping principles using native species for new landscaping, and phase in these principles for existing landscapes;
- Promote 100 foot buffers for all wetlands, and ensure land use and land management practices will not adversely affect wetland resources; and
- Continually verify that natural resources personnel obtain proper training and certifications.

### *Projects Related to Invasive Plant and Noxious Weed Management*

- Nuisance Animal Control (Project 1 in Section 7);
- Vegetative Community Survey (Project 4 in Section 7);
- Invasive Species Management (Project 6 in Section 7);
- Forestry Urban Tree Assessment and Monitoring (Project 7 in Section 7);
- Vegetation Management and Fuel Load Reduction in Forest Stands (Project 9 in Section 7); and
- NSA Mid-South INRMP (Project 10 in Section 7).

### Additional Sources of Information

USDA Invasive and Noxious Weeds
http://plants.usda.gov/java/noxiousDriver

Federal Noxious Weed Act
http://www.fws.gov/laws/lawsdigest/fednox.html

FIFRA Act
http://www.epa.gov/agriculture/lfra.html

USDA State-Specific Threats
http://www.invasivespeciesinfo.gov/unitedstates/MS.shtml#thr

Center for Plant Conservation
http://www.centerforplantconservation.org/

The Nature Conservancy, Protecting Native Plants and Animals
http://www.nature.org/ourinitiatives/habitats/forests/howwework/protecting-native-plants-and-animals-taking-on-the-invaders.xml

USFWS Invasive Species
http://www.fws.gov/invasives/

### *6.1.8 Urban Forestry*

NAVSUPPACT Mid-South has several stands or rows of trees as well as individual trees located throughout the Base. These trees provide the most prominent visual component to the landscape and serve as noise buffers, as well as wind breaks. Urban tree management and preservation involves the protection of the roots, trunk, and canopy of the tree. Successful urban forestry programs manage these resources to enhance both natural and human-built features.

#### *Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Urban Forest Management*

- Federal Noxious Weed Act of 1974, 7 U.S.C. 2801, establishes control and eradication of noxious weeds and regulates them in interstate and foreign commerce.
- Executive Order 13112, Invasive Species, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems.
- OPNAVINST 5090.1E, 12-3.8(j), discusses laws that govern natural resources management relating to the protection and management of forest resources.

#### *Long-Term Management*

Long-term management for urban forestry will involve forest maintenance, tree planting, and tree protection to enhance the quality of life on the Installation. NAVSUPPACT Mid-South will identify areas where the benefits of urban forestry can be applied, develop a plan for planting trees and shrubs, and develop partnerships to support the Installation's urban forestry program.

The program primarily includes planting, removal, maintenance, and protection of urban trees and forests. The primary components of the program for NAVSUPPACT Mid-South are listed below.

##### *Tree Planting*

Tree planting will be undertaken during those times of the year when air temperatures are moderate, soil temperatures are above freezing, and water (i.e., rainfall) is more plentiful (NPS 1990). At NAVSUPPACT Mid-South these conditions occur most predominantly in the spring. Any future tree plantings will include trees that:

- Provide a noise-buffering effect,
- Have branches that are not usually brittle (subject to wind or snow weight breakage),

- Provide an adequate wind break,
- Produce fruit that attracts birds, and
- Shed a minimal amount of leaves or needles to reduce maintenance costs.

Trees purchased for planting shall have:

- A normal growth habit with full, vigorous, and uniform foliage,
- A sound and well-set root system, and
- Be free from evidence of insect or disease infestation or physiological weakness.

The recommended maximum size of trees for successful transplanting is approximately 2 to 2.5 inches in trunk caliper. Caliper is the trunk diameter measured at a point six inches above the root crown (NPS 1990). The process for planting a tree is as follows:

1) Tree pit dimensions are related to the size of the root ball. The minimum excavation shall be 1.5 times wider than the horizontal length of the root ball and 6 inches deeper than the vertical dimension (NPS 1990). As feasible, the soil will be loosened beyond the drip line of the tree (i.e., the area under a tree at the furthest point of the canopy) to promote and aide root growth (Shigo 1995).

2) Do not fertilize at the time of planting (Shigo 1995). Enough soil will be placed at the bottom of the excavated pit to keep the top of the root ball approximately 2 to 3 inches above ground level. The soil at the bottom of the excavated pit will be foot-tamped before placing the tree in the pit.

3) Inspect the tree roots prior to placing the tree in the excavated pit. If roots are injured, they will be cut so that a sharp edge wound results (i.e., at an angle). New roots will generate rapidly. Dead and dying branches shall be pruned as described in this Plan. Do not prune live branches at this time.

4) The tree shall then be carefully placed in the excavated pit. Soil will then be added slowly to ensure that the tree remains upright in a perfectly vertical in position. The top of the root ball will remain at or above the ground level to ensure adequate aeration and drainage. Soil or deep mulch will never cover the top of the root ball (NPS 1990 and Shigo 1995). The soil will be foot-tamped during backfilling followed by watering which floods the tree pit and forces any remaining air to the surface. This will ensure that the soil contains no air pockets adjacent to the root ball that could fill with water and result in root die-back (NPS 1990).

5) Grasses shall be kept away from the tree base to at least a radius of approximately 1½ to 2 feet from the tree stem. This area will be mulched lightly. Mulching of trees is important to provide temperature insulation and moisture detention to the root systems. However, a depth of approximately two inches will not be exceeded. It is important not to apply too much mulch to the base of the tree, as this may promote root growth into the mulch layer and jeopardize the tree's ability to develop the deep roots needed to withstand periods of drought.

6) The trunk of the new tree shall not be wrapped with paper or other materials, as wrapping benefits pathogens if the tree is wounded (Shigo 1995). The tree will be braced, if necessary, in a manner that allows some movement. The bracings will be removed after the tree is established, after a maximum of approximately 1 or 2 years.

7) After the tree is established and new leaves and branches have formed, prune weak-side branches that interfere with the central leader. The central leader of the tree shall not be pruned (NPS 1990).

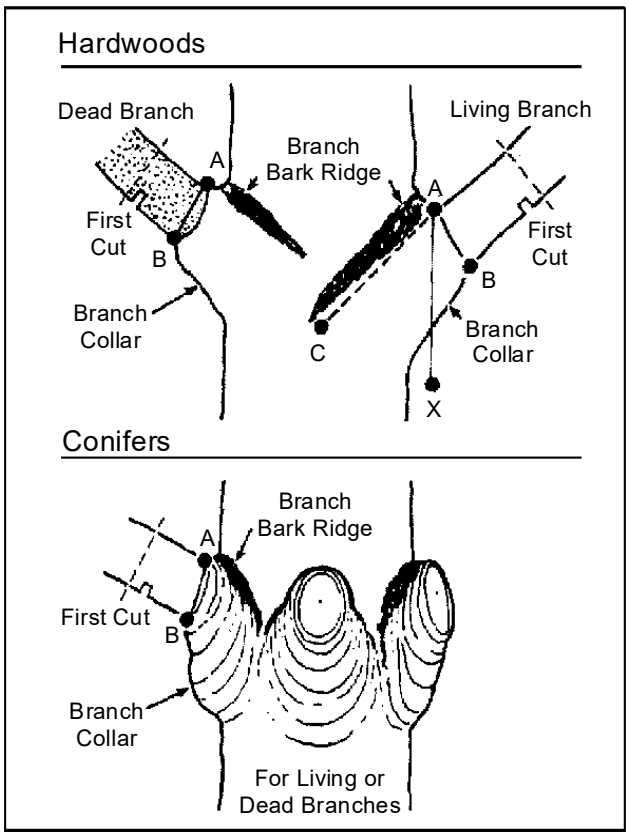
### *Tree Pruning*

Tree pruning shall be accomplished in accordance with National Arborist Association Standards for Pruning and Maintenance of Shade Trees. The trees may be pruned and trimmed on a five-year cycle, one-fifth of the total trees to be pruned (as needed) each year. Periodic removal of dead and broken branches (1) improves the appearance and structure of trees, (2) eliminates breeding sites for insect and disease organisms, and (3) increases the safety of Installation personnel. The BOS Contractor or a contracted arborist will inspect the Installation's trees annually in April. Branches that will be selected for removal include:

- Dead or broken branches,
- Branches that may come in contact with light posts and buildings,
- Trees around overhead power lines will be trimmed to maintain 10 feet of clearance between the limbs and power lines,
- Branches that may be crossing or rubbing against one another, and
- Branches that exhibit a narrow angle of attachment (i.e., less than 45 degrees) to the trunk because vascular tissues are compressed within the branch and structural failure of the branch becomes more likely as the tree ages.

Pruning shall be accomplished while the tree is still dormant (i.e., early spring or late fall). Pruning done in the spring will serve to increase foliage, while fall pruning enhances flowering (NPS 1990). Avoid pruning when tree sap is known to be flowing.

Unless a branch is extremely small, the Natural Target Pruning or double cut method shall be used as shown in the diagram presented in Figure 6-3. The branch will be cut outside the branch collar to promote healing (NPS 1990). The branch will first be safely removed leaving a stub (indicated as "cut first" in Figure 6-3), then the stub will be removed. The cutting process shall start by locating the branch bark ridge. After the initial undercut is made away from the branch bark ridge, the cutting tool should be placed as close as possible to the outer edge of the branch bark ridge within the branch crotch for the final cut (shown as Target "A" in Figure 6-3). Target B is where the branch meets the bottom of the branch collar. The final cut will be made from Point A to Point B. On larger branches, the final cut will be from Point B to Point A. A three-cut method may be necessary for larger limbs in order to prevent bark stripping. The three-cut method involves (1) making the initial cut further down the length of the branch, (2) then removing the remaining portion of branch leaving a stub, and (3) finally removing the stub. (CAUTION: The cuts on larger branches will be made with great care due to the "kick back" potential of the branch or power tool).




**Source:** Shigo 1995

**Figure 6-3. Diagram of the Natural Target Pruning or Double-Cut Pruning Method**

Do not cut the branch flush to the trunk, remove the branch collar, or leave a stub. The stub will provide pathogens with a food source while they grow into the corewood of the tree (Shigo 1995). Similarly, flush cuts, while aesthetically more pleasing, will not heal quickly. In addition, pruning paints inhibit wound healing and will not be used (NPS 1990).

When branches are cut properly, a ring, or "doughnut" of callus will form completely around the wound. The callus will form the growing season after the cut is made and turn the same color as the bark (Shigo 1995). Wounds to the basal area of trees (i.e., trunks) will be treated by removing torn and ragged material and carving the wound into the shape of an oval to promote healing (NPS 1990).

Pruned branches will be chipped by mechanical means. The chipped wood can be used as mulch on the Installation or will otherwise be removed from the Installation by the BOS Contractor.

Any tree or shrub which is within six inches of a building or light pole is determined to be of the category that it may come in contact with the pole or building. When cutting, pruning, or otherwise trimming trees and shrubs that may contact a building or light post, the trimming will

be sufficient such that the new clearance between the building and the object is at least twelve inches. Proper care will be taken to avoid electrocution during pruning operations.

#### *Dead Trees, Shrubs, Hedges and Vines*

Ornamental trees, shrubs, hedges and vines lost to either natural or unnatural causes shall be removed and replaced using the same or similar species (pre-approved by the Public Works Officer) of a size and growth form that will blend with the existing area within one or two year's growth. All tree and shrub species used as replacements will be of a size and species consistent with original landscaping designs, and will be subject to approval by the Public Works Officer before replacement planting is actually conducted. Trees to be replaced shall have a minimum height of 6 feet and a maximum height of 12 feet.

### *Ecosystem Management*

Urban forestry supports the ecosystem management concept by providing wildlife habitat through the development of new greenways and managing urban areas for the enhancement of wildlife. Urban forests help reduce stormwater runoff and soil erosion, and will be used as a component of xeriscaping. Urban trees can also play an important role in temperature modification in developed areas.

### *Military Mission*

Urban forestry practices can be implemented to help protect and enhance water quality and wildlife, thereby reducing the potential for adverse impacts to these resources that could threaten the military mission. It can also play an important part in improving quality of life for those supporting the military mission.

### *Management Strategies*

- Train and educate grounds maintenance personnel on the principles of urban forestry management;
- Implement projects to enhance wildlife habitat and aesthetics in developed areas;
- Apply xeriscaping principles using native species for new landscaping, and phase in these principles for existing landscapes;
- Ensure that the NRM reviews all planned maintenance for effects on urban forests. Additional duties include oversight and management of inventories, plantings, removals, pruning, fertilization, and protection practices. Construction and facility managers shall coordinate with the NRM concerning replacement of trees removed for any reason, except due to natural causes;
- Ensure that all Project Managers coordinate Installation planning, construction, and maintenance with the NRM to ensure a positive effect on the installation urban forest;
- Ensure that urban forestry management conforms to technical and professional recommendations as provided by NAVFAC SE or cooperating agencies;
- Review and monitor proposed activities for impact avoidance to the attenuation capacity of the 100-year floodplain. If it is determined that development is necessary within the 100-

year floodplain to support the military mission, development shall first be located in the previously disturbed areas of the floodplain;

- Promote 100-foot buffers for all wetlands, and ensure land use and land management practices that will not adversely affect wetland resources; and
- Continually verify that natural resources personnel obtain proper training and certifications.

### *Projects Related to Urban Forestry*

- Vegetative Community Survey (Project 4 in Section 7);
- Invasive Species Management (Project 6 in Section 7);
- Forestry Urban Tree Assessment and Monitoring (Project 7 in Section 7); and
- NSA Mid-South INRMP (Project 10 in Section 7).

### *Additional Sources of Information*

Alliance for Community Trees
http://actrees.org/site/index.php

Arbor Day Foundation
http://www.arborday.org/programs/treeCityUSA/index.cfm

International Society of Arboriculture
http://www.isa-arbor.com/home.aspx

National Association of State Foresters
http://www.stateforesters.org/

Society of American Foresters
http://www.safnet.org/

Society of Municipal Arborists
http://www.urban-forestry.com/mc/page.do?sitePageId=1374

USDA Forest Service
http://www.fs.fed.us/

Treelink
http://www.treelink.org/

## *6.1.9 Natural Resources Training*

Natural resources personnel at NAVSUPPACT Mid-South are expected to maintain a working knowledge of current research, issues, and technologies pertinent to natural resources management at the Installation. Training is important to ensure the limited staff is able to accomplish all necessary facets of natural resources management on the Installation. Personnel should also be knowledgeable of environmental laws pertaining to federal lands and DoD installations.

### *Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Natural Resources Training*

- Sikes Act, as amended 16 USC 670 a-o, requires each military department to manage fish and wildlife resources in accordance with a tripartite cooperative plan agreed to by the USFWS and state wildlife agency, to provide its personnel with professional training in fish and wildlife management.
- Fish and Wildlife Conservation Act, 16 USC 2901, encourages all federal departments and agencies to utilize their statutory and administrative authority, to the maximum extent practicable and consistent with each agency's statutory responsibilities, to conserve and promote conservation of nongame fish and wildlife and their habitats.
- OPNAVINST 6250.4B, 27 August 1998, DOD Pest Management Programs, provides the DON with policies for implementing pest management programs directed against pests that conflict with or adversely affect the mission of the DOD; affect the health and well-being of the DON personnel and their dependants; attach or damage real property, supplies, or equipment; adversely affect the environment; or are otherwise undesirable.
- DoD Instruction 4150.7, requires a supervisor to be at the specific location where pest management work is conducted, providing instruction and control, and maintaining a line-of-sight view of the work performed.
- OPNAVINST 5090.1E, Chapter 12, discusses natural resources management at Navy installations.

### *Long-Term Management*

Adequate staffing and training are essential components of long-term natural resources management at NAVSUPPACT Mid-South. Partnerships and cooperation with regulatory agencies, NAVFAC SE, university researchers, conservation groups, and non-government organizations are also vital to the continued success of management activities.

### *Ecosystem Management*

Ecosystem management is at the core of training for natural resources staff at NAVSUPPACT Mid-South, and would therefore be compromised by a lack of training.

### *Military Mission*

A properly-trained natural resources staff is NAVSUPPACT Mid-South's first line of protection against activities that could result in violations of environmental laws and policies. Communication between the NRM and the chain of command and other departments is vital to ensure NAVSUPPACT Mid-South remains in compliance with environmental legislation, avoiding regulatory action that could delay or otherwise compromise the military mission.

### *Management Strategies*

- Staffing needs shall be continuously reviewed for adequacy and filled to meet management needs;

- Continually verify that natural resources personnel obtain proper training and certifications for the following:
    - Fire Management;
    - Threatened and Endangered Species Management;
    - Wetlands Management;
    - Ecosystem Management;
    - Technology, especially GIS/GPS;
    - Natural Resources Legal Requirements;
    - Forest Management;
    - Department of Transportation (DOT) Requirements;
    - HW Training;
    - Safety Training; and
    - Pest Management.
- Continue to utilize the review board within the Facilities Maintenance Department to review all projects that potentially affect natural resources, including soil and water quality;
- Continue to integrate the management concepts of the INRMP into all working programs and department plans (i.e., HCP, PMP, and Grounds Maintenance Plan);
- Continue the working team that integrates the concepts of the INRMP into the HCP, PMP, and Grounds Maintenance Plan;
- Continue to ensure that all cooperative agreements, memoranda, and other agreements between the installation and federal and state agencies that oversee and regulate natural resources protection, are current, and those agreements have been established with all necessary agencies;
- Continue with the ecosystem management awareness and training/education program available to all interested NAVSUPPACT Mid-South personnel;
- Continue the technical education and training program for all contract and Installation personnel involved in activities on NAVSUPPACT Mid-South that may directly or indirectly affect ecosystem management success;
- Develop a team of experts with sufficient technical knowledge to evaluate the effectiveness of INRMP implementation and to recommend improvements; and
- Review NAVSUPPACT Mid-South staffing, including assistance from NAVFAC SE and federal, state, and county agencies, to identify whether there are adequate staffing and expertise to update the INRMP.

### *Projects Related to Natural Resources Training*

- NSA Mid-South INRMP (Project 10 in Section 7).

### *Additional Sources of Information*

Environmental Law Institute
http://www.eli.org/

NAVFAC Geospatial Information and Services
https://www.navfac.navy.mil/products_and_services/am/products_and_services/geospatial_services.html

Tennessee Pesticide Application
https://www.tn.gov/agriculture/businesses/pesticides/certification.html

National Wildfire Coordination Group
http://www.nwcg.gov/

Tennessee Fire Training and Certification
https://www.tn.gov/commerce/fire/training-certification.html

Qualifications of a Forestry Technician GS 0462-04 and Greater
http://www.opm.gov/qualifications/standards/IORs/gs0400/0462.htm

Naval Civil Engineering Officer's Corps School (CECOS)
http://www.cecosweb.com/

## 6.2 Forest Management

As a steward of public land containing forest resources, it is the responsibility of NAVSUPPACT Mid-South to actively manage its forests for conservation, utilization, and enhancement while maintaining environmental conditions that are consistent with the military missions of NAVSUPPACT Mid-South, its tenants, and the satellite areas. A forest is defined as a biological community dominated by trees and other woody plants. These areas have the potential to provide commercial timber products, wildlife habitat, recreation, and other benefits such as noise attenuation and aesthetic value. However, due to the small, fragmented forest acreage on NAVSUPPACT Mid-South, the Installation is limited in this potential. The goals for forest management at NAVSUPPACT Mid-South are summarized in Table 6-2.

**Table 6-2. The Forest Management Goal and Objectives**

Goal 2: Protect and enhance forest resources by practicing ecologically-sound forest management, leading to sustained yield of quality forest products, watershed protection, and wildlife habitat.

Objectives:

2.1 Implement sound silvicultural practices that promote biodiversity, ecosystem function, and disease control.

2.2 Stabilize and prevent degradation of natural resources that have been, or may be, impacted by wildland fires and fire management activities.

2.3 Prescribe burn to reduce potential wildland fire hazards and enhance ecosystem function.

2.4 Protect the forest-related real estate investment of the U.S. Government from unnecessary depreciation and depletion.

2.5 Support an optimal mix of consumptive and non-consumptive uses and value within the Installations' forests.

2.6 Maintain forests in a condition that minimizes threats to safety and human health.

The key issue in forest management at NAVSUPPACT Mid-South is to manage forest resources to enhance the military mission while maximizing biodiversity and preserving the visual appeal of the Installation. The forests should be managed as contiguous areas with an emphasis on ecological health and species diversity.

Forest stands at NAVSUPPACT Mid-South comprise slightly over 200 acres of land. Approximately 38 percent of the forested land is composed of a cottonwood cover (Society of American Foresters [SAF] cover type 63). The majority of the remaining acreage at the Installation is composed of loblolly pine at 35 percent (SAF cover type 81) and loblolly pine/hardwood at 27 percent (SAF cover type 82). The remaining forest is composed of the sweet gum/willow oak cover type (SAF cover type 92) and composes less than one percent of the total forested area. A summary of the cover types present at NAVSUPPACT Mid-South is presented in Table 6-3. Forest stands are depicted in Figure 6-4.

**Table 6-3. Area and Volume of Forest Cover at NAVSUPPACT Mid-South**

| Common Name | Scientific Name | SAF Cover Type[1] | Acres | Percent (%) |
|---|---|---|---|---|
| Cottonwood | *Populus deltoids* | 63 | 79.04 | 38.4 |
| Loblolly Pine | *Pinus taeda* | 81 | 71.19 | 34.5 |
| Loblolly Pine/ Hardwood | *Pinus taeda* | 82 | 54.27 | 26.3 |
| Sweetgum/ Willow Oak | *Liquidambar styraciflua/ Quercus phallus* | 92 | 1.59 | 0.8 |
| Total | | | 206.09 | 100.0 |

[1] SAF Cover Types as defined by Eyre 1980.

The management philosophy at NAVSUPPACT Mid-South also emphasizes opportunities for enhancing quality fish and wildlife habitat. Management integration must be watershed based, though mitigation can only occur on Navy-owned lands. Forest management will use uneven aged silviculture to develop diversity and improve habitat for indigenous species. The potential for fragmentation of various types of habitat will be mitigated through linking corridors of similar ecosystems. Silvicultural

treatments will concentrate on developing structure within stands, such as multistories, snags, large woody debris, created openings and large trees. The understory will be augmented with a variety of native shrubs and forbs to complement preferred wildlife species needs. Timber harvest will occur in support of the military mission, to open ground for construction of facilities, and in the development process of specific types of habitat. Most forest stand development harvests likely would be thinning or creating small openings, with the objective to create variety and structure within stands. NAVSUPPACT Mid-South is classified as a "non-commercial" forestry Installation since timber sales occur on an irregular basis. The forestry management issues are presented below.

### *Silviculture*

Forest stands at NAVSUPPACT Mid-South require periodic maintenance (i.e., use of silvicultural activities). Maintenance neglect represents a threat to the military mission and to the sustainability of forestry and wildlife resources. Timber stands require maintenance to increase the growth rate of the preferred trees, to reduce the potential for wildfires, to control diseases and insect pests, and to ensure the continuation of fire-dependent plant and wildlife communities.

The high density of trees on the loblolly pine stands over the old landfill has yielded high volumes of needle duff. These stands are very susceptible to rapidly spreading intense fire events. Due to the proximity to residential and operational areas, this presents a significant danger to human safety and NAVSUPPACT Mid-South property.

Forest health is evaluated by NAVFAC SE foresters on a regular basis. The potential for forest fire will be evaluated on a yearly basis until thinning reduces the heavy buildup of suspended needle duff in the loblolly pine stands.

Silvicultural activities include timber harvesting, prescribed burning (including the establishment of firebreaks), herbicide application, site preparation and regeneration. Timber harvesting methods include the following: thinning; improvement cutting; salvage cutting; clear cutting; seed tree cutting; and shelterwood cutting. Silvicultural practices are described below.

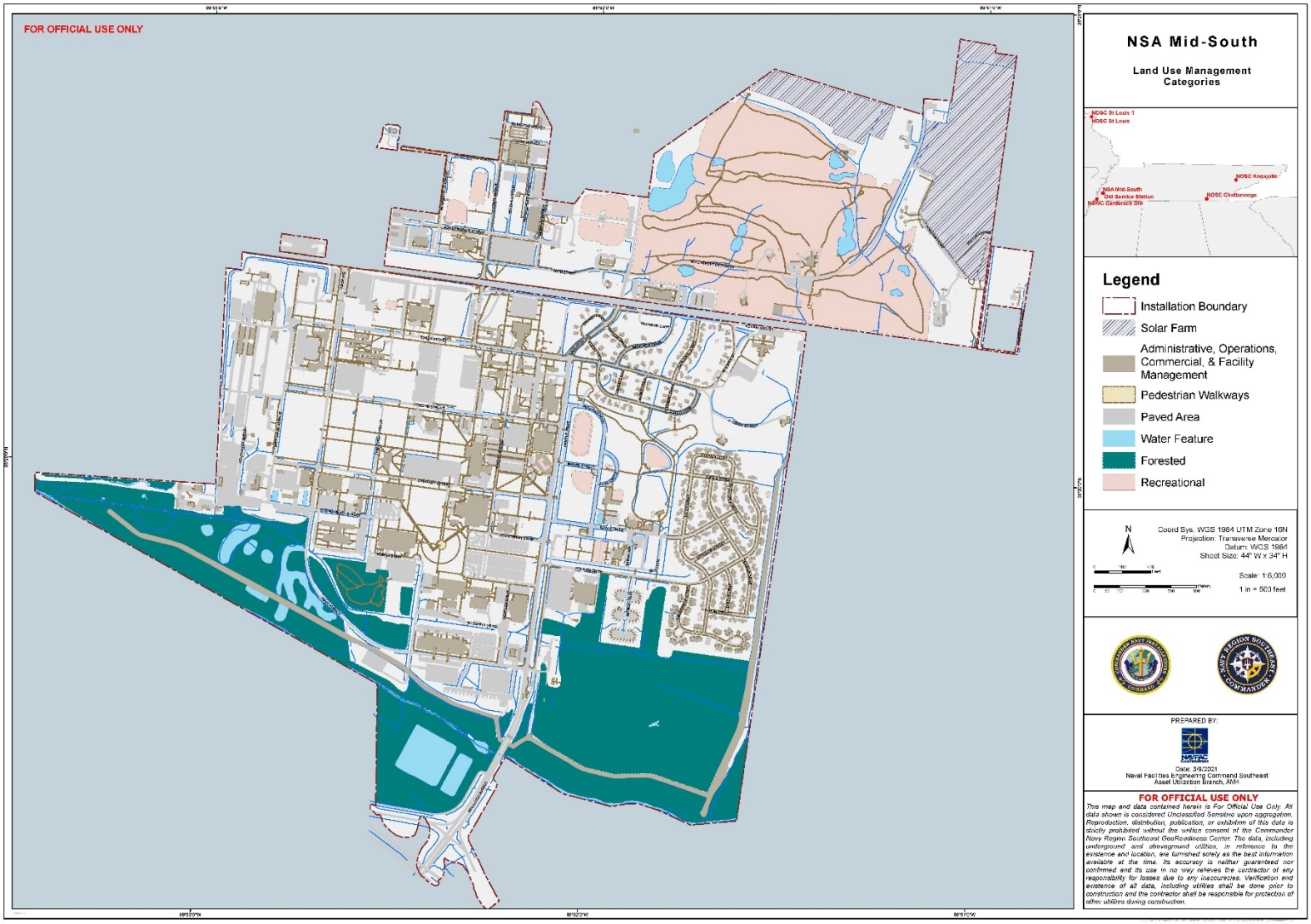



**Figure 6-4. Forest Stands at NAVSUPPACT Mid-South**

- **Thinnings** are cuttings in immature stands to increase the rate of growth of timber products and maintain stand composition. A thinning can be a removal of every other row of trees, or the removal of selected trees that are ready for the market and low-value trees that are competing with future crop trees. In either case, a thinning will redistribute the growth potential of the site to the best trees so that they continue to grow at an acceptable growth rate. This action also increases sunlight penetration to the forest floor, which stimulates understory growth and creates food and cover for wildlife.
- **Improvement cuttings** are made in stands older than the sapling stage, usually to improve the composition. This type cut is most often applied to wild stands being placed under management and involves removal of undesirable trees that are of sufficient size to provide merchantable products, as well as trees that are diseased, mechanically injured, unthrifty (likely to die before the next cut), insect infested, and of poor form (forked or crooked). Improvement cuttings and thinnings in a stand are usually concurrent operations.
- **Salvage cuttings** remove dead and injured trees in order to utilize them before they become unable to be harvested. Trees are salvaged promptly following storm events, severe fires, or attacks of insects and diseases. Salvage cuts are sometimes required to clear construction sites.
- **Clear cuttings** will be used at the discretion of the NRM in consultation with NAVFAC SE foresters and fish and wildlife biologists, as well as other federal and state agencies. Clear cutting will be used when there is an identified need to change species (e.g., loblolly pine to longleaf pine), remove an over mature or diseased stand, or for another reason deemed essential (i.e., following natural disasters). Occasionally, clear cutting is required to meet mission safety criteria, such as height restrictions around runways.
- **Shelterwood cuttings** will be used at the discretion of the NRM in consultation with NAVFAC SE foresters and fish and wildlife biologists, as well as other federal and state agencies. Shelterwood cutting will be used to regenerate forest stands through a series of perhaps two to three cuts. This system is frequently used to regenerate heavy seeded species. Cuttings may be separated by as much as 20 years.
- **Seed tree cuttings** will be used at the discretion of the NRM in consultation with NAVFAC SE foresters and fish and wildlife biologists, as well as other federal and state agencies. Seed tree cutting involves the removal of all trees except trees of the desired species in sufficient numbers to reseed the cut-over area.
- **Prescribed burning** is the purposeful application of fire in a controlled, knowledgeable manner to remove and reduce forest fuels on a specific land area under selected weather conditions. A prescribed burn generally involves backing a low-intensity, surface fire through forest stands. Prescribed burning improves habitat by removing dense, scrubby understory vegetation, and allowing early successional species to grow. Burning removes forest floor litter, promotes wildlife forage, promotes germination of plant seeds scarified by the heat, releases minerals and nutrients tied up in vegetation to the soil, and creates an edge effect along the boundaries between burned and unburned areas. In addition, prescribed burning reduces fuel levels and the chance of wildfires, which could destroy or seriously damage forest stands and potentially cause a threat to the military mission. Prescribed burning cannot be used in hardwood stands under management.

- **Firebreaks** are a necessary part of a fire management program. Existing features such as roads and streams may be used as firebreaks, but oftentimes such features are not present. Where existing features do not occur, man-made firebreaks must be established. Firebreaks will be bulldozed and leveled, and waterbars will be constructed where needed to prevent soil erosion and interruption of boundaries and hydrology. Permanent firebreaks may later be used for forest access.
- **Herbicide application** is used as a timber stand improvement (TSI) practice to control understory vegetation in areas where prescribed burning cannot be accomplished.
- **Site preparation** includes activities designed to improve conditions for seeding or planting that result in increased germination or seedling survival and tree growth.
- **Regeneration** is the renewal of a forest by either natural or artificial means. Regeneration is generally preceded by a clear cut, a seed tree cut, or a shelterwood cut. Regeneration methods include natural seeding, planting.

### *Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Silviculture*

- Resources Planning Act (RPA), passed by Congress in 1974, requires a complete national assessment or inventory of all forest, rangeland resources, and public needs every ten years, along with a plan to meet those needs.
- Soil Conservation Act, 16 USC 590a et. seq., provides for soil conservation practices on federal lands.
- Federal Noxious Weed Act of 1974, 7 U.S.C. 2801, establishes control and eradication of noxious weeds and regulates them in interstate and foreign commerce.
- Executive Order 13112, 3 February 1999, requires executive agencies to restrict the introduction of exotic organisms into natural ecosystems. Vegetative buffers and landscaping to control soil erosion must comply with this executive order.
- Executive Orders 11989 and 12608, close areas to off-road vehicles where soil, wildlife, and other natural resources may be adversely affected.
- Federal Water Pollution Control Act, as amended by the CWA of 1977, 33 USC 1251, regulates the dredging and filing of wetlands and establishes procedures to identify and regulate nonpoint sources of pollutant discharge, including turbidity, into wetlands.
- CWA, Section 402 NPDES Program, 2002, 33 USC 1251, controls direct discharges into navigable waters. NPDES permits, issued by either the EPA or an authorized state or tribe, contain industry-specific, technology-based and water-quality-based limits and establish pollutant monitoring and reporting requirements.
- CWA Section 401, requires an applicant for a federal license or permit to provide a certification that any discharges from the facility will comply with the CWA, including water quality standard requirements.
- CWA Section 404, establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands.

- Endangered Species Act, protects threatened and endangered species and their habitats until they are out of danger of extinction.
- DOD 7000.14-R, Volume 11A, Chapter 16 administers the reimbursement of costs of managing forest resources for timber production. Under this regulation, only expenses related to the maintenance of timber for commercial sale are reimbursed.
- OPNAVINST 5090.1E, 12-3.8(j), discusses laws that govern natural resources management relating to the protection and management of forest resources.
- Sikes Act, 16 U.S.C. 670a-o, authorizes conservation programs on military reservations.
- DOD Directive 4715.1E, establishes the Defense Environmental Security Council; the Environment, Safety, and Occupational Health Policy Board and the Defense Environmental Security Council Committee structure; and the Armed Forces Pest Management Board.

### *Long-Term Management*

Silvicultural activities are planned to protect sensitive flora and fauna and maintain habitat for wildlife species. These include the following long term management needs.

(1) During forest management activities, retain soft and hard mast producing trees in multiple age classes. Retain older mast producing trees in forest stands that are not being managed for longleaf conversion. Since many oak species peak in mast production at greater than 45 years of age, plan forest regeneration to maintain these age classes in stands over time. Trees to be favored include oaks, hickories, pecans, beech, sugarberry, black cherry, persimmon, dogwood, short-leaf and longleaf pines. Wildlife benefits include increased and sustained food production and cavity production.

(2) Maintain streamside management zones (SMZ) and forested wetland buffers. Limit tree harvesting and equipment operation in SMZs and buffers to protect riparian and wetland ecotone habitat. Maintain protective forested buffers at 75 to 100 feet from stream banks. Benefits to wildlife include undisturbed mesic and aquatic habitats, maintenance of habitat quality for protected flora, forest-dwelling neo-tropical migrants, and amphibians, and retention of wildlife travel corridors.

(3) Retain living cavity trees at densities of greater than one tree per acre if possible. Retention of living cavity trees, standing snags, and downed deadwood greatly improves wildlife habitat. Leave older age classes (greater than 70 years) of deciduous trees, such as beech, sweetgum, tupelo gum, bald cypress, hickories, and oaks to produce cavities and roost sites for bats, squirrels, and cavity-dwelling raptors and songbirds.

(4) Retain standing snags unless trees must be removed for control of pine beetles. Sizes from 10 to greater than 20 inches provide a wide range of species use, with primary excavators such as hairy woodpeckers using small snags and pileated woodpeckers using snags greater than 20 inches. Smaller secondary cavity users, such as tufted titmouse (*Baeolophus bico*lor) and Carolina chickadee (*Poecile carolinensis*), use small excavated snags and larger excavated snags provide cavities for owls and wood ducks (*Aix sponsa*). Downed deadwood resulting from fallen trees and snags produce habitat for invertebrates, forest-dwelling salamanders and frogs, rodents, and enhance soil fertility by increasing mycorrhizal and annelid activity

(Hunter 1990). Benefits include an increase in nesting and escape cover for a diversity of birds and herpetofauna.

### *Ecosystem Management*

Silvicultural activities are essential to maintain healthy forests, especially fire-dependent ecosystems, which provide quality wildlife habitat and sustainable yields of forest products. Silvicultural activities redistribute a site's growth potential to the best trees so that they grow at a faster rate. Ecosystem-based silviculture also stimulates understory growth, which creates food and cover for some wildlife. Prescribed burning mimics the natural burn cycles of ecosystems at NAVSUPPACT Mid-South and, when used in combination with harvesting, can maintain healthy and vigorous forest stands on the properties, and provide critical habitat for rare, threatened, and endangered species.

### *Military Mission*

Silvicultural practices such as harvesting, herbicide applications, and prescribed burning on NAVSUPPACT Mid-South decrease forest fuel loads, thus decreasing fuel available to wildfires, which could threaten the NAVSUPPACT Mid-South military mission activities, facilities, and housing, and affect scheduling for training.

### *Management Strategies*

- Using competitive timber sales contracts, sell timber to private logging contractors for removal. Awards will be made based on the highest return to the Navy;
- Identify certified prescribed burn training programs. Ensure that the program and its duration are compatible with the timeframe of the implementation strategy;
- Identify training programs for Federal Wildland Firefighting;
- Consult with foresters at NAVFAC SE, as well as state and county foresters;
- Continue a habitat development and protection program using prescribed burns and thinnings to improve habitat quality, reduce the potential for wildfires, control diseases and insect pests, and ensure the continuation of fire-dependent plant and wildlife communities;
- Perpetuate the prevailing pine forest while giving equal emphasis to hardwoods in those areas best suited to such species;
- Continually evaluate forest management practices and their effects on ecosystems and wildlife habitat, and continue programs to protect rare, threatened, and endangered plant and animal species;
- Review and monitor proposed activities for impact avoidance to the attenuation capacity of the 100-year floodplain. If it is determined that development is necessary within the 100-year floodplain to support the military mission, development shall first be located in the previously disturbed areas of the floodplain;
- Promote 50-to-100-foot buffers for all wetlands, and ensure land use and land management practices that will not adversely affect wetland resources; and
- Continually verify that natural resources personnel obtain proper training and certifications.

### *Projects Related to Silviculture*

- Vegetative Community Survey (Project 4 in Section 7);
- Invasive Species Management (Project 6 in Section 7);
- Species Habitat Assessment and Management (Project 8 in Section 7);
- Vegetation Management and Fuel Load Reduction in Forest Stands (Project 9 in Section 7); and
- NSA Mid-South INRMP (Project 10 in Section 7).

### Additional Sources of Information

Eglin Air Force Base Forest Restoration
http://www.eglin.af.mil/library/factsheets/factsheet_print.asp?fsID=6449&page=1

Tall Timbers Research Station
http://www.talltimbers.org/

TNC Fire Management Manual
http://www.tncfiremanual.org/

A Guide for Prescribed Fire in Southern Forests
http://www.sref.info/resources/publications/file_03_22b_06

American Forests
http://www.americanforests.org/

National Association of State Foresters
http://www.stateforesters.org/

Society of American Foresters
http://www.safnet.org/

USDA Forest Service
http://www.fs.fed.us/

Treelink
http://www.treelink.org/

## 6.3 Fish and Wildlife Management

Fish and wildlife management actions are designed to preserve, enhance, and manage indigenous wildlife and their habitats. These actions include the conservation of protected species and nongame species, and management and harvest of game species. Wildlife-associated recreation opportunities exist in the non-industrial areas of the Installation. Management for the hunting of game species on NAVSUPPACT Mid-South is limited because the Installation is situated in a suburban and industrial area. In addition, safety and security issues raised as a result of the proximity of game species' habitats to residential areas further contribute to the impracticality of consumptive use management.

Observations and discussions with Installation and Federal and state agency personnel identified a number of important wildlife species at the Installation. Populations of individual species do not

appear to be high due to the campus environment of most of the Installation and the high degrees of development surrounding NAVSUPPACT Mid-South. Game species that have been documented on NAVSUPPACT Mid-South include the red fox (*Vulpes vulpes*), gray squirrel (*Sciurus carolinensis*), cottontail rabbit (*Sylvilagus floridanus*), white-tailed deer (*Odocoileus virginianus*), mourning dove (*Zenaida macroura*), and bobwhite quail (*Colinus virginianus*). Populations of these species are limited by the reduction and fragmentation outside of the Installation, and isolation of habitats on the Installation. Although harvestable populations of these game species exist, resumption of a hunting program on the Installation will not be implemented for safety reasons.

Wildlife management is defined as manipulation of the environment and wildlife populations to produce desired objectives. Management may be performed in a manner that enhances biodiversity by reestablishing native habitats. Conversely, habitat management may be required to decrease the abundance of certain wildlife species to reduce animal damage. Traditionally, wildlife management was confined to large tracts of naturally vegetated land. However, due to the continued increase of urban development, wildlife management will be performed in small, fragmented tracts in proximity to the industrial portion of the Installation.

Table 6-4 presents a summary of the wildlife fisheries management objectives for the Installation. Wildlife population and habitat management on NAVSUPPACT Mid-South will attempt to conserve and enhance native habitats that support the greatest variety of biodiversity on the Installation. This approach has been chosen due to the relative abundance and variety of wildlife species present on NAVSUPPACT Mid-South, and the sparcity of contiguous habitat within the Installation's boundaries.

There are a variety of fish and wildlife management issues at NAVSUPPACT Mid-South, which are presented in the following subsections.

**Table 6-4. The Fish and Wildlife Management Goal and Objectives**

Goal 3: Protect, maintain, and restore native communities for plant and animal life while improving the quality of life and ensuring the continuation of the military mission.

Objectives:

3.1 Manage NAVSUPPACT Mid-South on a regional ecosystem-based approach that manages sensitive species and their associated ecosystems while protecting the operational functionality of the missions of the Installation.

3.2 Ensure compliance with environmental legislation, regulations, and guidelines governing fish and wildlife.

3.3 Manage based on an ecosystem management approach, rather than using a single species paradigm.

3.4 Restore and maintain a diversity of wildlife in areas on the Installation in a manner that mitigates conflict with the military mission.

3.5 Support multiple non-consumptive uses of wildlife and provide habitat enhancement for nongame species, including neotropical migratory birds.

3.6 Employ a systematic approach to managing wildlife resources, utilizing assessments, inventories, monitoring, modeling, and management.

3.7 Minimize wildlife-related health risks, safety risks, and environmental damage.

3.8 Maintain and strengthen partnerships with agencies and groups involved in wildlife management.

### *6.3.1 Management of Non-Game Wildlife Species*

Current management of nongame wildlife species, such as migratory birds, reptiles, amphibans, and small mammals, which make up the key building blocks of the vertebrate component of the ecosystem, is handled mainly on a case-by-case basis. Many of the wildlife found on NAVSUPPACT Mid-South benefit from the woodland, field, wetland, and edge habitats on the installation. Management activities will be conducted with the sensitivity of these habitats in mind.

In 2001, Congress established the Wildlife Conservation and Restoration Program (WCRP) and the State Wildlife Grant (SWG) Program. These programs were developed to provide financial assistance to state and tribal fish and wildlife entities for the conservation of a multitude of wildlife species. In compliance with the SWG Program, TWRA biologists developed a State Wildlife Action Plan (SWAP), updated in 2015, to identify Tennessee's species of greatest conservation need, their habitat, threats, conservation actions, and more. The SWAP must be updated every ten years and is available at:

Tennessee State Wildlife Action Plan
http://www.tnswap.com/swap.cfm

### *Laws, EOs, Regulations, Directives, and Memoranda Relevant to Management of Non-Game Wildlife Species*

- Fish and Wildlife Coordination Act, 16 USC 661-666c, authorizes the Secretaries of Agriculture and Commerce to provide assistance to and cooperate with federal and state agencies to protect, rear, stock, and increase the supply of game and fur-bearing animals, as well as to study the effects of domestic sewage, trade wastes, and other polluting substances on wildlife.
- Fish and Wildlife Conservation Act, 16 USC 2901, encourages all federal departments and agencies to utilize their statutory and administrative authority to the maximum extent practicable and consistent with each agency's statutory responsibilities, to conserve and promote conservation of nongame fish and wildlife and their habitats.
- National Defense Authorization Act (NDAA), Public Law 107-314, 2003, exempts the Armed Forces from the incidental taking of migratory birds during military readiness activities.
- MBTA, 6 USC 703, protects migratory birds against takes for normal and routine operations such as military support functions.
- EO 13186 (10 January 2001), *Responsibilities of Federal Agencies to Protect Migratory Birds*, imposes substantive obligations on the U.S. for the conservation of migratory birds and their habitats.
- SAIA, 16 USC 670a-o, requires that, to the extent appropriate and applicable, military installations must provide for fish and wildlife management, fish and wildlife habitat enhancements and modifications, and wetland protection, enhancement, and restoration where necessary to support fish, wildlife, and plants.
- DoDI 4715.03, Natural Resources Conservation Program, implements policy, assigns responsibilities, and prescribes procedures for the integrated management of natural and cultural resources on property under DoD control. Additionally, DoDI 4715.03 requires biologically or geographically significant or sensitive natural resources, such as ecosystems or species, be monitored and managed for their protection and long-term sustainability.
- OPNAVINST 5090.1E, 12-3.5, discusses laws that govern natural resources management relating to the protection and management of fish and wildlife resources.

### *Long-term Management*

The SAIA directs military installations to provide for sustainable use of natural resources, including wildlife, consistent with the military mission of the installation. These uses can be consumptive (hunting, fishing) or non-consumptive (wildlife viewing, nature education), as long as such uses do not cause conflict with the military readiness of the installation or adversely affect the natural resources under the stewardship of the DoD. The SAIA also requires that, to the extent appropriate and applicable, military installations must provide for wildlife management, wildlife habitat enhancements or modifications, and wetland protection, enhancement, and restoration where necessary for support of wildlife or plants. Opportunities exist for sustainable uses and stewardship of both game and non-game wildlife populations at the Installation, as provided in the SAIA. Stewardship of wildlife resources has high public relations value, and provides educational and partnership opportunities to local civic, conservation, and youth groups.

Wildlife surveys should be conducted to update the Installation species inventory as necessary, and to minimize, mitigate, and monitor the take of wildlife species, especially migratory birds. Natural resources management should look into opportunities to enter into conservation partnerships with federal, state, and local agencies, and NGOs to improve wildlife habitat at the Installation. Where possible, military readiness activities should be located to avoid and minimize impacts on wildlife species and habitat.

### *Ecosystems Management*

Updated biological data will help develop efficient management and research programs for wildlife resources. Such programs should include information about development and improvement of habitat for optimum conditions, need, and means to restore desired species abundances, wildlife control as necessary, and protection of wildlife resources.

### *Military Mission*

Updated biological data will help ensure the Navy has awareness of sensitive species presence in order to avoid and properly mitigate potential impacts before issues arise that could impede mission objectives.

### *Management Strategies*

Management strategies related to non-game wildlife species include the following.

1. Conduct censuses of wildlife populations as necessary to monitor the effectiveness of management activities in reaching management goals. These surveys should document the relative abundance of selected species that are indicators of healthy, self-sustaining ecosystems.
2. Establish conservation partnerships with state and federal agencies, universities, and NGOs.
3. Improve habitat conditions for aquatic communities by establishing vegetative buffers around waterbodies, including wetlands, and riparian corridors (i.e., Big Creek Drainage Ditch), maintaining healthy communities of riparian vegetation, minimizing training impacts, and preventing erosion and sedimentation.
4. Manage and protect wetlands on NAVSUPPACT Mid-South to protect wetland dependent species habitat.
5. Implement INRMP Project No. 5, as presented in Section 7. Install artificial nesting structures for eastern bluebirds (*Sialia sialis*), purple martins (*Progne subis*), and tree swallows (*Tachycineta bicolor*) in the open areas on the Installation. Outside services (e.g., Boy Scouts) and conservation organizations will be sought out to assist in nest box construction and placement. Additional structures will be erected on the southwest sides of residential buildings for bat shelter. Construction of bat boxes will not only be beneficial to biodiversity at NAVSUPPACT Mid-South, but will also aid in control of biting insects in the area. Photograph 6-3 is a photograph of a purple martin box erected on the NAVSUPPACT Mid-South golf course.

**Photograph 6-3. Purple Martin Box Adjacent to the Golf Course Pond**

6. Continue to preserve snags and trees with nesting cavities in areas that will not affect aircraft operating from the City of Millington airport.
7. Do not disturb migratory bird nest sites until offspring have been fledged and the NAVSUPPACT Mid-South Natural Resources Manager provides concurrence. Additional open grassland habitat is potentially available on the Installation by converting areas that are currently improved into semi-improved grounds.
8. Continue the prevention of the use of off-road vehicles on the Installation to protect wildlife habitat.
9. Forested areas on NAVSSUPACT Mid-South will be identified for management of neo-tropical songbird populations. NAVFAC SE core foresters currently manage much of the forested land in timber production as uneven aged stands to facilitate timber growth, which coincides with the management approach that will be necessary to enhance neo-tropical songbird habitat.
10. Implement INRMP Project No. 3 as presented Section 7. Comprehensive biological surveys for the presence, abundance, and status of migratory bird species on the Installation. Surveys shall be used to characterize species populations. Updating the Biological Resource Survey is a mandatory requirement of SAIA (16 U.S.C. 1531 and 1536 and OPNAVINST 5090.1D). Additionally, the Migratory Bird Treaty Act (16 U.S.C. 703 et.seq.) requires DoN to know what and where migratory birds are located on the Installation and ensure that DoN actions do not take or harm these birds.

11. Continue to promote the use of native trees as part of NAVSUPPACT Mid-South's urban forestry and forest management practices.
12. As previously stated, resumption of a hunting program on the Installation will not be implemented for safety reasons. However, federal and state fish and game laws are valid throughout the Installation. Installation Security Police will enforce these laws with assistance from State Wildlife Officers. At this time, no special training is required for this enforcement.
13. Control beaver populations along Big Creek Drainage Ditch and its tributaries.
    - Prior to any beaver management activities in Big Creek, NAVSUPPACT Mid-South staff will coordinate with Shelby County who holds a 200-foot easement on Big Creek Drainage Ditch.
    - USDA–Wildlife Services will be contacted regarding beaver management and may choose to provide assistance with the removal of individuals or the entire population.
    - Qualified wildlife biologists will evaluate the beaver population and their associated dams and propose measures to remove a select number of beaver and eliminate dams.
    - Once the beaver population is thinned, yearly evaluations must be made to ensure that additional removal of beaver is not necessary.

### *Projects Related to Management of Non-Game Wildlife Species*

- RTE Species Biological Resource Survey (Project 2 in Section 7);
- Migratory Bird Survey (Project 3 in Section 7);
- Artificial Nest Box Program (Project 5 in Section 7);
- Invasive Species Management (Project 6 in Section 7);
- Species Habitat Assessment and Management (Project 8 in Section 7); and
- NSA Mid-South INRMP (Project 10 in Section 7).

### *Additional Sources of Information*

Tennessee State Wildlife Action Plan
http://www.tnswap.com/swap.cfm

Tennessee Wildlife Resources Agency
https://www.tn.gov/twra.html

DOD Partners in Flight
https://www.denix.osd.mil/dodpif/

Cornell Lab of Ornithology
https://www.birds.cornell.edu/home/

Mammals in Tennessee
https://www.tn.gov/twra/wildlife/mammals.html

DOD Partners in Amphibian and Reptile Conservation

https://www.denix.osd.mil/dodparc/home/

### *6.3.2 Rare, Threatened, and Endangered Species*

Rare, threatened, and endangered species are protected under the Endangered Species Act (*16 U.S.C. 1536*), the Tennessee Nongame and Endangered or Threatened Wildlife Species Conservation Act of 1974 (*TCA §§70-8-101 et seq.*), and Rare Plant Protection and Conservation Act (*TCA §§70-8-301*). Section 7(a)(1) of the ESA also requires Federal agencies to participate in the conservation and recovery of listed threatened and endangered species.

The ecological integrity of wetland and upland communities will be maintained for the protection of native plant and animal species, including federally and state-listed species. Threatened and endangered species, and species of special concern, will be preserved and protected to ensure there is no reduction in species numbers or population sizes.

NAVSUPPACT Mid-South will actively manage for the species as presented in Table 6-5, but will also manage for other federally or state-listed threatened or endangered species as conditions warrant. Changes in management practices may result from the listing of a new species for protective status or a change in the species found to occur on the Installation. When practicable, buffer zones would be established between listed species or their habitat and construction or training activities. Management practices will be modified by the Natural Resources Manager in consultation with other Navy biologists, as well as other federal and state agencies. A description of how each species benefits from the management actions and specific projects included in this INRMP is and summarized in Table 6-5.

**American ginseng:** Although not recorded on NAVSUPPACT Mid-South, potentially suitable habitats include mature deciduous forests with a relatively open mid-canopy. There are 54.72 acres of Loblolly/Hardwood forests on NAVSUPPACT Mid-South that could be managed for this species. Management for this species includes thinning of understory canopies in hardwood forests, especially for control of invasive species. This species would benefit from the following projects: Comprehensive Vegetative Community Management, Invasive Species Management, Forestry Management Plan, Natural Resources Database Management, INRMP Updates, and Natural Resources Management Training.

**Bewick's wren:** Although not recorded on NAVSUPPACT Mid-South, Bewick's wren historically breeds and resides in Shelby County. Bewick's wren generally occurs in farmyards, brushy places, openings and edges of woodlands, and overgrown fields with cavities for nesting (TNC 1999). Bewick's wren nests near the ground in secluded natural tree cavities, old woodpecker holes, rock crevices, deserted buildings, birdhouses, or in almost any cavity where a nest can be built. Management for this species includes creating of nesting cavities within and maintenance of open areas, brushy edges, and small patches of forest, with minimal disturbance. This species would benefit from the following projects: Comprehensive Biological Resources Surveys, Neotropical Migratory Bird Surveys, Urban Forestry Management, Artificial Nest Program, Forestry Management Plan, Thinning of Forest Stands, Nature Trails and Watchable Wildlife Program, Natural Resources Database Management, INRMP Updates, and Natural Resources Management Training.

**Blue sucker:** Although the blue sucker is not likely to use the Big Creek Drainage, the species would benefit from avoidance and minimization of stormwater pollution. This species would benefit from the following projects: Wetlands Management and Enhancement, Comprehensive Biological Resources Survey, Natural Resources Database Management, INRMP Updates, and Natural Resources Management.

**Copper iris:** Although not recorded on NAVSUPPACT Mid-South, potentially suitable habitats occur in most wetland areas. This species is a common cultivar and could likely be established on NAVSUPPACT Mid-South. This species would benefit from the following projects: Wetlands Management and Enhancement, Comprehensive Vegetative Community Management, Invasive Species Management, Forest Management Plan, Natural Resources Database Management, INRMP Updates, and Natural Resources Management Training.

**Featherfoil:** Although not recorded on NAVSUPPACT Mid-South, potentially suitable habitats include the margings of rivers, streams, ditches, lakes, and ponds, especially where water levels are stable and shallow. This species would benefit from the following projects: Wetlands Management and Enhancement, Comprehensive Vegetative Community Management, Invasive Species Management, Forest Management Plan, Natural Resources Database Management, INRMP Updates, and Natural Resources Management Training.

**Indiana bat:** Although not recorded on NAVSUPPACT Mid-South, Indiana bat could forage in the area during the summer and use artificial roosts if present. Management for this species includes creation of artificial roost boxes and maintenance of open forest canopies suitable for foraging. This species would benefit from the following projects: Comprehensive Biological Resources Surveys, Artificial Nest Program, Urban Forestry Management, Forestry Management Plan, Nature Trails and Watchable Wildlife Program, Natural Resources Database Management, INRMP Updates, and Natural Resources Management Training.

**Interior least tern:** There is no suitable nesting habitat on NAVSUPPACT Mid-South; however, the species could forage along Big Creek Drainage. Management for this species should include control of stormwater and minimization of erosion and pollutants. This species would benefit from the following projects: Comprehensive Biological Resources Surveys, Urban Forestry Management, Neotropical Migratory Bird Surveys, Forestry Management Plan, Thinning of Forest Stands, Nature Trails and Watchable Wildlife Program, Natural Resources Database Management, INRMP Updates, and Natural Resources Management Training.

**Table 6-5. INRMP Management Activities and Projects that Benefit Rare, Threatened, and Endangered Species**

| | | | INRMP Management Activities | | | | | | | | | | | | | | | INRMP Projects | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Common Name<br>*Scientific Name* | Status | | Wetlands Management | Erosion Control | Stormwater and Water Quality Control | Floodplains Management | Landscaping and Ground Maintenance | Pest Management | Invasive Plant and Noxious Weed Management | Urban Forestry | Natural Resources Training | Forest Management | Fisheries Management | Management of Non-Game Wildlife Species | Rare, Threatened, and Endangered Species Mgmt. | Geographic Information Systems | Outdoor Recreation and Public Access | | Wetlands Management and Enhancement | Comprehensive Biological Surveys | Neotropical Migratory Bird Surveys | Comprehensive Vegetative Community Management | Artificial Nest Program | Invasive Species Management | Urban Forestry Management | Forestry Management Plan | Thinning of Forest Stands | Nature Trails and Watchable Wildlife Prgm. | Natural Resources GIS Database Management | INRMP Updates | Natural Resources Management Training |
| American ginseng<br>*Panax quiquefolius* | S-CE | | | M | M | M | M | M | M | | M | M | | | M | M | M | | | P | | P | | P | | P | P | P | P | P | P |
| Bewick's wren<br>*Thyromanes bewickii* | N | | | M | M | M | M | M | M | M | M | M | | M | M | M | M | | | P | P | | P | | P | P | P | P | P | P | P |
| Blue sucker<br>*Cycleptus elongates* | N | | M | M | M | M | M | M | M | | M | | M | M | M | M | M | | P | P | | | | | | | | P | P | P |
| Copper iris<br>*Iris fulva* | ST | | M | M | M | M | M | M | M | M | M | M | | | M | M | M | | P | P | | P | | P | | P | P | P | P | P | P |
| Featherfoil<br>*Hottonia inflata* | SSC | | M | M | M | M | M | M | M | M | M | M | | | M | M | M | | P | P | | P | | P | | P | P | P | P | P | P |
| Indiana bat<br>*Myotis sodalis* | FE | | M | M | M | M | M | M | M | M | M | M | | M | M | M | M | | P | P | | | P | P | P | P | P | P | P | P | P |
| Interior least tern<br>*Sterna antillarum* | FE | | M | M | M | M | M | M | M | | M | | | M | M | M | M | | P | P | P | | P | | P | P | P | P | P | P | P |
| Lark sparrow<br>*Chondestes grammacus* | N | | | M | M | M | M | M | M | M | M | M | | M | M | M | M | | | P | P | | P | | P | P | P | P | P | P | P |
| Monarch butterfly<br>*Danaus plexippus* | FP | | | M | M | M | M | M | M | M | M | M | | M | M | M | M | | | P | | P | | P | | P | P | P | P | P | P |
| Nodding rattlesnake-root<br>*Prenanthes crepindinea* | N | | M | M | M | M | M | M | M | M | M | M | | | M | M | M | | P | P | | P | | P | | P | P | P | P | P | P |
| Northern long-eared bat<br>*Myotis septentrionalis* | FT | | M | M | M | M | M | M | M | M | M | M | | M | M | M | M | | P | P | | | P | P | P | P | P | P | P | P | P |
| Northern pinesnake<br>*Pituophis melanoleucus melanoleucus* | N | | M | M | M | M | M | M | M | M | M | M | | M | M | M | M | | P | P | | | | | | P | P | P | P | P | P |
| Peregrine falcon<br>*falco peregrinus* | N | | M | M | M | M | M | M | M | M | M | M | | M | M | M | M | | P | P | P | | | | P | P | P | P | P | P | P |
| Red starvine<br>*Schisandra glabra* | ST | | M | M | M | M | M | M | M | M | M | M | | | M | M | M | | P | P | | P | | P | | P | P | P | P | P | P |
| Reniform sedge<br>*Carex reniformis* | SSC | | M | M | M | M | M | M | M | M | M | M | | | M | M | M | | P | P | | P | | P | | P | P | P | P | P | P |

| | | | **INRMP Management Activities** | | | | | | | | | | | | | | | **INRMP Projects** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Common Name<br>*Scientific Name* | Status | | Wetlands Management | Erosion Control | Stormwater and Water Quality Control | Floodplains Management | Landscaping and Ground Maintenance | Pest Management | Invasive Plant and Noxious Weed Management | Urban Forestry | Natural Resources Training | Forest Management | Fisheries Management | Management of Non-Game Wildlife Species | Rare, Threatened, and Endangered Species Mgmt. | Geographic Information Systems | Outdoor Recreation and Public Access | | Wetlands Management and Enhancement | Comprehensive Biological Surveys | Neotropical Migratory Bird Surveys | Comprehensive Vegetative Community Management | Artificial Nest Program | Invasive Species Management | Urban Forestry Management | Forestry Management Plan | Thinning of Forest Stands | Nature Trails and Watchable Wildlife Prgm. | Natural Resources GIS Database Management | INRMP Updates | Natural Resources Management Training |
| Turgid-blossom<br>*Epioblasma turgidula* | FE | | M | M | M | M | M | M | M | | M | | M | M | M | M | M | | P | P | | | | | | | | P | P | P |

FE = federally endangered, FP = petitioned for federal listing, FT = federally-threatened, N = not listed, S-CE = commercially-exploited in the state, SSC = state species of special concern, ST = state threatened

**Lark sparrow:** Although not recorded on NAVSUPPACT Mid-South, the lark sparrow breeds in Shelby County and utilizes early successional stages in a variety of upland forest types. Breeding habitat in west Tennessee usually consists of heavily grazed pastures, cultivated and fallow fields with brushy edges, and clearcuts planted in pines. Potential habitat for lark sparrow on NAVSUPPACT Mid-South includes the lands west of Veterans Parkway and surrounding Kerrville Rosemark Road. Management for this species includes maintenance of open areas, brushy edges, and small patches of forest, with minimal disturbance. This species would benefit from the following projects: Comprehensive Biological Resources Surveys, Neotropical Migratory Bird Surveys, Artificial Nest Program, Urban Forestry Management, Forestry Management Plan, Thinning of Forest Stands, Nature Trails and Watchable Wildlife Program, Natural Resources Database Management, INRMP Updates, and Natural Resources Management Training.

**Monarch Butterfly:** The monarch butterfly is a likely vistor to NAVSUPPACT Mid-South. Altough it has been petitioned for listing as threatened or endangered by the USFWS, the monarch butterfly is not afforded legal protection under the ESA at this time. This species would benefit from the following projects: Comprehensive Biological Resources Survey, Comprehensive Vegetative Community Management, Invasive Species Management, the Nature Trails and Watchable Wildlife Program, Natural Resources Database Management, INRMP Updates, and Natural Resources Management Training. A 2-acre pollinator field is planned to be established following NRCS guidelines.

**Nodding rattlesnake root:** Although not recorded on NAVSUPPACT Mid-South, potentially suitable habitats include mesic to dry-mesic hardwoods, particularly along creeks and in seepage areas. There are 1.59 acres of bottomland hardwoods on NAVSUPPACT Mid-South along the Big Creek Drainage. This species is often common in the rosette stage where it occurs, but only flowers in response to disturbances of the canopy allowing light to reach the forest floor. Management for this species includes thinning of understory canopies in hardwood forests, especially for control of invasive species. This species would benefit from the following projects: Comprehensive Vegetative Community Management, Invasive Species Management, Forestry Management Plan, Natural Resources Database Management, INRMP Updates, and Natural Resources Management Training.

**Northern long-eared bat:** Although not recorded on NAVSUPPACT Mid-South, the northern long-eared bat could forage in the area during the summer and use artificial roosts if present. Management for this species includes creation of artificial roost boxes boxes and maintenance of open forest canopies suitable for foraging. Several bat houses have been established on the installation, but bats have yet to roost. This species would benefit from the following projects: Comprehensive Biological Resources Surveys, Artificial Nest Program, Urban Forestry Management, Artificial Nest Program, Forestry Management Plan, Nature Trails and Watchable Wildlife Program, Natural Resources Database Management, INRMP Updates, and Natural Resources Management Training.

**Northern pinesnake:** Although Northern pinesnakes have not been documented at NAVSUPPACT Mid-South, they are known to occur in suitable habitats nearby. Management for this species includes maintenance of open areas, brushy edges, and small patches of

forest, with minimal disturbance. This species would benefit from the following projects: Comprehensive Biological Resources Survey, Forestry Management Plan, Natural Resources Database Management, INRMP Updates, and Natural Resources Management Training.

**Peregrine falcon:** Although not recorded on NAVSUPPACT Mid-South, the peregrine falcon is highly migratory and uses isolated areas of wildlife habitat as prime feeding grounds due to the concentration of prey species. When not breeding, peregrine falcons occur in areas where prey concentrates, including farmlands, marshes, cities, and airports. Other than intermittent migrant individuals, the bird has little likelihood of occurring on the Installation. This species would benefit from the following projects: Comprehensive Biological Resources Surveys, Neotropical Migratory Bird Surveys, Artificial Nest Program, Urban Forestry Program, Forestry Management Plan, Thinning of Forest Stands, Nature Trails and Watchable Wildlife Program, Natural Resources Database Management, INRMP Updates, and Natural Resources Management Training.

**Red starvine:** Although not recorded on NAVSUPPACT Mid-South, potentially suitable habitat includes mixed mesophytic forests on bottomlands. There are 1.59 acres of bottomland hardwoods on NAVSUPPACT Mid-South along the Big Creek Drainage. This species' association with wooded bluffs, ravines, and stream banks suggests that it is favored by natural soil disturbances. This species would benefit from the following projects: Comprehensive Vegetative Community Management, Invasive Species Management, Forestry Management Plan, Natural Resources Database Management, INRMP Updates, and Natural Resources Management Training.

**Reniform sedge:** Although not recorded on NAVSUPPACT Mid-South, potentially suitable habitats include the margins of rivers, streams, ditches, lakes, and ponds. This species would benefit from the following projects: Wetlands Management and Enhancement, Comprehensive Vegetative Community Management, Invasive Species Management, Forest Management Plan, Natural Resources Database Management, INRMP Updates, and Natural Resources Management Training.

**Turgid-blossom:** The turgid-blossom is presumed to be extinct. If extant, the Big Creek Drainage may offer suitable habitat, and the species would benefit from avoidance and minimization of stormwater pollution. This species, if extant, would benefit from the following projects: Comprehensive Biological Resources Survey, Natural Resources Database Management, INRMP Updates, and Natural Resources Management Training.

### *Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Rare, Threatened and Endangered Species*

Endangered Species Act, 16 U.S.C. 35, 32 CFR 190, provides for the identification and protection of threatened and endangered species of fish, wildlife, and plants and their critical habitats. It requires federal agencies to ensure that no agency action is likely to jeopardize the continued existence of a threatened or endangered species.

Fish and Wildlife Conservation Act, 16 U.S.C. 2901, encourages all federal departments and agencies to utilize their statutory and administrative authority, to the maximum extent

practicable and consistent with each agency's statutory responsibilities, to conserve and promote conservation of nongame fish and wildlife and their habitats.

Sikes Act, as amended 16 U.S.C. 670a-o, requires each military department to manage fish and wildlife resources in accordance with a tripartite cooperative plan agreed to by the USFWS and state wildlife agency.

Migratory Bird Treaty Act, as amended 16 U.S.C. 703-712, prohibits the taking or harming of a migratory bird, its eggs, nests, or young without the appropriate permit.

Bald and Golden Eagle Protection Act, 16 U.S.C. 668-668c, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs.

OPNAVINST 5090.1E, 12-3.5, discusses laws that govern natural resources management relating to the protection and management of fish and wildlife resources.

### *Long-Term Management*

NAVSUPPACT Mid-South will actively manage areas and natural communities to provide habitat for rare, threatened, and endangered species that are known to occur on the properties. Other federally or state-listed threatened and endangered species will also be managed as conditions warrant. The NRM will undertake measures, as appropriate, to ensure activities and actions conducted within NAVSUPPACT Mid-South are not detrimental to rare, threatened, and endangered species or habitats upon which they depend.

Species dependent upon wetlands and fire-dependent communities are the focus of most management activities at NAVSUPPACT Mid-South. Natural communities and other wildlife habitats will be managed to sustain and enhance fish and wildlife resources on the Installation consistent with the military mission.

Long-term habitat management concepts for wildlife habitat management that will be used at NAVSUPPACT Mid-South are presented below. NAVSUPPACT Mid-South will sustain existing natural communities for wildlife and enhance other ecosystems for urban and non-urban species using a combination of the following management concepts. These management concepts will be implemented under the direction of the NRM.

- Preserve portions of stands to provide suitable large snags and trees for den and cavity activities;
- Prevent disturbance of known colonies;
- Leave brush material along woodland edges following necessary clearing (e.g., military mission);
- Plant trees and shrubs, and seed open areas for soil stabilization and wildlife habitat;
- Maintain pine stands with basal areas low enough to prevent crown closure in order to stimulate understory growth, which creates food and cover;
- Prescribe burn on rotation through forest stands and wetland areas. Mosaic patterns, narrow-strip, and small-block burns will result in an interspersion of habitat types;

- Avoid habitat fragmentation. Although fragmentation increases edge, arbitrarily locating human-made linear and nonlinear features within wildlife areas undermines ecological processes through the separation of wildlife populations and may render the fragmented parcel unsustainable for wildlife;
- Create and enhance connections between habitats to facilitate wildlife movement between areas. The necessary characteristics of connections will vary depending on the species. For instance, amphibians need water or moist areas to move between ponds and wet areas. Most vertebrates require protective cover (from predation) such as trees, shrubs, dense ground cover, downed trees, and existing burrows;
- Create brush piles in clear-cuts and other open areas. Brush piles provide areas for nesting, feeding, and cover; a medium for plant growth; and a perch for songbirds whose droppings may contain viable seeds;
- Leave snags and downed logs for nesting, roosting, foraging, cover, perching, and territorial displays; and
- Maintain hardwood areas for foraging activities.

### *Ecosystem Management*

The concepts presented in this section are consistent with ecosystem management. By effectively managing wildlife habitats and natural communities on NAVSUPPACT Mid-South, managers not only enhance wildlife communities, but provide opportunities for interdependent species to thrive.

### *Military Mission*

Federal law prohibits harassment and all other forms of take for federally-protected species. NAVSUPPACT Mid-South must maintain a working knowledge of the protected species and their required habitats on its properties and take prudent steps to protect those species and habitats. Failure to do so could result in regulatory action by the USFWS and TWRA, which could delay or otherwise hinder military training operations at the Installation.

### *Management Strategies for Rare, Threatened, and Endangered Species*

- Update rare, threatened, and endangered species surveys;
- Update surveys for neotropical migratory birds;
- Use USFWS guidelines for the protection of listed species from proposed development or land clearing impacts;
- Continue to evaluate the stormwater management program and activities contributing to stormwater runoff and pollutant loading in stormwater runoff, and implement BMPs to minimize stormwater pollution;
- Continue to develop a soil erosion control management plan, and reduce the rate of soil erosion through the implementation of long-term measures and projects;
- Continue to use Integrated Pest Management (IPM) techniques in pest management programs and emphasize the use of pesticides with low toxicity and low application rates;

- Inventory wetlands and assess their function and quality as warranted, promote 100-foot buffers for all wetlands, and ensure land use and land management practices that will not adversely affect wetland resources;
- Continue using BMPs for forest management activities to ensure watershed;
- Review and monitor proposed activities for impact avoidance to the attenuation capacity of the 100-year floodplain. If it is determined that development is necessary within the 100-year floodplain to support the military mission, development shall first be located in the previously disturbed areas of the floodplain;
- Ensure implementation of policies that minimize adverse impacts to ecosystem resources from land disturbance activities;
- Continue to implement programs and activities for the protection and enhancement of habitat for threatened and endangered animal and plant species;
- Compile GIS data coverages and maintain and update data coverages of populations and habitats of endangered and threatened species and species of special concern; and
- Continually verify that natural resources personnel obtain proper training and certifications.

### *Projects Related to Management of Non-Game Wildlife Species*

- RTE Species Biological Resource Survey (Project 2 in Section 7);
- Migratory Bird Survey (Project 3 in Section 7);
- Species Habitat Assessment and Management (Project 8 in Section 7); and
- NSA Mid-South INRMP (Project 10 in Section 7).

### Additional Sources of Information

Habitat Conservation Planning Handbook
http://endangered.fws.gov/hcp/hcpbook.htm

U.S. Fish and Wildlife Service
http://www.fws.gov/

Effects of Fire on Threatened and Endangered Plants
http://fire.r9.fws.gov/ifcc/T&EPlants/T&EPlants.htm#Abstract

Fire Effects on Plants and Wildlife
http://www.fs.fed.us/database/feis/

Prevention and Control of Wildlife Damage and Wildlife Diseases and Humans
http://www.ces.ncsu.edu/nreos/wild/wildlife/wdc/index.html

## 6.4 Geographic Information Systems

Mapping and spatial analysis are integral components of natural resources management that are fulfilled through the use of Geographic Information Systems (GIS) data and software. Data provide documentation for the location and attributes of resources while software contains the tools necessary for the management, display, and analysis of these data. A major goal of any GIS is the

development of rigorous organization and accuracy standards. These standards provide for a sound base dataset needed for rigorous analysis used in managing natural resources.

All GIS information is managed by NAVFAC SE GeoReadiness Center. NAVSUPPACT Mid-South has digitized maps of the Installation that were prepared with ArcInfo. Many of these files were converted to ArcView shape files and used in the preparation of this INRMP (i.e., wetlands, forest stands, surface waters, and land use). Due to the relatively large size of the Installation and the extensive diversity of habitat and land use features, NAVSUPPACT Mid-South will continue to employ the use a GIS for all planning activities at the Installation.

The use of a GIS is to manage and catalog information, such as that acquired for natural resources management. GIS assists in planning by charting areas of environmental concern and providing a baseline for analyzing the potential impacts of any proposed natural resources management activity. Managers can implement the capabilities of the GIS to wetlands, forest, fish and wildlife, and other various natural resources management applications. The objectives for establishing GIS management issues and actions are summarized in Table 6-6.

**Table 6-6. The GIS Management Goal and Objectives**

Goal 4: Protect and conserve the ecological value and diversity of natural resources at NAVSUPPACT Mid-South by fostering knowledge of adaptive ecosystem management and natural resources on the Installation.

Objectives:

4.1 Collect, store, and maintain data about historical conditions and trends, and current status, for critical indicators of ecological integrity and sustainability.

4.2 Use GIS information to guide natural resources management.

4.3 Provide the staffing, training, budgeting and technology support to ensure successful implementation of the INRMP.

4.4 Conduct annual meetings in cooperation with the USFWS and TWRA to review and update the INRMP.

4.5 Identify natural resources and operational actions that compromise the function and composition of ecosystems, and develop remedies through adaptive management.

4.6 Gain an increasing understanding of ecosystem dynamics in an effort to prevent and respond to threats.

4.7 Continue collaborative partnering to protect and conserve the natural resources on the Installation, maintain environmental compliance, and enhance NAVSUPPACT Mid-South's ability to meet its mission critical objectives.

4.8 Network with local community and conservation organizations, and coordinate natural resources activities as practicable.

4.9 Incorporate regional ecosystem issues and advancements into management decisions on NAVSUPPACT Mid-South to conserve biodiversity.

### *Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Geographic Information Systems*

- Sikes Act, as amended 16 USC 670 a-o, requires each military department to manage fish and wildlife resources in accordance with a tripartite cooperative plan agreed to by the USFWS and state wildlife agency, to provide its personnel with professional training in fish and wildlife management.
- Fish and Wildlife Conservation Act, 16 USC 2901, encourages all federal departments and agencies to utilize their statutory and administrative authority, to the maximum extent practicable and consistent with each agency's statutory responsibilities, to conserve and promote conservation of nongame fish and wildlife and their habitats.
- OPNAVINST 5090.1D, Chapter 12, discusses natural resources management at Navy installations.

### *Long-Term Management*

GIS databases and mapping capabilities will be used for daily decisions as well as long-term planning of natural resources management and its integration with the military mission. This work is driven by laws such as NEPA, ESA, and Clean Water Act. All impacts on Federal land from a proposed project must be considered before the project can be implemented, in accordance with NEPA. These impacts may affect natural resources such as endangered species, water, and timber, so detailed maps are required to assess the impacts potential on resources. A list of data layers that should be developed and maintained includes:

- Rare, threatened and endangered species occurrences;
- Streams and wetlands;
- Archaeological sites;
- Fishing areas;
- Forest stand inventory data;
- Fire breaks and prescribed burning areas;
- Solid waste management areas;
- Hazardous waste management;
- Groundwater and soil remediation areas;
- Stormwater pollution prevention; and
- Air pollution emission sources.

The NRM also has access to ancillary data such as infrastructure, installation boundaries, and geodetic reference points via the NAVFACSE Georeadiness Center. The NAVFAC SE Georeadiness Center maintains a server where finalized data, intermediate working data, and all supporting files are stored. Data for the Navy's training mission are maintained by NAVSUPPACT Mid-South.

### *Ecosystem Management*

The use of GIS enhances ecosystem management by making data available and decipherable across all components of the ecosystem. Air quality, water quality, land use, species presence, forest stands, and urban development, among other factors, can more easily be consolidated into overall analyses of ecosystem function on NAVSUPPACT Mid-South.

### *Military Mission*

Uninterrupted performance of the military mission at NAVSUPPACT Mid-South depends upon compliance with environmental laws and policies and delineating environmentally-sensitive areas such as wetlands and the occurrences of protected species and their habitats. GIS is a crucial tool in this delineation and the accessibility of GIS databases by various departments at NAVSUPPACT Mid-South facilitates the avoidance and minimization of impacts to sensitive areas.

### *Management Strategies for Geographic Information Systems*

- Produce custom maps for preliminary environmental site assessments and to facilitate analysis of environmental issues;
- Attend GIS training classes that provide the basic understanding of GIS database management and analyses, manipulation and correction of themes, and on-screen digitization.
- Compile GIS data coverages and maintain and update data coverages, as needed. GIS data coverages should include:
    - Wetlands, waterbodies, water courses, and appropriate buffers;
    - Forest stands;
    - Natural communities;
    - Undisturbed and undeveloped 100-year floodplain;
    - Military constraint areas;
    - Map soil units and areas where soil type presents a threat of erosion;
    - Populations and habitats of endangered and threatened species and species of special concern;
    - HW sites;
    - Land use;
    - Infrastructure and utilities;
    - NAVSUPPACT Mid-South boundaries and buildings;
    - Roads;
    - Cultural, natural, historical, or archeological resources;
    - Surface water quality monitoring stations; and

  - Stormwater outfalls and monitoring stations.
- Continue the technical education and training program for all contract and Installation personnel involved in activities on NAVSUPPACT Mid-South that may directly or indirectly affect ecosystem management success.

### *Projects Related to Geographic Infromation Systems*

- RTE Species Biological Resource Survey (Project 2 in Section 7);
- Migratory Bird Survey (Project 3 in Section 7);
- Invasive Species Management (Project 6 in Section 7);
- Species Habitat Assessment and Management (Project 8 in Section 7); and
- NSA Mid-South INRMP (Project 10 in Section 7).

### *Additional Sources of Information*

Georeadiness Explorer
https://rsims.navfac.navy.mil/RSIMS/MapViewer/Default.aspx?MapID=3879

GIS.com
http://www.gis.com/

## 6.5 Outdoor Recreation and Public Access

The military mission has priority over recreation involving access to natural resource areas. A golf course, ball fields, fitness courses, running and bicycle trails, tennis courts, and picnic areas are provided on the Installation in the way of outdoor recreation. The provision of recreational activities for Installation personnel supports the military mission. Outdoor activities and projects must be integrated into this plan and be as sensitive as possible to needs of natural resources. Certain activities and access are restricted in the interest of national defense as safety, and security dictate. The exercise of care, judgment, and cooperation with authorities is expected of all persons who enter the Installation for the purpose of recreation.

The Morale, Wellness and Recreation (MWR) Department and the Environmental Department's Natural Resources Division are responsible for maintaining and developing outdoor recreational activities on NAVSUPPACT Mid-South. Most of the recreational programs and facilities have been established for many years. The NAVSUPPACT Mid-South's Environmental Department's Natural Resources Division reviews and provides recommendations and guidance for all new projects proposed by MWR. Currently, NAVSUPPACT Mid-South holds an executed cooperative agreement with the NPS and the State of Tennessee for technical assistance with recreation-oriented activities.

People and social uses/needs are an integral part of ecosystem management. The outdoor recreation program is based on providing quality experiences while sustaining ecosystem integrity. Activities that have a direct effect on species populations such as fish harvest, or soil erosion from hiking trails, will be monitored to determine effects, and adaptive management (i.e., water bars on trails) incorporated to mitigate negative impacts. Special consideration will be given to protecting critical areas (e.g., cultural resources sites) from negative impacts due to outdoor recreation or ecosystem

management activities. From these general outdoor recreation management philosophies, a series of goals and objectives has been developed to identify management issues and actions to address them. A summary of the objectives used for managing outdoor recreation resources is provided in Table 6-7.

**Table 6-7. The Outdoor Recreation Goal and Objectives**

| |
|---|
| Goal 5: Provide facilities and implement programs that encourage outdoor recreation and educational use of natural resources on NAVSUPPACT Mid-South, and improve the quality of life for user groups. |
| Objectives: |
| 5.1 Support sustainable, multiple-use human activities. |
| 5.2 Provide quality outdoor recreation experiences while sustaining ecosystem integrity. |
| 5.3 Ensure that outdoor recreation activities are not in conflict with mission priorities. |
| 5.4 Continue to restrict all types of off-road vehicles from utilizing Installation grounds. |
| 5.5 Develop additional recreational facilities, trails, and interpretive centers to support present and future natural resources-based outdoor recreation participants at NAVSUPPACT Mid-South. |

### *Laws, Executive Orders, Regulations, Directives, and Memoranda Relevant to Outdoor Recreation and Public Access*

- Sikes Act and Improvement Act of 1997, 16 U.S.C. 670a(b)(1)(G), requires public access to a military Installation for the necessary, appropriate, and sustainable use of natural resources by the public to the extent that the use is not inconsistent with the needs of the fish and wildlife resources or with safety and military security.
- Outdoor Recreation – Federal/State Program Act, 16 U.S.C. 460c, defines a program for managing lands for outdoor recreation.
- OPNAVINST 5090.1E, 12-3.11, discusses natural resources management relating to the protection and management of outdoor recreational resources.
- National Historic Preservation Act, 16 U.S.C. 470-470m, establishes a program for the preservation of historic properties throughout the nation and for other purposes.
- Executive Order 11989, establishes policies and procedures to ensure the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands.
- NAVFAC MO – 100.4, provides technical guidance for establishing goals and objectives and planning requirements for outdoor recreation.
- DODINST 4715.3 of May 1996, states DoD installations may engage in public awareness and outreach programs to educate the public regarding the resources on military lands and DoD efforts to conserve those resources.

- SECNAVINST 5090.8, requires integration of environmental protection, natural resources, and cultural resources programs into DoN operations and activities.
- State of Tennessee Freshwater Fishing Regulations.

### *Long-Term Management*

NAVSUPPACT Mid-South should survey existing outdoor recreational opportunities and usage, and continue to develop outdoor recreational opportunities that do not adversely affect natural systems. MWR will seek guidance from the NRM to ensure new projects do not negatively impact the natural environment. Recommended natural resources efforts include:

- Implement and maintain appropriate ecosystem management practices, and continue efforts to protect areas with significant natural resources (i.e., protected plant or animal communities);
- Implement a watchable wildlife program that takes advantage of both the improved campus setting and the natural environment associated with the forested regions and Big Creek Drainage Ditch.
- Look at existing natural communities for potential environmental interpretation areas;
- Utilize visitor surveys to determine if the existing fishing opportunities are meeting the needs of the users;
- Provide quality outdoor recreation that is compatible with the training mission in an aesthetically pleasing, educational, and safe setting;
- Evaluate comments provided at trailheads and informational kiosks;
- Limit the impacts of recreational activities on forests, fish and wildlife habitat;
- Evaluate biological diversity and soil erosion in recreational areas;
- Establish a system of promoting the use of all nature trails. Make information on these areas more readily available to the public;
- Contact state and National Park naturalist/interpreter for outdoor interpretive assistance;
- Develop the utility rights-of-way into multi-purpose trails, that could be used for hiking, bicycling and nature study; and
- Enhance the current jogging trail system and establish an Interpretive Nature Trail throughout the unimproved areas of the Base.

Public access is defined herein as the right of the general public to enter and use NAVSUPPACT Mid-South facilities. The Sikes Act requires that sustainable use of natural resources by the public take place to the extent that the use is not inconsistent with the needs of the fish and wildlife resources. Due to the relatively high level of outdoor recreation by military personnel at NAVSUPPACT Mid-South, additional public access to outdoor recreational areas at NAVSUPPACT Mid-South could cause detrimental effects to the natural environment.

### *Ecosystem Management*

Ecosystem management practices are enhanced by environmental stewardship and by educating the general public about environmental conservation issues, problems, and solutions. By providing outdoor recreational and educational opportunities on NAVSUPPACT Mid-South, public awareness of vital environmental resources issues can be enhanced, thus providing a regional educational resource. Recreational and educational facilities provide opportunities to educate the public on the values and characteristics of a healthy environment, and on the problems and solutions associated with human use of the environment.

### *Military Mission*

Outdoor recreational opportunities are dependent upon the environment and the security and safety constraints of the military mission. At the same time, outdoor recreation serves to enhance the well-being and morale of base tenants. Outdoor recreational opportunities must be developed and used consistently with the sustainability of the land. The over-utilization or improper location of an outdoor recreation area could impact natural resources and the military mission.

### *Management Strategies for Outdoor Recreation and Public Access*

- Continue to collect information pertaining to present usage of natural resources-based outdoor recreation activities;
- Continue to develop recreational trails and interpretive centers in areas exhibiting unique natural and historical resources;
- Monitor existing use of outdoor recreational facilities and trails by placing sign-in sheets at convenient locations;
- Identify potential natural resources conflicts that could arise from increased outdoor recreational facilities;
- Investigate facility use agreements with other providers of educational, cultural, and recreational opportunities in the area;
- Review issues that currently prohibit public access;
- Identify the types of outdoor recreational and educational opportunities compatible with the NAVSUPPACT Mid-South's mission;
- Continue to develop a soil erosion control management plan, and reduce the rate of soil erosion through the implementation of long-term measures and projects;
- Continue to use Integrated Pest Management (IPM) techniques in pest management programs and emphasize the use of pesticides with low toxicity and low application rates;
- Inventory wetlands and assess their function and quality as warranted, promote 100 foot buffers for all wetlands, and ensure land use and land management practices that will not adversely affect wetland resources;
- Review and monitor proposed activities for impact avoidance to the attenuation capacity of the 100-year floodplain. If it is determined that development is necessary within the 100-

year floodplain to support the military mission, development shall first be located in the previously disturbed areas of the floodplain;

- Ensure implementation of policies that minimize adverse impacts to ecosystem resources from land disturbance activities;
- Continue to establish a program to prevent further degradation of shorelines;
- Continue to implement programs and activities for the protection and enhancement of habitat for threatened and endangered animal and plant species; and
- Continually verify that natural resources personnel obtain proper training and certifications.

### *Projects Related to Outdoor Recreation and Public Access*

- Nuisance Animal Control (Project 1 in Section 7);
- RTE Species Biological Resource Survey (Project 2 in Section 7);
- Vegetative Community Survey (Project 5 in Section 7);
- Artificial Nest Box Program (Project 5 in Section 7);
- Invasive Species Management (Project 6 in Section 7);
- Species Habitat Assessment and Management (Project 8 in Section 7); and
- NSA Mid-South INRMP (Project 10 in Section 7).

### *Additional Sources of Information*

Tennessee State Parks
https://tnstateparks.com/

City of Memphis Parks
http://parkreservation.memphistn.gov/#/

Tennessee Fishing Guide
http://www.eregulations.com/tennessee/fishing/

Staying Safe: Trails and Hiking
https://www.nps.gov/subjects/trails/hiking-safety.htm

Staying Safe: Camping
https://www.nps.gov/subjects/camping/staying-safe.htm

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# 7.0 INRMP IMPLEMENTATION

## 7.1 Implementation Summary

The purpose of this section is to implement specific management goals and objectives for several natural resources subject areas. Table 7-1 summarizes the NAVSUPPACT Mid-South INRMP projects and proposes schedules for their implementation, although the established timelines may require modification due to a number of factors (e.g., budget and manpower constraints, wartime taskings, etc.). However, their importance to the proper management of the Installation's natural resources cannot be understated. Therefore, the schedule presented in Table 7-1 will be modified as part of the annual review of this INRMP to ensure that these taskings are continually emphasized and accomplished when practicable.

The Office of Management and Budget considers funding for the preparation and implementation of this INRMP, as required by SAIA, and the associated NEPA analysis and documentation to be a high priority. However, the reality is that not all of the projects and programs identified in this INRMP will receive immediate funding. As such, these programs and projects have been placed into two priority-based categories: (1) mandatory projects to fulfill legal requirements and (2) projects to fulfill Navy Policy requirements. The prioritization of the projects is based on need, and need is based on a project's importance in moving the natural resources management program closer towards successfully achieving its goals.

This INRMP reflects the commitment set forth by NAVSUPPACT Mid-South to conserve, protect, and enhance the natural resources present on the Installation. This INRMP is the final plan that will direct the natural resources management at NAVSUPPACT Mid-South. An ecosystem approach was used to develop the management measures for each resource area. Implementation of the management measures will maintain, conserve, and enhance the ecological integrity of the Installation and the biological communities inhabiting the Installation. In addition, the natural resources management measures described in this Plan will protect the NAVSUPPACT Mid-South ecosystems and their components from unacceptable damage or degradation and identify and restore previously degraded habitats.

Natural resource and land use management issues are not the only factors contributing to the development and implementation of this INRMP. Installation management and other seemingly unrelated issues affect the implementation of this Plan.

It is of utmost primacy to the implementation of this INRMP that Installation personnel take "ownership" of the Plan (i.e., individual or organizational primary responsibility to implement the INRMP), to provide the necessary resources (i.e., personnel and equipment), and to allocate the appropriate funding to enact the plan.

## Table 7-1. NAVSUPPACT Mid-South INRMP Project List

| Project No. | Project Description | Scheduled Implementation | Prime Legal Driver | Funding Priority | Source of Funds | EPR Proj. # |
|---|---|---|---|---|---|---|
| 1 | Nuisance Animal Control | Annually | 2, 4, 8, 9, 10 | M | ENV, ITA | 0063918023 |
| 2 | RTE Species Biological Resource Survey | 2023, 2027 | 1, 2, 4, 6, 9, 10 | M | ENV, ITA | 0063927647 |
| 3 | Migratory Bird Survey | 2021, 2025, 2029 | 1, 2, 6, 9, 10 | M | ENV, ITA | 0063912030 |
| 4 | Vegetative Community Survey | 2024, 2028 | 1, 2, 3, 4, 7, 8, 9, 10 | M | AO, ENV, ITA | 0063912029 |
| 5 | Artificial Nest Box Program | Annually | 2, 6, 9, 10 | S | AO, ITA | 0063912028 |
| 6 | Invasive Species Management | 2027 | 2, 3, 4, 7, 8, 9, 10 | M | ENV, ITA | 0063927052 |
| 7 | Forestry Urban Tree Assessment and Monitoring | 2023, 2026, 2029 | 2, 3, 9, 10 | S | AO | 0063912027 |
| 8 | Species Habitat Assessment and Management | 2021, 2026 | 1, 3, 5, 7, 8, 9, 10 | M | ENV, ITA | 0063927150 |
| 9 | Vegetation Management and Fuel Load Reduction in Forest Stands | 2022, 2025, 2028 | 2, 3 8, 9, 10 | M | ENV, FOR, FR | 00639VM001 |
| 10 | NSA Mid-South INRMP | 2025, 2029 | 1, 2, 3, 6, 9, 10 | M | ENV | 0063912037 |

**Key for Table 7-1**

| | | |
|---|---|---|
| **Source of Funds** | | |
| AO - Agricultural Outleasing, ENV - Environmental O&MN, FOR – Forestry, FR – Forestry Reserve, ITA – Installation O&MN | | |
| **Funding Priority** | | |
| M - Mandatory Projects (those projects that require funding in order to remain in compliance with federal, state, and Navy laws and regulations) | | |
| S - Stewardship Projects (those projects that meet the intent of responsible adaptive ecosystem management and the nature of regulations but that are not specifically required by law) | | |
| **Primary Legal Drivers** | | |
| (1) | 16 U.S.C. 1531 & 1536 | Endangered Species Act |
| (2) | 16 U.S.C. 670a-f | Sikes Act Improvement Act |
| (3) | 7 U.S.C. 2814 | Management of Undesirable Plants on Federal Lands |
| (4) | 32 CFR 190 | Natural Resources Management Program |
| (5) | 33 U.S.C. 1251 | Clean Water Act |
| (6) | 6 U.S.C. 705 | Migratory Bird Treaty Act |
| (7) | EO 11990 | Protection of Wetlands |
| (8) | EO 13112 | Prohibits Introduction of Exotic Species |
| (9) | DoDINST 4715..3 | Environmental Conservation Program |
| (10) | OPNAVINST 5090.1E | Environmental and Natural Resources Management Manual |

## Project No. 1: Nuisance Animal Control

**EPR Number:** 0063918023

**Purpose:** Reduce nuisance animal populations, particularly those of feral cats, that predate on the listed bat species and migratory birds.

**Location:** Installation-wide.

**Description:** Survey and assess the presence and populations of nuisance animals on the Installations. Prioritize areas for nuisance animal control, and implement humane measures to reduce and eliminate the impacts of nuisance animals on human health, vulnerable native species, and human health.

**Baseline:** Baseline will be established upon the evaluation and implementation of actions to assess and control nuisance animals.

**Monitoring:** The species, locations, and level of control effort will be evaluated annually.

**Hours:** This project will primarily consist of contract labor due to the lack of staff to be assigned for the completion of the project. Additional time will be required to include the information in the annual review and update of the INRMP. Estimated hours = 160.

**Funding Source:** Environmental O&MN, Station O&MN.

**Legal Driver(s):** Endangered Species Act, 16 U.S.C. 35, 32 CFR 190; EO 13112, Invasive Species; Sikes Act, as amended 16 U.S.C. 670a-o.

**Related Legal:** CNO Policy Letter (Ser. N456M/1U595820), 10 Jan 2002; OPNAVINST 5090.1E, 12-3.10(b); FIFRA, 7 U.S.C.136; Armed Forces Pest Management Board, Technical Information Memorandum No 37.

**Accomplishments:** Feral cats have been largely eliminated from the installation. They have not been spotted for several years and received complaint in several years. The only remaining problems are beavers and skunks. Beavers create the largest problem, since they can threaten our levee system.

## Project No. 2: RTE Species Biological Resource Survey

**EPR Number:** 0063927647

**Purpose:** Federal agencies must ensure their actions will not adversely impact listed species. This requires periodic surveys for listed species so potential effects can be assessed. The locations and abundances of wildlife must be determined to properly implement natural resources management goals, objectives, and actions.

**Location:** Installation-wide.

**Description:** Comprehensive biological surveys for the presence, abundance, and status of wildlife on the Installation, with emphasis on species-at-risk. Surveys shall be used to characterize species populations. This is a mandatory requirement of the Sikes Act to update the Biological Resources Survey, as required by 16 USC 1531 and 1536 and OPNAVINST 5090.

**Baseline:** Previous RTE surveys.

**Monitoring:** Monitoring will be conducted through the 5-to-10-year update of this biological species information.

**Hours:** This project will primarily consist of contract labor due to the lack of staff to be assigned for the completion of the project. Additional time will be required to include the information in the annual review and update of the INRMP. Estimated hours = 120.

**Funding Source:** Environmental O&MN, Station O&MN.

**Legal Driver(s):** Endangered Species Act, 16 U.S.C. 1531 et seq.; Natural Resources Management Program, 32 CFR 190.

**Related Legal:** Sikes Act, as amended 16 USC 670 a-o; Migratory Bird Treaty Act, as amended, 16 U.S.C. 703 et seq.; Fish and Wildlife Conservation Act, 16 U.S.C. 2901; OPNAVINST 5090.1E, 12-3.5.

**Accomplishments:** The most recent survey for rare, threatened, and endangered species at NAVSUPPACT Mid-South was completed in 2019-20. Observations included one federally petitioned species, the monarch butterfly, and four Birds of Conservation Concern: American kestrel, wood thrush, red-headed woodpecker, and prothonotary warbler (LG2ES 2020).

Previous surveys for RTE species were completed in 1997, 2001, 2006, and 2016.

A mist-net survey conducted in 2009 for bats captured a single eastern red bat (*Lasiurus borealis*) at the Installation (EnSafe 2009). A more comprehensive survey in 2016 captured 37 bats of 5 species, the most frequently captured species being the eastern red bat and evening bat (*Nycticeus humeralis*). The other three species captured were the big brown bat (*Eptesicus fuscus*), southeastern bat (*Myotis austroriparius*), and tricolored bat (*Perimyotis subflavus*) (Carver 2016). No federally- or state-listed bat species were captured during either survey.

## Project No. 3: Migratory Bird Survey

**EPR Number:** 0063912030

**Purpose:** Federal agencies must ensure their actions will not result in un-permitted takes of migratory birds or their nests. This requires periodic surveys of bird species so potential effects can be assessed.

**Location:** Installation-wide.

**Description:** Comprehensive biological surveys for the presence, abundance, and status of migratory bird species on the Installation. Surveys shall be used to characterize species populations. This is a mandatory requirement of the Sikes Act to update the Biological Resources Survey, as required by 16 USC 1531 and 1536 and OPNAVINST 5090. Additionally, 16 USC 703 et.seq. requires the Navy to know what and where migratory birds are located on the installation and ensure Navy actions do not take or harm these birds.

**Baseline:** Previously-completed migratory bird surveys.

**Monitoring:** Monitoring will be conducted through the five-to-10-year update of this biological species information.

**Hours:** This project will primarily consist of contract labor due to the lack of staff to be assigned for the completion of the project. Additional time will be required to include the information in the annual review and update of the INRMP. Estimated hours = 120.

**Funding Source:** Environmental O&MN, Station O&MN.

**Legal Driver(s):** Migratory Bird Treaty Act, 16 U.S.C. 703; Natural Resources Management Program, 32 CFR 190.

**Related Legal:** Fish and Wildlife Conservation Act, 16 U.S.C. 2901; Endangered Species Act, 16 U.S.C. 1531 et seq.; DOD 4715, Sikes Act, as amended, 16 U.S.C. 670 a-o; OPNAVINST 5090.1E, 12-3.5(b)(1).

**Accomplishments:** Migratory bird surveys have been completed at NAVSUPPACT Mid-South in 1997, 2001, 2006, and 2016. Seventy avian species were observed during the most recent survey at the Installation in 2015-16 (GSRC 2016), and an additional 25 species were observed during previous surveys, as presented in Table 4-4 of this INRMP. While no threatened or endangered species reportedly reside on the Installation, the surveys provide as baseline datasets that can be compared against future count surveys.

## Project No. 4: Vegetative Community Survey

**EPR Number:** 0063912029

**Purpose:** Federal agencies must ensure their actions will not adversely impact federally-listed plant species. This requires periodic surveys for listed species so potential effects can be assessed. The locations and abundances of plants must be determined to properly implement natural resources management goals, objectives, and actions.

**Location:** Installation-wide.

**Description:** Comprehensive plant surveys for the presence, abundance, and status of all plant species on the Installation, with emphasis on species-at-risk. Surveys shall be used to characterize species populations. Natural resources personnel will support the establishment of native vegetation in cooperation with Base Operations Services personnel. Aesthetic amenities shall be maintained and enhanced by converting mowed areas into old field or grassland habitat. Some of the lawn areas not utilized by the current mission will be converted to wildflowers, old field, or forest. Parcels should be chosen based on their current cover type, slope, and aspect to ensure that healthy grasslands can subsist with minimal physical manipulation to the site.

**Baseline:** Previously completed vegetative surveys.

**Monitoring:** Monitoring will be conducted through the five-to-10-year update of these vegetative communities and species information on a ten year cycle.

**Hours:** This project will primarily consist of contract labor due to the lack of staff to be assigned for the completion of the project. Additional time will be required to include the information in the annual review and update of the INRMP. Estimated hours = 120.

**Funding Source:** Environmental O&MN, Station O&MN.

**Legal Driver(s):** Endangered Species Act, 16 U.S.C. 1531 et seq.; Natural Resources Management Program, 32 CFR 190.

**Related Legal:** Sikes Act as amended, 16 U.S.C. 670 (a) et seq.; EO 1990 – *Wetlands Protection*; OPNAVINST 5090.1E, 12-3.5.

**Accomplishments:** A 1-mile-long nature trail was constructed on NAVSUPPACT Mid-South within an 18-acre forested area of the Installation's

southside by paving historic timber paths through the forest. Resting benches and tree identification markers were included. INRMP Project No. 4 builds on the successes of the existing nature trail to create native plantings that are specifically designed to draw wildlife to predetermined locations. Additionally it would establish birding circuits to take advantage of the varied environments at the Installation by allowing access to the forested regions along the levee.

## Project No. 5: Artificial Nest Box Program

**EPR Number:** 0063912028

**Purpose:** Due to the urban/campus like environment at NAVSUPPACT Mid-South, there is limited habitat for cavity nesting bird species and bats.

**Location:** In open grass areas and on southwest sides of buildings.

**Description:** Natural resources personnel will install artificial nesting structures for bird and bat species. Bird nest boxes will be places in the open spaces and areas converted to wildflower plantings for use by eastern bluebird and tree swallows. Bat boxes will be installed on the southwest side of buildings to provide nesting structures for a variety of bat species. Bat boxes should only be installed on buildings which have low vehicle and pedestrian traffic adjacent to the buildings. The program shall include not only the construction of the nesting structures, but also monitoring and maintenance of the nesting areas.

**Baseline:** Baseline conditions will be established with the installation of the artificial nest structure program.

**Monitoring:** Monitoring will include maintenance of structures for signs of predation or general wear Boxes will be replaces on an as needed basis.

**Hours:** Estimated hours = 400.

**Funding Source:** Station O&MN, Natural Resources Reserve.

**Legal Driver(s):** Migratory Bird Treaty Act, 16 U.S.C. 703; Natural Resources Management Program, 32 CFR 190.

**Related Legal:** Fish and Wildlife Conservation Act, 16 U.S.C. 2901; Endangered Species Act, 16 U.S.C. 1531 et seq.; DOD 4715, Sikes Act, as amended, 16 U.S.C. 670 a-o; OPNAVINST 5090.1E, 12-3.5(b)(1).

**Accomplishments:** The effects of the artificial nesting program on improving future bird and bat populations can be evaluated, at least qualitatively, through future count surveys.

## Project No. 6: Invasive Species Management

**EPR Number:** 0063927052

**Purpose:** Several invasive species have been observed on the Installation. *Sericea lespedeza* and Johnson grass, for example, are widespread across the Installation. Proactive management objectives should be implemented to control significant populations of such species.

**Location:** Installation-wide.

**Description:** Areas where invasive species occur will be identified and specific management actions targeted to populations of these species. These actions will include chemical application, physical removal, and possible use of biological agents. Specific projects will be developed should substantial populations of a species be found.

**Baseline:** Previous invasive plant species surveys and treatments.

**Monitoring:** Periodically investigate areas to assess invasive species concentrations.

**Hours:** This project will use primarily contract labor due to the lack of staff to be assigned for the completion of this project. Estimated hours = 160.

**Funding Source:** Environmental O&MN, Station O&MN.

**Legal Driver(s):** Federal Noxious Weed Act of 1974, 7 U.S.C. 2801, Sec. 2814 (a); Executive Order (EO) 13112 – *Invasive Species*.

**Related Legal:** DOD Pest Management Program; Endangered Species Act, 16 U.S.C. 1531 et seq.; Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), 7 U.S.C. 136; OPNAVINST 5090.1E, 12-3.10.

**Accomplishments:** Nine species of exotic invasive plants were identified during a 2019-20 survey of invasive plants on the installation: mimosa (*Albizia julibrissin*), Autumn olive (*Elaeagnus umbellata*), sericea lespedeza (*Lespedeza cuneata*), Chinese privet (*Ligustrum sinense*), Chinaberry (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), Japanese stiltgrass (*Microstegium vimineum*), Callery pear (*Pyrus celleryana*), and multiflora rose (*Rosa multiflora*). GIS coordinates were recorded to facilitate treatment and eradiaction (LG2ES 2020).

## Project No. 7: Forestry Urban Tree Assessment and Monitoring

**EPR Number:** 0063912027

**Purpose:** Update information about the health and viability of the urban tree resources on NAVSUPPACT Mid-South.

**Location:** Installation-wide.

**Description:** Urban tree surveys will be completed in the improved and landscaped portions of the Installation, and the viability and survivability of the conservation plantings will be assessed. Data collected for "stand-alone" urban trees will include diameter at breast height, form, condition, height, location (latitude and longitude), and species type. Problems associated with each tree and activities to resolve these problems will be described for each tree surveyed. Each tree will be tagged and assigned a unique identification number for each urban tree. All of the data collected will be entered into an Urban Tree GIS Database that will provide NAVSUPPACT Mid-South with an effective, interactive management tool to track the progress of the Installation's urban forestry program. In addition, it will allow communication between staff about management of urban forestry resources through creation of maps from the GIS database.

**Baseline:** Previous urban forestry efforts and assessments.

**Monitoring:** The Urban Tree Database will be continually monitored based on changes and management conducted within the urban forestry resource.

**Hours:** This project will use primarily contract labor due to the lack of staff to be assigned for the completion of this project. 60 hours will be required to oversee the development of the database and 16 hours will be required annually for continued maintenance and update of the database. Estimated hours = 220.

**Funding Source:** Agricultural Outleasing, Station O&MN.

**Legal Driver(s):** None.

**Accomplishments:** An Urban Tree Instruction was developed to mitigate inproper plantings. Trees planted directly under power lines are being removed. When replacing trees, species are selected based upon benefits to wildlife and are relocated to semi-improved and unimproved grounds when possible. The long-term plan is to expand those grounds.

## Project No. 8: Species Habitat Assessment and Management

**EPR Number:** 0063927150

**Purpose:** Protect and enhance habitat for species at risk.

**Location:** Installation-wide natural areas.

**Description:** Identify natural areas on the Installation that are vital to the recovery and continued survival of at-risk species. Establish site-specific plans and actions to conserve and enhance those habitats.

**Baseline:** GRX database and recurring installation-wide observations.

**Monitoring:** Monitoring and enhancements shall take place no less than every five years.

**Hours:** This project will use primarily contract labor due to the lack of staff to be assigned for the completion of this project. Estimated hours = 160.

**Funding Source:** Environmental O&MN, Station O&MN.

**Legal Driver(s):** Endangered Species Act, 16 U.S.C. 1531 & 1536; Sikes Act Improvement Act, 16 U.S.C. 670a-f; Clean Water Act, 33 U.S.C. 1251.

**Related Legal:** EO 11990, Protection of Wetlands; Management of Undesirable Plants on Federal Lands, 7 U.S.C. 2814; Natural Resources Management Program, 32 CFR 190; EO 13112, Prohibition on the Introduction of Exotic Species; OPNAVINST 5090.1E, Chap 12.

## Project No. 9: Vegetation Management and Fuel Load Reduction in Forest Stands

**EPR Number:** 00639VM001

**Purpose:** The high density of trees in the loblolly pine stands has yielded high volumes of needle duff, which is very susceptible to intense fire events. Due to the close proximity to residential and operational areas, this presents a significant danger to human safety and NAVSUPPACT Mid-South property.

**Location:** Forest stands.

**Description:** Thinning will take place by conducting selective cutting, which is the cutting of individual trees for a specific purpose. This may entail harvesting trees of a particular size and species in a natural stand. This type of harvest has much less impact than clearcutting and is more imitative of minor natural disturbances. It is the preferred method of timber harvest in most cases. Local markets exist for specialty products such as high quality poles and piling. Selective harvesting should not be allowed in sensitive areas of the Installation.

**Baseline:** Baseline conditions are the present high densities of trees and the large amounts of suspended needle duff.

**Monitoring:** Monitoring will take place during the yearly inspections by NAVFAC SE foresters.

**Hours:** This project will use primarily contract labor due to the lack of staff to be assigned for the completion of this project. Estimated hours = 80.

**Type:** Mandatory.

**Assessment Level:** Level 1.

**Funding Source:** Forest Reserve.

**Legal Driver(s):** Natural Resources Management Program, 32 CFR 190; Sikes Act Improvement Act of 1997.

**Related Legal:** 16 U.S.C. 670 (a)-(o); Environmental Natural Resources Protection Manual, 11015.2; Federal Noxious Weed Act of 1974, 7 U.S.C. 2801; Executive Order 13112 – Invasive Species; DODINST 7310.5; OPNAVINST 5090.1E, 12-3.8(j).

## Project No. 10: NSA Mid-South INRMP

**Purpose:** This INRMP must be reviewed annually and updated as warranted. Five-year reviews for operation and effect are also required under the SAIA.

**Location:** Installation-wide.

**Description:** The INRMP will be reviewed annually in cooperation with USFWS and TWRA. Updates will be made as needed to account for new species listings and project accomplishments. The INRMP will also be reviewed every five years for operation and effect, in accordance with the SAIA.

**Baseline:** Baseline conditions are established in the INRMP.

**Monitoring:** Annual reviews.

**Hours:** Estimated hours = 120.

**Type:** Mandatory.

**Assessment Level:** Level 1.

**Funding Source:** Environmental O&MN, Station O&MN.

**Legal Driver(s):** Conservation Programs on Military Installations (Sikes Act) as amended, 16 U.S.C. 670 (a) et seq.

**Related Legal:** DODINST 7310.5; OPNAVINST 5090.1E, 12-3.4; National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. 4321 et seq.

**Accomplishments:** This INRMP is reviewed annually with Federal and State partners and updated as necessary based upon input from the partners, intstallation Natrual Resources Manager, and regional Navy support personnel. This INRMP was last reviewed for operations and effect in 2021.

# 8.0 REFERENCES

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# APPENDIX A

# Acronyms, Terms, and Definitions

# ACRONYMS

| | |
|---|---|
| °F | degrees Fahrenheit |
| AST | Aboveground Storage Tank |
| BASH | Bird/Wildlife Aircraft Strike Hazard |
| BHWG | Bird Hazard Working Group |
| BMPs | Best Management Practices |
| BOS | Base Operating Services |
| BRAC | Base Realignment and Closure |
| BUPERS | Bureau of Naval Personnel |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| CNO | Chief of Naval Operations |
| CTDEP | Connecticut Department of Environmental Protection |
| CWA | Clean Water Act |
| DoD | Department of Defense |
| DoDI | Department of Defense Instruction |
| E&S | Erosion and Sedimentation |
| $e^2M$ | engineering-environmental Management |
| EFA | Engineering Field Activity |
| EFD | Engineering Field Divisions |
| EO | Executive Order |
| EPA | U.S. Environmental Protection Agency |
| ESA | Endangered Species Act |
| FEMA | Federal Emergency Management Agency |
| FIFRA | Federal Insecticide, Fungicide and Rodenticide Act |
| FIRM | Flood Insurance Rate Map |
| FMIS | Forest Management Information System |
| FONPA | Finding of No Practicable Alternative |
| FONSI | Finding of No Significant Impact |
| FR | Federal Register |
| FY | Fiscal Year |
| GIS | Geographical Information System |
| HAZMAT | hazardous materials |
| INRMP | Integrated Natural Resources Management Plan |
| IRP | Installation Restoration Program |
| MOA | Memorandum of Agreement |
| mph | miles per hour |
| msl | mean sea level |
| MWR | Morale, Welfare, and Recreation |
| N45 | Chief of Naval Operations Environmental Protection, Safety, and Occupational Health |
| NARB | Naval Air Reserve Base |
| NAS | Naval Air Station |
| NATTC | Naval Air Technical Training Center |
| NAVFAC | Naval Facilities Engineering Command |

| | |
|---|---|
| NAVFACINST | Naval Facilities Instruction |
| NAVSUPPACT | Naval Support Activity |
| NEPA | National Environmental Policy Act |
| NHIP | Natural Heritage Inventory Program |
| NHPA | National Historic Preservation Act |
| NPDES | National Pollutant Discharge Elimination System |
| NPS | National Park Service |
| NRHP | National Register of Historic Places |
| NRCS | Natural Resources Conservation Service |
| OPNAVINST | Chief of Naval Operations Instruction |
| P.L. | Public Law |
| POL | Petroleum, Oil, and Lubricants |
| RCRA | Resource Conservation and Recovery Act |
| ROD | Record of Decision |
| ROICC | Resident Officer in Charge of Construction |
| SAIA | Sikes Act Improvement Act |
| SAF | Secretary of American Foresters |
| SECNAV | Secretary of the Navy |
| SECNAVINST | Secretary of the Navy Instruction |
| SE-EPPC | Southeast Exotic Pest Plant Council |
| SOUTHDIV NAVFACENGCOM | Southern Division Naval Facilities Engineering Command |
| TCA | Tennessee Code of Authorities |
| SWP3 | Stormwater Pollution Prevention Plan |
| TDEC | Tennessee Department of Environmental Conservation |
| TDNH | Tennessee Department of Natural Heritage |
| TE | Threatened or Endangered Species and Critical Habitats |
| TFC | Tennessee Forestry Commission |
| TNC | The Nature Conservancy |
| TWRA | Tennessee Wildlife Resources Agency |
| TWRC | Tennessee Wildlife Resources Commission |
| U.S. | United States |
| U.S.C. | United States Code |
| USACE | U.S. Army Corps of Engineers |
| USDA | U.S. Department of Agriculture |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| UST | Underground Storage Tank |
| WPC | Water Pollution Control |

# TERMS AND DEFINITIONS

***Agricultural Outleasing —*** The use of Department of Defense (DoD) lands under a lease to an agency, organization, or person for growing crops or grazing animals.

***Biological Diversity —*** The variety of life forms, the ecological roles they perform, and the genetic variability they contain within any defined time and space.

***Cooperative Agreement —*** A written agreement between an Air Force Range and one or more outside agencies (Federal, state, or local) that coordinates planning strategies. It is a vehicle for obtaining assistance in developing natural resources programs.

***Critical Habitat —*** Any air, land, or water area (excluding existing synthetic structures or settlements that are not necessary to the survival and recovery of a listed species) and constituents thereof that the U.S. Fish and Wildlife Service has designated as essential to the survival and recovery of an endangered or threatened species or a distinct segment of its population.

***Cropland —*** Land primarily suitable for producing farm crops, including grain, hay, and truck crops.

***Ecosystem Management —*** An approach to natural resources management that focuses on the interrelationships of ecological processes linking soils, plants, animals, minerals, climate, water, and topography. Managers view such processes as a living system that affects and responds to human activity beyond traditional commodity and amenity uses. They also acknowledge the importance of ecosystem services such as water conservation, oxygen recharge, and nutrient recycling.

***Endangered Species*** — Any plant or animal listed or proposed for listing as threatened or endangered by the Federal Government or state Governments.

***Exotic Species —*** Any plant or animal not native to a region, state, or country. (This definition excludes certain game species that have become established, such as pheasants.)

***Featured Species —*** A fish or wildlife species whose habitat requires fish or wildlife management (including coordination, multiple-use planning, direct habitat improvements, and cooperative programs) on a unit of land or water. Also refers to a tree species that the forest management plan cites as having value for wood fiber production. The plan usually specifies one or more featured tree species along with one or more associated species to meet multiple-use management objectives.

***Fish —*** Fresh and salt water fin-fish, other aquatic vertebrate organisms, and crustaceans and mollusks.

***Floodplains*** — Lowland or flat areas adjoining inland and coastal waters, including flood-prone areas on offshore islands, that have a 1 percent or greater chance of flooding in any given year.

***Game —*** Any species of fish or wildlife for which state or Federal laws and regulations prescribe seasons and bag or creel limits.

***Habitat*** — An area that provides the environmental elements of air, water, food, cover, and space necessary for a given species to survive and reproduce.

***Highly Erodible Soils*** — Soils that, because of their physical properties or slope, the U.S. Department of Agriculture, Soil Conservation Service, identifies as being highly susceptible to wind or water erosion.

***Improved Grounds*** — Grounds on which personnel annually plan and perform intensive maintenance activities. These are developed areas of a Range that have lawns and landscape plantings that require intensive maintenance. They usually include the cantonment, parade ground, drill fields, athletic areas, golf courses (excluding roughs), cemeteries, and housing areas.

***Integrated Natural Resources Management Plan*** — A natural resources management plan based on ecosystem management that shows the interrelationships of the individual component plans as well as mission and land use activities affecting the basic land management plans.

***Land Management Unit*** — The smallest land management division that planners use in developing specific strategies to accomplish natural resources management goals. Land management units may correspond to grazing units on agricultural outleased land, stands or compartments on commercial forest lands, various types of improved grounds (for example, athletic fields, parks, yards in family housing, or landscaped areas around administrative buildings), or identifiable semi-improved grounds (for example, airfield areas, utility rights-of-way, or roadside areas).

***Land-Use Regulation*** — A document that prescribes the specific technical actions or land use and restrictions with which lessees, permittees, or contractors must comply. It derives from the grazing or cropland management plan and forms a part of all outleases, land use permits, and other contracts.

***Multiple-Use*** — The integrated, coordinated, and compatible use of various natural resources to derive the best benefit while perpetuating and protecting those resources.

***Multiple-Use and Sustained Yield Management*** — The care and use of natural resources so as to best serve the present and future needs of the United States and its people without impairing the productivity of the land and water.

***Natural Resources Management Professional*** — A person with a degree in the natural sciences who manages natural resources on a regular basis and receives periodic training to maintain proficiency in that job.

***NO FUNDS Service Contract*** — An agreement by which a party performs a land management service for a consideration other than funds. Such a contract exists, for example, when a party hired to establish, control, or remove vegetative cover or growth agrees to take payment for the service in the form of the growth that result.

***Outdoor Interpretation*** — Observing and explaining the history, development, and significance of our natural heritage and natural resources.

***Outdoor Recreation —*** Recreation that relates directly to and occurs in natural, outdoor environments.

***Outdoor Recreation Resources —*** Land and water areas and associated natural resources that provide, or have the potential to provide, opportunities for outdoor recreation for current and future generations.

***Procurement Contract —*** An agreement by which the Government agrees to pay a contractor to establish, control, or remove vegetative cover or growth for land management purposes. This contract may not extend beyond the period for which funding for the service is available.

***Recreation Carrying Capacity —*** The level of recreational use that an area can sustain without damage to the environment.

***Rotation Age —*** The planned number of years between the regeneration of a forest stand and its final cutting at a specified stage of maturity.

***SALES Service Contract —*** An agreement by which the contractor pays the Government for crops, crop residue, or grazing privilege incidental to control or removal of vegetative growth for land management purposes. Sales contracts cover a period of 1 to 5 years.

***Semi-Improved Grounds —*** Grounds where personnel perform periodic maintenance primarily for operational and aesthetic reasons (such as erosion and dust control, bird control, and visual clear zones). These usually include grounds adjacent to runways, taxiways, and aprons; runway clear zones; lateral safety zones (AFR 86-14); rifle and pistol ranges; picnic areas; ammunition storage areas; antenna facilities; and golf course roughs.

***Stewardship*** — The management of a Range resources with the goal of maintaining or increasing the resource's value indefinitely into the future.

***Threatened Species*** — Those federally or state-listed species of flora and fauna that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range and that have been designated for special protection and management pursuant to the Endangered Species Act.

***Unimproved Grounds —*** Grounds not classified as improved or semi-improved and usually not mowed more than once a year. These include weapons ranges; forest lands; cropland and grazing lands; lakes, ponds, and wetlands; and areas in airfields beyond the safety zones.

***Urban Forests —*** Planted or remnant native tree species existing within urbanized areas such as parks, tree-lined residential streets, scattered tracts of undisturbed woodlands, and cantonment areas.

***Urban Wildlife*** — Wildlife that habitually live or periodically survive in an urban environment on improved or semi-improved grounds.

***Watchable Wildlife Areas —*** Areas identified under the Watchable Wildlife Program as suitable for passive recreational uses such as bird watching, nature study, and other non-consumptive uses of wildlife resources.

***Wetlands —*** Areas inundated or saturated by surface or groundwater at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

***Wildlife-Carrying Capacity —*** The maximum density of wildlife that a particular area or habitat can carry on a sustained basis without deterioration of the habitat.

# APPENDIX B

# Environmental Documentation
# and
# Correspondence

Two Bala Plaza, Suite 300
Bala Cynwyd, PA 19004

1332 Morris Road
Wynnewood, PA 19096

Date

«Prefix» «FirstName» «LastName»
«Organization_Name_1»
«Organization_Name_2»
«Street_Address_1»
«Street_Address_2»
«City», «State» «Zip_Code»

Subject: Formation of a Task Force to Guide the Development of an Integrated Natural Resources Management Plan for Naval Support Activity Mid-South, Millington, Tennessee

Dear «Prefix» «FirstName» «LastName»:

engineering-environmental Management, Inc. (e2M) has been tasked by the Naval Support Activity (NAVSUPPACT) Mid-South to develop an Integrated Natural Resources Management Plan (INRMP) for their Installation in Millington, Tennessee. The Plan will provide the framework for management of natural resource activities at NAVSUPPACT Mid-South. General, long-term strategies for the management, development, conservation, and use of the Installation's natural resources will be developed as part of the Plan.

The INRMP will be developed in accordance with *Guidelines for Preparing Integrated Natural Resources Management Plans for Naval Installations* dated September 1998 and other pertinent Department of Defense, U.S. Navy, and natural resources management guidance. An interdisciplinary approach will be used to develop the Plan. Information and guidance will be solicited from a variety of Federal, State, and local agencies and groups. A Task Force will be formed which will be made up of key Installation personnel and individuals from various agencies and groups that have an interest in NAVSUPPACT Mid-South and the management of its natural resources. This Task Force will ensure that information concerning the natural resources on or in the vicinity of the Installation is accurately accounted for and is managed in a way that is compatible with local and regional management strategies.

This letter is to invite you to join the NAVSUPPACT Mid-South INRMP Task Force. Your role on the Task Force can range from providing technical information for the development of the INRMP to providing assistance to NAVSUPPACT Mid-South and e2M in establishing the Plan's goals and objectives. e2M and the NAVSUPPACT Mid-South will conduct the initial Task Force

Should you have any questions about the INRMP development process, the Task Force, or wish to confirm your desire to participate, please contact me at (610) 896-3991, or mail correspondence to the e2M business address provided on the cover page. I can also be reached via e-mail at bhoppy@e2m.net. You may also contact Mr. Rob Williamson of NAVSUPPACT Mid-South at (901) 874-5399 or email your response directly to him at RWilliamson@navsuppact-midsouth.navy.mil. We hope you will accept this invitation. We look forward to working with you soon. Thank you.

Sincerely,

engineering-environmental Management, Inc.

Brian K. Hoppy
Vice President, Environmental Planning

# Site Visit Trip Report

Integrated Natural Resources Management Plan

Naval Support Activity Mid-south

Millington, Tennessee

September 25 – 29, 2000

Site Visit Trip Report

Integrated Natural Resources Management Plan

Millington, TN

September 25-29, 2000

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This Trip Report summarizes the general results of the site visit and initial data collection efforts conducted for the preparation of an Integrated Natural Resources Management Plan (INRMP) for Naval Support Activity Mid-South located in Millington, TN. The site visit was conducted from September 25-29, 2000. The site visit team from engineering-environmental Management, Inc. (e2M) included Mr. Brian Hoppy (Program Manager), Ms. Jayme Melofchik (Deputy Program Manager) and Mr. Gino Giumarro (Project Manager). The primary point of contact at Naval Support Activity Mid-South who facilitated the coordination of the site visit and data collection efforts was Mr. Rob Williamson.

The purpose of this visit was to conduct an official project kick-off meeting with appropriate personnel, to collect data related to land use management, forestry management, and wildlife management activities on the base, and to conduct a task force meeting which includes key installation personnel and members of local resource agencies. Local resource agencies included the U.S. Fish and Wildlife Service, U.S. Department of Agriculture Natural Resources Conservation Service, U.S. Army Corps of Engineers – Mobile District, U.S. Army Corps of Engineers – Memphis District, Tennessee Wildlife Resources Agency, Tennessee Forestry Commission, and Tennessee Department of Environmental Conservation – Division of Natural Heritage and Environmental Assistance Center. The task force was established as a partnering effort with local resource agencies to ensure that the information concerning natural resources on or in the vicinity of the installation is managed in a manner commensurate with local and regional management strategies.

The site visit provided an opportunity to discuss with base personnel the nature and scope of the INRMP, to identify and define management concerns, and to establish goals and objectives to remedy these concerns. As a result of these discussions, the focus of the INRMP data collection and task force partnering will be to develop a practical document that will serve as an effective tool for site personnel to administer and implement all aspects of natural resources management. In addition, the development of the INRMP will lead to a heightened level of natural resources excellence at NAVSUPPACT Mid-South.

The mission of NAVSUPPACT Mid-South changed significantly with a 1994 base realignment and closure (BRAC) action resulting in a campus office setting. This new setting is comprised of tenants including the Bureau of Personnel as opposed to the prior mission of training and aviation support. The transfer of approximately 1900 acres of property located north of the original base footprint to the City of Millington included the airfield and predominantly agricultural areas. Therefore, data collection efforts were centered on the remaining southern portion of the base and focused on

grounds maintenance activities related to pesticide use and application practices, sedimentation and erosion control, landuse evaluations, wetland delineation and management, biological species surveys, wildlife management, outdoor recreation, and forestry management.

The following sections briefly describe the general results of the site visit, the initial data collection efforts, and results of the task force meeting.

Monday, September 25, 2000

A formal project kick-off meeting was conducted on Monday, September 25, 2000, at 10:00 AM in the Public Works Conference Room. The primary purpose of this meeting was to discuss the requirements driving the development of the INRMP, schedule appointments to meet with representatives individually to collect data, and to address potential issues. Those in attendance were Mr. Brain Hoppy, Mr. Gino Giumarro, and Ms. Jayme Melofchik of e2M; Mr. Mike Staten of the Army Corps of Engineers – Mobile District; Mr. Tom Magness of Tetratech, Inc. Representatives from NAVSUPPACT Mid-South included LCDR Robert McLean-Public Works Officer and Resident Officer in Charge of Construction, Mr. Rob Williamson-Environmental Engineer, Chief William Gates-Security, Lt Deandra Fuller-Judge Advocate General, Bob Sipowich-Civil Engineer, Rodger Aitken-Planner, Tim Campbell-Morale, Welfare, and Recreation, and Tonya Barker-Environmental Division Director.

As stated previously, the express wish of the NAVSUPPACT Mid-South staff is to develop a practical, effective INRMP that can be easily implemented at all levels of management. In addition, the staff would like the information gathered for the INRMP to augment their existing GIS database and easily integrate into the Base Master Plan. The topic of use of adjacent lands in concert with the development of the INRMP was discussed at length and it was determined that since this is a matter of great sensitivity given the proposed Industrial Development Plan by the City of Millington for the transferred acreage, the JAG should be consulted on this matter prior to gathering and incorporating information of this type into the INRMP.

Various documents and resources were discussed that will help in the data gathering effort and will be made available for the development of the INRMP. These documents and resources include the GIS coverages provided in CD-ROM format, the Regional Shore Infrastructure Plan (aka Base Master Plan), Industrial Development Plan, and Sustainable Design Plan. The kick-off meeting concluded with scheduling several additional meetings to interview individual personnel. After the meeting, e2M personnel met with Mr. Aitken to look at the GIS database and review documents that may prove useful in the development of the INRMP. One such document included, *Desirable Native Plants for Millington NAS.*

At 1500 hrs a windshield tour of the facility was conducted with Mr. Rodger Aitken providing a narrative of the base history as well as future plans for development.

Following the narrative windshield tour, the e2M site visit team returned to the field on their own to document areas of the Base noticed during the windshield tour that were in need of erosion control.

Tuesday, September 26, 2000

The e2M site visit team continued to gather information for development of the INRMP by conducting field surveys, interviewing base personnel, and reviewing pertinent documents. Various activities were undertaken such as contacting the Shelby Farms Agricenter in order to obtain a copy of the Shelby County Soil survey, contacting the local area Forester to determine the status of tree disease trends over recent years, reviewing natural resource projects currently programmed in the Navy ESCRS database, and discussing the Base Operating Services contract with base and contractor personnel as related to pesticide use and application. e2M personnel met with Mr. Jerry Goin, the base Pesticide Manager, who provided information on the specific herbicides and insecticides used on base and where they are typically used. Herbicide use includes glyphosate (*Round-up*) for weeds, simazine (*Drexel Simazine 4*) and pendimethalin (*Proturf Weedgra*) for pre-emergent weed control, MSMA (*MSMA plus*) for crab-grass control (rarely used), and 24,D (*Amine 4*) for lawns and post-emergent broad leaf control. Insecticide use includes chlorpyrifos (*Dursban Pro*) for termites, cyfluthrin (*Tempo 20*) for fire ants, diazinon (*Prentox Diazinon*), and four different types of larvaecide. Mr. Goin stated that based on a 1993 baseline survey, the base has reduced its pesticide use by 53%. Mr. Goin also provided a copy of the base Pesticide Management Plan.

In addition, the site visit team performed several biological surveys across the Base. A list of wildlife species observed during the initial site visit are included in Table 1 at the end of this report. The team began with a survey of the ponds situated on the golf course. This survey was conducted to note the presence of wildlife and to determine if additional management is necessitated in this area. Mr. Hoppy and Mr. Giumarro also met with the golf course manager, concerning management of the golf course.

In addition, the site visit team surveyed the drainage tributaries to Big Creek Drainage to confirm particular ecological communities, and to develop an understanding of drainage management. Mr. Hoppy and Mr. Giumarro noted areas of erosion which exemplified problems with the current culvert management practices. Erosion along the culverts is problematic due to lack of groundcover and steep sloped drainage basins. The need for stabilization of the drainage areas will be covered in the development of the INRMP. Mr. Hoppy and Mr. Giumarro also surveyed forest stands along the drainage to evaluate the need for any thinning of those stands. It was noted that there is a tremendous buildup of needle duff in the thick stand of trees that could be problematic. The high tree density is problematic for the health of the stand and because a there is a great potential for an extreme fire event. It is recommended that a quantitative evaluation of forest density be conducted on several stands at NAVSUPPACT Mid-South.

The site visit team left the Base at 1700 hrs and returned to perform a night survey on the Base. Species observed during the nighttime wildlife survey are included in Table 1. Evening is a crucial time to see crepuscular wildlife species. Few wildlife were observed during this survey. Additional nighttime surveys will be performed during the next site visit.

Wednesday September 27, 2000

The site visit team continued to review documents, conduct field surveys, and interview personnel. Mr. Jim Heide, NAVSUPPACT Mid-South Environmental Specialist, provided a listing of current and future Natural Resource projects programmed into the ESCRS database. The Chief of Naval Operations "Cookbook" for identifying and programming Natural Resource projects was reviewed

and Chapter 12 entitled "Natural Resources" was copied. Mr. Williamson requested a listing of proposed Natural Resource projects for submittal to Mr. Heide by 6 October 2000.

A phone interview was conducted with Mr. Jim Parlier of Naval Facilities Engineering Command – Southern Division. Mr. Parlier is a forester currently assisting NAVSUPPACT Mid-South with forest area management. He stated that he has planned a trip to NAVSUPPACT Mid-South for sometime in October 2000 to introduce the new staff forester, Ms. Kathy Raddigan. He also stated that he plans to work with the US Forestry Service to mark timber for sale at NAVSUPPACT Mid-South and to administer the sale. He also plans to look at the forested areas on the base to consider if a prescribed burn is necessary. He further stated that he does not plan to conduct any forestry management work in the areas designated as Solid Waste Management Units (SWMU's).

A phone interview was conducted with Mr. Barrow Taylor, Shelby County Area Forester. He provided information on the occurrence of various tree diseases that have occurred in the Shelby County Area over the past few years. He stated that there is a potential for dutch elm disease and that southern pine beetles have been abundant and have caused significant damage. He also stated that recent drought conditions have affected the hardwoods in the area as well. Mr. Taylor is interested in attending and participating in the next task force meeting.

A briefing was given to LCDR McLean to provide him with an idea of the type of information gathered thus far during the site visit. LCDR McLean requested that e2M make preliminary recommendations to him on grounds maintenance. He stated that he spends approximately 1.4 million dollars on grounds maintenance each fiscal year and he would like to cut this amount considerably. Mr. Hoppy made note of the fact that many open areas and ditches that are currently being mowed could potentially be managed with alternative grounds management practices that do not require significant up-keep or cost. E2M staff was informed of the Chicasaw Basin Authority plans to construct a flood control structure in the immediate area surrounding NAVSUPPACT Mid-South and that the US Forestry Service has a fisheries unit were we may be able to obtain a survey of the lakes on Navy property as well as the potential for free fish stocking capabilities.

Field surveys were conducted throughout the day. In the morning, Mr. Hoppy and Mr. Giumarro concentrated on surveying the settlement basins on the North side of the base. The basins are abandoned sewage lagoons, which now exist as reclaimed wetlands. There was very little water in the settlement basins during the time of the survey, however many species were observed feeding on the mud flats. The edges of the basins have distinct vegetative zones in response to changing water levels. Predominant herbaceous species observed on the edge of the basins include *Carex sp.*, horsetail grass, rice-cut grass, bush clover (*Lespedeza ceresia*), *Cyperinus sp.*, and fine-leaved sneezeweed (*Helenium tenuifolium*). The low herbaceous area that is repeatedly flooded is bordered by upland herbaceous and woody species dominated by sycamore (*Platinus occidentalis*), goldernrods (*Solidago sp.*), poison ivy (*Rhus radicans*), and scattered persimmon (*Diospyros virginiana*).

At 1400 hrs the site visit team had an additional briefing with Mr. Jerry Goin, the base Pesticide Manager, to further discuss pesticide management applications on the golf course areas. In addition, Mr. Goin described the use of a green inert tracker that is applied with all fertilizer and pesticide applications. e2M also received information regarding mowing and drainage

management. A brief discussion was also held concerning areas that should no longer be mowed. It was suggested that these areas instead be reforested or planted with a less maintenance intensive groundcover (e.g. wildflowers).

The site visit team continued their field survey at 1530 hrs in the utility line corridor on the southwest portion of the base. The corridor is in old field succession and vegetation is probably brush hogged down every few years to maintain the corridor. Evidence of some vernal pools was observed in the area which is predominantly covered by *Solidago sp.*, partridge pea (*Cassia fasciculata*), and bush clover (*Lespedeza ceresia*).

Field surveys continued with confirmation of ecological communities in the lowland floodplain forests adjacent to Big Creek Drainage. It was noted that wetlands in this area need confirmatory delineation in the spring when there is a more abundant presence of indicator species and water. The floodplain forest is dominated by sycamore (*Platinus occidentalis*), cottonwood (*Populus deltoides*), red maple (*Acer rubrum*), and sweet gum (*Liquidambar styraciflua*).

Beaver activity was also noted in the southeast portion of Big Creek Drainage. 3 impoundments were observed on the south side of the levy. Presence of beaver in this area will dramatically decrease the flow of water during major flooding events. e2m will provide recommendations for beaver management as part of the INRMP.

Thursday September 28, 2000

Prior to the NAVSUPPACT Mid-South INRMP Task Force meeting the e2M site visit team attended a briefing held with LCDR McClean and Mr. Rob Williamson. Issues discussed involved reducing grounds maintenance costs, thinning of forestry stands, and potential landuse changes.

The NAVSUPPACT Mid-South INRMP Task Force meeting was held with NAVSUPPACT Mid-South personnel including LCDR McLean, Mr. Rob Williamson, Mr. Roger Aitken, Mr. Bob Sipowich, Ms. Tonya Barker, Mr. Tim Campbell, Chief Gates, and Ms. Sue Miliken. Off-base task force members included Mr. Tim Merritt – USFWS, Mr. Don Miller – Tennessee Wildlife Resources Agency, Mr. Mike Staten – ACOE Mobile District, Mr. Tim Davis – ACOE Memphis District, and Mr. Jim Ferguson – City of Millington Department of Economic Development and Planning. e2M task force members included Mr. Brian Hoppy, Ms. Jayme Melofchik, and Mr. Gino Giumarro.

The meeting began at 1015 hrs in the Public Works Conference Room with an introduction of all members of the task force and proceeded with a review of the INRMP process by Mr. Brian Hoppy. Mr. Hoppy further explained the roles of the members of the task force in regard to the development of the INRMP. Expected participation and roles by task force members include providing technical information for the development of the INRMP to providing assistance to NAVSUPPACT Mid-South in establishing goals and objectives for developing the plan. Mr. Hoppy also described projects which will also be completed in association with the INRMP. These include, an update of GIS layers, an Urban Forestry Management Plan, and a Biological Resources Survey. Further details of the INRMP Task force meeting are found in the NAVSUPPACT Mid-South INRMP Task Force Meeting for Thursday September 28, 2000.

A windshield tour of the base was then provided for all interested task force members. The tour proved to be successful for obtaining information and suggestions from task force members. Since many of the task force members were already familiar with the base, specific issues were addressed during the drive. Areas that were cleared during the BRAC were observed and various changes in landuse were discussed. In addition, the windshield tour stopped at the settlement basins and discussed potential changes to their management. The tour concluded at 1215 and e2M thanked the task force members for their continued support of the INRMP at NAVSUPACT Mid-South.

At 1400 hrs Mr. Sipowich, Mr. Williamson, Ms. Barker, Mr. Giumarro, Ms. Melofchik, and Mr. Hoppy attending an outbriefing with LCDR McClean regarding the Task Force Meeting. Issues from the meeting were summarized and the general positive nature of the meeting and cooperation was noted. Ms. Melofchik departed the Base at 1700 hrs after thanking NAVSUPPACT personnel for their invaluable assistance during the site visit.

Field surveys continued at 1645 hrs near the drainage basins and the Big Creek Drainage. Several wildlife species were observed during the confirmation of the ecological communities. These species are included in Table 1. In addition, the beaver impoundments on the Big Creek Drainage were photo-documented and areas of erosion were noted and photo-documented. The field concluded their activities by photo-documenting urban forestry problem on the Base. Field surveys concluded at 2000 hrs.

Friday September 29, 2000

The site visit team continued confirming ecological communities on the Base. Severe erosion areas on the southwest part of the Base were photo-documented. Recommendations for alternative management of these eroding areas should be included in the development of the INRMP. Mr. Hoppy and Mr. Giumarro thanked Base personnel for all of the support that they provided during this initial data collection period. The site visit ended at 1000 hrs

Conclusions and Recommendations

The e2M site visit team was able to gather a significant amount of information pertaining to the baseline conditions associated with forestry management, wildlife management, grounds maintenance, pesticide use, and general land use. However, several issues will require further investigation or deserve special mention. In addition, the following also provides a preview of some of the management guidelines being developed as part of the Plan:

General Recommendations

- Grounds maintenance activities should be evaluated to determine if open areas and ditches that are currently mowed can be reseeded/replanted with indigenous species. There is significant erosion occurring along ditch lines and erosion control measures could be enhanced by replanting indigenous species and in some areas allowing grasses to grow along the ditches to prevent further erosion.

- A thorough review of pesticide usage and records is recommended in order to determine the amount of pesticide usage. While conducting field surveys, it was noted that a significant amount of blue-green dye that is used to trace pesticide and fertilizer application was present in the golf course ponds/lakes.
- Coordination of forestry management practices with Southdiv personnel should focus on reducing the fuel load that has built up in the forested areas. Prescribed burning may not be a feasible option due to the proximity of forest stands to housing areas. Also, management recommendations should be made for the forested areas where SWMU's exist. A comprehensive quantitative stand density should be conducted on all stands at NAVSUPPACT Mid-South.

Project Recommendations

The following Natural Resource projects are recommended for entry into the ESCRS database and will also be recommended in the INRMP.

- **Soil and Water Conservation**: Includes studies or projects for erosion control, habitat restoration, range management, water conservation, noxious weed, poisonous plant, and exotic species control, native plantings, firebreaks and fuel breaks.

    - Development of an Erosion and Sedimentation (E&S) Control Manual. A review of future land development activities on the installation to assess their impacts to this watershed should be included. The Manual should include a description of the critical slopes on the installation, suggested modifications to storm water management techniques, and an identification of the different soil types present on the installation as described in the Shelby County Soil Survey. Also, a detailed analysis of applicable Federal, state, and local regulatory requirements for E&S control. The plan shall describe how to select, install, and maintain erosion control measures. The Manual should also provide a generic E&S Control Plan for a fictitious land-disturbing site that can be tailored for use at a land-disturbing sites at the installation. Finally, the plan shall discuss the organizational responsibilities of host, tenants, and contractors.

    - Conversion of improved grounds to unimproved grounds. Although there are numerous areas that will be called out/suggested in the INRMP to convert to unimproved acreage, there is one area that can be well described. The mowed/manicured grass area directly south of Building 769 (Wood Hall) should be converted to either additional forest acreage or to a native grass/wildflower field. If the latter is chosen as the desired condition, local University support should be solicited to provide insight into the types of native vegetation that would readily establish in this area of the Installation.

    - Reclamation of the concrete foundations and asphalt parking lots as a result of building demolition activities. Several areas where building have been demolished contain remnant, impervious asphalt parking areas and concrete foundations. The

areas (if warranted) should be re-seeded utilizing a seed mix comprised of locally-adapted varieties of native grass/wildflower species (as described above).

- **Forest Management**: Includes maintenance of forested areas and access roads; forest and stand improvement methods; harvesting and reforestation methods, protection and enhancement of other natural resources.

    - Development of an Urban Forestry Data Base/GIS Mapping. A database should be developed to be used in conjunction with a GIS coverage depicting the locations of individual and stands of urban trees on the Installation. Each urban tree, stand of urban trees, or groups of similar/new plantings should be surveyed, assessed, and catalogued as part of this effort. Information should be gathered and incorporated into the database to include the species type, height, general health, and management needs of the urban trees present on the Installation. Each urban tree, stand of urban trees, or groups of similar/new plantings should be tagged with a unique identification number, and each tree's location should be logged utilizing a global positioning unit for incorporation into an urban tree GIS coverage. In accomplishing this task, the Installation will be able to more readily administer the maintenance of urban trees, and select species for new plantings to increase species diversity on the Installation.

    - Thinning of forested areas. The forested areas need a comprehensive evaluation of stand density before thinning can take place. After this evaluation, the appropriate stocking guide for the ecoregion of western Tennessee can be used to model the appropriate density of trees for the stands. The recommended thinning methodology is selective mechanical thinning rather than prescribed burning. Due to the high density of the understory, suspended needle duff, and the close proximity of on-Base housing prescribed burning does not appear to be a safe alternative as a thinning methodology. Thinning of these areas will improve the health of the timber stands and reduce the potential for a large scale fire events on the installation. However, an evaluation of tree density is needed before the proper management technique can be used. It is possible that prescribed burning may be possible on some stands, but further evaluation is highly recommended.

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

March 27, 2001

Mr. Gino Giumarro
Engineering-Environmental Management, Inc.
1109 East Jefferson Street, Apartment B
Charlottesville, Virginia 22902

Dear Mr. Giumarro:

Thank you for your letter and enclosures of March 5, 2001, concerning the preparation of an Integrated Natural Resources Management Plan and Environmental Assessment for the Naval Support Activity Mid-South in Millington, Shelby County, Tennessee. Fish and Wildlife Service personnel have reviewed the information submitted and offer the following comments.

Endangered species collection records available to the Service do not indicate that federally listed or proposed endangered or threatened species occur within the impact area of the project. We note, however, that collection records available to the Service may not be all-inclusive. Our data base is a compilation of collection records made available by various individuals and resource agencies. This information is seldom based on comprehensive surveys of all potential habitat and thus does not necessarily provide conclusive evidence that protected species are present or absent at a specific locality. However, based on the best information available at this time, we believe that the requirements of Section 7 of the Endangered Species Act of 1973, as amended, are fulfilled. Obligations under Section 7 of the Act must be reconsidered if (1) new information reveals impacts of the proposed action that may affect listed species or critical habitat in a manner not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

Your concern for the protection of endangered species is appreciated. If you have questions, or if we can be of further assistance, please contact Timothy Merritt of my staff at telephone 931/528-6481,ext. 211, or via e-mail at *timothy_merritt@fws.gov*.

Sincerely,

for Lee A. Barclay, Ph.D.
Field Supervisor

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, D.C. 20350-2000

IN REPLY REFER TO

5090
Ser N456/1U595880

DEC 20 2001

From: Chief of Naval Operations
To: Director, Field Support Activity

Subj: FINDING OF NO SIGNIFICANT IMPACT (FONSI) FOR IMPLEMENTATION OF AN INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN (INRMP) FOR NAVAL SUPPORT ACTIVITY (NAVSUPPACT) MID-SOUTH, MILLINGTON, TENNESSEE

Ref: (a) FSA ltr 5090.4 Ser 42/100322 of 14 November 2001
(b) OPNAVINST 5090.1B

Encl: (1) FONSI for Implementation of INRMP for NAVSUPPACT Mid-South

1. An Environmental Assessment (EA) for the subject action was forwarded by reference (a) for review in accordance with reference (b). It has been determined that preparation of an Environmental Impact Statement (EIS) is not required. Accordingly, it is considered that, with implementation of the following paragraph, compliance with the National Environmental Policy Act has been effected and, in this regard, the project may be initiated.

2. The Council on Environmental Quality regulations require public notification of the availability of the EA and of the decision not to prepare an EIS. Enclosure (1) is provided for your use in implementing this requirement, and should be published in local newspapers. Enclosure (1) should also be mailed to any interested parties. Please provide verification of local publication to the Chief of Naval Operations (N456) upon implementation. The EA should be retained in project files for possible future use.

3. Questions regarding this Finding Of No Significant Impact may be directed to Mrs. Agnes Peters at (703) 604-5421.

KIMBERLEY B. DEPAUL
By direction

Copy to:
DASN (E); OLA; CHINFO

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
1875 Century Boulevard
Atlanta, Georgia 30345

In Reply Refer To:
FWS/R4/F

NOV - 7 2001

Mr. William A. Drawdy
Head, Natural Resources Branch
Department of the Navy
Southern Division
Naval Facilities Engineering Command
P.O. Box 190010
North Charleston, South Carolina 29419-9010

Dear Mr. Drawdy:

The Fish and Wildlife Service's Cookeville Field Office and Southeast Regional Office have reviewed the latest revision of the Integrated Natural Resources Management Plan (INRMP) for the Naval Support Activity Mid-South, Millington, Tennessee, and have found that, pursuant to Paragraph (a) (2) of the Sikes Act (16 U.S.C. 670a et seq.), the Service and the facility are now in mutual agreement as to the plan's content.

We are providing this letter as recognition of our mutual agreement with regard to the INRMP. As requested, we are also enclosing a signed Agency Approval Page.

Thank you again for the opportunity to comment on the INRMP for your facility. Your concern for and efforts to protect endangered and threatened species are greatly appreciated. If you have any questions, please feel free to contact me at 404/679-4000 or Mr. Tom Sinclair, Regional Sikes Act Coordinator, at 404/679-7324.

Sincerely yours,

A Dale Hall

for Sam D. Hamilton
Regional Director

Enclosure

TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

September 28, 2001

J. V. Heckmann, Jr.
Commander
Civil Engineer Corps
U.S. Navy
Public Works Officer
5722 Integrity Drive
Millington, TN 38054-5045

re: SIKES ACT COORDINATION OF THE INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN FOR NAVAL SUPPORT ACTIVITY MID-SOUTH, MILLINGTON, TN

Dear Commander Heckmann:

The Tennessee Wildlife Resources Agency has reviewed the Millington Integrated Natural Resources Management Plan that you have provided us for coordination and comment. By this letter we fully support the goals and objectives presented in the plan. Any future management coordination associated with wildlife resources at the facility should be done with our Region 1 Aquatic Habitat Biologist, Mr. Steve Seymour. He can be reached at 200 Lowell Thomas Drive, Jackson, TN 38301; telephone 901/423-5725; FAX 901/423-6483.

Thank you for this opportunity to comment.

Sincerely,

Dan Sherry
Fish & Wildlife Environmentalist

DS/bjs
cc: Steve Seymour
Jerry Strom

STATE OF TENNESSEE
**DEPARTMENT OF ENVIRONMENT AND CONSERVATION**

Division of Natural Heritage
7th Floor L&C Annex
401 Church Street
Nashville, Tennessee 37243
Phone 615/532-0431 Fax 615/532-0046

January 19, 2006

Lisa C. Gandy
Whitenton Group, Inc. Environmental Consultants
13280 Rivercrest Drive
Little Rock, AR 72212

Subject: Project Review: DNH 2006-001; NAVSUPPACT Mid-South Vegetation Survey

Dear Ms. Gandy:

Thank you for your letter and enclosures regarding the above mentioned project in Shelby County. We have reviewed the information submitted and find that rare species have been documented within a 1-mile radius of the project area. These species are listed below and correspond with the locations of the records documented on the attached map (reference 'Species_ID').

| Species_ID | Scientific Name | Common Name | Federal Status | State Status | Global Rank | State Rank |
|---|---|---|---|---|---|---|
| Vertebrate Animal | | | | | | |
| 7837 | *Pituophis melanoleucus melanoleucu* | Northern Pine Snake | | T | G4T4 | S3 |

No rare plant species have been documented within a 1-mile radius of the site. However, rare plants have been documented in the surrounding area. I have attached a separate list of rare species that have been documented within a 4-mile radius of the project area. Consideration for these species should be given, if suitable habitat exists in the project area for these species.

No other natural areas, scenic rivers or ecologically sensitive sites were found to be within the project area. Please keep in mind, however, that not all areas of Tennessee have been surveyed and that a lack of records for any particular area is not a statement that rare species or unique features are absent from that area. For additional information regarding Tennessee's rare and endangered species or interpretation of Status or Ranks, please visit our website at http://www.state.tn.us/environment/nh/.

Thank you for the opportunity to comment on the subject proposal and for considering Tennessee's rare species throughout the planning of this project. Should you have any questions, please do not hesitate to contact me at (615) 532-0440.

Sincerely,
Kirstin Condict, Data Manager

| Vascular Plant | | Federal Status | State Status | Global Rank | State Rank |
|---|---|---|---|---|---|
| *Panax quinquefolius* | American Ginseng | | S-CE | G3G4 | S3S4 |
| *Phacelia ranunculacea* | Blue Scorpion-weed | | S | G4 | S2S3 |
| *Prenanthes crepidinea* | Nodding Rattlesnake-root | | E | G3G4 | S2 |
| **Vertebrate Animal** | | | | | |
| *Ictinia mississippiensis* | Mississippi Kite | | D | G5 | S2S3 |
| *Limnothlypis swainsonii* | Swainson's Warbler | | D | G4 | S3 |
| *Pituophis melanoleucus melanoleucus* | Northern Pine Snake | | T | G4T4 | S3 |

## Swain

| Vascular Plant | | Federal Status | State Status | Global Rank | State Rank |
|---|---|---|---|---|---|
| *Abies fraseri* | Fraser Fir | | T | G2 | S1S2 |
| **Vertebrate Animal** | | **Federal Status** | **State Status** | **Global Rank** | **State Rank** |
| *Desmognathus wrighti* | Pigmy Salamander | | D | G3G4 | S2 |
| *Glaucomys sabrinus coloratus* | Carolina Northern Flying Squirrel | LE | E | G5T1 | S1 |
| **Others** | | **Federal Status** | **State Status** | **Global Rank** | **State Rank** |
| *Bazzania nudicaulis* | A Liverwort | | T | G2G3 | S2 |
| *Leptodontium excelsum* | Grandfather Mountain Leptodontium | | E | G2 | S1S2 |
| *Leptoscyphus cuneifolius* | A Liverwort | | E | G4G5 | S1 |
| *Plagiochila corniculata* | A Liverwort | | S | G4? | S1S2 |
| *Sphenolobopsis pearsoni* | Sphenolobopsis | | E | G2? | S1 |

## Tipton

| Vascular Plant | | Federal Status | State Status | Global Rank | State Rank |
|---|---|---|---|---|---|
| *Acmella oppositifolia* | Creeping Spot-flower | | S | G5 | S2 |
| *Agalinis auriculata* | Earleaved False-foxglove | | E | G3 | S2 |
| *Carex oxylepis var. pubescens* | Hairy Sharp-scaled Sedge | | S | G5?T3 | S1 |
| *Carex reniformis* | Reniform Sedge | | S | G4? | S1 |
| *Hydrastis canadensis* | Goldenseal | | S-CE | G4 | S3 |
| *Panax quinquefolius* | American Ginseng | | S-CE | G3G4 | S3S4 |
| *Panicum ensifolium* | Small-leaved Panicgrass | | S | G4 | S2 |
| *Phacelia ranunculacea* | Blue Scorpion-weed | | S | G3G4 | S2S3 |
| *Prenanthes crepidinea* | Nodding Rattlesnake-root | | E | G3G4 | S2 |
| *Schisandra glabra* | Red Starvine | | T | G3 | S2 |
| **Invertebrate Animal** | | **Federal Status** | **State Status** | **Global Rank** | **State Rank** |
| *Obovaria jacksoniana* | Southern Hickorynut | | | G1G2 | S1 |
| *Villosa vibex* | Southern Rainbow | | | G4Q | S2 |
| **Vertebrate Animal** | | **Federal Status** | **State Status** | **Global Rank** | **State Rank** |
| *Ammocrypta beani* | Naked Sand Darter | | D | G5 | S2 |
| *Ammocrypta vivax* | Scaly Sand Darter | | D | G5 | S2 |
| *Cycleptus elongatus* | Blue Sucker | | T | G3G4 | S2 |
| *Ictinia mississippiensis* | Mississippi Kite | | D | G5 | S2S3 |
| *Macrhybopsis gelida* | Sturgeon Chub | | D | G3 | S1 |
| *Macroclemys temminckii* | Alligator Snapping Turtle | | D | G3G4 | S2S3 |
| *Notropis dorsalis* | Bigmouth Shiner | | D | G5 | S1 |
| *Noturus stigmosus* | Northern Madtom | | D | G3 | S3 |
| *Sistrurus miliarius streckeri* | Western Pigmy Rattlesnake | | T | G5T5 | S2S3 |
| *Sterna antillarum athalassos* | Interior Least Tern | LE | E | G4T2Q | S2S3B |

## Shelby

| Vascular Plant | | Federal Status | State Status | Global Rank | State Rank |
|---|---|---|---|---|---|
| *Acmella oppositifolia* | Creeping Spot-flower | | S | G5 | S2 |
| *Aster praealtus* | Willow Aster | | E | G5 | S1 |
| *Crataegus harbisonii* | Harbison's Hawthorn | | E | G1 | S1 |
| *Hydrastis canadensis* | Goldenseal | | S-CE | G4 | S3 |
| *Iris fulva* | Copper Iris | | T | G5 | S2 |
| *Ophioglossum crotalophoroides* | Bulbous Adder's-tongue | | S | G5 | SH |
| *Panax quinquefolius* | American Ginseng | | S-CE | G3G4 | S3S4 |
| *Penstemon tubiflorus* | Small-flowered Beardtongue | | S | G5 | S1 |
| *Phacelia ranunculacea* | Blue Scorpion-weed | | S | G3G4 | S2S3 |
| *Prenanthes crepidinea* | Nodding Rattlesnake-root | | E | G3G4 | S2 |
| *Schisandra glabra* | Red Starvine | | T | G3 | S2 |
| *Silene ovata* | Ovate Catchfly | | E | G2G3 | S2 |
| *Ulmus crassifolia* | Cedar Elm | | S | G5 | S2 |

| Invertebrate Animal | | Federal Status | State Status | Global Rank | State Rank |
|---|---|---|---|---|---|
| *Lampsilis siliquoidea* | Fatmucket | | | G5 | S2 |
| *Obovaria jacksoniana* | Southern Hickorynut | | | G1G2 | S1 |
| *Triodopsis multilineata* | Striped Whitelip (=t. Webbhelix) | | | GNR | S1 |

| Vertebrate Animal | | Federal Status | State Status | Global Rank | State Rank |
|---|---|---|---|---|---|
| *Ammocrypta beani* | Naked Sand Darter | | D | G5 | S2 |
| *Chondestes grammacus* | Lark Sparrow | | T | G5 | S1B |
| *Corynorhinus rafinesquii* | Eastern Big-eared Bat | | D | G3G4 | S3 |
| *Cycleptus elongatus* | Blue Sucker | | T | G3G4 | S2 |
| *Dendroica cerulea* | Cerulean Warbler | | D | G4 | S3B |
| *Haliaeetus leucocephalus* | Bald Eagle | LT | D | G4 | S3 |
| *Hyla gratiosa* | Barking Treefrog | | D | G5 | S3 |
| *Ictinia mississippiensis* | Mississippi Kite | | D | G5 | S2S3 |
| *Limnothlypis swainsonii* | Swainson's Warbler | | D | G4 | S3 |
| *Macroclemys temminckii* | Alligator Snapping Turtle | | D | G3G4 | S2S3 |
| *Myotis sodalis* | Indiana Bat | LE | E | G2 | S1 |
| *Neotoma floridana illinoensis* | Eastern Woodrat | | D | G5T5 | S3 |
| *Notarus stigmosus* | Northern Madtom | | D | G3 | S3 |
| *Ophisaurus attenuatus longicaudus* | Eastern Slender Glass Lizard | | D | G5T5 | S3 |
| *Pituophis melanoleucus melanoleucus* | Northern Pine Snake | | T | G4T4 | S3 |
| *Sorex longirostris* | Southeastern Shrew | | D | G5 | S4 |
| *Sterna antillarum athalassos* | Interior Least Tern | LE | E | G4T2Q | S2S3B |
| *Thryomanes bewickii* | Bewick's Wren | | E | G5 | S1 |
| *Tyto alba* | Common Barn-owl | | D | G5 | S3 |
| *Vireo bellii* | Bell's Vireo | | | G5 | SHB |

# APPENDIX C

# NAVSUPPACT Mid-South
# Natural Resources Database

| *Plans* | |
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| *Naval Support Activity Mid-South, Millington, Tennessee* | Installation Map. Current as of 2019. |
| *Facility Action Plan for IR sites* | Current as of 2015. |
| *Pest Management Plan Planned Pesticide Use Sheets, Authorized Pesticide Change List, Change Sheet for Approved Changes in the Pest Management Plan* | Current as of 2016. |
| *Stormwater Management Plan* | Current as of 2020. |
| *Wetlands Maps* | Current as of 2013. |
| ***Federal Public Laws and Executive Orders*** | |
| *National Defense Authorization Act of 1989, P.L. 101-189; Volunteer Partnership Cost-Share Program* | Amends two acts and establishes volunteer and partnership programs for natural and cultural resources management on DoD lands. |
| *Defense Appropriations Act of 1991, P.L. 101-511; Legacy Resource Management Program* | Establishes a program for the stewardship of biological, geophysical, cultural, and historic resources on DoD lands. |
| *EO 11988, Floodplain Management* | Provides direction regarding actions of Federal agencies in floodplains, and requires permits from state and Federal review agencies for any construction within a 100-year floodplain. |
| *EO 11990, Protection of Wetlands* | • Requires Federal agencies to avoid undertaking or providing assistance for new construction located in wetlands unless there is no practicable alternative, and all practicable measures to minimize harm to wetlands has been implemented.<br>• Each Agency shall take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities. |
| *EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds* | This EO directs executive departments and agencies to take certain actions to further implement the Migratory Bird Treaty Act. The EO requires Federal agencies taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement a Memorandum of Understanding with the USFWS that promote the conservation of migratory bird populations. |
| *EO 11644, Use of Off-Road Vehicles on Public Lands* | The purpose of this EO to establish policies and provide for procedures that will ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands. |
| *EO 13112, Exotic and Invasive Species* | To prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. |
| *EO 11987, Exotic Organisms* | Agencies shall restrict the introduction of exotic species into the natural ecosystems on lands and waters which they administer. |

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| *EO 11514, Protection and Enhancement of Environmental Quality* | Federal agencies shall initiate measures needed to direct their policies, plans, and programs to meet national environmental goals. They shall monitor, evaluate, and control agency activities to protect and enhance the quality of the environment. |
| *EO 11593, Protection and Enhancement of the Cultural Environment* | All Federal agencies are required to locate, identify, and record all cultural and natural resources. Cultural resources include sites of archaeological, historical, or architectural significance. Natural resources include the presence of endangered species, critical habitat, and areas of special biological significance. |
| *EO 12088, Federal Compliance With Pollution Control Standards.* | This EO delegates responsibility to the head of each executive agency for ensuring that all necessary actions are taken for the prevention, control, and abatement of environmental pollution. This order gives the Environmental Protection Agency authority to conduct reviews and inspections to monitor Federal facility compliance with pollution control standards. |
| *EO 12898, Environmental Justice* | This EO requires certain Federal agencies, including the DoD, to the greatest extent practicable permitted by law, to make environmental justice part of their missions by identifying and addressing disproportionately high and adverse health or environmental effects on minority and low-income populations. |
| *EO 13148, Greening the Government through Leadership in Environmental Management* | This EO makes it a high priority to ensure that all necessary actions are taken to integrate environmental accountability into agency day-to-day decision-making and long-term planning processes, across all agency missions, activities, and functions. |
| *EO 13045, Protection of Children from Environmental Health and Safety Risks* | This EO makes it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children. It also directs agencies to ensure that policies, programs, activities, and standards address such risks if identified. |
| ***United States Codes*** | |
| *National Environmental Policy Act of 1969 (NEPA), as amended; P.L. 91-190, 42 U.S.C. 4321 et seq.* | Requires Federal agencies to utilize a systematic approach when assessing environmental impacts of government activities. Sometimes referred to as the mother of environmental impact statement. NEPA proposes an interdisciplinary approach in a decision-making process designed to identify unacceptable or unnecessary impacts to the environment. |
| *Conservation Programs on Military Installations (Sikes Act), as amended; P.L. 86-797, U.S.C. 670(a) et seq.* | Requires Federal military installations with adequate wildlife habitat to implement cooperative agreements with other agencies and develop long-range integrated natural resources management plans. Thereby, it is appropriate to manage natural resources for multipurpose uses and provide the public access to those uses to the extent consistent with the military mission. The act also sets guidelines for the collection of fees for the use of natural resources such as hunting and fishing. |

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| *The Sikes Act, 16 U.S.C. 670 and PL 86-797* | The Sikes Act requires all DoD lands be managed for multiple uses and that integrated natural resource management plans be developed for all military installations which contain land and water areas suitable for the conservation and management of fish and wildlife resources. |
| *Endangered Species Act of 1973, as amended; P.L. 93-205, 16 U.S.C. 1531 et seq.* | Protects threatened, endangered, and candidate species of fish, wildlife, and plants and their designated critical habitats. Under this law, no Federal action is allowed to jeopardize the continued existence of an endangered or threatened species. The Endangered Species Act (ESA) also requires consultation with the USFWS and the National Marine Fisheries Service and the preparation of a biological assessment when such species are present in an area that is affected by government activities. |
| *Migratory Bird Treaty Act 16 U.S.C. 703-712* | The Migratory Bird Treaty Act implements various treaties and for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful. |
| *Federal Noxious Weed Act of 1974, 7 U.S.C. 2801-2814* | The Act provides for the control and management of nonindigenous weeds that injure or have the potential to injure the interests of agriculture and commerce, wildlife resources, or the public health. |
| *Leases: Non-excess Property of Military Departments, 10 U.S.C. 2667, as amended* | Authorizes DoD to lease to commercial enterprises Federal land that is not currently needed for Public use. Covers agricultural outleasing program. |
| *Federal Land Use Policy and Management Act, 43 U.S.C. 1701-1782* | Requires management of public lands to protect the quality of scientific, scenic, historical, ecological, environmental, and archaeological resources and values; as well as to preserve and protect certain lands in their natural condition for fish and wildlife habitat. This act also requires consideration of commodity production such as timbering. |
| *Clean Air Act, 42 U.S.C. 7401-7671q, July 14, 1955, as amended* | This Act, as amended, is known as the Clean Air Act of 1970. The amendments made in 1970 established the core of the clean air program. The primary objective is to establish Federal standards for air pollutants. It is designed to improve air quality in areas of the country which do not meet Federal standards and to prevent significant deterioration in areas where air quality exceeds those standards. |
| *Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. 1251-1387* | The Clean Water Act is a comprehensive statute aimed at restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. Primary authority for the implementation and enforcement rests with the U.S. Environmental Protection Agency (EPA). |
| *Sale of certain interests in land; logs 10 U.S.C. 2665* | Authorizes sale of forest products and reimbursement of the costs of management of forest resources. |

| *Department of Defense (DOD) Policy, Directives and Instructions* | |
|---|---|
| *DoD Directive 4700.4, Natural Resources Management Program* | Requires that the Department of Navy implement and maintain a balanced and integrated program for the management of natural resources. |
| *DoD Directive 4715.1, Environmental Security* | Establishes policy for protecting, preserving, and (when required) restoring and enhancing the quality of the environment. This directive also ensures that environmental factors are integrated into DoD decision-making processes that may impact the environment, and are given appropriate consideration along with other relevant factors. |
| *DoDI 4715.3, Environmental Conservation Program* | Implements policy, assigns responsibility, and prescribes procedures under *DoD Directive* 4715.1 for the integrated management of natural and cultural resources on property under DoD control. |
| *Department of Navy Instructions* | |
| *Secretary of the Navy Instruction (SECNAVINST) 6240.6E, Environmental Protection and Natural Resources* | Assigns responsibility to the CNO and the Commandant of the Marine Corps for the development and implementation of natural resources programs on all land and water areas under the jurisdiction of the Department of Navy. |
| *OPNAVINST 5090.1E, Environmental Readiness Program Manual* | • Establishes broad policy and assigns responsibilities for the Naval Natural Resources Program. Naval Facilities Engineering Command is assigned overall program management responsibility with authority to establish, coordinate, and promulgate the program; to issue appropriate instructions to the Navy installations for implementation of the various natural resources programs; and to provide professional natural resources services and technical assistance, through Engineering Field Activities, to Navy and Marine Corps Installations. It also directs major claimants and intermediate commands to ensure that subordinate commands support natural resources programs on installations under their control. Installation Commanding Officers are tasked with:<br>• Requesting and using technical assistance from the appropriate EFA in developing and maintaining an effective natural resources program.<br>• Providing funding to ensure adequate support of the natural resources program.<br>• Applying practices set forth in approved natural resources management plans.<br>• Assigning specific responsibilities, centralized supervision, and qualified personnel to the natural resources program. |

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| *NAVFAC INST P-73, Volume II, Natural Resources Management Procedure Manual* | Establishes the governing format under which the INRMP is structured. This document addresses all CNO natural resources program requirements. |

| *Department of Defense Policy, Directives and Instructions* | |
|---|---|
| *DoD Directive 4700.4, Natural Resources Management Program* | Requires that the DoD implement and maintain a balanced and integrated program for the management of natural resources. |
| *DoD Directive 4715.1, Environmental Security* | Establishes policy for protecting, preserving, and (when required) restoring and enhancing the quality of the environment. This directive also ensures that environmental factors are integrated into DoD decision-making processes that may impact the environment, and are given appropriate consideration along with other relevant factors. |
| *DoDI 4715.3, Environmental Conservation Program* | Implements policy, assigns responsibility, and prescribes procedures under *DoD Directive* 4715.1 for the integrated management of natural and cultural resources on property under DoD control. |

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# APPENDIX D

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