

FINAL

**INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN  
(INRMP)**

**FOR**

**JOINT BASE ANDREWS – NAVAL AIR FACILITY**

**PRINCE GEORGE'S AND ANNE ARUNDEL COUNTIES, MARYLAND**



**NOVEMBER 2014**

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**UPDATED**  
**INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN**  
**JOINT BASE ANDREWS – NAVAL AIR FACILITY (JBA)**  
**ANNE ARUNDEL AND PRINCE GEORGE'S COUNTIES, MARYLAND**  
**SIGNATURE PAGE**

This Integrated Natural Resources Management Plan (INRMP) is an update of the 2007 INRMP that has been reviewed for operation and effect and recommended for update and continued implementation. It meets the requirements for INRMPs per Air Force policy, meets the intent of the Sikes Act, as amended (16 United States Code [USC] §670a et seq.), and contributes to the management of natural resources on military installations.

To the extent that resources permit, the United States Fish and Wildlife Service, Maryland Department of Natural Resources; and the 11<sup>th</sup> Wing by signature of their agency representative, do hereby enter into a cooperative agreement for the conservation, protection, and management of natural resources in the public interest. This agreement may be modified and amended by mutual agreement of the authorized representatives of the three agencies. This agreement will become effective upon the date of the last signatory and shall continue in full force until terminated by written notice to the other parties, in whole or in part, by any of the parties signing this agreement.

By their signatures below, or an enclosed letter of concurrence, all parties grant their concurrence with and acceptance of the following document.

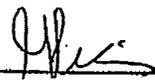
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8 May 2015

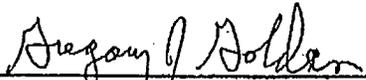
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## Chapter 1

### EXECUTIVE SUMMARY

The Integrated Natural Resources Management Plan (INRMP) is the primary guidance document for managing natural resources at Joint Base Andrews - Naval Air Facility (JBA). This INRMP addresses natural resource management for JBA, including the Main Base and the two Geographically Separated Units (GSUs), Brandywine Receiver Station and Davidsonville Transmitter Station. JBA encompasses approximately 6,877 acres, and its primary purpose is providing contingency operations in the Nation's Capital with immediate response rotary-assets.

The Sikes Act Improvement Act (SAIA) of 1997 (16 United States Code §670 et seq. as amended) requires military installations with significant natural resources to develop an INRMP and implement cooperative agreements with other agencies, while supporting the military mission. An INRMP is required for JBA because threatened and endangered species have been identified, and JBA performs limited fish and wildlife management; has natural resources based outdoor recreation; and conducts on-the-ground military operations.

This INRMP is an update and reorganization of the 2012 JBA INRMP and is the result of a review for operation and effect done by the United States Fish and Wildlife Service (USFWS) and the Maryland Department of Natural Resources (MD DNR). The review resulted in the desire of the cooperating agencies to update and continue implementing the existing INRMP. No substantive changes were made to the management programs and philosophies or the goals, objectives, and implementation projects, and this INRMP is compliant with SAIA, DoD and Air Force policy.

Specific goals identified in the JBA INRMP are:

- **Goal 1:** Manage natural resources in a manner that is compatible with and supports the military mission while complying with applicable federal and state laws and United States Air Force (USAF) regulations and policies.
- **Goal 2:** Maintain fish and wildlife populations while minimizing potential impacts to the military mission.
- **Goal 3:** Manage rare species using an ecosystem approach, while maintaining the military mission.
- **Goal 4:** Manage vegetation using sustainable and cost effective methods without negatively impacting the mission.
- **Goal 5:** Minimize impacts of invasive and pest species, while minimizing use of chemicals to manage those species, using an integrated management approach.

- **Goal 6:** Protect water resources and minimize impacts to coastal resources consistent with state and federal laws pertaining to water resources.

These goals are supported by objectives and projects, as well as management strategies and actions required to achieve these goals. This updated INRMP provides a description of JBA and its military mission, environment, natural resources and their management. The implementation of this INRMP will ensure successful support of the military mission at JBA while promoting adaptive ecosystem management to sustain ecosystem and biological integrity and also provide for multiple uses of areas with natural resources.

## Chapter 2

### GENERAL INFORMATION

#### 2.1 PURPOSE

The Integrated Natural Resources Management Plan (INRMP) is the primary guidance document and tool for managing natural resources at Joint Base Andrews – Naval Air Facility (JBA). Including the two Geographically Separated Units (GSUs), JBA includes approximately 6,877 acres of federally owned land under the command of the Air Force District of Washington (AFDW) in Prince George’s and Anne Arundel Counties in southwestern Maryland.

The management of JBA must be conducted in a way that provides for sustainable, healthy ecosystems, complies with applicable environmental laws and regulations, and provides for no net loss in the capability of military installation lands to support the military mission of the installation. Installation commanders can use INRMPs to manage natural resources more effectively to ensure that installation lands remain available and in good condition to support the military mission over the long term.

An INRMP is required to be consistent with the Sikes Act Improvement Act (SAIA) of 1997, 16 USC §670a et seq., as amended, and Department of Defense (DoD) Instruction 4715.03, Natural Resources Conservation Program. This INRMP is also intended to be consistent with Air Force Instruction (AFI) 32-7064, Integrated Natural Resources Management.

This INRMP is an updated version of the 2012 JBA INRMP. Previous INRMPs for JBA were prepared in 2001, 1997, 2007, and 2012. A review of the 2012 document for operation and effect was completed by all required parties and determined that only a minor update, rather than a full revision, is required since there are no military mission changes, no program or management philosophy changes, and no input was received from the United States Fish and Wildlife Service (USFWS) or Maryland Department of Natural Resources (MD DNR) that resulted in changes to the manner in which natural resources are managed at JBA.

Based on the desire to update the INRMP, the 11th Civil Engineering Squadron/Civil Engineering Asset Management (11 CES/CEIE) updated and reorganized the plan in accordance with the DoD INRMP Template. The DoD INRMP Template was used to ensure the plan content would meet Air Force and DoD requirements into the future. The template provides an easy to follow and logical organization for the INRMP.

#### 2.2 AUTHORITY

The SAIA requires federal military installations with natural resources requiring protection and management to develop a long-range INRMP and implement cooperative agreements with other agencies.

DoDI 4715.03, *Natural Resources Conservation Program*, dated 18 March 2011, identifies the DoD policies and procedures concerning natural resources management and

INRMP reviews, public comment, and endangered species consultation. Key requirements are as follows:

- INRMPs are required to be jointly reviewed by the USFWS, state conservation agency, and military proponent for operation and effect on a regular basis, but not less often than every five years.
- Minor updates and continued implementation of an existing INRMP do not require an opportunity for public comment. Major revisions to an INRMP do require an opportunity for public review.

AFI 32-7064, *Integrated Natural Resources Management*, dated 17 September 2004, and certified current on 11 April 2014, provides guidance on how the United States Air Force (USAF) implements the SAIA. This is a general guidance document on the purpose, development, implementation, and update/revision of INRMPs. Key points include the following:

- INRMPs are to be developed jointly with the USFWS and state conservation agency.
- INRMPs shall support an installation's military mission.
- The review process emphasizes the need for joint annual reviews and review for operation and effect no less than every five years. The guidance also indicates that the review for operation and effect will determine if a revision is required. A revision is not required if the cooperating agencies agree that an INRMP is meeting the intent of the SAIA. Instead, the INRMP can be updated as necessary and implementation continued.

In addition to complying with these three fundamental INRMP regulations, this updated INRMP has been prepared pursuant to applicable federal, state, local, and USAF laws, regulations and policies that pertain to natural resources management on military land.

A Programmatic Environmental Assessment (Programmatic EA) of the 2001 JBA INRMP was completed due to the fact that a Programmatic EA was not prepared for the 1997 INRMP. The Programmatic EA fulfills the requirements of the National Environmental Policy Act (NEPA). The 2001 INRMP Programmatic EA presented the Preferred Alternative (implementation of the INRMP) and other alternatives, summarized the affected environment, and assessed the environmental consequences of INRMP implementation. It concluded that implementation of the INRMP under the Preferred Alternative would not result in any negative cumulative impacts to the environment. A Finding of No Significant Impact (FONSI) was signed by JBA. As was expressed in the 2007 INRMP update, revisions made to this INRMP are considered to be minor, and implementation is continuation of the Preferred Alternative identified in the Programmatic EA for the 2001 JBA INRMP. As such, the 2001 INRMP Programmatic EA and the FONSI are valid for the updated INRMP and new NEPA analysis has not been conducted. Individual actions or projects that have the potential to impact the environment will be analyzed according to the NEPA process.

### 2.3 RESPONSIBILITIES

The INRMP has been organized to ensure the implementation of year-round, cost-effective management activities and projects that meet the requirements of JBA. The 11 CES/CEIE Natural Resource Manager is responsible for coordinating INRMP implementation and annual reviews. Various organizations on JBA that are responsible for the implementation of the INRMP are shown in Table 1.

Table 1. JBA Organizations Responsible for INRMP Implementation				
Wing	Group	Squadron	Flight Staff	Responsibilities
11th	Wing Staff		Wing Commander	INRMP Signature Authority Chairman, Facility Board
			Vice-Wing Commander	Chairman, Environmental Safety and Occupational Health Committee
			Judge Advocate	Regulatory Interpretation Off-Base Dispute/Complaint Resolution Legal Representation
				Public Affairs
	Mission Support Group	Civil Engineering	Engineering, Programming and Design	Project Programming, Management and Design Landscaping Specifications for New Construction
			Operations	Oil/Water Separator Maintenance General Grounds Maintenance Pest Management Wildlife Management/Deer Depredation Airfield Grounds Maintenance (Mowing) Clear Zone Tree Removal BASH Monitoring and Minimization
			Asset Management	Base General Plan Environmental Impact Assessment Process Stormwater/Erosion Control Forest Management Wildlife Management Oversight Hazardous Materials Management Environmental Restoration Program Air Quality Monitoring/Compliance Water Quality Compliance Wetlands Management Pollution Prevention Grounds Maintenance in Dormitory Areas
		Force Support	Community Services	Golf Course Grounds Maintenance Nature Education/Outdoor Recreation Activities Family Camp Outdoor Recreation Equipment Rental/Check Out Yuma Nature Trail Maintenance
	Security Forces Group	Security Police		Installation Security Hunting/Fishing Law Enforcement

89th	Air Wing		Flight Safety	BASH Management, Monitoring and Minimization (On and Off Base)
79th	Medical Wing		Bioenvironmental Engineer	NPDES Stormwater Quality Monitoring Wastewater Quality Monitoring
			Military Public Health	Zoonosis Monitoring Mosquito and Tick Surveillance

### 2.3.1 Other Organizations

The USFWS and MD DNR provide technical assistance to JBA and are partners in the development and review of this INRMP. Specifically, these agencies will alert the 11 CES/CEIE personnel whenever new species that have the potential for inhabiting JBA are added to the federal or state endangered species lists. In addition, these agencies support 11 CES/CEIE personnel during scheduled wildlife and vegetation surveys. The USFWS and MD DNR also support specific management recommendations and projects to support implementation of this INRMP.

## 2.4 MANAGEMENT PHILOSOPHY

Projects, activities, new development and mission changes are reviewed by multiple entities within JBA. Projects and activities that might impact natural resources are reviewed by 11 CES/CEIE personnel to ensure that planning decisions reflect environmental values, avoid delays later in the process, and head off potential conflicts. Air Force Policy Directive (AFPD) 32-70, *Environmental Quality*, states that the USAF will comply with applicable Federal, State, and local environmental laws and regulations, including NEPA. The USAF's implementing regulation for NEPA is the Environmental Impact Analysis Process (EIAP; 32 CFR 989). EIAP is used to identify projects and activities that might impact natural resources and to help project planners resolve environmental issues early in the planning process. The 11 CES/CEIE Environmental Planning Function (EPF) has primary responsibility for EIAP implementation at JBA. If there are additional environmental compliance requirements, 11 CES/CEIE members facilitate any required consultation or permit applications.

### 2.4.1 Environmental Awareness

The primary means of environmental awareness at JBA is the 11 CES/CEIE Office, which coordinates with other entities on the base, outside regulatory agencies, and the community. In addition, the Outdoor Recreation office is responsible for initiating and implementing outreach for environmental awareness and programs, including nature education and outdoor recreation programs on the Main Base and the GSUs.

### 2.4.2 Sustainability Challenges

The goal of natural resources management at JBA is to support the military mission by (1) providing for sustained use of its land, water, and air resources; (2) protecting

valuable natural resources for future generations; (3) meeting all legal requirements; (4) promoting compatible multiple uses of those resources; and (5) achieving efficiencies and other savings by partnering with interested stakeholders.

## **2.5 CONDITIONS FOR IMPLEMENTATION**

The Office of Management and Budget considers funding for the preparation and implementation of this INRMP, as required by the Sikes Act, to be a high priority. However, the reality is that not all of the projects and programs will receive immediate funding. Projects need to be funded consistent with timely execution to meet future deadlines. Projects are generally prioritized with respect to compliance. Highest priority projects are projects related to recurring or current compliance, and these are generally scheduled earliest. As such, these projects have been placed into three priority-based categories:

- (1) **High priority projects** which are essential for maintaining compliance or for successful natural resources management;
- (2) **Medium priority projects** with no immediate compliance requirement or less impact on the natural resource; and
- (3) **Low priority projects** with a natural resources benefit but no legal driver.

The prioritization of the projects is based on need, legal drivers, and ability to further implementation of the INRMP.

### **2.5.1 Implementation Review**

Not less than every five years, the INRMP will be reviewed for operation and effect to determine if, as required by the SAIA, the INRMP is being implemented and is contributing to the management of natural resources at JBA. The review will be conducted by the three cooperating parties to include the Wing Commander responsible for the INRMP, the Regional Director or Supervisor of the Chesapeake Bay Field Office for the USFWS, and the Senior Review Manager for the MD DNR. While these are the responsible parties, technical personnel generally conduct the review.

The review for operation and effect will either conclude that the INRMP is meeting the intent of the SAIA and it can be updated and implementation can continue; or that it is not effective in meeting the intent of the SAIA to conserve natural resources while providing for no net loss in mission capability and it must be revised. The conclusion of the review will be documented in a jointly executed memorandum, meeting minutes, or in some other way that reflects mutual agreement.

If only updates are needed, they will be done in a manner agreed to by all parties. The updated INRMP will be reviewed by a local Supervisor for the Chesapeake Bay Field Office (USFWS), and the Senior Review Manager for the MD DNR. Once concurrence letters or signatures are received from USFWS Field Office and the MD DNR, the update of the INRMP will be complete and implementation will continue.

If a review of operation and effect concludes that an INRMP must be revised, there is no set time to complete the revision. The existing INRMP remains in effect until the revision is complete and USFWS and MD DNR concurrence on the revised INRMP is received. The 11 CES/CEIE will endeavor to complete such revisions within 18 months depending upon funding availability. Revisions to the INRMP will go through a more detailed review process similar to development of the initial INRMP to ensure JBA military mission, USFWS, and MD DNR concerns are adequately addressed and the plan meets the intent of the SAIA.

### 2.5.2 Method of Analysis

AFI 32-7001, *Environmental Management*, dated 4 November 2011, establishes the framework for an Environmental Management System (EMS) at installations. The EMS addresses organizational structure, planning, responsibilities, practices, procedures and processes, and resource allocation for developing, implementing, achieving, reviewing, and maintaining environmental commitments. The International Standards Organization (ISO) 14001 EMS model used by the DoD leads to continual improvement based upon a cycle of “plan, do, check, act”:

- Planning, including identifying environmental aspects and establishing goals [plan];
- Implementing, including training and operational controls [do];
- including monitoring and corrective action [check]; and
- Reviewing, including progress reviews and acting to make needed changes to the EMS [act].

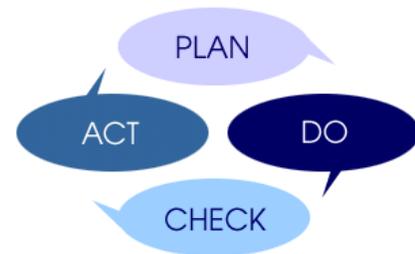


Figure 1  
EMS Process from EPA.

The EMS is continually updated through this cycle, fine-tuning the management of operations that may harm the environment. This continual improvement cycle is a fundamental attribute of the EMS that allows the system to adapt to the dynamic nature of the organization’s operations. The INRMP process is an integral part of the EMS process: develop an INRMP that identifies specific actions, implement the plan and actions, conduct annual and 5-year reviews to monitor implementation, and modify plans accordingly.

This INRMP will be used to directly support JBA’s EMS. Annual review of the INRMP in conjunction with the USFWS and MD DNR will be conducted as part of the EMS.

### 2.5.3 Integration with Other Plans

By its nature, an INRMP is multidisciplinary and provides the summary of natural resources at a specific installation. As a result, information from an INRMP is incorporated into other plans, and other plans help to identify management priorities and

potential impacts to natural resources. The INRMP is integrated with a number of other JBA plans, including:

1. General Plan Update for Joint Base Andrews–Naval Air Facility, Washington, Maryland (General Plan Update, 2010)
2. Joint Base Andrews Instruction 91-212: Bird/Wildlife Strike Hazard Program (BASH, 2010)
3. Stormwater Pollution Prevention Plan for Joint Base Andrews (SWPPP, 2011)
4. Integrated Pest Management Plan (IPMP, 2008)
5. Andrews NAF Arbor Plan (Arbor Plan, 2011)
6. Installation Complex Encroachment Management Action Plan (ICEMAP)

## Chapter 3

### INSTALLATION OVERVIEW

#### 3.1 LOCATION AND AREA

JBA is located in Maryland and is within the greater Washington, D.C. metropolitan area. It encompasses three distinct parcels of federal land: the Main Base and two Geographically Separated Units (GSUs), the Brandywine Receiver Station and Davidsonville Transmitter Station (Figure 2).

Figure 2.  
Location Map

The Main Base encompasses 4,346 acres located approximately five miles southeast of Washington, D.C. in central Prince George's County, Maryland. The Capital Beltway (I-495 / I-95) is adjacent to the base's western boundary. The base has two parallel runways and is home to Air Force One. It is the main port of entry for foreign military and government officials en route to Washington.

The two GSU's are outlying sites for communications facilities. Brandywine Receiver Station includes 1,635 acres in the Brandywine community, an unincorporated area in southern Prince George's County. The station is approximately 6.5 miles south of the Main Base. The Davidsonville Transmitter Station is 852 acres located approximately 12.5 miles northeast of the Main Base in Davidsonville, an unincorporated area in western Anne Arundel County, Maryland. The Patuxent River defines the western border of the site.



#### 3.2 INSTALLATION HISTORY

The history of military activity at JBA dates back to the Civil War when the Union occupied a small country church as its headquarters for soldiers camped nearby. Today, that church is known as Chapel Two, and the base community still uses it for worship services. In 1942, President Franklin D. Roosevelt authorized acquisition of land to construct a military airfield on the present site of the Main Base. In April 1943, the Camp Springs Army Air Field became operational.

Camp Springs became Andrews Field in 1945, and shortly after the Air Force became a separate service in 1947, the base's name changed to Andrews Air Force Base (AFB). In 1962 Andrews AFB officially became the “Home of Air Force One” after President John F. Kennedy’s official aircraft, a C-118, permanently transferred from Washington National Airport. In 1966 the 89th Airlift Wing (“The President’s Wing”) began operations at Andrews AFB. It continues to be the elite Air Mobility Command wing for transporting VIPs around the world.

In 2005 the Air Force reactivated the Air Force District of Washington (AFDW), resulting in the 2006 combination of the 89th Medical Group (Andrews AFB) and the 11th Medical Group (Bolling AFB, Washington, D.C.) into the 79th Medical Wing. Also in 2006, the 316th Wing was activated as the new host unit for Andrews AFB, and in 2007 the AFDW, as well as the 844th Communications Group, transferred from Bolling AFB to Andrews AFB.

In 2009 Andrews AFB, along with Naval Air Facility Washington, became a joint base known as Joint Base Andrews - Naval Air Facility Washington, or Joint Base Andrews. In 2010 the 316th Wing was inactivated and the 11th Wing, formerly the host wing at Bolling Air Force Base, was re-designated the host wing at JBA.

The 11th Wing and several partner units are located on the Main Base. Table 2 summarizes the major units and their functions.

<b>Table 2. Major Units and Functions at JBA</b>	
<b>Unit</b>	<b>Key Functions</b>
11 <sup>th</sup> Wing (11 WG)	The 11th Wing is the host wing for Joint Base Andrews providing security, personnel, contracting, finance and infrastructure support for six Wings, two Headquarters and more than 50 tenant organizations, as well as 60,000 Airmen and families in the national capital region and around the world. The 11th Wing supports contingency operations in our nation's capital with immediate response rotary-assets. It also provides security for the world's highest visibility flight line and is responsible for ceremonial support with the United States Air Force Band, Honor Guard and Air Force Arlington Chaplaincy.
Naval Air Facility, Washington	Oversees the Reserve Component requirements within the Naval District Washington Region for the Commander Navy Reserve Forces Command.
	Supports Navy and Marine Corps tenant commands with facility liaison management and Joint Base air operations.
89 <sup>th</sup> Air Wing (89 AW)	With an Air Expeditionary Force combat-ready force of more than 1,100 personnel, the 89th Airlift Wing provides global Special Air Mission airlift, logistics, aerial port and communications for the president, vice president, cabinet members, combatant commanders and other senior military and elected leaders as tasked by the White House, Air Force chief of staff and Air Mobility Command. The 89th Airlift Wing maintains 24/7 alert, operating the Executive Airlift Training Center and Government Network Operation Center.

**Table 2. Major Units and Functions at JBA**

Unit	Key Functions
Air Force District of Washington (AFDW)	Air Force District of Washington (AFDW) is composed of three wings and one group. The 11th Wing at Bolling Air Force Base, and the 79th Medical Wing and 11th Wing at Andrews Air Force Base. Also under AFDW is the 844th Communications Group. The 79th Medical Wing and 844th Communications Group both have specialized missions where they will be the single Air Force voice in the National Capital Region (NCR) for their respective fields of expertise. Both the 11th and 11th Wings will fulfill duties as the host base organization of Bolling and Andrews, respectively, while also supporting AFDW requirements.
Air National Guard Readiness Center (ANGRC)	Air National Guard Readiness Center (ANGRC) The Air National Guard's federal mission is to maintain well-trained, well-equipped units available for prompt mobilization during war and provide assistance during national emergencies (such as natural disasters or civil disturbances). During peacetime, the combat-ready units and support units are assigned to most Air Force major commands to carry out missions compatible with training, mobilization readiness, humanitarian and contingency operations such as Operation Enduring Freedom in Afghanistan.
113 <sup>th</sup> Wing (District of Columbia Air National Guard [DCANG]) <ul style="list-style-type: none"> <li>• 121st Fighter Squadron</li> <li>• 201st Airlift Squadron</li> </ul>	Our mission is to be Capital Guardians who provide our nation fighter, airlift and support forces capable of global employment; to provide air sovereignty forces to defend the Nation's Capital; to employ our forces with mastery and lethality, if required; and to provide the community with support and enhance it through good will.
79 <sup>th</sup> Medical Wing (79 MDW)	Organizes trains, equips and provides medical forces for AEF deployments, homeland operations and joint operations within the NCR.
459 <sup>th</sup> Air Refueling Wing	The mission of the 459th Air Refueling Wing is to recruit, train and equip its Citizen Airmen to fly and maintain the KC-135 Stratotanker to help the Air Force protect its interests in air and space power.
844 Communication Group	Provides vital command, control, communications, computer, multimedia, and information systems support to the 11 WG, 89 AW, 79 MDW, and partner units on Andrews as well as Bolling AFB.

### **3.3 REGIONAL LAND USE**

Suburban residential, commercial, and industrial development generally surrounds the Main Base. Land uses in the area are diverse, reflecting the base's proximity to Washington, D.C. and its location in what has been a continually growing metropolitan area since the base was established in the 1940's. Existing development is generally denser to the north and west of the base towards Washington, D.C., with lower density suburban development to the south and the lowest densities to the east, where some land is classified as rural. Much of the land around the base is used for residential purposes; however, large acreages are also devoted to parks, institutional uses such as schools and churches, and commercial corridors. The only undeveloped area around the base is to the northeast; however, much of this area is slated for a large-scale mixed use development project expected to be built out over a period of 30 years (MNCPPC 2009).

The intensity of development is significantly less in the areas surrounding the GSU's. The area surrounding the Brandywine Receiver Station is composed of low-density residential land, agricultural land, and pockets of industrial land. The Cedarville State Forest is located just south of the Brandywine site. Predominant land uses in the vicinity of the Davidsonville Transmitter Station are forested land, agricultural and residential-agricultural. The site is bordered by the Patuxent River on the west, low density residential to the north, Patuxent River Park land on the north and south, and light residential development to the east.

## Chapter 4 PHYSICAL ENVIRONMENT

### 4.1 CLIMATE

JBA’s geographic location near the eastern seaboard provides for a humid subtropical climate that is influenced by an easterly airflow that produces frequent successions of high and low pressure systems. Tropical storms are a threat in this region during the hurricane season (June 1 to November 1). The inland location of JBA makes hurricane-force winds unlikely; however, flooding rains and some wind damage typically occur in association with the passage of a tropical system. Winter ice storms are common in the area, which can be particularly disruptive to road travel and flight operations. These conditions are sufficiently severe to require de-icing capability at the airfield.

Table 3 shows monthly average temperatures and rainfall for JBA, based on data collected between June 1943 and January 2012.

<b>Table 3</b>				
<b>Average Rainfall and Temperatures 1943-2012</b>				
<b>Month</b>	<b>Average Rainfall (inches)</b>	<b>Average Temperature (°F)</b>		
		<b>Minimum</b>	<b>Maximum</b>	<b>Average</b>
January	3.1	28	44	36
February	2.8	29	47	37
March	3.7	36	56	46
April	3.1	46	66	55
May	4.2	54	75	64
June	3.7	63	82	72
July	4.3	67	86	76
August	3.9	67	86	75
September	3.7	60	78	68
October	3.3	49	67	58
November	3.3	40	58	49
December	3.2	31	47	39
<b>Total</b>	<b>42.6</b>	<b>48</b>	<b>66</b>	<b>56</b>
<i>Source: 89<sup>th</sup> Air Wing Operations Support Squadron (89 OSS/OSW) 2012</i>				

Average Rainfall and Temperatures 1943-2012 Month Average Rainfall (inches) Average Temperature (-°F) Minimum Maximum Average January

### 4.2 LANDFORMS

JBA is near the western edge of the middle Atlantic Coastal Plain physiographic province with the fall line between the Piedmont and the Coastal Plain located approximately 12 miles west of the Main Base. The Blue Ridge Mountains are about 60 miles west of the

Main Base, and the Chesapeake Bay is 25 miles to the east. The Coastal Plain province is primarily characterized by unconsolidated substrata. The vast majority of this area is level to gently sloping with local relief generally being less than 100 feet except for moderately steep to steep stream banks. JBA is located on a level plateau between the Anacostia River on the west and the Patuxent River on the east.

Land surface elevations at the Main Base vary from approximately 215 feet above mean sea level (AMSL) to about 281 feet AMSL. Most of Brandywine Station is topographically level to gently sloping, and generally slopes to the southwest. Surface elevations range from about 195 feet to 225 feet AMSL. Most of Davidsonville Station is also topographically level to gently sloping; slopes are much steeper on the western edge of the site near the Patuxent River. Surface elevations range from approximately 60 feet to 180 feet AMSL.

### **4.3 GEOLOGY AND SOILS**

Much of the surficial geology at JBA is comprised of the late Tertiary Period Pliocene Epoch (about 7 million years old) upland deposits. These deposits consist of irregularly bedded cobbles, gravel, and fine sand intermixed with silt or clay, and vary in thickness from 10 feet to 20 feet. The underlying Calvert Formation is visible where streams have cut deeply through the upland deposits. This formation was deposited during the Miocene Epoch, approximately 19 million years ago, and consists of a mixture of sands, silts, clays, and shell beds.

Over the course of development on the Main Base, grading for construction of runways, housing, and other facilities has disturbed surface formations. Approximately half of the Main Base is urban land, which consists of areas covered by streets, buildings, parking lots, and other structures that obscure soils and prohibit soil identification. Approximately 10 percent of the Main Base remains undisturbed, mainly around the perimeter and in woodland areas among the golf courses. The two remaining dominant soil associations are the Sassafras-Croom and the Beltsville-Leonardtown-Chillum. These soils have been used for farming, residential, and industrial development in other portions of Prince George's County.

Table 4 identifies hydric soils and erodible soils at Main Base and the Brandywine and Davidsonville Stations. These soils represent potential natural resources management constraints. Hydric soils are generally characterized as either having a slow permeability or "poor to very poor" drainage class. A hydric soil is defined as a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Hydric soils, along with hydrophytic vegetation and wetland hydrology, are characteristics that define wetlands (USDA 2012).

Erodible soils can present challenges for natural resources management due to their susceptibility to creation of windthrows and gullies and susceptibility to erode into streams creating turbidity, sedimentation and associated problems. Additional information on soil types at JBA can be found in the 2006 Soils Planning Level Survey, on file with the 11 CES/CEIE.

**Table 4. Hydric and Erodible Soils**

Map Symbol	Series/Phase	Hydric	Erodible	Slope (%)	Drainage Class (includes Hydrology Comments,
<b>Main Base</b>					
BeA*	Beltsville Fine Sandy Loam	✓		0 to 2	Moderately Well Drained (Seasonal Perched Water table; Impeded Drainage)
BeB2*	Beltsville Fine Sandy Loam, Moderately Eroded	✓	✓	2 to 5	
BeC2	Beltsville Fine Sandy Loam, Moderately Eroded		✓	5 to 10	Moderately Well Drained
B1A*	Beltsville Silt Loam	✓		0 to 2	Moderately Well Drained (Slow Permeability – Seasonally Perched Water Table [1.5 to 2.5 feet]; Above Fragipan – Periods of Saturation on Golf Course and Surrounding Woods)
B1B2*	Beltsville Silt Loam, Moderately Eroded	✓	✓	2 to 5	
B1C2	Beltsville Silt Loam, Moderately Eroded		✓	5 to 10	
B1C3	Beltsville Silt Loam, Severely Eroded		✓	5 to 10	Moderately Well Drained
B1D3	Beltsville Silt Loam, Severely Eroded		✓	10 to 15	
BmB	Beltsville-Urban Land Complex	✓		0 to 5	Moderately Well Drained (Slow Permeability – Seasonal Wetness about 20% of Complex is Undisturbed Beltsville and about 20% is Disturbed Beltsville)
Bn	Bibb Sandy Loam	✓		0 to 2	Poorly Drained (Slow to Very Slow Permeability – Seasonal Perched Water Table [1.5 to 2.5 feet] Above Fragipan-Ponding-Seasonal Wetness)
Bo	Bibb Silt Loam	✓		0 to 2	Poorly Drained (Seasonal High Water Table [0 to 1 feet]; Flood Hazard; Poor Drainage Recent Alluvium on Floodplains; Drainage to Piscataway Creek South of Runways)
Fs	Fallsington Sandy Loam	✓		0 to 2	Poorly Drained (Moderately Permeable-Ponding-Water Table at or Near Surface for Long Periods Low-Lying Areas)

HoB2	Howell Fine Sandy Loam, Moderately Eroded		✓	2 to 6	Well Drained
HwC2	Howell Silt Loam, Moderately Eroded		✓	6 to 12	Well Drained
Ik	Iuka Fine Sandy Loam	✓		0 to 2	Moderately Well Drained (Moderately Permeable – Seasonal High Water Table [1 to 3 feet] – Flood Hazard Some Poorly Drained Inclusions [Series not Given]; On Floodplains and Along Major Streams, Flood Drainage 2 to 7 Days)
LeA*	Leonardtown Silt Loam	✓		0 to 2	Poorly Drained (Slow to Very Slow Permeability – Perched Water Table [0 to 1 feet] Above Fragipan-Ponding-Long Periods of Wetness Three Main Areas on base: Wooded Area Near Main Gate; Between Runways at NE End; Woods on Perimeter Road Near Gas Storage)
LeB*	Leonardtown Silt Loam	✓		2 to 5	
MnB2	Matapeake Silt Loam, Moderately Eroded		✓	2 to 5	Well Drained
MnC2	Matapeake Silt Loam, Moderately Eroded		✓	5 to 10	
MrA	Matawan Fine Sandy Loam	✓		0 to 2	Moderately Well Drained (Slow to Very Slow Permeability; Seasonal Wetness in and around the Golf Course)
MrB2	Matawan Fine Sandy Loam, Moderately Eroded		✓	2 to 5	Moderately Well Drained
MrC2	Matawan Fine Sandy Loam, Moderately Eroded		✓	5 to 10	
MuA	Mattapex Silt Loam	✓		0 to 2	Moderately Well Drained (Seasonal High Water Table [1.5 to 2.5 feet] Mostly Wooded)
MuB2	Mattapex Silt Loam, Moderately Eroded		✓	2 to 5	Moderately Well Drained
RdA	Rumsford Loamy Sand	✓		0 to 2	Well Drained (Slow Runoff Due to Slopes of 0 to 5 percent)
RdB2	Rumsford Loamy Sand		✓	2 to 5	Well Drained
RdC2	Rumsford Loamy Sand		✓	5 to 10	
RdC3	Rumsford Loamy Sand		✓	5 to 10	
RdD2	Rumsford Loamy Sand		✓	10 to 15	

SgB2	Sassafras Gravelly Sandy Loam, Moderately Eroded		✓	2 to 5	Well Drained
WaC2	Westphalia Fine Sandy Loam, Moderately Eroded		✓	6 to 12	Well Drained
WoA	Woodstown Sandy Loam	✓		0 to 2	Moderately Well Drained (Seasonal High Water Table and Wetness)
WoB2	Woodstown Sandy Loam, Moderately Eroded		✓	2 to 5	Well Drained
WoC2	Woodstown Sandy Loam, Moderately Eroded		✓	5 to 10	
<b>Brandywine Receiver Station</b>					
Bo	Bibb Silt Loam	✓		0 to 2	Poorly Drained
B1C2	Beltsville Silt Loam, Moderately Eroded		✓	5 to 10	Moderately Well Drained
B1C3	Beltsville Silt Loam, Severely Eroded		✓	5 to 10	
C1B2	Colemantown Loam, Moderately Eroded	✓	✓	3 to 8	Poorly Drained
C1C3	Colemantown Loam, Severely Eroded	✓	✓	8 to 15	
CsC3	Croom Gravelly Loam, Severely Eroded		✓	8 to 15	Well Drained
CtB2	Croom Gravelly Sandy Loam,		✓	3 to 8	Well Drained
CtC3	Croom Gravelly Sandy Loam, Severely Eroded		✓	8 to 15	
Ek	Elkton Silt Loam	✓		0 to 2	Poorly Drained
LeA	Leonardtown Silt Loam	✓		0 to 2	Poorly Drained
LeB	Leonardtown Silt Loam	✓		2 to 5	
SgC2	Sassafras Gravelly Sandy Loam, Moderately Eroded		✓	5 to 10	Moderately Well Drained

ShB2	Sassafrass Sandy Loam, Moderately Eroded		✓	2 to 5	Well Drained
<b>Davidsonville Transmitter Station</b>					
FaA	Fallsington Sandy Loam	✓		0 to 5	Poorly Drained
SaB2	Sassafras Fine Sandy Loam, Moderately Eroded		✓	2 to 5	Well Drained
WBA	Widewater and Issue Soils, Frequently Flooded	✓		0 to 2	Somewhat Poorly Drained
*Soils with hydric inclusions					
Source: USACE 2006a					

#### 4.4 HYDROLOGY

A summary of water resources found at Joint Base Andrews is provided in the following chapters.

##### 4.4.1 Surface Water

JBA is located within multiple sub-basins in the Mid-Atlantic Region (USGS 2012). Most of Main Base and Brandywine Station are in the Potomac River Sub-Region (Hydrologic Unit Code [HUC] 0207), while the eastern edge of Main Base and Davidsonville Station are in the Upper Chesapeake Sub-Region (HUC 0206).

The uplands that characterize the topography of the Main Base create a watershed divide, with the western portion of the base generally draining to the Potomac River (HUC 02070010) and the eastern portion generally draining to the Patuxent River (HUC 02060006), which is located approximately seven miles east of the base. Several streams that are fed by a shallow, unconfined surface aquifer originate on or near the Main Base. Piscataway Creek (HUC 020700100305) originates in the southeastern corner of the base. Tinkers Creek (HUC 020700100304), an intermediate order tributary of Piscataway Creek, also originates in the southeastern portion of the base and drains the majority of Main Base. Henson Creek (HUC 020700100303) originates in the northern portion of the base. These all drain toward the west and into the Potomac River. Cabin Creek and the Charles Branch (HUC 020600060304) originate in the northeastern quadrant of the base and drain toward the east to Western Branch, which eventually flows into the Patuxent River.

The Brandywine Station is located entirely in the Mattawoman Creek Watershed (HUC 020700110101). Two unnamed tributaries on the site flow into Mattawoman Creek. A significantly sized pond exists on both sides of Air Force Road in the northwestern portion of the site. This pond is created by a combination of the road crossing and heavy beaver activity.

The Davidsonville Station is bordered to the west by the Patuxent River, which receives all of the drainage from the site from two streams. Roper's Branch in the northern portion of the site, and one unnamed stream in the southeastern section (HUC 020600060402). These streams originate from springs discharging from an unconfined shallow surface aquifer. There are no water bodies on Davidsonville Station.

Piscataway and Mattawoman Creeks are listed as impaired waters under 303(d) of the Clean Water Act by Maryland Department of Environment for 1st through 4th order streams (as a "low priority" with an "unknown cause") (MDE 2012a).

#### **4.4.2. Groundwater**

JBA is located within a portion of the Maryland Coastal Plain that includes several important regional water supply aquifers. These aquifers are located several hundred feet below ground surface (bgs), and include, in order of descending stratigraphic sequence, the Aquia, Magothy, Patapsco, and Patuxent formations. The Aquia formation, located at a depth of 150 feet bgs, is a primary source of groundwater for Prince George's, Anne Arundel, Charles, and St. Mary's counties, and is primarily recharged by infiltration in an area northwest of the Main Base. The underlying Patapsco and Patuxent aquifers supply groundwater to consumers in Prince George's, Anne Arundel, and Charles counties. There are two non-potable water supply wells for the golf courses at Main Base. One of the wells was completed in the Magothy Formation at a depth of about 385 feet bgs, while the second well was completed in the Patapsco Formation at a depth of about 650 feet bgs. Potable water supply on base is provided by Washington Suburban Sanitary Commission (WSSC) (Infinity Technology and PBS&J 2010).

Groundwater underlying the Main Base occurs at or near the ground surface, with shallow groundwater occurring at depths of less than 20 feet bgs, likely under unconfined conditions. Groundwater recharge occurs primarily through precipitation. Groundwater flow is believed to be down-gradient toward local streams or downward toward deeper underlying aquifers. Similar groundwater conditions exist at the Brandywine and Davidsonville sites. There is one water supply well each at Brandywine and Davidsonville.

#### **4.4.3 Wetlands**

In July 2012, the US Corps of Engineers (EA Engineering, Science, and Technology (EA) conducted a wetland delineation survey of the non-tidal wetlands and waterways within the active airfield at Joint Base Andrews (JBA). The project site was separated into seven distinct areas of review. The overall airfield consisted of approximately 1,800 acres located in Prince George's County, Maryland. The airfield is surrounded by a secured perimeter fence and can only be accessed with an escort through multiple entrances around the airfield off the surrounding perimeter road. Within the airfield, the wetland delineation on approximately 1,009 acres known as the areas of review. The approximate latitude/longitude of the center of the study area is 38° 48' 52" and 76° 52' 01" W, respectively.

The majority of the wetlands delineated were identified as emergent wetlands within the limits of the active airfield. The dominant vegetation within the wetlands typically

included soft rush (*Juncus effuses*), reed canary grass (*Phalaris arundinacea*), straw color flatsedge (*Cyperus strigosus*), yellow foxtail (*Setaria pumila*), and slender fimbry (*Fimbristylis autumnali*). Soil profiles were generally characterized as fine sandy clays overlain by loamy material with some organics. Typically the wetland soils identified within the areas of review consisted of an upper matrix color 10YR 5/1 with mottles present and indicators of water ponding at the surface. The primary hydrologic indicators included inundation, water marks, and saturation of the soils.

#### **4.4.4. Floodplains**

Floodplains generally are areas of low, level ground on one or both sides of a stream channel that are subject to either periodic or infrequent inundation by flood waters. Floodplains are typically the result of lateral erosion and deposition that occurs as a river valley is widened. The porous material that composes the floodplain is conducive to retaining water that enters the soil via flooding events and elevated groundwater tables.

Floodplains are regulated by the Federal Emergency Management Agency (FEMA) with standards outlined in 44 Code of Federal Regulations (CFR) Part 60.3. Executive Order (EO) 11988 (Floodplain Management) requires agencies to assess the effects that their actions may have on floodplains and to consider alternatives to avoid adverse effects and incompatible development on floodplains.

FEMA has not developed Flood Insurance Rate Maps for the Main Base. In 2005 JBA completed a floodplain study which indicated that there are seven floodplains located within the boundaries of the Main Base. The floodplains are generally limited to small streams and the area immediately adjacent to these streams. FEMA flood maps are available for Brandywine and Davidsonville Stations. At Brandywine Station, there is a 100-year floodplain associated with the westernmost tributary of Mattawoman Creek. At Davidsonville Station, there is a 100-year floodplain associated with the Patuxent River at the western border of the site.

#### **4.4.5 Ecosystem**

JBA is in the eastern portion of the Outer Coastal Plain Mixed Forest Province – Northern Atlantic Coastal Plain Section (Bailey 1995). This is equivalent to the Eastern Temperate Forests Region in the USEPA Ecoregions (Level I) and Southeastern US Plains (Level II, CEC 1997). The Eastern Temperate Forests form a dense forest canopy consisting mostly of tall broadleaf, deciduous trees and needle-leaf conifers. Beech-maple and maple-basswood forest types occur widely especially in the eastern reaches of this region. Mixed oak-hickory associations are common in the Upper Midwest, changing into oak-hickory-pine mixed forests in the south and the Appalachians. These forests have a diversity of tree, shrub, vine and herb layers. While various species of oaks, hickories, maples and pines are common, other wide-ranging tree species include ashes, elms, black cherry, yellow poplar, sweet gum, basswood, hackberry, common persimmon, eastern red cedar and flowering dogwood. An important tree species, the American chestnut, was virtually eliminated from the Eastern Temperate Forests in the first half of the twentieth century by an introduced fungus.

Following the USEPA ecoregion hierarchy, JBA is located within the Chesapeake Rolling Coastal Plain ecoregion (Level IV) within the Southeastern Plains subregion (Level III, Woods et al. 2003). The Southeastern Plains subregion is an interior coastal plain that stretches from Maryland in the north to Mississippi and Louisiana in the south. Historically, the natural vegetation was predominantly longleaf pine with smaller areas of oak-hickory-pine forest stands in the north, and in the south native vegetation included some southern mixed forest with beech, sweetgum, southern magnolia, laurel and live oaks, and various pines. Floodplains are forested with bottomland oaks, red maple, green ash, sweetgum, and American elm, and areas of bald cypress, pond cypress, and water tupelo. The subregion presents a mosaic of cropland, pasture, woodland, and forestland cover. A significant portion of Prince George's County has been deforested for urban and suburban development, particularly in the vicinity of the District of Columbia. Therefore, relatively small remnants of woodland are present in these urbanized areas.

## Chapter 5

### ECOSYSTEM AND THE BIOTIC ENVIRONMENT

#### 5.1 ECOSYSTEM CLASSIFICATION

Nearly 80 percent of JBA Main Base is developed or intensely managed. The vegetation occurs largely in association with intensively managed areas (i.e., improved areas): lawns, gardens, golf course fairways, ponds, bare ground, and recreational fields. The airfield environment, including the infield of the airfield (grass areas adjacent to the taxiways ramps, aprons, hot cargo pad and compass rose) and the clear zones, is also intensively managed and is considered as improved area. The remaining patches of original vegetation (i.e., unimproved areas) are a combination of mixed hardwood forest, mixed hardwood/pine forest, oak forest, oak/hickory forest, oak/pine forest, pine forest, red maple swamp, and shallow emergent marsh.

In 2011 an arbor plan was prepared for JBA (MACTEC 2011). The plan analyzed existing tree cover on Main Base for the period from 1958 to 2009 using aerial imagery, remote sensing and GIS tools. During this 41 year period, the tree cover diminished from 1,618 acres to 942 acres, a loss of 676 acres. The majority was lost between 1958 and 1974, with only 157 acres lost since that time.

Both the Brandywine and Davidsonville sites are much less developed than the Main Base. Approximately 1,220 acres of Brandywine is forestland and approximately 667 acres at Davidsonville is forest. Vegetation at these sites consists primarily of mixed hardwood forests. This includes pine, oak, hickory and tulip trees. Vegetation in the areas surrounding the antenna fields includes fescue and foxtail at Davidsonville and native grasses and forbs at Brandywine.

Some areas on the Main Base contain patches of nonindigenous, invasive plants. A total of nineteen invasive plant species were reported in surveys conducted in 2006 at Main Base and the Brandywine and Davidsonville Stations: tree-of-heaven, mile-a-minute, kudzu, bamboo, Japanese honeysuckle, multiflora rose, common reed, English ivy, wintercreeper, privet, common periwinkle, wineberry, oriental bittersweet, autumn olive, Russian olive, bearded beggarticks, tall fescue, purple loosestrife, and Chinese lespedeza (USACE 2006c). A new invasive species, the wavy-leaved basket grass, has been identified at the Davidsonville Station (USFWS 2012a).

#### 5.2 VEGETATION

To date, one baseline survey effort has been conducted for the JBA Main Base and GSUs. The 1994 rare species survey identified 84 species of birds in a variety of ecological communities, including open water, red maple swamp, mixed hardwood forest, old field successional, mowed field, and mowed grass. The survey, combined with site visits in 2006, identified a total of 13 species of mammal; 10 species of reptiles and amphibians; 13 species of insects; and 5 species of fish. Since the survey was not a total inventory, it is possible that there are additional species on JBA that remain

### 5.3 THREATENED AND ENDANGERED SPECIES

The only federally listed species at JBA is the endangered sandplain gerardia (*Agalinus acuta*), which has been documented to occur approximately ¼ mile east of Base Lake, near Piscataway Creek. Sandplain gerardia is an annual pale green herb that typically occurs on dry, sandy, poor-nutrient soils of sparsely vegetated sandplain environments and serpentine barrens. No Federally listed species are known to occur on the lands of the Davidsonville Transmitter Station and Brandywine Receiver Station (MD DNR, 27 March 2012).

A Threatened and Endangered (T&E) Species Survey was conducted in 2004 for JBA, updating 1996 and 1997 natural resources surveys which in turn were updates to an original 1993 survey (Ecology and Environment, Inc. 2005). The 2004 survey, which was published in 2005, indicated the bald eagle had been observed during the 1996 and 1997 surveys. Once a federally listed species, effective August 8, 2007, under the authority of the Endangered Species Act of 1973, as amended, the USFWS removed the bald eagle in the lower 48 states from the Federal List of Endangered and Threatened Wildlife. However, the bald eagle is still protected by the Bald and Golden Eagle Protection Act, Lacey Act and the Migratory Bird Treaty Act (USFWS 2012b).

Seven rare plant species, as classified by the state, were also identified in the 2004 T&E. Based on MD DNR records, there are four additional rare species that were observed in the past (MD DNR 2012a). Hyssop-leaved Hedge-nettle (*Stachys hyssopifolia*) was documented in 1993 as occurring on the southwest end of the Davidsonville Transmitter Station, in mowed old field habitat near young woodland edge. The state-listed, threatened Racemed Milkwort (*Polygala polygama*) was documented as occurring in 1993 at the railroad right-of-way just east of the Brandywine Receiver Station Boundary. The state-listed, endangered Midwestern Gerardia (*Agalinis skinneriana*) was documented as occurring in 1995 at Brandywine near one of the *Linum intercursum* sites, on clay lens habitat. An occurrence of *Carex buxbaumii* is located on the railroad right-of-way in the easternmost part of the Brandywine site (MD DNR, 2012a).

Current fisheries information indicates that yellow perch have been documented near the Davidsonville site, as well as white perch and clupid species. No anadromous species have been documented near the Main Base and the Brandwine site (MD DNR 2012b). Anadromous fish are born in freshwater streams, migrate to the ocean, then return to freshwater rivers to spawn.

### 5.4 WETLANDS

Wetlands are protected as a subset of the “waters of the United States” under Section 404 of the Clean Water Act (CWA), as well as EO 11990 (Protection of Wetlands) which requires federal agencies to take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the beneficial values of wetlands. The United States Army Corps of Engineers (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 CFR 328).”

In general, wetlands at JBA are limited because of the base’s upland location. Existing information on wetland types and acreages is provided in Table 5 below.

Table 5. Summary of Wetlands within JBA		
Community Type	Acreage	Comments
<b>Main Base</b>		
Palustrine Forested Wetland (PFO)	43.006	Scattered throughout the Military Family Housing Area and near the North Gate; Concentrated along streams and drainageways; Most common species are sweet gum, red maple and willow oak.
Palustrine Scrub/Shrub Wetland (PSS)	8.674	Located in more open areas and in parts of the airfield.
Palustrine Emergent Wetland (PEM)	30.424	Dominate the Base Lake area; Large, open wetland areas have developed on the east side of the base near the perimeter fence; Most common species are soft rush and grasses.
Palustrine Unconsolidated Bottom Excavated Pond (PUBx)	3.614	--
Palustrine Unconsolidated Bottom Pond with Beaver Activity (PUBx)	1.328	--
<b>Brandywine Receiver Station</b>		
Palustrine Forested Wetland (PFO)	187.78	Concentrated along streams and drainageways, and many areas are believed to be only seasonally or intermittently wet; Dominated by red maple, black bum, willow oak ( <i>Quercus phellos</i> ), and sweetgum.
Palustrine Scrub/Shrub Wetland (PSS)	3.32	Dominated by button bush and smooth alder
Palustrine Emergent Wetland (PEM)	188.61	Large PEM wetlands created or enhanced by beaver activity; Dominated by spatterdock ( <i>Nuphar luteum</i> ) and soft rush ( <i>Juncus effusus</i> ).
Palustrine Open Water (POW)	1.88	--
<b>Davidsonville Transmitter Station</b>		
Palustrine Forested Wetland (PFO)	80.56	Concentrated along streams and drainageways; Many are only seasonally or intermittently wet; Dominated by red maple, willow oak, and sweetgum.

Table 5. Summary of Wetlands within JBA		
Community Type	Acreage	Comments
Palustrine Scrub/Shrub Wetland (PSS)	1.0	Located at edge of POW wetland.
Palustrine Emergent Wetland (PEM)	5.2	Ponded, shallow-water area; Dominated by soft rush with spike rushes.
Palustrine Open Water (POW)	1.0	Larger, deeper pond with PSS edge.
<i>Source:</i> USACE 2006b		

## Chapter 6

### MISSION IMPACTS ON NATURAL RESOURCES

#### 6.1 LAND USE

The Main Base includes an airfield and extensive support facilities. The base is divided into western and eastern sections containing mission and administrative facilities; the sections are separated by an airfield that is oriented north-south. The airfield includes two active runways that are 9,300 and 9,755 feet long, two mass aircraft parking aprons (west and east), and a network of parallel and connecting taxiways. The western portion of the Main Base is the larger land area, with community facilities (including commercial services), a medical center, housing, a large outdoor recreation/golf course facility, residential units and administrative uses. The majority of the industrial uses are located in the eastern portion of the base. JBA has approximately 105 miles of paved roads. Existing land uses are shown in Table 6.

<b>Land Use Category</b>	<b>Acres</b>	<b>Percentage</b>
Administrative	127	2.9
Aircraft Operations and Maintenance	366	8.3
Airfield	1,525	34.7
Community	136	3.1
Industrial	144	3.3
Medical	47	1.1
Open Space	784	17.8
Outdoor Recreation	731	16.7
Residential	508	11.6
Water	22	.5
<b>TOTAL</b>	<b>4,390</b>	<b>100</b>

Source: Infinity Technology and PBS&J 2010

Operations at the Brandywine Receiver Station support communication systems for the President of the United States, DoD, Department of State, and other critical government missions. Brandywine Station is comprised of forest and open space, along with limited development. Approximately 75 percent of the site is forested, 20 percent is open space (grasslands), and 5 percent is developed.

The Davidsonville Transmitter Station provides high frequency transmitter support to various civilian and military communications systems in the NCR, at JBA, and to deployed military units nationwide. Approximately 95 percent of the land at the Davidsonville Transmitter Station is wooded or grassland. The remaining 5 percent contains a small number of buildings and parking areas.

Both the Davidsonville and Brandywine Stations have landing zones and facilities to support helicopter training operations.

## **6.2 CURRENT MAJOR IMPACTS**

The 2007 Air Installation Compatible Use Zone (AICUZ) Study for JBA reaffirms Air Force policy of assisting local, regional, state, and federal officials in the areas neighboring JBA by promoting compatible development within the AICUZ area of influence while protecting Air Force operational capability from the effects of land use that are incompatible with aircraft operations. Specifically, the report documents changes in aircraft operations since the last study, which was conducted in 1998, and provides noise contours and compatible use guidelines for land areas neighboring the installation based on the May 2007 operations (USAF 2007).

A recommendation in the 2007 AICUZ Study is stated as: “Support the Joint Land Use Study Program for the Andrews AFB area to protect the area from encroachment.” Initiated in 2008, the Joint Base Andrews Naval Air Facility Washington Land Use Study (JLUS) represents a partnership between the base, Prince George’s County, and the local community that facilitates a cooperative approach to development policy for the JBA vicinity. The JLUS identifies encroachment issues that impact both the base and the communities around the base, and recommends strategies to address these impacts. Strategies are intended to balance the needs of the base with the long-term development plans and economic viability of the surrounding communities. One of the plan’s goals is to address encroachment issues, including noise, traffic, pollution, and impacts on environmental and cultural resources (MNCPPC 2009).

Current planning efforts include the development of an Installation Complex Encroachment Management Action Plan (ICEMAP). The ICEMAP will address current and future encroachment and sustainment challenges facing Air Force installations and their surrounding communities.

## **6.3 POTENTIAL FUTURE IMPACTS**

Any new activities or infrastructure development plans are evaluated to determine if any limitations or restrictions apply. A 2011 Environmental Assessment (EA) assessed the impacts of projects (construction, demolition, renovation, and maintenance activities) recommended by the 2010 General Plan Update and intended to support JBA’s current and future missions. A Finding of No Significant Impact (FONSI) was issued. The EA noted that whenever possible, new construction would avoid wetlands and areas where threatened and endangered species are known to occur.

## 6.4 NATURAL RESOURCES CONSTRAINTS TO MISSIONS AND MISSION PLANNING

The most significant constraints on the ability to fulfill the military mission on JBA are related to managing wildlife that pose hazards to aircraft operations, wetland protection, protecting riparian corridors to maintain water quality, and protecting threatened and endangered species and associated habitat. The three levels of development potential based on environmental issues (Infinity Technology and PBS&J 2010) are defined as:

**Limited Development** – areas with constraints that require significant mitigation measures (for example, a sensitive natural area)

**Restricted Development** – Areas with some constraints that might require mitigation before development can occur

**Unrestricted Development** – Areas with no environmental constraints that are recommended for development, as appropriate

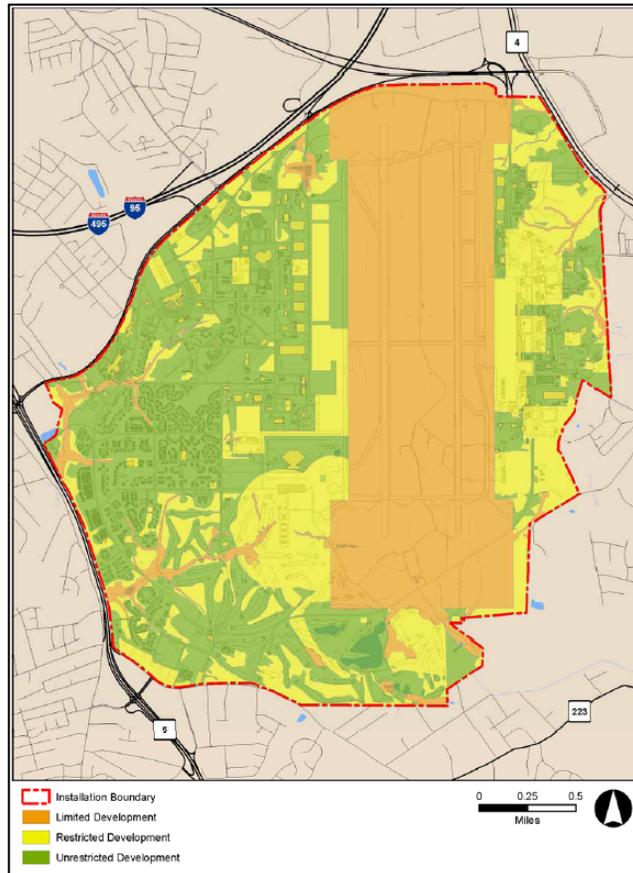


Figure 3: Composite Constraints and Opportunities, Main Base

## Chapter 7

### NATURAL RESOURCES PROGRAM MANAGEMENT

The guiding philosophy of this INRMP is to take an adaptive, ecosystems approach to managing the natural resources present on JBA. Ecosystem management provides a framework to link the military mission to local, regional, and global ecological integrity. Sustaining ecosystem integrity is the best way to protect and enhance biodiversity, ensure sustainable use, and minimize the effort and cost of management.

Ecosystem management is based on clearly stated goals and objectives, and associated activities and projects. Activities are generally in-house, no cost actions undertaken by base personnel. Projects are generally performed by others, usually under contract JBA. In addition, projects can be performed using non-DoD funds or by volunteers.

This section summarizes each technical area of natural resources management and identifies applicable goals and objectives.

#### **7.1 Geographic Information System (GIS)**

Complete and usable electronic Geographic Information System (GIS) data and access to GIS software are essential for efficient natural resources management. GIS data allows JBA to organize, evaluate, and present natural resources information for the Main Base and the two GSUs. In addition, the data facilitates accurate analysis of potential effects of all future projects and activities. JBA has existing Geographic Information System (GIS) data for natural resources, and personnel at JBA have the capability to use GIS on-site through GeoBase, an intranet site.

#### **7.2 Fish and Wildlife Management**

The variety of habitats present at the Main Base and GSU's contributes to the diversity of wildlife species. Documented non-game species include raptors, gulls, Killdeer, moderate flocks of migrating starlings and cowbirds, waterfowl, wading birds, and songbirds. Game species that have been documented include white-tailed deer, wild turkey, red fox, gray squirrel, eastern cottontail, Canada geese, mallard, lesser scaup, mourning dove, and northern bobwhite quail.

Populations of these species are limited by the reduction and fragmentation of suitable habitat outside of JBA and isolation of habitats at JBA. In addition, JBA does not encourage their population growth on the Main Base because of their incompatibility with aircraft operations. However, the GSU's offer the opportunity to manage for wildlife populations. An expansive and relatively contiguous area of open grasslands at both remote sites provides nesting and foraging habitats for many wildlife species. The Brandywine Bow hunting Club, administered by enlisted personnel, is open to all active duty military, veterans, and civilian DoD employees of JBA. The recreational hunting program at the Brandywine GSU reports the following wildlife harvests in recent years (Johnson 2012a):

- ✓ 2009-2010 Hunting Season: 9 Buck, 18 Doe and 1 Turkey
- ✓ 2010-11 Hunting Season: 12 Buck, 26 Doe and 0 Turkey
- ✓ 2011-2012 Hunting Season: 9 Buck, 28 Doe and 0 Turkey
- ✓ 2012-2013 Hunting Season: 19 Buck, 19 Doe and 0 Turkey

Hunting is not permitted at Davidsonville. Recreational fishing is allowed at the Base Lake without a permit. Due to water quality concerns fishing is limited to catch and release. A large section of the lake's perimeter is surrounded by the golf course, further limiting the opportunity for recreational fishing. There are no piers on the lake, and due to safety concerns JBA has no future plans to construct fishing piers. The lake may also be used for non-motorized boating. Due to mission and security constraints, no public access is permitted for hunting, fishing, trapping, or other wildlife-related outdoor recreation at the Main Base or GSU's.

### **7.3 Management of Threatened and Endangered Species and Habitats**

Rare, threatened and endangered (RTE) species surveys were conducted at JBA in 1993, 1996, 1997, and 2004 (Ecology and Environment, Inc. 2005). The federally- and state-listed sandplain gerardia (*Agalinis acuta*) was identified during the 1994 survey but was not observed in subsequent surveys. It was, however, observed in 2002 as part of annual monitoring activities (see Section 2.7.8). The plant's known habitat, located in the vicinity of the 18-hole golf course northeast of the Base Lake, is protected by fencing and signage that warns of the presence of a protected species. In addition, a "no mow" buffer surrounds the fenced area.

Based on the 2004 field survey, a Threatened and Endangered Species Survey was completed in 2005. The document identifies federally listed species, as well as federal candidate and state-listed threatened, endangered and rare species. It also includes a Management Action Plan (MAP) for the sandplain gerardia. The plan is intended to provide for the monitoring and protection of the species and maintenance of its habitat at JBA (see Appendix H). The management plan consists of the following goals:

**Goal :** Design and implement an appropriate annual monitoring plan

**Goal:** Evaluate the results of the monitoring to determine the status and condition of the population

**Goal:** Evaluate and implement alternative management strategies that would favor restoration/enhancement of the sandplain gerardia population

Additional objectives include expanding the population within the existing enclosure, as well as sowing available seeds in other areas of appropriate habitat if the plants in the existing habitat appear and set seed (Ecology and Environment, Inc. 2005). The management plan was augmented in September 2005 to include recommendations from MD DNR. The following guidance was recommended:

1. Outside of a 25 ft stream buffer, remove all trees from the area now enclosed that has been identified as the best suitable habitat in the vicinity of the historic sandplain gerardia population.
2. Immediately after cutting, paint stumps of cut trees with herbicide to control sprouting.
3. Mow in mid-November (after late summer grasses and forbes have set seed). Remove thatch from site.
4. Apply herbicide to multiflora rose (*Rosa multiflora*).
5. Using rake, scarify ground to expose soil in areas with little vegetative cover. Leave roughly half of the areas covered in lichens undisturbed in order to conserve some of this slow-growing lichen cover.
6. Annually monitor the encroachment of *Rubus* spp. and *Lespedeza* spp. and implement control of these species if areas with little vegetative cover are encroached upon by these invasive plants. This monitoring could be accomplished by establishing photo points for areas with little to no vegetative cover.
7. Consult Marilyn Jordan (The Nature Conservancy) regarding the advisability of watering the areas of little to no vegetative cover. If this it determined to be desirable to promote germination, develop a plan for watering that identifies the locations, time of year, frequency and duration of watering.
8. Consult Marilyn Jordan regarding seed longevity for this species. Annual monitoring should be conducted to determine if any Sandplain gerardia is present. The final year for monitoring should be selected based upon the longevity of seeds and the number of years that have passed since this species was observed.

No other federally-listed species are known to occur on the Main Base or the GSUs. The bald eagle was identified in the 2004 field survey, but it is no longer federally-listed. Although the bald eagle is still subject to protections through other federal regulations, it is not expected to frequent the base. Base Lake, the largest water body at JBA, lacks suitable perch trees, is relatively small and is subject to frequent human use (Ecology and Environment, Inc. 2005).

#### **7.4 Water Resource Protection**

Rivers and streams and some wetlands, ponds and lakes are protected as a subset of the “waters of the United States” under Section 404 of the CWA. As a result of federal and state regulations, as well as DoD and AF policy, JBA is responsible for identifying and locating jurisdictional “waters of the United States” (including wetlands), where these resources have the potential to be impacted by activities at the Base. Such impacts could include construction of roads, buildings, runways, taxiways, navigational aids, and other appurtenant structures or activities as simple as culvert crossings of small intermittent streams, rip-rap placement in stream channels to curb accelerated erosion, and incidental fill and grading of wet depressions.

Physical disturbances to wetlands and disturbances to both perennial and intermittent streams (e.g., stream crossings) are regulated by the CWA under Sections 404 and 401. Sometimes activities within ephemeral streams are also regulated. Most proposed activities within streams or wetlands (such as filling, dredging, or clearing of ditches) require either a general or individual permit. In general, individual permits are required for disturbances that exceed thresholds for disturbances covered by general permits. Permitting requirements vary depending on type, location, and extent of disturbance.

As a result of a new EPA ruling, MDE issued a new general permit that pertains to pesticide applications in, over or around waters of the US, and is consistent with the EPA pesticide general permit requirements published under 40 CFR 122. This permit covers discharges to State waters from the application of (1) biological pesticides or (2) chemical pesticides that leave a residue, when the pesticide application is for one of the following pesticide use patterns (MDE 2011):

1. Mosquito and Other Flying Insect Pest Control
2. Weed, Algae, and Pathogen Control
3. Nuisance Animal Control
4. Forest Canopy Pest Control

In addition to pesticides, JBA handles other hazardous materials, including: herbicides; solvents; petroleum, oils, and lubricants (POLs); paints; and deicing fluids. JBA's Hazardous Materials (HAZMAT) Pharmacy Program receives partially used hazardous materials which can then be used by others who require only small quantities. Operation of a large airfield involves the acquisition, use, and ultimate disposal of these hazardous materials. As a result, JBA is listed by the EPA as a Large Quantity Generator. This classification requires submittal of a bi-annual report to EPA on hazardous materials that are generated at the base.

Historical methods of hazardous waste disposal at JBA have resulted in contamination of surface waters, groundwater and soils. Remediation of past contamination is the focus of the Environmental Restoration Program (ERP), which is administered by JBA under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, aka "Superfund") guidance. The ERP was established to identify, assess, investigate, and clean up existing contamination on the Base. There are currently 20 ERP sites located in the vicinity of JBA. Cleanup efforts include many individual sites both on and off Base. Other natural resource management issues pertaining to wetlands and streams are the need to limit the creation of new wetlands, as they can attract birds, and the need to mitigate stream bank erosion. The 2003 MOA to Address Aircraft-Wildlife Strikes (see Section 4.3.1 and Appendix G) facilitates coordination with USFWS to address wetland mitigation projects that may pose a BASH issue. In addition, coordination between JBA and USFWS can address needed stream restoration measures on the Main Base. Stream channel erosion can be caused by inadequately controlled stormwater runoff (see also Sections 4.7.3 and 4.7.4). Streams on the Main Base, and the areas immediately adjacent to the streams, generally comprise the floodplains (see Map 2), making stormwater control the primary floodplain management issue at JBA. Several BMP projects are identified in the 2012 Draft EA for Stormwater System Repair and

Upgrades at JBA, including stream restoration. Section 4.7.4 further discusses stormwater management.

#### **7.4.1 Coastal Management**

JBA's location in Prince George's County, Maryland requires the Base's projects comply with Federal Coastal Zone Management Act of 1972 (CZMA), as amended, and the subsequent Coastal Zone Act Reauthorization Amendments of 1990 (CZARA). Compliance with the CZMA and CZARA mandates that activities within the coastal zone that affects any land or water use or natural resource shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of the federally approved Coastal Zone Management Program (CZMP) for the State of Maryland.

Compliance is achieved by Maryland regulatory review for "Federal consistency" of Base actions. Base actions are: (1) any Base development project and (2) any Base application for a required Federal license or permit to conduct an activity affecting land or water use or natural resource. Examples of a Federal permit or license obtained by JBA include water quality permits for non-point sources, permits for stormwater associated with construction activities and the permits to impact floodplain and wetlands on Base.

Maryland's CZMP is a coordinated program by state agencies, based on existing laws and authorities, for the protection, preservation, and orderly development of Maryland's coastal resources. Specific goals, objectives, and policies have been developed for the management of uses and activities which have a direct, and potentially significant, effect on coastal resources. Overall management is achieved through the use of existing State of Maryland regulatory programs, State of Maryland Executive Order 01.01.1978.05 mandating the program, and Memoranda of Understanding between appropriate state departments.

MS DNR is the lead agency for the state's CZMP. Within MD DNR, the Coastal Zone Management Division of the Watershed Services Unit is the lead agency for the CZMP. The federal consistency requirements are carried out by the MDE Coastal Zone Consistency Division in the Wetlands and Waterways Program of the Water Management Administration (WMA). The WMA is responsible for coordinating the review with the appropriate state agencies. The "Federal consistency" review can be initiated with direct interaction by JBA and either the MD DNR or MDE or through the Maryland State Clearinghouse operated by the Maryland Department of Planning (MDP). Examples of direct interaction with either MD DNR or MDE are a result of applications for water quality permits for non-point sources, permits for stormwater associated with construction activities and the permits to impact floodplain and wetlands on Base. An example of the Clearinghouse being the initial contact is the NEPA single point of contact in accordance with EO 12372 Intergovernmental Review of Federal Programs and the Maryland Code of Regulations.

#### **7.4.2 Stormwater Management**

Stormwater runoff can be a significant source of pollutants and sediment into surface waters, especially in areas where groundcover has been disturbed. Water quality also may be negatively impacted by disturbances causing increased sedimentation to wetlands and stream channels. Stormwater runoff from impervious surfaces on Base has a high potential to carry pollutants into wetlands, surface water and groundwater.

JBA must comply with various water quality requirements and regulations, including the CWA National Pollutant Discharge Elimination System (NPDES) stormwater program, the Maryland Stormwater Management Guidelines for State and Federal Projects, the Energy Independence Security Act Section 438, EO 13508 Chesapeake Bay Protection and Restoration, the Chesapeake Bay Total Maximum Daily Load (TMDL) requirements, and the Maryland Watershed Implementation Plan (WIP).

JBA has a Stormwater Pollution Prevention Plan (SWPPP), completed in 2011, that identifies potential sources of pollution that may be reasonably expected to affect the quality of stormwater discharges at JBA. The plan also serves to ensure the implementation of practices that are to be used to reduce the pollutants in stormwater discharges and to ensure compliance with the terms and conditions of the Base's NPDES permits (SWPPP, 2011).

The SWPPP is also intended to provide information that can be used to identify and implement proposed BMPs to comply with the Chesapeake Bay TMDL. A TMDL (total maximum daily load) is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards. Under section 303(d) of the Clean Water Act, states are required to develop lists of waters that are too polluted ("impaired waters") to meet required water standards. The law requires that TMDLs be developed for these waters.

On 29 December 2010, EPA issued the final rule regarding the Chesapeake Bay TMDL. The TMDL was established to counter the insufficient progress made towards improving the continued poor water quality in the Chesapeake Bay and its tidal tributaries. The Bay TMDL identifies the necessary reductions of nitrogen, phosphorus, and sediment and it sets required deadlines for compliance through the year 2025. The TMDL requires that municipalities, federal government, and industries improve the quality of stormwater runoff and it establishes specific goals for stormwater treatment. Specifically, JBA will be required to provide stormwater treatment for 20 percent of the existing impervious areas on the base (Los Alamos Technical Associates, Inc. and URS Group, Inc. 2011).

The Maryland Watershed Implementation Plan (WIP) was developed to address implementation of Maryland's part of the Chesapeake Bay TMDL (MDE 2010). Phase II of the WIP identifies 2-year (2012-2012) programmatic milestones for JBA, including the following (MDE 2012):

- JBA is working with the U.S. Army Regional Environmental Coordinator (REC) and the National Defense Center for Energy and the Environment (NDCEE) on an extensive assessment project that will help JBA identify applicable Chesapeake Bay TMDL requirements and prepare JBA to meet them.

- USACE to finalize numerous management projects aimed at improving the storm water management program at JBA, including (1) a programmatic environmental assessment of eight major stormwater retrofit projects; (2) preparation of a stormwater infrastructure and maintenance program.
- Continue to support applicable watershed jurisdictions Phase II WIP processes in 2012 and 2013.
- Implement Air Force Policy for Sustainable Design and Development (SDD), LEED certification and LID under the Energy Independence and Security Act of 2007 (EISA) as a means to manage stormwater for all construction and maintenance projects.
- Advocate for funding in order to implement water program projects in fiscal years 2012 and 2013.
- Continue to integrate stormwater management features into all facility construction projects on JBA.

#### **7.4.3 Erosion and Soil Conservation**

Erosion control and soil conservation are important water resource conservation issues. Accelerated erosion, continued compaction, or the removal of topsoil can drastically alter soils. Sediment accumulation resulting from erosion affects surface water quality and aquatic organisms. JBA complies with the state's soil erosion and sediment control regulations. MDE must approve sediment and erosion control and stormwater management plans if total disturbed area is more than 5,000 square feet or 100 cubic yards in size. JBA must also comply with MDE General Permit for Stormwater Associated with Construction Activity, Permit # 09GP if the project disturbs more than one acre of land. Disturbed area includes all areas disturbed during construction, including equipment movement and storage and supply lay-down areas, not just the building footprint (Los Alamos Technical Associates, Inc. and URS Group, Inc. 2011).

#### **7.5 WETLAND PROTECTION**

Natural resources at JBA will be managed with an ecosystem management approach as directed by AFI 32-7064 and DoDI 4715.03. Ecosystem management may be defined as management to restore and maintain the health, sustainability, and biological diversity of ecosystems while supporting sustainable economies and communities. The goal of ecosystem management on military lands is to ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. As described in DoDI 4715.03, ecosystem management incorporates the following elements:

- Avoid single-species management and implement an ecosystem-based multiple species management approach, insofar as that is consistent with the requirements of the ESA.

- Evaluate and engage in the formation of local or regional partnerships that benefit the goals and objectives of the INRMP.
- Use the best available scientific information in decision-making and adaptive management techniques in natural resource management.
- Foster long-term sustainability of ecosystem services.
- Use an adaptive management approach to manage natural resources such as climate change.

The last bullet can be further described as managing natural resources in a changing environment shaped by multiple stressors such as climate change, habitat loss and fragmentation and human development pressures.

Ecosystem management includes biodiversity conservation. Biodiversity is the degree of variation of life forms within a given ecosystem. The INRMP is identified by DoD as the primary vehicle for conserving biodiversity on military installations. USAF principles for ecosystem management, as described in AFI 32-7064, include biodiversity conservation. Biodiversity conservation can be achieved by maintaining or reestablishing viability populations of all native species on installations when practical and consistent with the military mission.

Other USAF ecosystem management principles include the following:

- Maintain or restore native ecosystem types across their natural range where practical and consistent with the military mission.
- Maintain or restore ecological processes such as wild land fire and other disturbance regimes where practical and consistent with the military mission.
- Maintain or restore the hydrological processes in streams, floodplains, and wetlands when feasible.
- Use regional approaches to implement ecosystem management on an installation by collaboration with other DoD components as well as other federal, state and local agencies, and adjoining property owners.
- Provide for outdoor recreation, agricultural production, harvesting of forest products, and other practical utilization of the land and its resources, provided that such uses do not inflict long-term ecosystem damage or negatively impact the USAF mission.

Related USAF guidance also cites the need for invasive species control as well as the conservation of rare, threatened and endangered species and communities when practical and consistent with the military mission.

## **7.6 GROUNDS MAINTENANCE**

Grounds maintenance includes mowing, fertilization, herbicide and pesticide application, and watering, as needed. Grounds maintenance and landscaping is performed in accordance with federal and state laws and regulations. JBA also carries out these

activities in accordance with the Arbor Plan, the Golf Courses at Andrews Environmental Management (GEM) Plan, the Integrated Pest Management Plan (IPMP), and the BASH Plan.

The 2008 GEM Plan identifies management approaches for golf course maintenance and landscaping to address the following environmental topics that were identified during the GEM process:

- Environmental Restoration Program (ERP) Sites
- BASH
- Wetlands
- Invasive species
- Proposed project
- Air quality
- Threatened and endangered species

The GEM Plan also identifies goals, objectives and Best Management Practices (BMPs). The BMPs are intended to minimize regular fairway maintenance and to preserve water quality downstream (USAF 2008b).

The IPMP describes strategies for treating trees and shrubs that are infested by insects and techniques to control fungi and turf diseases that can damage lawns and golf course turf. Section 4.6 further describes the IPMP.

The BASH Plan specifies grounds maintenance measures to reduce wildlife attractants, including managing airfield grass height, controlling broad-leaved weeds, planting sparsely vegetated areas, selective fertilizing, removing the “edge effect” around the airfield, and removing dead vegetation (JBAI 91-212).

## **7.7 FOREST MANAGEMENT**

The 2011 Arbor Plan is designed to be used as a guide to landscape development, reforestation and maintenance of forest resources at JBA. It is an update to the 2004 Arbor Plan. The 2011 plan calculates the forest stand loss since 1958 (see Section 2.7.6) and provides guidance to mitigate these losses. It identifies priority planting areas in the form of corridors, gateways and reforestation plans, and it recommends plant materials and design guidelines to achieve the following goals:

- Help offset the loss of forest stand which has occurred over the past 30 years (approximately 60 percent of these losses returned by implementing the Arbor Plan)
- Sustain the ecological values and the function of the forested landscape
- Integrate forest management activities with the management of base natural resources and the military mission of JBA

- Promote non-fragmented ecological communities and biodiversity while addressing the challenge of encouraging habitat that is in conflict with the mission
- Meet EMS and INRMP objectives in enhancing open space and natural areas
- Enhance the aesthetic and ecological value of the base where possible

To ensure compliance with airfield clearance zone requirements, the Arbor Plan stipulates that JBA shall perform a tree survey not less than once every three years to identify trees that extend into restricted distances from airfield clearance zones and therefore require removal or trimming (MACTEC 2011). All tree removal and/or pruning activities are required to be performed in accordance with the Arbor Plan's design and maintenance guidelines. Consistent with the 2004 Arbor Plan recommendations for airfield clearance zones, JBA continues to coordinate as necessary with other agencies, including the National Park Service, to manage the tree canopy on adjacent properties.

Primary threats to existing forest stands are wildfire, insects and disease. Fires have been minimal and are managed by the JBA Fire Department with assistance from local volunteer fire departments and the Maryland Forest Service (MFS). Gypsy moth and southern pine beetle are the insects that pose the greatest threat. Gypsy moths defoliate the oaks and can cause a reduction in canopy shade and extensive forested areas. Pine beetles often attack pine tree stands which are under stress. Potential tree diseases include anthracnose, annosus root rot, and oak wilt. The MFS and Maryland Department of Agriculture provide support for insect and disease detection, identification; JBA will establish a joint agreement with these state entities for insect and disease control, when necessary (89 Civil Engineer Squadron 2004).

## **7.8 INVASIVE PLANT SPECIES AND NOXIOUS WEEDS**

EO 13112 requires federal agencies to provide for restoration of native species and habitat conditions in ecosystems that are affected by invasive species. Invasive species at JBA are listed in Section 2.7.6. The 2006 Invasive Species Report (USACE 2006e), kept on file with the 11CES/CEIE, contains a description of each species that was known at the time and provides potential management strategies.

Common reed (*Phragmites communis*) has become a very destructive weed in Maryland, quickly displacing desirable plant species such as wild rice, cattails, and native wetland orchids. Invasive stands of common reed eliminate diverse wetland plant communities and provide little food or shelter for wildlife. Common reed is prevalent along drainages and streams in the southern portions of the main base. A schedule has been developed (twice a year) for the removal of the common reed in various areas of the Main Base; however, staff limitations have prevented treatment at the GSU's. Management of the common reed is also covered in the IPMP and GEM Plan.

Japanese honeysuckle is problematic due to its ability to outgrow and shade native vegetation. JBA applies herbicides to control the growth of the Japanese honeysuckle along the Main Base's perimeter fence.

Invasive species of tall fescue, Korean lespedeza, and multiflora rose have been documented in the endangered sandplain gerardia management plot. These invasive plants quickly dominate natural communities by out-competing native vegetation for resources. As a result, the quality and productivity of endangered species' habitat are directly affected. The management plan for the sandplain gerardia includes the removal of undergrowth, including the removal on invasive species.

There are currently six plant species that have been designated as noxious weeds in Maryland: plumeless thistle (*Carduus acanthoides*), musk/nodding thistle (*Carduus nutans*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), shattercane (*Sorghum bicolor*), and johnsongrass (*Sorghum halepense*). Maryland law requires landowners to manage noxious weeds on all types of land. None of these plants have been identified at JBA.

## **7.9 NUISANCE WILDLIFE AND WILDLIFE DISEASE**

In addition to wildlife described in the BASH Plan that pose threats to aircraft, other species that sometimes cause nuisance at JBA include rodents (field mice, Norway and Roof rats, and squirrels), raccoons, opossum, groundhogs, feral cats, stray dogs, foxes, bats, beavers, pigeons, crows, starlings, and sparrows (USAF 2008a). Most nuisance wildlife is currently managed according to the Integrated Pest Management Plan. Refer to Section 4.6 for additional information on the IPMP.

Rodents can carry disease, and animals such as foxes may be infected with rabies. Bird droppings from roosting in aircraft hangars can contribute to disease as well as corrosion of aircraft. Beavers destroy trees and vegetation, erode soil, and block waterways that cause flooding. Flooded areas in turn can breed disease-vector pests. Beavers can be found at both the Main Base and the GSUs due to the presence of flowing streams and undisturbed forestation (USAF 2008a). Maryland state law prohibits the relocation of beavers, which requires JBA to coordinate with MD DNR, USFWS and the National Park Service on non-lethal means of reducing the beaver population.

## **7.10 INTEGRATED PEST MANAGEMENT PROGRAM**

Integrated pest management (IPM) is the use of multiple techniques in a compatible manner to avoid damage and minimize adverse environmental affects while obtaining control of target pests. The goal of IPM is to utilize non-chemical procedures, to the extent possible, to control pests, including both invasive and exotic plant and animal species. Typically a combination of the following IPM techniques is required to resolve a problem on a sustained basis:

- Mechanical control, which alters environments in which pests live, traps or removes pests (i.e. glue boards and live-traps) from where they are not wanted, or excludes pests from where they are not wanted (i.e. screening);
- Cultural control, which manipulates environmental conditions to suppress or eliminate pests (i.e. filling in depressions in the ground to prevent standing pools of water);

- Biological control, which uses predators, parasites, or disease organisms to control pests (i.e., use of milky spore to control Gypsy moth and Japanese beetle larvae on Main Base);
- Chemical control, which relies on pesticides and/or herbicides to kill pest and/or undesirable species of plants.

The IPMP includes pest identification and management requirements, outlines the resources necessary for surveillance and control, and describes the administrative, safety, and environmental requirements of the program. Environmental considerations addressed in the plan include pest control operations in sensitive natural areas, endangered/protected species and critical habitats, pesticide spills and remediation, and pollution prevention (USAF 2008a).

### **7.11 BIRD/AIRCRAFT STRIKE HAZARD (BASH)**

Several species consistently pose a BASH (Bird/Wildlife Animal Strike Hazard) risk. Located in the Atlantic Migratory Flyway with several wildlife refuges in the local flying area, JBA is a stop-over zone for thousands of migratory birds. Historically, small birds such as killdeer, starlings, blackbirds and swallows have accounted for the vast majority of bird strikes near JBA. Although fewer in number, larger gulls, geese and birds of prey also pose a hazard to aircrews operating in the area (JBAI 91-212). Deer and small mammals have also been a hazard on the airfield. Habitats that attract these birds and mammals include the base lake to the south, the Belle Chance site to the northwest, landscaping and natural vegetation associated with the golf course, dense stands of trees at the southeast edge of the airfield, ornamental trees throughout the Main Base, and forested areas on and near the airfield. Adjacent to the Davidsonville Transmitter Station, the Patuxent River serves as a major migratory and local movement corridor for birds in the region.

In addition to general fish and wildlife management, there are management needs associated with minimizing air strikes and BASH-related risk since JBA's primary military mission is based on flying missions.

The 89 AW actively implements a BASH Plan at JBA in order to reduce the potential for strike hazards by resident and seasonal birds and by other species of wildlife. The BASH Plan is provided in Appendix F. The plan identifies specific hazards (types of wildlife and natural resource attractants) and local conditions (see also Section 2.7.7), as well as the process, responsibilities, available techniques, legal requirements and management recommendations. Implementation of specific portions of the plan is continuous, while other portions will be implemented as required by bird or other wildlife activity (JBAI 91-212).

JBA annually renews wildlife depredation permits that are issued by the MD DNR. The permits are used to control BASH risk species such as Canada geese and deer, as well as injured, sick or nuisance animals that could impact the military mission at JBA. Table 8 shows the number of birds and animals that have been removed by lethal means over the past five years. Although geese and mallards, as shown in the table, are protected by the Migratory Bird Treaty Act, the permit allows a maximum number of birds to be killed in

a season. The BASH Plan identifies non-lethal methods of addressing migratory birds, such as draining standing water that accumulates after rainstorms to remove a potential habitat for migratory birds and adjusting flight arrival and departure times during migratory bird seasons to reduce the potential for airstrikes.

The 2003 Memorandum of Agreement Between the Federal Aviation Administration, the U.S. Air Force, the U.S. Army, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture to Address Aircraft-Wildlife Strikes promotes coordination by the signatories on major activities of concern, including but not limited to: airport siting and expansion, development of conservation/mitigation habitats or other land uses that could attract hazardous wildlife to airports or nearby areas; and responses to known wildlife hazards or aircraft-wildlife strikes. The MOA allows JBA to evaluate and comment on off-site BASH risks, including proposed wetland mitigation projects in development proposals (Johnson 2012c).

## **7.12 OUTDOOR RECREATION**

Outdoor recreation activities at JBA include camping, hiking, picnicking, hunting, fishing, boating, and archery. Other outdoor recreation facilities include three 18-hole golf courses and the Base Lake (Freedom Lake), located on the south golf course. Recreational fishing at JBA is limited to Freedom Lake.

The 11 WG's Outdoor Recreation office is responsible for nature education, outdoor recreation activities, family campgrounds (FAMCAMP), outdoor recreation equipment rental and the maintenance of the Yuma nature trail, located in Yuma Park adjacent to Annapolis Estates neighborhood. Due to mission and security constraints, no public access is permitted for outdoor recreation at JBA Main Base, the Davidsonville Transmitter Station, or the Brandywine Receiver Station.

## **7.13 MIGRATORY BIRD ACT**

Mature forests are important to nesting and foraging song birds where their long term survival is dependent on a diversity of natural habitats. To minimize temporal and long term impacts to avian species at Joint-Base Andrews. In order to minimize the impact to birds, JBA will conduct the following actions:

- 1) Land clearing to be scheduled outside the migratory bird nesting period (March through August), to avoid adversely impacting active nests containing eggs or young as prohibited under MBTA. Some species of raptors begin nesting in February such as Great-horned owls and bald eagles which are common to the area.
- 2) Where possible, maintain existing forested corridors to allow for connectivity between forest patches or stands and,
- 3) Implement reforestation initiatives where possible, to create or enhance natural habitats for bird diversity.

In summary, the single, most important step that Joint-Base Andrews personnel will be taking is to avoid the incidental take of migratory birds and to initiate tree clearing after

the annual nesting season. Ideally, tree removal should occur in the fall or winter seasons. JBA will continue to work in partnership with the U.S. Fish and Wildlife Service (Chesapeake Bay Field Office @ 410-573-4534) in the continued protection of natural resources.

## **7.14 CULTURAL RESOURCES PROTECTION**

### **7.14.1 Native American**

AFI 90-2002, *Air Force Interactions with Federally-Recognized Tribes* directs all echelons within the Air Force to build relationships and conduct consultations with federally-recognized Indian/Alaska Native tribes, bands, nations, pueblos, or communities as required by federal laws and regulations, Executive Orders, and Presidential Memoranda. Within Maryland, there are no federally-recognized tribes. If in the future a tribe is federally-recognized within Maryland, Joint Base Andrews will immediately identify if the tribe has any historical or cultural affiliation to our property and if so, will take the necessary steps to implement all necessary protocols and meetings.

## **7.15 ENFORCEMENT**

JBA has multiple natural resources consultation requirements in addition to the INRMP development and review requirements as identified in the SAIA. Federally listed threatened and endangered species management requires ESA Section 7 consultation with the USFWS. State listed threatened and endangered species management and game species management requires consultation with MDNR. Actions that fall under the jurisdiction of Section 404 or 401 of the Clean Water Act (CWA) necessitate permitting from the USACE and MDE, respectively.

JBA would also be required to coordinate with the National Marine Fisheries Service regarding Essential Fish Habitat in any cases where a proposed action could have an impact on fisheries protected under the Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265). Because this coordination is meant to protect essential breeding and critical life stage habitats for commercially important fish, no consultation would be required for the Main Base or Brandywine Receiver Station. The Davidsonville Transmitter Station, however, is bounded on the west by a protected portion of the Patuxent River, which may support critical stages of some protected fish species.

Intra- and inter-agency cooperation, coordination, and communication at the federal, state and local levels (e.g., USFWS and MD DNR) are requisite to the success of the INRMP. The USFWS and MD DNR review the INRMP and its implementation and can contribute specialized expertise to assist with natural resources management at JBA.

Memorandums of Understanding (MOU), Memorandums of Agreement (MOA), and other cooperative agreements with other federal agencies and various state agencies allow installations and agencies to obtain mutual conservation objectives.

## **7.16 PUBLIC OUTREACH**

The 11th Wing Public Affairs office is responsible for communicating information about the 11th Wing and base programs and activities to the general public and Air Force members and their families. Their mission is to ensure all audiences are informed about how well the Air Force is prepared to carry out its mission at JBA. The Public Affairs office coordinates guided public tours of the Main Base, available to groups of 10 to 40 people. For safety reasons, children under the age of 10 are not allowed.

The 11th Wing Plans and Exercises office plans and executes the annual DoD Joint Service Open House, which falls on Armed Forces Day weekend in May. This event and airshow allows the DoD to showcase the military's air and land assets to more than 100,000 spectators each year.

Due to mission and security constraints, no public access is permitted for hunting, fishing, trapping, or other wildlife-related outdoor recreation at JBA Main Base, the Davidsonville Transmitter Station, or the Brandywine Receiver Station.

## Chapter 8 Management Goals and Objectives

### **GOAL 1: *MANAGE NATURAL RESOURCES WHILE SUPPORTING MISSION***

**GOAL PM:** Manage natural resources in a manner that is compatible with and supports the military mission while complying with applicable federal and state laws and USAF regulations and policies.

**OBJECTIVE PM1:** Initiate and/or continue programs and projects that enhance mission and training land / opportunities and result in no net loss in mission capability, while complying with all laws, regulations and policies

**OBJECTIVE PM2:** Use adaptive, ecosystem management as the primary natural resources management paradigm

**OBJECTIVE PM3:** Use the INRMP Project Team to facilitate implementation of this INRMP and to share knowledge about natural resources management at JBA

**OBJECTIVE PM4:** Provide outdoor recreation opportunities that do not conflict with sustainable ecosystem management or the military mission or jeopardize the safety of JBA users

**OBJECTIVE PM5:** Conduct internal environmental awareness activities to minimize impacts to natural resources

**OBJECTIVE PM6:** Cooperate with other agencies and local landowners on regional land and natural resources management

Programmatic management includes INRMP annual reviews, adaptive management, environmental awareness, public outreach, outdoor recreation, GIS data management, and other objectives related to implementing a natural resources management program.

### **GOAL 2: FISH AND WILDLIFE MANAGEMENT**

**GOAL FW:** Maintain fish and wildlife populations while minimizing potential impacts to the military mission.

**OBJECTIVE FW1:** Manage wildlife using a systematic approach that includes inventory, monitoring, management, and assessment

**OBJECTIVE FW2:** Minimize BASH risk by deterring birds and other hazardous wildlife from flight line areas

**OBJECTIVE FW3:** Maintain a sustainable wildlife harvest program using adaptive, ecosystem management

### **GOAL 3: THREATENED AND ENDANGERED SPECIES MANAGEMENT**

**GOAL TE:** Manage rare species using an ecosystem approach, while maintaining the military mission at JBA

**OBJECTIVE TE1:** Conduct flora and fauna surveys regularly, particularly where potential habitat exists for threatened and endangered species

**OBJECTIVE TE2:** Maintain populations of rare flora and fauna species

### **GOAL 4: VEGETATION MANAGEMENT**

**GOAL VM:** Manage vegetation using sustainable and cost effective methods without negatively impacting the mission

**OBJECTIVE VM1:** Maintain intact, healthy habitat and enhance or restore degraded habitat, without increasing BASH risk

**OBJECTIVE VM2:** Maximize native plants and avoid invasive non-native plants in landscaping and re-vegetation projects

**OBJECTIVE VM3:** Minimize chemical and maintenance input during grounds maintenance

Vegetation management includes forest management, fish and wildlife habitat management, rare species management, and grounds maintenance. There is a significant overlap in the objectives within this section and all other sections within the INRMP, which is indicative of the essential role vegetation plays in ecosystems and natural resources management.

### **GOAL 5: INVASIVE AND PEST SPECIES**

**GOAL IN:** Minimize impacts of invasive and pest species, while minimizing use of chemicals to manage those species, using an integrated management approach.

**OBJECTIVE IN1:** Control and minimize the impact of invasive species to reduce competition with native species

**OBJECTIVE IN2:** Maintain accurate data about current distribution of invasive species and effects of treatments

**OBJECTIVE IN3:** Protect infrastructure from pest species

**OBJECTIVE IN4:** Create and Implement IPMP

## **GOAL 6: WATER RESOURCES MANAGEMENT**

**GOAL WA:** Protect water resources and minimize impacts to coastal resources consistent with state and federal laws pertaining to water resources

**OBJECTIVE WA1:** Manage wetland areas to minimize impacts to existing wetlands and minimize the potential for new wetlands due to BASH risk

**OBJECTIVE WA2:** Maintain accurate and complete data associated with water resources to facilitate impact assessment and permitting, when needed

**OBJECTIVE WA3:** Minimize nonpoint source pollution through implementation of BMPs and following existing spill prevention and hazardous materials management protocols

**OBJECTIVE WA4:** Maintain healthy riparian buffer zones to protect surface waters

**OBJECTIVE WA5:** Manage soil to minimize sediment loss and erosion, while protecting water quality

## **Chapter 9**

### **Implementation**

The primary measure of INRMP effectiveness is whether implementation of INRMP helps prevent net loss in the capability of military lands to support the military mission. The 11 CES/CEIE is preserving JBA's capability to support the mission through its natural resource management practices outlined in the 2012 INRMP and in this update.

Long-term management effectiveness is also evaluated through periodic inventories of species populations, habitat quantity and quality, and habitat values through recurring Planning Level Surveys (PLS). Trends can be used to indicate the degree of success. The 11 CES/CEIE will evaluate these recurring data as they become available.

A practical evaluation of INRMP implementation includes reviewing whether planned projects and activities have been accomplished. An analysis of the FY 2007-2011 projects and their implementation status is included in Table 7. A large number of the projects are recurring actions that are continued in this INRMP. See Section 4 for topic-specific goals and objectives and Section 5 for associated projects and activities.

#### **9.1 WORK PLANS**

Management goals and objectives were developed through a thorough evaluation of the natural resources present on JBA. This updated INRMP will be implemented through the various policies and programs described throughout the document.

##### **9.1.1 Project Implementation**

In accordance with AFI 32-7064, an INRMP is considered implemented if an installation:

- Actively requests, receives, and uses funds for priority projects and activities (Levels 0 and 1 as defined by AFI 32-7001 Environmental Management and DoDI 4715.03);
- Executes all priority projects and activities in accordance with specific timeframes identified in the INRMP;
- Ensures that sufficient numbers of professionally trained natural resources management personnel are available to perform the tasks required by the INRMP;
- Reviews the INRMP annually and coordinates annually with cooperating agencies; and
- Documents specific INRMP action accomplishments undertaken each year.

**Table 7  
Bird and Mammal Lethal Means Counts, JBA**

Wildlife	Year				
	2009	2010	2011	2012	2013
Geese	10	7	10	10	0
Mallard Ducks	8	7		0	0
Deer	52	41	29	27	26
Raccoon		15	14	14	7
Beaver		8	2	2	6
Pigeons			9	0	0
Cat			6	6	0
Fox		1	3	3	2
Skunks			3	3	1
Ground Hog			3	1	6
Opossum		1	2	3	4
Squirrel			1	0	0
Snapping Turtle			1	1	0

Source: Johnson 2012b

## 9.2 NATURAL RESOURCES MANAGEMENT STAFFING

The 11 CES/CEIE personnel will coordinate and implement the INRMP, with support from the 11 WG’s Engineering, Programming and Design; Operations; and Community Services staff. The 89 WG Flight Safety and 79 WG Bioenvironmental Engineer will also provide support.

Additional labor resources may include:

- Federal agencies;
- State agencies;
- Local and regional universities;
- Scouting groups; and
- Conservation groups (e.g., Audubon Society, and sportsmen’s clubs)

## 9.3 ANNUAL COORDINATION REQUIREMENTS

Per DoD policy, the 11 CES/CEIE will review the INRMP annually in cooperation with the USFWS and MD DNR. On an annual basis, the 11 CES/CEIE will invite the USFWS Regional Office, the USFWS local Field Office, and the MD DNR to participate in a conference call or attend a meeting to review previous year INRMP implementation and discuss implementation of upcoming programs and projects. Invitations will be either by email or letter. Attendance is at the option of those invited, but, at minimum, the USFWS local field office and one representative of MD DNR are expected to attend. The meeting will be documented with an agenda, meeting minutes and sign-in roster of attendees.

At this annual meeting the attendees will discuss the need for updates or revisions. If updates are needed, the requesting party will initiate the updates and, after agreement of all three parties, they will be added to the INRMP. If it is determined that revision is needed, all three parties will provide input and an INRMP revision will be initiated with the 11 CES/CEIE acting as the lead coordinating agency. The annual meeting will be used to help expedite the more formal review for operation and effect and if all parties agree and document their mutual agreement, it can fulfill the requirement to review the INRMP for operation and effect.

If not already determined in previous annual meetings, by the fourth year annual review a determination will be made jointly to continue implementation of the existing INRMP with updates or alternatively to proceed with a revision. If the parties feel that the annual reviews have not been sufficient to evaluate operation and effect and if it cannot be determined whether the INRMP implementation should continue or the INRMP be revised, a formal review for operation and effect will be initiated. The determination on how to proceed with INRMP implementation or revision will be made after the parties have had time to complete this review.

As part of the annual review, the 11 CES/CEIE will specifically:

- Invite feedback from the USFWS and MD DNR on the effectiveness of the INRMP;
- Inform the USFWS and MD DNR which INRMP projects and activities are required to meet current natural resources compliance needs; and
- Document specific INRMP action accomplishments from the previous year.

Information for the annual reviews comes from the 11 CES/CEIE and military leadership, cooperating agencies, and project files. Natural resources data and program and project information are available to cooperating agencies. These agencies may request to see project folders or to have a site visit to view natural resources projects in progress at any time.

#### **9.4 MONITORING INRMP IMPLEMENTATION**

Monitoring of INRMP implementation is necessary to facilitate the legal requirements of the SAIA for review for operation and effect. The Sikes Act Improvement Amendments (SAIA) implementation criteria do not necessarily measure the effectiveness of an INRMP in facilitating mission accomplishment while conserving natural resources. The JBA INRMP implementation will be monitored for meeting the legal requirements of the SAIA as well as for other mission and biological measures of effectiveness.

The ultimate successful implementation of this INRMP is realized in no net loss in the capability of the JBA lands to support the military mission while at the same time providing effective natural resources management. Initiation of projects is one measure that is used to monitor INRMP implementation, but a significant portion of INRMP implementation is done through internal coordination in regard to site operations and land use decision making. This type of implementation cannot be measured by project implementation or funding levels. It is evidenced by such things as the ability to

continually train, sustainable land use, ongoing regulatory compliance, retention of species diversity, retention of surface water quality, and the acknowledgement of sustainable natural resources management by partnering conservation agencies and other interested organizations and individuals.

In order to monitor and evaluate the effectiveness of the INRMP implementation the following will be reviewed as applicable and discussed within the context of the annual review and/or a formal review of operation and effect:

- Impacts to/from the military mission;
- Conservation program budget;
- Staff requirements;
- Program and project implementation;
- Trends in species and habitat diversity as evidenced by recurring biological surveys,
- land use changes, and opinions of natural resource experts;
- Compliance with regulatory requirements; and
- Feedback from military trainers, the USFWS, the MD DNR, and others.

Some of these areas may not be looked at every year due to lack of data or pertinent information. The effectiveness of the INRMP as a mission enabling conservation tool will be decided by mutual agreement of the USFWS, the MD DNR, and the 11 CES/CEIE during annual reviews and / or reviews for operation and effect.

#### **9.4.1 USAF and DoD INRMP Implementation Monitoring**

The USAF uses the Defense Environmental Programs Annual Report to Congress (DEPARC) to monitor SAIA compliance. DEPARC is the automated system used to collect installation environmental information for reporting to DoD and Congress.

Established to fulfill an annual requirement to report the status of DoD's Environmental Quality program to Congress, DEPARC collects information on enforcement actions, inspections and other performance measures for high-level reports and quarterly reviews. DEPARC also helps the USAF track fulfillment of DoD Measures of Merit requirements.

The DUSD Updated Guidance for Implementation of the SAIA updated Conservation Metrics for Preparing and Implementing INRMPs. Progress toward meeting these measures of merit is reported in the annual report to Congress. DEPARC reporting requirements currently include:

- What are the installation plans, programs and budgets for actions that support INRMP goals and objectives?
- Was the INRMP "fully-implemented" during previous execution year?

- Were all funds allocated for INRMP implementation (EQ, Reimbursable, and other) executed for the intended purpose?
- Is there adequate participation / collaboration from USFWS during Annual INRMP Review and major revisions?
- Is there adequate participation / collaboration from the State Fish and Wildlife Agency during Annual INRMP Review and major revisions?
- Is the INRMP consistent with the goals of the State Wildlife Action Plan (WAP), Candidate Conservation Agreements, & other regional ecosystem management agreements for which DoD/AF is signatory?
- Are communications with USFWS and State Fish and Wildlife Agency documented?
- Does the installation have on-site Air Force natural resources management staff employed in the GS-0400 Biological Sciences Job Series?
- Is there a sufficient number of natural resources staff to adequately implement INRMP goals and objectives?
- Are the capabilities of the Air Force natural resources team enhanced through use of volunteers, cooperative agreements with non-governmental organizations, on-site contractor support, or Interagency Agreements with other federal or state agencies?
- Does the installation have adequate conservation law enforcement capability through employment of a credentialed conservation law enforcement officer, or through interagency agreement with another agency?
- Is there adequate participation/collaboration from the Operations Group, Range and Airspace managers, Community Planners, Tenant Organizations and other organizations in INRMP update and revision to ensure mission needs are addressed?
- Does the INRMP support unrestricted use of the installation?
- Has there been a net loss of operations area, airspace, or training lands? Is there a deficiency in capacity, size, or arrangement of the installation natural infrastructure to support the current mission and foreseeable future needs?
- What are the federally listed threatened and endangered species present on the installation?
- What are the state protected species present on the installation?
- Have surveys for the presence of potentially-occurring, federally-listed Threatened or Endangered species, or suitable habitat within the historic range of a listed species, been conducted on the installation?
- Does the INRMP adequately address potentially-occurring Threatened or Endangered species and/or potentially-suitable habitat within the historic range of a listed species?
- Have Threatened or Endangered species locations or potentially-suitable habitats within the historic range of a listed species, been mapped and included as part of the Environmental Functional Data Set and Geodatabase?

- Does the INRMP provide adequate conservation measures for identified Threatened or Endangered species and their habitat, as mutually-agreed by USFWS and State Fish and Wildlife agency during the INRMP Annual Review or major revision coordination?
- Has Critical Habitat for Threatened or Endangered species been designated on the installation?
- Have all major ecosystems (i.e., vegetative communities / habitats) been surveyed and mapped for the installation?
- Does the INRMP address the desired future condition for ecosystems, habitats and communities to sustain current and future mission activities and achieve natural resources management goals and objectives?
- Are native habitat restoration projects to support INRMP goals and objectives being planned, programmed, budgeted and executed?
- Does the INRMP provide for adequate control of invasive and exotic species?
- Does the INRMP address the availability of outdoor recreational opportunities (e.g., hunting, fishing, and other dispersed outdoor recreation) on the installation?
- Does the INRMP address the availability of outdoor recreation opportunities for the public, and establish access and usage categories for installation areas in accordance with mission and security requirements (i.e., Open, Restricted, Off-Limits)?
- For each outdoor recreation access category (Open, Restricted, Off-Limits), does the INRMP address and justify allowable access to those areas by category of participant (e.g., Active Duty Military, Military Dependents, DoD Civilians, Military Retirees, Defense Contractors, General Public)?
- Does the INRMP address program management for hunting, fishing and other outdoor recreation, and the role of the installation natural resources manager?

## APPENDICES

Appendix A: Acronyms

Appendix B: Maps

Soil Map

Water Resources Map

Vegetative Communities Map

Special Status Species Map

Appendix C: Five-Year Review for Operation and Effect

Appendix D: Agency Correspondences

Appendix E: Laws, Regulations, Policies, and Executive Orders

Appendix F: JBAI 92-212 (BASH Plan)

Appendix G: MOA to address Aircraft-Wildlife Strikes

Appendix H: Management Action Plan for Sandplain Gerardia

## REFERENCES

- 89 OSS/OSW.** 2012. Personal Correspondence, 89<sup>th</sup> Air Wing Operations Support Squadron. 5 May 2012.
- ARCADIS U.S., Inc.** 2008. *Department of Defense Chesapeake Bay Strategic Action Plan*. Prepared for Department of Defense Chesapeake Bay Program.
- Bailey, R.G., P.E. Avers, T. King, and W.H. McNab.** 1995. *Ecoregions and Subregions of the United States (with supplementary table of map unit descriptions compiled and edited by W.H. McNab and R.G. Bailey)*. Washington D.C.: US Forest Service.
- CEC.** 1997. *Ecological Regions of North American: Toward a Common Perspective*. Montreal, Quebec: Commission for Environmental Cooperation.
- DoD.** 2011. *Strategic Sustainability Performance Plan FY 2011*. Department of Defense.
- Ecology and Environment, Inc.** 2005. *Threatened and Endangered Species Survey*. Arlington, Virginia: Ecology and Environment, Inc. Prepared for Andrews AFB.
- Infinity Technology and PBS&J.** 2010. *General Plan Update: Joint Base Andrews-Naval Air Facility, Washington, Maryland*. Prepared for JBA.
- JBA.** 2012. JBA Environmental Flight, Pollution Prevention web page. <http://www.andrews.af.mil/library/environmental/polutionprevention.asp>
- JBAI 91-212.** *Joint Base Andrews Instruction 91-212 - Bird/Wildlife Aircraft Strike*. 1 November 2010.
- Johnson.** Erik. 2012a. Personal communication. 5 June 2012.
- Johnson.** Erik. 2012b. Personal communication. 16 April 2012.
- Johnson.** Erik. 2012c. Personal communication. 9 April 2012.
- Los Alamos Technical Associates, Inc. and URS Group, Inc.** 2011. *Stormwater Pollution Prevention Plan for Joint Base Andrews*. Prepared for JBA.
- MACTEC.** 2011. *Andrews – NAF Arbor Plan*. MACTEC Engineering and Consulting, Inc. Prepared for JBA.

- MCCE.** 2008. *Climate Action Plan – Interim Report to the Governor and the Maryland General Assembly.* The Maryland Commission on Climate Change.
- MDE.** 2010. *Maryland’s Phase I Watershed Implementation Plan for the Chesapeake Bay Total Maximum Daily Load.* Maryland Department of the Environment.
- \_\_\_\_\_ 2011. *General Permit for Discharges from the Application of Pesticides.* Maryland Department of the Environment.
- \_\_\_\_\_ 2012a. Maryland’s Searchable Integrated Report Database [Combined 303(d)/305(d) List]. Maryland Department of the Environment.  
<http://www.mde.state.md.us/programs/Water/TMDL/Integrated303dReports/Pages/303d.aspx>.
- \_\_\_\_\_ 2012b. *Maryland’s Phase II Watershed Implementation Plan for the Chesapeake Bay Total Maximum Daily Load.* Maryland Department of the Environment.
- MD DNR.** 2005. *Maryland Wildlife Diversity Conservation Plan.* Maryland Department of Natural Resources.
- \_\_\_\_\_ 2012a. Email correspondence regarding rare, threatened and endangered species at JBA from Ms. Lori Byrne of Maryland Department of Natural Resources to Ms. Paige Hatley of AMEC dated February 6, 2012.
- \_\_\_\_\_ 2012b. Letter regarding fisheries information at JBA from Mr. Ken Yetman of Maryland Department of Natural Resources to Ms. Paige Hatley of AMEC dated March 26, 2012.
- MNCPPC.** 2009. *Joint Base Andrews Naval Air Facility Washington Joint Land Use Study.* Upper Marlboro, Maryland: The Maryland-National Capital Park and Planning Commission.
- The Nature Conservancy.** 2012. Climate Wizard site.  
<http://www.climatewizard.org/>
- USACE.** 2006a. *Andrews AFB INRMP Update 2006: Soils Planning Level Survey.* U.S. Army Corps of Engineers. Prepared for Andrews AFB.
- \_\_\_\_\_ 2006b. *Andrews AFB INRMP Update 2006: Wetlands Planning Level Survey.* U.S. Army Corps of Engineers. Prepared for Andrews AFB.
- \_\_\_\_\_ 2006c. *Andrews AFB INRMP Update 2006: Appendix 4. Invasive*

- Species Found at Andrews AFB*. U.S. Army Corps of Engineers. Prepared for Andrews AFB.
- \_\_\_\_\_ 2006d. *Andrews AFB INRMP Update 2006: Fauna Planning Level Survey*. U.S. Army Corps of Engineers. Prepared for Andrews AFB.
- \_\_\_\_\_ 2006e. *Andrews AFB INRMP Update 2006: Appendix 4 – Invasive Species Found at Andrews AFB*. U.S. Army Corps of Engineers. Prepared for Andrews AFB.
- USAF**. 2007. *Air Installation Compatible Use Zone Study: Andrews Air Force Base*. United States Air Force.
- \_\_\_\_\_ 2008a. *Pest Management Plan for Andrews Air Force Base, Maryland*.
- \_\_\_\_\_ 2008b. *The Courses at Andrews Environmental Management (GEM) Plan*. San Antonio Texas: Air Force Center for Engineering & the Environment.
- \_\_\_\_\_ 2010. *Air Force Energy Plan 2010*. Air Force Installations, Environment and Logistics (SAF/IE).
- \_\_\_\_\_ 2012. *Draft Environmental Assessment for Stormwater System Repair and Upgrades at Joint Base Andrews-Naval Air Facility, Washington, Maryland*. United States Air Force.
- USDA**. 2012. National Soil Survey Handbook, title 430-VI. U.S. Department of Agriculture, Natural Resources Conservation Service.  
<http://soils.usda.gov/technical/handbook/>.
- USFWS**. 2012a. Comments from United States Fish and Wildlife Service representative. Conference Call. 1 May 2012.
- USFWS**. 2012b. Letter regarding threatened and endangered species at JBA from Ms. Genevieve LaRouche of the United States Fish and Wildlife Service to Ms. Paige Hatley of AMEC dated March 27, 2012.
- USGS**. 2012. *Hydrologic Unit Maps*. US Geological Survey.  
<http://water.usgs.gov/GIS/huc.html>.
- Woods**, Alan J., J.M. Omernik, and D.D. Brown. 2003. *Level III and IV Ecoregions of EPA Region 3*. (Map preparation by J.A. Comstock, S.H. Azevedo, M.F. Faure, and S.M. Pierson).

## APPENDIX A: ACRONYMS

11 CES/CEIE	11th Civil Engineering Squadron/ Civil, Environmental and Infrastructure Engineering
11WG	11 <sup>th</sup> Wing
79 MDW	79 <sup>th</sup> Medical Wing
89 AW	89 <sup>th</sup> Air Wing
AEF	Air and Space Expeditionary Force
AFB	Air Force Base
AFCEE	Air Force Center for Engineering and the Environment
AFDW	Air Force District of Washington
AFI	Air Force Instruction
AMC	Air Mobility Command
AMSL	Above Mean Sea Level
ANGRC	Air National Guard Readiness Center
BASH	Bird/Wildlife Aircraft Strike Hazard
BGS	Below Ground Surface
BMP	Best Management Practice
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
COMAR	Code of Maryland Regulations
CWA	Clean Water Act
CY	Calendar Year
CZARA	Coastal Zone Act Reauthorization
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DCANG	District of Columbia Air National Guard
DEPARC	Defense Environmental Programs Annual Report to Congress
DoD	Department of Defense
DoDI	DoD Instruction
DUSD	Deputy under Secretary of Defense
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process

EIS	Environmental Impact Assessment
EMS	Environmental Management System
EO	Executive Order
EPA	Environmental Protection Agency
EPF	Environmental Planning Function
ERP	Environmental Restoration Program
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FY	Fiscal Year
GEM	Golf Courses Environmental Management
GHG	Greenhouse Gases
GIS	Geographic Information System
GSU	Geographically Separated Unit
HAZMAT	Hazardous Materials
HUC	Hydrologic Unit Code
INRMP	Integrated Natural Resources Management Plan
IPM	Integrated Pest Management
IPMP	Integrated Pest Management Plan
ISO	International Standards Organization
JBA	Joint Base Andrews, <i>also</i> Joint Base Andrews – Naval Air Facility
JBAI	Joint Base Andrews Instruction
JSOH	Joint Services Open House
LEED	Leadership in Energy and Environmental Design
LID	Low Impact Development
MBTA	Migratory Bird Treaty Act
MD	Maryland
MD DNR	Maryland Department of Natural Resources
MDE	Maryland Department of the Environment
MDP	Maryland Department of Planning
MFS	Maryland Forest Service

MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NAF	Naval Air Facility
NCR	National Capital Region
NDCEE	National Defense Center for Energy and the Environment
NEEF	National Environmental Education Foundation
NEPA	National Environmental Policy Act
NGB	National Guard Bureau
NPDES	National Pollutant Discharge Elimination System
NPLD	National Public Lands Day
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
PLS	Planning Level Survey
POL	Petroleum, Oil and Lubricants
REC	Regional Environmental Coordinator
SAIA	Sikes Act Improvement Act
SAM	Special Airlift Mission
SCC	Sustainable Design and Development
SWPPP	Stormwater Pollution Prevention Plan
T&E	Threatened and Endangered
US	United States
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WMA	Water Management Administration
WSSC	Washington Suburban Sanitary Commission

**APPENDIX B: MAPS**

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**APPENDIX C: FIVE-YEAR REVIEW FOR OPERATION AND EFFECT**

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**APPENDIX D: AGENCY CORRESPONDENCE**

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**APPENDIX E: LAWS, REGULATIONS, POLICIES, AND EXECUTIVE  
ORDERS**

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## **GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION**

32 CFR. Part 190, *Appendix--Integrated Natural Resources Management*  
32 CFR. Part 989, *Environmental Impact Analysis Process (EIAP)*  
AFI 32-1053, *Pest Management Program*  
AFI 32-7045, *Environmental Compliance Assessment and Management Program (ECAMP)*  
AFI 32-7062, *Air Force Comprehensive Planning*  
AFI 32-7065, *Cultural Resources Management*  
AFI 65-601, *Budget Guidance and Procedures, Volume 1*  
AFI 90-2002, *Air Force Interactions with Federally-Recognized Tribes*  
AFI 91-202, *The US Air Force Mishap Prevention Program*  
AFI 91-204, *Safety Investigations and Reports*  
AFMAN 23-110, Volume II, Part Two, Chap 22, Section K, *USAF Supply Manual*  
AFMAN 37-123, *Management of Records*  
AFPAM 91-212, *Bird/Wildlife Aircraft Strike Hazard (BASH) Management Techniques*  
AFPD 32-70, *Environmental Quality*  
AFPD 37-1, *Air Force Information Management*  
Agricultural Risk Protection Act of 2000 (Plant Protection Act) (7 U.S.C. 7701-7772)  
Animal Damage Control Act (7 U.S.C. 426-426b)  
Bald Eagle Act of 1940 (16 U.S.C. 668-668d)  
Coastal Zone Management Act, as amended (16 U.S.C. 1451 *et. seq.*)  
Conservation Programs on Military Installations (Sikes Act), as amended (16 U.S.C. 670 *et. seq.*)  
*DoD Commander's Guide to Biodiversity*, 1996, Keystone Center, Keystone, CO  
DODI 4715.3, *Environmental Conservation Program*, May 3, 1996  
DoD Regulation 5400.7-R, *DoD Freedom of Information Act Program*, May 22, 1997  
Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543)  
Estuary Protection Act (16 U.S.C. 1221-1226)  
Executive Memorandum, April 26, 1994, *Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds*.  
Executive Order 11514, *Protection and Enhancement of Environmental Quality*, March 5, 1970  
Executive Order 11988, *Flood plain Management*, May 24, 1977  
Executive Order 11990, *Protection of Wetlands*, May 24, 1977  
Executive Order 13112, *Invasive Species*, February 3, 1999  
Executive Order 13148, *Greening the Government Through Leadership in Environmental Management*, April 22, 2000  
Executive Order No. 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, January 10, 2001  
Federal Insecticide, Fungicide, & Rodenticide Act (FIFRA), as amended (7 U.S.C. 136 *et. seq.*)  
Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701)  
Federal Noxious Weed Act of 1976 (7 U.S.C. 2801)  
Federal Water Pollution Control Act of 1977 (Clean Water Act), as amended (33 U.S.C. 1251-1376)  
Fish and Wildlife Conservation Act of 1980 (16 U.S.C. 2901)  
Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661 *et. seq.*)  
Hunting, Fishing and Trapping on Military Lands [An update of the Military Construction Authorization Act] (10 U.S.C. 2671)  
Lacey Act of 1900 (16 U.S.C. 701, 702)

Leslie, M., G.K. Meffe, J.L. Hardesty, and D.L. Adams. 1996. *Conserving Biodiversity on Military Lands -- A Handbook for Natural Resources Managers*. The Nature Conservancy, Arlington, VA.

Migratory Bird Treaty Act, as amended (16 U.S.C. 703 *et. seq.*)

National Defense Authorization Act for Fiscal Year 2003 (P.L. 107-314)

National Defense Authorization Act for Fiscal Year 2004 ( P.L. 108-136)

National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321-4347)

Outdoor Recreation on Federal Lands (16 U.S.C. 460(l))

Protection of Fossils on Federal Lands (43 U.S.C. 1701 *et. seq.*, 18 U.S.C. 641, and 18 U.S.C. 1361).

Rivers and Harbors Act of 1899 (33 U.S.C. 401 *et. seq.*)

Sikes Act (16 USC 670a-f), as amended

Soil and Water Conservation Act (16 U.S.C. 2001)

### **Department of Defense Instructions (DoDI), Air Force Instructions (AFI), Air Force Pamphlets (AFP) & Joint Base Andrews Instructions (JBAI)**

DoDI 4715.03 – Natural Resources Conservation Program

AFI 32-1053 – Pest Management Program

AFI 32-7001 – Environmental Management

AFI 32-7064 – Integrated Natural Resources Management

AFI 32-7062 – Air Force Comprehensive Planning

AFP 91-212 – Bird/Wildlife Aircraft Strike Hazard (BASH) Management Techniques

JBAI 91-212 – Bird/Wildlife Aircraft Strike Hazard (BASH Program)

### **Memoranda**

Memorandum, Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health), 14 Aug 06, Subject: *Integrated Natural Resource Management Plan (INRMP) Template*

Memorandum, Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health), 1 Nov 04, Subject: *Implementation of Sikes Act Improvement Amendments: Supplemental Guidance concerning INRMP Reviews*

Memorandum, Deputy Under Secretary of Defense (Installations and Environment), 10 Oct 02, Subject: *Implementation of Sikes Act Improvement Act: Updated Guidance*

Memorandum, Assistant Deputy Under Secretary of Defense (Environment), 5 Aug 02, Subject: *Access to Outdoor Recreation Programs on Military Installations for Persons with Disabilities.*

### **Maryland Regulations and Statutes**

*Regulations are found in the Maryland Code of Regulations (COMAR) and authorizing statutes in the Annotated Code of Maryland.*

**Air Quality**

(COMAR 26.11; Authority: Environment Article, §§9-313—9-316, 9-319, 9-320, 9-325, 9-327, and 9-328, Annotated Code of Maryland)

**Disposal of Controlled Hazardous Substances**

(COMAR 26.13; Authority: Environment Article, Title 7, Subtitle 2)

**Nontidal Wetlands**

COMAR 26.24; Authority: Environment Article, §§5-901—5-911 [Maryland Nontidal Wetlands Protection Act]

**Pesticide Use Control**

COMAR 15.05.01; Authority: Agriculture Article, §§2-103, 5-204, 5-207, and 5-210.2

**Threatened and Endangered Species**

COMAR 8.03.08; Authority: Natural Resources Article, §§4-2A-01—4-2A-09 and 10-2A-01—10-2A-09 [Nongame and Endangered Species Conservation Act]

**Threatened and Endangered Fish Species**

COMAR 8.02.12, Authority: Natural Resources Article, §4-2A-01 et seq.

**Water Management**

COMAR 26.17

**Soil and Erosion Control**

COMAR 26.17.01; Authority: Environment Article, §4-101

**Stormwater Management**

COMAR 26.17.02; Authority: Environment Article, §§4-201 and 4-203 [Stormwater Management Act]

**Water Pollution**

COMAR 26.08.01 – 26.08.04 [NPDES permits]; Authority: Environment Article, §§9-313—9-316, 9-319,9-320, 9-325, 9-327, and 9-328

**Wildlife**

COMAR 08.03; Authority: Natural Resources Article, §§10-101, 10-205, 10-206, 10-301, 10-404—10-409, 10-415, 10-418, 10902, and 10-903

**Noxious Weeds**

Agriculture, Title 9. Regulation and Supervision of Seeds, Turf Grass, Sod, Potatoes, Ginseng and Noxious Weeds, Subtitle 4. Weed Control, Annotated Code of Maryland

**State of Maryland Wildlife Laws**

Natural Resources Title 10. Wildlife

**APPENDIX F: JBAI 92-212 (BASH Plan)**

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**APPENDIX G: MOA TO ADDRESS AIRCRAFT-WILDLIFE STRIKES**

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**APPENDIX H: MANAGEMENT ACTION PLAN FOR SANDPLAIN GERARDIA**

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