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# **Timber Inventory & Forest Management Plan of JBLE-Eustis, VA**

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## **Executive Summary**

Forest Inventory & Vegetation Assessments for Fort Eustis (JBLE-Eustis) were previously conducted in 1997, 2007, and most recently in 2021. Implicit in the unique mission of JBLE-Eustis is the challenge of operating diverse air and ground training activities that are compatible within its natural and cultural surroundings. Since the 2007 report, considerable alterations to the land cover on JBLE-Eustis have occurred. New construction/development has altered the forest within various compartments, directly impacting previous management recommendations. Additionally, some previous silvicultural recommendations not implemented within specified timelines in the 2007 Forest Inventory needed to be revised or are now obsolete. The purpose of this document is to provide JBLE-Eustis with a comprehensive re-inventory of the Installation's forest resources and to impart sound management recommendations to promote a more sustainable, healthy forest/vegetative component that is compatible for land uses in both training lands and urban forests.

Prior to conducting a new inventory of existing vegetation and assessing its condition and status, an effort was made to research existing and future missions that may impact forested compartments at JBLE-Eustis. The research was paired with a comparative geographical information systems (GIS) analysis of land cover changes that have occurred since the 2007 Forest Vegetation Assessment. The analysis resulted in minor modifications to forested compartments that had been designated in the 2007 Report (according to criteria that included vegetation type, operational functions, and natural and/or man-made boundaries). Compartments were adjusted by use of a GIS to depict identified land use changes and previously unaccounted land cover characteristics made visible by the use of high-resolution imagery. Primary changes were made as a result of new development, land clearing, new forest cover, and/or previous imagery discrepancies. Upon completion on the preliminary compartment designation, maps were sent to the environmental department with the proposed compartment boundary adjustments in addition to proposed plot sample locations for the upcoming inventory. Modifications to the compartment boundaries were approved, however plot locations needed to be adjusted to avoid possible exposure to UXO (primarily behind Ranges 3 and 4). Geo-referenced maps/data were provided by JBLE-Eustis ITAM personnel that outlined Impact Area Trails and then proposed sampling locations were re-drawn by RMA, LLC (RMA) with 100' buffers whereby data would be collected within 100' of either side of designated trails (buffers currently used for recreational hunters behind the impact area). Prior to field data collection, RMA personnel were given a UXO safety and awareness briefing. All plot locations were subsequently approved by the JBLE-Eustis Environmental Department. Compartments 5, 32, and 38 (island compartments) were not sampled during this most recent inventory due to access limitations. The remaining 35 (Compartments 1-4, 6-31, 33-37) compartments were then examined to collect data that described the vegetation, its structure, as well as to provide specific recommendations for forest management.

Two months of data collection was conducted by teams of forestry techs and botanists during the summer of 2021 (which is a period when vegetation can most effectively be identified). Management recommendations were then developed, which are compatible with existing and proposed future missions of JBLE-Eustis as well as being consistent with the protection and enhancement of environmental and cultural resource protection requirements.

Forestry technicians and botanists with RMA sampled 200 species from the herbaceous layer, 16 species from the shrub layer, 40 species from the sapling layer, 11 species from the vine layer, and 41 species from the upper canopy, for a total of 308 species recorded. The overwhelming dominant species in the herbaceous layer was Japanese stiltgrass (*Microstegium vimineum*), a widespread (endemic), highly invasive, non-native species. Japanese stiltgrass comprised 35.9% of the relative cover of the herbaceous layer. Dominant shrubs included southern wax myrtle (*Morella cerifera*, 55.9%) and American beautyberry (*Callicarpa americana*, 27.9%). Autumn olive (*Elaeagnus umbellata*), Chinese privet (*Ligustrum sinense*), and multiflora rose (*Rosa multiflora*) are listed as highly invasive and were found at several plots (mostly island compartments and behind ranges) as nondominant components of the shrub layer.

Dominant tree species observed in the upper canopy were loblolly pine (*Pinus taeda*), sweetgum (*Liquidambar styraciflua*), and cherrybark oak (*Quercus pagoda*). Tree species found in the sapling layer also included loblolly pine (*Pinus taeda*, 34.3%) and red bay (*Persea palustris*, 30.8%). Sweet gum (*Liquidambar styraciflua*, 18.4%) was also very common and dominant in many plots, although not dominant by measure of relative abundance. Tree-of-heaven (*Ailanthus altissima*) is a highly invasive species that was found to be a dominant sapling at several plots within island compartments, behind ranges three and four, and within compartment 17 (southwest of Felker Army Airfield). The dominant species recorded in the vine layer included common greenbrier (45.9%) and muscadine grape (*Muscadinia rotundifolia* var. *rotundifolia*, 22.5%)

Based on a comprehensive study involving an overlay of sampling plots (217 plots total), a diversity of species is present within the study area. Dominant species reflect varying degrees of past disturbance in several different habitat types including maritime upland forest, mesic mixed-hardwood forest, and mixed-hardwood bottomland forest. Active re-generation appears to be ensuring that dominant native shrub and tree species remain dominant in their respective layers.

Current commercial fair market values (2<sup>nd</sup> Quarter 2021) are given in this report for marketable pine/hardwood timber and pulpwood in applicable forest compartments. Particularly noteworthy is the significant decline in value of pine sawtimber over the last 14 years throughout the state of Virginia. Second quarter comparisons in July of 2007 (previous timber inventory) and July of 2021 reflect the downward trend with current stumpage prices substantially down (49%) for this commodity. Values are not expected to increase significantly anytime soon because it may take a while before increasing sawmill capacities can absorb the oversupply of pine sawtimber that has been accumulating for more than a decade, meanwhile the overall health/vigor of over-mature loblolly pine on JBLE-Eustis is likely to further decline. Aside from pine sawtimber, other forest product values are up from the previous inventory; Mixed hardwood sawtimber (up 64%), pine pulpwood (up 48%), and hardwood pulpwood (up 175%).

Vegetation data presented in this report may be used to establish baseline conditions and set management priorities for various habitats present on JBLE-Eustis which may be particularly useful for restoration of native vegetation communities that are currently maintained, or for additional management of nonnative invasive species. In addition to the specific recommendations for each compartment, a set of recurring recommendations emerged, and they were then offered as general recommendations. They focus



on the need for sound forest management practices to be considered and incorporated into existing operations. More active silvicultural management and an increased use of management tools should be used to address the declining forest conditions and aid in promoting a more sustainable, healthy forest component that will directly benefit military training and availability of quality urban forests.

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## **1.0 - Introduction**

### ***1.1 - Objective of Project***

This assessment is the second follow-up to an original survey conducted in 1997. The objective of this project is to:

1. Conduct a forest inventory to determine the composition and volume of all forestlands on JBLE-Eustis.
2. Develop short- and long-term forest management recommendations.
3. Assess changes to forest health that have occurred since the previous Timber Inventory and Forest Management Plan that was completed in 2007.
4. Prepare a comprehensive Forest Management Plan of various forested compartments on JBLE-Eustis and provide compartmental recommendations.

### ***1.2 - Purpose and Need***

The management of this acreage requires careful consideration and understanding of the vegetational component of the landscape and how it can best be managed to fit the mission of JBLE-Eustis. The forest is dynamic, and as it evolves the functional attributes also change. The changing conditions may or may not support existing or future training requirements.

Through an understanding of its existing and future characteristics, sound forest management can simultaneously support training, provide recreational opportunities for military personnel and their families, and provide aesthetic and economic values. Concurrently, it is imperative that when planning construction and/or training activities, consideration be given to natural resources due to the potential to either support or detract from JBLE-Eustis training missions. Unnecessary construction, damage to soils, and existing vegetation will result in future liabilities if forest health is compromised and tree removal becomes necessary, particularly if impacted vegetation is located in critical or sensitive areas. A carefully planned landscaping and reforestation program around redevelopment sites supporting native trees and plants can provide functional benefits and greatly improve the aesthetic character while supporting training missions.

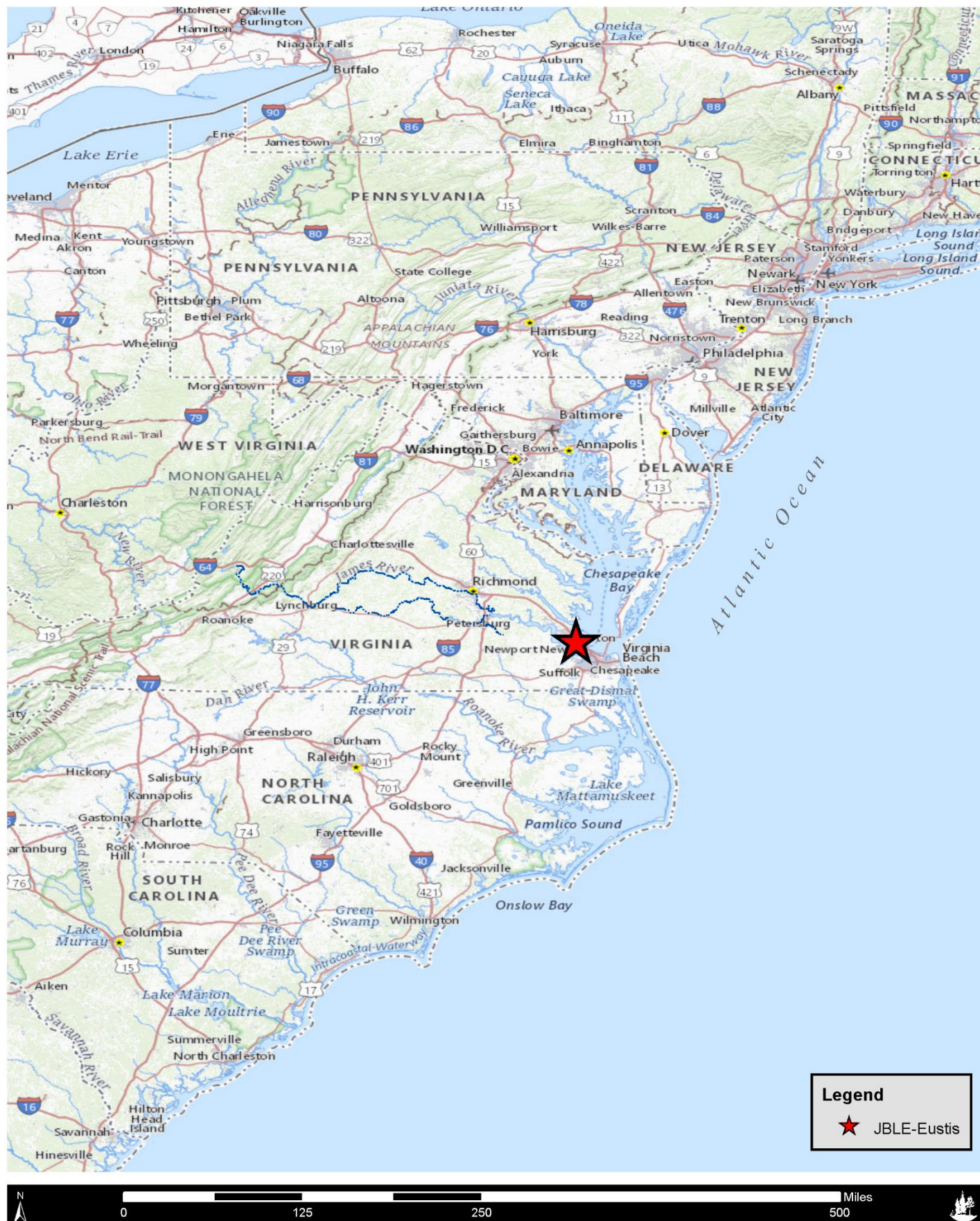
The purpose of this document is therefore to provide the Installation with pertinent information on existing vegetation at JBLE-Eustis, as well as to provide recommendations for the future development of the facility.

### ***1.3 - Site Orientation***

JBLE-Eustis is located in southeastern Virginia, approximately 30 miles west of the mouth of the James River and its confluence with the Chesapeake Bay, 60 miles southeast of the City of Richmond, 160 miles south of Washington D.C., and 20 miles northwest of Norfolk. Reference is made to Figure 1.3A: JBLE-Eustis, VA ~ General East Coast Vicinity map. It is nestled in the southwest portion of the Hampton Roads metropolitan area, being contiguous with the City of Newport News. It is bordered on the northwest by

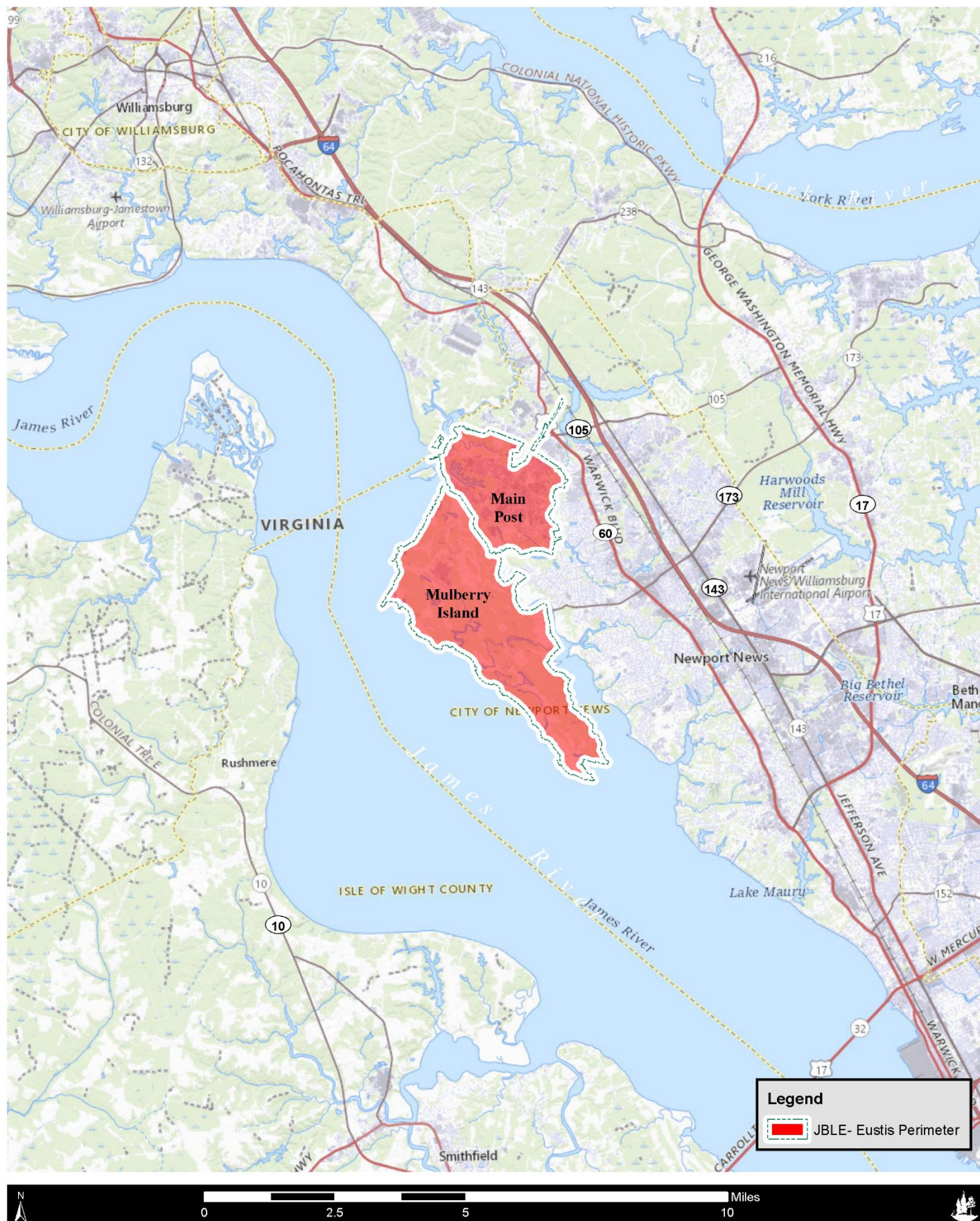
James City County, on the northeast by the City of Newport News, on the west and south by the James River, and east by the Warwick River. The 7,809-acre installation consists of a 2,466-acre cantonment area and a 5,343-acre island, known as Mulberry Island. Reference is made to Figure 1.3B: JBLE-Eustis, VA ~ General Site Location (Virginia Peninsula) which depicts the cantonment or Main Post and Mulberry Island areas on the installation. The cantonment area or Main Post, which contains the more developed areas of the installation, is found on the mainland of southern Newport News County. It also includes a small training area within James City County located on the west side of the inlet to Skiffes Creek and being the southeastern most part of James City County. The 51-acre training area is located on the southeastern most part of James City County, on the northwest side of Skiffes Creek. A canal connecting the James and Warwick Rivers divides the Main Post and Mulberry Island. Mulberry Island consists of low vegetated land and is therefore mainly used for training purposes.

# JBLE-Eustis, VA - General East Coast Vicinity





# JBLE-Eustis, VA - General Site Location (Virginia Peninsula)



#### ***1.4 - JBLE-Eustis History***

The land presently occupied by JBLE-Eustis was settled in the early 1600s, the majority of which, mainly Mulberry Island, consisted of tobacco plantations. Throughout the 1800s the land underwent industrial and commercial development resulting in rapid population growth. In the late 1800s, during the civil war, the land served as one of the Confederacy's defensive posts, anchoring the southern end of the Warwick Line (Wkp 2007). The army purchased the land on March 7th, 1918, later naming the installation Camp Abraham Eustis. The camp served as a training center for Coast Artillery Corps units and as an Army Balloonist's School. In 1923 the installation was renamed Fort Eustis. During the 1930s, the installation was used as a correction camp for bootleggers and later used as a work camp under the Works Progress Administration and the National Youth Administration. During World War II, the camp served as training grounds for Coast Artillery Units and later as a naval hospital and POW Camp. In 1946 it became a transportation school of rail, marine, and amphibious operations.

The 2005 Base Realignment and Closure Act resulted in the greatest recent change in the make-up of JBLE-Eustis by relocating the Army Transportation School headquarters to Fort Lee in 2010. The Training and Doctrine Command, or TRADOC Headquarters replaced it in 2011. The BRAC decision consolidated adjoining bases of different services, referred to as joint basing. As a result, Fort Eustis and Langley Air Force Base were consolidated under the responsibility of the Air Force and the 633rd Air Base Wing as Joint Base Langley-Eustis in 2010.

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## **2.0 - JBLE-Eustis Overview**

### ***2.1 - JBLE-Eustis Mission***

The 2005 Base Realignment, Allocation and Closure (BRAC) Act consolidated Langley Air Force Base and Fort Eustis into Joint Base Langley-Eustis under the responsibility of the Air Force 633d Air Base Wing officially as of 1 October 2010. The 733 Mission Support Group (733 MSG) manages the installation by supporting Army tenants and mission partners. Its mission is to provide garrison support in crisis and emergency management, mail operations, installation and Rapid Port Opening Element support and exercise development to sustain Soldiers and customers in accomplishing the Joint Base Langley-Eustis mission. The 733 MSG is composed of the following organizations:

733 Civil Engineer Squadron

733d Force Support Squadron

733d Logistics Readiness Squadron

733d Security Forces Squadron

### ***2.2 - JBLE-Eustis Training & Ranges***

JBLE-Eustis provides various training activities, including training for: fixed port operations and logistics-over-the-shore (LOTS); highway and motor transport operations; proficiency in common tasks and skills associated with the transportation of units, rolling stock, and cargo; use of equipment and techniques for loading and unloading railcars, ships, and trucks under a variety of conditions; driving trucks and other rolling stock over roads and rough terrain; equipment maintenance; and ship-to-shore discharge of cargo. There are 24 training areas, found both on the Main Post (cantonment area) and Mulberry Island and seven ranges, one of which is a non-live fire grenade assault course on the Main Post, the other six are located on Mulberry Island. Reference is made to Tables 2.2A and Table: 2.2B for a list of training areas and firing ranges and Figures 2.2A, 2.2B, and 2.2C for locations of training areas and firing ranges.

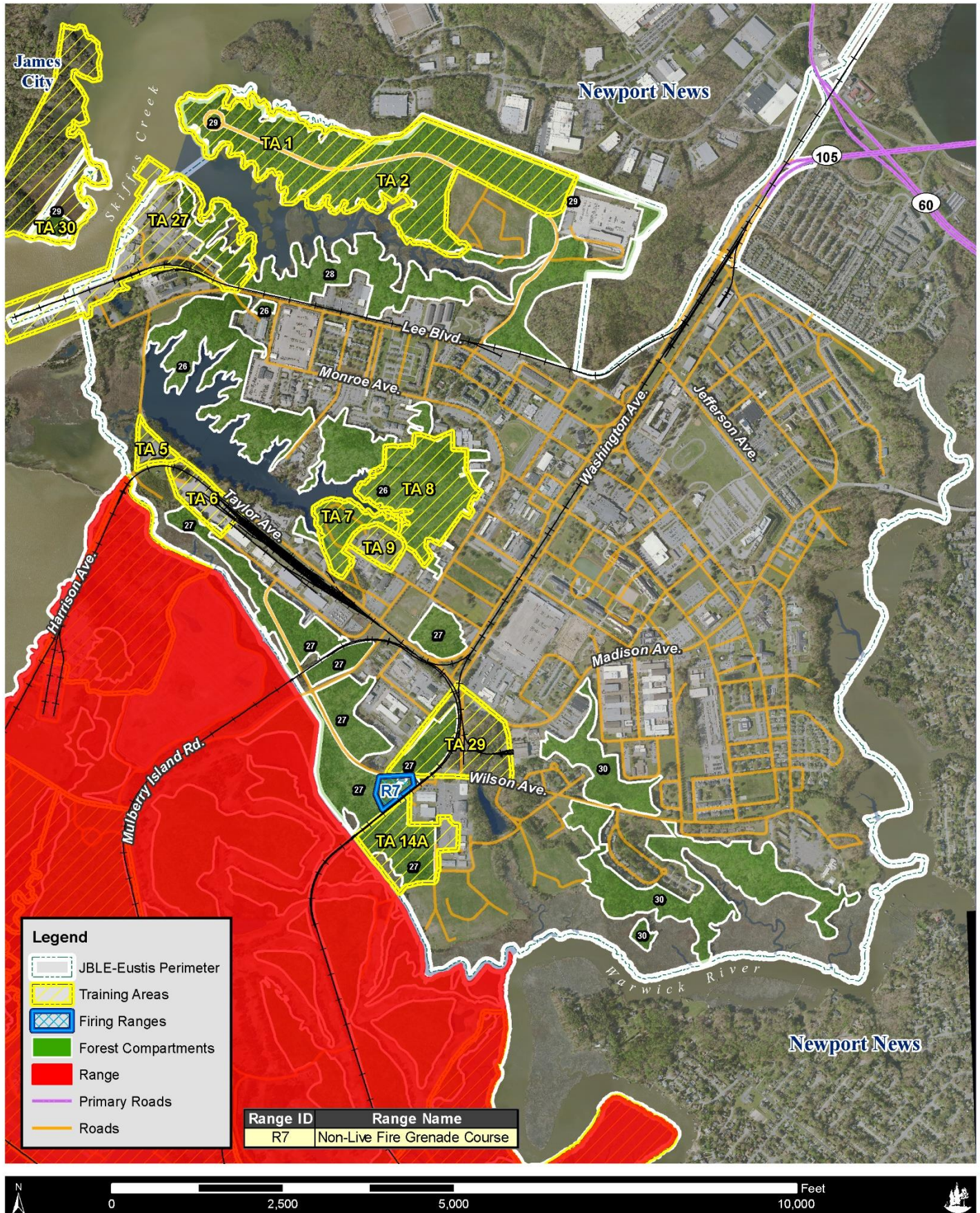


Fort Eustis Training Areas			Table: 2.2A
TA # (NAME)	Location	Description	Acres
TA 1 (YORKTOWN)	MP	MANEUVER/TNG AREA, LIGHT; BASIC LANDNAV	49.80
TA 2 (TIENSEN)	MP	MANEUVER/TNG AREA, LIGHT; BASIC LANDNAV	66.22
TA 05 (COWPENS)	MP	FIELD TRAINING AREA	4.46
TA 6 (HANKS YARD)	MP	DOCK AND RAMP LOADING/UNLOADING	12.17
TA 7 (CHANCELLORSVILLE)	MP	FIELD TRAINING AREA	14.20
TA 8 (MUESE ARGONNE)	MP	FIELD TRAINING AREA; OBSTACLE COURSE; CTT COURSE	42.05
TA 9 (TIPPECANOE)	MP	AIR TRANSPORT MOCKUP; EST2000; RUNNING TRACK	7.83
TA 14A (HUE)	MP	WHEELED VEHICLE DRIVERS COURSE	25.78
TA 15 (NORMANDY)	MI(N)	FIELD TRAINING AREA; MEDIUM/HEAVY EQUIPMENT TRAINING; FOB	87.35
TA 17A (ST. MICHEL)	MI(N)	FIELD TRAINING AREA; LANDNAV	88.12
TA 17B (FELKER)	MI(N)	FELKER AIRFIELD, TA 17B	258.88
TA 17C (MISSIONARY RIDGE)	MI(N)	FIELD TRAINING AREA; LANDNAV	87.81
TA 18 (ANZIO BEACH)	MI(N)	MANEUVER/TNG AREA, AMPHIBIOUS FORCES, AMPHIB VEHICLE TNG	13.78
TA 19 (GRENADA)	MI(N)	MANEUVER/TNG AREA, LIGHT; INTERMEDIATE LANDNAV	96.58
TA 20 (QUI NHON)	MI(N)	AMPHIBIOUS VEHICLE TNG AREA	11.60
TA 21 (ANTIETAM)	MI(N)	MANEUVER/TNG AREA, LIGHT; SMALL MOUT; LANDNAV	187.73
TA 22 (INCHON)	MI(N)	MANEUVER/TNG AREA, LIGHT	50.29
TA 23 (MAGRUDER LINE)	MI(N)	MANEUVER/TNG AREA, LIGHT	616.37
TA 24 (SEOUL)	MI(N&S)	MANEUVER/TNG AREA, LIGHT	603.63
TA 26 (COLD HARBOR)	MI(N)	MANEUVER/TNG AREA, LIGHT; LRC; NBC CHAMBER	148.30
TA 27 (THIRD PORT)	MP	SHIP LOADING/UNLOADING MOCKUP	74.87
TA 28 (JUNCTION CITY)	MI(N)	MANEUVER/TNG AREA, LIGHT; STALZ; LANDNAV	767.38
TA 29 (WONJU)	MP	DOCK AND RAMP LOADING/UNLOADING	35.44
TA 30 (UNNAMED)	MP(JCC)	MANEUVER/TNG AREA, LIGHT	65.64

Fort Eustis Firing Ranges		Table: 2.2B
#/ID	Description	Acres
R1	Fort Eustis/NNPD Cooperative Pistol/Shotgun Range; Future Shoothouse Location	5.25
R2	25M Zero Range; M16 Alternate Qualification Course; M249 10M FAM	3.41
R3	Automated Record Fire Range	25.81
R4	SRT Sniper Range; 9mm; M60 MG	16.34
R5	CPQC; AATD Ballistics Lab;	10.03
R6	M203 Range; Helicopter Landing Tower Operations	12.79
R7	Non-Live Fire Grenade Course	12.00



# JBLE-Eustis, VA ~ Main Post: Training Areas & Ranges



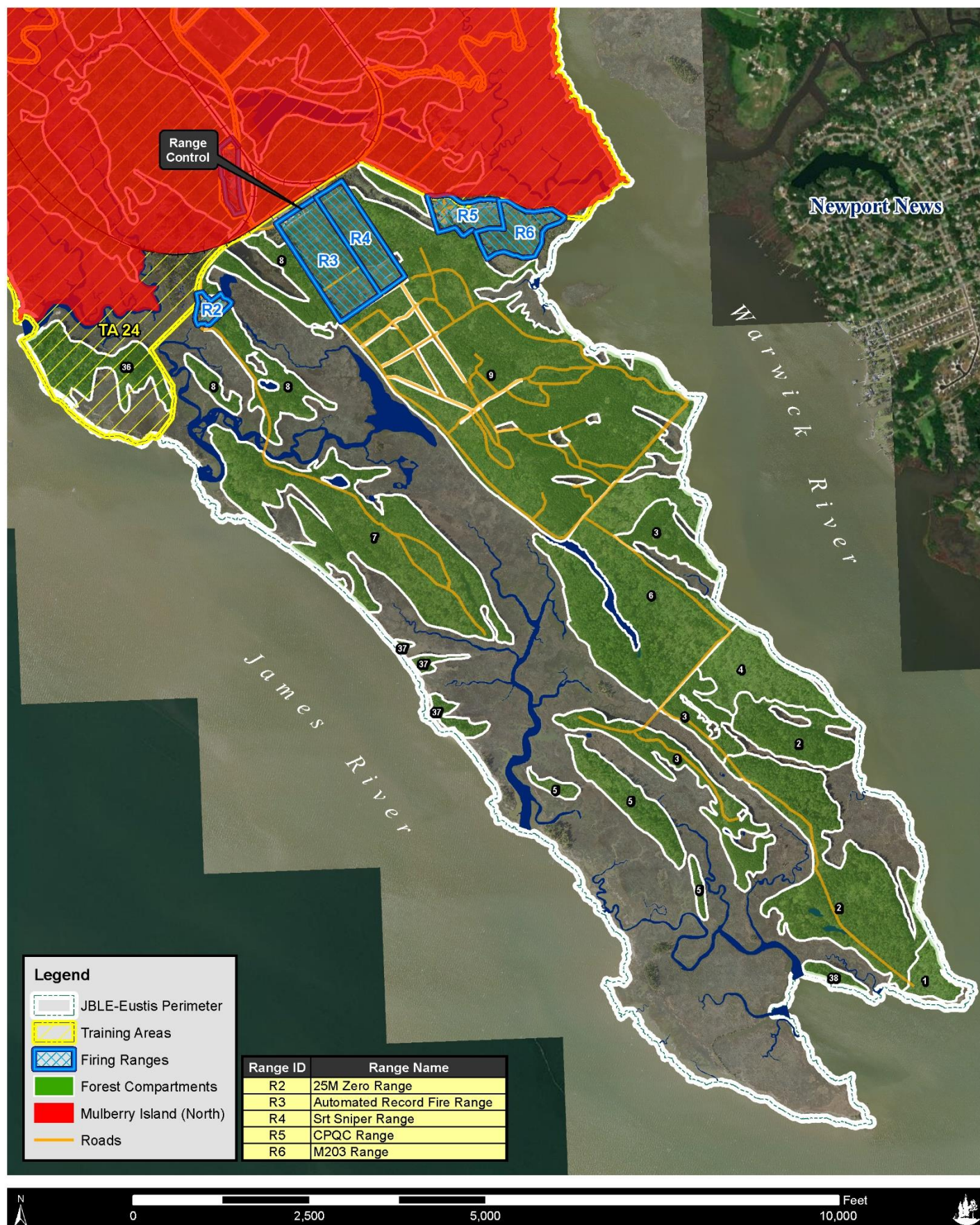


# JBLE-Eustis, VA - Mulberry Island (North): Training Areas & Ranges





# JBLE-Eustis, VA - Mulberry Island (South): Training Areas & Ranges



### **2.3 - JBLE-Eustis Mission Partners**

Training and Doctrine Command  
Joint Task Force-Civil Support  
Installation Management Command Training Directorate  
7th Transportation Brigade (Expeditionary)  
597<sup>th</sup> Transportation Brigade  
93d Signal Brigade  
128<sup>th</sup> Aviation Brigade  
362<sup>nd</sup> Training Squadron, Detachment 1  
US Army Training Support Center  
Installation Management Command – Atlantic Region  
Aviation Development Directorate-Eustis  
Joint Deployment Training Center  
Criminal Investigation Division-12<sup>th</sup> Military Police Detachment  
221st Military Police Detachment  
5<sup>th</sup> Battalion, 159<sup>th</sup> Aviation Regiment  
1<sup>st</sup> Fighter Wing  
Maritime & Intermodal Training Department  
Enterprise Multimedia Center  
Dental Activity Fort Eustis  
McDonald Army Health Center  
US Coast Guard 305<sup>th</sup> Port Security Unit  
US Army Aviation Center of Excellence-Non-Commissioned Officer Academy-Fort Eustis  
James River Reserve Fleet (Maritime Administration/Department of Transportation)

### **2.4 - Infrastructure**

JBLE-Eustis contains approximately 1,900 acres of improved grounds, consisting of open operational and cantonment areas including the airfield, golf course, range complex; and two freshwater lakes. An additional 1,400+ acres are classified as unimproved grounds.

#### **Buildings:**

JBLE-Eustis supports 5.8 million square feet or 132.4 acres of buildings (as calculated by GIS), the majority of which are located on the Main Post, these structures include administrative offices, community facilities, housing, barracks, industrial, landfill, Third Port (1,000' pier), maintenance, medical, research, supply/storage, recreation, and training areas. Mulberry Island contains buildings associated with Felker Airfield, Pines Golf Course, and training areas.

#### **Roads/Rail:**

The road network on JBLE-Eustis includes approximately 76.7 miles of surfaced roads with average widths of approximately 26 feet. This road system is estimated to cover approximately 189 acres. The majority of these roads are located on the Main Post area of JBLE-Eustis. Unpaved roads serve the majority of Mulberry Island. The installation also contains a rail system including approximately 21 miles of rail.

**Utilities:**

Privatized utility systems throughout the installation include drinking water, electric, steam heating, industrial waste, natural gas, wastewater sewer, storage tanks, storm water sewer, and telephone. The resulting network of utilities mainly serves the Main Post with extensions serving the airfield and golf course on Mulberry Island.

**2.5 - Natural Resources****Topography:**

JBLE-Eustis is found within the Atlantic Coastal Plain Physiographic Province. It consists of low, flat terrain with maximum elevations only reaching 30 feet above mean sea level. The built-up areas of the installation on the Main Post are relatively level at an elevation of approximately 30 feet above sea level. The outlying areas form a peninsula known as Mulberry Island between the James River and the Warwick River. A man-made ditch that connects Milstead and Butlers Creeks, which flow into the James and Warwick Rivers, separates these two areas. The terrain of Mulberry Island is level, partly wooded, and is composed of extensive tidal creek and marshy areas. Elevations range from sea level to 10 feet above. The general ground condition lends itself to drainage into either the James or Warwick Rivers, which are both tributaries leading to the Chesapeake Bay.

The majority of the 7,809-acre installation has physical limitations to access and development, ranging from marshes and ponds typically found on Mulberry Island, to the steeply sloped ravines more characteristic of the Main Post area.

The Main Post contains extensive areas of steep slopes north of Milstead and Butlers Creeks, essentially around the perimeter of the upland/shoreline interface. Steep slopes also border the western banks of the Warwick River and its tributaries. These ravines reach into some privatized areas in the cantonment area to the south. Smaller ranges of steep slopes limit expansion of the warehouse area on Taylor Avenue. Most of these areas have slopes in excess of 10%, resulting in potential erosion issues due to storm water runoff.

**Geology/Soils:**

JBLE-Eustis is located in the Coastal Plain Geomorphic. JBLE-Eustis rests upon the Princess Anne terrace formation, which is of Pleistocene age. Between this formation and the granite basement rock surface, which lies at a depth of approximately 2,000 feet, are mostly unconsolidated Cretaceous and Tertiary sediments which are separated by an unconformity. Clays and sands are exposed at the surface.

Stiff surface clays with underlying soft organic silts and clays occur within a one-mile belt running northwest-southeast through the middle of the installation. The eastern part of the post is composed of stiff surface clays that overlie dense silty sands and shell fragments, with occasional zones of organics in buried stream valleys off the Warwick River.

Great differences in soil properties can occur within short distances, especially on Mulberry Island. Understanding soil properties, their capabilities, limitations, and incorporating this understanding in the



planning process for construction, training and natural resource management is essential to ensure sustainability of the ecosystem.

Damage to soil structure as a result of construction, training and or forest management can cause unintended, on- and off-site consequences such as die-back and/or mortality of established trees, disruption and/or redirection of subsurface water flows to undesirable locations and increased runoff that can lead to soil erosion and degradation of water quality. A detailed Soil Survey Report for JBLE-Eustis was conducted by Robert L. Hodges and Kathleen W. Molten in 1984 and should be referenced prior to any planned changes in activities involving land uses.

Fort Eustis Soil Types		Table: 2.5A
Altavista fine sandy loam (fsl)	Craven-Uchee complex (cx), 2-10% slopes	Seabrook loamy fine sand (lfs)
Augusta fine sandy loam (fsl)	Dragston fine sandy loam (sl)	Slagle fine sandy loam (fsl), 0-6% slopes
Axis very fine sandy loam (fsl)	Emporia fine sandy loam (fsl), 2-50% slopes	State fine sandy loam (fsl)
Beaches	Johnston complex (cx)	Tetotum silt loam (sl)
Bethera silt loam (sl)	Levy silty clay (sc)	Tomotley fine sandy loam (fsl)
Bohicket muck (m)	Munden loamy fine sand (fs)	Udorthents, loamy (l)
Bojac sandy loam (sl)	Newflat silt loam (sl)	Udorthents-Dumps complex (cx)
Chickahominy silt loam (sl)	Peawick silt loam (sl)	Yemassee fine sandy loam (cx)

## General Soils Descriptions:

**Altavista fine sandy loam (fsl):** Altavista soils are non-hydric soils found throughout the Mulberry Island and James/Warwick rivers marshland systems that encompass small islands and pockets of well drained soils found adjacent to tidal wetlands. The majority of these soils are forested.

**Augusta fine sandy loam (fsl):** Augusta soils are non-hydric soils found throughout the Mulberry Island and James/Warwick rivers marshland systems that encompass pockets of poorly drained soils adjacent to tidal wetlands. The majority of these soils are forested.

**Axis very fine sandy loam (fsl):** Axis soils are hydric soils found as a small pocket of poorly drained soil along the James River, between Mulberry and Marshy Points.

**Beaches:** Beaches are found along the James River on the west side of Mulberry Island.

**Bethera silt loam (sl):** Bethera soils are hydric soils found on the southeastern quarter of the main post. The majority of these soils are forested.

**Bohicket muck (m):** Bohicket soils are hydric, poorly drained soils found throughout the Mulberry Island and James/Warwick Rivers marshland systems that encompass the majority of the tidal wetlands within this area. These soils are not forested.

**Bojac sandy loam (sl):** Bojac soils are non-hydric, well drained soils present in two areas within central Mulberry Island, the majority of which are forested.



**Chickahominy silt loam (sl):** Chickahominy soils are hydric, poorly drained soils scattered throughout Mulberry Island. The majority of these soils are forested.

**Craven-Uchee complex (cx), 2-10% slopes:** Craven-Uchee complex soils are non-hydric, well drained soils found along ravines throughout the base, mainly those on the main post leading to the water. The majority of these soils are forested.

**Dragston fine sandy loam (sl):** Dragston soils are non-hydric, poorly drained soils found sporadically throughout the Mulberry Island and James/Warwick Rivers marshland system. This soil is somewhat forested.

**Emporia fine sandy loam (fsl), 2 -50% slopes:** Emporia soils are non-hydric, well drained soils found along ravines throughout the main post. The majority of these soils are forested.

**Johnston complex (cx):** Johnston soils are hydric, poorly drained soils found at the head of various guts on the main post.

**Levy silty clay (sc):** Levy soils are hydric, poorly drained soils found sporadically in tidal wetlands throughout the base.

**Munden loamy fine sand (fs):** Munden soils are non-hydric, moderately drained soils that make up a small, forested island within the Mulberry Island marshland system.

**Newflat silt loam (sl):** Newflat soils are non-hydric, somewhat poorly drained soils found sporadically throughout the base. The majority of these soils are forested.

**Peawick silt loam (sl):** Peawick soils are non-hydric, moderately well drained soils found on the main post. The majority of these soils are forested.

**Seabrook loamy fine sand (lfs):** Seabrook soils are non-hydric, moderately well drained soils found in a small island within the Mulberry Island marshland system and within the dredge spoil site on the northwestern portion of Mulberry Island.

**Slagle fine sandy loam (fsl), 0-6% slopes:** Slagle soils are non-hydric, moderately well drained soils found sloping down towards wetlands on the main post.

**State fine sandy loam (fsl):** State soils are non-hydric, well drained soils found throughout Mulberry Island, making up a large portion of the well-drained soils on the islands. The majority of these soils are forested.

**Tetotum silt loam (sl):** Tetotum soils are non-hydric, moderately well drained soils found throughout Mulberry Island, making up a large portion of the well-drained soils on the islands. The majority of these soils are forested.

**Tomotley fine sandy loam (fsl):** Tomotley soils are hydric, poorly drained soils found on the northeastern portion of Mulberry Island along tidal wetlands.

**Udorthents, loamy (l):** Udorthents soils are disturbed, moderately well drained soils found throughout the base.

**Udorthents-Dumps complex (cx):** Udorthents-Dumps complex soils are disturbed, moderately well drained soils found in the dredge spoil site and on the southeastern portion of the main post.

**Yemassee fine sandy loam (cx):** Yemassee soils are non-hydric, somewhat poorly drained soils found sporadically within the base.

### **Drainage/Wetlands:**

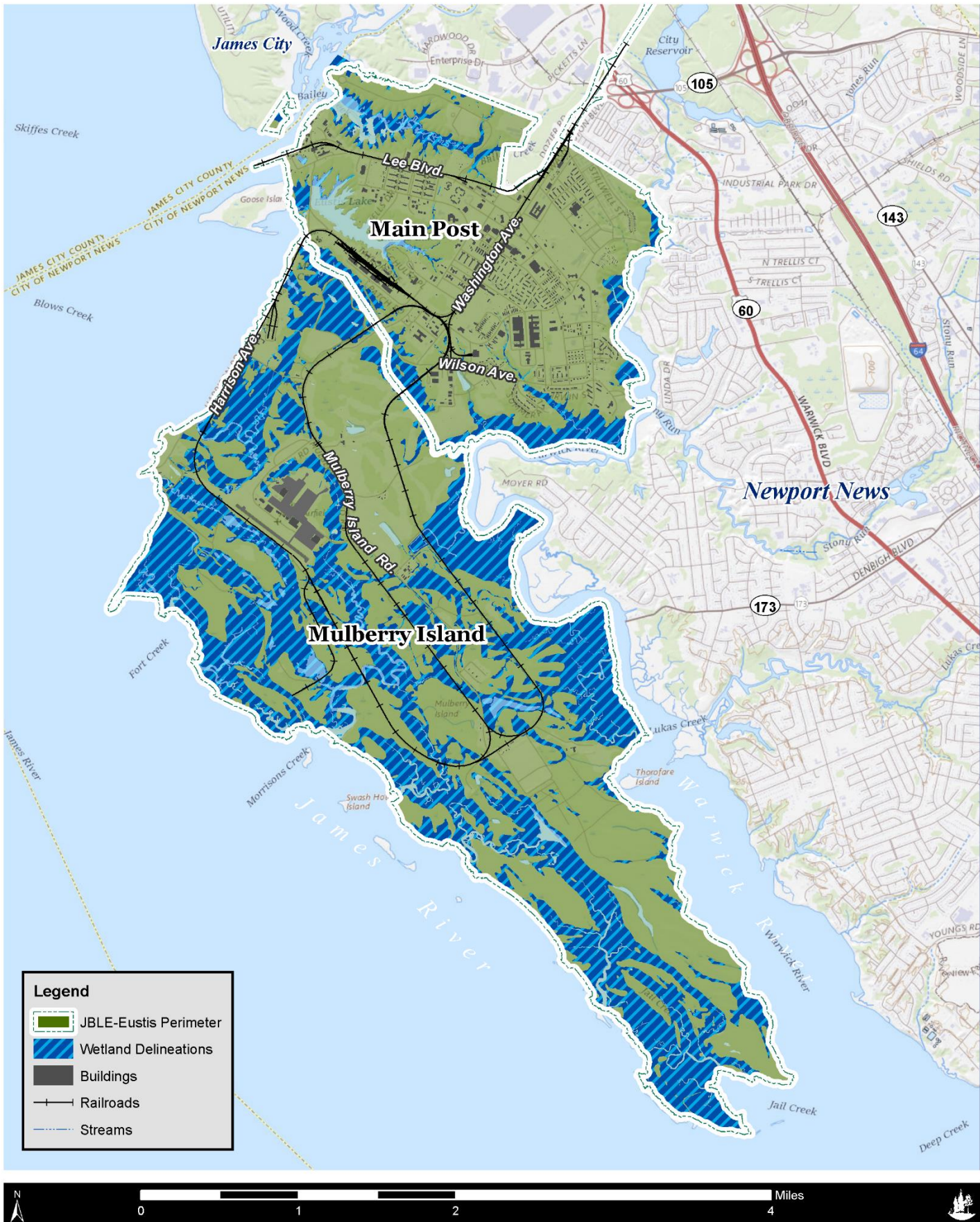
Surface drainage of the northern, developed portion of the installation readily occurs via a drainage system characterized by relatively short, steep slopes that has created natural drainage channels leading to small streams and creeks influenced by tidal action. Within this area, surface runoff is generally rapid. Seasonal high surface water table elevations on the main post generally range from 5'-10' below the ground surface. Two man-made lakes exist on the Main Post, these are Eustis Lake (45 acres) and Brown's Lake (2.5 acres). Eustis Lake was originally and still is a recreational lake. Brown's Lake was originally constructed as a storm water retention pond and is now a recreational pond.

The entire area of Mulberry Island lies below the standard flood line of 13 feet above mean sea level. It contains approximately 1,800 acres of wetlands, as delineated by the USFWS, 1,312 acres which have since been re-delineated by the Army Corps of Engineers. The remaining land is composed of loose sands and organic deposits with an elevation between 5' and 10' above mean sea level. Scattered throughout the island are more than 30 low profile, smaller islands supporting maritime forest surrounded by tidal creeks and marshes. Runoff on Mulberry Island is predominately horizontal surface and subsurface flow at much slower rates than found on the Main Post. Vertical infiltration is greatly limited due to the shallow depths to the surface water table, which is generally found less than 2' from the ground's surface. Horizontal runoff rates are also greatly influenced by tidal conditions, especially during periods of high tides resulting from storm and high lunar tides.

All surface drainage waterways from JBLE-Eustis eventually enter the James and Warwick Rivers, which flow into the Chesapeake Bay and Atlantic Ocean. The named waterways are Bailey Creek, Skiffes Creek, Milstead Island Creek, Morleys Gut, Butlers Gut, Blows Creek, Morrisons Creek, Fort Creek, and Jail Creek. Several unnamed tributaries extend through the wetlands of Mulberry Island. The marshes are mostly saline or brackish along the James and Warwick Rivers. Because of the large volume of freshwater entering the James from upstream stormwater flows, however, the river can show considerable variability in salinity levels. Reference is made to Figure 2.5A: JBLE-Eustis, VA ~ Wetlands, for the locations of wetlands as defined by the National Wetland Inventory and a wetland delineation project completed by the U.S. Army Corp. of Engineers.

Figure: 2.5A

**JBLE-Eustis, VA ~ Wetlands (USF&W & USACE)**



## Community Assemblage & Composition:

JBLE-Eustis is situated within the Coastal Plain physiographic province in Virginia. The Coastal Plain is characterized by level to gently-sloping terrain that extends from the Atlantic Coast inland to the Fall Zone, an abrupt topographic rise at the western edge of the province. Although the Coastal Plain is regarded as a relatively flat, terraced landscape, the upper (or 'inner') Coastal Plain sub-province is generally referred to as 'dissected' due to the prevalent stream erosion that has cut moderately sloping valleys into the local terrain. This type of topography stands in contrast to the nearly-flat landscape of the lower (or 'outer') Coastal Plain sub-province which occurs east of the Suffolk Scarp, a geologic rise that marks the interior edge of the Great Dismal Swamp and, essentially, the lower Coastal Plain. JBLE-Eustis sits at the eastern edge of the upper Coastal Plain, on a low marine terrace within the James River corridor (Johnson 1976, Hobbs 2009). Both 'dissected' forests with steep terrain that cuts into marine sediment as well as nearly flat bottomland habitats were observed during the inventory. The vegetation of the Coastal Plain in this area of the region is typified by hardwood oak-hickory forest communities with some interspersions of pine (Ware 1970). In successional habitats, the oak-hickory unit tends to be replaced by maple-gum-tulip tree stands, or by pine regeneration when in proximity to silvicultural sites. Along the tidal fringes of the main tributaries in the Chesapeake Bay watershed such as the lower James River estuary, brackish cordgrass marshes predominate (Perry and Atkinson 2009). Moving inland toward the broad interfluvies of the Chesapeake Bay lowlands, brackish marshes gradually intergrade with maple-gum-pine flats characteristic of maritime forest communities found throughout the region (Silberhorn 1999). Dissected forests which occur inland to maritime communities are dominated by a mix of hardwoods including American beech, oaks, hickories, and tulip poplar. Occasionally dissected forests cut into fossiliferous shell-rich substrates which provide the conditions for coastal plain calcareous ravine forests, a rare forest type with a narrow geographic distribution. This forest type contains southern sugar maple (*Acer floridanum*), chinquapin oak (*Quercus muhlenbergia*), and numerous species disjunct from base-rich areas in the mountains (Ware and Ware, 1992). JBLE-Eustis is primarily a loblolly pine-hardwood ecosystem that has been managed to favor loblolly pine. Approximately 2,784 acres of JBLE-Eustis are forested and 2,500 acres are wetlands, both tidal and non-tidal. The installation encircles one of the largest principally intact wetlands systems in the lower James River. Tidal areas include Milstead Island Creek, Blows Creek, and Morleys Gut, as well as the brackish tidal marsh which covers 50 acres of the southern end of the installation. Non-tidal wetlands are found in Eustis and Brown's Lakes, Skiffes Creek, Bailey's Creek, and an unnamed freshwater tributary of the Warwick River. A significant portion of the lower peninsula remains in wooded, undeveloped tracts. There are 2,784 acres of commercial forest land on JBLE-Eustis.

Woodlands are comprised of approximately 2/3 coniferous species dominated by mature to overmature loblolly pine. The remaining 1/3 is a variety of hardwoods, including sweetgum, cherrybark oak, southern red oak, black oak, white oak, yellow poplar, and red maple. A diversity of species is present within the shrub-sapling layers found in several different habitat types including maritime upland forests, mesic mixed-hardwood forests, and mixed hardwood bottomland forests.

Estuarine marshes on JBLE-Eustis have largely been maintained in a natural state in contrast to those found in adjacent areas such as Newport News, which have been altered through dredging and filling activities. The estuarine marshes of JBLE-Eustis are characterized by broad areas of black needlerush with abundant salt marsh cordgrass at lower elevations, especially along the creek channels. One of the



important values of black needle rush marsh is its ability to resist erosion. This value is especially important along the James River where erosive action of storm waves and currents are more in evidence. Scattered throughout areas of higher elevations are species such as big cordgrass and salt meadow hay. In the upstream creek sections, where salinities are very low, marsh species such as marsh hibiscus, cattails and saltbushes occur.

Freshwater lakes and marshes are hospitable to duckweed watermeal, cattails, willows and goldenrod. Soil disturbance of marsh communities either by filling, dredging and/or attempts to control vegetation as conducted around Felker Army Airfield can create conditions favorable for the establishment, spread and domination of phragmites, at the detriment of the natural more diverse marsh community.

### **Wildlife:**

The forests of JBLE-Eustis provide habitat for a wide variety of wildlife, both game and nongame species. Predominant game species include deer, turkey, gray squirrel, woodcock, and an assortment of waterfowl.

The expansive mixed hardwood stands also provide good habitat for neotropical migratory birds. A number of warblers, thrushes, vireos, and other songbirds utilize these forests for nesting as well as migration habitat. Large areas of unfragmented forest are decreasing at an alarming rate, especially in the piedmont, and areas like JBLE-Eustis are important at the landscape level as well as at the local base level.

Some areas are maintained in early successional stages (mowing), such as the portions of TA-17C and TA-23, the airfield, and other training and open space areas. Early successional wildlife species will benefit by the maintenance of such areas. It is recommended, however, that a maintenance plan which allows for taller growth of grass stages be implemented, along with a plan to encourage the growth of native plant species. A one to three-year maintenance plan would benefit wildlife like quail, turkey, grasshopper sparrow and other sparrows, meadowlarks, and upland sandpipers. Many species utilize early successional patches for foraging and cover if adequate buffers are in place.

Fish common to the James and Warwick Rivers include various varieties of prey fish such as inland silverside and striped killifish, American shad and hickory shad, and Atlantic herring. Representative bottom feeders include a variety of catfish and bullheads, spot, and flounder. Predator fish include striped bass, Atlantic croaker, and bluefish. Shellfish populations have declined through the 1900's as a result of general water quality problems in the Bay and its tributaries.

### **Threatened and Endangered Species:**

Threatened species are animals and plants that are likely to become endangered in the foreseeable future and endangered species are animals and plants that are in danger of becoming extinct. The following species are known to occur at JBLE-Eustis.

#### **Northern Long-eared bat (*Myotis septentrionalis*)**

The Northern Long-eared Bat has been documented on JBLE-Eustis via acoustics and captures since 2016 (was listed as threatened in 2015). It is federally listed as a *Threatened* species under the Endangered

Species Act. The northern long-eared bat is a medium-sized bat with a body length of 3 to 3.7 inches and a wingspan of 9 to 10 inches. Their fur color can be medium to dark brown on the back and tawny to pale-brown on the underside. As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus, *Myotis*.

White-nose Syndrome has decimated the population and it is believed that if this disease had not emerged, it is unlikely that northern long-eared bat populations would be experiencing such dramatic declines. Since symptoms were first observed in New York in 2006, white-nose syndrome has spread rapidly from the Northeast to the Midwest and Southeast; an area that includes the core of the northern long-eared bat's range, where it was most common before this disease. Numbers of northern long-eared bats (from hibernacula counts) have declined by up to 99 percent in the Northeast. Although there is uncertainty about the rate that white-nose syndrome will spread throughout the species' range, it is expected to continue to spread throughout the United States in the foreseeable future. JBLE Eustis is currently following the Key to the Northern Long-eared Bat 4(d) rule for Federal Agencies as far as "Time of the Year" restrictions regarding tree harvesting, tree removal, etc. For more information, refer to USFWS and VA DWR rules and information, which can be found through the following links:

- <https://www.fws.gov/midwest/endangered/mammals/nleb/KeyFinal4dNLEBFedProjects.html>
- <https://dwr.virginia.gov/wp-content/uploads/media/Time-of-Year-Restrictions.pdf>



Source: <https://www.fws.gov/midwest/endangered/mammals/nleb/nlebFactSheet.html>

### **Eastern black rail (*Laterallus jamaicensis jamaicensis*)**

On November 9, 2020, the eastern black rail (*Laterallus jamaicensis jamaicensis*) was formally listed as *Threatened* under the Endangered Species Act by the Department of Interior following on the recommendation of the U.S. Fish & Wildlife Service, published on October 9, 2018. A small, secretive marsh bird, the eastern black rail (*Laterallus jamaicensis jamaicensis*) rail is four to six inches long with a wingspan of up to 11 inches. It weighs approximately 1.2 ounces. The black rail is mostly gray to black with a black bill and red eyes. They have some brown feathers on their backs and white spots on their dark wing feathers. There is no significant size difference between males and females. Black rails likely eat mostly small invertebrates and seeds, but because they are rarely seen, little is known about their feeding habits. The black rail may be preyed on by raccoons, snakes and raptors, however, there are larger threats to the black rail from habitat loss and climate change

The eastern black rail is protected under the Migratory Bird Treaty Act of 1918 and is state-listed as either endangered or threatened in seven states within the subspecies' range: Delaware, Illinois, Indiana, Maryland, New Jersey, New York, and Virginia. While existing surveys have so far failed to document it, it must be considered in future projects. A list of prohibitions can be found at <https://www.fws.gov/southeast/faq/eastern-black-rail-final-4d-rule/>



Source: [https://www.chesapeakebay.net/discover/field-guide/entry/eastern\\_black\\_rail](https://www.chesapeakebay.net/discover/field-guide/entry/eastern_black_rail)



## **Additional Sensitive Species:**

### **Bald eagles (*Haliaeetus leucocephalus*)**

On August 8, 2007, following decades of documented population recovery, bald eagles were delisted from protection under the federal Endangered Species Act (72 FR 37345), though the species remained listed as a threatened species under the Virginia Endangered Species Act. In August 2012, the Board of Game and Inland Fisheries delisted bald eagles from protection under the Virginia Endangered Species Act, effective January 1, 2013. As of that date, bald eagles are not protected under either federal or state endangered species laws. They remain, however, federally protected under the Eagle Act, the Migratory Bird Treaty Act, and are also protected under Virginia law and VDGIF regulations regarding native wildlife species. Currently there are 11 active eagle nests on the installation. The USFWS has developed a JBLE-Eustis bald eagle plan. Please refer to this plan for details on the status of the utilization of the forests for nesting, foraging and roosting.



Source: [https://media.13newsnow.com/assets/WVEC/images/535665541/535665541\\_750x422.jpg](https://media.13newsnow.com/assets/WVEC/images/535665541/535665541_750x422.jpg)

### **American wisteria (*Wisteria frutescens*)**

Although not found within a sampling plot, American wisteria (*Wisteria frutescens*) was found at two locations on JBLE-Eustis in June of 2021. American wisteria is listed by the Virginia DCR, Division of Natural Heritage as S1, which indicates the species is “critically imperiled – at high risk of extirpation from the state due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors”. The two populations found on JBLE-Eustis were not previously known and can serve as a new record for the City of Newport News. In TA-28, a large population of American wisteria was found growing for several hundred yards along the marsh edge and dirt road at 37.127000, -76.612417, and a smaller population was found in a similar habitat at 37.131199, -76.615720. It can be distinguished from the highly invasive Asian species

of wisteria by a number of characters. The leguminous fruit produced by the flowers of American wisteria are smooth and without hair, as opposed to the velvety fruit of Asian species. Pedicels which connect the flowers to the stem are shorter (5-15 mm) as opposed to the 15-20 mm long pedicels on Asian species. Leaves of American wisteria do not usually have a wavy-surfaced appearance that Asian species often display, and the tips of the leaflets are merely acute to slightly acuminate, compared to the strongly acuminate leaf tips of Asian wisterias (Weakley et al. 2020).



Source: RMA LLC



## JBLE-Eustis, VA - American Wisteria Sites (2021)





### **3.0 - Existing Vegetative Management Program**

The responsibility for the existing vegetative management program at JBLE-Eustis is divided among several organizational units. The primary organization is the Directorate of Public Works (DPW). The responsibility for all forest management activities is the responsibility of the Environmental Element/Civil Engineer Squadron.

### **4.0 - Invasive Species**

#### ***4.1 - Plant Species***

JBLE-Eustis (Fort Eustis) managed approximately 2,800 acres of commercial forested land (and approximately 1,000 acres of urban forest) and has conducted invasive species control in training areas, urban forests, wetlands, and other natural areas since completion of the previous forest inventory in 2007 (though such work occurred before that date). Significant improvements by reducing invasive species populations have enhanced troop training lands, improved biodiversity, and increased recreational opportunities for military personnel, dependents, and installation community members. Funding availability for control efforts has not been guaranteed on a yearly basis, therefore when funds are available, priority is given to areas that are designated based upon objectives of the Environmental Element/Civil Engineer Squadron and in consultation with ITAM, regarding training areas. Sound record keeping, mapping, follow-up monitoring/scouting, and where applicable, mowing/mulching and follow-up herbicide applications (typical) have been crucial in preventing invasive species re-colonization (especially species deemed highly invasive by VADCR). During the 2021 Inventory, particular attention was paid to noting non-endemic invasive species both within sampling locations and while traversing/trekking to those sampling locations. Table 4.1 lists invasive species recorded or known to occur on JBLE- Eustis, and the rank as classified by VADCR (high, medium, low).

Over the last several years, chemical (herbicides) and mechanical (mowing) control methods have been extremely successful in reclaiming hundreds of acres of training lands and urban forests, areas that were previously inhospitable for training and/or recreation and limiting further invasive species dispersal. Both methods will need to be continued to prevent the re-colonization of invasives. Fortunately, follow-up herbicide applications within previous treatment areas can be expected to be done on a smaller scale if done in a timely manner. While the time spent to monitor the treatment areas has been generally the same over the past several years, time spent applying herbicides and the amount of herbicide(s) used has decreased significantly. Funding for invasive species control has been variable over the past several years, therefore priority areas may change based upon the success of previous applications and/or the military mission – it is extremely important to have mapping and other relative application data. Continued monitoring and close coordination between ITAM and Natural Resources & IPM Branch/Environmental Element is highly recommended to ensure all parties are aware of the results of previous herbicide applications, the spread of any new invasive species if applicable, and to determine where future control efforts should be implemented.

Table 4.1, Target Invasive Alien Plant Species as Ranked by VADCR\*

Common Name		Scientific Name
<b>Highly Invasive Species</b>		
1	autumn olive	<i>Elaeagnus umbellata</i>
2	Chinese lespedeza	<i>Lespedeza cuneata</i>
3	Chinese privet	<i>Ligustrum sinense</i>
4	common reed	<i>Phragmites australis</i>
5	hydrilla	<i>Hydrilla verticillata</i>
6	Japanese honeysuckle	<i>Lonicera japonica</i>
7	Japanese stiltgrass	<i>Microstegium vimineum</i>
8	johnson grass	<i>Sorghum halepense</i>
9	kudzu	<i>Pueraria montana</i>
10	multiflora rose	<i>Rosa multiflora</i>
11	Tree of Heaven	<i>Ailanthus altissima</i>
<b>Moderately Invasive Species</b>		
12	callery pear	<i>Pyrus calleryana</i>
13	Chinese wisteria	<i>Wisteria sinensis</i>
14	common chickweed	<i>Stellaria media</i>
15	English ivy	<i>Hedera helix</i>
16	golden bamboo	<i>Phyllostachys aurea</i>
17	mimosa	<i>Albizia julibrissin</i>
18	royal paulownia	<i>Paulownia tomentosa</i>
<b>Minimally Invasive Species</b>		
19	Asiatic dayflower	<i>Commelina communis</i>
20	beefsteak plant	<i>Perilla frutescens</i>
21	chinaberry	<i>Melia azedarach</i>
22	thorny olive	<i>Elaeagnus pungens</i>
23	vinca major	<i>Vinca major</i>
24	vinca minor	<i>Vinca minor</i>

\*Source: VA DCR

**1. AUTUMN OLIVE (*Elaeagnus umbellata*) - Highly Invasive**

**Appearance:** *Elaeagnus umbellata* is a deciduous shrub from 3-20 ft. (0.9-6.1 m) in height with thorny branches. It is easily recognized by the silvery, dotted underside of the leaves.

**Foliage:** Leaves are alternate, 2-3 in. (5-8 cm) long and 1 in. (2.5 cm) wide. The margins are entire and undulate. Leaves are bright green to gray green above and silver scaly beneath with short petioles.

**Flowers:** Small, yellowish tubular flowers are abundant and occur in clusters of 5 to 10 near the stems from February to June.

**Fruit:** Fruits are round, red, juicy drupes which are finely dotted with silvery to silvery-brown scales. Each drupe contains one seed. Fruits ripen from August to November.

**Ecological Threat:** *Elaeagnus umbellata* invades old fields, woodland edges, and other disturbed areas. It can form a dense shrub layer which displaces native species and closes open areas. *Elaeagnus umbellata* is native to China and Japan and was introduced into North America in 1830. Since then, it has been widely planted for wildlife habitat, mine reclamation, and shelterbelts. It is a non-leguminous nitrogen fixer.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3021>



## 2. CHINESE LESPEDEZA (*Lespedeza cuneata*) - Highly Invasive

**Appearance:** *Lespedeza cuneata* is an upright semi-woody forb reaching 3-6 ft. (0.9-1.8 m) in height with one-to-many slender stems. Stems are often gray green with lines of hairs along the stem.

**Foliage:** Leaves are thin, alternate, abundant and three-parted. Leaflets have wedge-shaped bases and are 0.5-1 in. (1.3-2.5 cm) long and hairy.

**Flowers:** Flowering occurs from July to September, when small, creamy-white flowers with purple throats develop in clusters of two to four.

**Fruit:** Fruit is a flat ovate to round single-seeded pod 0.12-0.15 in. (3-4 mm) wide. Pods are clustered in terminal axils, scattered along the stem, and clasped by persistent sepals.

**Ecological Threat:** *Lespedeza cuneata* is an extremely aggressive invader of open areas and out competes native vegetation. Once established, *Lespedeza cuneata* is very difficult to remove due to the seed bank which may remain viable for decades. Native to Asia and introduced into the United States in the late 1800s, it has been widely planted for erosion control, mine reclamation and wildlife habitat.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3033>





### 3. CHINESE PRIVET (*Ligustrum sinense*) - Highly Invasive

**Appearance:** *Ligustrum sinense* is a semi-evergreen shrub or small tree that grows to 20 ft. (6.1 m) in height. Trunks usually occur as multiple stems with many long, leafy branches.

**Foliage:** Leaves are opposite, oblong, 1-2.4 in. (2.5-6 cm) long, and 0.2-0.6 in. (0.5-1.5 cm) wide. Foliage can be pubescent along the underside of the midvein.

**Flowers:** Flowering occurs from April to June, when panicles of white to cream flowers develop in terminal and upper axillary clusters. Pollen can cause an allergic reaction in some people.

**Fruit:** The abundant fruits are spherical and 0.3-0.5 in. (1-1.3 cm) long. Fruit begins green, ripens to dark purple to black, and persists into winter. Birds and other wildlife eat the fruit and disperse the seeds. Seed soil viability is about one year. The plant also colonizes by root sprouts.

**Ecological Threat:** Several privet species occur and distinguishing among them can be difficult. *Ligustrum sinense* can tolerate a wide range of conditions. Plants form dense thickets, invading fields, fencerows, roadsides, forest understories, and riparian sites. They can shade out and exclude native understory species, perhaps even reducing tree recruitment. Native to Europe and Asia, *Ligustrum sinense* was introduced in the United States in 1852 as an ornamental plant. It is commonly used as an ornamental shrub and for hedgerows.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3035>





#### 4. COMMON REED (*Phragmites australis*) - Highly Invasive

**Appearance:** *Phragmites australis* is a tall, perennial grass that can grow to heights of 15 ft. (4.6 m) or more. Broad, pointed leaves arise from thick, vertical stalks.

**Foliage:** Leaves are 6-23.6 in. (15-60 cm) long, 0.4-2.4 in. (1-6 cm) wide, flat and glabrous.

**Flowers:** The flower heads are dense, fluffy, gray or purple in color and 5.9-15.7 in. (15-40 cm) long. Flowering occurs from July to October.

**Fruit:** The seeds are brown, light weight, and about 0.3 in. (8 mm) long. In the fall the plant turns brown, and the inflorescences persist throughout the winter.

**Ecological Threat:** *Phragmites australis* is usually found in dense thickets growing in or near shallow water. These thickets displace native wetlands plants, alter hydrology and block sunlight to the aquatic community. It is native to Eurasia and Africa. Native *Phragmites* do occur in the United States, and they are sometimes very difficult to distinguish from the exotics.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3062>



## 5. HYDRILLA (*Hydrilla verticillata*) - Highly Invasive

**Appearance:** Hydrilla verticillata is a submersed, rooted aquatic plant that can grow in water up to depths of 20 ft. (6.1 m). Plants can survive in depths up to 40 ft. (12 m) in non-turbid water.

**Foliage:** Leaves are whorled in bunches of 3-8, but most often with whorls of 5. The midribs of the leaves are reddish in color with the undersides having small, raised teeth. Leaves are 0.2-0.8 in. (5-20 mm) long, less than 0.1 in. (2 mm) wide and have serrated margins.

**Flowers:** Only the female flowers of this dioecious plant have been found in the United States, which means no viable seed are produced.

**Fruit:** Turions (stem tubers) are bud-like structures which can drop off the plant and successfully survive freezing or drought. Tubers from the rhizomes are another way these plants reproduce and increase their invasive potential.

**Ecological Threat:** Hydrilla verticillata forms dense mats at the surface of the water. The dense mats can restrict native vegetation, irrigation practices, recreation, hydroelectric production, and water flow. It can invade most slow-moving or still water systems. This plant is believed to be native to Asia or Africa, although it is widely spread across the globe. It was first introduced into North America as an aquarium plant in the 1950s.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3028>



## 6. JAPANESE HONEYSUCKLE (*Lonicera japonica*) - Highly Invasive

**Appearance:** *Lonicera japonica* is a woody perennial, evergreen to semi-evergreen vine that can be found either trailing or climbing to over 80 ft. (24 m) in length. Young stems may be pubescent while older stems are glabrous.

**Foliage:** Leaves are opposite, pubescent, oval and 1-2.5 in. (2.5-6.4 cm) long. Margins are usually entire but young leaves may be lobed or toothed.

**Flowers:** Flowering occurs from April to July, when showy, fragrant, tubular, whitish-pink flowers develop in the axils of the leaves. The flowers turn cream-yellow as they age.

**Fruit:** The small shiny globular fruits turn from green to black as they ripen. Each fruit contains 2-3 small brown to black ovate seeds.

**Ecological Threat:** *Lonicera japonica* invades a wide variety of habitats including forest floors, canopies, roadsides, wetlands, and disturbed areas. It can girdle small saplings by twining around them, and can form dense mats in the canopies of trees, shading everything below. A native of eastern Asia, it was first introduced into North America in 1806 in Long Island, NY. *Lonicera japonica* has been planted widely throughout the United States as an ornamental, for erosion control, and for wildlife habitat.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3039>





## 7. JAPANESE STILTGRASS (*Microstegium vimineum*) - Highly Invasive

**Appearance:** *Microstegium vimineum* is a delicate, sprawling, annual grass that is 0.5-3.5 ft. (0.2-1.1 m) in height. The stems can root at the nodes.

**Foliage:** The leaves are pale-green, alternate, lance-shaped, 1-3 in. (2.5-7.6 cm) long, asymmetrical with a shiny, off-center midrib. Upper and lower leaf surface is slightly pubescent. A silvery line runs down the center of the blade. Stems usually droop.

**Flowers:** Flowering begins in September, when delicate flower stalks develop in the axils of the leaves or at the top of the stems.

**Fruit:** Fruit is produced from late September through early October.

**Ecological Threat:** Most commonly an invader of forested floodplains, *Microstegium vimineum* is also found in ditches, forest edges, fields, and trails. It is very shade tolerant and can completely displace native vegetation. It is native to Asia and was accidentally introduced into North America sometime around 1920. It has previously been used as packing material for porcelain, possibly explaining its accidental introduction.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3051>



## 8. JOHNSON GRASS (*Sorghum halepense*) - Highly Invasive

**Appearance:** *Sorghum halepense* is a tall (up to 8 ft. [2.4 m]), rhizomatous, perennial grass that invades open areas throughout the United States.

**Foliage:** The 2 ft. (0.6 m) long, lanceolate leaves are arranged alternately along a stout, hairless, somewhat upward branching stem and have distinct, white midribs.

**Flowers:** Flowers occur in a loose, spreading, purplish panicle.

**Fruit:** Fruits are also produced in a panicle. Seeds form in the sessile spikelets.

**Ecological Threat:** *Sorghum halepense* is adapted to a wide variety of habitats including open forests, old fields, ditches and wetlands. It spreads aggressively and can form dense colonies which displace native vegetation and restrict tree seedling establishment. *Sorghum halepense* has naturalized throughout the world, but it is thought to be native to the Mediterranean region. It was first introduced into the United States in the early 1800s as a forage crop.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3075>





## 9. KUDZU (*Pueraria montana*) - Highly Invasive

**Appearance:** *Pueraria montana* var. *lobata* is a climbing, deciduous vine capable of reaching lengths of over 100 ft. (30.5 m) in a single season. Its fleshy tap roots can reach 7 in. (18 cm) in width and grow to 9 ft. (3.8 m) deep. These roots can weigh up to 400 lbs. (180 kg).

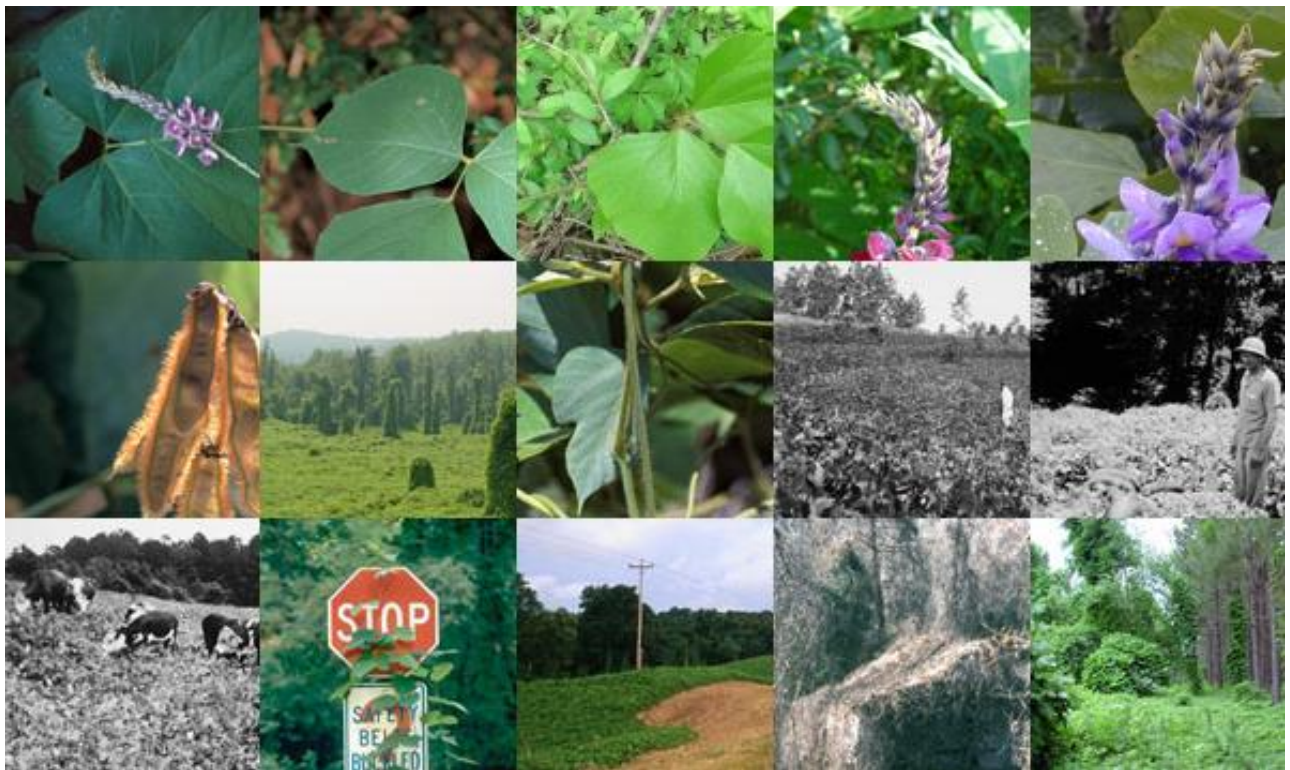
**Foliage:** Leaves are alternate, compound (with three, usually lobed, leaflets), hairy underneath and up to 5.4 in. (15 cm) long.

**Flowers:** Flowering occurs in midsummer, when 0.5 in. (1.3 cm) long, purple, fragrant flowers hang, in clusters, in the axils of the leaves.

**Fruit:** Fruit are brown, hairy, flat, 3 in. (7.6 cm) long, 0.3 in. (0.8 cm) wide seed pods. Each pod can contain 3-10 hard seeds.

**Ecological Threat:** Preferred habitat includes open, disturbed areas such as roadsides, right-of-ways, forest edges, and old fields. *Pueraria montana* var. *lobata* often grows over, shades out and kills all other vegetation, including trees. It is native to Asia and was first introduced into the United States in 1876 at the Philadelphia Centennial Exposition. It was widely planted throughout the eastern United States in an attempt to control erosion.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=2425>





#### 10. MULTIFLORA ROSE (*Rosa multiflora*) - Highly Invasive

**Appearance:** *Rosa multiflora* is a multistemmed, thorny, perennial shrub that grows up to 15 ft. (4.6 m) tall. The stems are green to red arching canes which are round in cross section and have stiff, curved thorns.

**Foliage:** Leaves are pinnately compound with 7-9 leaflets. Leaflets are oblong, 1-1.5 in. (2.5-3.8 cm) long and have serrated edges. The fringed petioles of *Rosa multiflora* usually distinguish it from most other rose species.

**Flowers:** Small, white to pinkish, 5-petaled flowers occur abundantly in clusters on the plant in the spring.

**Fruit:** Fruit are small, red rose hips that remain on the plant throughout the winter. Birds and other wildlife eat the fruit and disperse the seeds.

**Ecological Threat:** *Rosa multiflora* forms impenetrable thickets in pastures, fields, and forest edges. It restricts human, livestock, and wildlife movement and displaces native vegetation. It tolerates a wide range of conditions allowing it to invade habitats across the United States. *Rosa multiflora* is native to Asia and was first introduced to North America in 1866 as rootstock for ornamental roses. During the mid-1900s it was widely planted as a “living fence” for livestock control.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3071>



## 11. TREE OF HEAVEN (*Ailanthus altissima*) - Highly Invasive

**Appearance:** *Ailanthus altissima* is a rapidly growing, typically small tree up to 80 ft. (24.4 m) in height and 6 ft. (1.8 m) in diameter. It has large leaf scars on the twigs.

**Foliage:** Foliage is one of the best identifying characteristics for this species. The leaves are pinnately compound and 1-4 ft. (0.3-1.2 m) in length with 10-41 leaflets. *Ailanthus altissima* resembles native sumac and hickory species, but it is easily distinguished by the glandular, notched base on each leaflet.

**Flowers:** Species is dioecious and flowering occurs in early summer when large clusters of yellow flowers develop above the foliage.

**Fruit:** Fruit produced on female plants are tan to reddish, single winged and can be wind or water-dispersed.

**Ecological Threat:** *Ailanthus altissima* forms dense, clonal thickets which displace native species and can rapidly invade fields, meadows, and harvested forests. This invasive tree species is extremely tolerant of poor soil conditions and can even grow in cement cracks. *Ailanthus altissima* is not shade tolerant, but easily invades disturbed forests or forest edges causing habitat damage. Introduced as an ornamental, it was widely planted in cities because of its ability to grow in poor conditions. Management and control efforts for this species continue across the United States at great economic cost.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3003>



## 12. CALLERY PEAR (*Pyrus calleryana*) - Moderately Invasive

**Appearance:** Bradford pear is a cultivar of *Pyrus calleryana*. It is a deciduous tree that can grow up to 60 ft. (18 m) in height and 2 ft. (0.6 m) in diameter.

**Foliage:** The leaves are alternate, simple, 2-3 in. (5.1-7.6 cm) long, petiolate, and shiny with wavy, slightly toothed margins.

**Flower:** Flowering occurs early in the spring (April to May) before the leaves emerge. The flowers are 1 in. (2.5 cm) wide, showy, malodorous, and white. It is insect pollinated.

**Fruit:** Fruits are round, 0.5 in. (1.3 cm) in diameter and green to brown in color.

**Ecological Threat:** *Pyrus calleryana* 'Bradford', produce sterile fruits because they do not self-pollinate. They have been widely planted throughout the United States since the early 1900s as an ornamental. New cultivars of *Pyrus calleryana* were bred to reduce the tree's tendency to split in snow or high winds. The Bradford pear cultivar, other *P. calleryana* cultivars and *P. betulifolia* or Asian pear, can hybridize and produce fertile fruit. In addition to this, fertile pear varieties are commonly used as the rootstock when grafting. If the grafted crown is damaged the fertile rootstock can then dominate, producing fertile fruit. These factors and others may have contributed to the trees seeding out into natural areas and becoming an invasive problem.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=10957>





### 13. CHINESE WISTERIA (*Wisteria sinensis*) - Moderately Invasive

**Appearance:** *Wisteria sinensis* is a deciduous woody vine capable of growing to a height of 40 ft. (12.2 m). Stems can be up to 10 in. (25.4 cm) in diameter with smooth, gray-brown bark. When looking down on the vine, it twines in a counterclockwise direction around the host.

**Foliage:** Alternate, pinnately compound (7-13 leaflets) leaves are tapered at the tip with wavy edges. Leaflets are approximately 3 in. (7.6 cm) in length.

**Flowers:** Lavender, purple or white flowers are fragrant, very showy and abundant and occur in long, dangling clusters in the spring, 6-12 inches long.

**Fruit:** Seeds are contained in flattened, hairy, 6 in. (15.2 cm) long, bean-like pods. Invasions often occur around previous plantings.

**Ecological Threat:** *Wisteria sinensis* can displace native vegetation and kill trees and shrubs by girdling them. The vine has the ability to change the structure of a forest by killing trees and altering the light availability to the forest floor. A native of China, it was first introduced into the United States in 1816 for ornamental purposes.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3083>



#### 14. COMMON CHICKWEED (*Stellaria media*) - Moderately Invasive

**Appearance:** Common chickweed is an annual, low-growing herb. Stems are decumbent, to 19.7 in. (50 cm) long with a longitudinal line of hairs.

**Foliage:** Leaves are opposite, oval, to 0.8 in. (2 cm) long and pointed at the tip. Older leaves are petiolate.

**Flowers:** Flowering occurs in early spring when small, white flowers develop in the leaf axils or in terminal clusters. Flowers have five cleft petals, therefore, appearing to have 10.

**Fruit:** Fruits are very small and are covered by extremely hairy calyces.

**Ecological Threat:** Common chickweed occurs in shady, moist locations and can commonly threaten habitats on rocky seeps.

**Sources:** <https://invasive-species.extension.org/stellaria-media-common-chickweed/>  
& <https://www.invasive.org/browse/subinfo.cfm?sub=29310>





## 15. ENGLISH IVY (*Hedera helix*) - Moderately Invasive

**Appearance:** *Hedera helix* is an evergreen perennial climbing vine that attaches to bark of trees, brickwork and other surfaces by root-like structures that exude a glue-like substance to aid in adherence.

**Foliage:** Leaves are alternate, dark green, waxy, somewhat leathery; extremely variable leaf forms, from unlobed to 3-5 lobed; typically green with whitish veins.

**Flowers:** Flowering occurs in late summer to early fall, typically under full sun conditions; flowers are small, greenish-yellow and occur in globular starburst type inflorescence at tips of flowering stems.

**Fruit:** Fruits are black with a fleshy outer layer and stone-like seeds. New plants grow easily from cuttings or stem fragments that make contact with the soil.

**Ecological Threat:** *Hedera helix* is an aggressive invader threatening all levels of forested and open areas, growing along the ground as well as into the forest canopy. Vines climb up tree trunks and envelop branches and twigs, blocking sunlight from the host tree's foliage, impeding photosynthesis. An infested tree will exhibit decline for years before it dies. The weight of vines also makes trees susceptible to blowing over in storms. This plant has been confirmed as a reservoir for bacterial leaf scorch (*Xylella fastidiosa*), which affects a wide variety of trees.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3027>





## 16. GOLDEN BAMBOO (*Phyllostachys aurea*) - Moderately Invasive

**Appearance:** *Phyllostachys aurea* is a perennial, reed-like plant that can reach heights of 16-40 ft. (5-12 m). The canes (stems) are hollow with solid joints and can be 1-6 in. (2.5-15.2 cm) in diameter.

**Foliage:** Leaves are alternate, 3-10 in. (7.6-25.4 cm) long and 0.25-0.75 in. (0.6-1.9 cm) wide.

**Flowers:** Flowering is very rare (maybe once every 7 to 12 years).

**Fruit:** Plants spread by rhizomes.

**Ecological Threat:** Infestations are commonly found around old homesites and can rapidly expand in size. *Phyllostachys aurea* can form dense, monocultural thickets that displace native species. Once this plant is established, it is difficult to remove. It is native to China and was first introduced into the United States in 1882 for ornamental purposes.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3063>



### 17. MIMOSA (*Albizia julibrissin*) - Moderately Invasive

**Appearance:** *Albizia julibrissin* is a small tree that is 10-50 ft. (3-15.2 m) in height, often having multiple trunks.

**Foliage:** It has delicate-looking, bi-pinnately compound leaves that resemble ferns.

**Flowers:** Flowering occurs in early summer, when very showy, fragrant, pink flowers develop in groups at the ends of the branches.

**Fruit:** Fruit are flat, 6 in. (15.2 cm) long seed pods that develop in the late summer.

**Ecological Threat:** *Albizia julibrissin* invades any type of disturbed habitat. It is commonly found in old fields, stream banks, and roadsides. Once established, mimosa is difficult to remove due to the long lived seeds and its ability to re-sprout vigorously. *Albizia julibrissin* is native to Asia and was first introduced into the U.S. in 1745. It has been widely used as an ornamental.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3004>





## 18. ROYAL PAULOWNIA (*Paulownia tomentosa*) - Moderately Invasive

**Appearance:** Paulownia tomentosa is a medium sized tree (50-60 ft. [15.2-18.3 m] in height and 2 ft. [0.6 m] in diameter) that can commonly be mistaken for the native tree northern catalpa (Catalpa speciosa). Bark is gray-brown and rough, often developing lighter-colored shallow vertical fissures.

**Foliage:** Leaves are large, broadly oval to heart-shaped (6-12 in. [15.2-30.5 cm] long, 5-9 in. [12.7-22.8 cm] wide) and arranged opposite along the stem, hairy on both surfaces. Petioles are also hairy and can be sticky when young. Leaves growing off root sprouts have been measured up to 2 ft. (0.6 m) in length. Twigs are stout, brown, and speckled with white dots (lenticels). They can be slightly hairy when young. Lateral leaf scars are somewhat round, becoming darker and sunken. The pith is chambered or hollow.

**Flowers:** Large flowers (2 in. [5.1 cm] long) are fragrant and light violet-pink, appearing in showy upright clusters (8-12 in. [20.3-30.5 cm] in length) in early spring (April-May) before leaves emerge. They have tubular corollas, ending in 5 unequal lobes. Flower buds are hairy and linear, becoming round.

**Fruit:** Fruits (1-2 in. [2.5-5.1 cm] long, 1-1.5 in. [2.5-3.8 cm] wide) are egg-shaped capsules, divided into 4 inner compartments that contain the seeds. Fruits are light green in the summer, becoming dark brown in the winter, and persist in clusters on the tree until the following spring. The capsules split in half during late winter to release up to 2000 tiny winged, wind-borne seeds 0.08-0.12 in. (2-3 mm).

**Ecological Threat:** Paulownia tomentosa is an aggressive tree that invades disturbed natural areas including forests, roadsides, and stream banks. It is native to China and was first introduced into the United States as an ornamental in 1840.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=2426>





## 19. ASIATIC DAYFLOWER (*Commelina communis*) - Minimally Invasive

**Appearance:** *Commelina communis* is an annual herb with many branched, prostrate stems, which are minutely pubescent distally, and about 3.4 ft. (1 m) long.

**Foliage:** The leaves are lanceolate to ovate-lanceolate, 1.2-3.5 in. (3–9 cm) long and 0.6-0.8 in. (1.5–2 cm) wide.

**Flowers:** The inflorescence is a cyme with one flower near the top, with dark blue petals and membranous sepals about 0.2 in. (5 mm) long.

**Fruit:** Fruit are two-valved capsules that are elliptic from 2-3 in. (5–7 mm). The two seeds in each valve are brown-yellow, 0.08-0.12 in. (2–3 mm) long, irregularly pitted, flat-sided, and truncate at one end.

**Ecological Threat:** *Commelina communis* can be found in moist, shady forest edges. It can be found in wet areas of crop fields, orchards, ditches, and roadsides.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=5365>



## 20. BEEFSTEAK PLANT (*Perilla frutescens*) - Minimally Invasive

**Appearance:** *Perilla frutescens* is an erect, annual freely branching herbaceous plant that grows from 1-6.6 ft. (0.3-2 m) tall. The square stems are villose, purple or green with four parallel grooves. Dried stalks can persist through winter. It is native to Eastern Asia.

**Foliage:** Opposite leaves are membranous or herbaceous, broadly ovate or orbicular, 2.76-5.12 in. long by 1.77-3.94 in. wide (7-13 cm X 4.5-10 cm), with mucronate tips, a rounded or broad cuneate bases, and dentate margins. The pilose surface of the leaves may be green or purple on both sides. Each leaf has seven to eight pairs of lateral veins, which are closer together near the base. The veins on the upper surface are slightly raised, more so on the underside. The petiole is flat and villose.

**Flowers:** Flowers are held in pairs along the stalk. The inflorescence is a villose corymb that may grow either terminally or from the leaf axils.

**Fruit:** The sub-globose fruits are reticulate nutlets, grayish-brown, and are about 0.06 in. (1.5 mm) in diameter.

**Ecological Threat:** *P. frutescens* grows along roadsides, ditches, forest margins, and on hillsides. It spreads to natural areas, especially disturbed areas. It can disrupt native ecosystems by outcompeting native plants. It is ordinarily avoided by cattle and has been implicated in cattle poisoning. Beefsteak plants are most toxic if cut and dried for hay late in the summer, during seed production.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3413>



## 21. CHINABERRY (*Melia azedarach*) - Minimally Invasive

**Appearance:** *Melia azedarach* is a deciduous tree growing to 50 ft. (15.2 m) in height and 2 ft. (0.6 m) in diameter.

**Foliage:** The leaves are alternate, bi-pinnately compound, 1-2 ft. (0.3-0.6 m) in length and turn golden-yellow in fall.

**Flowers:** Flowering occurs in the spring, when showy, lavender, 5-petaled flowers develop in panicles.

**Fruit:** Fruit are hard, yellow, marble-sized, stalked berries that can be dangerous on sidewalks and other walkways. Seeds are spread by birds.

**Ecological Threat:** *Melia azedarach* invades disturbed areas and is commonly found along roads and forest edges. It has the potential to grow in dense thickets, restricting the growth of native vegetation. *Melia azedarach* is native to Southeast Asia and northern Australia. It was introduced into the United States in the mid 1800s for ornamental purposes.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3049>





## 22. THORNY OLIVE (*Elaeagnus pungens*) - Minimally Invasive

**Appearance:** *Elaeagnus pungens* is a dense evergreen shrub that invades natural areas throughout the southeastern United States. The shrub is often multi-stemmed and short. Sharp shoots give it a thorny appearance. Shrubs can grow 3.3-26.3 ft. (1-8 m) tall. Shrubs are usually very dense with long shoots extending from the top.

**Foliage:** The leaves are alternate, oval to elliptical, with irregular wavy margins and silvery surfaces, 2-4 in. (5.1-10.2 cm) in length and thick.

**Flowers:** The axillary clusters of small, sweet-smelling, white to brown flowers develop in the fall.

**Fruit:** Plants rarely fruit, but fruit are small, red and dotted with small brown scales.

**Ecological Threat:** *Elaeagnus pungens* closely resembles two other exotic olives, autumn olive and Russian olive. A high shade tolerance allows *Elaeagnus pungens* to invade both in open areas and under forest canopies. The seeds are dispersed by animals, giving this plant the potential for rapid spread. This plant is native to eastern Asia and was first introduced into the United States in 1830 as an ornamental shrub.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=4526>



### 23. VINCA MAJOR (*Vinca major*) - Minimally Invasive

**Appearance:** Evergreen to semievergreen vines, some-what woody, trailing or scrambling to 3 ft. (1 m) long and upright to 1 ft. (30 cm).

**Foliage:** Foliage is opposite, glossy and hairless, some-what thick, with margins slightly rolled under. Leaves are heart-shaped to somewhat triangular to elliptic, 1.5-2.5 in. (4-6 cm) long and 1-1.5 in. (2.5-4 cm) wide, with petioles 0.2-0.4 in. (5-10 mm) long.

**Flowers:** Violet to blue lavender (to white), with five petals radiating pinwheel-like at right angles from the floral tube. Flowers from 1.5-2 in. (4-5 cm) wide with a 0.6-0.8 in. (1.5-2 cm) long tube. Five sepals long lanceo-late, about 0.4 in. (1 cm), hairy margined. Blooms April to May, then sporadically to September.

**Fruit:** Slender, cylindrical fruit up to 2 in. (5 cm) long. Splitting when dry to release three to five seeds.

**Ecological Threat:** Found around old homesites and scattered in open to dense canopied forests. Forms mats and extensive infestations even under forest canopies by vines rooting at nodes. Introduced from Europe in 1700s. Ornamental ground cover, commonly sold and planted by gardeners.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=4528>



## 24. VINCA MINOR (*Vinca minor*) - Minimally Invasive

**Appearance:** Vinca minor is a vine-like erect or trailing groundcover; mostly evergreen; stems slender.

**Foliage:** Leaves are opposite, dark green, glossy, oval to lance-shaped, thick-textured; may be variegated.

**Flowers:** Flowers are blue, lavender or white, about 1 in. (2.5 cm) across, five petals blunt at tip, arranged in spiral; blooms in springtime.

**Fruit:** No fruits or seeds typically. Spreads vegetatively through rhizomes.

**Ecological Threat:** Vinca minor has escaped cultivation and is invading natural areas throughout the eastern U.S. It inhabits open to shady sites including forests and often escapes from old homesites. Vinca minor grows vigorously and forms dense and extensive mats along the forest floor, displacing native herbaceous and woody plant species. Vinca minor was first introduced into North America in the 1700s as an ornamental. It is still commonly sold as an ornamental ground cover.

**Source:** <https://www.invasive.org/browse/subinfo.cfm?sub=3081>





## 4.2 - Pest Species

The Integrated Pest Management Plan for JBLE-Eustis 2020-2024, Appendix P (Tim Christensen) identifies several insect pests that could cause significant negative impacts to forest resources on the installation. Emerald ash borer (*Agrilus planipennis*), Asian longhorned beetle (*Anoplophora glabripennis*), southern pine beetle (*Dendroctonus frontalis*), redbay ambrosia beetle (*Xyleborus glabratus*), sirex woodwasp (*Sirex noctilio*), beech scale (*Cryptococcus fagisuga*), spotted lanternfly (*Lycorma delicatula*) and gypsy moth (*Lymantria dispar*) are listed in the report (as well as other forest pests). Pest summaries for each species including in depth information on life history, distribution, plant hosts, and classification as well as surveillance protocols, including the selection of appropriate sites for detection activities, ground checking and/or trapping methods (if applicable), season of surveillance, and trap maintenance are given as they apply to each potential pest.

Southern pine beetle, emerald ash borer, spotted lanternfly, and beech scale are presently known to occur in Virginia (listed below), of which, only southern pine beetle is found at JBLE-Eustis. Additionally, three other species are listed below that are of concern in that they have potential to significantly impact forest health (two of which occur on the installation or have presumably been documented on the installation).

### **Southern Pine Beetle (*Dendroctonus frontalis*)**

CE conducted field surveys for Southern Pine Beetle (SPB) in 2011 and 2015. This species was expected but none were found. Nonetheless, this remains as a potentially serious forest pest given its distribution in Virginia, and that loblolly pine is the predominant tree species on the installation with some overmature stands. Routine surveillance is highly recommended. A large outbreak was documented on Fort Lee, VA (appx 55 miles west of JBLE-Eustis) and caused significant damage in 2019-2020.



Photo Credit, J. R. Baker, N.C. State University

### **Emerald Ash Borer (*Agrilus planipennis*)**

Emerald ash borer has been documented on JBLE-Langley (Big Bethel Reservoir, located appx 13.5 miles Southeast of JBLE-Eustis), however there is not a significant amount of host trees (*Fraxinus* spp) on the JBLE-Eustis installation.



*Photo credit, Will Parson/Chesapeake Bay Program*

### **Spotted lanternfly (*Lycorma delicatula*)**

A confirmed sighting of spotted lantern fly was reported in July of 2021 near Charlottesville, VA (Albemarle County, about 140 miles northwest of JBLE-Eustis). This pest was only discovered in the United States in 2014. The non-native tree known as tree of heaven (*Ailanthus altissima*) is a preferred host though the spotted lanternfly is known to attack 70 host species including fruit trees, ornamental trees, vines, apple trees, birch, cherry, dogwood, grapes, lilac, maples, and poplar (found frequently on the installation). Natural barriers such as the James River and Warwick River coupled with the removal of previous stands of tree of heaven (excluding areas south of ranges 3 and 4) *may* contribute to preventing establishment of the spotted lanternfly. Its risk of damage at the installation remains uncertain at this time.



Photo Credit, Diane Behm, Manassas, Va)

### **Beech Scale (*Cryptococcus fagisuga*)**

Beech scale is documented in Virginia; however, it is possible that the genetic strain of beech trees growing in the coastal plain (and possibly including beech stands at JBLE-Eustis), is likely resistant to the *Neonectria* fungal infections vectored by the beech scale however, this is difficult to confirm, and surveillance is recommended.



Photo Credit, Joseph O'Brien, USDA Forest Service



**Beech Bark Aphid (*Grylloprociphilus imbricator*).**

Beech bark aphid is gregarious and easily observed on branches and twigs of American beech based on their waving white tails that look like snowflakes. It is a native species but an outbreak or their effects in conjunction with the invasive beech scale (*Cryptococcus fagisuga*) could lead to significant damage to beech stands on the installation (should the latter become established).



Photo Credit, Steven Katovich

**Gypsy Moth (*Lymantria dispar*)**

The gypsy moth is an invasive lepidopteran having the potential to inflict severe damage to hardwood trees by defoliation. This species was supposedly documented on the installation in the 1980s-time frame, but none have been observed in recent years and no evidence of serious damage has been evident. However, due to its occurrence in the local area previously and its potential to cause significant damage, surveillance is warranted.



USDA APHIS PPQ, Bugwood.org

**Redbay Ambrosia Beetle (*Xyleborus glabratus*)**

Redbay ambrosia beetle is uncommon (not yet documented in Virginia) and typically found as scattered individuals, which reduces the possibility of RAB becoming an invasive insect pest. Its preferred host (*Persea spp*) is currently prolific in the sapling layer on the installation which may eventually lead to its arrival.



Photograph by Lyle J. Buss, University of Florida

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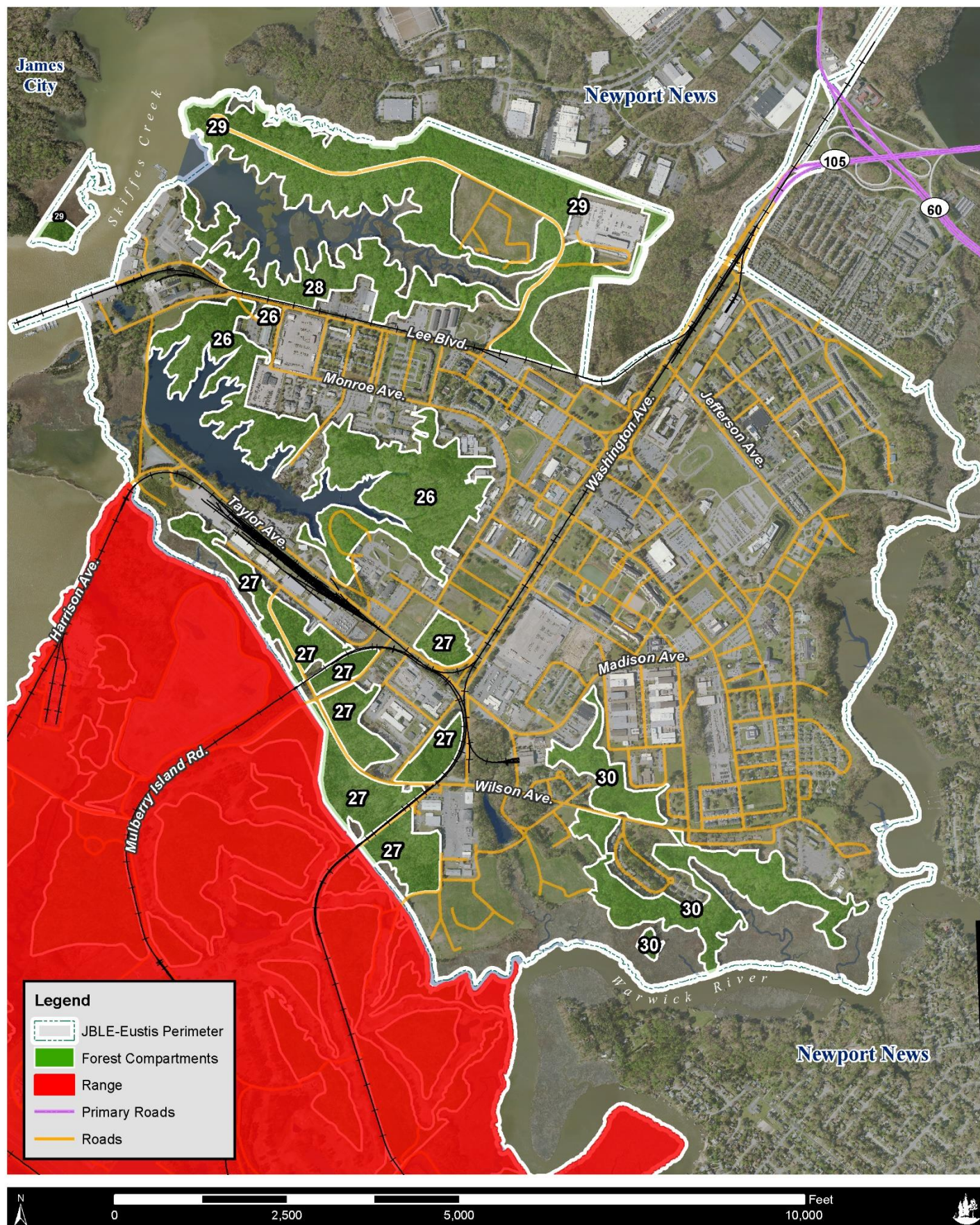


## **5.0 - Forest Compartments**

A comparative analysis was conducted utilizing aerial photographs and a Geographic Information System (GIS) to identify changes to the 2007 compartments. Changes were identified on aerial imagery from June, 2020. Compartments were then adjusted by use of a GIS to depict identified land use changes and previously unaccounted land cover characteristics made visible by the use of high-resolution imagery. Primary changes were made as a result of new development/construction, land clearing, new forest cover, and/or previous imagery discrepancies. Upon completion on the preliminary compartment designation, maps were sent to the environmental department with the proposed compartment boundary adjustments in addition to proposed plot sample locations for the upcoming inventory. Modifications to the compartment boundaries were approved, however plot locations needed to be adjusted to avoid possible exposure to UXO (primarily behind Ranges 3 and 4). Geo-referenced maps/data were provided by JBLE – Eustis ITAM personnel that outlined Impact Area Trails and then proposed sampling locations were re-drawn by RMA, LLC with 100' buffers whereby data would be collected within 100' of either side of designated trails (buffers currently used for recreational hunters behind the impact area). All plot locations were subsequently approved by the JBLE-Eustis Environmental Department. Compartments 5, 32 and 38 (island compartments) were not sampled during this most recent inventory due to access limitations. The remaining 35 compartments (Compartments 1-4, 6-31, 33-37) were then examined to collect data that described the vegetation, its structure, as well as to provide specific recommendations for forest management.

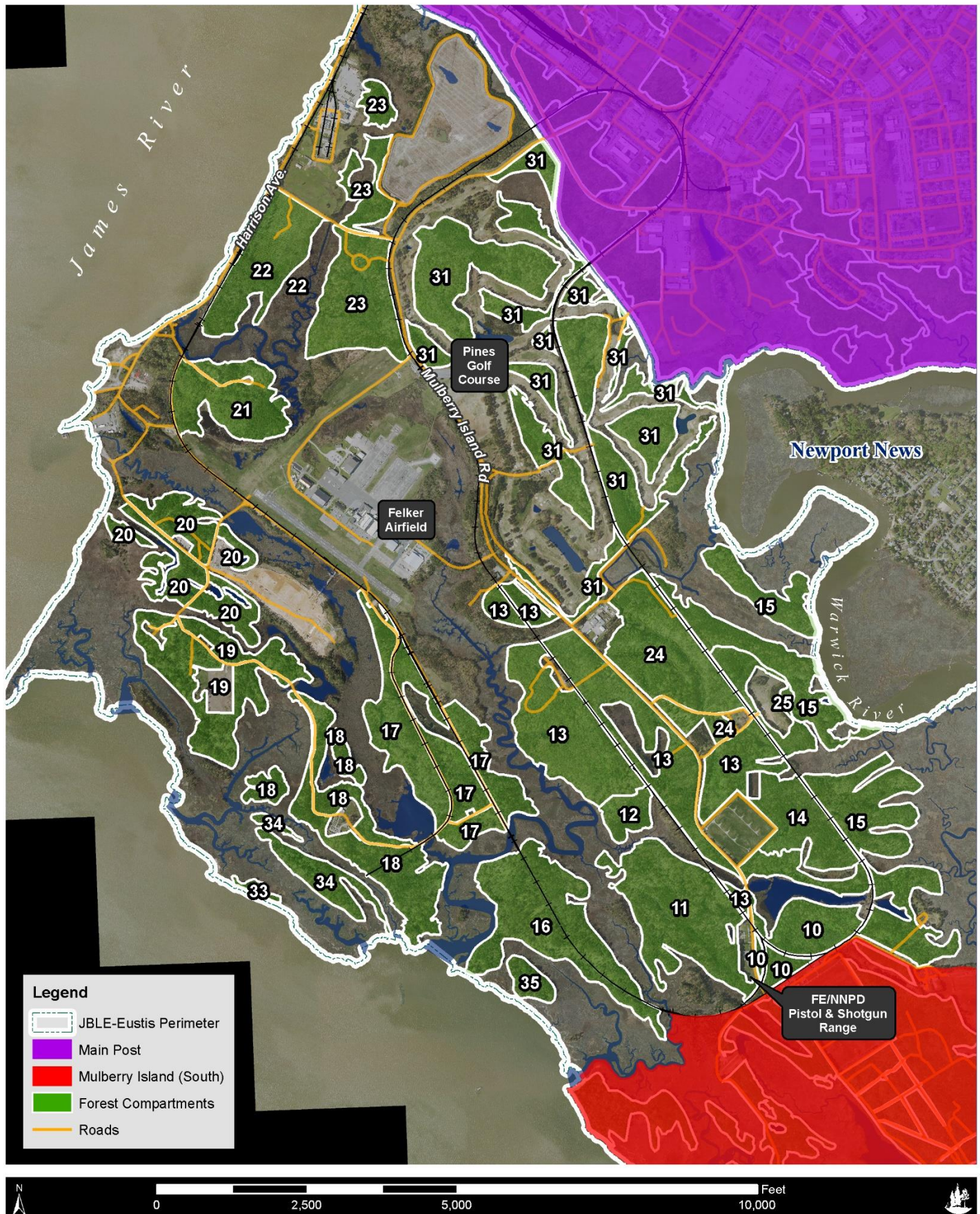


# JBLE-Eustis, VA ~ Main Post: Forest Compartments



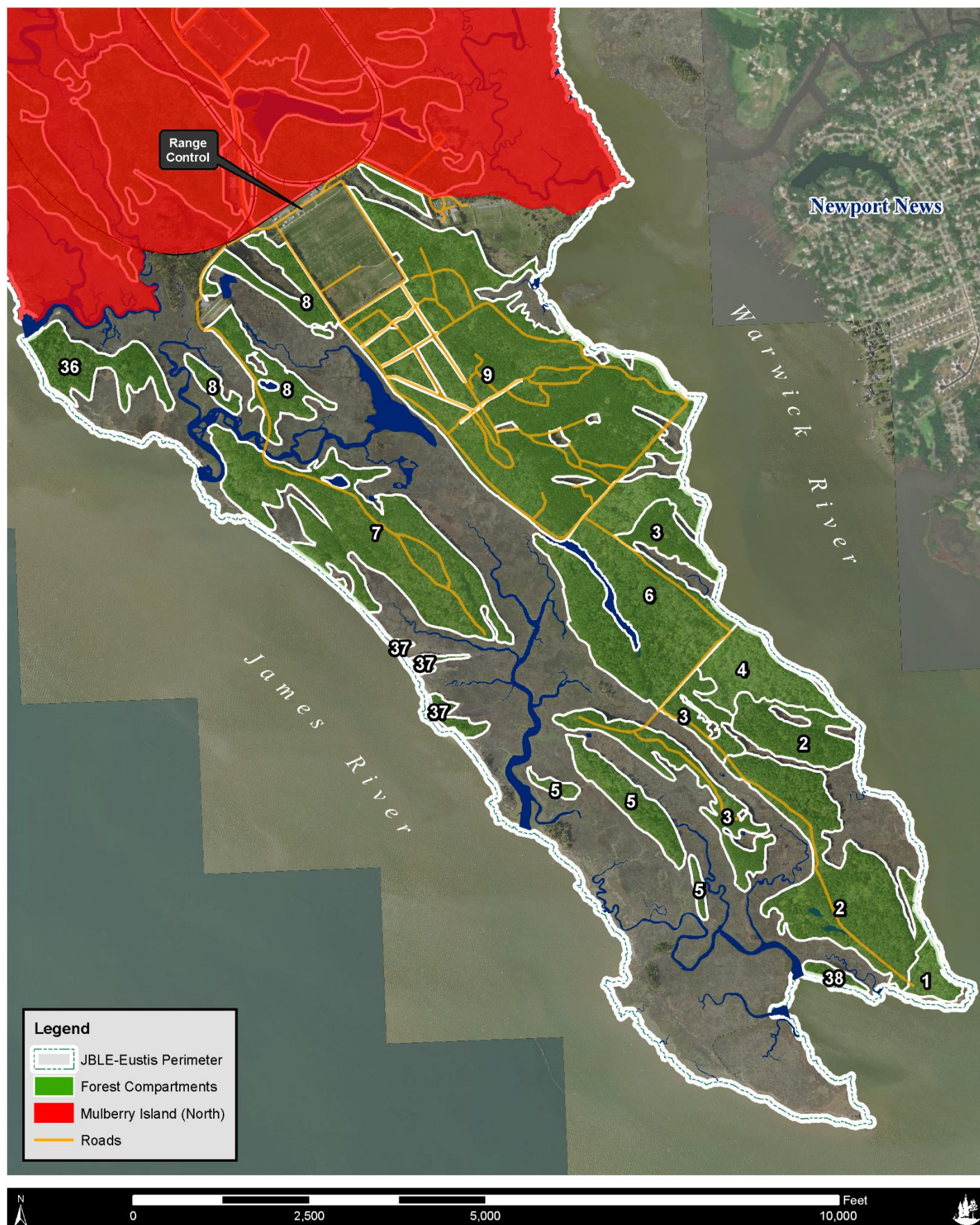


# JBLE-Eustis, VA - Mulberry Island (North): Forest Compartments





# JBLE-Eustis, VA - Mulberry Island (South): Forest Compartments



## 6.0 - Timber Inventory and Management Plan

### Objective

Conduct a timber inventory to precisely determine the species composition and volume of all forestlands on JBLE-Eustis.

### 6.1 - Inventory Methodology

In order to adequately assess the structure of all forestlands, each stand/vegetative compartment was sampled by means of a multi-phased, stratified sampling technique, the sampling units being; strategically selected plots within each vegetative compartment. Stratification having been achieved by previous stand compartmentalization based on similar ecological characteristics and topographic fragmentation. Sampling was conducted according to the following conditional sampling intensities:

- a. One plot per ten acres for compartments with a total acreage less than or equal to fifty acres.
- b. One plot per fifteen acres for compartments with a total acreage greater than fifty acres.

\* Each compartment, regardless of size, was sampled a minimum of three times (three plots).

The following sampling methods were then applied to assess forestland composition:

- a. Canopy (timber) - Quantitative, variable-plot sampling by means of a 10 basal area factor (BAF) prism at each plot center point, resulting in plot sizes of variable probability with respect to the sawtimber component.
- b. Shrubs, & Saplings – Direct Stem counts within each plot location. Shrub stems were counted within a 5-meter radius and saplings were counted within a 10-meter radius. Stem counts for both shrubs and saplings were then extrapolated to per acre values.
- c. Herbaceous species - Three (3) one-meters squared subplots, randomly placed within each sample plot (10-m radius circular plots). All plants within the meter-squared subplots were identified to species level, and abundance was estimated by species using a modified Braun-Blanquet cover class scale (Mueller-Dombois and Ellenberg 1974), taking the midpoints of each cover class for analysis. The cover classes used were (midpoints in parentheses): Class 1: 0-1% cover (1%) Class 2: 1-5% cover (3%) Class 3: 5-25% cover (15%) Class 4: 25-50% cover (38%) Class 5: 50-75% cover (63%) Class 6: 75-95% cover (85%) Class 7: >95% cover (98%)
- d. Woody vines – The woody vine layer was measured as a percent cover within a 10-m radius at each plot. Coverage was estimated using the above-described modified Braun-Blanquet cover class scale.

Multidimensional data was collected on two levels, plot and tree. Plot-level data pertained to the overall stand/compartment composition and volume, while tree-level data pertained to the tree composition within a particular plot. The following figures illustrate data elements collected in the field:

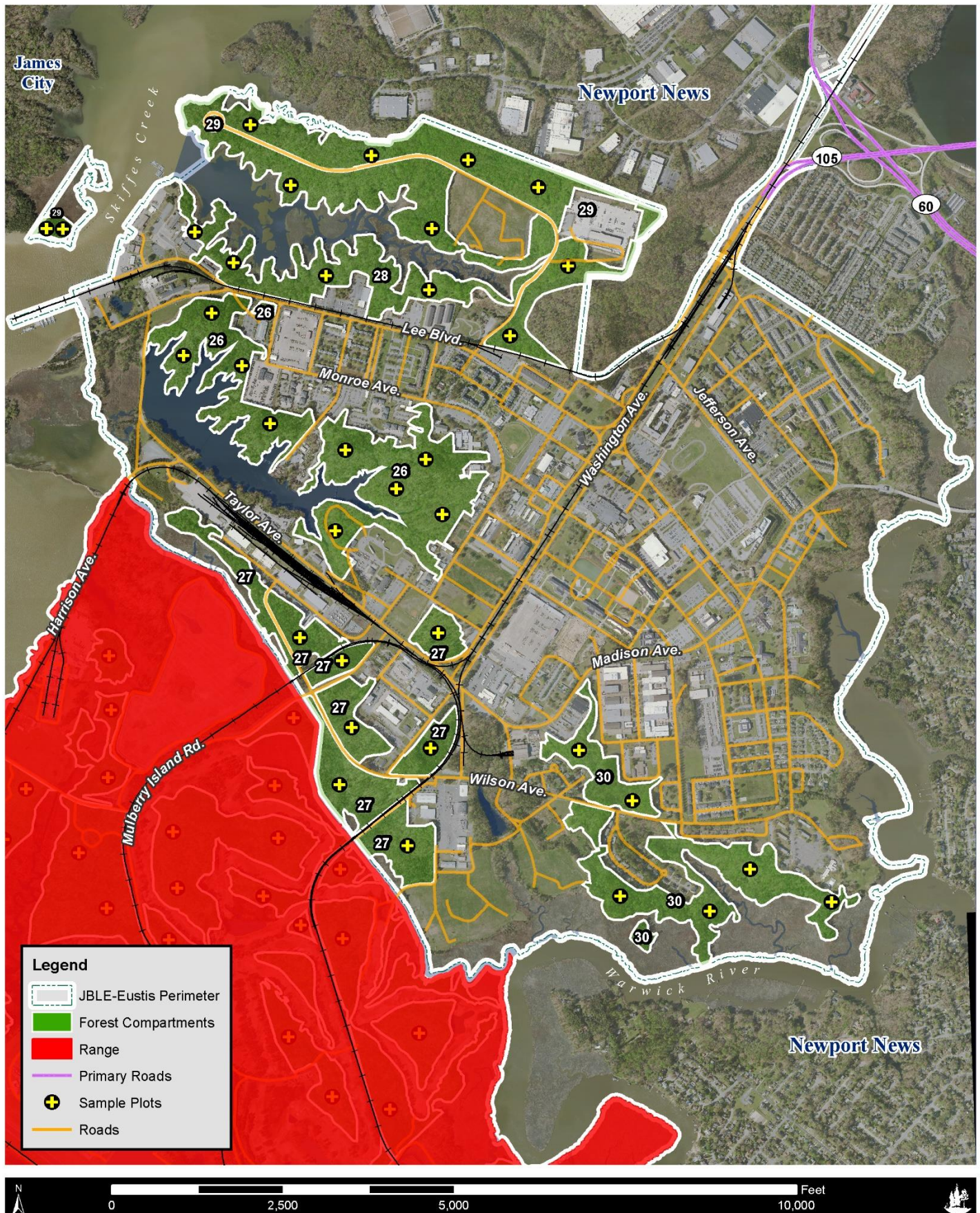
PLOT LEVEL FIELD DATA SHEET		Plot #:
Plot forest cover type:	Dominant species / species representing the majority of onsite stocking	
Age of dominant tree (stand age):	Age of dominant species. Determined by increment bore at breast height	
Diameter growth (5yr & 10yr):	Growth rate determined for five and ten year intervals. Measured by increment bore	
Height of dominant tree:	Tree height measured by clinometer (ground level to tip of the apical meristem)	
Crown closure (%):	Measure of ground area covered by canopy. Measured by densiometer	
Invasive/disease/insect or mechanical damage, description & % affected:	Account of invasive species present and description of adverse tree conditions	
Description:	Brief plot description	

TREE LEVEL FIELD DATA SHEET		Plot #:
Tree #:	Given as: <u>Compartment #</u> - <u>Tree #</u>	
Tree species:	Scientific and common name of tree species being assessed	
Tree DBH:	Tree diameter measured 4.5' above ground by caliper	
Tree height:	Tree height measured by clinometer (ground level to tip of the apical meristem)	
Merchantable tree height (to 4" top):	Tree height measured from stump (1') to point where diameter is 4", given as # of 16' logs	
Crown class:	Tree's position in the canopy: Open, Dominant, Co-dominant, Intermediate, or Overtopped	
Crown height (live crown ratio):	Height of tree crown, measured by clinometer	
Crown basal diameter:	Measurement of diameter, given as an average	
Tree condition:	Overall tree assessment of tree health: Good, Fair, or Poor	
Tree quality:	Classification of log quality/growing stock: Acceptable, Unacceptable, Cull, or Dead	
Forest product:	Given as: Sawtimber, Pulpwood, or Not Applicable (Cull trees)	
Diameter growth:	Growth rate determined for five and ten year intervals. Measured by increment bore	
Tree damage; location & severity:	Assessment of physical tree damage and its location	

Reference is made to Figures 6.1A, 6.1B, and 6.1C which depict the locations of all sample plots where data collection occurred for to this project.



# JBLE-Eustis, VA ~ Main Post: Sample Plot Locations



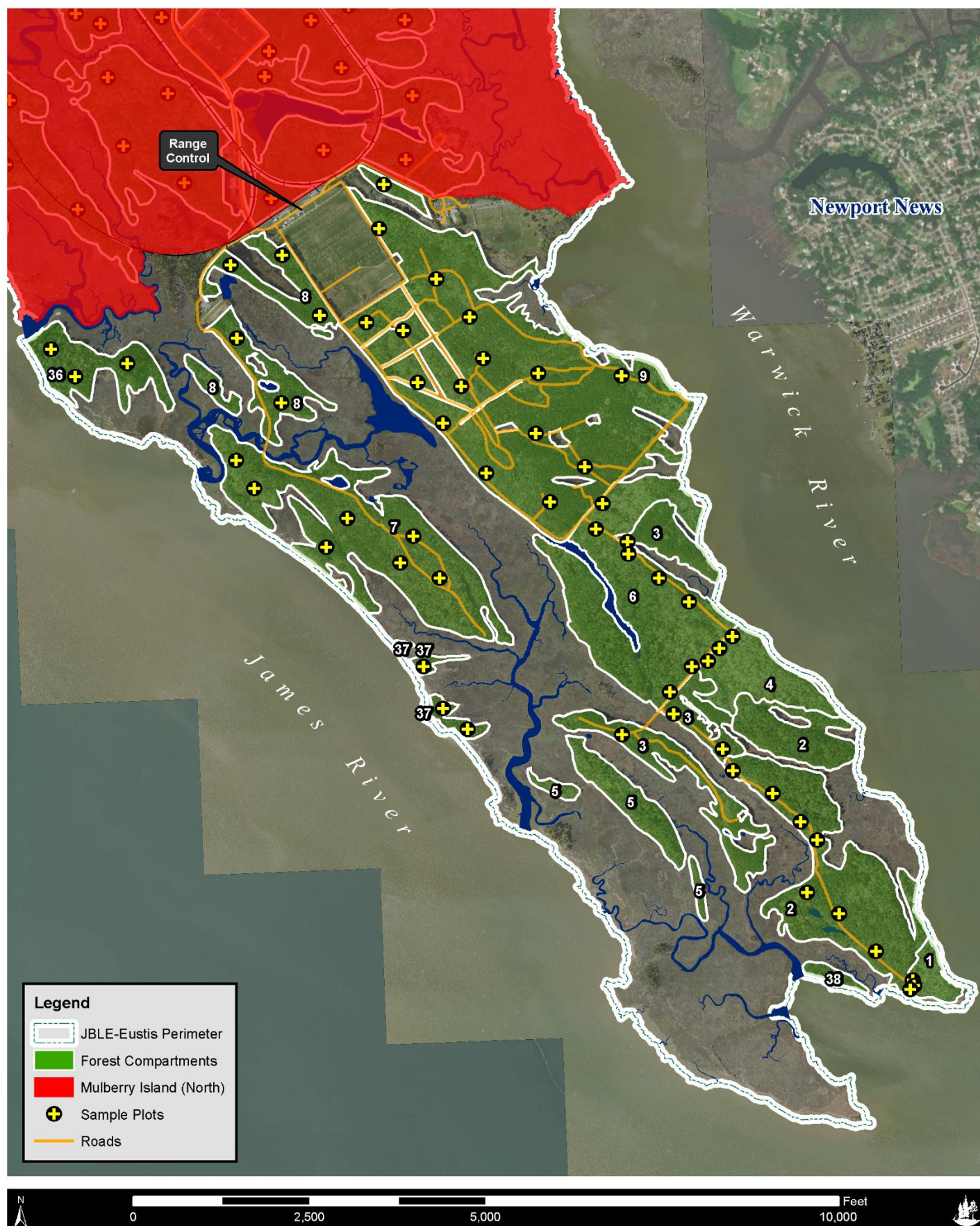


# JBLE-Eustis, VA ~ Mulberry Island (North): Sample Plot Locations





# JBLE-Eustis, VA - Mulberry Island (South): Sample Plot Locations





## **6.2 - Management Tools**

### **Pre-commercial Thinning**

Pre-commercial thinning is a management tool used primarily in overstocked forestland between 5 and 10 years of age. Predominant tree/sapling species are determined and optimum post-thinning stocking levels and tree spacings are defined prior to this silvicultural practice. Generally, 10' spacing between residual trees or 435-450 trees/acre are prescribed for loblolly pine stands. Experienced hand crews using gasoline powered brush cutters identify dominant desirable species (depending on management objectives) and remove surrounding trees to achieve the prescribed stocking levels. Releasing the desirable trees from competition greatly accelerates their growth rate and overall vigor of the stand and can lower the risk of insect and/or disease conditions.

This practice can also be modified to develop either pine/hardwood or hardwood/pine stand(s) depending upon pre-existing species composition/numbers. Hardwoods such as mixed oak species are typically more durable (longer lived) than pines and could allow a longer rotation before a final harvest is necessary. Additionally, oak and hickory species, as well as black gum can provide mast for foraging opportunities for a variety of wildlife. Less desirable species such as red maple and sweetgum should be felled (cut) during the precommercial thinning process. Targeted trees (trees that are felled) are non-merchantable and left on site where they will eventually decompose. This silvicultural practice does not generate revenue.

### **Commercial Thinning**

Commercial thinning is a management tool used in overstocked stands, usually when the stand is between the ages of 18-28 years of age. The objective of a commercial thinning operation is to provide additional growing space to the most desirable, healthier trees in the forest stand. Optimum post-thinning stocking levels are established prior to the practice and ideal spacing between the trees are defined. Generally, 20' -25' spacing between residual trees or 80-110 trees/acre are prescribed. In order to justify a commercial thinning operation, at least 10 or more acres are required to justify the cost of moving harvesting equipment to the site. Packaging smaller, adjacent compartments in a commercial thinning contract may be used to attract buyers to perform this practice. Although thinning typically generates limited revenue, the primary value accrues to the residual forest by improving its quality and growth rate. Commercial thinning equipment is very expensive and most thinning contractors must be highly productive and generate considerable volume of harvested pulpwood to cover their expenses. It is very important to design thinning projects so that unnecessary delays do not occur. Thinning projects behind the Range training areas must occur so the contractor can work without interruption. Therefore, close coordination with Range control will be necessary to assure unrestricted access occurs for as long a period possible. A discount in the price for the pulpwood may be necessary to balance a contractor's lost productivity in the event range activities interfere with the project.

### **Selective Harvest**

A selective harvest is a management tool generally applied to relatively mature stands where selected, saw timber-sized trees are removed to enhance specie composition according to defined management objectives. The primary goal of a selective harvest for JBLE-Eustis would be the removal of mature

loblolly pine and/or less desirable hardwoods such as red maple and sweetgum and the protection of species that have longer life spans such as white oak, cherrybark oak and black gum. Applications of this tool could increase overall forest health and enhance opportunities to accommodate concentrated troop or vehicle use. Additionally, wildlife habitat could be significantly improved by removing mature loblolly and less desirable species found in the upper canopy which will stimulate the development of more diverse understory by allowing sunlight to penetrate to the forest floor. A selective harvest should be carefully designed and supervised to ensure that proper selection and protection of the residual trees occurs.

### **Clear Cut Harvest**

Clear cutting is a management tool used in the Coastal Plain of Virginia to establish monoculture forest types, predominately pine plantations. Typically, all the trees in the forest are harvested and any residual vegetation on the site is controlled by the use of herbicides and/or prescribed burning prior to planting or natural regeneration. Although clear cutting might be less applicable to multiple land management objectives (which are typically found on JBLE-Eustis), this management tool would be practical in clearing aircraft approach zones and as a silvicultural practice that should be conducted in mesic forests that contain homogenous, over mature loblolly pine. In these situations a clear-cut may be necessary to re-establish a younger forest more capable of responding to the range of tools outlined above in order to work towards a more diverse forest type, more suitable for multiple-use objectives.

### **Hazard Tree Inspections**

Hazard trees include dead or dying trees, dead parts of live trees, or unstable live trees (due to structural defects or other factors) that are within striking distance of people or property (a target). Hazard trees have the potential to cause property damage, personal injury, or even fatality in the event of a failure. In the tree care industry, the term "hazard tree" is generally reserved to describe a tree that requires immediate removal, or other mitigating actions, to reduce the level of risk posed. The risk posed by a tree is dependent on the likelihood of a tree failure occurring, combined with the severity of the potential consequences of such a failure. Archaeological sites threatened and endangered species, and a variety of military training activities, including live fire ranges are factors that have made silvicultural activities difficult to conduct on JBLE-Eustis. At the present time, the majority of forestland on the installation is over-mature loblolly pine which may exacerbate tree or tree part failure(s) due to biological causes (fungi, decay, loss of vigor). Routine hazard tree inspections are currently conducted by qualified personnel on the installation and should be continued. More frequent inspections should be considered, especially after periods of high wind speeds and heavy rainfall in areas where human activity is high (training lands and urban recreational settings), and in close proximity to buildings and/or other potentially vulnerable infrastructure.

### **Prescribed Burning**

Prescribed fire can be an important and effective tool in land management. However, a thorough understanding of ecology, natural resources and experience in using prescribed fire is necessary to determine if this tool will meet specific objectives. The improper application of prescribed fire may exacerbate the objective being addressed by its use and cause unnecessary safety risks.

Thus, the specific objective or desired vegetative condition must first be identified. Once the objective is established, the land/habitat manager should determine if prescribed fire, one of several vegetative management tools, is the most appropriate tool to meet the identified objective. The proximity of JBLE-

Eustis to urban areas must be considered to ensure the use of prescribed fires does not create any off-site adverse impacts. Smoke management planning is designed to carefully identify sensitive areas and specific meteorological conditions that should be followed to reduce potential adverse impacts. Incorporating these recommendations will minimize risk and maximize safety to personnel, equipment, and resources.

Prior to utilizing prescribed fire, its objectives must be carefully determined and confirmed. Prescribed fires can be used to reduce hazardous fuel accumulations, prepare sites for seeding and planting, dispose of logging or organic debris, improve wildlife habitat, manage competing vegetation, manage endangered species, improve access for training purposes, as a tool to expose unexploded ordinance in Range Training Areas and non-combustible surface items associated with archeological sites. The control of prescribed fire is very similar to the suppression of wildfire, and it is a valuable learning experience for training and maintaining the firefighting skills of experienced personnel. Prescribed burning can serve all of these purposes at JBLE-Eustis and be a valuable element of the forest and wildlife management programs.

#### *Hazard Reduction:*

Forest fuels in pine stands accumulate rapidly and may build up 8"-12" depths with fuel loading of 12 tons/acre. Fires that occur during "worst case" or summer drought conditions can be difficult to control and result in extensive timber mortality. Prescribed fire is the most practical way to reduce dangerous accumulations of combustible fuels under pine stands. Wildfires that burn in areas where fuels have been reduced by prescribed fires cause less damage and are much easier to control.

It is not always necessary to completely burn large acreage compartments to reduce fire hazard. Creating breaks in fuel continuity often can create opportunities to reduce wildfire fire intensity and aid in the control of wildfires. Dividing consistent vegetation compartments into smaller units and selectively burning a variety of compartments over several years can provide hazard reduction. This will also enhance wildlife habitat by diversifying the vertical structure of vegetation. Finally, creating vegetation diversity will enhance training opportunities within training areas by providing a variety of cover and concealment options.

#### *Noxious Flora Control:*

Noxious, exotic and/or invasive plants can adversely impact natural ecosystems by displacing indigenous species. Common Reed or Phragmites (*Phragmites australis*) is an example of a dominant invasive species on JBLE-Eustis. Training and construction activities are likely the principal causes of colonization of these species into new areas. Transportation of root stock of Phragmites inadvertently occurs if equipment operates in areas of infestation, and then without completely cleaning off soil-containing root stocks, the equipment is subsequently operated in un-infested areas.

Combinations of burning and herbicide applications are the primary tools for Common Reed management. Late winter or spring fires will eliminate the standing dead stems of Phragmites and will increase the effectiveness of subsequent herbicide application. Repeated annual use of these tools over a three (3) year period may be required to control Common Reed infestations.



### *Control of Ectoparasites:*

Noxious insects such as ticks and mosquitoes are present on JBLE-Eustis and can influence field and outdoor classroom training activities. Optimum parasite habitat includes low-lying, dense grassland and scrub/shrub and forest with well-developed scrub/shrub vegetational communities. These habitats dominate many training and range areas on JBLE-Eustis.

Mosquito populations also closely correspond to these habitats. Mosquitoes typically are less active in open areas characterized with windy conditions and subject to desiccating winds and temperatures.

Despite the abundance of these pests, they are representative of the ecosystem and should only be managed within those areas where conflict occurs with intensive human use. Typical control techniques would involve chemicals that may adversely impact the ecosystem. A more benign approach would be to manage the habitat to create conditions less favorable for the buildup of mosquito and/or tick populations. In order to ensure minimal impact on the ecosystem, habitat manipulations should be targeted to those priority areas involving outdoor classroom and training activities. Prescribed fires may be used to reduce the density of scrub/shrub communities within forest training areas to allow greater air circulation and less favorable mosquitoes and biting flies and reduce low vegetation that harbors ticks.

### *Wildlife Habitat Improvement:*

Prescribed fire for wildlife habitat improvement is a recommended practice where loblolly pine is the dominant overstory species. Periodic fires tend to favor early succession herbaceous and woody plants that favor open understory conditions. Following a fire, mineral soil is exposed creating a favorable seedbed for establishment. The seeds of many wildlife desirable plant species, such as berries and hard mast, are generally dispersed by wildlife and quickly colonize burned areas. These plants will dominate a site for several years and will be gradually reduced in abundance by plant succession. Prescribed fire is then used to "restart" the successional process.

A patchwork of burned and unburned area tends to maximize vertical and horizontal vegetational diversity thereby creating maximum habitat opportunities. The quality and quantity of wildlife foods is generally enhanced as herbaceous vegetation and hardwood sprouts become more abundant within the surface layers of a pine forest.

Native warm season grasses (nwsg) are increasingly being used to provide habitat and cover and are well adapted to management with fire. Timing a prescribed burn varies depending on the objectives of a habitat/land manager. Fields are most often burned in late winter, before spring green-up which reduces winter cover only for a short time and does not disrupt nesting birds and rabbits. Prescribed fire in late summer/early fall can be used when nwsg have become too dense and additional forb growth is desired (this may also reduce woody succession if completed before leaf senescence). Using prescribed fire under appropriate conditions can be efficient, effective, and relatively easy with proper planning and experience. -*A Landowner's Guide to Native Warm-Season Grasses in the Mid-South - University of Tenn*

### *Site Preparation/Reforestation:*

Prescribed fire can be an effective tool to prepare sites for reforestation, habitat development, and restoration projects. Fire as a tool is especially important on poorly drained soils as found over much of the land associated with Range Training Areas. During seasonally wet periods, usually beginning during mid-December through mid-May, the water table is typically at the surface or closely to the surface. In cases where vegetation management is necessary, heavy equipment use can severely impact the structure of the soil and exacerbate internal drainage. Fire is a low impact method to clear undesirable woody vegetation from sites and prepare the sites for reforestation and seeding. Prescribed fire also recycles nutrients making them available for new vegetation establishment.

Advance planning is necessary for site preparation burns since most are conducted the early spring following a timber harvest and prior to active re-growth. Since this period is typically late spring and early summer, when water tables can be high, fire line construction should be done the preceding fall if soils can support equipment, minimizing adverse impacts to natural resources and the environment.

If natural regeneration of loblolly pine is the objective, prescribed burning should be done prior to seed dispersal. Pine seed within the cones are mature by October. Between October and January, cones gradually open and seeds are dispersed by wind. In most years by January, 90% of loblolly seeds have been dispersed. Seedling germination and establishment is generally complete by mid-July. Therefore, prescribed burning for reforestation should be completed between July and September in anticipation of a fall/winter seeding period.

### *Training Area Improvement:*

Many training activities are conducted on JBLE-Eustis. Outdoor classroom and field training exercises are conducted within designated training areas. Outdoor classrooms typically are semi-improved and may offer sitting areas and restroom facilities, while field training exercise areas may have foot and vehicle paths and/or trails.

The primary objective of vegetation management associated with outdoor classrooms should be to provide optimum environmental conditions to maximize the learning experience. During the summer months, high summer air temperatures and biting insects can affect the effectiveness of outdoor classroom training. In order to mitigate these conditions, mid and understory vegetation should be eliminated to improve airflow. On smaller areas, using hand tools including the selective application of approved herbicides can most effectively provide vegetation control, especially if improvements to the site are at risk if fire is used to control vegetation. Otherwise, fire may be the best tool to provide vegetation control.

Generally, dividing the Training Area into smaller areas and conducting rotational prescribed fires can maximize field-training activities that develop tactical island concealment cover/camouflage skills. In order to maximize vertical vegetational diversity, a Training Area should be divided into at least three (3) compartments for rotational burning. At least three (3) years should be allowed between burns. Therefore, the oldest compartment should support mid-story vegetation approximately 10'-15' in height, which should provide sufficient cover for most military vehicles. Much of the forest on the Range

Training Area is supported on wetland soils which if allowed to develop without intervention will evolve into a diverse under-story, mid -story and over-story. Some areas of undisturbed vegetation should be reserved to provide a broad range of realistic training opportunities that may be encountered under actual combat situations.

Certain areas within the Range Training Area have been used extensively for long periods of time for training utilizing a variety of munitions. Over the years a significant amount of these munitions, included unexploded ordinance, have accumulated in the forest within the training areas and overtime have been covered by both hardwood and evergreen leaves. During the control of forest fires, the Range Safety Office has reported fires have ignited some of this ordinance.

#### *Archaeological Site Improvement:*

Cultural resources are present on JBLE-Eustis. Cultural resources are found above and below ground. The decomposition process has largely degraded the organic composition of above ground cultural resources, such as woody material. Any subsurface excavations including the installations of new firebreaks should be coordinated with the Natural Resources & IPM Branch/Environmental Element to insure the protection of cultural and natural resources.

Existing cultural resources that likely would be present are generally those more durable items such as bricks, glassware, shards, and metal-based artifacts. Many of these sites were once in an open or grassland state and over the years have become re-established with woody vegetation. Renovating these sites can be very difficult due to the possibility of ground disturbance that may move these cultural resources and diminish or destroy their historical juxtaposition. Earthworks are particularly vulnerable when woody vegetation becomes established. Many times trees become anchored to the earthworks and may be uprooted by strong winds. Over time, the integrity of earthworks can be diminished.

Prescribed fire may also be used to eliminate cover prior to conducting archeological fieldwork. Immediately following a fire and prior to vegetation re-establishment, prior excavations and land disturbance is more readily discernable. Durable manmade debris piles are typically revealed, which may indicate cultural resources. The risk of sub-surface disturbance to artifacts associated with prescribed fire is minimal. However, the installation of permanent and/or temporary firebreaks usually involves trenching or digging as deep as 8"-12" into the mineral soil and can adversely impact important cultural resources. In order to avoid unintentional disturbance of known sites the perimeter of these sites should be clearly designated by painting bands on regularly spaced trees around the perimeter of each known site.

#### *Unexploded Ordinance:*

Many areas on JBLE-Eustis, particularly on Mulberry Island have been used for training activities for decades and contain accumulated unexploded ordinance that is buried underneath soil and/or concealed by vegetation. Plowing new firebreaks in these locations should be avoided and prescribed fires should be prohibited in known or suspected UXO areas until a risk assessment can be conducted to evaluate potential hazards. In the event of a wildfire, fire suppression should be conducted only when working from established fire-lines.



## **Buffers**

Forested buffers are recommended in forest management plans because they are effective in softening the transition from intensively managed forestland(s) to other land uses. They are a useful tool in managing the aesthetics of forests if they block the view of unattractive forest management activities and extremely important in protecting water quality. Federal, state and/or local laws may mandate forested buffers, primarily in and along tidal and non-tidal wetlands that fall within Chesapeake Bay Preservation Act Resource Protection Areas. In 1990, Secretary of Defense representing the Department of Defense (DOD) and Environmental Protection Agency (EPA) entered into a Cooperative Agreement concerning Chesapeake Bay activities. Prior to this agreement the DOD completed a water quality assessment study to determine the relative impact of its activities on the water quality and living resources of this estuary and agreed to cooperate to implement the goals and objectives of the Chesapeake Bay Agreement. Within this document, JBLE-Eustis was identified as an installation with a significant impact potential on the Bay's water quality. In addition the DOD agreed to participate with state, regional, local and other Federal agencies to "improve effectiveness of Chesapeake Bay activities within its existing programs of natural resources conservation and environmental quality management"; and, during project planning, to "develop, and implement best management practices (BMPs) for nonpoint source pollution control on leased farmland, commercial forest land, and on all other DOD lands. In addition the DOD agreed to ensure that all DOD projects and activities at JBLE-Eustis do not conflict with policies, standards and activities in the States' Non-point Source Management Programs pursuant to the Federal Consistency provisions in Section 319 of the Clean Water Act. Therefore DOD has made a commitment to participate, plan, direct funding, and conduct audits and inspections on JBLE-Eustis to protect water quality and the Chesapeake Bay, including the incorporation of vegetative buffers and other BMP's.

### *No-Cut Buffers:*

Buffers where silvicultural practices are prohibited.

### *Riparian "No-Cut Buffers:*

Buffers adjacent to streams, ponds, waterways where silvicultural practices are prohibited. Typically, the recommended buffer widths for the 2021 Timber Inventory and Forest Management Plan are 50'-75', however, an assessment should be made prior to planned silvicultural activities to determine if buffer widths are sufficient to support logging equipment or should be increased to minimize windthrow, and/or ensure that soil profiles/water quality are protected.

### *Selective-Cut Buffers:*

Primarily aesthetic buffers that are adjacent to roadways, buildings, powerlines, and railways where some harvesting is permitted. Trees targeted for removal should be mature to over-mature loblolly pine, and weakened, suppressed and/or damaged trees that are, or may become a hazard. The buffer should be clearly defined and trees targeted for removal within the buffer should be clearly marked. Typically, the recommended selective cut buffer widths for the 2021 Timber Inventory and Forest Management Plan are 50'-75', however an assessment should be made prior to planned silvicultural activities to determine if buffer widths should be customized to further enhance aesthetics or to protect soil profiles.

### **Management Classifications**

There are three management classifications used by the Army as follows:

1. Manageable without limitations
2. Manageable with limitations
3. Non-manageable

Each forest compartment was evaluated to determine the appropriate classification to guide the development of recommendations. Reference is made to Figure: 6.2A, JBLE-Eustis, VA ~ Forest Compartment Management Classifications. The majority of forest compartments were considered manageable with limitations. Since most forest compartments serve multiple Installation objectives, from training, recreation, cultural resource and that all compartments are subject to either state and/or federal resource protection guidelines and/or regulations, no compartment was considered manageable without limitations. A few compartments, all located on Mulberry Island were classified as unmanageable due primarily to access issues that would require building roads across tidal marsh or safety issues regarding potential UXO.

### ***6.3 - General Recommendations***

1. Typically, timber harvests are conducted on areas subject to land use changes for the sole purpose of site development without having consideration for improving the composition or health of the surrounding forest. Consideration should be given to begin planning a timber harvest once it appears development plans for a particular site are reasonably certain. A comprehensive harvest plan can meet the requirements for site development, while concurrently improving the durability and health of adjacent forests.

2. Grounds maintenance plans should include the maintenance and systematic control of vegetation as well as the removal of hazardous trees surrounding all buildings, primary roads, utility lines and perimeter fencing. Selective removal of fast growing/short lifespan species such as pines should be conducted, which will encourage more durable species such as most species of oaks and will improve the durability of the forest cover.

3. Landscape plans for all site development should require the use of native vegetation whenever possible. Native vegetation typically is more capable of withstanding insect and disease conditions and requires less maintenance than most non-native species.

4. Greater use of prescribed burns on JBLE-Eustis in certain forest types such as pine and pine/hardwood stands can improve access for training activities, reduce ectoparasites, as well as promoting improved habitat for wildlife. Although not specifically mentioned as a management recommendation in either forest compartment, the use of prescribed burns as a management tool may be warranted to meet objectives of the installation natural resource/habitat manager (Natural Resources & IPM Branch/Environmental Element) and/or the ITAM Program Manager (if within training lands).

5. Aggressive pre-commercial and commercial thinning operations will increase forest health by removing weaker trees that are more likely to attract insect and disease. Using thinning to manage stocking levels (number of trees/acre) will stimulate the growth and vigor of residual forests and allow for a longer rotation before a final harvest becomes necessary. The use of a forestry mower to reduce stocking should also be considered in locations that are impractical for larger-scale logging/thinning operations.

6. Training of the grounds maintenance crew on general Plant Health Care would likely result in the reduction of damage to existing vegetation and improve the health of new plantings. Consideration should be given to restricting grass mowing below forested areas to prevent mechanical stem injuries. Stem injuries will shorten the lives of afflicted trees and can result in the development of a hazardous tree, should the tree be located in a sensitive area. Greater use of mulch and selective use of herbicides can reduce the need for mowing.

7. During planning design meetings, proposed new buildings as well as the identification of all environmental constraints associated with construction should be discussed. Additionally, a list of environmental opportunities should be included to proactively address possible opportunities. A primary opportunity would be to identify forested vegetation that must be removed for the footprint of the building and associated infrastructure as well as further expanding the scope of discussion on practices that can be concurrently performed that will improve forest health in areas near the proposed construction project.

8. Several invasive species are present on the JBLE-Eustis and reference is made to Section 4.2, Invasive Species Accounts for species descriptions. Japanese stiltgrass, Japanese honeysuckle, common chickweed, common reed, autumn olive, tree-of-heaven, thorny olive, and Chinese privet were the most prevalent invasive species observed while conducting the forest inventory. Invasive species are opportunistic and capitalize on both man made and natural disturbances. JBLE-Eustis has been conducting intensive species control work on training lands, urban forests, and wetlands since 2008. Significant improvements by reducing invasive species populations have enhanced troop training lands, improved biodiversity, and increased recreational opportunities for military personnel, dependents, and installation community members. Control efforts utilizing herbicides and/or mechanical methods are critical in preventing re-colonization.

The recommendations as outlined for each compartment should be implemented within the time period specified whenever possible, however, training schedules, the need for cultural resource evaluations, and other factors may delay implementation. Therefore, for planning purposes, projects should be planned and coordinated on a five-year planning period.



Forest vegetation is not static but is constantly evolving. As vegetation grows and matures, its ability to provide functional benefits also change. Shrubs planted below power lines may be appropriate in some settings as long as the shrubs' mature height does not interfere with overhead wires. Obstructions such as trees, may pose a safety concern if they grow tall enough to extend into the airspace used by aircraft during take-off and landing. Height restrictions for trees and other obstructions are established using the glide slope, which is the angle an aircraft can safely approach an airfield. Another example is established trees on or in close proximity to Civil War earthworks have reduced erosion by dissipating energy from rainfall and/or by providing leaf litter which may slow run-off. Trees die naturally or prematurely for a variety of reasons sometimes leaving voids in the upper canopy or even worse, falling over where residual roots can pull up volumes of soil, diminishing historical value.

Understanding vegetational dynamics, individual species silvicultural characteristics, including longevity, rooting and structural wood characteristics and the functional needs for the use of the land can provide a reasonably predictable schedule of management practices. If a decision is made to harvest timber to accommodate pending construction activities, to protect cultural resources, for insect and disease control, or to stimulate growth of the residual forest, the harvest design planning and approval process should get underway and a systematic process should be followed to ensure that all management objectives are balanced. Otherwise, natural vegetational changes will continue to occur in an unpredictable manner with little ability to address management objectives. Management will be reactive rather than proactive.

#### ***6.4 - Interviews***

##### **Tim Christensen, Chief, Natural Resources and IPM Branch, Environmental Element, 733 Civil Engineer Squadron**

Mr. Christensen is responsible for natural resources and entomology/integrated pest management programs that include wildlife and invertebrate fauna and habitats (forest, wetland, early successional, shorelines/beaches) and ensures compliance with Federal and State conservation regulations and laws. Mr. Christensen, served as the project point of contact and provided resource data, overviews of natural resource projects since the first Forest Inventory and Management Plan conducted in 1997.

##### **Adam Priestley, Habitat Biologist, Natural Resources and IPM Branch, Environmental Element, 733 Civil Engineer Squadron**

Mr. Priestley is responsible for Wetland, Forestry, and Habitat programs at JBLE-Eustis, as well as NR&IPM GIS, contracted projects, and invasive species control.

##### **James Carr, Wildlife Biologist, Natural Resources and IPM Branch, Environmental Element, 733 Civil Engineer Squadron**

Mr. Carr is responsible for wildlife programs and overseeing hunting, fishing, and boating programs at JBLE-Eustis. Mr. Carr is also the liaison between NR&IPM and the BASH team on the airfield as well as Sec. 7 ESA consultations and T/E monitoring.

**Tessa Martin-Bashore, ITAM Program Manager, Training Division, Directorate of Plans, Training, Mobilization and Security**

Tessa Martin-Bashore is responsible for Integrated Training Area Management (ITAM) Program. One of the primary functions of the ITAM coordinator is to monitor and assess damage associated with training activities. This is done under the auspices of the ITAM Range and Training Land Analysis (RTLTA) component. The RTLTA program is used at Army installations to provide for the monitoring of training lands to monitor the effects of military training and Land Rehabilitation and Maintenance (LRAM) efforts to mitigate environmental degradation within the training lands.

***6.5 - Description of Forest Compartments and Management Recommendations***

In order to more effectively provide details on the land cover and its relationship to the programmatic mission of JBLE-Eustis, the installation was divided into three primary areas, the Main Post, Mulberry Island – North and Mulberry Island – South.

**6.51 - Main Post**

The Main Post area of JBLE-Eustis is shown on Figure: 5.0A, JBLE-Eustis, VA ~ Main Post: Forest Compartments. This area supports five forest vegetation compartments labeled compartments 26 thru 30. The dominant land cover is administrative buildings, housing and associated infrastructure including roads and utility lines on the upland flat areas. Forest cover occupies the remaining area and covers approximately 584.17 acres. The majority of this forestland is largely located on land with development constraints, such as steep slopes and forest wetlands. The use of the forest on the Main Post area is primarily for troop tactical training and outdoor recreation. Primary considerations with any silvicultural activities in this area include water quality and aesthetic protection and enhancements, maintaining forest health in support of training activities.

Forested areas adjoining ponds, the river, perennial and intermittent streams or riparian forests are invaluable for protecting water quality by the filtration of surface and subsurface water flows before discharge occurs in the adjacent water bodies. Concurrently these riparian forests represent very valuable wildlife habitat by providing food and cover for small mammals and various species of birds. These forest riparian buffers also provide aesthetic screens that buffer training activities from the public waters. At the minimum riparian areas should be maintained and/or created beginning at the edge of the water/upland interface and should be a minimum of 100' in width or to the crest of adjoining slopes.

Removal of any of the natural vegetation on steep slopes for construction of forest management should only be done following careful examination of the necessity and/or benefits due to the risk of soil erosion and potential for water quality degradation.

**Main Post Forest Compartment Descriptions and  
Management Recommendations: Compartments 26-30**



## *JBLE-Eustis Forest Compartment Analysis*

### **Main Post**

### **Compartment # 26**

#### **Compartment Details**

**Location:** Main Post (Supports Training Areas: 7 & 8)

**2021 Comp. Acreage:** 132.54

**Forest/Veg. Type:** Hardwood/Pine

**Age Range:** 1873-1933

**Avg. Growth Rate:** 5yr, 0.32 / 10yr, 0.55

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** red heart (4%)

**Mechanical Damage:** butt damage (2%)

**Invasives:** Japanese honeysuckle

#### **Soils Data**

**Site Index Range (Soils):** 77-86

**Site Index Range (Curve):** 92-105

**Average Slope:** 0.78

#### **Soil Types:**

Bohicket-msc, Craven-Uchee-cx, Emporia-cx, Johnston-cx, Peawick-sl, Slagle-fsl, Udorthents-Dumps-cx, Udorthents-l

#### **Compartment Description**

Compartment 26 is found on the north and east sides of Eustis Lake. The surrounding land is frequently cut by streambeds and steep ravines that drain towards the lake, which serves as a large storm water impoundment area. There is tremendous edge habitat along this manmade lake which is providing valuable cover and foraging habitat for neotropical migratory songbirds. Although the compartment is used heavily for military training and frequently for recreation (hiking, jogging, etc.), wildlife use appears to be moderate. The compartment consists primarily of a mature, mixed hardwood/pine forest type. The dense upper canopy is dominated by American beech, tulip poplar, sweetgum, red maple, a variety of oak species, loblolly pine, and Virginia pine. The commercial value of the timber within the compartment is as medium to large hardwood/soft hardwood sawtimber, with a smaller component of medium to large pine sawtimber. In its current capacity, the forest is highly valuable for a variety of functions such as filtering of nutrients/soil stabilization (protecting water quality), wildlife food/shelter, troop training, and aesthetics.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	8196.66	22.2	39.9	369.22	1086058
H. Hardwood	3307.13	12.8	31.1	258.37	438195
S. Hardwood	3879.47	15.2	29.9	255.23	514030
Total:	15383.26	50.2	100.9		2038282
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	0.6	3.4	2.2	451	
Hardwood	1.76	11.1	9.1	1471	
Total:	2.36	14.5	12.1	1921	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	92.56
	<b>Dominant Species:</b>	tulip poplar, cherrybark oak, American beech, sweetgum, loblolly pine
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	368.00
	<b>Dominant Species:</b>	American beech, sweetgum, American holly, red maple, pawpaw
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	58.00
	<b>Dominant Species:</b>	blue huckleberry, black highbush blueberry, American beautyberry
<b>Groundcover</b>	<b>% Cover:</b>	10.80
	<b>Dominant Species:</b>	muscadine grape/Scuppernong, common daffodil, partidge-berry, sensitive fern/bead fern, American holly

**Management Recommendations**

Conduct annual inspections for forest health/invasives/hazard trees. This compartment is subdivided by natural drainage systems and steeply sloped ravines, which will make commercial logging impractical. The forest vegetation within this compartment is critical in preventing erosion and filtering excessive nutrients/contaminants from nearby roads, parking lots and administrative buildings. Additionally, the compartment is used for training (confidence course) and recreation such as walking and trail running. Within these more heavily used areas, consideration should be given to more frequent hazard tree inspections, especially after periods of heavy rainfall and high wind speeds. Hazard trees should be carefully dropped and left on-site to limit soil disturbance and possible injury to neighboring trees/structures. Forest management activities should be limited to maintain the health and vigor of the residual trees.



## JBLE-Eustis Forest Compartment Analysis

- Main Post -

Compartment # 27

### Compartment Details

**Location:** Main Post (Supports Training Areas: 6, 14A, 14B, & 29)  
**2021 Comp. Acreage:** 111.51  
**Forest/Veg. Type:** Pine/Hardwood  
**Age Range:** 1882-1998  
**Avg. Growth Rate:** 5yr, 0.35 / 10yr, 0.7  
**T/E Species:** northern long-eared bat  
**Disease/Insect Damage:** red heart (3%)  
**Mechanical Damage:** legacy trash  
**Invasives:** Callery pear, Japanese honeysuckle, Japanese stiltgrass

#### Soils Data

**Site Index Range (Soils):** 75-90

**Site Index Range (Curve):** 72-106

**Average Slope:** 1.43

#### Soil Types:

Augusta-fsl, Bethera-sl, Bohicket-msc, Chickahominy-sl, Craven-Uchee-cx, Emporia-cx, Emporia-fsl, Slagle-fsl, Udorthents-Dumps-cx, Udorthents-l, Yemasee-fsl

### Compartment Description

This compartment is located north of the golf course and south of compartment 26. It is extremely fragmented by railroad tracks, roads, development, and drainage features. The forest is composed primarily of a mature hardwood/pine forest type. Medium to large sawtimber-sized tulip poplar, white oak, American beech, and loblolly pine dominate the dense upper canopy throughout much of the compartment. Two younger, heavily stocked, pulpwood-sized pine stands are present east of Washington Avenue and east of the intersection of Mulberry Island/Wilson Road established in 1994-2000. Throughout most of the compartment, the midstory and the herbaceous layers are dense and diverse, except north of Taylor Avenue where the forest understory is kept in a park-like state by periodic mowing.





<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	9576.11	24.8	48.7	386.13	1067736
H. Hardwood	823.56	6.6	8.6	124.78	91827
S. Hardwood	2352.45	12.3	21.4	191.26	262298
Total:	12752.12	43.7	78.7		1421861
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	3.48	34.3	14.3	388	
Hardwood	2.57	15.9	12.8	287	
Total:	6.05	50.2	27.1	675	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	90.48
	<b>Dominant Species:</b>	loblolly pine, tulip poplar, willow oak, sweetgum
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	355.00
	<b>Dominant Species:</b>	sweetgum, loblolly pine, willow oak, American holly, black oak
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	238.00
	<b>Dominant Species:</b>	wax myrtle, deerberry, black huckleberry
<b>Groundcover</b>	<b>% Cover:</b>	31.70
	<b>Dominant Species:</b>	common rush/Soft rush, greenish-white sedge, woolgrass, Cinnamon fern, broad-leaved white panicle Aster

**Management Recommendations**

Conduct annual inspections for forest health/invasives/hazard trees and consider a selective harvest within 2022-2026 for the majority of this compartment. Most of the loblolly pine found within the compartment is over-mature and showing some indications of decline. Install 50'-75' riparian "no-cut" buffers along Chesapeake Bay Preservation Act Resource Protection Areas. In the event of a selective harvest, particular attention should be given to prevent/minimize erosion in the compartment location generally described as north of Wilson Avenue and west of CID. Consider installing 50'-75' aesthetic "selective-cut" buffers around the road system and administrative buildings. Attempts should be made to remove the majority of the pines and weakened, suppressed, or damaged species within the aesthetic "selective-cut" buffer, due to the likelihood they may become a hazard to roadways, power lines and administrative buildings. Trees targeted for removal should be clearly marked. Continue herbicide applications around the base of planted trees and other desirable soft and hardwood mast producing regeneration found in the "Enchanted Forest" until 2031 in order to minimize weed competition and reduce the risk of damage from equipment used for maintenance mowing. Within the Enchanted Forest, consider restricting mowing activities when soils are seasonally saturated and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. Conduct more frequent hazard tree inspections in close proximity to the Grenade Assault Course in TA14B, especially after periods of heavy rainfall and high wind speeds. Hazard trees should be carefully dropped and left on-site to minimize soil disturbance and possible injury to neighboring trees. Consider utilizing a forestry mower on a 3-to-5-year rotation to reduce the amount of sapling regeneration within this area. Some regeneration may be desirable in order to fill voids in the upper canopy and should be designated prior to the utilization of a forestry mower.

## *JBLE-Eustis Forest Compartment Analysis*

- Main Post -

Compartment # 28

### Compartment Details

**Location:** Main Post (Supports Training Area: 27)

**2021 Comp. Acreage:** 61.95

**Forest/Veg. Type:** Hardwood/Pine

**Age Range:** 1900-1930

**Avg. Growth Rate:** 5yr, 0.3 / 10yr, 0.75

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** red heart (4%)

**Mechanical Damage:** metal debris (minor)

**Invasives:** Japanese honeysuckle

#### Soils Data

**Site Index Range (Soils):** 77-77

**Site Index Range (Curve):** NA

**Average Slope:** 1.45

#### Soil Types:

Bohicket-msc, Craven-Uchee-cx, Emporia-cx, Johnston-cx, Levy-sc, Peawick-sl, Udorthents-l

### Compartment Description

This narrow compartment is located north of Lee Boulevard and south of a brackish tidal wetland. It is composed of ridge-like uplands with large, steeply sloped ravines that protrude out into tidal wetlands. The majority of the upper forest canopy is dominated by large, mature hardwood species such as American beech, white oak, and tulip poplar. Midstory and shrub-sapling species frequently observed while sampling and/or traversing through the compartment were dogwood, American holly, mockernut hickory, and southern wax myrtle with dangleberry and Virginia wild rye found in the relatively scarce herbaceous layer.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	4014.56	9.1	20	441.16	248501
H. Hardwood	5088.91	18.7	42.5	272.13	315004
S. Hardwood	1731.76	6.6	15	262.39	107196
Total:	10835.23	34.4	77.5		670701
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	0.65	6.4	5	40	
Hardwood	3.75	23.7	20	232	
Total:	4.4	30.1	25	272	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	92.56
	<b>Dominant Species:</b>	American beech, white oak, tulip poplar, loblolly pine
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	143.00
	<b>Dominant Species:</b>	American holly, sweetgum, American beech, tulip poplar, loblolly pine
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	13.00
	<b>Dominant Species:</b>	wax myrtle
<b>Groundcover</b>	<b>% Cover:</b>	11.60
	<b>Dominant Species:</b>	dangleberry, Virginia wild rye, poverty oatgrass, black huckleberry, white oak

**Management Recommendations**

Conduct annual inspections for forest health/invasives/hazard trees, and excessive erosion from storm water. This narrow compartment should be considered non-commercial due to its importance as a water quality buffer. The forest vegetation within this compartment is critical in preventing erosion and filtering excessive nutrients/contaminants from nearby roads, parking lots and administrative buildings.



## *JBLE-Eustis Forest Compartment Analysis*

### **Main Post**

### **Compartment # 29**

#### **Compartment Details**

**Location:** Main Post (Supports Training Areas: 1, 2, & 3)  
**2021 Comp. Acreage:** 157.08  
**Forest/Veg. Type:** Hardwood/Pine  
**Age Range:** 1893-1971  
**Avg. Growth Rate:** 5yr, 0.4 / 10yr, 0.88  
**T/E Species:** northern long-eared bat  
**Disease/Insect Damage:** red heart (3%)  
**Mechanical Damage:** None  
**Invasives:** Japanese honeysuckle, Japanese stiltgrass

#### **Soils Data**

**Site Index Range (Soils):** NA

**Site Index Range (Curve):** 79-107

**Average Slope:** 1.25

#### **Soil Types:**

Beaches, Bohicket-msc, Craven-Uchee-cx, Emporia-cx, Johnston-cx, Newflat-sl, Peawick-sl, Udorthents-l

#### **Compartment Description**

This compartment is found in three noncontiguous areas. The northern and eastern areas are similar in species composition and consist of a large, mixed hardwood forest type that's found within varying topography ranging from steep ravines to moist flatwoods. Species in the upper canopy include tulip poplar, American beech, sweetgum, and mixed oaks. Prevalent midstory species are American hornbeam, dogwood, American holly, and red maple. Herbaceous layer/ground cover species are relatively scarce, mostly wild comfrey, white edged sedge, and jack in the pulpit. Subsequent to the 2007 Forest Inventory, a significant amount of forestland (TA-3) was removed from the original compartment footprint and is now occupied as a motor pool. The other (noncontiguous) portion of the compartment, accessed by boat, is found west of TA-27 (Third Port). This area contains a maritime loblolly pine forest that was established in 1970. Frequent tidal over wash is evident by debris found in and near the sampling areas. Loblolly pine and sweetgum are dominant upper canopy species with southern wax myrtle, eastern red cedar, American holly, and persimmon most common in the mid-story. Ground cover is relatively sparse and composed mostly of common reed.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	2623.69	15.6	18.8	168.19	412129
H. Hardwood	2169.48	8.2	20.9	264.57	340782
S. Hardwood	4745.72	23.3	39.9	203.68	745458
Total:	9538.89	47.1	79.6		1498369
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	0.8	7.1	6.6	126	
Hardwood	2.09	17.4	11.1	328	
Total:	2.89	24.5	17.7	454	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	90.22
	<b>Dominant Species:</b>	tulip poplar, American beech, sweetgum, cherrybark oak, loblolly pine
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	399.00
	<b>Dominant Species:</b>	pawpaw, American holly, American hornbeam, black gum/sour gum, flowering dogwood
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	26.00
	<b>Dominant Species:</b>	wax myrtle
<b>Groundcover</b>	<b>% Cover:</b>	7.70
	<b>Dominant Species:</b>	wild comfrey, white-edged sedge, jack-in-the-pulpit, black gum/sour gum, Japanese stiltgrass

**Management Recommendations**

Conduct annual inspections for forest health/invasives/hazard trees and re-evaluate growth rates in 2026 on the northern and eastern locations. In the event of an insect, disease, or invasive pest species outbreak that might jeopardize forest health, consider silvicultural practices, such as selective harvesting, which would substantially limit the amount of damage and minimally compromise the existing vegetation screen. Hazard trees should be felled (carefully so as not to damage adjacent trees or fencing and either chipped/shredded or left on site to decompose. Currently, the forest appears generally healthy (although some American beech and yellow poplar decline was observed) and is providing ideal habitat for a variety of wildlife. The dense upper canopy along the interface between the tidal creek and freshwater streams provides cover for neotropical migratory songbirds, perching opportunities for wading birds (herons and egrets), and also renders foraging opportunities for an array of small mammals and resident birds. Historically, the compartment area has been used for troop training, which was apparent by the considerable amount of low threshold ground disturbances, primarily pit & mound type (fox holes), which are likely used as breeding pools for amphibians. The northernmost portion of this compartment also serves as a valuable vegetation screen (buffer) that may minimize conflict between military and industrial land uses.



## JBLE-Eustis Forest Compartment Analysis

- Main Post -

Compartment # 30

### Compartment Details

**Location:** Main Post (Does not support any training areas)

**2021 Comp. Acreage:** 88.38

**Forest/Veg. Type:** Hardwood/Pine

**Age Range:** 1888-1961

**Avg. Growth Rate:** 5yr, 0.52 / 10yr, 0.9

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** red heart (4%)

**Mechanical Damage:** butt damage (1.5%)

**Invasives:** thorny olive, Japanese honeysuckle

#### Soils Data

**Site Index Range (Soils):** 75-88

**Site Index Range (Curve):** 78-78

**Average Slope:** 1.25

#### Soil Types:

Altavista-fsl, Augusta-fsl, Bohicket-msc, Craven-Uchee-cx, Dragston-fsl, Emporia-cx, Emporia-fsl, Johnston-cx, Slagle-fsl, Udorthents-Dumps-cx, Udorthents-l

### Compartment Description

The majority of the forest within this sloping, relatively narrow, fragmented compartment is a mature hardwood/pine forest type, although sampling immediately north of Wilson Avenue found a heavily stocked pine/hardwood forest type (est. 1961). Large tulip poplar, American beech, white oak, cherrybark oak, and loblolly pine make up the majority of the upper canopy species. Dense, diverse herbaceous layers are found in uplands and mesic flatwoods throughout the compartment comprised of pawpaw, wild comfrey, and slender spikegrass. The forest within this compartment is significantly enhancing water quality by trapping sediment and nutrients from nearby developed areas (recent improvements to a sediment and erosion control structure were observed near the southeastern boundary of the compartment). Additionally, the vegetation within this compartment is providing valuable habitat for migrating neotropical songbirds and resident species that are attracted to the riparian habitat adjoining the Warwick River. Civil war earthworks were observed behind housing, in close proximity to a sampling location (a small patch of invasive bamboo was also noted near this same location).





<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	1011.94	1.7	5	595.26	89456
H. Hardwood	2323.68	8.4	21.8	276.63	205413
S. Hardwood	3507.74	13.9	26.7	252.36	310084
Total:	6843.36	24	53.5		604953
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	0	0	0	0	
Hardwood	1.19	10.4	10	105	
Total:	1.19	10.4	10	105	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	96.20
	<b>Dominant Species:</b>	tulip poplar, white oak, American beech, loblolly pine
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	503.00
	<b>Dominant Species:</b>	pawpaw, sweetgum, red bay, American hornbeam, mockernut hickory
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	139.00
	<b>Dominant Species:</b>	American beautyberry, thorny olive, common sweetleaf
<b>Groundcover</b>	<b>% Cover:</b>	15.60
	<b>Dominant Species:</b>	pawpaw, wild comfrey, slender spikegrass, black Cherry, Virginia-creeper

**Management Recommendations**

Conduct annual inspections for forest health/invasives/hazard trees, and excessive erosion from storm water (some significant improvements to storm water run-off were observed during sampling). The narrow-forested area on the north side of Wilson Avenue should be considered non-commercial due to its importance as a vegetation buffer. The forest in this area abuts a large drain that flows underneath Wilson Avenue and eventually into the Warwick River. The forest vegetation is critical in preventing erosion and filtering nutrients/contaminants from nearby roads, parking lots, administrative buildings, and base housing. The forested area on the south side of Wilson Avenue provides the same function, however, it is considerably larger. The remaining forest within the compartment should be retained for aesthetics and environmental protection (water quality). Consider invasive species control work on the bamboo stand that's located south of Summerall Circle as soon as practical.

## **Main Post – Management Considerations:**

### **Training**

Training on the Main Post is conducted on 11 sites. The perimeter of these sites is depicted on Figure: 2.2A, titled JBLE-Eustis, VA ~ Main Post: Training Areas. A description of the types of training within each Training area can be found in Table 2.2A – titled JBLE Eustis Training Areas. Training areas 1 and 2 are used for Tactical Bivouac and Land Nav purposes. These areas are all located within vegetation compartment 29. This forest compartment contains a large amount of yellow poplar and American beech along moist, but well drained ravines and moist upland flats. These species require moist, well aerated soils and can be adversely impacted by soil compaction. As aeration is diminished, gradual tree top die-back occurs. Yellow poplar wood is very brittle and during periods of high winds and/or storm conditions, the risks of personal injury and/or damage to equipment from falling branches and limbs increases. Bivouac sites should avoid areas with high concentrations of yellow poplar and American beech. In order to most effectively accommodate this risk while protecting the value of the riparian forest, only trees classified as a hazard should be removed. If too many trees are removed, especially on poorly drained land or adjacent to the shoreline, the risk of additional windthrow of the residual trees could increase significantly.

In addition, Ms. Martin-Bashore indicated that the "Army Acceptable Landscape Conditions for Maneuver Training Areas and Associated Training Features" have changed since the previous Forest Inventory. They are now associated with the type of training conducted in the area and detail acceptable land conditions for dismounted, wheeled, tracked, and aviation training on maneuver areas and associated maneuver area training features. Land conditions include cover Ground Cover/ Grasses (height or percent cover), Understory Thickness (acceptable line of sight threshold in meters), and Tree Spacing (acceptable tree spacing threshold in meters).

For both Maneuver Area, Dismounted and Tactical Assembly/Bivouac, Dismounted, ground cover is 3 feet maximum height, understory thickness is 50 meter minimum (acceptable line of sight), and tree spacing is 3 meter minimum spacing.

For Land Navigation Courses ground cover is 3 feet maximum height, understory thickness is 25 meter minimum (acceptable line of sight), and tree spacing is 3 meter minimum spacing.

Training areas 8 and 9 are located within vegetation compartment 26. This compartment is extremely dissected by natural drainage systems leading to Eustis Lake. The vegetation within this compartment supports a diversity of uses from training to passive outdoor recreation while also providing invaluable water quality protection along the steep slopes leading to Eustis Lake. All of the forest along the shoreline, up to the crest of the slope and a 50' upland corridor should be reserved and protected from disturbance. Protecting the leaf litter on the forest floor by restricting access will protect water quality by allowing filtration of non-point source pollution from surface water flows discharging into Eustis Lake.

All of the training activities on the Main Post, excepting the skeet and trap range, have not and do not involve live-firing activities, little metal contamination of the trees is likely and the limitations for access are not as restrictive as found on Mulberry Island. The ability to actively manage this forest is generally less complicated and easier to administer than applying similar management tools on Mulberry Island.

### **Cultural Resources**

The installation's Integrated Cultural Resources Management Plan identified 234 archaeological sites on the installation. Assuming riparian areas are protected, standard Best Management Practices (BMP's) are followed, and the majority of the upland soils are well drained and will support timber harvesting equipment without subsurface disturbance, impacts of forest management practices should have little impact on sub surface cultural resources. However, prior to any forest management practices, particularly timber harvesting, the perimeter of all above-ground cultural resources, such as earthworks or foundations of home sites should be clearly designated and protected from all disturbance including equipment activity.

## **6.52 - Mulberry Island (North)**

The Mulberry Island (North) vegetational compartments of JBLE-Eustis are shown on Figure: 5.0B, titled JBLE-Eustis, VA ~ Mulberry Island (North): Forest Vegetation compartments. This portion of Mulberry Island supports 18 vegetation compartments, labeled 10 through 25, 31 and 33 through 35. The dominant land cover is forest, tidal wetlands and managed grassland associated with the golf course and Felker Airfield. The majority of the land in this portion of the Post is located on land with development constraints involving low-lying land with seasonally high surface water tables and tidal wetlands. However, an improved road, Mulberry Island Road, and a system of secondary unimproved roads and trails provides seasonal access to most of the vegetation compartments within this portion of the post. A rail bed is also present and is supported by a solid foundation of stone and fill. Improvements to this roadbed would likely provide the best access/egress for the removal of forest products. Along this rail bed, relatively large areas where brick, concrete rubble and other construction debris have historically been deposited. During the planning of any forest harvesting activities these areas would support forest product loading areas and mitigate the risk of cultural resource impacts. The dominant use of this portion of the Post is associated with the operations of Felker Army Airfield, troop tactical training and outdoor recreational activities.

In order to most effectively support the Airfield and training activities within this portion of the post, vegetation management activities should include the maintenance of vegetation surrounding Felker Army Airfield to maintain aircraft approach zones clear of vegetation obstructions. In addition, vegetation or land cover management is necessary to maintain and enhance training activities, protect water quality and wildlife habitat; and maintain forest health. The production of forest products can occur with management limitations on most of the compartments within this portion of the post.



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**Mulberry Island (North) Forest Compartment Descriptions and  
Management Recommendations: Compartments 10-25, 31, & 33-35**

## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 10**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Area: 23)

**2021 Comp. Acreage:** 50.44

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1923-1982

**Avg. Growth Rate:** 5yr, 0.6 / 10yr, 1

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** None

**Mechanical Damage:** None

**Invasives:** Japanese honeysuckle, Japanese stiltgrass

#### **Soils Data**

**Site Index Range (Soils):** 88-88

**Site Index Range (Curve):** 84-100

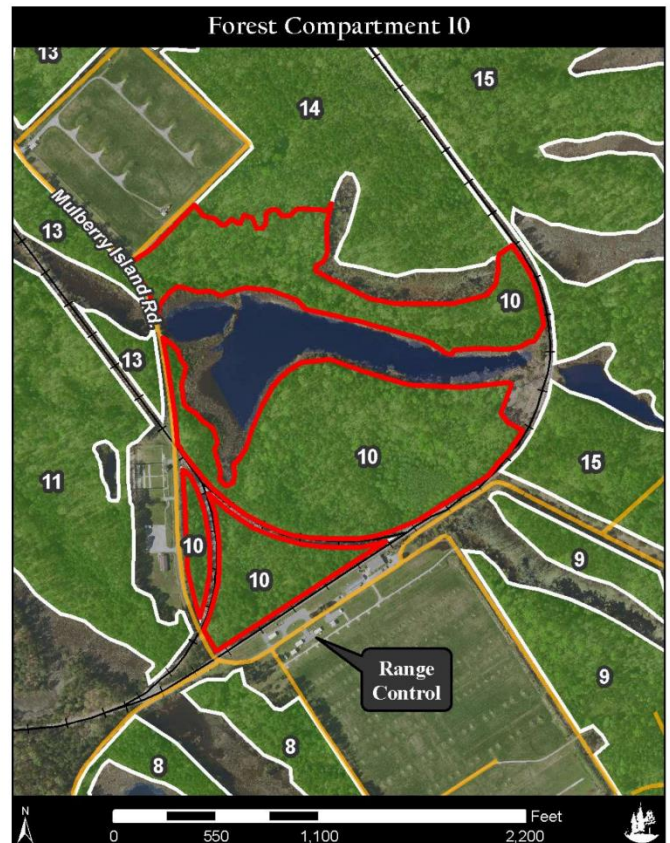
**Average Slope:** 1.20

#### **Soil Types:**

Altavista-fsl, Augusta-fsl, Bohicket-msc, Chickahominy-sl, Craven-Uchee-cx, Newflat-sl, State-s, Tetotum-sl, Udorthents-l

### **Compartment Description**

Forest Compartment Ten lies north of Range Three and Four, and east of Range One (Fort Eustis/Newport News Police Department Pistol & Shotgun Range). The forestland within this compartment is fragmented by railroad tracks and a large wetland and consists primarily of mixed hardwood/pine with establishment dates ranging from 1923 to 1982. A dense herbaceous layer consisting of a mosaic of wetland and upland vegetation, most likely attributed to historical disturbances from manmade ditches, training, and railroad construction can be found throughout the compartment. The majority of large pine sawtimber within this compartment can be found north of Range Three.





<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	3484.86	14.8	20.1	235.46	175776
H. Hardwood	0	0	0	0	0
S. Hardwood	1397.62	9.6	13.3	145.59	70496
Total:	4882.48	24.4	33.4		246272
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	1.49	8.5	6.7	75	
Hardwood	4.82	53.5	23.3	243	
Total:	6.31	62	30	318	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	92.60
	<b>Dominant Species:</b>	loblolly pine, sweetgum, red maple
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	615.00
	<b>Dominant Species:</b>	loblolly pine, sweetgum, American holly, black oak
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	555.00
	<b>Dominant Species:</b>	wax myrtle, maleberry, black highbush blueberry
<b>Groundcover</b>	<b>% Cover:</b>	77.20
	<b>Dominant Species:</b>	Japanese stiltgrass, lizard's-tail/water-dragon, Japanese honeysuckle, southern adder's-tongue, slender spikegrass

**Management Recommendations**

Conduct annual inspections for forest health/invasive species and re-evaluate in 2027-2031 for a potential selective timber harvest. The younger component of pine within this compartment is now medium-sized, pine sawtimber and could be included in a timber-sale with the older, more mature pine located north of Range 3 and the RR tracks. Invasive species treatments have been conducted over the last several years in this compartment targeting a variety of woody invasives and Chinese wisteria. Follow-up monitoring and herbicide treatments (likely necessary) are highly recommended.

## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 11**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Area: 24 & Pistol Range impact area)

**2021 Comp. Acreage:** 78

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1903-2003

**Avg. Growth Rate:** 5yr, 0.7 / 10yr, 1.4

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** None

**Mechanical Damage:** rutting (moderate)

**Invasives:** Japanese stiltgrass, Chinese lespedeza

#### **Soils Data**

**Site Index Range (Soils):** 88-90

**Site Index Range (Curve):** 74-98

**Average Slope:** 0.80

#### **Soil Types:**

Altavista-fsl, Augusta-fsl, Bohicket-msc, Chickahominy-sl, Newflat-sl, State-s, Tetotum-sl, Udorthents-l

### **Compartment Description**

Forest Compartment 11 (a portion of Training Area 24) is located west of Range One (Fort Eustis/Newport News Police Department Pistol & Shotgun Range) and is bounded by tidal wetlands on the north and west, the range previously mentioned on the east, and railroad tracks on the south. The majority of the compartment is at least partially seasonally flooded and contains a variably stocked pine/hardwood forest type (established 1995-1999) consisting of mostly pulpwood-sized loblolly pine, sweetgum, red maple, and mixed oak species with a few widely scattered large hardwood mast species protected (reserved) from the previous timber harvest. The midstory in this area is overstocked, sapling-sized loblolly pine, sweetgum, black gum, and red bay. The residual forest type consists of large, mature pine/hardwood (est. 1902-1954) and can be found within buffer strips that were left adjacent to tidal and non-tidal wetlands, the railroad, and Range One. Sweetgum, red bay, American holly, southern wax myrtle, and beautyberry were dominant in the shrub/sapling layer throughout the compartment with New York fern and the invasive, (endemic) Japanese stiltgrass observed most often in the herbaceous layer.



## Timber & Vegetation Inventory

<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	730.22	4.8	6	152.13	56957
H. Hardwood	0	0	0	0	0
S. Hardwood	372.3	2.8	4	132.96	29039
Total:	1102.52	7.6	10		85997
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	5.32	61.3	28	415	
Hardwood	3.96	35.8	18	309	
Total:	9.28	97.1	46	724	

## Vegetative Class Dominance

<b>Trees</b>	<b>% Canopy Closure:</b>	93.60
	<b>Dominant Species:</b>	loblolly pine, sweetgum, red maple
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	205.00
	<b>Dominant Species:</b>	sweetgum, loblolly pine, red bay, American holly, black gum/sour gum
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	73.00
	<b>Dominant Species:</b>	wax myrtle, American beautyberry, strawberry bush
<b>Groundcover</b>	<b>% Cover:</b>	50.70
	<b>Dominant Species:</b>	New York fern, Japanese stiltgrass, slender spikegrass, Christmas fern, wax-myrtle

## Management Recommendations

Conduct annual inspections for forest health/invasive species and consider mechanical mulching (forestry mower) to thin some of the heavy pine-sweetgum regeneration within the midstory of the bulk of the compartment. The use of commercial thinning/logging equipment would not be practical considering the seasonally saturated soils and limited access availability due to frequent "hot" ranges. Currently, upper canopy species are light to adequately stocked with a dense midstory of mostly sapling-sized 4" to 5" (DBH) pine/sweetgum. The desired outcome of this silvicultural activity would be to reduce stocking levels to approximately 110-150 trees/saplings per acre. In time, this will provide the residual midstory with adequate sunlight, moisture, and more readily available nutrients to fill current voids (increase stocking levels) in the upper canopy and in the interim, likely yield more foraging opportunities for wildlife.



## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 12**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Area: 24)

**2021 Comp. Acreage:** 12.04

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1992

**Avg. Growth Rate:** 5yr, 0.4 / 10yr, 0.8

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** None

**Mechanical Damage:** rutting (moderate)

**Invasives:** Japanese honeysuckle, Japanese stiltgrass, common chickweed

#### **Soils Data**

**Site Index Range (Soils):** 85-90

**Site Index Range (Curve):** 85-100

**Average Slope:** 0.67

#### **Soil Types:**

Bohicket-msc, Newflat-sl, State-s, Tetotum-sl

### **Compartment Description**

This small, variably stocked, pine/hardwood compartment is located south of compartment 13. It abuts the railroad west of Mulberry Road and is bounded by tidal and non-tidal wetlands on its eastern, southern, and western borders.

Loblolly pine and sweetgum are the dominant upper canopy species (mostly pulpwood-sized) with a few widely scattered, large mixed oak species reserved/protected from the previous harvest. Midstory species were primarily sweetgum, eastern red cedar, beautyberry, and strawberry bush. Moderate to extensive rutting was common throughout the compartment.



## Timber & Vegetation Inventory

<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	340.32	3.1	3.3	109.78	4084
H. Hardwood	619.27	3.9	6.6	158.79	7431
S. Hardwood	0	0	0	0	0
Total:	959.59	7	9.9		11515
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	9.38	74.2	36.6	113	
Hardwood	3.19	33.9	16.6	38	
Total:	12.57	108.1	53.2	151	

## Vegetative Class Dominance

<b>Trees</b>	<b>% Canopy Closure:</b>	93.60
	<b>Dominant Species:</b>	loblolly pine, sweetgum, southern red oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	82.00
	<b>Dominant Species:</b>	sweetgum, eastern red cedar, southern hackberry
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	104.00
	<b>Dominant Species:</b>	American beautyberry, strawberry bush
<b>Groundcover</b>	<b>% Cover:</b>	72.00
	<b>Dominant Species:</b>	Japanese stiltgrass, common chickweed, yellow crownbeard, Virginia cutgrass, wood reedgrass

## Management Recommendations

Conduct annual inspections for forest health/invasive species. Currently the forest within this compartment is adequately stocked and appears healthy.

## *JBLE-Eustis Forest Compartment Analysis*

- Mulberry Island (North) -

Compartment # 13

### Compartment Details

**Location:** Mulberry Island (Supports Training Areas: 22, 23, & 24)

**2021 Comp. Acreage:** 177.13

**Forest/Veg. Type:** Hardwood/Pine

**Age Range:** 1914-1986

**Avg. Growth Rate:** 5yr, 0.6 / 10yr, 1.1

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** red heart(1%)

**Mechanical Damage:** rutting (moderate)

**Invasives:** autumn olive, Japanese honeysuckle, Japanese stiltgrass, common chickweed

#### Soils Data

**Site Index Range (Soils):** 80-95

**Site Index Range (Curve):** 77-118

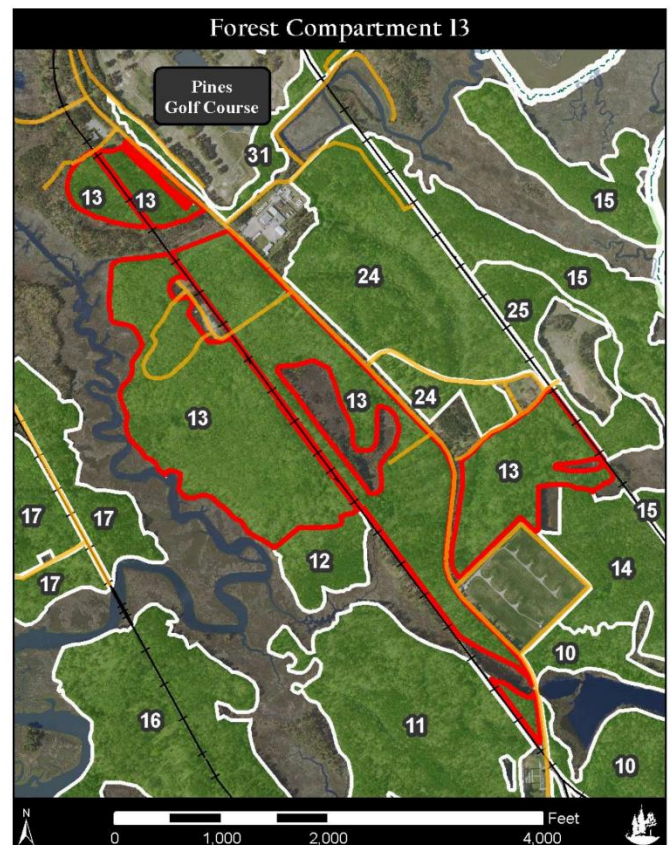
**Average Slope:** 0.48

#### Soil Types:

Augusta-fsl, Bohicket-msc, Bojac-sl, Chickahominy-sl, Craven-Uchee-cx, Newflat-sl, State-s, Tetotum-sl, Udorthents-l

### Compartment Description

Forest Compartment 13 is likely one of the most variable compartments on Fort Eustis. An array of forest types and establishment dates along with varying hydrology are present throughout. The northern portion of the compartment appears to be used extensively for troop training, and consists of a commercially thinned, upland pine forest type established in 1964. A selectively cut hardwood/pine stand (primarily sweetgum) that regenerated in 1984-1986 is found west of the railroad tracks with Japanese stiltgrass prevalent in the herbaceous layer. The central portion of the compartment contains a mixed hardwood forest type composed mostly of sweetgum and a few widely scattered hardwood mast species with establishment dates that range from 1914-1971. This area has extensive ditching (including some civil war earthworks) that have substantially changed hydrology as evidenced by a mosaic of hydrophytic and upland species. The southern portion of the compartment is composed of a variably aged (established 1942-1961), adequately stocked, hardwood/pine forest type which is found on slightly drier soils. Merchantable pine sawtimber is found in scattered locations throughout the compartment.





<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	4841.34	15.4	25.3	314.37	856917
H. Hardwood	919.83	4.1	7.2	224.35	162810
S. Hardwood	2808.96	18.7	26.3	150.21	497186
Total:	8570.13	38.2	58.8		1516913
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	1.34	7.9	5.4	237	
Hardwood	5.29	44.2	27.3	936	
Total:	6.63	52.1	32.7	1174	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	93.60
	<b>Dominant Species:</b>	sweetgum, loblolly pine, cherrybark oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	168.00
	<b>Dominant Species:</b>	sweetgum, cherrybark oak, devil's walking-stick, red bay, flowering dogwood
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	236.00
	<b>Dominant Species:</b>	wax myrtle, American beautyberry, autumn olive, strawberry bush, northern spicebush
<b>Groundcover</b>	<b>% Cover:</b>	95.40
	<b>Dominant Species:</b>	Japanese stiltgrass, sensitive fern/bead fern, Japanese honeysuckle, wax-myrtle, cleavers

**Management Recommendations**

Conduct annual inspections for forest health/invasive species and consider a selective harvest within 2027-2031 for the southern portion of this compartment that lies south of Mulberry Island Road. This portion of the compartment contains pockets of large, merchantable pine sawtimber along with some smaller mixed oak species, sweetgum, and red maple (pulpwood to small sawtimber-sized). Consider placing 50'-75' aesthetic selective-cut buffers along Mulberry Road. Trees targeted for removal should include the majority of the loblolly pine and suppressed, weakened, or damaged tree species that may become a hazard to roadways or the RR tracks. Install 50'-75' riparian "no-cut" buffers along Chesapeake Bay Preservation Act Resource Protection Areas. Existing parameters which limit/prohibit harvesting near the archaeological site must also be considered in the harvest design and clearly stated in a timber sale contract. Re-evaluate the northern portion of this compartment found south of the Range Control Office and the southern portion of this compartment that lies north of Mulberry Island Road (northwest of the Ammo Storage Area) for a potential selective harvest in 2032.

## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 14**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Area: 23)

**2021 Comp. Acreage:** 35.35

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1989

**Avg. Growth Rate:** 5yr, 0.5 / 10yr, 1.2

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** None

**Mechanical Damage:** rutting (moderate)

**Invasives:** Japanese honeysuckle, Japanese stiltgrass, common chickweed, Asiatic dayflower

#### **Soils Data**

**Site Index Range (Soils):** 85-88

**Site Index Range (Curve):** 85-110

**Average Slope:** 1.25

#### **Soil Types:**

Augusta-fsl, Bohicket-msc, Chickahominy-sl, Newflat-sl, State-s, Tetotum-sl, Udorthents-l

### **Compartment Description**

Forest Compartment 14 is found on mesic to gently sloping soils and consists of an adequate to heavily stocked pine/hardwood forest type that has regenerated from a clear-cut that occurred in 1989-1990. Pulpwood to small sawtimber-sized loblolly pine is dominant in the upper canopy with a few widely scattered, larger mixed oak species observed while traversing through the compartment. The midstory is composed primarily of sweetgum, black oak, swamp chestnut oak, and mockernut hickory with beautyberry and southern wax myrtle found most frequently in the shrub layer (The invasive autumn olive was noted as well but to a much lesser extent). Japanese stilt grass is dominant in the herbaceous layer.



## Timber & Vegetation Inventory

<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	6343.22	30.9	40	205.28	222013
H. Hardwood	0	0	0	0	0
S. Hardwood	0	0	0	0	0
Total:	6343.22	30.9	40		222013
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	7.9	59.8	36.6	277	
Hardwood	2.44	20.7	13.4	85	
Total:	10.34	80.5	50	362	

## Vegetative Class Dominance

<b>Trees</b>	<b>% Canopy Closure:</b>	91.52
	<b>Dominant Species:</b>	loblolly pine, sweetgum, cherrybark oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	127.00
	<b>Dominant Species:</b>	sweetgum, black oak, mockernut hickory, swamp chestnut oak, cherrybark oak
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	195.00
	<b>Dominant Species:</b>	American beautyberry, wax myrtle
<b>Groundcover</b>	<b>% Cover:</b>	79.80
	<b>Dominant Species:</b>	Japanese stiltgrass, Christmas fern, slender spikegrass, yellow crownbeard, violet wood-sorrel

## Management Recommendations

Conduct annual inspections for forest health/invasive species and re-evaluate for a potential selective harvest in 2032. Moderate rutting was noted during data collecting, most likely from previous harvesting operations. Consider timing any potential harvesting operation when seasonal water tables are low to prevent further rutting and soil compaction. Protect water quality by limiting stream/ditch crossings and installing 50'-75' "no-cut" riparian buffers along Chesapeake Bay Preservation Act Resource Protection Areas.



## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 15**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Areas: 23 & 26)

**2021 Comp. Acreage:** 143.7

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1902-1975

**Avg. Growth Rate:** 5yr, 0.9 / 10yr, 0.4

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** red heart(1%)

**Mechanical Damage:** None

**Invasives:** autumn olive, Japanese honeysuckle, Japanese stiltgrass

#### **Soils Data**

**Site Index Range (Soils):** 86-90

**Site Index Range (Curve):** 61-109

**Average Slope:** 0.90

#### **Soil Types:**

Augusta-fsl, Bohicket-msc, Chickahominy-sl, Levy-sc, Newflat-sl, State-s, Tetotum-sl, Udorthents-l

### **Compartment Description**

Forest Compartment 15 is fragmented by tidal wetlands into three non-contiguous areas, the majority of which is a variably aged, pine/hardwood maritime forest type. The northernmost area is an island, completely surrounded by tidal wetlands and consists primarily of adequately stocked, small to medium pine sawtimber and hardwood pulpwood (sweetgum). A more mature age class can be found near the northern tip of the island in the vicinity of civil war earthworks with an active eagle nest. The central portion of this compartment is variably aged and variably stocked as well. Lying southwest of the afore-mentioned island and north of the open bivouac field is a younger, adequate to heavily stocked pine/hardwood forest type. Upper canopy species are predominantly medium sawtimber-sized loblolly pine, with a smaller component of pulpwood-sized sweetgum and black cherry (established 1971-1974). A mature forest type consisting of large pine/hardwood sawtimber (established 1935-1943) is also present east of the bivouac field. The southern portion of this compartment consists of a mature, large pine/hardwood forest type with tree heights in excess of 110'. The majority of the loblolly pine is large sawtimber-sized (fair to good quality), however, some of the loblolly is declining. Core samplings indicate very slow growth rates, and some visual indicators of red heart fungus are present. The hardwood component (also sawtimber-sized) consists of a variety of oak species and sweetgum.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	8807.61	25.3	45.5	348.13	1265654
H. Hardwood	741.24	4.6	7.7	161.14	106516
S. Hardwood	1123.6	8.2	8.2	137.02	161461
Total:	10672.45	38.1	38.1		1533631
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	2.53	18.4	11.1	364	
Hardwood	2.61	17.4	12.3	375	
Total:	5.14	35.4	23.3	739	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	91.08
	<b>Dominant Species:</b>	loblolly pine, sweetgum, cherrybark oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	134.00
	<b>Dominant Species:</b>	loblolly pine, sweetgum, devil's walking-stick, American persimmon, black oak
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	324.00
	<b>Dominant Species:</b>	wax myrtle, American beautyberry, autumn olive
<b>Groundcover</b>	<b>% Cover:</b>	11.10
	<b>Dominant Species:</b>	Christmas fern, Virginia wild rye, slender spikegrass, wax-myrtle, Japanese honeysuckle

**Management Recommendations**

Conduct annual inspections for forest health/invasive species and consider a selective harvest within 2022-2026 (excluding the northernmost island). The central portion contains a historic brickyard where restrictions protecting the integrity of the site exist. Existing parameters which limit/prohibit harvesting near this archaeological site must be considered in the harvest design and clearly stated in a timber sale contract. Implement 50'-75' riparian "no-cut" buffers along the compartment's interface with the Warwick River and other Chesapeake Bay Preservation Act Resource Protection Areas that may be applicable. Consider timing potential harvesting operations when seasonal water tables are low to reduce rutting and soil compaction.



## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 16**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Area: 24 & Pistol Range impact area)

**2021 Comp. Acreage:** 81.78

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1924-1976

**Avg. Growth Rate:** 5yr, 0.4 / 10yr, 0.9

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** red heart (4%)

**Mechanical Damage:** None

**Invasives:** Japanese honeysuckle, Japanese stiltgrass

#### **Soils Data**

**Site Index Range (Soils):** 86-86

**Site Index Range (Curve):** 86-112

**Average Slope:** 0.68

#### **Soil Types:**

Altavista-fsl, Augusta-fsl, Bohicket-msc, Craven-Uchee-cx, State-s, Tetotum-sl

### **Compartment Description**

Access to this compartment, which lies west of the Fort Eustis/Newport News Police Department Pistol & Shotgun Range (Range One), involved crossing an old railroad trestle (north end), that was rehabbed after the previous 2007 Forest Inventory. A variety of forest types and habitats are present within the forest compartment. The majority of the compartment consists of an over-mature, pine/hardwood maritime forest type established 1924-1930. The shrub layer is dense with beautyberry and wax myrtle with red bay and sweetgum found frequently in the sapling layer. The compartment also contains an upland, heavily stocked, hardwood/pine forest type established in 1976, which is found near the northeastern edge of the compartment. Dominant upper canopy species are primarily pulpwood-sized sweetgum, loblolly pine, black cherry, and cherrybark oak. Intensive invasive species control work has been ongoing in the compartment since 2009, utilizing both mechanical and chemical control methods. Approximately 10 acres of forest cover once dominated by tree of heaven has been removed, some of which is now being used as pollinator habitat, wildlife food plots, and/or kept in a meadow-like state by mowing.





<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	6206.11	8.4	29.9	738.82	507536
H. Hardwood	796.15	6	9.9	132.69	65109
S. Hardwood	1854.48	6	13.3	309.08	151654
Total:	8856.74	20.4	53.1		724304
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	1.72	9.4	10	141	
Hardwood	3.69	33.8	20.1	302	
Total:	5.41	43.2	30.1	442	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	87.88
	<b>Dominant Species:</b>	loblolly pine, sweetgum, cherrybark oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	174.00
	<b>Dominant Species:</b>	red bay, sweetgum, loblolly pine, eastern redcedar
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	406.00
	<b>Dominant Species:</b>	American beautyberry, wax myrtle
<b>Groundcover</b>	<b>% Cover:</b>	56.70
	<b>Dominant Species:</b>	Japanese stiltgrass, slender spikegrass, Canada germander, Virginia wild rye, common rush/Soft rush

**Management Recommendations**

Consider additional rehab of the trestle-bridge located on the northern end of the compartment. Currently there are restrictions implemented by Range Control that prohibit access due to major structural issues.

## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment #17**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Areas: 17B, 24, & 28)

**2021 Comp. Acreage:** 104.12

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1914-1991

**Avg. Growth Rate:** 5yr, 0.6 / 10yr, 1.15

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** None

**Mechanical Damage:** rutting (moderate), piled debris

**Invasives:** tree-of-heaven, Japanese honeysuckle, Japanese stiltgrass, common chickweed, autumn olive

#### **Soils Data**

**Site Index Range (Soils):** 86-88

**Site Index Range (Curve):** 84-110

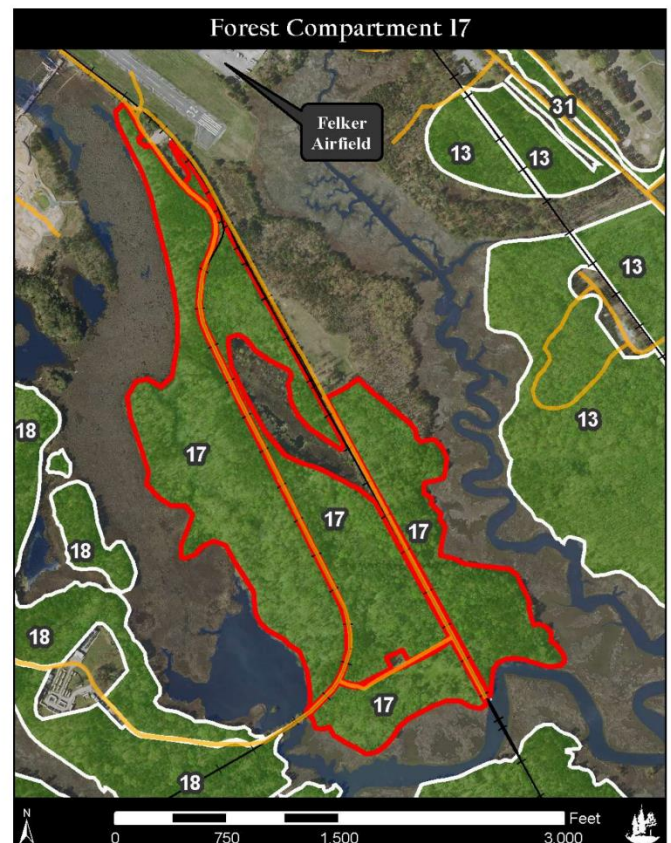
**Average Slope:** 0.93

#### **Soil Types:**

Altavista-fsl, Augusta-fsl, Bohicket-msc, Chickahominy-sl, State-s, Tetotum-sl, Udorthents-l

### **Compartment Description**

This forest compartment consists of variably aged, mixture of forest types. The northern portion consists of an upland, heavily stocked pine forest type (est. 1980) with a dense upper canopy and a sparse understory. Varying hydrologic conditions, consisting of dry fringes and mesic swales, are present near the center of the compartment. The forest in this area consists of mature, mixed hardwood/pine with establishment dates ranging from 1914 to 1951. The southern portion of the compartment (est. 1977-1985) consists primarily of an upland, adequate to heavily stocked hardwood/pine forest type which is mostly pulpwood-sized with some small pine piling. Approximately one acre of forest cover once dominated by tree of heaven and Chinaberry has been removed and now kept in a meadow-like state by periodic mowing and to a lesser extent, follow-up herbicide applications when necessary.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	2304.33	14	15	164.6	244259
H. Hardwood	255.78	2.8	3.4	91.35	27113
S. Hardwood	508.15	5.9	6.7	86.13	53864
Total:	3068.26	22.7	25.1		325236
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	1.35	7.7	5	143	
Hardwood	4.85	33	23.4	477	
Total:	5.85	40.7	28.4	620	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	91.17
	<b>Dominant Species:</b>	loblolly pine, sweetgum, tulip poplar
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	108.00
	<b>Dominant Species:</b>	sweetgum, tree-of-heaven, devil's walking-stick, flowering dogwood, American holly
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	607.00
	<b>Dominant Species:</b>	American beautyberry, wax myrtle
<b>Groundcover</b>	<b>% Cover:</b>	90.80
	<b>Dominant Species:</b>	Japanese stiltgrass, Christmas fern, common chickweed, false nettle, catbrier

**Management Recommendations**

Conduct annual inspections for forest health/invasive species and re-evaluate for a potential selective harvest in 2032. Signs of human disturbance were abundant at sample locations and observed while trekking through the northern and central portions of the compartment (soil piles, concrete slabs, old timbers, etc.). Several of these disturbed sites are now inundated with tree of heaven and autumn olive, species that have been intensely managed to control at other locations of JBLE-Eustis (including the southern end of the compartment). It is highly recommended that control efforts to limit the dispersal of the afore-mentioned woody invasives be implemented as soon as practical.



## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 18**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Area: 28)

**2021 Comp. Acreage:** 77.55

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1933-1993

**Avg. Growth Rate:** 5yr, 0.43 / 10yr, 0.95

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** None

**Mechanical Damage:** soil dumping

**Invasives:** tree-of-heaven, autumn olive, Japanese honeysuckle, Japanese stiltgrass

#### **Soils Data**

**Site Index Range (Soils):** 86-95

**Site Index Range (Curve):** 59-101

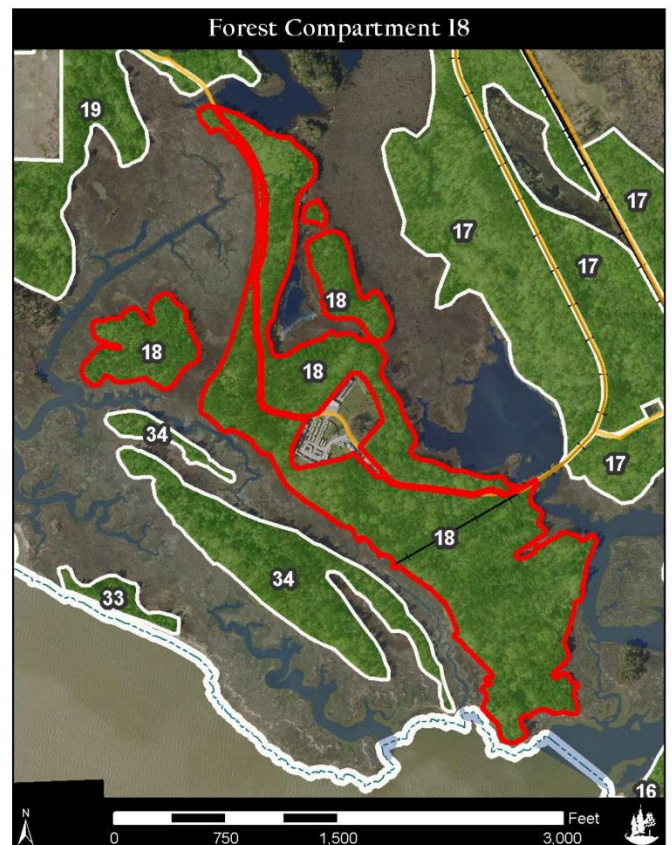
**Average Slope:** 1.15

#### **Soil Types:**

Bohicket-msc, Chickahominy-sl, Newflat-sl, State-s, Tetotum-sl, Udorthents-l

### **Compartment Description**

This compartment is composed of four islands. The center island, which is the largest and the only area that is manageable (with limitations), is connected to Forest Compartment 19 by a road that crosses over a tidal drain. It appears that this road may have once been interconnected with abandoned railroad tracks found in Forest Compartment 17, linking the three compartments. The northern portion here is comprised primarily of an upland, hardwood/pine forest type (established in 1942). Ground cover is relatively sparse, as is the shrub/sapling layer. The middle and southern component of forestland contains a variable stocked mixture of loblolly pine, sweetgum, black oak, and widely scattered tree of heaven with establishment dates ranging from 1968 to 1984. Southern wax myrtle, beautyberry, and eastern red cedar are common throughout the compartment in the shrub layer, red bay in the sapling layer, and Japanese stilt grass often found as the dominant ground cover.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	5488.44	28.1	34	195.32	439075
H. Hardwood	646.79	3.8	8	170.21	51743
S. Hardwood	355.61	3.7	4	96.11	28449
Total:	6490.84	35.6	46		519267
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	4.38	44.9	20	350	
Hardwood	6.15	46.4	32	492	
Total:	10.53	91.3	52	842	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	93.10
	<b>Dominant Species:</b>	loblolly pine, sweetgum, black oak, tulip poplar
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	283.00
	<b>Dominant Species:</b>	sweetgum, red bay, loblolly pine, tree-of-heaven, eastern red cedar
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	666.00
	<b>Dominant Species:</b>	American beautyberry, wax myrtle, strawberry bush, autumn olive
<b>Groundcover</b>	<b>% Cover:</b>	39.50
	<b>Dominant Species:</b>	Japanese stiltgrass, slender spikegrass, common greenbrier, American beauty-berry, yellow crownbeard

**Management Recommendations**

Conduct annual inspections for forest health/invasive species and re-evaluate for a potential selective harvest in 2032. Signs of human disturbance were abundant at sample locations and observed while trekking through the central portion of the compartment (mostly soil piles). Several of these disturbed sites are now inundated with tree of heaven and autumn olive, species that have been intensely managed to control on JBLE-Eustis. Autumn olive is prolific along the roadway and on the edges of open land. It is highly recommended that control efforts to limit the dispersal of the woody invasives previously mentioned be implemented as soon as practical.

## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 19**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Area: 28)

**2021 Comp. Acreage:** 75.45

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1943-1981

**Avg. Growth Rate:** 5yr, 0.45 / 10yr, 0.9

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** red heart (2%)

**Mechanical Damage:** None

**Invasives:** Chinese privet,  
autumn olive, Japanese honeysuckle, Japanese stiltgrass, common chickweed

#### **Soils Data**

**Site Index Range (Soils):** 86-88

**Soil Types:**

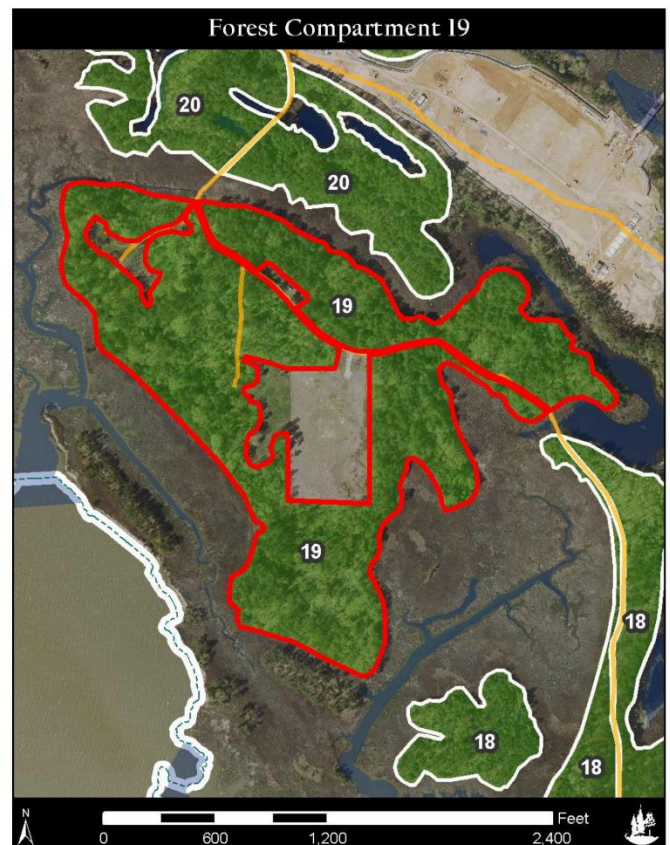
**Site Index Range (Curve):** 85-108

Bohicket-msc, Levy-sc, State-s, Tetotum-sl, Udorthents-l

**Average Slope:** 0.60

### **Compartment Description**

This compartment is composed primarily of a mature pine/hardwood forest type. The pine is variably stocked, good quality, medium to large sawtimber. Hardwood species in the upper canopy consist primarily of cherrybark oak, black walnut, black gum, sweetgum, black cherry, persimmon, and black locust. Previous storm damage is evident near the southern tip in pocketed areas with a sparse upper canopy and a dense “blanket-like” ground cover of roundleaf greenbrier and muscadine. An upland hardwood/pine forest type established in 1951 is also present within this compartment, where Japanese stiltgrass is dominant in the herbaceous layer. Fort Crafford, an historic site listed on the National Register of Historic Places, can be found near the northwestern edge of the compartment. Within this compartment, several acres of forest cover have been removed since the 2007 Forest Inventory. This area is now utilized for helicopter sling load training, and periodically mowed (red imported fire ant mounds were observed within this open field).





## Timber & Vegetation Inventory

<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	4776.54	14.1	29.9	338.76	360629
H. Hardwood	886.86	5.5	9.9	161.25	66958
S. Hardwood	1763.62	11.9	16.7	148.2	133153
Total:	7427.02	31.5	56.5		560740
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	0.38	2.4	3.3	29	
Hardwood	2.92	31.4	19.9	220	
Total:	3.3	33.8	23.2	249	

## Vegetative Class Dominance

<b>Trees</b>	<b>% Canopy Closure:</b>	85.50
	<b>Dominant Species:</b>	loblolly pine, sweetgum, cherrybark oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	325.00
	<b>Dominant Species:</b>	sweetgum, loblolly pine, red bay, black oak, eastern red cedar
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	146.00
	<b>Dominant Species:</b>	American beautyberry, wax myrtle, autumn olive, Chinese privet
<b>Groundcover</b>	<b>% Cover:</b>	41.60
	<b>Dominant Species:</b>	Japanese stiltgrass, wood reedgrass, common chickweed, autumn Olive, yellow crownbeard

## Management Recommendations

Conduct annual inspections for forest health/invasive species and consider a selective harvest within 2022-2026. The mature loblolly pine is declining as evidenced by significantly reduced growth rates. Reduced vigor will also likely increase the risk of disease and/or undesirable forest insect pest problems. Install 50'-75' riparian "no-cut" buffers in Chesapeake Bay Preservation Act Resource Protection Areas. Certain restrictions protecting the integrity of the Fort Crafford exist which limit/prohibit harvesting near this archaeological site and should be clearly defined in a timber sale contract. American wisteria (*Wisteria frutescens*) was found along the roadway near the eastern boundary of the compartment and its population should be mapped and designated in the field so as to protect it from any potential harvesting operations or vegetation control work (especially herbicides). It is listed by the VA DCR Division of Natural Heritage as S1, which indicates the species is "critically imperiled". Continue invasive species control work on woody invasives. Extensive herbicide control efforts have been performed over the last several years, primarily to tree of heaven and most recently to Chinese privet and autumn olive. Storm damage and pine mortality over the years have created pockets on the forest floor of dense, mat-like muscadine, some of which is also occupied by the afore-mentioned invasive species. Consideration could also be given to reclaiming these pocketed areas and turning them into early successional habitat by utilizing a forestry mower if a selective harvest is not imminent.

## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 20**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Areas: 20, 21, & 28)

**2021 Comp. Acreage:** 61.24

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1945-1990

**Avg. Growth Rate:** 5yr, 0.6 / 10yr, 1

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** red heart (3%)

**Mechanical Damage:** rutting (minor)

**Invasives:** Japanese honeysuckle, Japanese stiltgrass

#### **Soils Data**

**Site Index Range (Soils):** 88-88

**Site Index Range (Curve):** 74-103

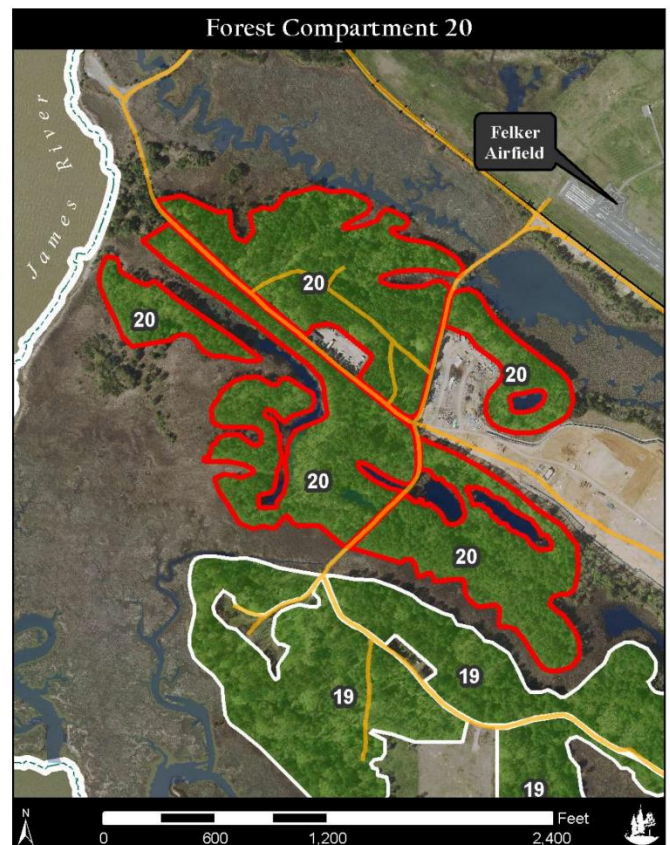
**Average Slope:** 0.30

#### **Soil Types:**

Altavista-fsl, Bohicket-msc, Chickahominy-sl, Levy-sc, Newflat-sl, State-s, Tetotum-sl, Udorthents-l

### **Compartment Description**

This compartment is dissected by drainage systems and roads. The upland areas are very narrow and relatively low in elevations and are composed of a pine/hardwood forest type with establishment dates that range from 1945 to 1990. The majority of the compartment consists of mature to over-mature loblolly pine with a mixture of cherrybark oak, sweetgum, white oak, and willow oak. Black cherry, persimmon, and dogwood are common throughout the midstory with southern wax myrtle and beautyberry frequently observed in the shrub layer. A much younger forest type (1990) was sampled near the northeastern boundary of the compartment composed primarily of heavily stocked, small sawtimber to pulpwood-sized loblolly pine and sweetgum. This compartment appears to be used heavily for troop training and outdoor recreation (hunting).



## Timber & Vegetation Inventory

<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	10754.38	43.8	65	245.53	658598
H. Hardwood	366.15	4.1	5	89.3	22423
S. Hardwood	587.22	4.1	5	143.22	35961
Total:	11707.75	52	75		716983
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	2.3	20.2	12.5	141	
Hardwood	1.2	23.8	10	73	
Total:	3.5	44	22.5	214	

## Vegetative Class Dominance

<b>Trees</b>	<b>% Canopy Closure:</b>	90.35
	<b>Dominant Species:</b>	loblolly pine, sweetgum, black oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	374.00
	<b>Dominant Species:</b>	loblolly pine, sweetgum, black oak
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	650.00
	<b>Dominant Species:</b>	wax myrtle, American beautyberry
<b>Groundcover</b>	<b>% Cover:</b>	53.60
	<b>Dominant Species:</b>	violet wood-sorrel, common rush/Soft rush, slender spikegrass, Japanese stiltgrass, common greenbrier

## Management Recommendations

Conduct annual inspections for forest health/invasive species and consider a selective harvest within 2022-2026, excluding the younger forest type near the northeastern boundary. The selective harvest could be done congruently with compartment 19. Consider timing potential harvesting operations when seasonal water tables are low to reduce rutting and soil compaction. Protect water quality by limiting stream/ditch crossings and installing 50'-75' "no-cut" riparian buffers along Chesapeake Bay Preservation Act Resource Protection Areas. American wisteria (*Wisteria frutescens*) was found along the roadway near the southeastern portion of the compartment and its population should be mapped and designated in the field so as to protect it from any potential harvesting operations or vegetation control work (especially herbicides). It is listed by the VA DCR Division of Natural Heritage as S1, which indicates the species is critically imperiled.



## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 21**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Area: 19)

**2021 Comp. Acreage:** 46.56

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1934-1985

**Avg. Growth Rate:** 5yr, 0.45 / 10yr, 0.9

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** red heart (1%)

**Mechanical Damage:** None

**Invasives:** Japanese honeysuckle, Japanese stiltgrass

#### **Soils Data**

**Site Index Range (Soils):** 85-88

**Site Index Range (Curve):** 87-115

**Average Slope:** 0.60

#### **Soil Types:**

Bohicket-msc, Chickahominy-sl, Newflat-sl, State-s, Tetotum-sl, Udorthents-l

### **Compartment Description**

The majority of this compartment consists of a variably aged, hardwood forest type which contains predominantly small to medium sawtimber-sized sweetgum with a few widely scattered oaks that were reserved from an earlier harvest. The southeastern portion of the compartment is primarily a heavily stocked, medium sawtimber-sized pine forest type that was established in 1966-1967. Moderate pine regeneration was noted within sample locations where the stocking of upper canopy trees was less dense. Southern wax myrtle and beautyberry were sampled most frequently in the shrub layer with Japanese stilt grass as the dominant species in the herbaceous layer.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	5398.88	24	32	224.95	251642
H. Hardwood	866.36	4.2	10	206.28	40381
S. Hardwood	2853.17	22.4	28	127.4	133012
Total:	9118.97	50.6	70		425035
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	0.66	8.2	4	31	
Hardwood	2.85	19	14	133	
Total:	3.51	27.2	18	164	

### Vegetative Class Dominance

<b>Trees</b>	<b>% Canopy Closure:</b>	91.52
	<b>Dominant Species:</b>	loblolly pine, sweetgum, cherrybark oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	676.00
	<b>Dominant Species:</b>	loblolly pine, sweetgum, American persimmon, black oak, flowering dogwood
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	385.00
	<b>Dominant Species:</b>	wax myrtle, American beautyberry
<b>Groundcover</b>	<b>% Cover:</b>	82.60
	<b>Dominant Species:</b>	Japanese stiltgrass, partidge-berry, cleavers, slender spikegrass, Japanese honeysuckle

### Management Recommendations

Conduct annual inspections for forest health/invasive species and reevaluate in 2027-2031 for a potential selective timber harvest. The younger component of hardwood/pine located on the western edge of the compartment is expected to become more merchantable as medium-sized sawtimber and should be included in a potential timber-sale with the older, more mature pine located on the central and eastern sides of the compartment. Consider timing potential harvesting operations when seasonal water tables are low to reduce rutting and soil compaction. Protect water quality by limiting stream/ditch crossings and installing 50'-75' "no-cut" riparian buffers along Chesapeake Bay Preservation Act Resource Protection Areas.

## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 22**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Area: 17C)  
**2021 Comp. Acreage:** 48.2  
**Forest/Veg. Type:** Pine/Hardwood  
**Age Range:** 1935-1984  
**Avg. Growth Rate:** 5yr, 0.43 / 10yr, 0.95  
**T/E Species:** northern long-eared bat  
**Disease/Insect Damage:** red heart (2%)  
**Mechanical Damage:** rutting (moderate)  
**Invasives:** Japanese honeysuckle, Japanese stiltgrass, common reed, hydrilla

#### **Soils Data**

**Site Index Range (Soils):** NA

**Site Index Range (Curve):** NA

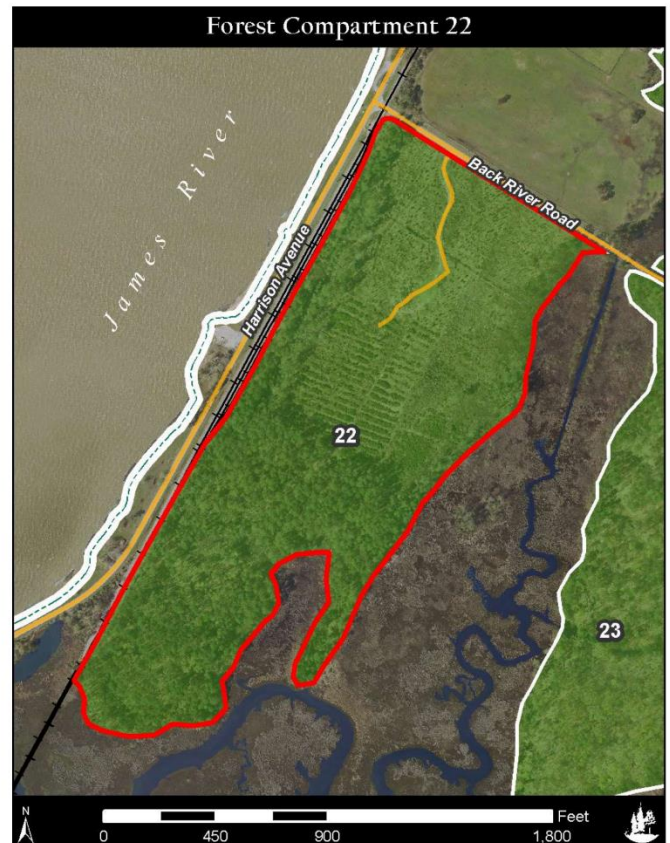
**Average Slope:** 0.67

#### **Soil Types:**

Bohicket-msc, Newflat-sl, Tetotum-sl, Udorthents-l

### **Compartment Description**

Compartment 22 is found just south of the intersection of Harrison Avenue and Back River Road. The compartment is fragmented into two parts, the smallest of which is a tiny island located east of the main compartment land mass (not sampled). A clear-cut timber harvest was conducted in 2014 on approximately 20 acres just south of Back River Road. This area was subsequently replanted with a variety of hardwood/soft hardwood mast producing species and bald cypress and is being kept in a “savannah-like” state with periodic mowing. Some pine regeneration exists within the planting project location and the area can be classified now as a hardwood/pine forest type. The remnant forest type south of the clear-cut (excluding the island that was not sampled) consists of a pine/hardwood forest type, primarily over-mature, declining loblolly pine, sweetgum, and cherrybark oak that’s found on poorly drained soils.





<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	5571.51	14.4	28	386.91	267433
H. Hardwood	155.51	1.4	2	111.08	7464
S. Hardwood	0	0	0	0	0
Total:	5727.02	15.8	30		274897
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	0.52	2.5	2	25	
Hardwood	2.23	20.6	12	107	
Total:	2.75	23.1	14	132	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	83.03
	<b>Dominant Species:</b>	loblolly pine, cherrybark oak, willow oak, sweetgum
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	2,317.00
	<b>Dominant Species:</b>	loblolly pine, sweetgum, cherrybark oak, black oak, southern red oak
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	2,881.00
	<b>Dominant Species:</b>	wax myrtle, eastern baccharis
<b>Groundcover</b>	<b>% Cover:</b>	96.00
	<b>Dominant Species:</b>	common rush/Soft rush, Japanese stiltgrass, bird's-foot trefoil, Long-leaved panic grass, leathery rush

**Management Recommendations**

Conduct annual inspections for forest health/invasive species. Continue herbicide applications around the base of planted hardwoods until 2032. Consider restricting mowing activities when soils are seasonally saturated to minimize soil compaction and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. Evaluate the efficacy of mowing to control common reed that is spread intermittently throughout the hardwood planting area and encroaching from adjacent wetlands. Herbicide treatments around planted hardwoods and to common reed could be done congruently if mowing is not sufficient and should be done at least 6 weeks prior to mowing operations. Consult with RR authorities to see if a temporary ROW agreement is an option to allow for harvesting of the over-mature timber located southwest of the hardwood planting project. Consider timing any potential timber harvesting operation when seasonal water tables are low to reduce rutting and soil compaction.

## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 23**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Areas: 15 & 17A)

**2021 Comp. Acreage:** 77.75

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1900-1959

**Avg. Growth Rate:** 5yr, 0.5 / 10yr, 1.1

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** red heart (3%)

**Mechanical Damage:** None

**Invasives:** common reed

#### **Soils Data**

**Site Index Range (Soils):** 88-88

**Site Index Range (Curve):** 90-91

**Average Slope:** 0.38

#### **Soil Types:**

Altavista-fsl, Bohicket-msc, Chickahominy-sl, Newflat-sl, State-s, Tetotum-sl, Udorthents-l

### **Compartment Description**

Forest Compartment 23 is fragmented into three areas separated by tidal and nontidal drains and Back River Road. The northernmost area, which lies northeast of the DPW Bulk Storage, is predominantly a mature, pine/hardwood forest type with varying hydrology (an active eagle nest is located in this area but not observed). Loblolly pine, cherrybark oak, and southern red oak are common in the dense upper canopy, while red maple and black cherry are found frequently in the midstory. Several of the loblolly pines within this area had visual indicators of red heart fungus (conks). Groundcover is typically scarce, most likely attributed to the limited amount of sunlight able to reach the forest floor. South of this area lies the center of the compartment, which is located southeast of the DPW Bulk Storage area, abutting Back River Road on the south. The forest consists of adequately stocked, medium sawtimber-sized loblolly pine, established in 1959. Common reed was observed on occasion underneath the upper canopy, where it has likely spread from an adjacent dredge spoil site. The southern portion of the compartment is bounded by Back River Road on the north, tidal wetlands on the west and south, and Mulberry Road and the airfield on the east where a mature pine/hardwood forest type is present (established 1901-1914) and can be found in both uplands and areas that are seasonally saturated. Subsequent to the 1997 Forest Inventory, logging equipment was utilized to remove some of the declining loblolly pine, wind-thrown trees, and other trees that were identified as potential hazards.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	13287.45	35.9	68	370.12	1033099
H. Hardwood	563.9	5.1	6	110.57	43843
S. Hardwood	375.93	0.9	2	417.7	29229
Total:	14227.28	41.9	76		1106171
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	1.52	8.8	6	118	
Hardwood	2.77	20.9	16	215	
Total:	4.29	29.7	22	334	

### **Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	90.48
	<b>Dominant Species:</b>	loblolly pine, cherrybark oak, sweetgum
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	174.00
	<b>Dominant Species:</b>	sweetgum, loblolly pine, swamp tupelo, black gum/sour gum, American holly
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	73.00
	<b>Dominant Species:</b>	wax myrtle
<b>Groundcover</b>	<b>% Cover:</b>	33.10
	<b>Dominant Species:</b>	common reed, New York fern, slender spikegrass, common greenbrier, Virginia chain fern

### **Management Recommendations**

Conduct annual inspections for forest health/invasives and consider a selective harvest in 2022-2026. The loblolly pine is over mature and showing signs of decline. Several loblolly pines throughout the compartment had visual indications of red heart fungus (conks). Additionally, declining growth rates found in core samples (tree borings) indicate loss of vigor which may increase the likelihood of future insect/disease problems. Implement 50'-75' riparian "no-cut" buffers in Chesapeake Bay Preservation Act Resource Protection Areas and 75' wide aesthetic "selective-cut" buffers along Mulberry Island and Back River Roads. Trees targeted for removal within the "selective cut" buffer should include the majority of the loblolly pine and suppressed, weakened, or damaged tree species that may become a hazard to roadways, powerlines, fencing, or buildings. Additionally, install a "no-cut" buffer (prohibiting harvesting) around the permanently flooded area that's found near the middle of the southern portion of the compartment. Timing of timber harvesting within this compartment should occur when seasonal water tables are low. The northern portion of the compartment (TA-15) contains an active eagle nest and would require perimeter fencing removal with the access/egress across a large parking/loading area. Subsequent to the last forest inventory conducted in 2007, a hazard tree removal operation (logging equipment) was performed south of River Road (TA-17A), as was a midstory removal operation a few years later, utilizing a forestry mower. In the event that timber harvesting operations are not feasible, consider similar hazard tree/mid-story removal activities within this location.



## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 24**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Area: 23)

**2021 Comp. Acreage:** 77.26

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1970-2012

**Avg. Growth Rate:** 5yr, 0.6 / 10yr, 1.3

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** None

**Mechanical Damage:** legacy debris (moderate)

**Invasives:** autumn olive, Japanese honeysuckle, Japanese stiltgrass

#### **Soils Data**

**Site Index Range (Soils):** 85-95

**Site Index Range (Curve):** 96-117

**Average Slope:** 0.75

#### **Soil Types:**

Chickahominy-sl, Newflat-sl, State-s, Tetotum-sl, Udorthents-l

### **Compartment Description**

This compartment is variably aged, but primarily a heavily stocked pine/hardwood forest type (most of which is pulpwood to small sawtimber-sized). The majority of forest was established in 1983-1984, however, a slightly more mature age class is found near the northern boundary (established 1970). Civil war earthworks were observed near this area as was debris such as metal tracks, concrete, etc. A large, nontidal wetland system with a moderate number of snags lies near the center of the compartment and likely provides ideal habitat for a variety of amphibians and waterfowl. Planted hardwoods consisting of mostly mixed oak species with a few larger “reserve” trees in the upper canopy exist near the southern boundary of the compartment where the area is kept in a “park-like” state by frequent mowing.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	11955.94	46.7	64	256.02	923716
H. Hardwood	536.37	3.2	6	167.62	41440
S. Hardwood	302.84	3.7	4	81.85	23397
Total:	12795.15	53.6	74		988553
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	6.05	41.2	22	467	
Hardwood	3.06	21.2	14	236	
Total:	9.11	62.4	36	704	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	80.24
	<b>Dominant Species:</b>	loblolly pine, sweetgum, willow oak, cherrybark oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	229.00
	<b>Dominant Species:</b>	sweetgum, black oak, willow oak, southern red oak, American persimmon
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	302.00
	<b>Dominant Species:</b>	wax myrtle, American beautyberry, autumn olive
<b>Groundcover</b>	<b>% Cover:</b>	47.70
	<b>Dominant Species:</b>	Small-flowered Buttercup, Periwinkle, southern Lady fern, Indian-strawberry

**Management Recommendations**

Conduct annual inspections for forest health/invasives, re-evaluate growth rates in 2032, and continue herbicide applications around planted trees until 2032. The younger component of pine/hardwood located on the southwestern portion of the compartment (not including the planted hardwoods) is expected to become more merchantable as medium-sized sawtimber and could be included in any potential timber-sale with the older, more mature pine located on the north. Another consideration is to include the northern portion of the compartment with that of the neighboring Compartment 15 should a timber harvesting operation be planned for that compartment prior to 2032. Existing parameters which limit/prohibit harvesting near civil war earthworks must be considered in the harvest design and clearly stated in a timber sale contract.

## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 25**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Area: 23)  
**2021 Comp. Acreage:** 18.96  
**Forest/Veg. Type:** Pine  
**Age Range:** 1989  
**Avg. Growth Rate:** 5yr, 0.6 / 10yr, 1.1  
**T/E Species:** northern long-eared bat  
**Disease/Insect Damage:** None  
**Mechanical Damage:** None  
**Invasives:** Japanese honeysuckle, Japanese stiltgrass

#### **Soils Data**

**Site Index Range (Soils):** 88-88

**Site Index Range (Curve):** 82-95

**Average Slope:** 0.50

#### **Soil Types:**

Bohicket-msc, Chickahominy-sl, Newflat-sl, State-s, Tetotum-sl

### **Compartment Description**

The majority of the compartment (a portion of TA-23) consists primarily of a heavily stocked, pine/hardwood forest type that was established in 1985-1986, found on gently sloping to seasonally saturated soils. Dominant upper canopy species are primarily heavily stocked, pulpwood to small sawtimber-sized loblolly pine and sweetgum with an occasional large hardwood “reserve” tree (mixed oak species). Sweetgum, black oak, beautyberry, and blue huckleberry were sampled most frequently in the shrub-sapling layer with Japanese stilt grass as the most dominant ground cover species.





<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	5685.46	40.5	40	140.38	107796
H. Hardwood	0	0	0	0	0
S. Hardwood	0	0	0	0	0
Total:	5685.46	40.5	40		107796
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	11.85	81.5	46.6	225	
Hardwood	5.91	37.1	23.3	112	
Total:	17.76	118.6	69.9	337	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	93.60
	<b>Dominant Species:</b>	loblolly pine, sweetgum
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	368.00
	<b>Dominant Species:</b>	sweetgum, black oak
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	416.00
	<b>Dominant Species:</b>	American beautyberry, blue huckleberry
<b>Groundcover</b>	<b>% Cover:</b>	50.20
	<b>Dominant Species:</b>	Japanese stiltgrass, wax-myrtle, Virginia wild rye, Virginia cutgrass, yellow crownbeard

**Management Recommendations**

Conduct annual inspections for forest health/invasives and re-evaluate growth rates in 2032. The pine component appears healthy and is expected to become more merchantable as medium-sized sawtimber with an additional 10-11 years of growth.

## *JBLE-Eustis Forest Compartment Analysis*

- Mulberry Island (North) -

Compartment # 31

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Areas: 14B & 23 and Pines Golf Course)

**2021 Comp. Acreage:** 216.46

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1870-1993

**Avg. Growth Rate:** 5yr, 0.38 / 10yr, 0.77

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** red heart (3%)

**Mechanical Damage:** rutting (moderate)

**Invasives:** Japanese honeysuckle, Japanese stiltgrass

#### **Soils Data**

**Site Index Range (Soils):** 85-90

**Site Index Range (Curve):** 71-109

**Average Slope:** 0.55

#### **Soil Types:**

Altavista-fsl, Augusta-fsl, Bohicket-msc, Chickahominy-sl, Newflat-sl, State-s, Tetotum-sl, Tomotley-fsl, Udorthents-l

### **Compartment Description**

This compartment encompasses most of the woodlands associated with The Pines Golf Course. The forest within this compartment is fragmented and is composed of a pine/hardwood forest type. Upper canopy species are variably stocked and consist primarily of loblolly pine, sweetgum, red maple, tulip poplar, a variety of oak species and bald cypress. Sample areas include wetland fringes where the herbaceous layer is dense with lizard's tail, ferns, and other hydrophytic vegetation as well as gently sloping uplands nearly devoid of ground cover. Historic ground disturbance (soil piles) and rutting of soils are found in or in close proximity to most sample locations and frequently observed while traversing through the compartment. Although the majority of the forest is narrow, it is vital in filtering nutrients and other chemicals associated with golf course maintenance activities.



## Timber & Vegetation Inventory

<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	9118.76	27.5	47.2	331.59	1973847
H. Hardwood	2133.95	8.9	19.8	239.77	461915
S. Hardwood	1307.06	7.3	11.3	179.05	282926
Total:	12559.77	43.7	78.3		2718688
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	3.3	35.3	15.8	714	
Hardwood	1.83	11.6	10.6	396	
Total:	5.13	46.9	26.4	1110	

## Vegetative Class Dominance

<b>Trees</b>	<b>% Canopy Closure:</b>	94.38
	<b>Dominant Species:</b>	loblolly pine, sweetgum, southern red oak, tulip poplar, red maple
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	126.00
	<b>Dominant Species:</b>	sweetgum, swamp cottonwood, loblolly pine, red maple, swamp chestnut oak
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	119.00
	<b>Dominant Species:</b>	wax myrtle, deerberry, American beautyberry
<b>Groundcover</b>	<b>% Cover:</b>	40.10
	<b>Dominant Species:</b>	New York fern, Japanese stiltgrass, lizard's-tail/water-dragon, slender spikegrass, common rush/Soft rush

## Management Recommendations

Conduct annual inspections for insect/disease/hazard trees and consider additional mechanical mulching (forestry mower) to create more “edge” habitat (NLEB timeline restrictions may apply). Pollinator planting areas were observed while trekking through the compartment. These areas not only benefit pollinating insects but also save time and resources because they don’t require frequent mowing, watering, and fertilizing. Additionally, they are likely providing conservation biological control by attracting natural enemies to control pests such as fall armyworm. The forest within this compartment is variably aged, narrow, extremely fragmented, and vital in filtering nutrients/contaminants from the golf course. Hazard trees/branches should be removed in areas where they may jeopardize the safety of personnel using or maintaining the golf course.



## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 33**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Area: 28)

**2021 Comp. Acreage:** 2.59

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1905

**Avg. Growth Rate:** 5yr, 0.5 / 10yr, 0.92

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** None

**Mechanical Damage:** None

**Invasives:** tree-of-heaven, Japanese honeysuckle, common chickweed, common reed

#### **Soils Data**

**Site Index Range (Soils):** 91-91

**Site Index Range (Curve):** NA

**Average Slope:** 0.00

#### **Soil Types:**

Altavista-fsl, Augusta-fsl, Bohicket-msc

### **Compartment Description**

This island compartment experiences periodic sandy over-wash and has suffered significant storm damage over the last two decades. It contains a pine/hardwood maritime forest type established in 1905 consisting of widely scattered, large loblolly pine and cherrybark oak. It is likely that this island previously consisted of a much heavier pine component, which over the years, has succumbed to windthrow and periodic tidal inundation. Re-generation of tree of heaven, red bay, American holly, and black locust are abundant in areas where the upper canopy is now scarce. Beautyberry and southern wax myrtle were most common in the shrub layer with shoreline sedge, common chickweed, and saltmeadow cordgrass found to be most dominant in the herbaceous layer. Roundleaf greenbrier and saw greenbrier were both encountered frequently while traversing to sample locations.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	2379.24	5.5	13.3	432.59	7138
H. Hardwood	271.89	1.3	3.3	209.15	816
S. Hardwood	0	0	0	0	0
Total:	2651.13	6.8	16.6		7953
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	1.26	12.2	6.7	6.7	
Hardwood	1.73	10	10	10	
Total:	2.99	22.2	16.7	16.7	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	61.50
	<b>Dominant Species:</b>	loblolly pine, cherrybark oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	243.00
	<b>Dominant Species:</b>	red bay, loblolly pine, tree-of-heaven, sweetgum, eastern redcedar
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	485.00
	<b>Dominant Species:</b>	American beautyberry, wax myrtle
<b>Groundcover</b>	<b>% Cover:</b>	66.40
	<b>Dominant Species:</b>	shoreline sedge, common chickweed, saltmeadow cordgrass, Virginia cutgrass, American holly

**Management Recommendations**

Due to access limitations, this forest compartment is considered as non-manageable.

## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 34**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Area: 28)

**2021 Comp. Acreage:** 22.7

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1920-1944

**Avg. Growth Rate:** 5yr, 0.46 / 10yr, 0.84

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** None

**Mechanical Damage:** None

**Invasives:** tree-of-heaven, Japanese honeysuckle

#### **Soils Data**

**Site Index Range (Soils):** 86-86

**Site Index Range (Curve):** 77-105

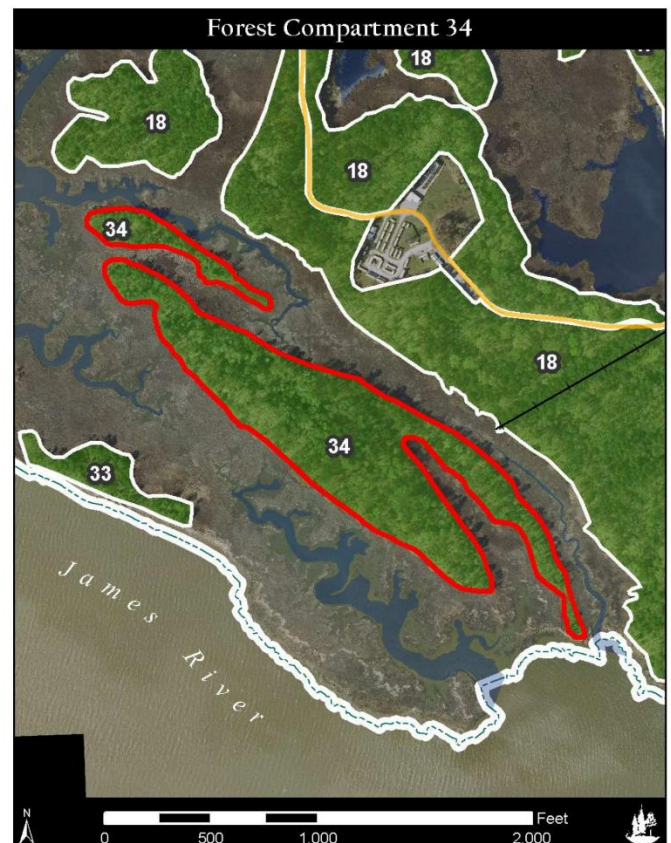
**Average Slope:** 1.50

#### **Soil Types:**

Altavista-fsl, Bohicket-msc, State-s, Tetotum-sl

### **Compartment Description**

This forest compartment is on an island, surrounded by tidal marsh, and contains a mature, variably stocked, pine/hardwood maritime forest type. The island has suffered significant storm damage over the years as evidenced by several leaning trees, broken snags, and trees that are completely blown over (wind-throw). The residual upper canopy is now dominated by cherrybark oak, loblolly pine, sweetgum, black gum, and willow oak. In areas where the upper canopy is scarce, the shrub sapling layer is dense with pine regeneration (heights of 16'), American holly, red bay, southern wax myrtle, and the invasive tree of heaven.





<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	5893.33	16.1	32.5	366.05	133779
H. Hardwood	194.39	1.8	2.5	107.99	4413
S. Hardwood	1993.35	12.5	17.5	159.47	45249
Total:	8081.07	52.5	52.5		183440
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	0.56	3.2	2.5	13	
Hardwood	1.36	11	7.5	31	
Total:	1.92	14.2	10	44	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	93.60
	<b>Dominant Species:</b>	loblolly pine, cherrybark oak, sweetgum
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	1,131.00
	<b>Dominant Species:</b>	loblolly pine, red bay, eastern redcedar, devil's walking-stick, tree-of-heaven
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	295.00
	<b>Dominant Species:</b>	wax myrtle, American beautyberry
<b>Groundcover</b>	<b>% Cover:</b>	12.00
	<b>Dominant Species:</b>	American holly, wax-myrtle, Loblolly Pine, slender spikegrass, American beauty-berry

**Management Recommendations**

Due to access limitations, this forest compartment is considered as non-manageable.

## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (North)** -

**Compartment # 35**

### **Compartment Details**

**Location:** Mulberry Island (Supports Training Area: 24 & Pistol Range impact area)

**2021 Comp. Acreage:** 8.76

**Forest/Veg. Type:** Hardwood/Pine

**Age Range:** 1916-1952

**Avg. Growth Rate:** 5yr, 0.5 / 10yr, 0.9

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** None

**Mechanical Damage:** None

**Invasives:** tree-of-heaven, Chinese privet, Japanese honeysuckle, Japanese stiltgrass, common chickweed, chinaberry

#### **Soils Data**

**Site Index Range (Soils):** 86-86

**Site Index Range (Curve):** 81-91

**Average Slope:** 0.00

#### **Soil Types:**

Bohicket-msc, State-s, Tetotum-sl

### **Compartment Description**

This island compartment consists of a mature, pine/hardwood maritime forest type, found on mostly mesic soils. Loblolly pine, sweetgum, cherrybark oak, black cherry, hackberry, and black walnut are prevalent in the upper canopy with American holly, southern wax myrtle, beautyberry, and the invasive Chinese privet found frequently in the shrub layer. The compartment has a small rise in elevation near the middle of the island where a small patch of tree-of-heaven exists. Similar to most of the island compartments where there is scarce upper canopy stocking from storm damage, regeneration of loblolly pine, southern wax myrtle, and invasives species such as tree of heaven, Chinese privet, Chinaberry, and multiflora rose are now prolific.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	756.73	2.2	6.6	343.97	6629
H. Hardwood	743.85	3	6.6	247.95	6516
S. Hardwood	455.55	1.9	3.3	239.76	3991
Total:	1956.13	7.1	16.5		17136
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	0	0	0	0	
Hardwood	2.88	16.7	16.6	25	
Total:	2.88	16.7	16.6	25	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	89.25
	<b>Dominant Species:</b>	cherrybark oak, loblolly pine, sweetgum
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	108.00
	<b>Dominant Species:</b>	loblolly pine, tree-of-heaven, eastern red Cedar, cherrybark oak
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	121.00
	<b>Dominant Species:</b>	American beautyberry, wax myrtle, Chinese privet
<b>Groundcover</b>	<b>% Cover:</b>	83.00
	<b>Dominant Species:</b>	Japanese stiltgrass, slender spikegrass, yellow crownbeard, tree-of-heaven, early forget-me-not

**Management Recommendations**

Due to access limitations, this forest compartment is considered as non-manageable.



## **Mulberry Island (North) - Management Considerations:**

### **Training**

Training on Mulberry Island (North) portion of JBLE-Eustis is conducted on 14 areas as depicted on Figure: 2.2B, titled JBLE-Eustis – Mulberry Island (North): Training Areas. All of these training areas except TA-15, TA-18, TA-20 and the pistol and shotgun range R-1 are conducted within forest vegetation compartments. The soils that occur within Mulberry Island (North) are generally characterized as being more poorly drained than those found on the Main Post area of JBLE-Eustis. The seasonally high water table is close to the surface during December through late March in most years. Hurricanes during the fall can generate large amounts of rainfall and can elevate the ground water table as early as September or October which can create access problems to many of the low-lying compartments.

The existing, unimproved secondary road system leading to the training areas is navigable with all-terrain vehicles (ATV's) throughout the year. However once ATV's leave the road/trail systems rutting and subsequent soil erosion would typically occur during any period associated with high water tables. Subsurface water movement in an undisturbed soil profile typically occurs both horizontally and vertically during drier portions of the year. Any rutting or use of vehicles that disturbs the soil profile at any time during the year will inhibit water movement and will diminish drainage capacity leading to wetter conditions for longer periods than what would occur in an undisturbed soil profile.

While training activities need to represent a variety or range of combat situations, including driving under adverse conditions, consideration should be given to identifying those areas on the secondary road system that would generate off-site non-point source discharges and incorporate Best Management Practices, including Erosion and Sediment Control and reinforcing low-lying areas with geo-textile mats and the application of stone to reinforce the roadbeds. Otherwise training restrictions during wet periods should be considered to protect the long-term use of these sites for training activities.

### **Felker Army Airfield**

Felker Airfield is used for fixed and rotary-wing operations. The Federal Aviation Administration (FAA) establishes requirements for minimum safety heights for obstructions with aircraft approach zones. These zones are established based on the classification of the airfield. These classifications are based on the use of the airfield for precision, non-precision or visual approaches. Felker Army Airfield is considered non-precision. Therefore, a 34/1 unobstructed slope beginning from the end of the runway outward is required. These regulations prohibit vegetation, especially trees from penetrating these slopes.

In order to meet these minimum requirements, woody vegetation within the approach zone will need to be managed so as not to penetrate the specified slopes. When forest encroaches into these approach zones a timber harvest should occur. Following a timber harvest, regrowth will need to be maintained. The soils within these approach zones are very poorly drained. Due to the limitations of a high water table and need to restrict equipment activity on these sites management tools including the application of herbicides and/or prescribe burning should be used for vegetation control.

Before the application of fire as a vegetation control tool, a fire/smoke management plan needs to be developed by the Natural Resources & Integrated Pest Management Branch and coordinated with the Airfield Safety Officer and the Post Fire Department and any other stakeholders that may have interest.

### **Recreation/Golf Course**

The Office of Outdoor Recreation provides developed recreational facilities such as outdoor pools, tennis courts, the skeet and trap field and golf course. This office also works with the Natural Resources & Integrated Pest Management Branch to conduct and manage the hunting program. Most of the forest supported at the golf course are mature and vigor is declining. Due to the intensive use of this facility by military personnel, retirees and their guest special consideration should be given to conducting an annual hazard tree inventory, maintenance and removal when necessary.

## **6.53 - Mulberry Island – South**

The Mulberry Island – South vegetation compartments are shown on Figure:5.0C, titled JBLE-Eustis, VA ~ Mulberry Island (South): Forest Vegetation Compartments. This area supports 12 vegetation compartments, labeled 1 through 9, and 36 through 38. The dominant land cover in these compartments is forest and tidal wetlands. The majority of this area is located on land with significant environmental constraints which will limit the use of many traditional forest management tools.

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**Mulberry Island (South) Forest Compartment Descriptions and  
Management Recommendations: Compartments 1-9 & 36-38**

## *JBLE-Eustis Forest Compartment Analysis*

-Mulberry Island (South)-

Compartment # 01

### **Compartment Details**

**Location:** Mulberry Island (Supports Firing Range impact area)

**2021 Comp. Acreage:** 9

**Forest/Veg. Type:** Hardwood

**Age Range:** 1931

**Avg. Growth Rate:** 5yr, 0.39 / 10yr, 0.8

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** None

**Mechanical Damage:** blow down (1), legacy debris (minimal)

**Invasives:** Japanese honeysuckle, Japanese stiltgrass

#### **Soils Data**

**Site Index Range (Soils):** NA

**Site Index Range (Curve):** 72-73

**Average Slope:** 0.00

**Soil Types:**

Bohicket-msc, State-s, Tetotum-sl

### **Compartment Description**

This forest compartment is located at the southernmost tip of Mulberry Island, bounded on the west by the James River and on the east by the Warwick River. The upper canopy is relatively open and consists of species such as black walnut, southern hackberry, sweetgum, and a few, widely scattered large loblolly pines. The sapling and shrub layer is sparse with widely scattered sweetgum, red bay, and beautyberry. Frost grape and roundleaf greenbrier are most abundant in the vine layer, climbing in the midstory to heights of 30-35'. Japanese brome grass and Japanese stilt grass are prevalent in the herbaceous layer. Signs of human disturbance (metal, concrete, etc.) are quite common, especially near the southern tip.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	0	0	0	0	0
H. Hardwood	1053.83	7	10	146.37	9484
S. Hardwood	0	0	0	0	0
Total:	1053.83	7	10		9484
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	0	0	0	0	
Hardwood	4.78	24.5	23.3	43	
Total:	4.78	24.5	23.3	43	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	83.00
	<b>Dominant Species:</b>	black walnut, hackberry, sweetgum
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	26.00
	<b>Dominant Species:</b>	sweetgum, red bay, southern, hackberry
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	52.00
	<b>Dominant Species:</b>	American beautyberry
<b>Groundcover</b>	<b>% Cover:</b>	139.90
	<b>Dominant Species:</b>	Japanese brome grass, Japanese stiltgrass, tall fescue, shoreline sedge, fox sedge

**Management Recommendations**

Maintain access trails. Consider restricting mowing activities when soils are seasonally saturated and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. There is little commercial value found in the poor-quality black walnuts and hackberry trees, and the relatively few loblolly pines that are of sawtimber-size are found in Chesapeake Bay Preservation Act Resource Protection Areas. The loblolly pines are, however, currently providing perching opportunities for raptors such as the bald eagle and may additionally provide future nesting opportunities. Several invasive species have been documented within this compartment over the last fifteen years (primarily tree of heaven), however invasive species control work has been generally prioritized in training lands and urban forests (access limitations due to firing ranges and potential UXO hazards were also contributing factors in establishing priority areas for invasive species control efforts). Additional restrictions regarding access in this compartment as well as several other forested compartments located in JBLE-Eustis' impact area(s) are now in place. Until a risk assessment can be conducted to evaluate potential hazards such as munitions and explosives of concern (MEC), type of AE, amount, and location-surface or subsurface of MEC present, access is restricted to personnel who have operational requirements (and may be even further limited) as dictated by the Garrison Commander and the installation range authority (DA PAM 385-64).



## *JBLE-Eustis Forest Compartment Analysis*

-Mulberry Island (South)-

Compartment # 02

### **Compartment Details**

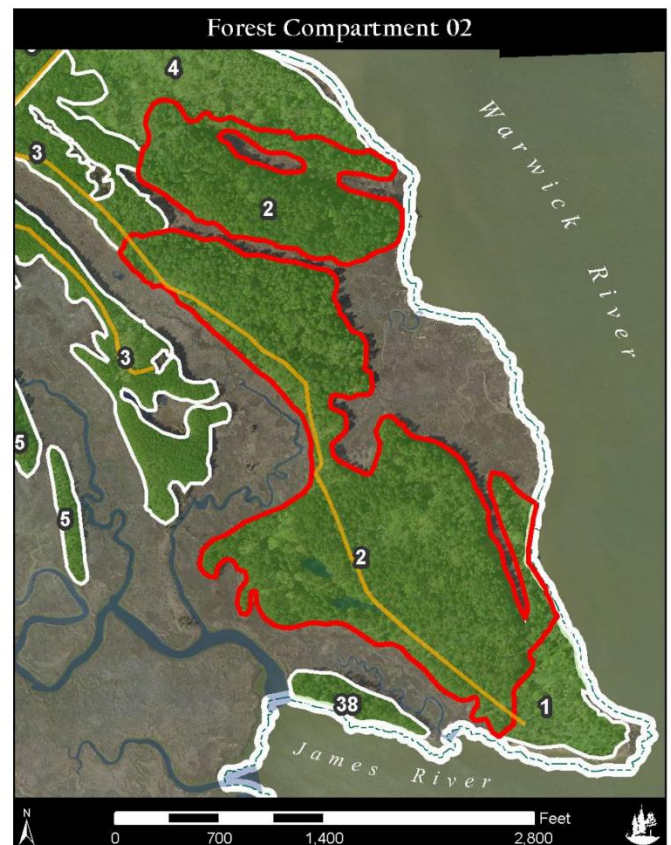
**Location:** Mulberry Island (Supports Firing Range impact area)  
**2021 Comp. Acreage:** 106.85  
**Forest/Veg. Type:** Pine/Hardwood  
**Age Range:** 1936-1943  
**Avg. Growth Rate:** 5yr, 0.7 / 10yr, 1.5  
**T/E Species:** northern long-eared bat  
**Disease/Insect Damage:** red heart(3%)  
**Mechanical Damage:** rutting(minimal), impact craters  
**Invasives:** Japanese honeysuckle, Japanese stiltgrass

#### **Soils Data**

<b>Site Index Range (Soils):</b> 86-88	<b>Soil Types:</b>
<b>Site Index Range (Curve):</b> 84-107	Augusta-fsl, Bohicket-msc, Chickahominy-sl, Levy-sc, State-s, Tetotum-sl
<b>Average Slope:</b> 0.14	

### **Compartment Description**

This forest compartment is found on predominantly mesic soils and is composed of a mature, pine/hardwood timber type that was established between 1936-1943. The upper canopy consists primarily of large, sawtimber-sized loblolly pine, sweetgum, and mixed oak species, however several different vegetation communities with varying hydrologic conditions are present, ranging from uplands with hardwood/pine to pine/hardwood fringes on non-tidal depressions. Large, loblolly pines with heights of 115' are common, some of which are possibly contaminated with metal. Sweetgum, persimmon, southern magnolia, and dogwood are dominant in the midstory. Shrub/sapling species found most abundant were red bay, southern wax myrtle, and beautyberry with American holly, black cherry, and cherrybark oak observed to a lesser extent. Japanese stilt grass (highly invasive) and Virginia chain fern, were dominant in the herbaceous layer. Impact craters from historical aerial bombing/artillery with large trees growing within them are scattered throughout the compartment. These depressions are most likely providing ideal habitat for forest dwelling amphibians.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	11410.64	19.1	52.8	597.42	1220939
H. Hardwood	117.71	0.5	1.4	235.42	12595
S. Hardwood	2726.6	15.1	22.9	180.57	291746
Total:	14254.95	34.7	77.1		1525280
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	0.68	5.2	2.9	73	
Hardwood	4.41	31	21.4	472	
Total:	5.09	36.2	24.3	545	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	92.56
	<b>Dominant Species:</b>	loblolly pine, sweetgum, cherrybark oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	228.00
	<b>Dominant Species:</b>	red bay, sweetgum, loblolly pine, cherrybark oak, laurel oak
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	305.00
	<b>Dominant Species:</b>	wax myrtle, American beautyberry
<b>Groundcover</b>	<b>% Cover:</b>	38.00
	<b>Dominant Species:</b>	Japanese stiltgrass, Virginia chain fern, common greenbrier, slender spikegrass, wood reedgrass

**Management Recommendations**

Maintain access trails. Consider restricting mowing activities when soils are seasonally saturated and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. The loblolly pine within this compartment is mature to over-mature and showing some indications of decline, however silvicultural activities are significantly limited at this time. Until a risk assessment can be conducted to evaluate potential hazards such as munitions and explosives of concern (MEC), type of AE, amount, and location-surface or subsurface of MEC present, access has been restricted to personnel who have operational requirements (and may be even further limited) as dictated by the Garrison Commander and the installation range authority (DA PAM 385-64).

## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (South)** -

**Compartment # 03**

### **Compartment Details**

**Location:** Mulberry Island (Supports Firing Range impact area)

**2021 Comp. Acreage:** 39

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1982

**Avg. Growth Rate:** 5yr, 1.1 / 10yr, 2.2

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** None

**Mechanical Damage:** None

**Invasives:** tree-of-heaven, Japanese honeysuckle, Japanese stiltgrass, common chickweed

#### **Soils Data**

**Site Index Range (Soils):** 86-86

**Site Index Range (Curve):** 82-100

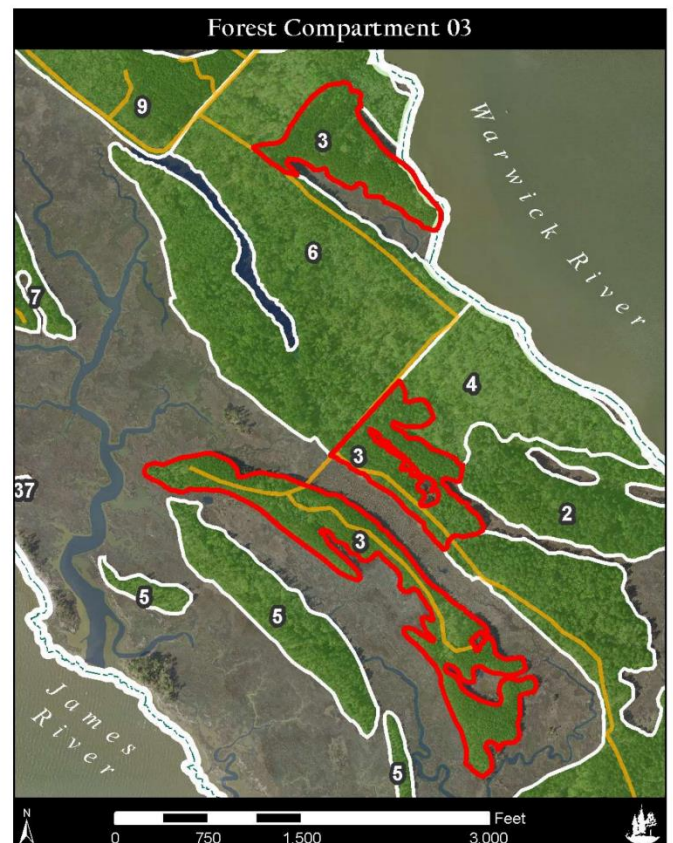
**Average Slope:** 0.63

#### **Soil Types:**

Augusta-fsl, Bohicket-msc, Chickahominy-sl, Levy-sc, State-s, Tetotum-sl

### **Compartment Description**

This forest compartment is fragmented into three separate areas and composed primarily of a pine/hardwood forest type. The upper canopy is predominantly heavily stocked, small to medium sawtimber-sized loblolly pine and pulpwood-sized sweetgum established 1982-1984 (a few larger, widely scattered mixed oak species were noted, protected/reserved from the previous timber harvest). Tree of heaven (highly invasive) was found in the sapling layer of Plot 3B. The soil road leading to the southernmost portion of the compartment has deteriorated considerably over the last decade.





## Timber & Vegetation Inventory

<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	11307.64	72.6	72.5	155.75	667151
H. Hardwood	0	0	5	0	0
S. Hardwood	612.4	2.8	0	218.71	36132
Total:	11920	75.4	77.5		703282
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	6.28	60.1	30	371	
Hardwood	1.83	15.6	10	108	
Total:	8.11	75.7	40	478	

## Vegetative Class Dominance

<b>Trees</b>	<b>% Canopy Closure:</b>	91.52
	<b>Dominant Species:</b>	loblolly pine, sweetgum, cherrybark oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	9.00
	<b>Dominant Species:</b>	red bay, sweetgum, tree-of-heaven, cherrybark oak, American holly
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	35.00
	<b>Dominant Species:</b>	American beautyberry, wax myrtle
<b>Groundcover</b>	<b>% Cover:</b>	36.00
	<b>Dominant Species:</b>	Japanese stiltgrass, common chickweed, American beauty-berry, red bay, Sweetgum

## Management Recommendations

Maintain access trails. Consider restricting mowing activities when soils are seasonally saturated and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. The loblolly pine within this compartment appears to be relatively healthy as is the hardwood component. Until a risk assessment can be conducted to evaluate potential hazards such as munitions and explosives of concern (MEC), type of AE, amount, and location-surface or subsurface of MEC present, control efforts to limit invasive species dispersal are not recommended. Access has been restricted to personnel who have operational requirements (and may be even further limited) as dictated by the Garrison Commander and the installation range authority (DA PAM 385-64).

## *JBLE-Eustis Forest Compartment Analysis*

- Mulberry Island (South) -

Compartment # 04

### **Compartment Details**

**Location:** Mulberry Island (Supports Firing Range impact area)

**2021 Comp. Acreage:** 28.53

**Forest/Veg. Type:** Hardwood

**Age Range:** 1932

**Avg. Growth Rate:** 5yr, 0.6 / 10yr, 1.1

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** None

**Mechanical Damage:** impact craters

**Invasives:** autumn olive, Japanese stiltgrass, common chickweed, autumn olive, Chinese privet

#### **Soils Data**

**Site Index Range (Soils):** NA

**Site Index Range (Curve):** 86-89

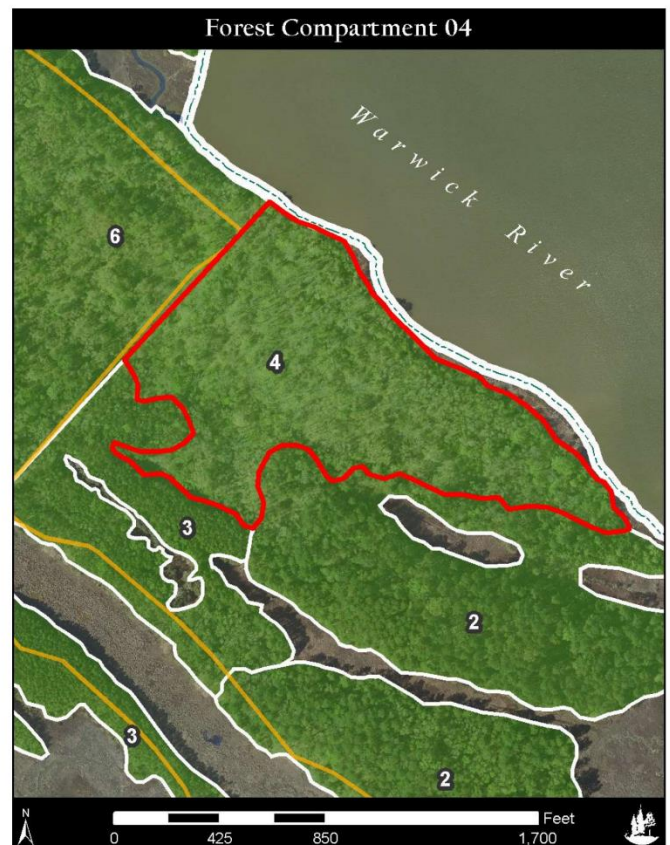
**Average Slope:** 0.33

#### **Soil Types:**

Augusta-fsl, Bohicket-msc, State-s, Tetotum-sl

### **Compartment Description**

The upper canopy within this compartment is generally open, and dominated by black walnut, sweetgum, and black cherry. A few of the black walnuts are large enough to be commercially valuable as sawtimber, however the majority are of poor quality. The compartment appears to be a reclaimed old field with a scarce sapling/shrub layer, most notably present is black locust in the sapling layer and autumn olive (highly invasive) in the shrub layer. A dense, mat-like groundcover consisting of Japanese stilt grass, Japanese brome grass, and slender spikegrass is common in the herbaceous layer. Impact craters from historical artillery/bombing are present, noted in previous timber inventories and forest health exams.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	0	0	0	0	0
H. Hardwood	511.55	5.5	6.6	93.01	14595
S. Hardwood	0	0	0	0	0
Total:	511.55	5.5	6.6		14595
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	0	0	0	0	
Hardwood	4.53	26.3	30	129	
Total:	4.53	26.3	30	129	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	86.32
	<b>Dominant Species:</b>	black walnut, sweetgum, hackberry
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	9.00
	<b>Dominant Species:</b>	black locust
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	35.00
	<b>Dominant Species:</b>	autumn olive
<b>Groundcover</b>	<b>% Cover:</b>	147.20
	<b>Dominant Species:</b>	Japanese stiltgrass, Japanese brome grass, slender spikegrass, yellow crownbeard, common chickweed

**Management Recommendations**

Maintain access trails. Consider restricting mowing activities when soils are seasonally saturated and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. Little commercial value is present except for an occasional sawtimber-sized black walnut tree; however, wildlife use seems to be high. This compartment is very similar in age and upper canopy species composition to compartment one however there is a much larger population of invasive species present (primarily autumn olive sampled, and tree of heaven observed near plot locations). Until a risk assessment can be conducted to evaluate potential hazards such as munitions and explosives of concern (MEC), type of AE, amount, and location-surface or subsurface of MEC present, control efforts to limit invasive species dispersal are not recommended. Access has been restricted to personnel who have operational requirements (and may be even further limited) as dictated by the Garrison Commander and the installation range authority (DA PAM 385-64).



## *JBLE-Eustis Forest Compartment Analysis*

- Mulberry Island (South) -

Compartment # 05

### **Compartment Details**

**Location:** Mulberry Island (Supports Firing Range impact area)

**2021 Comp. Acreage:** 24.5

**Forest/Veg. Type:**

**Age Range:**

**Avg. Growth Rate:** 5yr, / 10yr,

**T/E Species:**

**Disease/Insect Damage:**

**Mechanical Damage:**

**Invasives:**

#### **Soils Data**

**Site Index Range (Soils):** 88-88

**Site Index Range (Curve):**

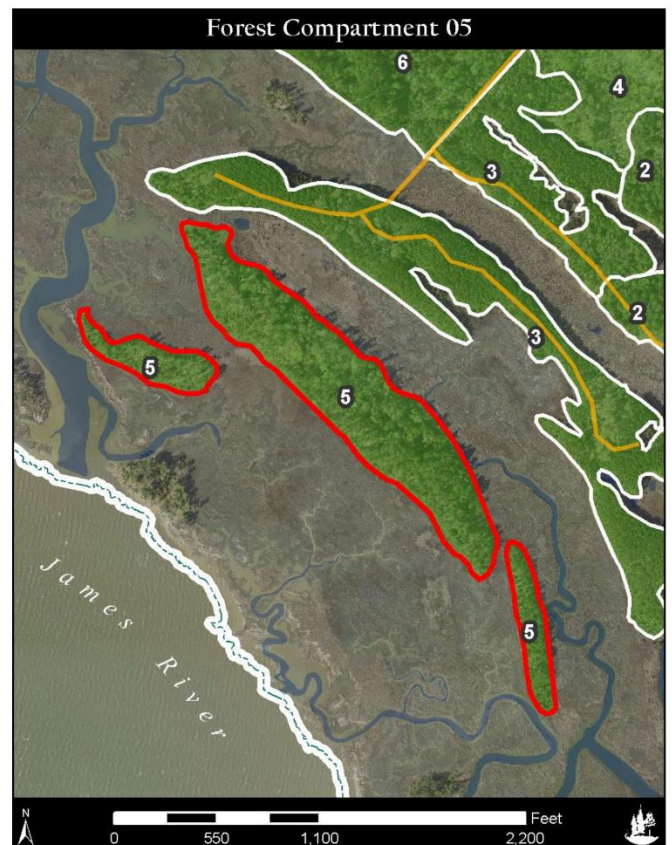
**Average Slope:** 0.33

**Soil Types:**

Bohicket-msc, State-s, Tetotum-sl

### **Compartment Description**

Not sampled.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine					
H. Hardwood					
S. Hardwood					
Total:					
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine					
Hardwood					
Total:					

**Vegetative Class Dominance**

<i>Trees</i>	<i>% Canopy Closure:</i>	
	<i>Dominant Species:</i>	NA
<i>Saplings</i>	<i>Total Saplings/ Ac:</i>	
	<i>Dominant Species:</i>	NA
<i>Shrubs</i>	<i>Total Shrubs/ Ac:</i>	
	<i>Dominant Species:</i>	NA
<i>Groundcover</i>	<i>% Cover:</i>	
	<i>Dominant Species:</i>	NA

**Management Recommendations**

Not sampled.

## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (South)** -

**Compartment # 06**

### **Compartment Details**

**Location:** Mulberry Island (Supports Firing Range impact area)  
**2021 Comp. Acreage:** 101.55  
**Forest/Veg. Type:** Hardwood/Pine  
**Age Range:** 1930  
**Avg. Growth Rate:** 5yr, 0.75 / 10yr, 1.5  
**T/E Species:** northern long-eared bat  
**Disease/Insect Damage:** red heart (2.5%)  
**Mechanical Damage:** impact craters  
**Invasives:** thorny olive, Japanese honeysuckle, Japanese stiltgrass

#### **Soils Data**

**Site Index Range (Soils):** 85-88

**Site Index Range (Curve):** 85-110

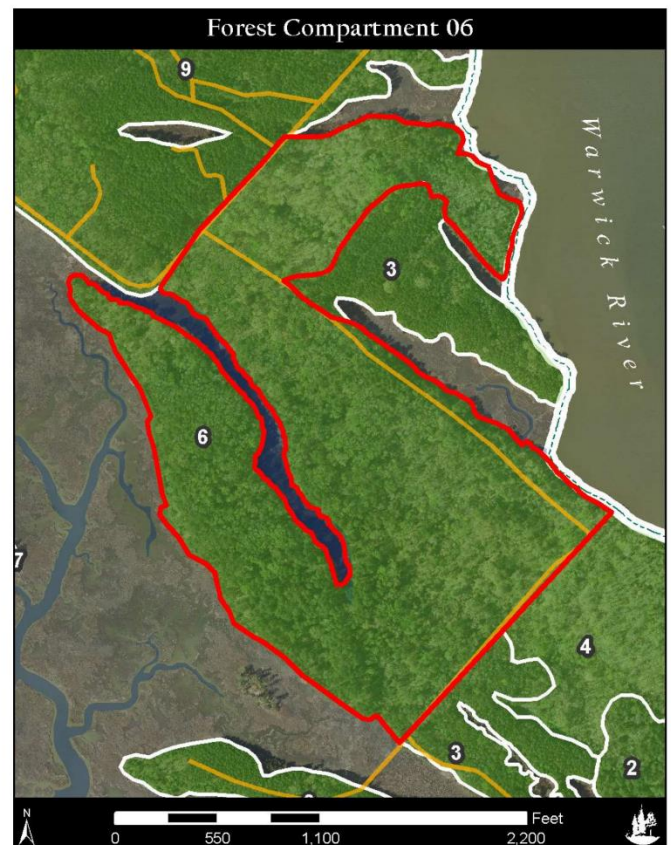
**Average Slope:** 0.27

#### **Soil Types:**

Augusta-fsl, Bohicket-msc, Chickahominy-sl, Levy-sc, State-s, Tetotum-sl

### **Compartment Description**

This forest compartment consists of a variety of timber types and age classes. A mature pine/hardwood forest type, established in 1936, lies south of a large, finger-like wetland that nearly divides the compartment. Large loblolly pine, cherrybark oak, and sweetgum are dominant in the upper canopy, some of which are growing in the bottoms of impact craters. The remainder of the compartment (north of the wetland finger) is composed of mature, merchantable, hardwood and hardwood/pine forest types consisting of a variety of oak species, a few scattered black walnut(s), red maple, and loblolly pine. The sapling layer throughout the compartment is composed of red bay, sweetgum, and dogwood. Southern wax myrtle and beautyberry were most dominant in the shrub layer, but also present is the exotic "Peanut butter tree" (*Clerodendrum trichotomum*) and the invasive thorny olive. Japanese stilt grass was dominant in the herbaceous layer, typical throughout nearly all of the forest compartments south of Ranges 3 and 4.





<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	4967.2	11.3	26	439.58	504171
H. Hardwood	1452.53	5.7	12	254.83	147432
S. Hardwood	4798.26	22	40	218.1	487023
Total:	11217.99	39	78		1138626
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	1.4	2.4	6	142	
Hardwood	2.95	26.8	16	299	
Total:	4.35	29.2	22	442	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	90.48
	<b>Dominant Species:</b>	sweetgum, loblolly pine, cherrybark oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	438.00
	<b>Dominant Species:</b>	red bay, sweetgum, flowering dogwood
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	319.00
	<b>Dominant Species:</b>	wax myrtle, American beautyberry, peanut butter tree, thorny olive
<b>Groundcover</b>	<b>% Cover:</b>	53.70
	<b>Dominant Species:</b>	Japanese stiltgrass, slender spikegrass, red bay, Christmas fern, wood reedgrass

**Management Recommendations**

Maintain access trails. Consider restricting mowing activities when soils are seasonally saturated and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. The loblolly pine within this compartment is mature to overmature and showing some indications of decline however forestry operations (timber harvesting) as well as intensive invasive species control efforts which would typically be recommended are significantly limited/restricted until a risk assessment can be performed to evaluate potential hazards such as munitions and explosives of concern (MEC), type of AE, amount, and location-surface or subsurface of MEC present. Consideration should be given to controlling (by herbicides) the exotic peanut butter tree population that is in close proximity to the impact area trail system (Plot 6B).

## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (South)** -

**Compartment # 07**

### **Compartment Details**

**Location:** Mulberry Island (Supports Firing Range impact area)  
**2021 Comp. Acreage:** 104.05  
**Forest/Veg. Type:** Pine/Hardwood  
**Age Range:** 1914-1970  
**Avg. Growth Rate:** 5yr, 0.9 / 10yr, 2  
**T/E Species:** northern long-eared bat  
**Disease/Insect Damage:** None  
**Mechanical Damage:** None  
**Invasives:** Japanese honeysuckle, Japanese stiltgrass

#### **Soils Data**

**Site Index Range (Soils):** 85-88

**Site Index Range (Curve):** 75-102

**Average Slope:** 0.14

#### **Soil Types:**

Altavista-fsl, Augusta-fsl, Bohicket-msc, Bojac-sl, Levy-sl, Newflat-sl, State-s, Tetotum-sl

### **Compartment Description**

This forest compartment is bounded by the James River, tidal creeks, and tidal marshlands. The predominant forest type is adequate to heavily stocked pine/hardwood established between 1968-1970. The loblolly pine component is mostly adequately stocked, small to medium sawtimber. Other species present within this pine/hardwood maritime forest are beautyberry, southern wax myrtle, and eastern baccharis, with Japanese stilt grass found most abundant in the herbaceous layer. A more mature hardwood/pine forest type is found adjacent to the James River and near the southern tip of the compartment, with establishment dates ranging from 1913-1962. The upper canopy within this area is dominated by large tulip poplar, a variety of oak species, sweetgum, and black walnut. Storm damage over the years has left voids in the upper canopy in several locations, which are now heavily populated with red bay, Chinese privet, frost grape, and eastern poison ivy.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	4166.74	28.1	27.2	148.28	433341
H. Hardwood	1352.72	5	12.8	270.54	140683
S. Hardwood	2156.97	12.6	19.9	171.19	224325
Total:	7676.43	45.7	59.9		798349
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	4.61	25.1	17.1	479	
Hardwood	4.26	28.1	20	443	
Total:	8.87	53.2	37.1	922	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	90.48
	<b>Dominant Species:</b>	loblolly pine, sweetgum, willow oak, cherrybark oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	891.00
	<b>Dominant Species:</b>	red bay, sweetgum, loblolly pine, black oak, flowering dogwood
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	215.00
	<b>Dominant Species:</b>	American beautyberry, wax myrtle
<b>Groundcover</b>	<b>% Cover:</b>	34.80
	<b>Dominant Species:</b>	Japanese stiltgrass, Virginia cutgrass, slender spikegrass, American beauty-berry, red bay

**Management Recommendations**

This forest compartment should be considered unmanageable. Access to the island (no longer accessible by bridge) was made by johnboat.



## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (South)** -

**Compartment # 08**

### **Compartment Details**

**Location:** Mulberry Island (Supports Firing Range impact area)

**2021 Comp. Acreage:** 47.3

**Forest/Veg. Type:** Pine

**Age Range:** 1913-1987

**Avg. Growth Rate:** 5yr, 0.8 / 10yr, 1.5

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** red heart (1%)

**Mechanical Damage:** None

**Invasives:** Japanese honeysuckle

#### **Soils Data**

**Site Index Range (Soils):** 88-88

**Site Index Range (Curve):** 108-110

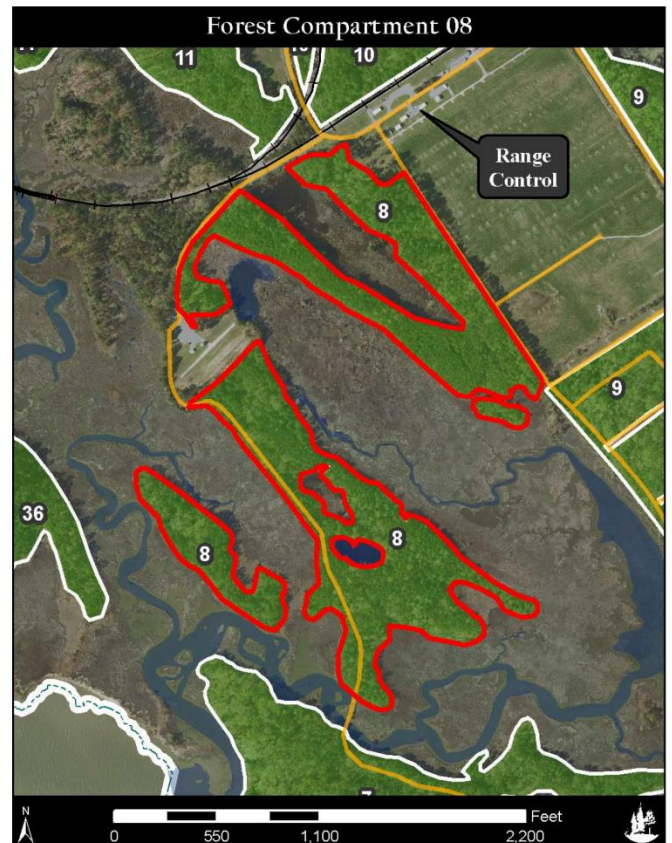
**Average Slope:** 0.00

#### **Soil Types:**

Bohicket-msc, Chickahominy-sl, Newflat-sl, State-s, Tetotum-sl, Udorthents-l

### **Compartment Description**

Two distinct age classes are found within this forest compartment. West of Range Three and east of a tidal wetland lies a pine/hardwood forest type established in 1917. The pine is over-mature, lightly stocked, and most likely contaminated with metal from the firing range. Currently, this area is regenerating into more of a hardwood/pine forest type consisting of sweetgum, red bay, and loblolly pine. The remaining forest (which also includes a small island) was established in 1989-1990 and is located south of Range Two. It consists of a moderate to heavily stocked pine/hardwood forest type on mesic soils, dominated by pulpwood to small sawtimber-sized loblolly pine and sweetgum with beautyberry and southern wax myrtle abundant in the shrub layer.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	11258.2	51.6	65	218.18	532513
H. Hardwood	0	0	0	0	0
S. Hardwood	0	0	0	0	0
Total:	11258.2	51.6	65		532513
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	15.05	109.9	62.5	712	
Hardwood	2	12.9	10	95	
Total:	17.05	122.8	72.5	807	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	89.00
	<b>Dominant Species:</b>	loblolly pine
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	728.00
	<b>Dominant Species:</b>	red bay, sweetgum, black oak, loblolly pine, devil's walking-stick
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	218.00
	<b>Dominant Species:</b>	wax myrtle, American beautyberry
<b>Groundcover</b>	<b>% Cover:</b>	22.70
	<b>Dominant Species:</b>	slender spikegrass, Virginia cutgrass, red bay, Japanese honeysuckle, wax-myrtle

**Management Recommendations**

Maintain access trails and conduct annual inspections for forest health/invasive species/hazard trees. Conduct biennial evaluations of encroaching vegetation on the access roads around Ranges Three and Four. More frequent hazard tree evaluations, especially after periods of heavy rainfall and high wind speeds, should be made along the perimeter hard surface road(s) to determine if there is a potential hazard to troops or range personnel. Consider restricting mowing activities on soil trails that are seasonally saturated and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. Consider enhancing (widening) the road/firebreak system that currently exists south of Range Two by removing some of the encroaching woody vegetation.

## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (South)** -

**Compartment # 09**

### **Compartment Details**

**Location:** Mulberry Island (Supports Firing Range impact area)

**2021 Comp. Acreage:** 243.9

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1928-1984

**Avg. Growth Rate:** 5yr, 0.5 / 10yr, 0.9

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** None

**Mechanical Damage:** rutting(moderate)

**Invasives:** tree-of-heaven  
Chinese privet

#### **Soils Data**

**Site Index Range (Soils):** 85-90

**Site Index Range (Curve):** 68-110

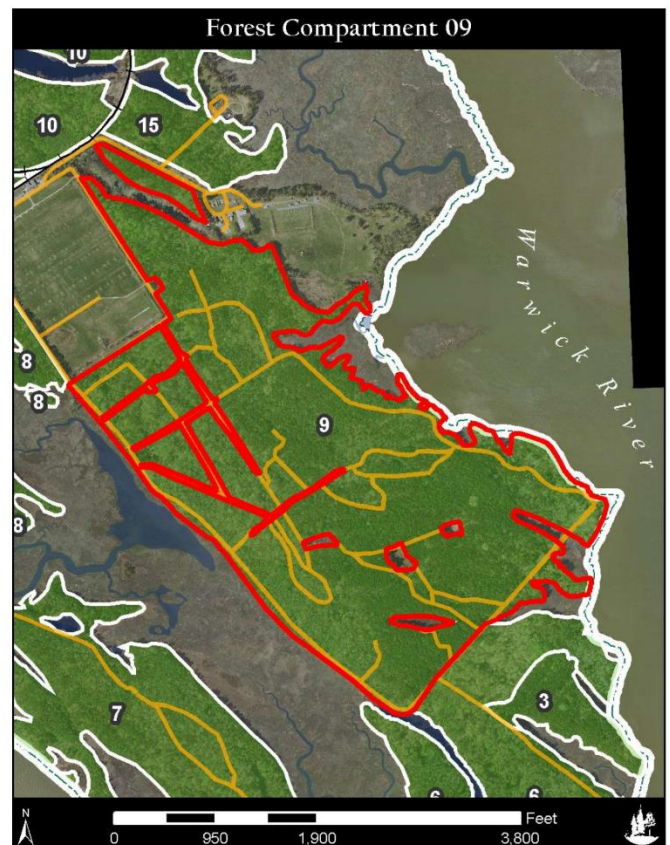
**Average Slope:** 0.87

#### **Soil Types:**

Augusta-fsl, Bohicket-msc, Chickahominy-sl, Craven-Uchee-cx, Newflat-sl, State-s, Tetotum-sl, Udorthents-l

### **Compartment Description**

The forest composition of this compartment is variably aged with relatively small, more mature areas that were reserved from previous harvests for aesthetics, safety, or wetland protection. The majority of the compartment consists of adequate to heavily stocked small to medium-sized loblolly pine established in 1983-1984. The western portion of the compartment consists of a more mature hardwood component (established 1954), with upper canopy species primarily composed of pulpwood-sized sweetgum, black cherry, and a few widely scattered oak species found on slightly drier soils. A variety of natural communities, ranging from palustrine wetlands, mesic flatwoods, and dry, sandy ridges are present in the compartment. The flat to gently sloping topography permits seasonal surface water drainage, which allows a mixture of upland and hydrophytic vegetation to exist. Several “woody” invasives were observed throughout the compartment including tree of heaven, Chinese privet, and princess tree.





<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	5895.14	36.1	37.7	163.3	1437825
H. Hardwood	758.28	4.6	7.1	164.84	184945
S. Hardwood	1328.16	8.2	11.3	161.97	323938
Total:	7981.58	48.9	56.1		1946707
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	5.01	37.5	19.2	1222	
Hardwood	4.7	33.8	22	1146	
Total:	9.71	71.3	41.2	2368	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	91.52
	<b>Dominant Species:</b>	loblolly pine, sweetgum, cherrybark oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	535.00
	<b>Dominant Species:</b>	red bay, sweetgum, devil's walking-stick, eastern redcedar, flowering dogwood
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	137.00
	<b>Dominant Species:</b>	American beautyberry, wax myrtle, Chinese privet, autumn olive, multiflora rose
<b>Groundcover</b>	<b>% Cover:</b>	54.30
	<b>Dominant Species:</b>	Japanese stiltgrass, hop sedge, Japanese honeysuckle, Christmas fern, common chickweed

**Management Recommendations**

Maintain access trails. Consider restricting mowing activities when soils are seasonally saturated and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. The majority of the loblolly pine within this compartment appears to be healthy as is the hardwood component. Until a risk assessment can be conducted to evaluate potential hazards such as munitions and explosives of concern (MEC), type of AE, amount, and location-surface or subsurface of MEC present, efforts to control invasive species would be severally limited and not practical. Access has been restricted to personnel who have operational requirements (and may be even further limited) as dictated by the Garrison Commander and the installation range authority (DA PAM 385-64).

## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (South)** -

**Compartment # 36**

### **Compartment Details**

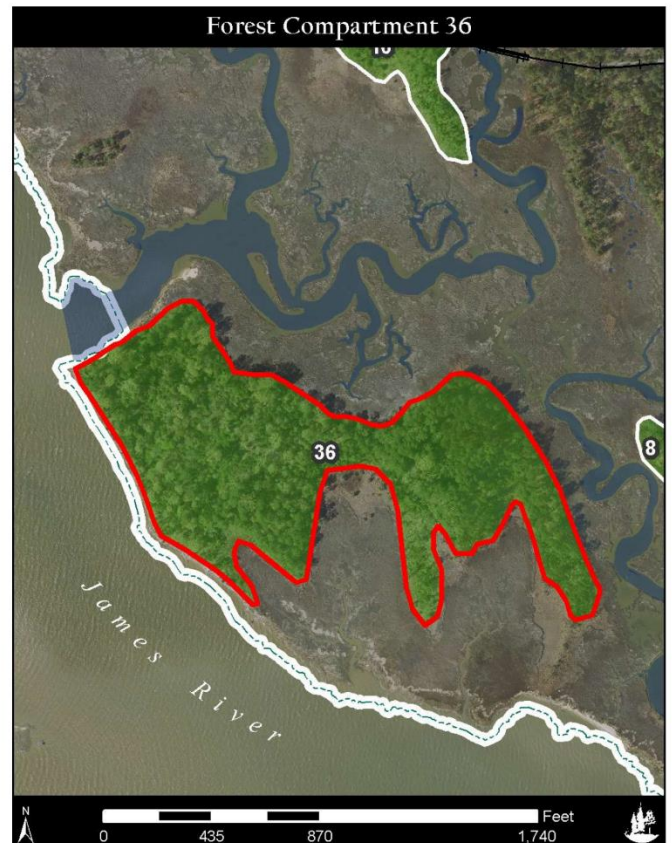
**Location:** Mulberry Island (Supports Training Area: 24)  
**2021 Comp. Acreage:** 26.97  
**Forest/Veg. Type:** Pine/Hardwood  
**Age Range:** 1916  
**Avg. Growth Rate:** 5yr, 0.38 / 10yr, 0.67  
**T/E Species:** northern long-eared bat  
**Disease/Insect Damage:** None  
**Mechanical Damage:** None  
**Invasives:** Japanese stiltgrass

#### **Soils Data**

<b>Site Index Range (Soils):</b> 86-86	<b>Soil Types:</b>
<b>Site Index Range (Curve):</b> 101-101	Altavista-fsl, Bohicket-msc, State-s
<b>Average Slope:</b> 0.00	

### **Compartment Description**

The forest within this island compartment consists of a mature, pine/hardwood maritime forest type that has suffered significant storm damage over the last three decades. The upper canopy species consists primarily of widely scattered declining, loblolly pine and cherrybark oak. The midstory in areas on the island that have not suffered storm damage are composed of hackberry, loblolly pine, and red bay with southern wax myrtle abundant in the shrub layer. In areas that have suffered the brunt of storm damage, the midstory is inundated with red bay, princess tree, tree of heaven, southern wax myrtle, muscadine, saw leaf greenbrier, and varying amounts of loblolly pine regeneration.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	7881.87	20.1	43.5	392.13	212811
H. Hardwood	2037.34	8.1	19.9	251.52	55008
S. Hardwood	0	0	0	0	0
Total:	9919.21	28.2	63.4		267819
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	1.58	12.2	6.7	43	
Hardwood	1.88	18.3	10	51	
Total:	3.46	30.5	16.7	94	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	89.44
	<b>Dominant Species:</b>	loblolly pine, cherrybark oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	763.00
	<b>Dominant Species:</b>	red bay
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	17.00
	<b>Dominant Species:</b>	wax myrtle
<b>Groundcover</b>	<b>% Cover:</b>	36.80
	<b>Dominant Species:</b>	Japanese stiltgrass, wax-myrtle, red bay, muscadine grape/Scuppernong, common Greenbrier

**Management Recommendations**

Due to access limitations, this forest compartment is considered as non-manageable.



## *JBLE-Eustis Forest Compartment Analysis*

- **Mulberry Island (South)** -

**Compartment # 37**

### **Compartment Details**

**Location:** Mulberry Island (Supports Firing Range impact area)

**2021 Comp. Acreage:** 7.53

**Forest/Veg. Type:** Pine/Hardwood

**Age Range:** 1926

**Avg. Growth Rate:** 5yr, 0.33 / 10yr, 0.6

**T/E Species:** northern long-eared bat

**Disease/Insect Damage:** None

**Mechanical Damage:** None

**Invasives:** None

#### **Soils Data**

**Site Index Range (Soils):** NA

**Site Index Range (Curve):** NA

**Average Slope:**

**Soil Types:**

Bohicket-msc, Tetotum-sl

### **Compartment Description**

This compartment is composed of three small islands found along the southwestern coast of Mulberry Island. This pine/hardwood maritime forest is composed primarily of large, declining loblolly pine and cherrybark oak established in 1928. The upper canopy stocking is variable throughout these islands, attributed to storm damage that has occurred over the last few decades. Red bay, loblolly pine, black cherry, and beautyberry are prevalent in the shrub-sapling layer with common green brier and cat brier sampled most frequently in the herbaceous layer.



<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine	496.46	6	3.3	709.23	3972
H. Hardwood	0	0	0	0	0
S. Hardwood	0	0	0	0	0
Total:	496.46	6	3.3		3972
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine	0	0	0	0	
Hardwood	2.15	13.6	13.3	17	
Total:	2.15	13.6	13.3	17	

**Vegetative Class Dominance**

<b>Trees</b>	<b>% Canopy Closure:</b>	89.44
	<b>Dominant Species:</b>	loblolly pine, cherrybark oak
<b>Saplings</b>	<b>Total Saplings/ Ac:</b>	685.00
	<b>Dominant Species:</b>	red bay, loblolly pine, sweetgum, cherrybark oak, willow oak
<b>Shrubs</b>	<b>Total Shrubs/ Ac:</b>	17.00
	<b>Dominant Species:</b>	American beautyberry
<b>Groundcover</b>	<b>% Cover:</b>	35.80
	<b>Dominant Species:</b>	common greenbrier, catbrier, slender spikegrass, red bay, muscadine Grape/Scuppernong

**Management Recommendations**

Due to access limitations, this forest compartment is considered as non-manageable.

## *JBLE-Eustis Forest Compartment Analysis*

-Mulberry Island (South)-

Compartment # 38

### **Compartment Details**

**Location:** Mulberry Island (Supports Firing Range impact area)  
**2021 Comp. Acreage:** 4.64  
**Forest/Veg. Type:** NA  
**Age Range:** NA  
**Avg. Growth Rate:** 5yr, / 10yr,  
**T/E Species:** None  
**Disease/Insect Damage:** NA  
**Mechanical Damage:** NA  
**Invasives:** NA

#### **Soils Data**

**Site Index Range (Soils):** NA

**Site Index Range (Curve):** NA

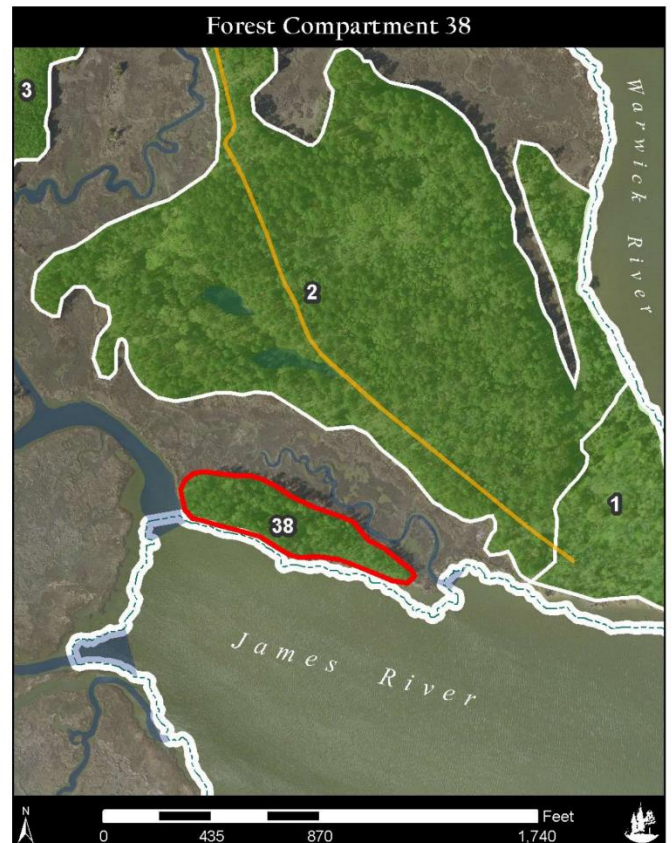
**Average Slope:**

#### **Soil Types:**

Bohicket-msc, Tetotum-sl

### **Compartment Description**

Not sampled.





<b>Forest Product Volume Summary</b>					
<b>Sawtimber Product</b>					
<b>Sawtimber:</b>	<b>Vol/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Avg. Size</b>	<b>Total Comp. Vol.</b>
Pine					
H. Hardwood					
S. Hardwood					
Total:					
<b>Pulpwood Product</b>					
<b>Pulpwood:</b>	<b>Cords/Acre</b>	<b>Trees/Acre</b>	<b>Basal Area/Ac.</b>	<b>Total Cords/Comp.</b>	
Pine					
Hardwood					
Total:					

**Vegetative Class Dominance**

<i>Trees</i>	<i>% Canopy Closure:</i>	
	<i>Dominant Species:</i>	NA
<i>Saplings</i>	<i>Total Saplings/ Ac:</i>	
	<i>Dominant Species:</i>	NA
<i>Shrubs</i>	<i>Total Shrubs/ Ac:</i>	
	<i>Dominant Species:</i>	NA
<i>Groundcover</i>	<i>% Cover:</i>	
	<i>Dominant Species:</i>	NA

**Management Recommendations**

Not sampled.

## **Mulberry Island (South) - Management Considerations:**

### **Training**

Training/Range Areas on Mulberry Island – South are supported on 12 forest compartments, labeled 1 through 9, and 36, and 37. Reference is made to Figure: 2.2C, titled JBLE-Eustis, VA ~ Mulberry Island (South): Training Areas and Ranges. The Range Training Area is used for training at four primary sites: the 25-meter Range (R-2), Combat Positions Range (R-3), the known Distance Range (R-4), and the M203.-Law-Grenade Range (R-5). Although these firing range sites constitute less than 10% of the total acreage, their operations directly affect all of Mulberry –South, due to the necessity of down-range safety fans. Due to heightened military and police training requirements, access behind the range is very limited, due to the necessity of down-range safety fans. Primary vegetation impacts associated with the operation of these ranges would likely be confined to Compartments 8 and 9.

### **UXO/Metal Contamination of the Forest**

Mulberry Island has a long history of supporting live fire training activities from both the air and ground. Mulberry Island was an artillery and bombing range in the 1940's. Large-scale gunnery and bombing practice ended by the 1950's. Since the 2007 Forest Inventory, further analysis of potential UXO on JBLE-Eustis has been conducted utilizing LIDAR and orthophotography. Subsequently, limited access has been given only to personnel who have an operational requirement to enter such areas (for example, range maintenance, environmental monitoring, and security).

Until a risk assessment can be conducted to evaluate potential hazards of MEC present (for example, category of MEC, type of AE, amount, and location-surface or subsurface of MEC present) and methods to mitigate any potential exposure can be implemented, silvicultural management activities to the majority of forestland south of Ranges 3 and 4 are significantly limited/restricted.

## ***6.6 - Compartment Management Recommendations***

The recommendations as outlined for each compartment should be implemented within the time period specified whenever possible. However, training schedules, the need for cultural resource evaluations and other factors may delay implementation. Therefore, for planning purposes projects should be planned and coordinated on a five-year planning period. Reference is made to Table 6.6 for a summary of management recommendations for each compartment.

*Table 6.6, Forest Compartment Management Recommendations*

Comp. #	Management Recommendations
01	<p>Maintain access trails. Consider restricting mowing activities when soils are seasonally saturated and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. There is little commercial value found in the poor-quality black walnuts and hackberry trees, and the relatively few loblolly pines that are of sawtimber-size are found in Chesapeake Bay Preservation Act Resource Protection Areas. The loblolly pines are, however, currently providing perching opportunities for raptors such as the bald eagle and may additionally provide future nesting opportunities. Several invasive species have been documented within this compartment over the last fifteen years (primarily tree of heaven), however invasive species control work has been generally prioritized in training lands and urban forests (access limitations due to firing ranges and potential UXO hazards were also contributing factors in establishing priority areas for invasive species control efforts). Additional restrictions regarding access in this compartment as well as several other forested compartments located in JBLE-Eustis' impact area(s) are now in place. Until a risk assessment can be conducted to evaluate potential hazards such as munitions and explosives of concern (MEC), type of AE, amount, and location-surface or subsurface of MEC present, access is restricted to personnel who have operational requirements (and may be even further limited) as dictated by the Garrison Commander and the installation range authority (DA PAM 385-64).</p>
02	<p>Maintain access trails. Consider restricting mowing activities when soils are seasonally saturated and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. The loblolly pine within this compartment is mature to over-mature and showing some indications of decline, however silvicultural activities are significantly limited at this time. Until a risk assessment can be conducted to evaluate potential hazards such as munitions and explosives of concern (MEC), type of AE, amount, and location-surface or subsurface of MEC present, access has been restricted to personnel who have operational requirements (and may be even further limited) as dictated by the Garrison Commander and the installation range authority (DA PAM 385-64).</p>
03	<p>Maintain access trails. Consider restricting mowing activities when soils are seasonally saturated and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. The loblolly pine within this compartment appears to be relatively healthy as is the hardwood component. Until a risk assessment can be conducted to evaluate potential hazards such as munitions and explosives of concern (MEC), type of AE, amount, and location-surface or subsurface of MEC present, control efforts to limit invasive species dispersal are not recommended. Access has been restricted to personnel who have operational requirements (and may be even further limited) as dictated by the Garrison Commander and the installation range authority (DA PAM 385-64).</p>
04	<p>Maintain access trails. Consider restricting mowing activities when soils are seasonally saturated and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. Little commercial value is present except for an occasional sawtimber-sized black walnut tree; however, wildlife use seems to be high. This compartment is very similar in age and upper canopy species composition to compartment one however there is a much larger population of invasive species present (primarily autumn olive sampled, and tree of heaven observed near plot locations). Until a risk assessment can be conducted to evaluate potential hazards such as munitions and explosives of concern (MEC), type of AE, amount, and location-surface or subsurface of MEC present, control efforts to limit invasive species dispersal are not recommended. Access has been restricted to personnel who have operational requirements (and may be even further limited) as dictated by the Garrison Commander and the installation range authority (DA PAM 385-64).</p>
05	<p>Not sampled.</p>



*Table 6.6, Forest Compartment Management Recommendations*

Comp. #	Management Recommendations
06	Maintain access trails. Consider restricting mowing activities when soils are seasonally saturated and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. The loblolly pine within this compartment is mature to overmature and showing some indications of decline however forestry operations (timber harvesting) as well as intensive invasive species control efforts which would typically be recommended are significantly limited/restricted until a risk assessment can be performed to evaluate potential hazards such as munitions and explosives of concern (MEC), type of AE, amount, and location-surface or subsurface of MEC present. Consideration should be given to controlling (by herbicides) the exotic peanut butter tree population that is in close proximity to the impact area trail system (Plot 6B).
07	This forest compartment should be considered unmanageable. Access to the island (no longer accessible by bridge) was made by johnboat.
08	Maintain access trails and conduct annual inspections for forest health/invasive species/hazard trees. Conduct biennial evaluations of encroaching vegetation on the access roads around Ranges Three and Four. More frequent hazard tree evaluations, especially after periods of heavy rainfall and high wind speeds, should be made along the perimeter hard surface road(s) to determine if there is a potential hazard to troops or range personnel. Consider restricting mowing activities on soil trails that are seasonally saturated and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. Consider enhancing (widening) the road/firebreak system that currently exists south of Range Two by removing some of the encroaching woody vegetation.
09	Maintain access trails. Consider restricting mowing activities when soils are seasonally saturated and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. The majority of the loblolly pine within this compartment appears to be healthy as is the hardwood component. Until a risk assessment can be conducted to evaluate potential hazards such as munitions and explosives of concern (MEC), type of AE, amount, and location-surface or subsurface of MEC present, efforts to control invasive species would be severally limited and not practical. Access has been restricted to personnel who have operational requirements (and may be even further limited) as dictated by the Garrison Commander and the installation range authority (DA PAM 385-64).
10	Conduct annual inspections for forest health/invasive species and re-evaluate in 2027-2031 for a potential selective timber harvest. The younger component of pine within this compartment is now medium-sized, pine sawtimber and could be included in a timber-sale with the older, more mature pine located north of Range 3 and the RR tracks. Invasive species treatments have been conducted over the last several years in this compartment targeting a variety of woody invasives and Chinese wisteria. Follow-up monitoring and herbicide treatments (likely necessary) are highly recommended.
11	Conduct annual inspections for forest health/invasive species and consider mechanical mulching (forestry mower) to thin some of the heavy pine-sweetgum regeneration within the midstory of the bulk of the compartment. The use of commercial thinning/logging equipment would not be practical considering the seasonally saturated soils and limited access availability due to frequent "hot" ranges. Currently, upper canopy species are light to adequately stocked with a dense midstory of mostly sapling-sized 4" to 5" (DBH) pine/sweetgum. The desired outcome of this silvicultural activity would be to reduce stocking levels to approximately 110-150 trees/saplings per acre. In time, this will provide the residual midstory with adequate sunlight, moisture, and more readily available nutrients to fill current voids (increase stocking levels) in the upper canopy and in the interim, likely yield more foraging opportunities for wildlife.
12	Conduct annual inspections for forest health/invasive species. Currently the forest within this compartment is adequately stocked and appears healthy.

*Table 6.6, Forest Compartment Management Recommendations*

<b>Comp. #</b>	<b>Management Recommendations</b>
13	Conduct annual inspections for forest health/invasive species and consider a selective harvest within 2027-2031 for the southern portion of this compartment that lies south of Mulberry Island Road. This portion of the compartment contains pockets of large, merchantable pine sawtimber along with some smaller mixed oak species, sweetgum, and red maple (pulpwood to small sawtimber-sized). Consider placing 50'-75' aesthetic selective-cut buffers along Mulberry Road. Trees targeted for removal should include the majority of the loblolly pine and suppressed, weakened, or damaged tree species that may become a hazard to roadways or the RR tracks. Install 50'-75' riparian "no-cut" buffers along Chesapeake Bay Preservation Act Resource Protection Areas. Existing parameters which limit/prohibit harvesting near the archaeological site must also be considered in the harvest design and clearly stated in a timber sale contract. Re-evaluate the northern portion of this compartment found south of the Range Control Office and the southern portion of this compartment that lies north of Mulberry Island Road (northwest of the Ammo Storage Area) for a potential selective harvest in 2032.
14	Conduct annual inspections for forest health/invasive species and re-evaluate for a potential selective harvest in 2032. Moderate rutting was noted during data collecting, most likely from previous harvesting operations. Consider timing any potential harvesting operation when seasonal water tables are low to prevent further rutting and soil compaction. Protect water quality by limiting stream/ditch crossings and installing 50'-75' "no-cut" riparian buffers along Chesapeake Bay Preservation Act Resource Protection Areas.
15	Conduct annual inspections for forest health/invasive species and consider a selective harvest within 2022-2026 (excluding the northernmost island). The central portion contains a historic brickyard where restrictions protecting the integrity of the site exist. Existing parameters which limit/prohibit harvesting near this archaeological site must be considered in the harvest design and clearly stated in a timber sale contract. Implement 50'-75' riparian "no-cut" buffers along the compartment's interface with the Warwick River and other Chesapeake Bay Preservation Act Resource Protection Areas that may be applicable. Consider timing potential harvesting operations when seasonal water tables are low to reduce rutting and soil compaction.
16	Consider additional rehab of the trestle-bridge located on the northern end of the compartment. Currently there are restrictions implemented by Range Control that prohibit access due to major structural issues.
17	Conduct annual inspections for forest health/invasive species and re-evaluate for a potential selective harvest in 2032. Signs of human disturbance were abundant at sample locations and observed while trekking through the northern and central portions of the compartment (soil piles, concrete slabs, old timbers, etc.). Several of these disturbed sites are now inundated with tree of heaven and autumn olive, species that have been intensely managed to control at other locations of JBLE-Eustis (including the southern end of the compartment). It is highly recommended that control efforts to limit the dispersal of the afore-mentioned woody invasives be implemented as soon as practical.
18	Conduct annual inspections for forest health/invasive species and re-evaluate for a potential selective harvest in 2032. Signs of human disturbance were abundant at sample locations and observed while trekking through the central portion of the compartment (mostly soil piles). Several of these disturbed sites are now inundated with tree of heaven and autumn olive, species that have been intensely managed to control on JBLE-Eustis. Autumn olive is prolific along the roadway and on the edges of open land. It is highly recommended that control efforts to limit the dispersal of the woody invasives previously mentioned be implemented as soon as practical.

*Table 6.6, Forest Compartment Management Recommendations*

Comp. #	Management Recommendations
19	<p>Conduct annual inspections for forest health/invasive species and consider a selective harvest within 2022-2026. The mature loblolly pine is declining as evidenced by significantly reduced growth rates. Reduced vigor will also likely increase the risk of disease and/or undesirable forest insect pest problems. Install 50'-75' riparian "no-cut" buffers in Chesapeake Bay Preservation Act Resource Protection Areas. Certain restrictions protecting the integrity of the Fort Crafford exist which limit/prohibit harvesting near this archaeological site and should be clearly defined in a timber sale contract. American wisteria (<i>Wisteria frutescens</i>) was found along the roadway near the eastern boundary of the compartment and its population should be mapped and designated in the field so as to protect it from any potential harvesting operations or vegetation control work (especially herbicides). It is listed by the VA DCR Division of Natural Heritage as S1, which indicates the species is "critically imperiled". Continue invasive species control work on woody invasives. Extensive herbicide control efforts have been performed over the last several years, primarily to tree of heaven and most recently to Chinese privet and autumn olive. Storm damage and pine mortality over the years have created pockets on the forest floor of dense, mat-like muscadine, some of which is also occupied by the afore-mentioned invasive species. Consideration could also be given to reclaiming these pocketed areas and turning them into early successional habitat by utilizing a forestry mower if a selective harvest is not imminent.</p>
20	<p>Conduct annual inspections for forest health/invasive species and consider a selective harvest within 2022-2026, excluding the younger forest type near the northeastern boundary. The selective harvest could be done congruently with compartment 19. Consider timing potential harvesting operations when seasonal water tables are low to reduce rutting and soil compaction. Protect water quality by limiting stream/ditch crossings and installing 50'-75' "no-cut" riparian buffers along Chesapeake Bay Preservation Act Resource Protection Areas. American wisteria (<i>Wisteria frutescens</i>) was found along the roadway near the southeastern portion of the compartment and its population should be mapped and designated in the field so as to protect it from any potential harvesting operations or vegetation control work (especially herbicides). It is listed by the VA DCR Division of Natural Heritage as S1, which indicates the species is critically imperiled.</p>
21	<p>Conduct annual inspections for forest health/invasive species and reevaluate in 2027-2031 for a potential selective timber harvest. The younger component of hardwood/pine located on the western edge of the compartment is expected to become more merchantable as medium-sized sawtimber and should be included in a potential timber-sale with the older, more mature pine located on the central and eastern sides of the compartment. Consider timing potential harvesting operations when seasonal water tables are low to reduce rutting and soil compaction. Protect water quality by limiting stream/ditch crossings and installing 50'-75' "no-cut" riparian buffers along Chesapeake Bay Preservation Act Resource Protection Areas.</p>
22	<p>Conduct annual inspections for forest health/invasive species. Continue herbicide applications around the base of planted hardwoods until 2032. Consider restricting mowing activities when soils are seasonally saturated to minimize soil compaction and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. Evaluate the efficacy of mowing to control common reed that is spread intermittently throughout the hardwood planting area and encroaching from adjacent wetlands. Herbicide treatments around planted hardwoods and to common reed could be done congruently if mowing is not sufficient and should be done at least 6 weeks prior to mowing operations. Consult with RR authorities to see if a temporary ROW agreement is an option to allow for harvesting of the over-mature timber located southwest of the hardwood planting project. Consider timing any potential timber harvesting operation when seasonal water tables are low to reduce rutting and soil compaction.</p>



*Table 6.6, Forest Compartment Management Recommendations*

Comp. #	Management Recommendations
23	<p>Conduct annual inspections for forest health/invasives and consider a selective harvest in 2022-2026. The loblolly pine is over mature and showing signs of decline. Several loblolly pines throughout the compartment had visual indications of red heart fungus (conks). Additionally, declining growth rates found in core samples (tree borings) indicate loss of vigor which may increase the likelihood of future insect/disease problems. Implement 50'-75' riparian "no-cut" buffers in Chesapeake Bay Preservation Act Resource Protection Areas and 75' wide aesthetic "selective-cut" buffers along Mulberry Island and Back River Roads. Trees targeted for removal within the "selective cut" buffer should include the majority of the loblolly pine and suppressed, weakened, or damaged tree species that may become a hazard to roadways, powerlines, fencing, or buildings. Additionally, install a "no-cut" buffer (prohibiting harvesting) around the permanently flooded area that's found near the middle of the southern portion of the compartment. Timing of timber harvesting within this compartment should occur when seasonal water tables are low. The northern portion of the compartment (TA-15) contains an active eagle nest and would require perimeter fencing removal with the access/egress across a large parking/loading area. Subsequent to the last forest inventory conducted in 2007, a hazard tree removal operation (logging equipment) was performed south of River Road (TA-17A), as was a midstory removal operation a few years later, utilizing a forestry mower. In the event that timber harvesting operations are not feasible, consider similar hazard tree/mid-story removal activities within this location.</p>
24	<p>Conduct annual inspections for forest health/invasives, re-evaluate growth rates in 2032, and continue herbicide applications around planted trees until 2032. The younger component of pine/hardwood located on the southwestern portion of the compartment (not including the planted hardwoods) is expected to become more merchantable as medium-sized sawtimber and could be included in any potential timber-sale with the older, more mature pine located on the north. Another consideration is to include the northern portion of the compartment with that of the neighboring Compartment 15 should a timber harvesting operation be planned for that compartment prior to 2032. Existing parameters which limit/prohibit harvesting near civil war earthworks must be considered in the harvest design and clearly stated in a timber sale contract.</p>
25	<p>Conduct annual inspections for forest health/invasives and re-evaluate growth rates in 2032. The pine component appears healthy and is expected to become more merchantable as medium-sized sawtimber with an additional 10-11 years of growth.</p>
26	<p>Conduct annual inspections for forest health/invasives/hazard trees. This compartment is subdivided by natural drainage systems and steeply sloped ravines, which will make commercial logging impractical. The forest vegetation within this compartment is critical in preventing erosion and filtering excessive nutrients/contaminants from nearby roads, parking lots and administrative buildings. Additionally, the compartment is used for training (confidence course) and recreation such as walking and trail running. Within these more heavily used areas, consideration should be given to more frequent hazard tree inspections, especially after periods of heavy rainfall and high wind speeds. Hazard trees should be carefully dropped and left on-site to limit soil disturbance and possible injury to neighboring trees/structures. Forest management activities should be limited to maintain the health and vigor of the residual trees.</p>

*Table 6.6, Forest Compartment Management Recommendations*

Comp. #	Management Recommendations
27	<p>Conduct annual inspections for forest health/invasives/hazard trees and consider a selective harvest within 2022-2026 for the majority of this compartment. Most of the loblolly pine found within the compartment is over-mature and showing some indications of decline. Install 50'-75' riparian "no-cut" buffers along Chesapeake Bay Preservation Act Resource Protection Areas. In the event of a selective harvest, particular attention should be given to prevent/minimize erosion in the compartment location generally described as north of Wilson Avenue and west of CID. Consider installing 50'-75' aesthetic "selective-cut" buffers around the road system and administrative buildings. Attempts should be made to remove the majority of the pines and weakened, suppressed, or damaged species within the aesthetic "selective-cut" buffer, due to the likelihood they may become a hazard to roadways, power lines and administrative buildings. Trees targeted for removal should be clearly marked. Continue herbicide applications around the base of planted trees and other desirable soft and hardwood mast producing regeneration found in the "Enchanted Forest" until 2031 in order to minimize weed competition and reduce the risk of damage from equipment used for maintenance mowing. Within the Enchanted Forest, consider restricting mowing activities when soils are seasonally saturated and from April 15th to July 15th in order to protect ground nesting and ground foraging birds. Conduct more frequent hazard tree inspections in close proximity to the Grenade Assault Course in TA14B, especially after periods of heavy rainfall and high wind speeds. Hazard trees should be carefully dropped and left on-site to minimize soil disturbance and possible injury to neighboring trees. Consider utilizing a forestry mower on a 3-to-5-year rotation to reduce the amount of sapling regeneration within this area. Some regeneration may be desirable in order to fill voids in the upper canopy and should be designated prior to the utilization of a forestry mower.</p>
28	<p>Conduct annual inspections for forest health/invasives/hazard trees, and excessive erosion from storm water. This narrow compartment should be considered non-commercial due to its importance as a water quality buffer. The forest vegetation within this compartment is critical in preventing erosion and filtering excessive nutrients/contaminants from nearby roads, parking lots and administrative buildings.</p>
29	<p>Conduct annual inspections for forest health/invasives/hazard trees and re-evaluate growth rates in 2026 on the northern and eastern locations. In the event of an insect, disease, or invasive pest species outbreak that might jeopardize forest health, consider silvicultural practices, such as selective harvesting, which would substantially limit the amount of damage and minimally compromise the existing vegetation screen. Hazard trees should be felled (carefully so as not to damage adjacent trees or fencing and either chipped/shredded or left on site to decompose. Currently, the forest appears generally healthy (although some American beech and yellow poplar decline was observed) and is providing ideal habitat for a variety of wildlife. The dense upper canopy along the interface between the tidal creek and freshwater streams provides cover for neotropical migratory songbirds, perching opportunities for wading birds (herons and egrets), and also renders foraging opportunities for an array of small mammals and resident birds. Historically, the compartment area has been used for troop training, which was apparent by the considerable amount of low threshold ground disturbances, primarily pit &amp; mound type (fox holes), which are likely used as breeding pools for amphibians. The northernmost portion of this compartment also serves as a valuable vegetation screen (buffer) that may minimize conflict between military and industrial land uses.</p>
30	<p>Conduct annual inspections for forest health/invasives/hazard trees, and excessive erosion from storm water (some significant improvements to storm water run-off were observed during sampling). The narrow-forested area on the north side of Wilson Avenue should be considered non-commercial due to its importance as a vegetation buffer. The forest in this area abuts a large drain that flows underneath Wilson Avenue and eventually into the Warwick River. The forest vegetation is critical in preventing erosion and filtering nutrients/contaminants from nearby roads, parking lots, administrative buildings, and base housing. The forested area on the south side of Wilson Avenue provides the same function, however, it is considerably larger. The remaining forest within the compartment should be retained for aesthetics and environmental protection (water quality). Consider invasive species control work on the bamboo stand that's located south of Summerall Circle as soon as practical.</p>

*Table 6.6, Forest Compartment Management Recommendations*

<b>Comp. #</b>	<b>Management Recommendations</b>
31	Conduct annual inspections for insect/disease/hazard trees and consider additional mechanical mulching (forestry mower) to create more “edge” habitat (NLEB timeline restrictions may apply). Pollinator planting areas were observed while trekking through the compartment. These areas not only benefit pollinating insects but also save time and resources because they don’t require frequent mowing, watering, and fertilizing. Additionally, they are likely providing conservation biological control by attracting natural enemies to control pests such as fall armyworm. The forest within this compartment is variably aged, narrow, extremely fragmented, and vital in filtering nutrients/contaminants from the golf course. Hazard trees/branches should be removed in areas where they may jeopardize the safety of personnel using or maintaining the golf course.
33	Due to access limitations, this forest compartment is considered as non-manageable.
34	Due to access limitations, this forest compartment is considered as non-manageable.
35	Due to access limitations, this forest compartment is considered as non-manageable.
36	Due to access limitations, this forest compartment is considered as non-manageable.
37	Due to access limitations, this forest compartment is considered as non-manageable.
38	Not sampled.

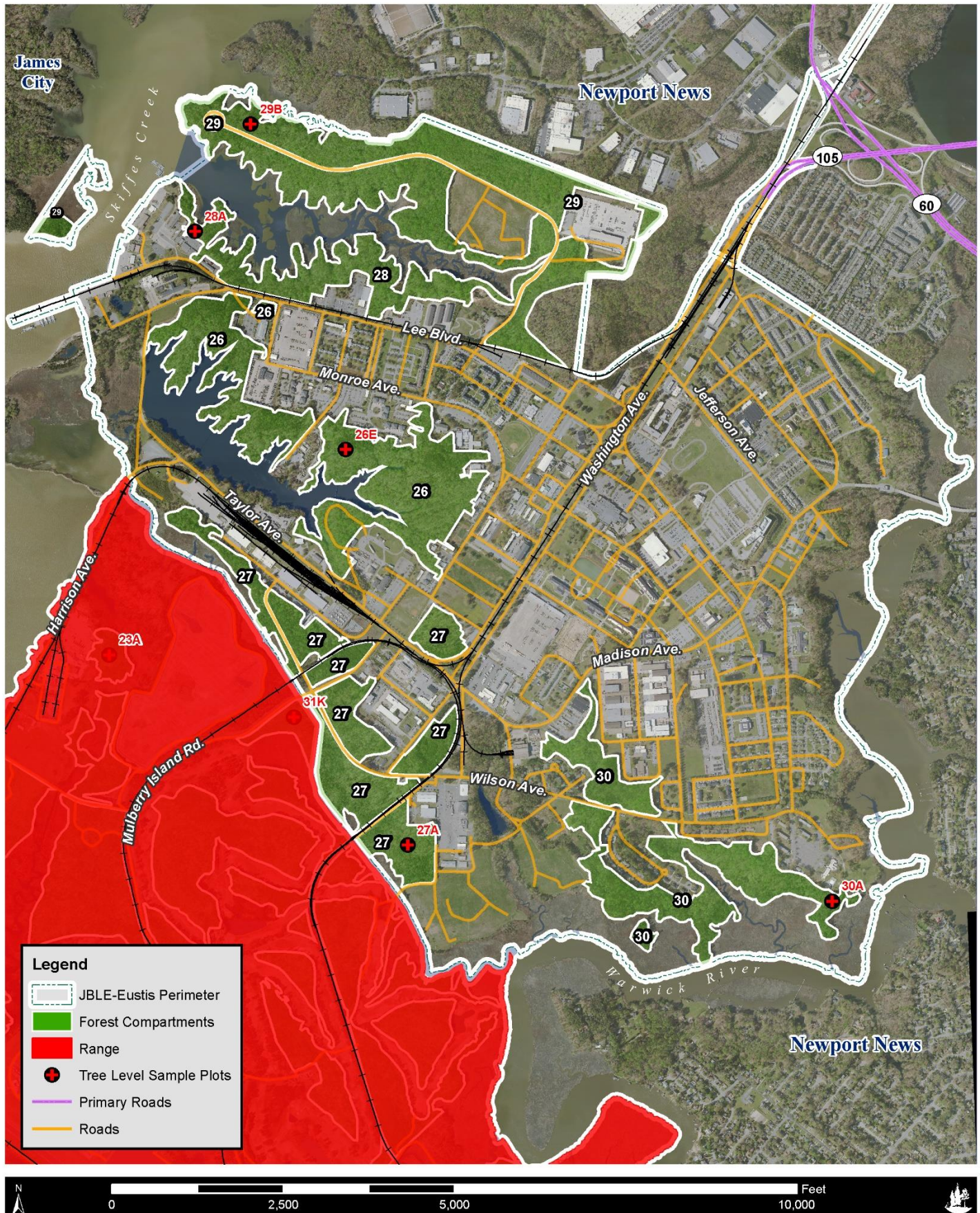


## ***6.7 - Tree Level Data***

Tree level data was collected in order to document the species composition of select plots. One plot within each compartment was chosen arbitrarily from within the field. Plots were chosen arbitrarily for the purpose of covering a variety of forest types and ecological conditions. Refer to Figures 6.7A, 6.7B, and 6.7C for plot locations. The resulting data was analyzed for overall averages (numerical values) and frequency/percent for species and subclass values (text). Data summaries and raw data for each compartment follow each figure/map.



# JBLE-Eustis, VA - Main Post: Tree Level Sample Plot Locations



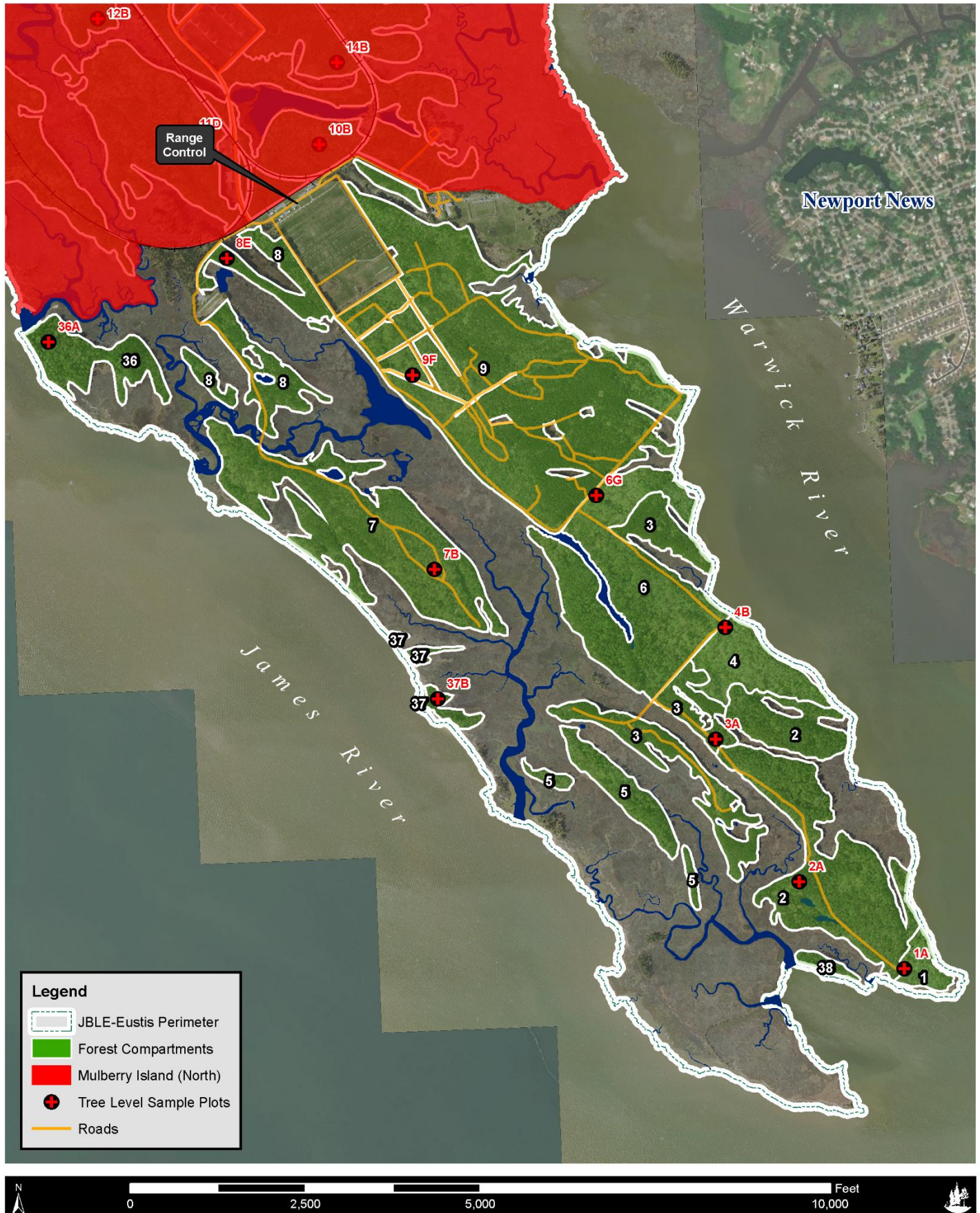


# JBLE-Eustis, VA - Mulberry Is. (North): Tree Level Sample Plot Locations





# JBLE-Eustis, VA - Mulberry Is. (South): Tree Level Sample Plot Locations



## 6.71 - Main Post Tree Level Data: Compartments 26-30

PLOT	SPECIES	DBH"	HT'	MERCH HT (16')	CROWN CLASS	LIVE CROWN	CROWN DIAM.	5YR GR	10YR GR	TREE CONDITION	TREE QUALITY	FOREST PRODUCT	TREE DAMAGE
26E	AMERICAN BEECH	22	85	1.5	INT	50	46			GOOD	AGS	SAW	NONE
	WHITE OAK	24	120	2	CD	30	40			GOOD	AGS	SAW	NONE
	WHITE OAK	22	110	2	CD	45	45			GOOD	AGS	SAW	NONE
	WHITE OAK	16	85	1.5	INT	25	35			GOOD	AGS	SAW	NONE
	AMERICAN BEECH	32	120	1.5	CD	40	31			FAIR	AGS	SAW	NONE
	AMERICAN BEECH	30	115	3	CD	33	39			GOOD	AGS	SAW	NONE
	WHITE OAK	30	120	1.5	CD	50	38			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	18	105	1.5	INT	33	35	0.2	0.45	POOR	AGS	PULP	NONE
	LOBLOLLY PINE	18	110	4	CD	33	27	0.3	0.6	FAIR	AGS	SAW	NONE
27A	LOBLOLLY PINE	24	110	3.5	CD	30	24			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	22	110	3.5	CD	30	23			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	28	110	3	CD	33	30			GOOD	AGS	SAW	NONE
	RED MAPLE	12	60	0	OT	25	28			POOR	CULL		NONE
	LOBLOLLY PINE	26	112	3	CD	30	30			GOOD	AGS	SAW	NONE
	SWEETGUM	24	85	2.5	INT	40	33			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	24	112	3.5	CD	25	28			GOOD	AGS	SAW	NONE
28A	BLACK GUM	16	85	1.5	INT	50	45			FAIR	AGS	PULP	NONE
	WHITE OAK	20	110	1	CD	80	35			GOOD	AGS	SAW	NONE
	WHITE OAK	30	110	0	CD	50	41			POOR	CULL		NONE
	WHITE OAK	22	85	1	CD	60	46			GOOD	AGS	SAW	NONE
	SWEETGUM	16	80	2	INT	50	19			FAIR	AGS	SAW	NONE
	WHITE OAK	24	110	1.5	CD	60	36			GOOD	AGS	SAW	NONE
	WHITE OAK	26	110	1.5	CD	45	39			GOOD	AGS	SAW	NONE
	SCARLET OAK	26	90	1.5	INT	65	31			POOR	AGS	PULP	NONE
	SOUTHERN RED OAK	12	50	1	OT	40	30			POOR	AGS	PULP	NONE
	SOUTHERN RED OAK	24	100	1.5	CD	50	35			GOOD	AGS	SAW	NONE
	BLACK GUM	16	40	1	OT	25	20	0.35	0.70	POOR	AGS	PULP	NONE
29B	SWEETGUM	18	110	2	CD	55	22			GOOD	AGS	SAW	NONE
	TULIP POPLAR	20	110	3	CD	45	26	0.50	0.90	GOOD	AGS	SAW	NONE
	WHITE OAK	24	110	1.5	CD	60	40			GOOD	AGS	SAW	NONE
	AMERICAN BEECH	10	40	0	OT	20	24			POOR	CULL		NONE
	AMERICAN BEECH	12	65	1	OT	28	26			POOR	AGS	PULP	NONE
	SWAMP CHESTNUT OAK	18	115	1	CD	68	35			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	12	90	1.5	OT	25	20			POOR	AGS	PULP	NONE
	TULIP POPLAR	22	110	3	CD	42	26			GOOD	AGS	SAW	NONE
	CHERRYBARK OAK	18	110	1	CD	65	30			GOOD	AGS	SAW	NONE
30A	TULIP POPLAR	26	115	3	CD	50	40	0.5	1.1	GOOD	AGS	SAW	NONE
	SOUTHERN RED OAK	26	115	1	CD	40	35			GOOD	AGS	SAW	NONE
	AMERICAN HORNBEAM	8	45	0	OT	60	30			POOR	CULL		NONE
	TULIP POPLAR	24	115	2.5	CD	35	38			FAIR	AGS	SAW	NONE
	BLACK CHERRY	12	80	1.5	INT	50	40			FAIR	AGS	PULP	NONE
	WHITE OAK	22	115	1	CD	45	50			FAIR	AGS	SAW	NONE
	FLOWERING DOGWOOD	6	45	0	OT	60	35			POOR	CULL		NONE



## 6.721 - Mulberry Island (North) Tree Level Data: Compartments 10-17

PLOT	SPECIES	DBH"	HT'	MERCH HT (16')	CROWN CLASS	LIVE CROWN	CROWN DIAM.	5YR GR	10YR GR	TREE CONDITION	TREE QUALITY	FOREST PRODUCT	TREE DAMAGE
10B	RED MAPLE	16	75	1	D	40	38			GOOD	CULL		WETLAND
	SWEETGUM	8	45	1	OT	80	12			POOR	CULL		WETLAND
	RED MAPLE	8	45	1	OT	60	18			POOR	CULL		WETLAND
	SWEETGUM	16	80	2	CD	85	40	0.5	1.1	FAIR	CULL		WETLAND
	RED MAPLE	22	90	1	CD	50	50			GOOD	CULL		WETLAND
	RED MAPLE	20	90	1	CD	70	50			GOOD	CULL		WETLAND
	RED MAPLE	16	85	0	CD	75	45			POOR	CULL		WETLAND
11D	LOBLOLLY PINE	22	105	3	D	30	50	0.55	1	GOOD	AGS	SAW	NONE
	SWEETGUM	14	105	2	CD	50	35			GOOD	AGS	SAW	NONE
	SWEETGUM	8	80	0	INT	75	25			POOR	CULL		NONE
	SWEETGUM	8	80	0	INT	70	30			POOR	CULL		NONE
	LOBLOLLY PINE	12	75	2	INT	40	25	0.6	1.1	FAIR	AGS	PULP	NONE
	RED MAPLE	14	75	0	INT	75	40			POOR	CULL		NONE
12B	LOBLOLLY PINE	14	75	2	CD	30	15	0.6	1.2	GOOD	AGS	PULP	NONE
	LOBLOLLY PINE	10	75	2.5	CD	35	25			FAIR	AGS	PULP	NONE
	LOBLOLLY PINE	8	60	1	OT	25	22			POOR	AGS	PULP	NONE
	LOBLOLLY PINE	8	60	0	OT	28	25			POOR	CULL		NONE
	LOBLOLLY PINE	10	75	2	CD	35	28			FAIR	AGS	PULP	NONE
	LOBLOLLY PINE	10	75	2	CD	35	22			FAIR	AGS	PULP	NONE
	LOBLOLLY PINE	10	75	2	CD	35	26			FAIR	AGS	PULP	NONE
	SWEETGUM	8	60	0	OT	70	20			POOR	CULL		NONE
	LOBLOLLY PINE	10	50	1.5	INT	33	20			FAIR	AGS	PULP	NONE
	LOBLOLLY PINE	8	55	1.5	INT	33	18			FAIR	AGS	PULP	NONE
13B	LOBLOLLY PINE	12	7.5	2	CD	33	22			GOOD	AGS	PULP	NONE
	LOBLOLLY PINE	14	70	1.5	CD	30	20	0.6	1.3	FAIR	AGS	PULP	NONE
	SWEETGUM	12	55	1	INT	60	25			POOR	AGS	PULP	NONE
	SWEETGUM	12	55	1	INT	50	27			POOR	AGS	PULP	NONE
	SWEETGUM	14	70	1.5	CD	70	30			GOOD	AGS	PULP	NONE
	SWEETGUM	6	55	0	OT	60	25			POOR	CULL		NONE
14B	SWEETGUM	8	55	1	INT	50	23			POOR	AGS	PULP	NONE
	LOBLOLLY PINE	10	60	1.5	INT	33	35	0.6	1.3	POOR	AGS	PULP	NONE
	LOBLOLLY PINE	12	75	2.5	CD	30	30			GOOD	AGS	PULP	NONE
	LOBLOLLY PINE	14	75	2.5	D	30	30			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	12	60	2	CD	35	25			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	16	75	3	D	30	25			GOOD	AGS	SAW	NONE
	SWEETGUM	8	60	0	OT	45	18			POOR	CULL		NONE
15C	SWEETGUM	10	65	1.5	INT	40	20			POOR	AGS	PULP	NONE
	LOBLOLLY PINE	20	110	3.5	CD	25	35	0.3	0.7	GOOD	AGS	SAW	NONE
	SOUTHERN RED OAK	22	100	1.5	INT	50	40			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	14	100	3	INT	25	28			GOOD	AGS	SAW	NONE
	BLACK OAK	18	90	1	INT	40	40			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	12	85	0	OT	30	20			POOR	CULL		NONE
	LOBLOLLY PINE	16	110	3	CD	25	30			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	22	110	3.5	CD	28	30			GOOD	AGS	SAW	NONE
	RED MAPLE	22	80	1	OT	80	40			POOR	AGS	PULP	NONE
	BLACK OAK	22	100	1	CD	55	40			GOOD	AGS	SAW	NONE
16A	BLACK CHERRY	10	70	0	OT	40	20			POOR	CULL		NONE
	LOBLOLLY PINE	36	115	3.5	D	25	40	0.25	0.5	FAIR	AGS	SAW	RED HEART @ 20'
	LOBLOLLY PINE	20	115	0	CD	30	35			POOR	CULL		SEVERE RED HEART
	LOBLOLLY PINE	18	85	3	INT	38	32			FAIR	AGS	SAW	RED HEART
	LOBLOLLY PINE	14	85	2.5	INT	36	30			POOR	AGS	PULP	NONE
	LOBLOLLY PINE	20	115	3.5	CD	35	29			GOOD	AGS	SAW	NONE
17B	SWEETGUM	16	70	1.5	INT	50	28			FAIR	AGS	SAW	NONE
	CHERRYBARK OAK	24	110	1.5	D	50	65	0.2	0.55	GOOD	AGS	SAW	NONE
	SWEETGUM	14	90	2	INT	40	35			GOOD	AGS	SAW	NONE
	WHITE OAK	18	110	1.5	CD	60	40			GOOD	AGS	SAW	NONE
	WHITE OAK	14	90	1	INT	70	35			GOOD	AGS	SAW	NONE
	SWEETGUM	12	70	1	OT	60	30			POOR	AGS	PULP	BUTT DAMAGE
	HICKORY	14	90	1	INT	70	40			POOR	AGS	PULP	NONE
	SWEETGUM	10	70	1	OT	80	25			POOR	AGS	PULP	NONE



### 6.722 - Mulberry Island (North) Tree Level Data: Compartments 18-23

PLOT	SPECIES	DBH"	HT'	MERCH HT (16')	CROWN CLASS	LIVE CROWN	CROWN DIAM.	5YR GR	10YR GR	TREE CONDITION	TREE QUALITY	FOREST PRODUCT	TREE DAMAGE
18D	LOBLOLLY PINE	18	85	3	CD	30	30	0.45	8	GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	20	90	3	CD	28	30			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	20	90	2.5	CD	30	35			GOOD	AGS	SAW	NONE
	SWEETGUM	14	85	1.5	CD	40	23			FAIR	AGS	SAW	NONE
	SWEETGUM	16	85	1	CD	35	25			GOOD	AGS	SAW	NONE
	SWEETGUM	12	75	1.5	INT	38	22			POOR	AGS	PULP	NONE
	LOBLOLLY PINE	18	85	3	CD	30	28			GOOD	AGS	SAW	NONE
	SWEETGUM	6	50	0	OT	40	20			POOR	CULL		NONE
	CHERRYBARK OAK	8	50	0	OT	60	20			POOR	CULL		NONE
19A	LOBLOLLY PINE	12	65	1.5	OT	50	22			POOR	AGS	PULP	NONE
	LOBLOLLY PINE	24	95	3.5	CD	50	45	0.35	0.6	GOOD	AGS	SAW	NONE
	BLACK CHERRY	16	75	1	CD	50	30			POOR	AGS	PULP	NONE
	CHERRYBARK OAK	24	105	2	D	50	60			FAIR	AGS	SAW	NONE
	CHERRYBARK OAK	22	105	2	CD	50	60			FAIR	AGS	SAW	NONE
	CHERRYBARK OAK	26	105	1.5	D	60	50			GOOD	AGS	SAW	NONE
20B	LOBLOLLY PINE	24	95	2	D	30	40	0.25	0.5	FAIR	AGS	SAW	NONE
	LOBLOLLY PINE	20	95	2.5	CD	25	38			FAIR	AGS	SAW	RED HEART
	LOBLOLLY PINE	24	100	4	CD	30	32			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	16	80	3.5	INT	28	28			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	18	100	2.5	CD	30	32			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	20	9.5	3.5	CD	30	28			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	14	95	3	CD	33	32			FAIR	AGS	SAW	METAL NAIL @ 5'
	LOBLOLLY PINE	12	40	0	OT	30	30			POOR	CULL		NONE
	LOBLOLLY PINE	20	95	3	CD	25	30			FAIR	AGS	SAW	NONE
	LOBLOLLY PINE	22	95	4	CD	25	40			GOOD	AGS	SAW	NONE
21A	LOBLOLLY PINE	18	95	1.5	CD	30	30			POOR	AGS	PULP	RED HEART
	LOBLOLLY PINE	12	75	2.5	INT	35	28	0.5	1	FAIR	AGS	PULP	NONE
	LOBLOLLY PINE	14	85	2.5	CD	33	30			FAIR	AGS	SAW	NONE
	LOBLOLLY PINE	14	85	3	CD	30	25			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	16	85	2.5	CD	30	20			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	20	85	3	D	30	35			GOOD	AGS	SAW	NONE
	WILLOW OAK	14	80	1	CD	40	40			GOOD	AGS	SAW	NONE
	CHERRYBARK OAK	12	75	1	INT	35	40			FAIR	AGS	PULP	NONE
	SWEETGUM	14	85	2	INT	45	25			FAIR	AGS	PULP	NONE
22A	CHERRYBARK OAK	10	85	1.5	OT	50	30			POOR	AGS	PULP	NONE
	CHERRYBARK OAK	12	90	1.5	INT	45	35			FAIR	AGS	PULP	NONE
	SWEETGUM	10	85	1.5	INT	40	33			POOR	AGS	PULP	NONE
	LOBLOLLY PINE	16	110	3.5	CD	28	30	0.3	0.5	GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	18	110	2	CD	30	28			FAIR	AGS	SAW	RED HEART
	LOBLOLLY PINE	20	110	3.5	CD	26	30			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	26	110	3.5	D	25	35			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	22	110	3.5	CD	25	33			GOOD	AGS	SAW	NONE
	CHERRYBARK OAK	16	110	1	CD	45	40			GOOD	AGS	SAW	NONE
23A	CHERRYBARK OAK	12	85	1.5	INT	40	40			FAIR	AGS	PULP	NONE
	CHERRYBARK OAK	14	90	1.5	INT	35	38			FAIR	AGS	PULP	NONE
	LOBLOLLY PINE	32	115	3.5	D	38	35			GOOD	AGS	SAW	NONE
	CHERRYBARK OAK	16	110	1	CD	40	45			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	18	110	2	CD	25	38	0.25	0.5	GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	24	110	1.5	CD	25	36			POOR	AGS	SAW	RED HEART
	LOBLOLLY PINE	24	110	2.5	CD	30	33			POOR	AGS	SAW	RED HEART
	CHERRYBARK OAK	14	90	1	INT	40	38			FAIR	AGS	SAW	NONE
	LOBLOLLY PINE	24	110	3.5	CD	30	28			GOOD	AGS	SAW	NONE

### 6.723 - Mulberry Island (North) Tree Level Data: Compartments 24-25, 31, & 33-35

PLOT	SPECIES	DBH"	HT'	MERCH HT (16')	CROWN CLASS	LIVE CROWN	CROWN DIAM.	5YR GR	10YR GR	TREE CONDITION	TREE QUALITY	FOREST PRODUCT	TREE DAMAGE
24D	SWEETGUM	12	80	1.5	INT	65	30	0.5	1.1	FAIR	AGS	PULP	NONE
	SWEETGUM	14	95	1	CD	65	25			FAIR	AGS	SAW	NONE
	CHERRYBARK OAK	20	95	1	D	60	45			GOOD	AGS	SAW	NONE
	SWEETGUM	10	75	1.5	INT	40	38			FAIR	AGS	PULP	NONE
	SWEETGUM	10	75	1	INT	45	40			FAIR	AGS	PULP	NONE
	LOBLOLLY PINE	16	95	3.5	CD	30	35			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	10	80	1	INT	20	22			POOR	AGS	PULP	NONE
	LOBLOLLY PINE	18	95	3.5	CD	30	38			GOOD	AGS	SAW	NONE
	SWEETGUM	8	70	1	OT	30	25			POOR	AGS	PULP	NONE
	LOBLOLLY PINE	12	95	2.5	CD	28	30			FAIR	AGS	PULP	NONE
	LOBLOLLY PINE	10	90	2	INT	33	22			FAIR	AGS	PULP	NONE
	LOBLOLLY PINE	10	85	1.5	INT	35	15			FAIR	AGS	PULP	NONE
25B	SOUTHERN RED OAK	40	95	0	D	60	55			POOR	CULL		NONE
	LOBLOLLY PINE	16	95	2.5	CD	30	30	0.6	1.1	GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	10	75	1.5	OT	20	20			POOR	AGS	PULP	NONE
	LOBLOLLY PINE	8	85	1.5	INT	20	18			POOR	AGS	PULP	NONE
	LOBLOLLY PINE	14	95	2.5	CD	25	25			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	14	95	3	CD	30	28			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	10	80	0	OT	35	30			POOR	CULL		NONE
	LOBLOLLY PINE	12	80	1.5	INT	30	28			FAIR	AGS	PULP	NONE
31K	SWEETGUM	22	80	1.5	INT	30	24			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	28	110	3.5	CD	33	22	0.3	0.7	GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	24	110	3.5	CD	30	23			GOOD	AGS	SAW	NONE
	SOUTHERN RED OAK	12	50	0	OT	50	24			POOR	CULL		NONE
	SWEETGUM	10	80	1	INT	25	20			POOR	AGS	PULP	NONE
	SWEETGUM	10	80	1.5	INT	30	20			POOR	AGS	PULP	NONE
	SWEETGUM	8	80	1	INT	25	12			POOR	AGS	PULP	NONE
	SOUTHERN RED OAK	18	80	1	INT	25	35			FAIR	AGS	SAW	NONE
	SWEETGUM	10	80	0	INT	25	19			POOR	CULL		NONE
	LOBLOLLY PINE	24	110	4	CD	25	29			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	22	110	4	CD	25	28			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	28	110	3.5	CD	25	34			GOOD	AGS	SAW	NONE
33A	LOBLOLLY PINE	24	100	2.5	D	33	45	0.6	1.1	GOOD	AGS	SAW	NONE
	CHERRYBARK OAK	20	90	1.5	CD	60	40			FAIR	AGS	PULP	NONE
	CHERRYBARK OAK	22	90	1	CD	70	30			FAIR	AGS	SAW	NONE
	BLACK LOCUST	6	40	0	INT	50	20			POOR	CULL		NONE
34C	LOBLOLLY PINE	20	110	2.5	D	30	30	0.3	0.6	FAIR	AGS	SAW	RED HEART 30'
	SWEETGUM	18	110	2	CD	35	33			GOOD	AGS	SAW	NONE
	CHERRYBARK OAK	22	110	1.5	CD	48	50			GOOD	AGS	SAW	NONE
	CHERRYBARK OAK	14	85	1	INT	50	40			FAIR	AGS	SAW	NONE
	SWEETGUM	12	85	1	INT	45	30			FAIR	AGS	PULP	NONE
	BLACK CHERRY	14	60	0	OT	30	25			POOR	CULL		NONE
35B	SWEETGUM	14	55	1.5	OT	60	25			POOR	AGS	PULP	NONE
	BLACK CHERRY	16	30	0	OT	40	30			POOR	CULL		NONE
	LOBLOLLY PINE	22	80	1.5	CD	45	45	0.4	0.7	GOOD	AGS	SAW	NONE
	CHERRYBARK OAK	22	80	1	CD	45	40			FAIR	AGS	SAW	NONE
	CHERRYBARK OAK	34	100	1.5	D	60	60			FAIR	AGS	SAW	NONE

# 6.731 - Mulberry Island (South) Tree Level Data: Compartments 1-8

PLOT	SPECIES	DBH"	HT'	MERCH HT (16')	CROWN CLASS	LIVE CROWN	CROWN DIAM.	5YR GR	10YR GR	TREE CONDITION	TREE QUALITY	FOREST PRODUCT	TREE DAMAGE
1A	BLACK WALNUT	18	90	1	D	30	50			POOR	CULL		NONE
	SWEETGUM	14	90	1.5	CD	33	40	0.45	1	FAIR	AGS	PULP	NONE
2A	LOBLOLLY PINE	20	120	4	CD	25	40	0.33	0.8	GOOD	AGS	SAW	NONE
	SWEETGUM	12	45	1.5	OT	20	25			POOR	AGS	PULP	NONE
	SWEETGUM	18	80	2	INT	25	30			FAIR	AGS	SAW	NONE
	CHERRYBARK OAK	34	100	1.5	CD	60	55			GOOD	AGS	SAW	NONE
	WILLOW OAK	24	100	2	CD	50	45			POOR	AGS	PULP	NONE
	BLACK CHERRY	16	70	0	OT	50	40			POOR	CULL		NONE
	SWEETGUM	8	65	1	INT	25	30			POOR	AGS	PULP	NONE
	LOBLOLLY PINE	18	110	3.5	CD	25	40			FAIR	AGS	SAW	NONE
	LOBLOLLY PINE	24	110	3.5	CD	25	45			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	20	100	3.5	INT	25	40			FAIR	AGS	SAW	RED HEART @ 18'
3A	SWEETGUM	10	50	0	OT	30	15			POOR	CULL		NONE
	SWEETGUM	18	105	2	CD	33	35	0.55	1.2	GOOD	AGS	SAW	NONE
	SWEETGUM	20	105	1.5	CD	33	40			GOOD	AGS	SAW	NONE
	SWEETGUM	20	105	1	CD	40	35			GOOD	AGS	SAW	NONE
	SWEETGUM	22	105	1.5	CD	40	45			GOOD	AGS	SAW	NONE
4B	LOBLOLLY PINE	18	105	2	CD	30	45			FAIR	AGS	SAW	NONE
	BLACK WALNUT	16	85	1	D	75	60	0.3	0.5	FAIR	AGS	SAW	NONE
	BLACK WALNUT	12	85	1	INT	50	25			POOR	AGS	PULP	NONE
	BLACK WALNUT	16	85	1	CD	50	50			POOR	AGS	PULP	NONE
	BLACK WALNUT	12	30	0	OT	25	25			POOR	CULL		HOLLOW TRUNK
6G	PERSIMMON	12	65	1	INT	50	40			POOR	AGS	PULP	NONE
	SWEETGUM	14	70	2	INT	60	40	0.4	0.8	POOR	AGS	PULP	NONE
	CHERRYBARK OAK	32	100	1.5	CD	60	55			GOOD	AGS	SAW	NONE
	SWEETGUM	18	70	1.5	INT	50	32			POOR	AGS	PULP	NONE
	SWEETGUM	16	70	1.5	INT	60	30			FAIR	AGS	PULP	NONE
	CHERRYBARK OAK	34	105	2	CD	60	60			GOOD	AGS	SAW	NONE
	CHERRYBARK OAK	26	105	1.5	CD	30	45			GOOD	AGS	SAW	NONE
	WILLOW OAK	30	105	1.5	CD	50	40			GOOD	AGS	SAW	NONE
	SWEETGUM	18	70	1	OT	75	40			GOOD	AGS	SAW	NONE
	SWEETGUM	14	70	1.5	OT	90	40			POOR	AGS	PULP	NONE
7B	CHERRYBARK OAK	26	105	1	CD	50	75			GOOD	AGS	SAW	NONE
	SWEETGUM	12	80	1.5	INT	25	30	0.4	0.85	FAIR	AGS	PULP	NONE
	CHERRYBARK OAK	14	45	1.5	OT	80	25			POOR	AGS	PULP	NONE
	SWEETGUM	16	100	1.5	CD	30	30			GOOD	AGS	SAW	NONE
	SWEETGUM	22	100	1.5	CD	30	40			GOOD	AGS	SAW	NONE
	SOUTHERN RED OAK	14	80	1.5	INT	70	40			FAIR	AGS	PULP	NONE
	TULIP POPLAR	20	100	2	D	60	50			GOOD	AGS	SAW	NONE
	SOUTHERN RED OAK	22	100	1.5	D	50	40			FAIR	AGS	SAW	NONE
	LOBLOLLY PINE	18	100	3.5	CD	40	30			GOOD	AGS	SAW	NONE
8E	LOBLOLLY PINE	12	90	3	CD	30	30	0.6	1.2	GOOD	AGS	PULP	NONE
	LOBLOLLY PINE	12	90	3	CD	30	30			GOOD	AGS	PULP	NONE
	LOBLOLLY PINE	10	75	2	INT	22	22			FAIR	AGS	PULP	NONE
	LOBLOLLY PINE	10	75	2	INT	25	35			FAIR	AGS	PULP	NONE
	LOBLOLLY PINE	12	90	3.5	CD	25	35			FAIR	AGS	SAW	NONE
	SWEETGUM	18	90	2	CD	35	30			GOOD	AGS	SAW	NONE
	LOBLOLLY PINE	12	90	3	CD	30	35			GOOD	AGS	PULP	NONE
	LOBLOLLY PINE	12	90	3	CD	30	30			GOOD	AGS	PULP	NONE
	LOBLOLLY PINE	10	75	2	INT	22	25			FAIR	AGS	PULP	NONE
	LOBLOLLY PINE	10	75	2	INT	25	30			POOR	AGS	PULP	NONE
	SWEETGUM	12	90	2.5	CD	30	30			FAIR	AGS	PULP	NONE
	SWEETGUM	12	75	2	INT	35	28			POOR	AGS	PULP	NONE
	LOBLOLLY PINE	10	60	0	OT	25	25			POOR	CULL		NONE



**6.732 - Mulberry Island (South) Tree Level Data: Compartments 9 & 36-37**

PLOT	SPECIES	DBH"	HT'	MERCH HT (16')	CROWN CLASS	LIVE CROWN	CROWN DIAM.	5YR GR	10YR GR	TREE CONDITION	TREE QUALITY	FOREST PRODUCT	TREE DAMAGE
9F	HACKBERRY	16	70	0	INT	50	42			POOR	CULL		NONE
	AMERICAN HOLLY	10	60	0	OT	70	26			POOR	CULL		NONE
	RED BAY	12	60	0	OT	40	40			POOR	CULL		NONE
	SWEETGUM	18	85	1.5	CD	40	45	0.5	1.1	FAIR	AGS	PULP	NONE
	SWEETGUM	12	60	1	INT	50	40			FAIR	AGS	PULP	NONE
	SWEETGUM	18	85	1	CD	40	40			FAIR	AGS	SAW	NONE
	SWEETGUM	14	85	1	CD	40	40			FAIR	AGS	SAW	NONE
36A	SWEETGUM	12	65	1	OT	50	40			POOR	AGS	PULP	NONE
	TREE-OF-HEAVEN	12	70	0	INT	50	40			POOR	CULL		NONE
	PRINCES TREE	12	70	0	INT	50	50			POOR	CULL		NONE
	CHERRYBARK OAK	32	100	2	D	50	55	0.3	0.5	GOOD	AGS	SAW	NONE
37B	RED BAY	10	45	0	OT	50	50			POOR	CULL		NONE
	CHERRYBARK OAK	13	75	1	CD	50	30			GOOD	AGS	SAW	NONE
	CHERRYBARK OAK	14	75	1	CD	50	30			GOOD	AGS	SAW	NONE
	CHERRYBARK OAK	12	75	1	INT	50	30			POOR	AGS	PULP	NONE
	BLACK CHERRY	8	40	0	OT	60	25			POOR	CULL		NONE
	CHERRYBARK OAK	14	40	1	OT	60	25			FAIR	AGS	PULP	NONE
	WHITE OAK	10	40	1	OT	50	25			POOR	AGS	PULP	NONE
	LOBLOLLY PINE	30	110	2.5	D	33	50	0.3	0.75	FAIR	AGS	SAW	NONE

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## **Appendix**

A.1 JBLE-Eustis Timber Volume Summary

A.2 JBLE-Eustis Canopy Species

A.3 JBLE-Eustis Groundcover Species

A.4 JBLE-Eustis Sapling Species

A.5 JBLE-Eustis Shrub Species

A.6 JBLE-Eustis Dominant Species by Compartment

*Table A.1, Ft. Eustis Forest Compartment Timber Volumes*

Compartment:		Sawtimber Volumes (Int. 1/4 log scale, Bd.ft.):				Pulpwood Cords:		
#	Acres	Pine	Hard HW	Soft HW	Total	Pine	Hardwood	Total
01	9	0	9484	0	9484	0	43	43
02	106.85	1220939	12595	291746	1525280	73	472	545
03	39	667151	0	36132	703282	371	108	478
04	28.53	0	14595	0	14595	0	129	129
05	24.5							
06	101.55	504171	147432	487023	1138626	142	299	442
07	104.05	433341	140683	224325	798349	479	443	922
08	47.3	532513	0	0	532513	712	95	807
09	243.9	1437825	184945	323938	1946707	1222	1146	2368
10	50.44	175776	0	70496	246272	75	243	318
11	78	56957	0	29039	85997	415	309	724
12	12.04	4084	7431	0	11515	113	38	151
13	177.13	856917	162810	497186	1516913	237	936	1174
14	35.35	222013	0	0	222013	277	85	362
15	143.7	1265654	106516	161461	1533631	364	375	739
16	81.78	507536	65109	151654	724304	141	302	442
17	104.12	244259	27113	53864	325236	143	477	620
18	77.55	439075	51743	28449	519267	350	492	842
19	75.45	360629	66958	133153	560740	29	220	249
20	61.24	658598	22423	35961	716983	141	73	214
21	46.56	251642	40381	133012	425035	31	133	164
22	48.2	267433	7464	0	274897	25	107	132
23	77.75	1033099	43843	29229	1106171	118	215	334
24	77.26	923716	41440	23397	988553	467	236	704
25	18.96	107796	0	0	107796	225	112	337
26	132.54	1086058	438195	514030	2038282	451	1471	1921
27	111.51	1067736	91827	262298	1421861	388	287	675
28	61.95	248501	315004	107196	670701	40	232	272



*Table A.1, Ft. Eustis Forest Compartment Timber Volumes*

Compartment:		Sawtimber Volumes (Int. 1/4 log scale, Bd.ft.):				Pulpwood Cords:		
#	Acres	Pine	Hard HW	Soft HW	Total	Pine	Hardwood	Total
29	157.08	412129	340782	745458	1498369	126	328	454
30	88.38	89456	205413	310084	604953	0	105	105
31	216.46	1973847	461915	282926	2718688	714	396	1110
33	2.59	7138	816	0	7953	6.7	10	16.7
34	22.7	133779	4413	45249	183440	13	31	44
35	8.76	6629	6516	3991	17136	0	25	25
36	26.97	212811	55008	0	267819	43	51	94
37	7.53	3972	0	0	3972	0	17	17
38	4.64							
<b>Total:</b>		17413180	3072854	4981297	25467333	7932	10041	17974
<b>Total Value Est:</b>		\$1,929,903	\$651,230	\$1,055,686	\$3,636,819	\$231,209	\$226,927	\$458,136

**Grand Total Value Estimate, Effective 10/2021:   \$4,094,955.00**

## A.2, Fort Eustis Canopy Species

---

- |   |   |
|---|---|
| 1, <i>Acer rubrum</i> L.<br>red maple                               | 17, <i>Nyssa sylvatica</i> Marshall<br>black gum, sour gum              |
| 2, <i>Ailanthus altissima</i> (P. Miller) Swingle<br>tree-of-heaven | 18, <i>Paulownia tomentosa</i><br>princess tree                         |
| 3, <i>Carpinus caroliniana</i> Walt.<br>American hornbeam           | 19, <i>Persea palustris</i> (Raf.) Sarg.<br>red bay                     |
| 4, <i>Carya glabra</i> (P. Miller) Sweet<br>pignut hickory          | 20, <i>Pinus taeda</i> L.<br>loblolly pine                              |
| 5, <i>Carya tomentosa</i> (Poir.) Nutt.<br>mockernut hickory        | 21, <i>Pinus virginiana</i><br>Virginia pine                            |
| 6, <i>Celtis laevigata</i> Willd.<br>southern hackberry             | 22, <i>Platanus occidentalis</i> L.<br>American sycamore                |
| 7, <i>Celtis occidentalis</i> L.<br>northern hackberry              | 23, <i>Populus heterophylla</i> L.<br>swamp cottonwood                  |
| 8, <i>Cornus florida</i> L.<br>flowering dogwood                    | 24, <i>Prunus serotina</i> Ehrhart var. <i>serotina</i><br>black cherry |
| 9, <i>Diospyros virginiana</i> L.<br>American persimmon             | 25, <i>Quercus acutissima</i><br>sawtooth oak                           |
| 10, <i>Fagus grandifolia</i> Ehrhart<br>American beech              | 26, <i>Quercus alba</i> Linnaeus<br>white oak                           |
| 11, <i>Ilex opaca</i> Aiton<br>American holly                       | 27, <i>Quercus bicolor</i> Willdenow<br>swamp white oak                 |
| 12, <i>Juniperus virginiana</i> L.<br>eastern redcedar              | 28, <i>Quercus falcata</i> Michaux<br>southern red oak                  |
| 13, <i>Liquidambar styraciflua</i> L.<br>sweetgum                   | 29, <i>Quercus laurifolia</i> Michaux<br>laurel oak                     |
| 14, <i>Liriodendron tulipifera</i> L.<br>tulip-poplar, tuliptree    | 30, <i>Quercus michauxii</i> Nuttall<br>swamp chestnut oak              |
| 15, <i>Magnolia grandiflora</i> L.<br>southern magnolia             | 31, <i>Quercus muehlenbergii</i> Engelman<br>chinquapin oak             |
| 16, <i>Nyssa biflora</i> Walt.<br>swamp tupelo                      | 32, <i>Quercus nigra</i> Linnaeus<br>water oak                          |

## A.2, Fort Eustis Canopy Species

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- 33, *Quercus pagoda* Rafinesque  
cherrybark oak
- 34, *Quercus palustris* Muenchhausen  
pin oak
- 35, *Quercus phellos* Linnaeus  
willow oak
- 36, *Quercus rubra*  
northern red oak
- 37, *Quercus velutina* Lamarck  
black oak
- 38, *Robinia pseudoacacia* L.  
black locust
- 39, *Sassafras albidum* (Nutt.) Nees  
sassafras
- 40, *Taxodium distichum* (L.) Richard var. *distichum*  
bald cypress
- 41, *Ulmus americana* L.  
American elm



### A.3, Fort Eustis Groundcover Species

---

- |   |   |
|---|---|
| 1, <i>Acer rubrum</i> L.<br>red maple   | 21, <i>Cardamine hirsuta</i> Linnaeus<br>hairy bittercress              |
| 2, <i>Ageratina altissima</i> (L.) King & H.E. Robins.<br>white snakeroot       | 22, <i>Carex albicans</i> complex<br>white-tinged sedge                 |
| 3, <i>Agrimonia pubescens</i> Wallr.<br>downy agrimony                          | 23, <i>Carex albolutescens</i> Schweinitz<br>greenish-white sedge       |
| 4, <i>Ailanthus altissima</i> (P. Miller) Swingle<br>tree-of-heaven             | 24, <i>Carex annectens</i> (Bickn.) Bickn.<br>yellow-fruited sedge      |
| 5, <i>Aira caryophyllea</i> L.<br>silver hairgrass                              | 25, <i>Carex blanda</i> Dewey<br>eastern woodland sedge                 |
| 6, <i>Allium vineale</i> L.<br>field garlic                                     | 26, <i>Carex cephalophora</i> Muhl. ex Willd.<br>oval-leaved sedge      |
| 7, <i>Amphicarpaea bracteata</i> (L.) Fern. var. <i>bracteata</i><br>hog-peanut | 27, <i>Carex complanata</i> Torr. & Hook.<br>hirsute sedge              |
| 8, <i>Andropogon glomeratus</i> (Walt.) B.S.P.<br>bushy bluestem                | 28, <i>Carex crinita</i> Lam. var. <i>crinita</i><br>long-fringed sedge |
| 9, <i>Andropogon virginicus</i> L. var. <i>virginicus</i><br>Virginia bluestem  | 29, <i>Carex debilis</i> Michaux<br>white-edged sedge                   |
| 10, <i>Anthoxanthum odoratum</i> L. ssp. <i>odoratum</i><br>sweet vernal grass  | 30, <i>Carex festucacea</i> Schk. ex Willd.<br>fescue sedge             |
| 11, <i>Aralia spinosa</i> L.<br>devil's walking-stick                           | 31, <i>Carex hyalinolepis</i> Steudel<br>shoreline sedge                |
| 12, <i>Arisaema triphyllum</i> (L.) Schott<br>jack-in-the-pulpit                | 32, <i>Carex jorii</i> Bailey<br>joor's sedge                           |
| 13, <i>Asimina triloba</i> (L.) Dunal<br>pawpaw                                 | 33, <i>Carex kraliana</i> Naczi & Bryson<br>kral's sedge                |
| 14, <i>Asplenium platyneuron</i> (L.) B.S.P.<br>ebony spleenwort                | 34, <i>Carex lupulina</i> Willd.<br>hop sedge                           |
| 15, <i>Athyrium asplenoides</i> (Michx.) A.A. Eaton<br>southern lady fern       | 35, <i>Carex nigromarginata</i> Schweinitz<br>black-edged sedge         |
| 16, <i>Baccharis halimifolia</i> L.<br>groundsel tree                           | 36, <i>Carex seorsa</i> Howe in Gordinier & Howe<br>weak stellate sedge |
| 17, <i>Boehmeria cylindrica</i> (L.) Sw.<br>false nettle                        | 37, <i>Carex</i> sp.<br>a sedge   |
| 18, <i>Bromus japonicus</i> Thunb. ex Murr.<br>Japanese brome grass             | 38, <i>Carex striatula</i> Michaux<br>lined sedge                       |
| 19, <i>Callicarpa americana</i> L.<br>american beauty-berry                     | 39, <i>Carex swanii</i> (Fernald) Mackenzie<br>swan's sedge             |
| 20, <i>Campsis radicans</i> (L.) Seem. ex Bureau<br>trumpet-creeper             | 40, <i>Carex typhina</i> Michaux<br>cattail sedge                       |

### A.3, Fort Eustis Groundcover Species

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- 41, *Carex vulpinoidea* Michaux  
fox sedge
- 42, *Carpinus caroliniana* Walt.  
american hornbeam
- 43, *Carya tomentosa* (Poir.) Nutt.  
mockernut hickory
- 44, *Celtis laevigata* Willd.  
southern hackberry
- 45, *Celtis occidentalis* L.  
northern hackberry
- 46, *Cerastium fontanum* Baumg. ssp. *vulgare*  
(Hartman) Greuter & Burdet  
mouse-ear chickweed
- 47, *Cerastium glomeratum* Thuill.  
sticky mouse-ear chickweed
- 48, *Chasmanthium laxum* (L.) Yates  
slender spikegrass
- 49, *Chasmanthium sessiliflorum* (Poir.) Yates  
long-leaf spikegrass
- 50, *Cinna arundinacea* L.  
wood reedgrass
- 51, *Coleataenia anceps* (Michx.) Soreng ssp. *anceps*  
beaked panic grass
- 52, *Coleataenia longifolia* (Torrey) Soreng ssp.  
*longifolia*  
long-leaved panic grass
- 53, *Commelina communis* L.  
asiatic dayflower
- 54, *Cynoglossum virginianum* L. var. *virginianum*  
wild comfrey
- 55, *Danthonia spicata* (L.) Beauv. ex Roemer & J.A.  
Schultes  
poverty oatgrass
- 56, *Dennstaedtia punctilobula* (Michx.) T. Moore  
hay-scented fern
- 57, *Desmodium perplexum* Schub.  
perplexing tick-trefoil
- 58, *Dichanthelium acuminatum* complex  
wooly panic grass
- 59, *Dichanthelium boscii* (Poir.) Gould & C.A. Clark  
bosc's panic grass
- 60, *Dichanthelium clandestinum* (L.) Gould  
deer-tongue grass
- 61, *Dichanthelium commutatum* (J.A. Schultes) Gould  
ssp. *commutatum*  
variable panic grass
- 62, *Dichanthelium dichotomum* (L.) Gould var.  
*dichotomum*  
small-fruited panic grass
- 63, *Dichanthelium scoparium* (Lam.) Gould  
velvet panic grass
- 64, *Dichanthelium* sp.  
a panic grass
- 65, *Diodia virginiana* L.  
Virginia buttonweed
- 66, *Dulichium arundinaceum* (L.) Britton var.  
*arundinaceum*  
three-way sedge
- 67, *Elaeagnus umbellata* Thunb.  
autumn olive
- 68, *Eleocharis obtusa* (Willd.) Schultes  
blunt spikerush
- 69, *Elephantopus carolinianus* Raeusch.  
carolina elephant's-foot
- 70, *Elymus villosus* Muhl. ex Willd.  
hairy wild rye
- 71, *Elymus virginicus* L.  
virginia wild rye
- 72, *Epifagus virginiana* (L.) W.Barton  
beechdrops
- 73, *Erianthus giganteus* (Walt.) P. Beauv.  
giant plumegrass
- 74, *Euonymus americanus* L.  
strawberry-bush
- 75, *Eupatorium capillifolium* (Lam.) Small  
dog-fennel
- 76, *Eupatorium hyssopifolium* L.  
hyssop-leaf thoroughwort
- 77, *Eupatorium serotinum* Michx.  
late thoroughwort
- 78, *Fagus grandifolia* Ehrhart  
American beech

### A.3, Fort Eustis Groundcover Species

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- 79, *Forsteronia difformis* (Walt.) A. DC.  
climbing dogbane
- 80, *Galium aparine* L.  
cleavers
- 81, *Galium circaezans* Michx.  
forest bedstraw
- 82, *Galium sherardia* E.H.L. Krause  
field madder
- 84, *Galium tinctorium* (L.) Scop.  
three-lobed bedstraw
- 83, *Galium triflorum* Michx.  
sweet-scented bedstraw
- 85, *Galium uniflorum* Michx.  
one-flowered bedstraw
- 86, *Gamochaeta argyrinea* Nesom  
silver cudweed
- 87, *Gamochaeta purpurea* (L.) Cabrera  
purple cudweed
- 88, *Gaylussacia baccata* (Wangenh.) K. Koch  
black huckleberry
- 89, *Gaylussacia frondosa* (L.) Torr. & Gray ex Torr.  
dangleberry
- 90, *Gelsemium sempervirens* (L.) St.-Hilaire  
carolina jessamine
- 91, *Geranium carolinianum* L.  
carolina geranium
- 92, *Geum canadense* Jacquin  
white avens
- 93, *Gonolobus suberosus* (L.) R. Br. var. *suberosus*  
eastern anglepod
- 94, *Grass sp. (non-native)*
- 95, *Hibiscus moscheutos* L.  
swamp rose-mallow
- 96, *Hieracium gronovii* L.  
hairy hawkweed
- 97, *Holosteum umbellatum* L. ssp. *umbellatum*  
jagged chickweed
- 98, *Hordeum pusillum* Nutt.  
little barley
- 100, *Hydrilla verticillata* (L.f.) Royle  
hydrilla
- 99, *Hydrocotyle americana* L.  
American water-pennywort
- 101, *Hypericum mutilum* L. var. *mutilum*  
dwarf st. john's-wort
- 102, *Hypericum stragulum* W.P. Adams and Robson  
low st. johns-wort
- 103, *Hypoxis hirsuta* (L.) Coville  
eastern yellow stargrass
- 104, *Ilex opaca* Aiton  
American holly
- 105, *Juncus acuminatus* Michx.  
sharp-fruited rush
- 106, *Juncus coriaceus* Mackenzie  
leathery rush
- 107, *Juncus effusus* L.  
common rush, soft rush
- 108, *Juncus tenuis* Willd.  
path rush, slender rush
- 109, *Juniperus virginiana* L.  
eastern redcedar
- 110, *Leersia oryzoides* (L.) Sw.  
rice cutgrass
- 111, *Leersia virginica* Willd.  
Virginia cutgrass
- 112, *Lespedeza cuneata* (Dum.-Cours.) G. Don  
Chinese lespedeza
- 113, *Ligustrum sinense* Louriere  
Chinese privet
- 114, *Lindera benzoin* (L.) Blume  
spicebush
- 115, *Liquidambar styraciflua* L.  
sweetgum
- 116, *Liriodendron tulipifera* L.  
tulip-poplar, tuliptree
- 117, *Listera australis* Lindl.  
southern twayblade
- 118, *Lolium arundinaceum* (Schreber) Darbyshire.  
tall fescue



### A.3, Fort Eustis Groundcover Species

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- 119, *Lonicera japonica* Thunb.  
Japanese honeysuckle
- 120, *Lotus corniculatus* L.  
bird's-foot trefoil
- 121, *Ludwigia palustris* (L.) Elliott  
marsh seedbox
- 122, *Lycopus virginicus* L.  
Virginia bugleweed
- 123, *Magnolia grandiflora* L.  
southern magnolia
- 124, *Medicago lupulina* L.  
black medick
- 125, *Melia azedarach* L.  
chinaberry
- 126, *Microstegium vimineum* (Trin.) A. Camus  
Japanese stiltgrass
- 127, *Mikania scandens* (L.) Willd.  
climbing hempweed
- 128, *Mitchella repens* L.  
partidge-berry
- 129, *Morella cerifera* (L.) Small  
wax-myrtle
- 130, *Muscadinia rotundifolia* (Michx.) Small var.  
*rotundifolia*  
muscadine grape, scuppernong
- 131, *Myosotis verna* Nutt.  
early forget-me-not
- 132, *Narcissus pseudonarcissus* L.  
common daffodil
- 133, *Nyssa biflora* Walt.  
swamp tupelo
- 134, *Nyssa sylvatica* Marshall  
black gum, sour gum
- 135, *Onoclea sensibilis* L.  
sensitive fern, bead fern
- 136, *Ophioglossum pycnostichum* (Fernald) A. & D. Love  
southern adder's-tongue
- 137, *Osmunda spectabilis* Willd.  
royal fern
- 138, *Osmundastrum cinnamomeum* (L.) C. Presl var.  
*cinnamomeum*  
cinnamon fern
- 139, *Oxalis dillenii* Jacquin  
southern yellow wood-sorrel
- 140, *Oxalis stricta* L.  
yellow wood-sorrel
- 141, *Oxalis violacea* L.  
violet wood-sorrel
- 142, *Panicum verrucosum* Muhl.  
warty panic grass
- 143, *Panicum virgatum* L.  
switchgrass
- 144, *Parathelypteris noveboracensis* (L.) Ching  
New York fern
- 145, *Parthenocissus quinquefolia* (L.) Planch.  
Virginia-creeper
- 146, *Persea palustris* (Raf.) Sarg.  
red bay
- 147, *Persicaria arifolia* (L.) Haraldson  
halberd-leaf tearthumb
- 148, *Persicaria hydropiperoides* (Michx.) Small  
mild water-pepper
- 149, *Persicaria pensylvanica* (L.) M. Gomez  
Pennsylvania smartweed
- 150, *Persicaria sagittata* (L.) H. Gross ex Nakai  
arrow-leaf tearthumb
- 151, *Persicaria virginiana* (L.) Gaertn.  
Virginia jumpseed
- 152, *Phegopteris hexagonoptera* (Michx.) Fee  
broad beech fern
- 153, *Phragmites australis* (Cav.) Trin. ex Steud. ssp.  
*australis*  
common reed
- 154, *Pinus taeda* L.  
loblolly pine
- 155, *Plantago virginica* L.  
Virginia plantain
- 156, *Poa annua* L.  
annual bluegrass

### A.3, Fort Eustis Groundcover Species

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- 157, *Polystichum acrostichoides* (Michx.) Schott  
christmas fern
- 158, *Potentilla canadensis* L.  
Canada cinquefoil
- 159, *Potentilla indica* (Andr.) T. Wolf  
indian-strawberry
- 160, *Proserpinaca palustris* L.  
common mermaid-weed
- 161, *Prunus serotina* Ehrhart var. *serotina*  
black cherry
- 162, *Pseudognaphalium obtusifolium* (L.) Hilliard & Burt  
rabbit tobacco
- 163, *Pteridium aquilinum* (L.) Kuhn  
bracken fern
- 164, *Pyrus calleryana* Dcne.  
callery pear
- 165, *Quercus alba* Linnaeus  
white oak
- 166, *Quercus falcata* Michaux  
southern red oak
- 167, *Quercus michauxii* Nuttall  
swamp chestnut oak
- 168, *Quercus pagoda* Rafinesque  
cherrybark oak
- 169, *Quercus phellos* Linnaeus  
willow oak
- 170, *Quercus velutina* Lamarck  
black oak
- 171, *Ranunculus bulbosus* L.  
bulbous buttercup
- 172, *Ranunculus parviflorus* L.  
small-flowered buttercup
- 173, *Rosa multiflora* Thunb. ex Murr.  
multiflora rose
- 174, *Rubus flagellaris* Willd.  
common dewberry
- 175, *Rubus pensilvanicus* Poir.  
Pennsylvania blackberry
- 176, *Rumex verticillatus* L.  
swamp dock
- 177, *Sanicula canadensis* L. var. *canadensis*  
black snakeroot
- 178, *Sassafras albidum* (Nutt.) Nees  
sassafras
- 179, *Saururus cernuus* L.  
lizard's-tail, water-dragon
- 180, *Sceptridium dissectum* (Sprengel) Lyon  
cut-leaf grape fern
- 181, *Scirpus cyperinus* (L.) Kunth  
woolgrass
- 182, *Scleria* sp.
- 183, *Scutellaria lateriflora* L.  
mad-dog skullcap
- 184, *Setaria pumila* (Poir.) Roemer & Schultes ssp. *pumila*  
yellow foxtail
- 185, *Sisyrinchium angustifolium* P. Mill.  
narrow-leaved blue-eyed-grass
- 186, *Smallanthus uvedalia* (L.) Mackenzie ex Small  
hairy leafcup
- 187, *Smilax bona-nox* L.  
catbrier
- 188, *Smilax rotundifolia* L.  
common greenbrier
- 189, *Spartina patens* (Ait.) Muhl.  
saltmeadow cordgrass
- 190, *Stellaria media* (L.) Vill.  
common chickweed
- 191, *Symphotrichum lanceolatum* (Willd.) Nesom var. *latifolium* (Semple & Chmielewski)  
broad-leaved white panicle aster
- 192, *Teucrium canadense* L.  
Canada germander
- 193, *Toxicodendron radicans* (L.) Kuntze var. *radicans*  
eastern poison ivy
- 194, *Typha latifolia* L.  
broadleaf cattail
- 195, *Ulmus alata* Michx.  
winged elm

### A.3, Fort Eustis Groundcover Species

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- 196, *Ulmus americana* L.  
American elm
- 197, *Vaccinium fuscatum* Ait.  
black highbush blueberry
- 198, *Vaccinium pallidum* Ait.  
early lowbush blueberry
- 199, *Verbesina occidentalis* (L.) Walt.  
yellow crownbeard
- 200, *Veronica arvensis* L.  
corn speedwell
- 201, *Vicia sativa* L. ssp. *nigra* (L.) Ehrhart  
narrowleaf vetch
- 202, *Vinca minor* L.  
periwinkle
- 203, *Viola cucullata* Ait.  
marsh blue violet
- 204, *Viola sororia* Willd.  
common blue violet, confererate violet
- 205, *Vitis vulpina* L.  
winter grape, frost grape
- 206, *Woodwardia areolata* (L.) T. Moore  
netted chain fern
- 207, *Woodwardia virginica* (L.) Sm.  
Virginia chain fern
- 208, *Youngia japonica* (L.) DC.  
asiatic false hawksbeard

#### A.4, Fort Eustis Sapling Species

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- 1, *Acer rubrum* L.  
red maple
- 2, *Ailanthus altissima* (P. Miller) Swingle  
tree-of-heaven
- 3, *Aralia spinosa* L.  
devil's walking-stick
- 4, *Asimina triloba* (L.) Dunal  
pawpaw
- 5, *Carpinus caroliniana* Walt.  
American hornbeam
- 6, *Carya glabra* (P. Miller) Sweet  
pignut hickory
- 7, *Carya tomentosa* (Poir.) Nutt.  
mockernut hickory
- 8, *Celtis laevigata* Willd.  
southern hackberry
- 9, *Celtis occidentalis* L.  
northern hackberry
- 10, *Cornus florida* L.  
flowering dogwood
- 11, *Diospyros virginiana* L.  
American persimmon
- 12, *Fagus grandifolia* Ehrhart  
American beech
- 13, *Ilex opaca* Aiton  
American holly
- 14, *Juniperus virginiana* L.  
eastern redcedar
- 15, *Liquidambar styraciflua* L.  
sweetgum
- 16, *Liriodendron tulipifera* L.  
tulip-poplar, tuliptree
- 17, *Magnolia grandiflora* L.  
southern magnolia
- 18, *Nyssa biflora* Walt.  
swamp tupelo
- 19, *Nyssa sylvatica* Marshall  
black gum, sour gum
- 20, *Persea palustris* (Raf.) Sarg.  
red bay
- 21, *Pinus taeda* L.  
loblolly pine
- 22, *Platanus occidentalis* L.  
American sycamore
- 23, *Populus heterophylla* L.  
swamp cottonwood
- 24, *Prunus serotina* Ehrhart var. *serotina*  
black cherry
- 25, *Pyrus calleryana* Dcne.  
callery pear
- 26, *Quercus alba* Linnaeus  
white oak
- 27, *Quercus bicolor* Willdenow  
swamp white oak
- 28, *Quercus falcata* Michaux  
southern red oak
- 29, *Quercus laurifolia* Michaux  
laurel oak
- 30, *Quercus michauxii* Nuttall  
swamp chestnut oak
- 31, *Quercus muehlenbergii* Engelman  
chinquapin oak
- 32, *Quercus nigra* Linnaeus  
water oak
- 33, *Quercus pagoda* Rafinesque  
cherrybark oak
- 34, *Quercus palustris* Muenchhausen  
pin oak
- 35, *Quercus phellos* Linnaeus  
willow oak
- 36, *Quercus velutina* Lamarck  
black oak
- 37, *Robinia pseudoacacia* L.  
black locust
- 38, *Sassafras albidum* (Nutt.) Nees  
sassafras
- 39, *Taxodium distichum* (L.) Richard var. *distichum*  
bald cypress
- 40, *Ulmus americana* L.  
American elm



## A.5, Fort Eustis Shrub Species

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- 1, *Baccharis halimifolia* L.  
eastern baccharis
- 2, *Callicarpa americana* L.  
American beautyberry
- 3, *Clerodendrum trichotomum* Thunb.  
peanut butter tree
- 4, *Elaeagnus pungens* Thunb.  
thorny olive
- 5, *Elaeagnus umbellata* Thunb.  
autumn olive
- 6, *Euonymus americana* L.  
strawberry bush
- 7, *Gaylussacia baccata* (Wangenh.) K. Koch  
black huckleberry
- 8, *Gaylussacia frondosa* (L.) Torr. & Gray ex Torr.  
blue huckleberry
- 9, *Ligustrum sinense* Lour.  
Chinese privet
- 10, *Lindera benzoin* (L.) Blume var. *benzoin*  
northern spicebush
- 11, *Lyonia ligustrina* (L.) DC.  
maleberry
- 12, *Morella cerifera* (L.) Small  
wax myrtle
- 13, *Rosa multiflora* Thunb. ex Murr.  
multiflora rose
- 14, *Symplocos tinctoria* (L.) L'Hér.  
common sweetleaf
- 15, *Vaccinium fuscatum* Ait.  
black highbush blueberry
- 16, *Vaccinium stamineum* L.  
deerberry

## A.6, Dominant Species by Compartment

Comp. #	Vegetative Class	Dominant Species
01	Canopy	black walnut, hackberry, sweetgum
	Shrubs	American beautyberry
	Saplings	sweetgum, red bay, southern, hackberry
	Groundcover	Japanese brome grass, Japanese stiltgrass, tall fescue, shoreline sedge, fox sedge
02	Canopy	loblolly pine, sweetgum, cherrybark oak
	Shrubs	wax myrtle, American beautyberry
	Saplings	red bay, sweetgum, loblolly pine, cherrybark oak, laurel oak
	Groundcover	Japanese stiltgrass, Virginia chain fern, common greenbrier, slender spikegrass, wood reedgrass
03	Canopy	loblolly pine, sweetgum, cherrybark oak
	Shrubs	American beautyberry, wax myrtle
	Saplings	red bay, sweetgum, tree-of-heaven, cherrybark oak, American holly
	Groundcover	Japanese stiltgrass, common chickweed, American beauty-berry, red bay, Sweetgum
04	Canopy	black walnut, sweetgum, hackberry
	Shrubs	autumn olive
	Saplings	black locust
	Groundcover	Japanese stiltgrass, Japanese brome grass, slender spikegrass, yellow crownbeard, common chickweed
05	Canopy	NA
	Shrubs	NA
	Saplings	NA
	Groundcover	NA
06	Canopy	sweetgum, loblolly pine, cherrybark oak
	Shrubs	wax myrtle, American beautyberry, peanut butter tree, thorny olive
	Saplings	red bay, sweetgum, flowering dogwood
	Groundcover	Japanese stiltgrass, slender spikegrass, red bay, Christmas fern, wood reedgrass
07	Canopy	loblolly pine, sweetgum, willow oak, cherrybark oak
	Shrubs	American beautyberry, wax myrtle
	Saplings	red bay, sweetgum, loblolly pine, black oak, flowering dogwood
	Groundcover	Japanese stiltgrass, Virginia cutgrass, slender spikegrass, American beauty-berry, red bay
08	Canopy	loblolly pine
	Shrubs	wax myrtle, American beautyberry
	Saplings	red bay, sweetgum, black oak, loblolly pine, devil's walking-stick
	Groundcover	slender spikegrass, Virginia cutgrass, red bay, Japanese honeysuckle, wax-myrtle
09	Canopy	loblolly pine, sweetgum, cherrybark oak
	Shrubs	American beautyberry, wax myrtle, Chinese privet, autumn olive, multiflora rose
	Saplings	red bay, sweetgum, devil's walking-stick, eastern redcedar, flowering dogwood
	Groundcover	Japanese stiltgrass, hop sedge, Japanese honeysuckle, Christmas fern, common chickweed

## A.6, Dominant Species by Compartment

Comp. #	Vegetative Class	Dominant Species
10	Canopy	loblolly pine, sweetgum, red maple
	Shrubs	wax myrtle, maleberry, black highbush blueberry
	Saplings	loblolly pine, sweetgum, American holly, black oak
	Groundcover	Japanese stiltgrass, lizard's-tail/water-dragon, Japanese honeysuckle, southern adder's-tongue, slender spikegrass
11	Canopy	loblolly pine, sweetgum, red maple
	Shrubs	wax myrtle, American beautyberry, strawberry bush
	Saplings	sweetgum, loblolly pine, red bay, American holly, black gum/sour gum
	Groundcover	New York fern, Japanese stiltgrass, slender spikegrass, Christmas fern, wax-myrtle
12	Canopy	loblolly pine, sweetgum, southern red oak
	Shrubs	American beautyberry, strawberry bush
	Saplings	sweetgum, eastern red cedar, southern hackberry
	Groundcover	Japanese stiltgrass, common chickweed, yellow crownbeard, Virginia cutgrass, wood reedgrass
13	Canopy	sweetgum, loblolly pine, cherrybark oak
	Shrubs	wax myrtle, American beautyberry, autumn olive, strawberry bush, northern spicebush
	Saplings	sweetgum, cherrybark oak, devil's walking-stick, red bay, flowering dogwood
	Groundcover	Japanese stiltgrass, sensitive fern/bead fern, Japanese honeysuckle, wax-myrtle, cleavers
14	Canopy	loblolly pine, sweetgum, cherrybark oak
	Shrubs	American beautyberry, wax myrtle
	Saplings	sweetgum, black oak, mockernut hickory, swamp chestnut oak, cherrybark oak
	Groundcover	Japanese stiltgrass, Christmas fern, slender spikegrass, yellow crownbeard, violet wood-sorrel
15	Canopy	loblolly pine, sweetgum, cherrybark oak
	Shrubs	wax myrtle, American beautyberry, autumn olive
	Saplings	loblolly pine, sweetgum, devil's walking-stick, American persimmon, black oak
	Groundcover	Christmas fern, Virginia wild rye, slender spikegrass, wax-myrtle, Japanese honeysuckle
16	Canopy	loblolly pine, sweetgum, cherrybark oak
	Shrubs	American beautyberry, wax myrtle
	Saplings	red bay, sweetgum, loblolly pine, eastern redcedar
	Groundcover	Japanese stiltgrass, slender spikegrass, Canada germander, Virginia wild rye, common rush/Soft rush
17	Canopy	loblolly pine, sweetgum, tulip poplar
	Shrubs	American beautyberry, wax myrtle
	Saplings	sweetgum, tree-of-heaven, devil's walking-stick, flowering dogwood, American holly
	Groundcover	Japanese stiltgrass, Christmas fern, common chickweed, false nettle, catbrier

## A.6, Dominant Species by Compartment

Comp. #	Vegetative Class	Dominant Species
18	Canopy	loblolly pine, sweetgum, black oak, tulip poplar
	Shrubs	American beautyberry, wax myrtle, strawberry bush, autumn olive
	Saplings	sweetgum, red bay, loblolly pine, tree-of-heaven, eastern red cedar
	Groundcover	Japanese stiltgrass, slender spikegrass, common greenbrier, American beauty-berry, yellow crownbeard
19	Canopy	loblolly pine, sweetgum, cherrybark oak
	Shrubs	American beautyberry, wax myrtle, autumn olive, Chinese privet
	Saplings	sweetgum, loblolly pine, red bay, black oak, eastern red cedar
	Groundcover	Japanese stiltgrass, wood reedgrass, common chickweed, autumn Olive, yellow crownbeard
20	Canopy	loblolly pine, sweetgum, black oak
	Shrubs	wax myrtle, American beautyberry
	Saplings	loblolly pine, sweetgum, black oak
	Groundcover	violet wood-sorrel, common rush/Soft rush, slender spikegrass, Japanese stiltgrass, common greenbrier
21	Canopy	loblolly pine, sweetgum, cherrybark oak
	Shrubs	wax myrtle, American beautyberry
	Saplings	loblolly pine, sweetgum, American persimmon, black oak, flowering dogwood
	Groundcover	Japanese stiltgrass, partidge-berry, cleavers, slender spikegrass, Japanese honeysuckle
22	Canopy	loblolly pine, cherrybark oak, willow oak, sweetgum
	Shrubs	wax myrtle, eastern baccharis
	Saplings	loblolly pine, sweetgum, cherrybark oak, black oak, southern red oak
	Groundcover	common rush/Soft rush, Japanese stiltgrass, bird's-foot trefoil, Long-leaved panic grass, leathery rush
23	Canopy	loblolly pine, cherrybark oak, sweetgum
	Shrubs	wax myrtle
	Saplings	sweetgum, loblolly pine, swamp tupelo, black gum/sour gum, American holly
	Groundcover	common reed, New York fern, slender spikegrass, common greenbrier, Virginia chain fern
24	Canopy	loblolly pine, sweetgum, willow oak, cherrybark oak
	Shrubs	wax myrtle, American beautyberry, autumn olive
	Saplings	sweetgum, black oak, willow oak, southern red oak, American persimmon
	Groundcover	Small-flowered Buttercup, Periwinkle, southern Lady fern, Indian-strawberry
25	Canopy	loblolly pine, sweetgum
	Shrubs	American beautyberry, blue huckleberry
	Saplings	sweetgum, black oak
	Groundcover	Japanese stiltgrass, wax-myrtle, Virginia wild rye, Virginia cutgrass, yellow crownbeard



## A.6, Dominant Species by Compartment

Comp. #	Vegetative Class	Dominant Species
26	Canopy	tulip poplar, cherrybark oak, American beech, sweetgum, loblolly pine
	Shrubs	blue huckleberry, black highbush blueberry, American beautyberry
	Saplings	American beech, sweetgum, American holly, red maple, pawpaw
	Groundcover	muscadine grape/Scuppernong, common daffodil, partidge-berry, sensitive fern/bead fern, American holly
27	Canopy	loblolly pine, tulip poplar, willow oak, sweetgum
	Shrubs	wax myrtle, deerberry, black huckleberry
	Saplings	sweetgum, loblolly pine, willow oak, American holly, black oak
	Groundcover	common rush/Soft rush, greenish-white sedge, woolgrass, Cinnamon fern, broad-leaved white panicle Aster
28	Canopy	American beech, white oak, tulip poplar, loblolly pine
	Shrubs	wax myrtle
	Saplings	American holly, sweetgum, American beech, tulip poplar, loblolly pine
	Groundcover	dangleberry, Virginia wild rye, poverty oatgrass, black huckleberry, white oak
29	Canopy	tulip poplar, American beech, sweetgum, cherrybark oak, loblolly pine
	Shrubs	wax myrtle
	Saplings	pawpaw, American holly, American hornbeam, black gum/sour gum, flowering dogwood
	Groundcover	wild comfrey, white-edged sedge, jack-in-the-pulpit, black gum/sour gum, Japanese stiltgrass
30	Canopy	tulip poplar, white oak, American beech, loblolly pine
	Shrubs	American beautyberry, thorny olive, common sweetleaf
	Saplings	pawpaw, sweetgum, red bay, American hornbeam, mockernut hickory
	Groundcover	pawpaw, wild comfrey, slender spikegrass, black Cherry, Virginia-creeper
31	Canopy	loblolly pine, sweetgum, southern red oak, tulip poplar, red maple
	Shrubs	wax myrtle, deerberry, American beautyberry
	Saplings	sweetgum, swamp cottonwood, loblolly pine, red maple, swamp chestnut oak
	Groundcover	New York fern, Japanese stiltgrass, lizard's-tail/water-dragon, slender spikegrass, common rush/Soft rush
33	Canopy	loblolly pine, cherrybark oak
	Shrubs	American beautyberry, wax myrtle
	Saplings	red bay, loblolly pine, tree-of-heaven, sweetgum, eastern redcedar
	Groundcover	shoreline sedge, common chickweed, saltmeadow cordgrass, Virginia cutgrass, American holly
34	Canopy	loblolly pine, cherrybark oak, sweetgum
	Shrubs	wax myrtle, American beautyberry
	Saplings	loblolly pine, red bay, eastern redcedar, devil's walking-stick, tree-of-heaven
	Groundcover	American holly, wax-myrtle, Loblolly Pine, slender spikegrass, American beauty-berry

### *A.6, Dominant Species by Compartment*

Comp. #	Vegetative Class	Dominant Species
35	Canopy	cherrybark oak, loblolly pine, sweetgum
	Shrubs	American beautyberry, wax myrtle, Chinese privet
	Saplings	loblolly pine, tree-of-heaven, eastern red Cedar, cherrybark oak
	Groundcover	Japanese stiltgrass, slender spikegrass, yellow crownbeard, tree-of-heaven, early forget-me-not
36	Canopy	loblolly pine, cherrybark oak
	Shrubs	wax myrtle
	Saplings	red bay
	Groundcover	Japanese stiltgrass, wax-myrtle, red bay, muscadine grape/Scuppernong, common Greenbrier
37	Canopy	loblolly pine, cherrybark oak
	Shrubs	American beautyberry
	Saplings	red bay, loblolly pine, sweetgum, cherrybark oak, willow oak
	Groundcover	common greenbrier, catbrier, slender spikegrass, red bay, muscadine Grape/Scuppernong
38	Canopy	NA
	Shrubs	NA
	Saplings	NA
	Groundcover	NA