FY 2011 Secretary of Defense Environmental Awards

Raven Rock Mountain Complex
Natural Resources Conservation, Small Installation

INTRODUCTION

Raven Rock Mountain is a historic property eligible for the National Register of Historic Places based on the property's historic context and association with the Cold War (Pennsylvania State Historic Preservation Office). Due to national security considerations, however, site access is restricted and many of the specifics about design, capability, and activities conducted at RRMC are classified. The mountainous RRMC is located in Adams County, Pennsylvania and is sustained by an Integrated Natural Resources Management Plan (INRMP). The site is 90% forested, enclosed within a fence, and comprises a magnificent forest of towering chestnut oak, tulip poplar, black oak, northern red oak, and pignut hickory trees. The INRMP outlines management principles and the broad range of current natural resource activities at RRMC as well as those planned for the next five years. The environmental office focuses on conserving and protecting natural resources through implementation of their INRMP. The contiguous forest habitat supports an extensive variety of wildlife including neotropical migrant birds, other nongame wildlife, and the common game species in Pennsylvania. The INRMP was reapproved by state and federal cooperators in 2011.

JUDGING CRITERIA:

- PM **Program Management**
- TM **Technical Merit**
- OM **Orientation to Mission**
- T **Transferability**
- SI **Stakeholder Interaction**

Deer are a common sight at RRMC

Mountain forest scene at RRMC

READY ALWAYS PERIOD

BACKGROUND

RRMC was initially included in Fort Ritchie's natural resources management plan. After the closure of Fort Ritchie in 1998, RRMC was transferred to Fort Detrick. Responsibility was then transferred to the Military District of Washington in 2002. Consequently, little attention was given to management of natural resources at RRMC. In 2003, RRMC started developing its own management plan instead of attempting to follow a plan developed primarily for Fort Ritchie. The 2004 INRMP compiled the broad range of ongoing natural resources activities and identified management issues to be addressed in the 5-year plan period. Annual reports were prepared to document implementation of the INRMP and provided to coordinators for review. The 2011 INRMP update, approved by state and federal coordinators, emphasizes stakeholder coordination and forest sustainability. Ongoing efforts under the INRMP address management issues and concerns related to forestry; wildlife; endangered, threatened, and rare species; invasive species; wetlands; storm water; and erosion and sediment control using an ecosystem management approach.

PROGRAM SUMMARY

The Commander is responsible for implementing the INRMP under the direction of the Environmental, Safety, and Health Management Directorate. A cross-functional management team consisting of facilities, security, engineering, and operations personnel provides oversight for development, implementation, and revision of the INRMP. The natural resources conservation management team consists of the Environmental, Safety and Health Director and three Environmental Protection Specialists. The environmental office focuses on conserving and protecting natural resources through implementation of their INRMP as part of the Environmental, Safety, and Health Management System. The management team is always aware of the requirements for conducting natural resources management operations within the context of a secure facility.

ACCOMPLISHMENTS

Overall Natural Resources Conservation Management

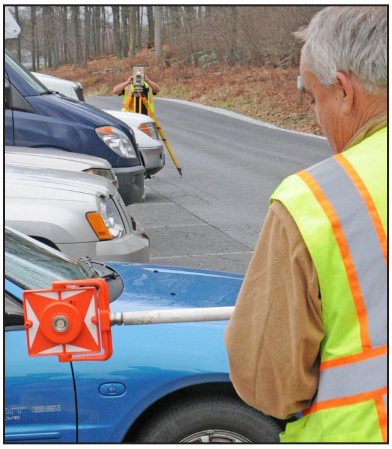
RRMC used partnerships and contractual support to implement installation-specific projects and augment their limited staff for natural resources management. This approach provided access to a wide range of subject matter experts, which resulted in an interdisciplinary approach to natural resources management. For example, the Pennsylvania Bureau of Forestry provided assistance in forest management, Pennsylvania Game Commission assisted in wildlife management, and the Center for Ecological Management of Military Lands at Colorado State University assisted in documenting the flora at RRMC. The goals and objectives in the INRMP are linked to sustainable forest management as the overarching theme. The primary accomplishments relate to development of a geographic information system (GIS), forest health monitoring, coordination with state and federal subject matter experts for forest management and deer population control, endangered species identification, conservation education, and land use management.

"The Pennsylvania Game Commission is pleased to provide the signed form approving the Integrated Natural Resources Management Plan (INRMP) submitted for the Raven Rock Mountain Complex property for the 2011 Update and Re-Approval request. The plan (INRMP) presented exceeds the required actions and you are to be commended for taking these actions"

Gary R. Camus
Pennsylvania Game Commission

Geographic Information System Support

RRMC initiated a comprehensive project in 2007 that included natural resources GIS support for implementation of the 2004 INRMP. Prior to the 2004 INRMP, there was no mapping information available to manage natural resources except for the 1966 county soil survey and 1977 topographic quadrangle. The launch of Google Earth satellite imagery-based mapping service in 2006 provided the first opportunity to begin spatial data development.



Survey team mapping infrastructure

Global positioning system (GPS) coordinates are used to map spatial features. Data layers were developed for forest health monitoring plots, invasive plant species mapping, invasive species control areas, migratory bird monitoring plots, wetland areas, 1994 timber stand delineations, deer hunting stands, and 5-meter topography. The GIS provides a visual framework for conceptualizing, understanding, and prescribing natural resource management actions. GIS is increasingly being envisioned as an enterprise information system to support day-to-day work management tasks and provide a broader context for assets and resource management.

Additional GIS support was provided in 2010-2011 to incorporate forestry sustainability projects designed to address the primary factors limiting forest regeneration such as deer over-browsing, lack of light availability to the forest floor, and abundance of invasive plant species. Ongoing efforts incorporate GIS data layers for forest regeneration areas, installation boundary, multiple use trails, timber management units, inventory data, and implementing a forest management plan.

Recent efforts incorporated infrastructure information in the GIS. Mapping of underground utilities and high resolution topography will be used to facilitate placement of storm water management structures and routine maintenance along the access road. The shared, highly accurate base maps will be used for preliminary planning and design work for all engineering projects, resulting in time and real cost savings and eliminate the need to conduct costly field surveys for each project.

Forest Health Inventory and Monitoring

While the oak-hickory-poplar forest at RRMC has been relatively undisturbed for more than 60 years, decades of over browsing by deer, invasive species, and lack of forest management precluded natural regeneration of native tree seedlings and threatened forest sustainability. A five year study of forest health revealed a forest in a moderate state of decline.

Forest health condition, vegetation diversity, and structure data were collected at RRMC and at the nearby Michaux State Forest in accordance with the U.S. Forest Service Forest Health Monitoring Program. Statistical analysis of data indicated that RRMC's forest health is primarily threatened by white-tailed deer over-browsing, lack of light availability to the forest floor, and abundance of competing invasive plant species.

Monitoring is conducted to gather data on the forest condition. The data describe a mature forest lacking sufficient regeneration to sustain the native trees.

Invasive Species Control and Pest Management

Pest Management at RRMC integrates the use of herbicides and pesticides with the INRMP to ensure the protection of natural resources.

Surveys identified 16 invasive plant species at RRMC. Locations have been mapped using GIS coordinates to augment efforts to control invasive plants. Most of RRMC has been found to be infested with one or more invasive species.

Selective herbicides have been used to control invasive species on approximately 180 acres. Target species include tree-of-heaven, princess tree, Japanese stiltgrass, garlic mustard, mile-a-minute vine, and Japanese barberry.

Forest Regeneration Project Areas

RRMC assembled a team of subject matter experts in deer management, forest regeneration, and forest management to initiate a forest regeneration project in 2010. The Pennsylvania Game Commission Law Enforcement Agent for Adams County provided technical expertise and guidance for deer control. The lead scientist for the U.S. Department of Agriculture (USDA) Forest Service, Forest Inventory and Analysis (FIA) project provided technical expertise and guidance for regeneration of native tree species. A local consulting forestry firm provided technical expertise and guidance on herbicide applications, planting native tree seedlings, and installing deer deterrent fencing. The Army Command Forester provided guidance and direction on consistency with the DoD forestry program.

Four forest regeneration project areas (24 acres) were established to demonstrate forest sustainability measures. The USFS, FIA installed 96 baseline monitoring plots to document pre-existing conditions within the project and control areas. The USFS, FIA team will continue future measurements and analysis.

Deer Deterrent Fencing

More than 50 percent of Pennsylvania's forests have inadequate regeneration due to deer over-browsing. The FIA team concluded in a survey that the entire area of RRMC forest lacks any native oak regeneration. In an effort to protect native tree seedlings, the forest regeneration project areas were enclosed by 8-foot high woven wire deer deterrent fencing. Fences are typical of those used

One of the forest regeneration areas enclosed by deer fencing. Note the request to keep the gates closed to protect the planted seedlings from deer browsing.

by Pennsylvania Department of Conservation and Natural Resources (DCNR), Bureau of Forestry and Pennsylvania Game Commission for deer exclusion projects. This cooperative effort between RRMC the Forest Service and the Game Commission is the first of its kind in a state with a long history of deer overpopulation.

"The RRMC facility has been challenged by extreme forest health and tree regeneration challenges for decades. Put simply, invasive plants and deer impacts have devastated native vegetation. Forest and wildlife management activities have reversed the threat and set the course for a bright future for the facility's forest ecosystem. This is the most intense victory for adaptive forest resource management I have seen in 28 years of experience."

-William H. McWilliams, U.S. Department of Agriculture

Forest Service Northern Research Station, Forest Inventory and Analysis Pennsylvania Regeneration Study Coordinator

Deer deterrent fencing used to protect planted tree seedlings from browsing.

Herbicide Applications for Forest Management

Selective herbicides were applied to kill invasive plants and competing vegetation in the forest regeneration areas using backpack mist sprayers. Eradication of approximately 99 percent kill of non-native and competing species was documented one growing season after spraying.

OM An air-blast mist blower mounted on a modified log skidder was used to conduct efficient and effective forest-wide herbicide applications. The wide tracks provided low ground pressure and navigability of the steep terrain. The applications were similar to efforts on state and federal lands in Pennsylvania.

Forest wide herbicide application using a modified skidder. Note the nozzles blasting herbicide mist from the back sides of the skidder.

Planting Native Seedlings

Approximately 10,300 native tree seedlings such as shagbark hickory, white pine, Norway pine, hawthorn, white ash, butternut, black walnut, tulip poplar, white oak, red oak, and black oak were planted in the forest regeneration areas. Seedling survival was 90 percent one month after planting.

Planting native tree seedlings in the forest regeneration areas. Note the absence of understory and groundcover from decades of deer over browsing.

Canopy Thinning Treatments

Thinning the forest canopy of diseased, damaged, suppressed, intermediate, and poor quality trees was scheduled to enhance light conditions for the planted seedlings. These efforts will be conducted as part of site preparation activities in the forest regeneration areas.

Timber Stand Mapping, Inventory, and Forest Management Plan

OM Forest-wide timber stand mapping and inventorying to prepare a forest management plan in accordance with Army Regulation 200-3 as a component of the INRMP is underway. Timber stands, inventory data, and prescriptions will be analyzed and managed in a GIS database. The forest management plan will facilitate management actions necessary to sustain the forest cover and the military mission.

Endangered Species Identification

A survey for the presence of timber rattlesnake (state candidate at risk species) denning sites was coordinated with the Pennsylvania Fish and Boat Commission Natural Diversity Section. The survey revealed that basking and denning habitat exists; however, no evidence of a denning population was found.

Surveys were also conducted for the presence of the Allegheny woodrat and the bog turtle, both state-listed threatened species. Again, suitable habitat was identified, but no recent evidence of Allegheny woodrat or bog turtle activity was found.

Bird Surveys

Seventy-eight species of migratory birds, including 41 neo-tropical migrant species were detected during fall and spring migratory and breed bird surveys. Survey methods were adapted from the U.S. Forest Service Handbook for Monitoring Birds, PSW-GTR-144.

Conservation Education

Environmental stewardship is only effective if all stakeholders are active participants. Every effort is made to ensure that the INRMP is integrated with the Environmental, Safety and Health Management System cross functional team. This team, composed of members from all Directorates and Mission Partners, mapped the implementation of every INRMP project.

Installation of a bluebird nest box at RRMC.

A bird habitat enhancement workshop resulted in the construction and installation of more than 25 nesting boxes by cross functional team members.

Site-specific educational booklets of trees, invasive plants and birds were prepared and distributed at stakeholder events, including Earth Day 2011. The booklets contain species descriptions, identification photographs, management options, and species distribution maps.

RRMC celebrates Earth Day each year to improve environmental awareness and participation in the conservation programs. The 2011 Earth Day theme was a *Billion Acts of Green* and pledge cards were distributed to all in attendance. Guest speakers were invited to present a wide range of topics including Green Infrastructure and a historical account of the Battle of Gettysburg.

The American Chestnut Foundation and RRMC volunteers planted an educational chestnut tree demonstration grove.

A Gettysburg Honeylocust Witness Tree seedling was planted as part of the 2011 Earth Day events.

PM Environmental Program Training Modules. The Environmental, Safety and Health Management System includes interactive, web-based training modules. These conservation education efforts provide awareness of environmental protection as it relates to the various regulations that govern RRMC's environmental and occupational health programs.

Land Use Management

OM **Storm Water Management Plan.** RRMC is located at the nexus of the Potomac and Susquehanna/Chesapeake watersheds, critical for regional ecosystem function. A Storm Water Pollution Prevention Plan (SWPPP) is maintained and has been updated biannually since 2005 to meet the emerging regulations for the Chesapeake Bay watershed. The SWPPP is a tool for establishing best management practices that minimize sediment loading to the watershed. As a National Pollution Discharge Elimination System permitted facility, RRMC prepares an erosion and sediment control plan for all earth-disturbing activities.

Site-wide Storm Water Assessment. A site-wide storm water assessment has been conducted biannually since 2005 to manage storm water runoff from non-point sources and various defined outfalls. Emphasis is on identifying erosion damage that compromises site security and causes sediment loading to the watersheds. In keeping with the DoD initiatives for addressing global climate change, the forecasted patterns of increasing frequency and intensity of storms are considered in the biannual storm water assessments.

OM **Erosion Control.** Erosion control measures include planting native species to provide ground cover, contouring the landscape around structures, installing culverts and drop inlets, and installing gabion walls and armored pathways to control storm water flow during heavy precipitation events. Ten projects were completed in the past two years. The erosion and sediment control measures implemented at RRMC are critical to maintaining site access. These efforts help to ensure that the command is *READY ALWAYS PERIOD.*

Storm water management and erosion control.

CONCLUSION

RRMC's accomplishments in natural resources conservation management are the result of working cooperatively with subject matter experts and natural resources agency stakeholders, focusing on forest sustainability using an ecosystem management approach, and promoting environmental awareness to facilitate mission readiness into the future. The natural resources program is providing the ecological restoration needed for long-term sustainability of the oak-hickory-poplar forest and is the first example of forest management on the installation in more than 50 years. These accomplishments demonstrate RRMCs efforts, using limited resources, to sustain the environment while helping achieve the mission. Future generations will benefit and be witness to the environmental stewardship exhibited at RRMC today.