

Appendix H



USFWS

Prescribed fire

Environmental Assessment and Fire Management Plan for Montezuma National Wildlife Refuge and St. Lawrence Wetland and Grassland Management District

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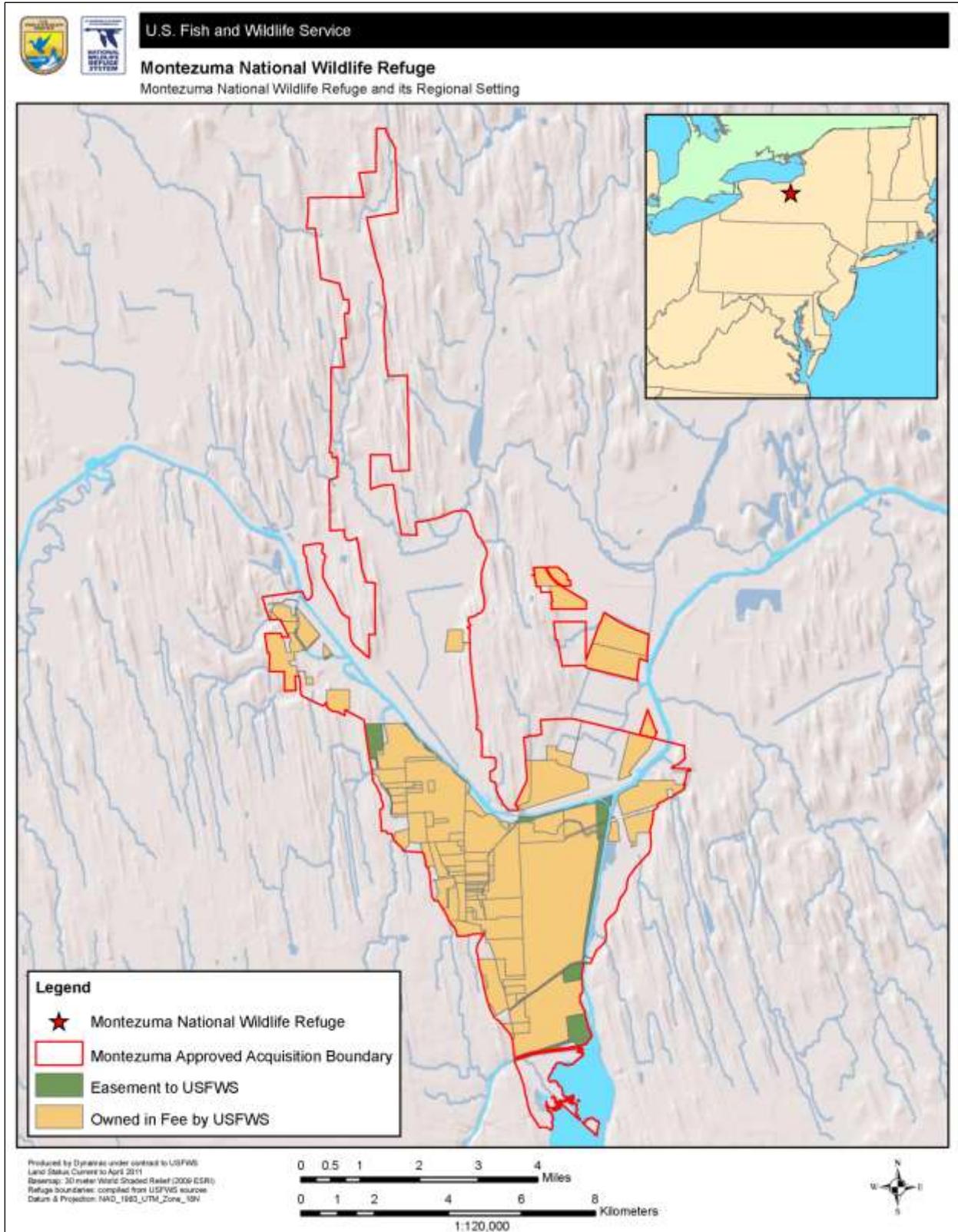
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Map H.1. Vicinity Map of Montezuma National Wildlife Refuge.

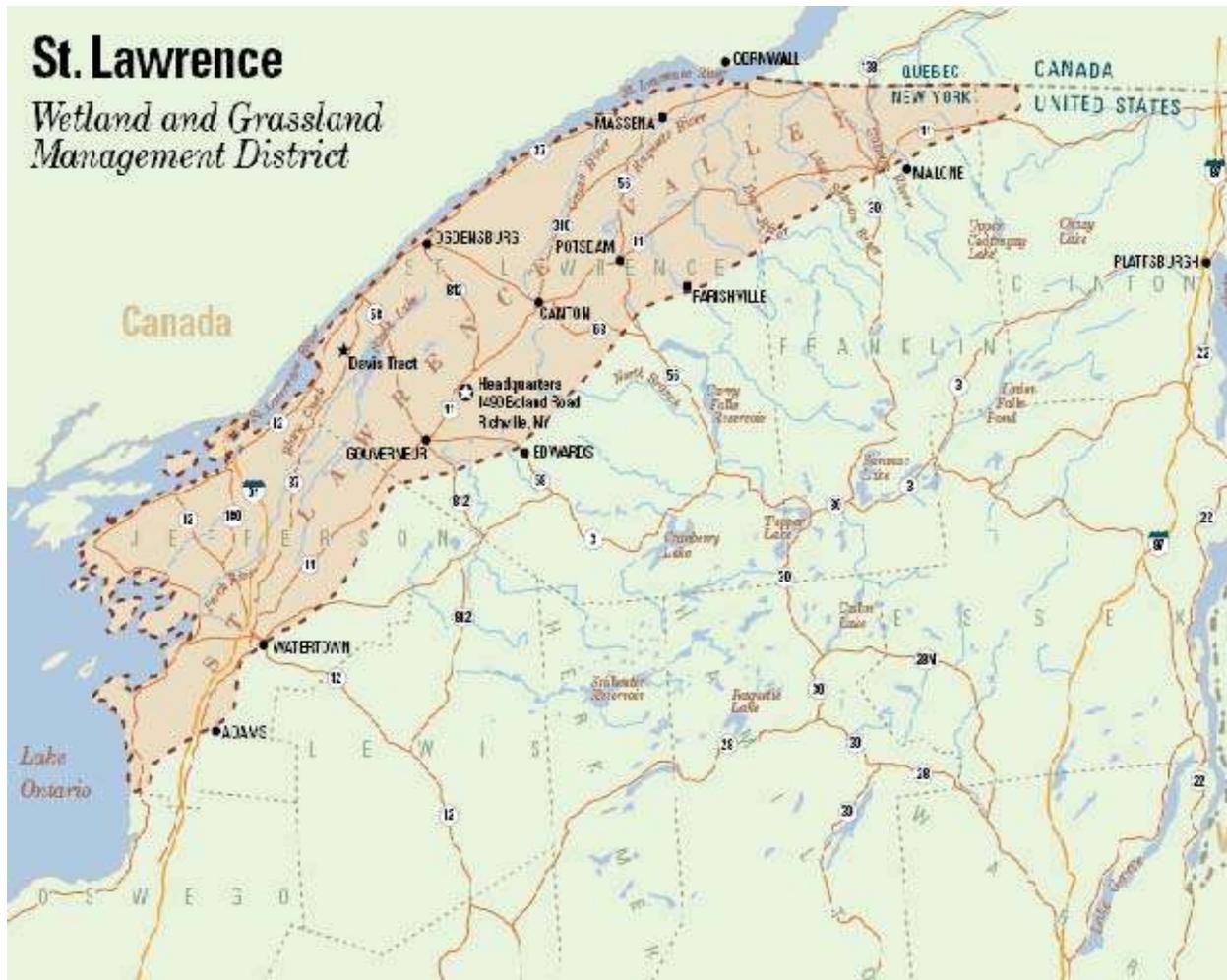


Figure H.1. St. Lawrence Wetland and Grassland Management Unit.



SUMMARY

The U.S. Fish and Wildlife Service (the Service, USFWS) policy requires that any refuge with combustible vegetation must prepare a Fire Management Plan (FMP). The USFWS is therefore proposing to develop an updated FMP for Montezuma National Wildlife Refuge (the refuge, NWR) and St. Lawrence Wetland and Grassland Management District (WMD). The plan would guide and direct the wildland fire program for the refuge and would support the accomplishment of resource management objectives.

Under an existing FMP, refuge management would continue an ongoing program to reduce fuel accumulations around values at risk, use prescribed fire to maintain a variety of vegetative cover types, and reduce invasive plants that threaten native species. All unwanted wildfires would be aggressively and immediately suppressed.

Two alternatives were considered for Montezuma NWR and St. Lawrence WMD FMP:

Alternative A – No action alternative: All wildfires would be fully and aggressively suppressed.

Alternative B – Service-preferred alternative: Suppress wildfires and use prescribed fire and manual/mechanical fuels reduction to meet objectives.

Under each alternative, suppression operations would include a quick response to wildfires to achieve effective control for the protection of human life and property with the least amount of damage to refuge resources.

Three other alternatives were considered but were dismissed from further analysis. A fire management program at Montezuma NWR that includes wildland fire use as a management option was considered, but the refuge is too small to allow free-burning fires without a substantial risk to public safety and property. A second alternative considered using only suppression and manual fuels management strategies to meet refuge objectives. Without the ability to use prescribed fire, many fire management, resource protection, and vegetation maintenance/restoration objectives would not be attainable. A third alternative considered but dismissed was no management, meaning that all wildfires would be allowed to burn unimpeded on the refuge. This alternative was dismissed because it is too risky and would not meet resource protection objectives.

This environmental assessment/assessment of effect analyzes the impacts of the alternatives on: vegetation; nonnative, invasive plant species; wildlife; threatened, endangered, and sensitive animal species; soils; water resources; air quality; cultural resources; and public health and safety. Measures to mitigate adverse effects on refuge resources are identified. The cumulative effects of each alternative are also described. Based on the analysis, there would be no direct, indirect, or cumulative major effects to resources resulting from the preferred alternative.

Public Comment

If you wish to comment on the environmental assessment/assessment of effect, you may mail comments to the address below. This document will be on public review for 30 days in conjunction with the release of the refuge's draft Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA). Please note that names and addresses of those who comment become part of the public record. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations, businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses available for public inspection in their entirety.

Please address comments to:

Refuge Manager
Montezuma National Wildlife Refuge
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1.0 INTRODUCTION

The U.S. Department of the Interior policy (620 DM 1.4) states that, “every area with burnable vegetation must have an approved Fire Management Plan (FMP).” The Montezuma National Wildlife Refuge (NWR, refuge) FMP has been developed in response to this policy statement.

1.1 Purpose and Need

Pursuant to the National Environmental Policy Act (NEPA) of 1969, this Environmental Assessment (EA) is intended to identify and examine the various options (alternatives) for the Montezuma NWR FMP and also includes the St. Lawrence Wetland and Grassland Management District (WMD) under refuge administration. The FMP sets forth the program direction through resource and fire management goals, objectives, and strategies necessary for the suppression of unwanted fire and the use of fire as a viable management tool on the refuge.

The EA considers anticipated natural and human environmental consequences of each identified alternative, including a preferred alternative outlining the proposed future management direction.

This action is necessary to meet and update important fire-related resource management needs and national and agency fire management policy changes from the existing Montezuma NWR FMP, approved in 1997, and proposed fire management strategies for St. Lawrence WMD. Discussions in this document will apply to both management units unless stated otherwise.

First, the 2001 Federal Fire Management Policy update addresses 17 wildland and prescribed fire-related directions. The foremost of these is to provide for human safety. FMPs and operational fire management actions must reflect this commitment. The policy also provides for a full range of management responses to any given wildland fire.

Moreover, this policy represents a significant departure from past fire management practices. All ignitions occurring in wildland areas are now classified as wildfires or prescribed fires. Wildland fires include any nonstructure fire that occurs in the wildland, and includes prescribed fire. Under this policy, wildfires are considered to be unwanted events regardless of whether the origin is natural (e.g., lightning) or human (accident or arson). All wildfires receive a suppression response. Prescribed fires include any fire ignited by management actions to meet stated management objectives in an FMP. Prior to the ignition of prescribed fires, a written and approved prescribed fire plan must exist, and NEPA requirements must be met. This EA constitutes the requisite NEPA documentation and compliance for the FMP.

Secondly, and from a resource management standpoint, fire as a management tool can benefit wildlife in many ways. This may include: maintenance and restoration of native grasslands; recycling of nutrients tied up in old plant growth; control of woody and herbaceous plants, including invasive species; reduction of monocultures; improvements in forage quality; promoting habitat quality for listed species; increased plant growth; and reduced risk of large wildfires.

The habitat goals and objectives in the Montezuma NWR Habitat Management Plan (HMP) (USFWS 2008) provide an important foundation for the refuge's CCP. The goals listed in the Montezuma NWR HMP are in priority order.

Goal 1

Provide high-quality mudflat and freshwater emergent marsh and open water wetland habitats dominated by native plants for migrating and breeding waterfowl, shorebirds, waterbirds, marshbirds, and bald eagles provided through water level control.

Goal 2

Restore and maintain bottomland hardwood forests (forested wetland), the riparian forests along the Seneca and Clyde Rivers, and upland forests to increase block size and connectivity and reduce fragmentation to support nesting waterfowl and songbirds, breeding amphibians, and uncommon plant communities.

Goal 3

Provide a diverse mix of grasslands and shrublands within the Montezuma Wetlands Complex (MWC) juxtaposed to reduce fragmentation and edge effect and to enhance habitat quality for priority species of conservation concern.

Goals set out for St. Lawrence WMD in the EA, Conceptual Management Plan, and Land Protection Plan (USFWS 2006b) include:

Goal 1

Protect and maintain, restore and enhance the quality and quantity of wetland and grassland resources of the St. Lawrence Valley to support a diversity of plants, animals, and Trust Resources, particularly breeding and migrating waterfowl and other grassland-nesting migratory species.

Goal 2

Maintain the integrity of the unique ecological communities and rich natural resources of the St. Lawrence Valley by working cooperatively with private landowners, stakeholders, and local communities in an ecologically sound, economically feasible, and socially acceptable way.

Goal 3

Provide opportunities for priority, high-quality, wildlife-dependent public use where appropriate and compatible with wildlife and habitat goals and the purposes for establishment.

As stated above, Montezuma NWR completed a FMP in 1997 to guide all fire program activities on the refuge (USFWS 1997). The 1997 FMP was accompanied by an EA, as required under NEPA and the National Historic Preservation Act. The highest priority of the refuge's existing FMP is the protection of life, property, and natural resources from fire.

Broad fire management objectives articulated in the revised FMP for Montezuma NWR and St. Lawrence WMD are the following:

- Firefighter and public safety is the first priority in every fire management activity.
- The role of wildland fire as an essential ecological process and natural change agent has been incorporated into the planning process. Federal agency land and resource management plans set the objectives for the use and desired future condition of the various public lands.
- FMPs, programs, and activities support land and resource management plans and their implementation.
- Sound risk management is a foundation for all fire management activities. Risks and uncertainties relating to fire management activities must be understood, analyzed, communicated, and managed as they relate to the cost of either doing or not doing an activity.
- FMPs and activities are economically viable, based upon values to be protected, costs, and land and resource management objectives.
- FMPs and activities are based upon the best available science.
- Fire management plans and activities incorporate public health and environmental quality considerations.
- Federal, State, Tribal, local, interagency, and international coordination and cooperation are essential.
- Standardization of policies and procedures among Federal agencies is an ongoing objective.

1.2 Location and Description

1.2.1 Montezuma NWR

Montezuma NWR is located at the north end of Cayuga Lake in the heart of the Finger Lakes region of central New York State. The 9,152-acre refuge lies within New York's 24th U.S. Congressional District in Seneca, Wayne, and Cayuga Counties—35 miles west of Syracuse, 40 miles north of Ithaca, and 45 miles east of Rochester, NY. The refuge headquarters is located on State Route 5 and U.S. Route 20, near the Menard Memorial Bridge over the Cayuga-Seneca Canal. The refuge is bordered on the south by segments of the New York State Canal System. The western boundary is irregular, following segments of New York State Route 89, Gravel Road, and East Tyre Road. U.S. Routes 5 and 20, New York State Route 89, the New York State Thruway (I-90), and segments of the New York State Canal System pass through the interior of the refuge. Since the early 1990s, over 2,500 acres of land have been added to the refuge. Many of these parcels are scattered tracts within the original boundaries of the historic Montezuma marshes.

Although established primarily for migratory waterfowl, Montezuma NWR provides habitats for an abundance of wildlife species. The mix of wooded wetlands, emergent marshes, and mixed

successional stages of vegetation on the upland areas all contribute to the species diversity of the wildlife community found at Montezuma. The MWC, of which the refuge is a part, was recognized for supporting one of the largest migratory concentrations of waterfowl in the Northeast and as a significant stopover site for migrating shorebirds in upstate New York. The MWC was New York's flagship project in the Atlantic Coast Joint Venture after the adoption of the North American Waterfowl Management Plan. The National Audubon Society identified the MWC as an Important Bird Area (IBA). At present, Montezuma NWR has 16 manageable impoundments totaling over 4,700 acres of freshwater wetland habitat. Water levels are managed within and between years in an attempt to mimic natural wetland hydroperiods or to provide the best possible habitat for priority wildlife species. Of note, the MWC supports the second-largest population of cerulean warblers in New York, a species of high conservation concern. Cerulean warblers breed in riparian forested wetlands, a habitat that was drained or cleared in many other areas (USFWS 2006a).

Approximately 1,000 acres of mature bottomland floodplain forest is dominated by red maple, American elm, green ash, and swamp white oak. This unique ecosystem provides breeding habitat for cavity-nesting waterfowl (primarily wood duck), migratory songbirds (such as cerulean warbler), and breeding amphibians. The New York Natural Heritage Program (NYNHP) identified the Montezuma floodplain forest as a significant ecological community.

1.2.2 St. Lawrence WMD

Located in Jefferson County, with a field office in Richville, New York, St. Lawrence WMD (established in 1997) is managed by the Service for conserving freshwater wetland habitat and extensive grassland acreage that support large breeding and migratory populations of waterfowl and grassland birds. More than 300 partnerships on 350 wetland and grassland habitat restoration sites totaling 5,250 acres have been established over the last 15 years. The Service also manages three Farm & Home Administration (FHA) transfer properties totaling 1,000 acres, which it owns in fee-title, and 19 wetland easements totaling 1,125 acres.

The St. Lawrence WMD manages and protects wetlands for high-quality waterfowl migration and brood-rearing habitat for species such as mallards. Grassland management focuses on nesting waterfowl and other bird species, such as Henslow's sparrow, bobolink, eastern meadowlark, and short-eared owl. The North American Waterfowl Management Plan of 1986 designated the Lower Great Lakes-St. Lawrence Basin, including the valley, as one of the first 34 waterfowl habitat areas of major concern in North America (USFWS 2006b).

1.3 Relationship to Other Plans

The 1997 National Wildlife Refuge Improvement Act requires all refuges to complete CCPs by 2012. Once completed and approved, the Montezuma NWR CCP will provide overall management guidance for maintenance, restoration, and use of refuge resources. A HMP for Montezuma NWR, completed in 2008, also supports the CCP and is much more site-specific in detail. The HMP sets a direction for the next 15 years (2008-2022) with plan review every 5 years and use of adaptive management to assess and modify management activities as new research and monitoring information become available.

Supporting the CCP and HMP, the Montezuma FMP as stated above represents an update from an earlier FMP. However, many policies with respect to the fire management program have changed and are addressed in the updated plan. The FMP will receive an annual review with a formal revision in 5 years.

The St. Lawrence WMD EA, Conceptual Management Plan, and Land Protection Plan (July 2006) currently provide management direction for this unit. The FMP will serve to support the mission, goals, and objectives stated in these management documents.

1.4 Laws, Policies, and Authorities

The National Wildlife Refuge System (Refuge System) includes Federal lands managed primarily to provide habitat for a diversity of wildlife species. The purpose(s) for which a particular refuge is established are specified in the authorizing document for that refuge. These purposes guide the establishment, design, and management of the refuge.

Key authorities, statutes, and orders that guide operations and management are summarized in the following section.

Migratory Bird Conservation Act (1929), as amended (16 U.S.C. 715-715s)

The Secretary of Interior is authorized to cooperate with local authorities in wildlife conservation and to conduct investigations, to publish documents related to North American birds, and to maintain and develop refuges.

National Wildlife Refuge System Improvement Act (1997)

This Act calls for managing the Refuge System to conserve biological diversity by applying the latest scientific information and methods to refuge management.

Fish and Wildlife Coordination Act (1934), as amended (16 U.S.C. 661-666)

This Act authorizes the preparation of plans to protect wildlife resources, the completion of wildlife surveys on public lands, and the acceptance by the Federal agencies of funds or lands for related purposes, provided that land donations received the consent of the state in which they are located.

National Wildlife Refuge System Administration Act of 1966 (U.S.C. 668dd-668ee)

This Act provides guidelines and directives for administration and management of all areas in the system, including “wildlife refuges, areas for the protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, or waterfowl production areas.”

Fish and Wildlife Conservation Act of 1980 (Public Law 96-366, dated September 29, 1980)

Public Law 96-366 authorized the Service to monitor and assess migratory nongame birds, determine the effects of environmental changes and human activities, identify those likely to become candidates for endangered species listing, identify appropriate actions, and report to Congress one year from enactment. It also requires the Service to report at 5-year intervals on actions taken.

The Federal Noxious Weed Act Public Law 93-629 (7 U.S.C. 2801 et. Seq.; 88Stat. 2148)

This Federal law established a program to control the spread of noxious weeds.

Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands)

These Executive Orders prohibit any significant changes to the natural and beneficial values of the floodplain or wetland and require avoidance of direct and indirect support of floodplain development.

Executive Order 12996 (Management and Public Use of the National Wildlife Refuge System)

This order defines a conservation mission for the Refuge System to “preserve a national network of lands and waters for the conservation and management of fish, wildlife, and plants of the United States for the benefit of present and future generations.”

National Environmental Policy Act of 1969, as Amended

The National Environmental Policy Act, or NEPA, established a national policy for the environment. Preparation of this EA is a part of the compliance process.

Clean Water Act, as amended

The Clean Water Act provides for the restoration and maintenance of the physical, chemical, and biological integrity of the nation’s waters. Section 404 of the act prohibits the discharge of fill material into waters of the United States, including wetlands.

Clean Air Act (42 United State Code (USC) 7401 et Seq.)

The Act requires states to attain and maintain the national ambient air quality standards adopted to protect health and welfare. This encourages states to implement smoke management programs to mitigate the public health and welfare impacts of wildland and prescribed fires managed for resource benefit

Endangered Species Act (ESA) of 1973, as amended

The ESA provides for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend, through Federal and state actions. A consultation pursuant to Section 7 of the Endangered Species Act was conducted as part of this project to ensure that the proposal would not affect the continued existence of any endangered or threatened species in the project area or result in destruction or adverse modification of their critical habitats.

National Historic Preservation Act

Section 106 of the Act of 1966 requires Federal agencies to consider the effects of their undertakings on properties meeting the criteria for the National Register of Historic Places.

Departmental Manual (Interior), Part 620 Wildland Fire Management, Chapter 1 General Policy and Procedures (April 10, 1998)

This authority defines Department of Interior Fire Management Policies.

The Federal Wildland Fire Management Policy and Program Review (USDA/USDI 1995) and Wildland and Prescribed Fire Management Policy Implementation Procedures Reference Guide (USDA/USDI 1998)

These policies provide specific guidance on fire planning and implementation and require FMPs to recognize the full range of fire management actions to accomplish stated protection and resource management objectives. The policy states:

Fire, as a critical natural process, will be integrated into land and resource management plans and activities on a landscape scale, across agency boundaries, and will be based upon best available science. All use of fire for resource management requires a formal prescription. Management actions taken on wildfires will be consistent with approved fire management plans.

1.5 Issues and Impact Topics Analyzed in Detail

A resource, value, or condition that is protected by Federal, state, or local laws and regulations; executive orders; and USFWS policy can be an impact topic. An impact topic can also be a unique or limited national, regional, or local resource or value. The following impact topics were identified for Montezuma NWR and St. Lawrence WMD:

Vegetation

Wildland fire may affect plant species richness and grassland/wetland plant community diversity. Also, impacts of wildland fire and fire management activities may affect nonnative species.

Soils

Wildland fire may affect soil erosion, soil chemistry, and related processes.

Threatened, Endangered, and Sensitive Plant Species

There are no known federally listed threatened or endangered plants presently occurring on the refuge or WMD.

Wildlife

Wildland fire may injure, kill, or stress wildlife and change wildlife habitat attributes.

Threatened, Endangered, and Sensitive Animal Species

There are no official federally listed species occurring on the refuge or WMD. However, the St. Lawrence River valley shelters important breeding populations of birds listed as threatened in the State of New York, as does Montezuma NWR. Wildland fire may have an impact on these populations.

Water and Wetland Resources

Wildland fire potentially may affect water quality, quantity, and/or wetland ecosystems on or near burned areas or from equipment used on wildland fire suppression, possibly affecting siltation and nutrient loading and water levels. Wildland fire can result in damage or loss of wetland vegetation and wildlife.

Air Quality

Emissions from wildland fires may degrade air quality below State and local standards.

Health and Safety

Wildland fire may affect the health of the public or firefighters. Managing fuels in certain areas may protect the health and safety of the public and firefighters; smoke may cause respiratory problems.

1.6 Issues and Impact Topics Considered and Dismissed from Further Consideration

NEPA and the Council on Environmental Quality (CEQ) regulations direct agencies to “avoid useless bulk...and concentrate effort and attention on important issues” (40 CFR 1502.15). Some impact topics that are relevant to other kinds of proposals or projects are not relevant to the FMP alternatives considered in this EA. Potential issues and impact topics that were dismissed from further consideration were:

Cultural Resources

No archaeological, cultural, or historic resources are known to exist on refuge or WMD lands. However, should any be discovered during wildfire incidents or any phase of planning for fire use, a cultural resources specialist would be assigned to establish protection measures.

Wilderness Character

There is no designated wilderness, nor any refuge or WMD lands under study for wilderness designation. Therefore, wilderness character was dismissed from further analysis.

Prime and Unique Farmlands

In August 1980, the CEQ directed Federal agencies to assess the impacts of their actions on farmland soils classified by the Natural Resources Conservation Service (NRCS) as prime or unique. Prime or unique farmland is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed; or unique farmland specialty crops such as fruits, vegetables, and nuts. According to the NRCS, none of the soils on any of Montezuma NWR are classified as prime or unique farmlands. Therefore, the topic of prime and unique farmlands was dismissed from further analysis.

Socioeconomics

NEPA requires an analysis of impacts to the “human environment” which includes economic, social, and demographic elements in the affected area. Implementation of fire management activities, particularly prescribed burning, may require temporary closures of project areas which may, in turn, inconvenience some visitors and public. Such closures, however, are likely to be limited in size and of very short duration. Some fire management activities may bring a short-term need for additional personnel on the refuge, but that would not substantially affect local businesses or the economy. Thus, the alternatives would have a negligible impact on local businesses and the economy. Therefore, the socioeconomic environment will not be addressed as an impact topic.

Environmental Justice

Executive Order 12898, “General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” requires all Federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high adverse health or environmental effects of their programs on minorities and low-income communities. Executive Order 13045 requires Federal actions and policies to identify and address disproportionately adverse risks to the health and safety of children. The alternatives would not disproportionately affect the environment or health of minority or low-income populations or communities as defined in the Environmental Protection Agency’s Environmental Justice Guidance (US EPA 1998). Therefore, environmental justice was dismissed from further analysis.

Native American Traditional Values

As there have been no identified or documented traditional values associated with the refuge, the wildland fire program will not affect ethnographic resources linked to Native American traditional values.

Museum Objects

There is currently no museum or significant collection of objects at the refuge.

Noise

Noise is defined as an unwanted sound. Hazard fuels reduction, hazard tree removal, prescribed fires, and fire suppression can all involve the use of noise-generating equipment such as motorized vehicles and equipment. However, it would not substantively interfere with human activities in the area or with wildlife behavior. The infrequent noise associated with fire management activities would not chronically impair the solitude of the refuge to any degree. Therefore, this impact topic was dismissed from further analysis.

Waste Management

None of the fire management alternatives would generate hazardous material or solid wastes that require disposal in hazardous waste or general sanitary landfills. Therefore, this impact topic was dismissed from further analysis.

Transportation

The FMP alternatives would not substantively affect transportation in and around the refuge. There may be temporary closures of nearby roads during fire suppression or prescribed burning activities. However, as evidenced by a low-occurrence fire history, such closures would be very infrequent and would not substantially impinge on local transportation. The impacts of all alternatives on transportation would be negligible. Therefore, this impact topic was dismissed from further analysis.

Utilities

None of the proposed alternatives would cause any effects to existing utility systems on the refuge. Therefore, this impact topic was dismissed from further analysis.

2.0 ALTERNATIVES

Alternatives are an array of proposals that satisfy the purpose and need for the Fire Management Plan outlined in section 1.1. Alternatives should be “reasonable” and meet project objectives. The alternatives that follow were developed from information obtained from the Montezuma NWR Interdisciplinary Team (IDT) scoping process, agency guidance, the Federal Fire Policy, the National Fire Plan, and relevant literature.

Two alternatives were identified by the IDT, one of which meets management objectives. The “no action” alternative is included for analysis in compliance with NEPA.

2.1 Description of Alternatives

Alternative A – No Action

Without an updated refuge FMP, all wildfires would be fully and aggressively suppressed. Rapid assignment of firefighters with hand tools and, in some situations, mechanized equipment would be used to suppress all fires. However, in consideration of firefighter safety, an incident commander would carefully evaluate whether to send fire crews into areas with heavy vegetation, especially under severe fire season conditions.

Wildfire occurrence on Montezuma NWR is very low, with 3 small fires recorded over the past 9 years (1986, 1991, and 1994). All were human-caused, and the largest was just over 5 acres.

Also under alternative A, prescribed fires would not be an allowable option to treat fuels, conduct maintenance burns, or consume debris, unless separate NEPA compliance for the burn was completed.

Alternative B – Proposed Action/Service-preferred Alternative: Suppress wildfires and use prescribed fire and manual/mechanical fuels reduction to meet objectives.

Under alternative B, suppression operations on all unplanned wildfires would be commensurate with values to be protected, human safety, and suppression costs. For example, where an assessment of an initiating fire indicates a potential to threaten identified values or to cross refuge or WMD boundaries, a prompt and aggressive suppression action would be taken to minimize such threats at minimum cost, similar to alternative A. However, under alternative B, the manager has the discretion (based on criteria in the FMP) to actively suppress wildfires using natural barriers (e.g., open water, breaks in vegetation) and human-made features such as roads, trails, etc., that would serve to minimize disturbance to resource values.

The primary strategy under alternative B is the use of prescribed fire as a management tool. An approved prescribed fire plan (also called a “burn plan”) must be written for each prescribed fire project. A burn plan (according to wildland fire policy) outlines the management objectives, prescription, resources to be used, contingencies, and mitigation required for the prescribed fire.

An additional strategy would be nonfire treatments to accomplish fuels management objectives. Mowing, disking, and hand cutting of vegetation would be employed to reduce hazardous fuels from around values at risk.

Refuge vehicles would be deployed where necessary to suppress unwanted wildland fires, but would be restricted to existing refuge or WMD roads for fuels reduction and prescribed burning operations. Tools for prescribed fires would be hand-carried equipment such as hand tools, saws, backpacks, drip torches, and portable pumps for hose-lays from engines stationed along roads or pumping from pools.

Monitoring would consist of notated photos taken before and following treatment and would be used to determine if objectives of the burn have been met.

2.2 Alternatives Considered but Dismissed

Alternative C – Include wildfire as a Management Option

A fire management program at Montezuma NWR and St. Lawrence WMD that allows wildfire as a management option was considered. The refuge is too small to allow free-burning fires to achieve resource objectives without a substantial risk to public safety and property. Further, only personnel with specialized skills and training are qualified to manage such fires; such personnel are not always readily available onsite as required by agency policy. This same reasoning also applies to St. Lawrence WMD.

Alternative D – Use Suppression and Manual Fuels Management Strategies Only

Use only suppression and manual fuels management strategies to meet objectives. Without the ability to use prescribed fire, many fire management, resource protection, and vegetation maintenance and restoration objectives would not be attainable.

Alternative E - No Management

This alternative would allow all wildfires to burn unimpeded without any management action. This alternative was dismissed because it is too risky and would not meet resource protection objectives.

2.3 Mitigating Measures

According to NEPA regulations (40 CFR 1508.20), mitigation actions do one of the following

- avoid the effect altogether by not taking a certain action or parts of an action;
- minimize impacts by limiting the degree or magnitude of the action and its implementation;
- rectify the impact by repairing, rehabilitating, or restoring the affected environment;
- reduce or eliminate the impact over time by preservation and maintenance operations during the duration of the action; or
- compensate for the impact by replacing or providing substitute resources or environments.

Minimum Impact Suppression Tactics (MIST) is defined as the application of strategy and tactics that effectively meet suppression objectives with the least environmental, cultural, and social impacts. MIST would be employed during suppression operations.

Public and firefighter safety is the number one priority in fire management. The Federal Fire Policy states “firefighter and public safety is the first priority, and all fire management plans and

activities must reflect this commitment.” Specifically, the refuge and WMD would:

- Restrict portions of the area(s) by order of the refuge manager when there is any threat to the public or firefighters from a wildfire or fire management activities.
- Smoke warning signs will be posted on roadways and/or traffic control will be instituted during wildland or prescribed fires as needed.
- All fire personnel will receive annual training in all wildland fire safety standards (including the 10 Standard Fire Orders, the 18 Situations That Shout “Watchout,” Downhill/Indirect Line Checklist, Four Common Denominators of Fatality Fires, Lookouts-Communications-Escape Routes-Safety Zones (LCES), and Risk Management/Situational Awareness.)
- A safety briefing will be given prior to initiating work on any project.
- All personnel on wildland and prescribed fires will be equipped with proper personal protective equipment (PPE), including a fire shelter.

In areas where species of concern are known to or are suspected to occur, fire management personnel would consult with the wildlife biologist regarding the need for actions to be taken to avoid impacts to the species.

To minimize smoke impacts on visitors and the public, smoke dispersal should avoid sensitive receptors by burning under an unstable air mass (mixing height greater than 1,500 feet).

If indicated, rehabilitation or restoration techniques would be used where appropriate to promote the recovery of burned areas. However, it is the FWS policy to allow burned areas to recover naturally.

2.4 Environmentally Preferred Alternative

The environmentally preferred alternative is determined by applying the criteria suggested in NEPA, which is guided by the CEQ. The CEQ provides direction that, “...the environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in Section 101 of the NEPA,” which considers:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
- Assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings.
- Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.
- Achieve a balance between population and resource use that would permit high standards of living and a wide sharing of life’s amenities.
- Enhance the quality of renewable resources and approach the maximum attainable recycling of resources.

Under alternative A, firefighters would be exposed to potentially elevated safety risks. This alternative would also contribute to the continued buildup of fuels and the spread of nonnative or invasive species, thus affecting wildlife habitats on the refuge and WMD. This alternative would generally not provide the same level of protection of resources and humans over the long term as would occur under the preferred alternative B.

Alternative B, the Service-preferred alternative, provides the greatest flexibility in responding to wildfires and provides more opportunities for the effective management of vegetation. It offers the lowest risk to firefighters (i.e., selecting from among the full range of suppression strategies) for wildland fires. Fuels can be effectively managed under alternative B using prescribed fire and manual (non-fire) fuels treatments. Prescribed fire treatments would also contribute to increased long-term stability, productivity, and diversity in grassland, forest, and wetland ecosystems. This alternative would satisfy each of the provisions of NEPA Section 101. Therefore, the environmentally preferred alternative is alternative B. Table H.1 below summarizes and compares the environmental impacts between alternatives.

Table H.1. Summary Comparison of Impacts by Alternative.

| TOPIC | ALTERNATIVE A (NO ACTION) | ALTERNATIVE B (PREFERRED) |
|--|---|---|
| Vegetation | Minor to moderate and localized direct adverse effects to vegetation depending on fire severity, and indirect minor adverse impacts due to loss of vegetation from suppression operations. | Negligible to moderate beneficial impacts as fuels are restored to natural levels locally and a diversity of native vegetation is gradually restored and maintained through prescribed fire and nonfire treatments under an annual workplan and schedule. |
| Nonnative, Invasive Plant Species | Direct adverse effects on refuge and WMD invasive plants under the no action alternative would be localized, short-term to long-term, and minor to moderate. Indirect effects of suppression of wildfires would be adverse, localized, short term to long term, and moderate. | Direct adverse effects under the no action alternative would be localized, short term to long term, and minor to moderate. Indirect effects of suppression of wildfires would be adverse, localized, short term to long term, and moderate. Indirect effects resulting from treatments may result in a minor, localized, and long term benefit as nonnative species are displaced by native plants. |
| Wildlife | Negligible to moderate, adverse, localized, short and long term impacts to wildlife or habitat. | Beneficial, localized, long-term impacts of minor to moderate intensity on refuge wildlife and habitat during the analysis period as overall habitat conditions are improved. |
| Threatened, Endangered, and Sensitive Animal Species | Impacts would range from negligible to adverse, minor, localized, short term to long term, to potentially beneficial. | Impacts would range from negligible to beneficial, indirect, localized, and moderate over the long term. |
| Soils | Impacts from the no action alternative would be negligible with the exception of the most severe wildfire effects. | The direct impacts on the soils resource would be negligible to beneficial, indirect, and of minor intensity. |

| | | |
|-----------------------------|--|---|
| Water and Wetland Resources | Direct and indirect impacts resulting from wildfires would range from negligible to moderate, depending on fire severity and location. | Long term impacts would be beneficial, indirect, localized, and of minor intensity under a planned program of treatments. |
| Air Quality | Direct and indirect impacts would be short term and minor on a local scale and nearly negligible on a regional scale. | Minor, direct, localized, but generally short term, adverse impacts to air quality. |
| Public Health and Safety | The direct and indirect adverse impacts would be localized, short term to long term, and minor. | Impacts would range from negligible to beneficial, minor to moderate, and localized. |

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the affected environment, methodology, laws, and regulations specific to an impact topic and analyzes probable environmental effects of implementing each of the alternatives. Probable effects are quantified where data exist; otherwise, qualitative descriptions are used.

3.1 Methodology for Assessing Impacts

The potential impacts of each alternative on resources and systems on the refuge and WMD were evaluated based on available information, interviews and correspondence with refuge staff, and relevant scientific literature. Potential impacts to rare species or unique habitats and wetlands or riparian resources within the refuge are assessed in separate sections. Predictions about short and long term impacts were based on past and current studies and relevant science.

For each impact topic evaluated below, the impacts are defined in terms of context, intensity, duration, and timing. Direct, indirect, and cumulative impacts are discussed for each impact topic. Definitions of impact intensity levels vary by impact topic (see the thresholds matrix under each impact topic), but the following definitions were applied for all impact topics.

Beneficial: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.

Adverse: A change that moves the resource away from a desired condition or detracts from its appearance or condition.

Direct: An effect that is caused by an action and occurs in the same time and place.

Indirect: An effect that is caused by an action but that is later in time or farther removed in distance, but it is still reasonably foreseeable.

Context: The geographic extent of the impact; for example, the impact may be localized to a relatively small area (e.g., site-specific) or regional in scope.

Intensity: Refers to the magnitude of the impact. The four impact thresholds are defined for each impact topic. Threshold values for these four intensity categories were developed based on agency standards, similar approved Fire Management Plans or NEPA documents, and discussions with refuge staff.

Duration (short-term, long-term): Refers to length of time that an impact would last; i.e., the length of time before the resource is returned to its predisturbance condition or appearance. Impacts may range from a few hours or the duration of a project (short-term) up to 5 years or greater (long-term).

3.2 Cumulative Effects Analysis

From CEQ regulations (1508.7), a “cumulative effect” (also termed “cumulative impact”) is the effect on the environment that results from the incremental effect of the action(s) when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such action.

Cumulative impacts were determined by combining the impacts of the alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify and analyze other ongoing or reasonably foreseeable future projects on Montezuma NWR and St. Lawrence WMD and, if applicable, the surrounding area.

3.3 Impairment Analysis Method

Refuge managers must always seek ways to avoid, or minimize to the greatest degree practicable, adverse impacts on resources and values. However, the laws do give the management discretion to allow impacts to refuge resources and values when necessary and appropriate to fulfill the purposes of a refuge, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given USFWS the management discretion to allow certain impacts within refuges, that discretion is limited by the statutory requirement that the agency must leave resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible refuge manager, would harm the integrity of refuge resources or values. However, an impact to any refuge resource or value may constitute impairment.

3.4 Impact Topics Analyzed

3.4.1 Vegetation

3.4.1.1 Montezuma

The following table shows approximate acreages by ecotype on Montezuma NWR on which the treatment portion of the proposed alternative would be implemented. However, specific areas of the refuge would be selected based on habitat needs, cyclic maintenance schedules, and other factors described in the refuge’s Annual Habitat Work Plan (AHWP, see appendix A).

Uplands

Over 50 percent of the upland habitat on Montezuma NWR is maintained in an early successional state (grassland or scrub/shrub fields) through active management. These areas are currently maintained through a variety of management techniques including mowing, burning, disking, planting, hydro-axing, and chemical treatment.

Grasslands and Crops

Montezuma NWR maintains several fields to support grassland-dependent species. These fields require long-term maintenance, including frequent mowing, herbicide applications, and prescribed burning (see below), to control invasive plants and other nondesirable plants, including woody shrubs.

The more common cool season plant species in grassland fields include timothy (*Phleum pratense*), smooth brome (*Bromis inermis*), birds-foot trefoil (*Lotus corniculatus*), bluegrass (*Poa* spp.), reed canarygrass (*Phalaris arundinacea*), common burdock (*Arctium minus*), thistle (*Cirsium* spp.), field mustard (*Brassica rapa*), and goldenrod (*Solidago* spp.). Warm season grasses include switchgrass (*Panicum virgatum*), big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), sideoats grama (*Bouteloua curtipendula*), and indiagrass (*Sorghastrum nutans*).

In 2006, four cooperative farmers planted corn or soybeans on 663 acres of refuge lands (USFWS 2007). In 2007, the refuge area in the cooperative farming program was reduced to 510 acres. Cooperative farmers provide other in-kind services including

- mowing grasslands to prevent brush encroachment;
- spraying invasive plants;
- seeding fields;
- plowing, disking, and cultipacking upland fields prior to planting permanent grass cover;
- purchasing grass seed for planting in upland fields; and
- maintaining the tops and slopes of dikes.

Also, prescribed fire has been applied under the currently approved FMP (1997) on the upland grasslands for hazard fuel reduction, waterfowl habitat maintenance, retarding thatch buildup, to encourage nutrient cycling, and to setback woody shrub encroachment. Grass fields would be scheduled for spring burning prior to green-up. Cattail units can be burned in the spring, late summer, or fall. Debris burning would be accomplished in the spring, summer, fall, or winter, whenever higher fuel moisture content is present. Table H.2 below lists the primary vegetation habitat types and percent coverage for the refuge.

Scrub/shrub

Montezuma NWR maintains several tracts as scrub/shrub. Shrublands require long-term maintenance to remove trees and minimize invasive plant density. Shrublands have been created on the refuge by allowing succession to proceed past the grassland stage but stopping it prior to forest establishment. In 2007, shrubs were planted on two tracts to facilitate shrubland establishment.

Forest

Upland forested sites, including Clark's Ridge and Esker Brook, are dominated by hickory, black walnut, sugar maple, oak spp., and white ash, with some basswood, red maple, white pine, and hemlock. The climax community is a beech-maple association. These sites require little to no maintenance but should be monitored for invasive plants.

Table H.2. Selected Habitat Types and Acres, Montezuma NWR.

| Habitat Type | Acres | Percent |
|--|--------------|--------------|
| Emergent Marsh | 4,093 | 44.7 |
| Bottomland Floodplain Forest | 1,685 | 18.4 |
| Riparian Forest Corridor | 1,033 | 11.3 |
| Scrub/Shrub | 850 | 9.3 |
| Upland Forest (all successional stages) | 298 | 3.3 |
| Cropland | 380 | 4.2 |
| Grassland | 316 | 3.4 |
| Ponds, Ditches, Rivers | 181 | 1.9 |
| Infrastructure (dikes, facilities, trails, etc.) | 316 | 3.5 |
| Total | 9,152 | 100.0 |

3.4.1.2 St. Lawrence

The valley’s 150,000 acres of freshwater wetlands consist of nearly every inland wetland type found in the northeastern United States, including flooded woodland (45 percent), shrub-scrub wetland (33 percent), emergent wetland and wet meadow (17 percent), and other (5 percent) (USFWS Conservation Proposal). This resource provides essential seasonal habitat for numerous species of waterfowl and water-dependent wildlife species.

Jefferson County contains 16 percent of all Alvar habitat found in the Great Lakes Basin. Alvar habitats are grasslands and shrublands that develop on shallow soils with limestone geology and support rare plant communities (NYSDEC 2005) such as Limerick Cedars and Chaumont Barrens (USFWS 2006b). The position of Jefferson County in the internationally-recognized Great Lakes Basin and St. Lawrence River Ecosystem and the unspoiled nature of its aquatic and terrestrial habitats and natural resources create an extremely valuable, biologically unique environment (USFWS 2006b). However, little information exists on the historical role of fire within these systems or vegetation as a whole. It is currently believed that historical fires have not greatly influenced vegetative structure, function, or succession on the WMD.

The following threshold and duration criteria are identified for analysis of impacts on vegetation.

| Impact Topic | Negligible | Minor | Moderate | Major | Duration of Impact |
|---------------------|---|--|--|---|---|
| Vegetation | Vegetation would not be affected or individual plants could be slightly affected; impacts limited to small area. Impact on exotics barely detectable or individual species could be affected. | Changes would be localized and measurable to one or more species, but would be of little consequence to the population. Mitigation of any adverse impacts would be effective. Mitigation to protect native species would be effective. | A large segment of one or more species populations would be affected over a relatively larger area. Mitigation could be extensive, but likely effective. | Considerable impacts on plant populations over large areas. Mitigation to offset adverse impacts would be required and extensive, and success not assured. Impact is severe or of exceptional benefit to native species. Extensive mitigation would be required to offset adverse impacts to native species, but success not assured. | Short term refers to a period of less than 5 years. Long term refers to a period longer than 5 years. |

3.4.1.3 Impacts of Alternative A – No Action Alternative

Impact Analysis: Under the no action alternative, neither the refuge nor the Wetland and Grassland Management District would have a long-term strategy for proactively managing fuels buildup and using fire to maintain desired vegetation. Over time and under the right conditions, wildfires in certain vegetation types would be expected to become gradually more severe, with greater impacts on native vegetation and threats to life and property in the area particularly during droughts and high-fire severity periods.

The direct adverse impacts of wildfire under the no action alternative, particularly given the relatively low occurrence of wildfire and small acreages burned would be localized, short term, and negligible to minor under most circumstances. Minor to moderate impacts may occur under more extreme burning conditions. The indirect impacts of wildfire and suppression operations would be adverse, localized, and minor to moderate, and short term to long term depending on the severity and location of fires.

Cumulative Effects: Any loss of vegetation from high-severity wildland fire, when considered cumulatively with any past fire damage on adjacent lands, would result in minor adverse cumulative impacts. Native seed sources from any damaging wildfires would likely decline temporarily, as would overall habitat quality, particularly during drought conditions.

Mitigation Measures: Suppression operations will have an impact on vegetation. Following the MIST guidelines outlined below can reduce the degree of undesirable impacts associated with wildland fire suppression tactics.

- Fireline construction would be minimized by taking advantage of natural barriers, refuge trails, roads, streams, pools, wetlands, and other existing fuel breaks.
- Consider impacts to open water areas when setting water-handling operations (e.g., porta-tanks, drafting sites, portable pump operations).
- Plan travel routes to avoid identified sensitive areas.
- Select procedures, tools, and equipment that least impact the environment.
- Firelines will be the minimum width necessary to halt the spread of the fire and will be routed to avoid impacts to any resources vulnerable to the effects of fire and fire suppression activities.
- Identify hazards with flagging or use a lookout.
- During fireline construction, cut shrubs or small trees only when necessary. Make all cuts flush with the ground.
- Retardant shall be only used as a last resort.
- Restore area by picking up and removing all flagging, garbage, litter, and equipment. Dispose of trash appropriately.

Conclusion: Alternative A would result in minor to moderate and localized direct adverse effects to vegetation depending on fire severity, and indirect minor adverse impacts due to loss of vegetation from suppression operations during the analysis period. Alternative A would not produce any major adverse impacts or impairment to native vegetation resources or values.

3.4.1.4 Impacts of Alternative B – Service-preferred Alternative

Impact Analysis: Under this alternative, prescribed fire as a management tool would help to maintain historic/native vegetation and reduce fuel accumulations that contribute to larger and more destructive wildland fires. Prescribed burning as a maintenance treatment would act to reduce woody and some exotic plant invasions into grasslands and wetland systems. Prescribed fire would also be used to protect values at risk and other sensitive areas.

Direct and indirect impacts from the limited application of prescribed fire to refuge or WMD lands would be beneficial, localized, and of moderate intensity as habitat management and fuel reduction objectives are met in the long term.

The strategy of manual fuels reduction using hand tools and refuge-owned machinery would have a moderate beneficial impact locally as overgrown areas are thinned, mowed, or disked. Hazard fuels can be kept at natural levels, thus avoiding high-intensity wildland fires. Some surface vegetation would be subject to localized trampling from refuge staff working in the area, but impacts would be negligible.

Cumulative Effects: Any anticipated facility modifications, depending on location and timing, would have adverse impacts in the immediate work area, but the area affected would be sufficiently small that the overall impacts to vegetation communities would be minor.

Mitigation Measures: The following apply to proposed prescribed fire and manual or mechanical fuels management projects.

- Reduce fuels available for combustion by removal and use of head-fire ignition with the wind wherever practical.
- Reduce particulate emissions for the fuel consumed by reducing the time period of the smoldering phase; encourage flaming combustion to the extent possible.
- Avoid smoke-sensitive areas, such as highways during heavier traffic periods (i.e., weekends, holidays).
- Use MIST wherever possible.

Conclusion: Overall, alternative B would have negligible to moderate beneficial impacts as fuels are restored to natural levels and a diversity of native vegetation is restored and maintained through prescribed fire and nonfire treatments under an annual work plan.

3.4.2 Nonnative, Invasive Plant Species

A plant species is generally considered native if it existed in North America prior to European settlement. Deliberate or inadvertent introductions thereafter were generally unobtrusive until the age of rapid transport in the last century. When populations of nonnative plants invade and dominate landscapes, healthy natural ecosystems are compromised or eliminated. Displacement of native plants and dependent insects, birds, mammals, amphibians, reptiles, and invertebrates causes cascading effects on not only the ‘footprint’ occupied by the invasive species, but on the adjacent habitats and ecosystems.

Refuge wetlands are dominated by extensive stands of invasive cattail, phragmites, and purple loosestrife. These species mainly occupy disturbed areas. Roads, trails, and disturbed areas function as corridors for invasive species to move onto the refuge. Over time, aggressive populations can greatly expand, altering natural vegetation, displacing rarer native plants, eliminating native forage and cover for wildlife, and changing the scenic character. However, fire is not considered a significant contributor to the spread of invasive species across the refuge.

It should be noted that Montezuma NWR is a key area for research on the management and control of purple loosestrife. The refuge has suffered one of the worst infestations of purple loosestrife over the past 45 years. In 1951, loosestrife was found only in sparse stands; by 1980, the plant occupied 1,500 acres of the refuge’s 3,200 acres of managed wetlands. Various control measures were used, including herbicides and water level manipulations, with little success in controlling the infestation and at high long-term maintenance costs (USFWS 2006a).

For a more complete listing of rare plants occurring on Montezuma NWR, see appendix C.

The following tables (table H.3 and H.4) summarize species of invasive plants that are known to occur within the refuge and off the refuge.

Table H.3. Species of Invasive Plants That are Known to Occur Near the Refuge Boundary.

| Species | Closest Location(s) to refuge |
|---|---|
| Norway Maple (<i>Acer platanoides</i>) | Onondaga, Ontario, and Oswego Counties |
| Tree of Heaven (<i>Ailanthus altissima</i>) | Cayuga County |
| Nodding Plumeless Thistle (<i>Carduus nutans</i>) | Yates and Tompkins Counties |
| Chinese Catalpa (<i>Catalpa ovata</i>) | Montezuma Wetlands Complex |
| Giant Hogweed (<i>Heracleum mantegazzianum</i>) | Cayuga and Wayne Counties |
| Common (European) Frogbit (<i>Hydrocharis morsus-ranae</i>) | Wayne County |
| Princesstree (<i>Paulownia tomentosa</i>) | Tompkins County |
| Fig Buttercup (<i>Ranunculus ficaria</i>) | Cayuga County |
| Wine Raspberry (<i>Rubus phoenicolasius</i>) | Cayuga and Wayne Counties |
| Water Chestnut (<i>Trapa natans</i>) | Northern Montezuma Wildlife Management Area |

Table H.4. Species of Invasive Plants That are Known to Occur Within the Refuge Boundary.

| Species | Treatment (Yes/No) | Treatment Method |
|---|--------------------|---|
| Velvetleaf (<i>Abutilon theophrasti</i>) | No | |
| Tree of Heaven (<i>Ailanthus altissima</i>) | No | |
| Garlic Mustard (<i>Alliaria petiolata</i>) | No | |
| Burdock (<i>Arctium</i> sp.) | No | |
| Japanese Barberry (<i>Berberis thunbergii</i>) | No | |
| Carlina Thistle (<i>Carlina vulgaris</i>) | No | |
| Oriental Bittersweet (<i>Celastrus orbiculatus</i>) | Yes | Cut stump treatments with glyphosate herbicide |
| Knapweed (<i>Centaurea</i> sp.) | No | |
| Canada Thistle (<i>Cirsium arvense</i>) | No | |
| Bull Thistle (<i>Cirsium vulgare</i>) | No | |
| European (Pale) Swallowwort (<i>Cynanchum rossicum</i>) | Yes | Triclopyr and glyphosate herbicides, mowing, seeding natives |
| Teasel (<i>Dipsacus</i> sp.) | No | |
| Autumn Olive (<i>Elaeagnus umbellata</i>) | Yes | Cut stump treatments with glyphosate herbicide |
| Paleyellow Iris (<i>Iris pseudacorus</i>) | No | |
| Tatarian Honeysuckle (<i>Lonicera tatarica</i>) | Yes | Cut stump and foliar treatments with glyphosate herbicide, mowing, planting cover crops |
| Purple Loosestrife (<i>Lythrum salicaria</i>) | Yes | Wetland-approved glyphosate herbicide, Beetles |
| Yellow Sweetclover (<i>Melilotus officinalis</i>) | No | |
| Eurasian Watermilfoil (<i>Myriophyllum spicatum</i>) | No | |
| Reed Canary Grass (<i>Phalaris arundinacea</i>) | No | |
| Common Reed (<i>Phragmites australis</i>) | Yes | Wetland-approved glyphosate herbicide, mowing, burning, water level manipulation |
| Japanese Knotweed (<i>Polygonum cuspidatum</i>) | No | |
| Curly Pondweed (<i>Potamogeton crispus</i>) | No | |
| Common Buckthorn (<i>Rhamnus cathartica</i>) | Yes | Cut stump and foliar treatments with glyphosate herbicide, mowing, seeding natives |
| Black Locust (<i>Robinia pseudoacacia</i>) | Yes | Mowing |
| Multiflora Rose (<i>Rosa multiflora</i>) | Yes | Cut stump and foliar treatments with glyphosate herbicide |

3.4.2.1 Impacts of Alternative A – No Action Alternative

Impact Analysis: Under the no action alternative, direct effects of high-severity fires that result in temporary bare ground may include spread of nonnative species, resulting in localized, short-term or long-term, minor to moderate adverse impacts. High-intensity fires may, on the other hand, kill seeds of one or more species, depending on time of year, resulting in negligible to even some minor benefits locally.

Low-intensity wildfires may favor either native or nonnative, invasive species depending on time of year and would range between adverse and beneficial. Purple loosestrife may be increased from either high- or low-intensity fire, resulting in potentially moderate adverse effects. Generally, burning the shoots of sprouters stimulates growth (adverse effect) but high-intensity fires may kill seeds of sensitive nonnative species (beneficial effect).

Indirect impacts of suppressing most wildfires may range from expansion of nonnative, invasive species in the burned area to suppressed vigor of nonnative, invasive species. The response is largely dependent on the time and intensity of burning as well as secondary factors such as competition with native species and moisture availability postburn.

Indirect effects include the creation of limited new habitat by suppression-activity disturbances and the clearing of areas by fire. The greater reliance on suppression under the no action alternative would lead to moderate long-term adverse effects.

Mitigation Measures: Mitigation would include the following:

- Surveying for invasive plant locations;
- Nonnative species control programs (such as pulling plants, application of approved herbicides);
- Maintaining vigilance about seed transport on vehicles; and
- Education to help reduce effects of the fire program on the spread of nonnative, invasive species.

Cumulative Effects: Management, visitation, and hunting activities contribute to cumulative impacts through the inadvertent spread of invasive species. Past and future suppression activities in or adjacent to the refuge may cause disturbances that encourage spread of nonnative, invasive plants with minor, long-term adverse effects.

The following criteria are identified for analysis of impacts on invasive vegetation.

| Impact Topic | Negligible | Minor | Moderate | Major | Duration of Impact |
|-----------------------------|--|---|---|--|---|
| Nonnative, Invasive Species | Impacts would barely be detectable as to changes in number, distribution, and densities. | Impacts would be sufficient to cause a noticeable but not substantial change in number, distribution, and densities of nonnative, invasive species. | Impacts would be sufficient to cause a noticeable but not substantial change in number, distribution, and densities of nonnative, invasive species. | Impacts would result in highly noticeable changes in number, distribution, and densities of nonnative, invasive species. | Short term refers to a period of less than 5 years. Long term refers to a period longer than 5 years. |

Conclusion: Both high-severity wildfires and associated suppression activities would potentially prepare more areas for colonization by nonnative, invasive species. Thus, the direct adverse effects on invasive plants under the no action alternative would be localized, short-term to long-term, and minor to moderate. Indirect effects of suppression of wildfires would be adverse, localized, short-term to long-term, and moderate.

3.4.2.2 Impacts of Alternative B – Service-preferred Alternative

Impact Analysis: Under this alternative, direct and indirect effects from potential suppression actions and high-intensity wildfires would be similar to alternative A in the short term. However, as both fire and nonfire treatment objectives are met over time, these localized impacts may be reduced or result in a minor beneficial effect by increasing native plant competition. Similar to the no action alternative, those invasive species that are established on the refuge may benefit from prescribed or wildfire of any intensity.

Moreover, many plant species identified above are limited to specific locations; fire management actions in these areas would be tailored to reflect the specific characteristics of each species. The continued use of hand and power tools to remove unwanted plants would be another control strategy. However, minor adverse effects may occur from any increased clearing from either fire or by hand, increasing the opportunity for the spread of nonnative plants.

Mitigation Measures: In addition to those measures described in alternative A, the following mitigation would help reduce or minimize the proliferation of invasive species:

- Avoid unnecessary ground disturbance;
- Before any native ecosystems are disturbed (such as with prescribed burning), identify the nonnative species likely to invade the disturbed areas and establish measures to prevent such invasion;
- Consider education programs that teach people how to avoid spreading nonnative plants; and

- Continue with nonnative plant management programs on the refuge.

Cumulative Effects: Management activities, hunting, and visitation activities contribute to cumulative impacts through the inadvertent spread of invasive species. Past and future suppression activities in or adjacent to the refuge may cause disturbances that encourage spread of nonnative, invasive plants with minor, long-term adverse effects.

Conclusion: Both high-severity wildfires and suppression activities, as with alternative A, would potentially prepare more areas for colonization by nonnative, invasive species. Thus, the direct adverse effects under the no action alternative would be localized, short-term to long-term, and minor to moderate. Indirect effects of suppression of wildfires would be adverse, localized, short-term to long-term, and moderate. Indirect effects resulting from treatments may result in a minor, localized, and long-term benefit as nonnative species are displaced by native plants.

3.4.3 Wildlife

Montezuma NWR lies within Bird Conservation Region (BCR) 13, the Lower Great Lakes/St. Lawrence Plain (map 2-2). BCR 13 encompasses the vast, low-lying lake plain region surrounding Lakes Erie and Ontario, the St. Lawrence River Valley, low-lying regions between the Adirondack Mountains and the Laurentian Highlands, and upper regions of the Hudson River Valley. In addition to important lakeshore habitats and associated wetlands, this region was originally covered with a mixture of oak-hickory, northern hardwood, and mixed-coniferous forests. Although once dominated by forests, the landscape is now dominated by agriculture with interspersed wetlands and remnant forest stands. Today, nearly 95 percent of the original habitat types have been lost to agriculture and urban development. The BCR plays a critical role in providing important staging and migrating habitat for birds during the spring and fall migration. In addition, over 17 percent of the global population of bobolinks nests in the St. Lawrence Valley of northern New York (USFWS 2008).

The bird list for Montezuma NWR lists 320 species that have been identified on the refuge since its creation in 1938. Of these, 117 species of birds are known to nest on the refuge. The New York Important Bird Area (IBA) Program recognized the Montezuma Wetlands Complex for harboring a suite of nesting bird species of conservation concern including pied-billed grebe, least bittern, osprey, bald eagle, black tern, sedge wren, and cerulean warbler. Most of the forested wetlands in this region were historically cleared or drained so the bird species that use this habitat are of conservation concern. Montezuma NWR supports this habitat type along with many breeding birds associated with these forests including: sharp-shinned hawk, black-billed cuckoo, eastern wood-pewee, wood thrush, cerulean warbler, rose-breasted grosbeak, and Baltimore oriole. The Montezuma Wetlands Complex is also recognized for its importance to migratory birds (USFWS 2008).

In a 2003 survey, 37 species, 26 genera, 15 families, and 10 orders of fish were recorded on the refuge. Only one species, brown bullhead, was present in all sample sites. The most commonly encountered species were common carp, golden shiner, bluegill, brown bullhead, and yellow perch. The most abundant fish, common carp, represented 20 percent of the total catch within the refuge (Foust 2003 in USFWS 2008).

A baseline inventory of reptiles and amphibians on the refuge in 1995 and 1996 using various methods including evening audio surveys for frogs and toads, visual encounter surveys, and live-trapping using pitfalls, drift fences, funnel traps, minnow traps, and aquatic hoop traps (USFWS 2008). Frogs and toads recorded during this survey included American toad, gray treefrog, spring peeper, western chorus frog, bullfrog, green frog, wood frog, and northern leopard frog. Salamanders included mudpuppy, blue spotted/Jefferson salamander complex, and northern two-lined salamander. Turtles observed during the survey included snapping turtle, common musk turtle, and midland and eastern painted turtles. Snakes observed included northern water snake, northern brown snake, and eastern garter snake (USFWS 2008).

Waterfowl use the habitat of the valley in most seasons. Ten species, including mallard, American black duck, northern pintail, and wood duck, have been documented using sheetwater wetlands during the spring. Based on 1994 waterfowl breeding surveys throughout the eastern United States, the valley has one of the highest estimates of mallard breeding population in the Atlantic Flyway (USFWS 2008).

Grasslands not only provide habitat for grassland nesting birds, but also for deer mice and meadow voles. Those mammals are part of the food supply for such raptors as the northern harrier, rough-legged hawk, red-tailed hawk, short-eared owl, and snowy owl.

Fox hunt fields for the mice and voles that inhabit them; they are an important winter food source. Deer also bed down in fields at warmer times of the year. Hedgerows and shrubby edge as well as fields reverting to shrubs provide good habitat for the eastern cottontail, striped skunk, snowshoe hare, and whitetail deer. Porcupines, common throughout the valley, are often observed chewing the bark off trees. The eastern chipmunk, gray squirrel, and fisher inhabit hardwood forests throughout the area. Raccoon, ermine, and mink may be found close to water or shrubby or wooded habitat. The red squirrel is likely to be found in spruce or pine or mixed hardwood forests (USFWS 2008).

The St. Lawrence WMD supports a wide variety of waterfowl habitat. These include, but are not limited to, mallards, American black duck, wood duck, green-winged teal, northern pintail, ring-necked duck, and Canada goose. Numerous other waterfowl use the open waters during migration. They include: the snow goose, northern pintail, northern shoveler, American coot, bufflehead, common merganser, lesser scaup, canvasback, and common goldeneye (USFWS 2006b). Ducks Unlimited lists the valley as a priority area in its Continental Conservation Plan.

Songbirds include; grasshopper sparrow, Henslow's sparrow, vesper sparrow, sedge wren, and upland sandpiper. The northern harrier is listed as either a threatened species or as species of special concern in St. Lawrence WMD.

Eagles nest, forage, and overwinter in the region. The St. Lawrence River is the second largest overwintering site for bald eagles in New York State (USFWS 2006b).

The following threshold and duration criteria are identified for wildlife.

| Impact Topic | Negligible | Minor | Moderate | Major | Duration of Impact |
|---------------------|--|--|--|--|---|
| Wildlife | Impacts barely detectable or individuals could be affected but not populations. Impacts limited to small areas and not measurable. | Changes would be localized and affect one or more species populations. Any adverse impacts can be effectively mitigated. | A large segment of one or more wildlife populations affected over a relatively large area. Mitigation to offset adverse impacts extensive but likely successful. | Impact is severe or of exceptional benefit to wildlife populations. Extensive mitigation would be required to offset adverse impacts, and its success not assured. | Short term refers to a period of less than 5 years. Long term refers to a period longer than 5 years. |

3.4.3.1 Impacts of Alternative A – No Action Alternative

Impact Analysis: Given the relatively low fire occurrence on Montezuma NWR, the direct and indirect impacts of suppression actions on wildlife and habitats would be variable in the short term. Direct impacts would include localized loss of habitat for short periods following fire, particularly in drought years and where fuels accumulations are excessive. Disruption of ground-nesting bird and mammal activity as a result of any fireline construction and general firefighter presence would be adverse, direct, localized, short-term, and of minor intensity. Long-term indirect impacts in high-severity burn areas that recover slowly also would be adverse and minor to moderate in intensity.

Similar impacts would be expected for St. Lawrence WMD.

Cumulative Effects: Any illegal poaching or off-road vehicle use has resulted in negligible impacts when considered cumulatively with the low occurrence of fire traffic. The most prominent activity continuing to occur over the refuge that would add cumulative impacts on species or habitats under the no action alternative would be machinery use for moving earth and fire risk reduction treatments.

Mitigation Measures: Mitigation of impacts associated with alternative A on native wildlife species and habitats includes, but is not limited to, the following

- Minimizing ground disturbance wherever possible;
- Planned protection of specified habitats for cavity and ground nesters and other wildlife;
- Where consistent with safe, effective suppression techniques, use natural barriers, such as existing roads and open water; and

- Fire retardant, if used, must be on the approved list of retardants.

Conclusion: Impacts of alternative A would result in negligible to moderate, adverse, localized, short- and long-term impacts to wildlife or habitat on Montezuma NWR and St. Lawrence WMD.

3.4.3.2 Impacts of Alternative B – Service-preferred Alternative

Impact Analysis: Under this alternative, use of planned ignitions and nonfire treatment strategies would result in habitat improvements that generally favor wildlife over the long term. The less aggressive approach to suppression of wildfires, where appropriate and safe, would minimize inadvertent damage that might result from aggressive suppression operations under the no action alternative. This would result in a beneficial, localized, indirect, long-term effect of minor to moderate intensity for wildlife habitats.

Limited prescribed fire, planting, and nonfire fuels treatment operations initially would likely disturb waterfowl and some small mammals in localized areas, but would temporarily benefit predator species. Those species dependent on heavier cover and large trees may experience localized, minor adverse impacts. Noise from human presence also may disturb birds temporarily. However, mitigation would serve to minimize disturbance during breeding and nesting season. Within a post-treatment growing season, sprouting and regrowth of target grasses and forbs would likely invigorate grassland and emergent marshlands.

Proposed prescribed fire and nonfire treatments under alternative B would likely cause short-term adverse effects on wildlife populations. However, as fuels management objectives on refuge lands are met, foreseeable impacts would likely be beneficial and of minor to moderate intensity due to habitat improvement.

Mitigation Measures: Mitigation of impacts for alternative B consists of those listed in alternative A, plus:

- Selection of a time of year for actions that least affect breeding and/or nesting wildlife on the refuge.
- Protection of any values at risk.

Conclusion: Alternative B would produce beneficial, localized, long-term impacts of minor to moderate intensity on Montezuma NWR and St. Lawrence WMD wildlife and habitat during the analysis period as overall habitat conditions are improved.

3.4.4 Threatened, Endangered, and Sensitive Animal Species

Categories of endangered and threatened species are defined in New York State Environmental Conservation Law section 11-0535. Endangered, threatened, and special concern animal species are listed in regulation 6NYCRR 182.5. The following definitions apply:

- **Endangered**-Any native species in imminent danger of extirpation or extinction in New York State. For a list of endangered animal species present in the State of New York, see the New York State Department of Environmental Conservation (NYSDEC) list at: <http://www.dec.ny.gov/animals/7494.html#Endangered> (accessed June 2011).

- **Threatened**-Any native species likely to become an endangered species within the foreseeable future in New York State. For a list of threatened animal species present in the State of New York, see the NYSDEC list at:
<http://www.dec.ny.gov/animals/7494.html#Threatened> (accessed June 2011).
- **Special Concern**-Any native species for which a welfare concern or risk of endangerment has been documented in New York State. For a list of animal species of special concern present in the State of New York, see the NYSDEC list at:
http://www.dec.ny.gov/animals/7494.html#Special_Concern (accessed June 2011).

Presently, no known or documented mammals or reptiles that are classified as threatened or endangered occur on the refuge. The NYSDEC lists the following species that occur or may occur on Montezuma NWR:

Cerulean Warbler

The MWC is one of four sites in New York with exceptional numbers of cerulean warblers recorded during the Cerulean Atlas Project. This warbler is among the highest priority landbirds for conservation in the U.S. (USFWS 2006a).

Bald Eagle

Most of the eagle activity on the refuge occurs around Tschache Pool, the site of two of the three active nesting territories. However, adult and immature eagles use the refuge throughout the year. As the Main Pool was draining to encourage vegetative growth in 2007, 59 bald eagles were counted in one morning in early June.

Sandhill Crane

Sandhill cranes were first observed on the MWC during spring migration in 1999. Since then, a few cranes were observed during migration and the first confirmed breeding occurred in 2003; a pair with young was observed again in the 2004 through 2006 breeding seasons. By the 1930s the sandhill crane population was nearly decimated across its range. Today the population has recovered to 650,000 birds and several states including New York, Pennsylvania, Ohio, and Iowa are part of a range expansion (USFWS 2006a).

In addition to the rare bird species, the NYNHP (2006) reported the following species and communities for the refuge: blue-tipped dancer (damselfly) and the holly-leaved naiad.

The following threshold and duration criteria are identified for Threatened, Endangered, and Sensitive Animal Species.

| Impact Topic | Negligible | Minor | Moderate | Major | Duration of Impact |
|---|---|---|--|---|--|
| Threatened, Endangered, and Sensitive Animal Species | Listed species would not be affected or change so small as to not be of any measurable or perceptible consequence to the individual or its population. Negligible effect would equate with a “no effect” determination per Endangered Species Act Section 7 regulations for species listed as threatened or endangered. | There would be an effect on one or more individuals of a listed species or its habitat, but change would be small. Minor effect would equate with a determination of “may affect but not likely to adversely affect” the species per Endangered Species Act Section 7 regulations for species listed as threatened or endangered. | A noticeable, measurable affect to an individual or population of a listed species. Moderate effect would equate with a determination of “likely to adversely affect” for the species per the Endangered Species Act Section 7 regulations for species threatened or endangered. | Noticeable, measurable affect with severe consequences or exceptional benefit to the population or habitat of a listed species. Special status species populations may have large changes with population numbers significantly increased or depressed. In extreme adverse cases, species may be at risk of being extirpated locally, key ecosystem processes like nutrient cycling disrupted, or habitat rendered nonfunctional. Major effect would equate with an “adversely affect without a jeopardy opinion” per the Endangered Species Act Section 7 regulations. | Short term refers to a period of 1 to 3 years. Long term refers to a period longer than 3 years. |

3.4.4.1 Impacts of Alternative A – No Action Alternative

Impact Analysis: Under the no action alternative, direct impacts to roosting and nesting habitat may range from short-term to long-term, minor to moderate, and localized to widespread, depending on fire size, intensity, and time of year. Most surface fires occurring on the refuge would likely have little effect on any aerial nest, roost, or perch sites, including those used by bald eagles. Indirect impacts would include a possible short-term reduction in prey habitat – a localized, minor, adverse effect – and a long-term increase in prey availability – a localized, minor, beneficial effect. If high-intensity wildfires occur as a result of increased drought, the potential for damage or loss to important roosting or perching habitat components would likely increase.

Cumulative Effects: Considering the locations of any planned activities on the refuge, including support facilities, compared with known sensitive habitat types, the cumulative effects from the no action alternative would be negligible.

Mitigation Measures: Any potential disturbance to listed species or habitats would be identified through informal consultation with agency Ecological Services under Section 7 of the Endangered Species Act (ESA). However, with the planned use of prescribed fire being very limited on the refuge, formal consultations would likely not be necessary for the foreseeable future. This would also apply to St. Lawrence WMD.

Conclusion: The direct and indirect impacts of alternative A from wildfire and/or suppression operations on most special status plant species across the refuge would range from negligible to adverse, minor, localized, short-term to long-term, to potentially beneficial.

3.4.4.2 Impacts of Alternative B – Service-preferred Alternative

Impact Analysis: Although individual fires may become slightly larger, impacts of prescribed fire and manual/mechanical fuels treatments on most special status animal species would approach negligible over the long term. In extreme drought conditions, periods of high-severity fire potential could increase risk to habitat as described in alternative A. However, mitigation directed by a proposed fire management plan would help reduce any potential impacts on local habitats from fire or nonfire fuels reduction to negligible.

Cumulative Effects: The locations of any planned changes to visitor/hunting access or support facilities were compared with known sensitive species distribution records and habitat types to assess potential cumulative impacts from a fuels treatment schedule. Any foreseeable planned actions would be outside habitats used by special status species. Therefore, the cumulative effects associated with the preferred alternative on the refuge would be negligible.

Mitigation Measures: In addition to those mitigations described under alternative A, any site-specific measures developed in consultation with Ecological Services will be incorporated into the FMP and subsequent project implementation plans.

Conclusion: For special status species and habitats on the refuge, impacts from the preferred alternative would range from negligible to beneficial, indirect, localized, and moderate over the long term.

3.4.5 Soils

Montezuma NWR: The refuge region is generally underlain by a combination of limestone and limestone/shale bedrock. These calcareous rocks result in the highly productive glacial till found throughout the Montezuma wetlands area. A soil profile of the refuge wetlands would reveal an upper layer of deep Carlisle muck and sedimentary peat over a Chara and shell marl. The subsoil in this area of the old lake basin is compact blue clay. The well-drained sandy loams include pockets of Palmyra gravelly loam, Ontario loam, Poygan silty clay loam, Schoharie silty clay loam, and Wayland silty loam (USFWS 2008).

St. Lawrence WMD: The combination of a generally flat landscape and the presence of dense, clay soils creates suitable conditions for sheet water wetlands throughout the county. Warming sunshine and early spring rains create shallow pools in low field depressions. The small, temporary, shallow pools are the first to thaw in early spring. The heavy soils underneath them are slow to absorb water and extend their life. Their presence is critical for the food they supply waterfowl, shorebirds, and other wildlife.

Large, low, hydric areas also exist throughout the area. Shaped during the last glacial period, those larger wetlands provide nesting and brood-rearing habitat. The uplands surrounding the low areas have enough difference in elevation to sustain upland vegetation: grasses, shrubs, or woods. Those upland areas are often locations with soils containing hydric inclusions. They are not as wet as the hydric soils, but they are wet enough to make intensive agriculture difficult. These lands typically are mowed late in the season because they are too wet to mow much earlier than mid- to late July (USFWS 2006b).

3.4.5.1 Impacts of Alternative A – No Action Alternative

Impact Analysis: Under the no action alternative, physical soil movement or damage would likely result from equipment use on wildfire suppression actions. However, given the low incidence of fires at Montezuma NWR and no fire record at St. Lawrence WMD, this impact would likely be negligible except in the most extreme cases. Any direct impacts of high-severity fire on soil properties would include changes in soil chemistry (e.g., loss of nitrogen), reduction in porosity, and consumption of subsurface organic matter.

Cumulative Effects: Considering the locations of any planned activities on the refuge, including support facilities, and local development involving soil disturbance, the cumulative effects from the no action alternative would be negligible.

Mitigation Measures: Most mitigation from severe wildfires on the refuge (or St. Lawrence WMD) would take the form of actions to prevent further soil disturbance; this may include seeding, raking over bare soil, and isolating severe burn areas from further human or mechanical entry.

Conclusion: Impacts from the no action alternative would be negligible with the exception of the most severe wildfire effects.

3.4.5.2 Impacts of Alternative B – Service-preferred Alternative

Impact Analysis: Under the preferred alternative, most maintenance-type prescribed fire treatments and other fuels management on the refuge would result in negligible to beneficial but minor direct effects on the soils resource. Indirect impacts on post-prescribed-fire soils would include a slight increase in soil temperature after vegetation layers are removed in small, localized patches. Soil disturbance from mechanical fuels reduction and exotic plant removal projects would be negligible to beneficial but of minor intensity and indirect. For St. Lawrence WMD, the small prescribed fires planned would result in negligible effects.

Accidental spills from refueling saws or equipment in the field would be minimized by refueling on surfaces where any spills could be contained.

Cumulative Effects: Considering the locations of any planned activities on the refuge, including support facilities, and local development involving soil disturbance, the cumulative effects from the preferred alternative would be negligible.

Mitigation Measures: Mitigation actions would likely be similar to the no action alternative; project plans involving prescribed fire or mechanical fuels work would outline specific, onsite measures to minimize damage to soils.

Conclusion: The direct impacts of alternative B on the soils resource would be negligible to beneficial, indirect, and of minor intensity.

3.4.6 Water and Wetland Resources

3.4.6.1 Montezuma NWR

Montezuma NWR (9,152 acres), Northern Montezuma Wildlife Management Area (approximately 7,000 acres), and other conservation lands and private ownerships comprise the 50,000-acre Montezuma Wetlands Complex. The entire MWC is located in what was historically called the Montezuma Swamp. This vast area extended northward from Cayuga Lake almost to Lake Ontario. In the late 19th century, most of this swamp was effectively drained for commerce and transportation by the development of the Erie Canal, the NYS Canal System, and the dam at the north end of Cayuga Lake. Draining the area made it possible to clear and farm the rich organic soils that underlaid the marsh. Crop farming of potatoes, onions, and other root crops became a major part of the local economy (Ducks Unlimited 2000).

The refuge receives water from direct precipitation, runoff from the hilly areas bordering the west side of the refuge, three streams originating to the west of the refuge, and several springs within refuge boundaries.

Surface water concerns include water quality, flood flows generated by the operation of the NYS Canal System, and surface water supply for current and future wetland impoundments. Groundwater resources in the MWC are located in the consolidated (bedrock) and unconsolidated glacial deposits. Nearly all the groundwater in this area is derived from precipitation that is absorbed by the mantle of surficial deposits. Unconsolidated sand and gravel deposits produce the best yield of water for wells in the region. Overall, hydrological data for the MWC is lacking, and more detailed information is needed (USFWS 2006a).

The agricultural land uses surrounding the MWC contribute runoff to the wetlands. However, the function and value of some of these reverted wetlands may have lower wetland quality if invasive plants become established or concentrations of agricultural chemicals are left undetected. One study found concentrations of DDT, PCBs, and dieldrin in turtle and fish tissue samples, but not in sediment samples (USFWS 2008).

3.4.6.2 St. Lawrence WMD

Jefferson County is largely contained by the watershed for Lake Ontario and the St. Lawrence River. Most of the county’s waters flow into Lake Ontario in a number of smaller streams, such as Sandy Creek, South Sandy Creek, North Branch Sandy Creek, Mill, and Stony and Skinner Creeks, whose headwaters are in the Tug Hill Region of Jefferson County.

Subwatersheds are frequently low gradient flows. They were often altered by ditching and channeling in an attempt to drain water from surrounding lands for farming and now provide the greatest opportunity for wetland restoration in an altered landscape. The management of water levels by the dams, coupled with other factors, degraded the vegetation and function of coastal wetlands and bays. That change adversely affected waterfowl, water bird, shore bird, and fisheries habitat (USFWS 2006b).

Methodology: The following threshold and duration criteria are identified for water and wetland resources.

| Impact Topic | Negligible | Minor | Moderate | Major | Duration of Impact |
|------------------------------------|---|---|--|--|---|
| Water and Wetland Resources | Impacts barely perceptible or below detection levels. | Changes to water quality, wetland hydrology, and aquatic organisms detectable but relatively small. No mitigation would be necessary. | Changes to water quality, wetland hydrology, and aquatic organisms readily apparent but localized. Mitigation to offset adverse impacts could be necessary and would likely be successful. | Impacts to water quality, wetland hydrology, and aquatic organisms severe or of exceptional benefit over a wide area. Mitigation to offset adverse impacts would be necessary, but success is not assured. | Short term would refer to recovery in less than 5 years. Long term would refer to recovery, following treatment, requiring longer than 5 years. |

3.4.6.1 Impacts of Alternative A – No Action Alternative

Impact Analysis: Under the no action alternative, wildfire suppression operations and direct and indirect effects of fire on the refuge and WMD would range from negligible to moderate, depending on severity. Ash charge into surface water, along with some soil runoff from equipment use, would likely result in direct, short-term and minor impacts to aquatic systems.

Cumulative Effects: There are no known or planned actions at the refuge or WMD that would disturb surface waters or wetlands. Therefore, there would be negligible cumulative impacts associated with alternative A.

Mitigation Measures: Mitigation for low-severity wildfires would be very minimal. For high-severity fires, a rehabilitation plan may be necessary to mitigate any undesirable impacts.

Cumulative Effects: There are no known or planned actions at the refuge or WMD that would disturb surface waters or wetlands. Therefore, there would be negligible cumulative impacts associated with alternative A.

Conclusion: Direct and indirect impacts resulting from wildfires would range from negligible to moderate, depending on fire severity.

3.4.6.2 Impacts of Alternative B – Service-preferred Alternative

Impact Analysis: Under this alternative, as wildfire severity potential is reduced by fuel reduction treatments under an annual treatment schedule, long-term impacts would be beneficial, indirect, localized, and of minor intensity when compared with current conditions. Any change to overall water discharge rates into refuge waterways or pools also is expected to be negligible over the long term. There could be an increase in runoff during intense storms directly following heavy vegetation removal and/or prescribed fire, but the amount or contents would not likely affect water quality or quantity adversely. The St. Lawrence WMD would experience negligible impacts to water resources from the preferred alternative.

Cumulative Effects: Same as for the no action alternative.

Mitigation Measures: Mitigation actions under the preferred alternative would be that project plans involving prescribed fire or mechanical fuels work would outline specific, onsite measures to protect surface waters and wetlands prior to commencing work.

Conclusion: Long-term impacts on refuge or WMD water resources would be beneficial, indirect, localized, and of minor intensity under a planned program of treatments.

3.4.7 Air Quality

Generally, the air quality over Montezuma NWR and St. Lawrence WMD and their surrounding areas is good. Agricultural burning and other types of debris burning occur during the year and may affect the quality of the air to a minor degree and temporary in duration.

The following threshold and duration criteria are identified for air quality.

| Impact Topic | Negligible | Minor | Moderate | Major | Duration of Impact |
|---------------------|---|--|--|---|--|
| Air Quality | Impact on air quality barely detectable and not measurable; if detected, would have slight effects. | Impact on air quality measurable and localized. No mitigation measures would be necessary. | Changes in air quality would be measurable and would have consequences, but impacts local. Mitigation measures necessary and | Changes in air quality measurable, would have substantial consequences, and noticed regionally. Mitigation measures | Short term would refer to hours or days; i.e., the duration of the fire management incident. Long term would refer to that substantially |

| | | |
|-------------------|--|--|
| likely effective. | necessary and success of measures not assured. | beyond the duration of the incident or action. |
|-------------------|--|--|

3.4.7.1 Impacts of Alternative A – No Action Alternative

Impact Analysis: Direct impacts to air quality from wildfires under the no action alternative would include release of varying amounts of particulates and smoke into the environment. However, with the relatively low fire occurrence on the refuge, under normal fire season conditions the impacts would likely be negligible. Possible health effects on sensitive residents locally and visitors would also be likely under the most high-severity wildfire conditions.

The direct and indirect impacts of the no action alternative on the refuge and WMD would be short-term and minor on a local scale and nearly negligible on a regional scale, except in the most extreme cases.

Cumulative Effects: Cumulative effects, absent a major increase in nonfire related pollutants or large wildfires in the region, would be adverse, direct, localized, and minor.

Mitigation Measures: As all wildfires on the refuge would be considered unwanted and emergencies, mitigation would consist of aggressive suppression action to minimize smoke impacts.

Conclusion: Direct and indirect impacts of the no action alternative would be short-term and minor on a local scale and nearly negligible on a regional scale.

3.4.7.2 Impacts of Alternative B – Service-preferred Alternative

Activities resulting from implementing the FMP under a proposed annual work schedule would involve some vegetation removal, debris or pile burning, and broadcast prescribed fire. Direct impacts include release of particulates, and indirect impacts would be similar to those of wildland fire. The limited scale of treatments and resulting emissions would cause minor, direct, localized, but generally short-term, adverse impacts to air quality.

Vegetation would also be cut with hand tools in project areas containing fuels that, if burned, would produce moderate levels of emissions for very short periods. The long-term effect would be beneficial, indirect, and of minor intensity.

Cumulative Effects: Cumulative effects generally would be similar to the no action alternative.

Mitigation Measures: Effects of smoke on air quality would be mitigated by the following:

- Reduce particulate emissions for the fuel consumed by reducing the time period of the smoldering phase.
- Avoid wind vectors that would carry smoke toward smoke-sensitive locations such as highways and towns during heavier traffic periods (i.e., weekends, holidays, etc.).
- Avoid burning near smoke-sensitive areas when there are strong inversions or very stable high-pressure systems are in place.

- Post “Smoke on Road” signs when smoke has the potential to drift over a public roadway.

Conclusion: The preferred alternative would result in minor, direct, localized, but generally short-term, adverse impacts to air quality given mitigation measures.

3.4.8 Public Health and Safety

Wildfires have the potential to impact human health and safety, particularly during high-fire severity periods. Public safety is becoming a management concern, particularly where the Interstate borders Montezuma NWR (e.g., smoke on the highway). Other areas of risk are the refuge’s visitor trails, parking areas, and access roads.

The following threshold and duration criteria are identified for park health and safety.

| Impact Topic | Negligible | Minor | Moderate | Major | Duration of Impact |
|---------------------------------|---|--|---|---|--|
| Public Health and Safety | An action that could cause a change in level of risk to public and firefighter safety, but the change would be so small that it would not be of any measurable or perceptible effect. | An action that could cause a change in risk level, but the change would be small and localized effect. Mitigation would be a standard procedure and highly effective in minimizing risk. | An action that would cause measurable levels of risk; however, mitigation to offset adverse effects would generally be moderate complexity and effective. | An action that would cause a severe change or exceptional benefit to public and firefighter safety-related values. The change would have a substantial effect, and mitigation to offset adverse impacts is not assured. | Short term would refer to the duration of a fire management incident. Long term refers to duration extending beyond the specific incident. |

3.4.8.1 Impacts of Alternative A – No Action Alternative

Impact Analysis: One important health impact is the impacts of smoke on refuge visitors and employees, which is addressed as an impact topic under “Air Quality” above.

Montezuma NWR: The increased chance of wildfire escapes along public roadways and the Interstate would create an element of risk to surrounding residents, visitors, refuge staff, and firefighters. Wildfires and the suppression actions all combine to produce confusion and fear, especially during initial phases. Protection of residents and visitors from any short-term, rapidly

spreading fires may or may not be as achievable without preventive fuels management interventions to reduce risk. Impacts would be potentially adverse, short-term, direct, localized, and of minor to moderate intensity on public safety and would be partially mitigated by implementing any existing emergency response plans.

St. Lawrence WMD can anticipate some level of visitor increases during fire season in the future, but impacts to public health and/or safety would be negligible.

Cumulative Effects: Cumulative effects of the no action alternative would be increased duration of exposure to hazards associated with fire and suppression activities on and adjacent to USFWS lands. The cumulative effects on wildland firefighter and public safety are localized and minor.

Mitigation Measures:

- Portions of the refuge or WMD may be restricted by the refuge manager when there is any threat to the public or firefighters from a wildfire or fire management activities.
- Smoke warning signs will be posted on roadways and/or traffic control will be instituted during wildland fires.
- All fire personnel will receive annual training in all wildland fire safety standards.
- A safety briefing will be given prior to initiating work on any project.
- Every Incident Action Plan (IAP) will include a safety message.
- Every project or incident will have at least one person charged with incident safety oversight.
- All personnel will be authorized and obligated to exercise emergency authority to stop and prevent unsafe acts.

Conclusion: The direct and indirect adverse impacts to firefighters and the public under the no action alternative would be localized, short-term to long-term, and minor.

3.4.8.2 Impacts of Alternative B – Service-preferred Alternative

Impact Analysis: Under this alternative, long-term impacts under alternative B would be reduction in potential for high-intensity wildland fires, as fuels reduction treatments are applied around values at risk. Prescribed fire and fuel removal operations under a proposed work schedule would result in reduced safety threats to visitors, adjacent residents, and staff.

As long-term refuge and WMD protection and resource objectives are accomplished, the impact of the proposed alternative would range from negligible to beneficial, minor to moderate, and localized as the potential for high-intensity wildfires is reduced.

Cumulative Effects: When considered with reasonably foreseeable impacts of the proposed fire management program, cumulative effects would be negligible.

Mitigation Measures: Mitigation measures would be similar to the no action alternative.

Conclusion: Impacts from the preferred alternative would range from negligible to beneficial, minor to moderate, and localized as the potential for high-intensity wildfires is reduced.

4.0 CONSULTATION AND COORDINATION

4.1 Public Involvement Summary

The environmental analysis pathway follows a general progression starting with internal scoping. Internal scoping at Montezuma NWR was conducted by Wildland Fire Associates, LLC in compliance with NEPA requirements.

Following internal scoping, issues and concerns were distilled into distinct impact topics to facilitate the analysis and allow for a standardized comparison between alternatives based on the most relevant information. The impact topics were identified on the basis of the Federal laws, regulations, and staff inputs.

This EA will be released concurrent with the Montezuma NWR Draft Comprehensive Conservation Plan and Environmental Assessment (draft CCP/EA). Through this process, it will be subject to a 30 public review and comment period.

4.2 Agency Consultation

This EA is included as part of the draft CCP/EA). It will be made available at Montezuma NWR Headquarters and St. Lawrence WMD Field Office, a notice of availability will be published in the *Federal Register* for the draft CCP/EA, and a press release will be sent to local media.

4.3 List of Preparers

| Name | Role on Project | Title | Office |
|------------------|--------------------------------------|------------------------------|--|
| Tom Jasikoff | Administrative Oversight | Refuge Manager | Montezuma NWR 315-568-5987 |
| Linda C. Ziembra | Site and Fire Management Information | Wildlife Biologist | Montezuma NWR 315-568-5987 ext. 225 |
| Mike Durfee | Fire Management Information | Zone Fire Management Officer | US Fish & Wildlife Service 973.702.7266 ext. 16 |
| Rick Vollick | Fire Management Information | Regional Fire Planner | US Fish & Wildlife Service 973.702.7266 ext. 19 |
| John Lissoway | Author, FMP/EA | Senior Planner | Wildland Fire Assocs. St. Louis, MO 505.670.6437 |

4.4 List of Agencies, Governments, Officials, and Organizations Contacted

[Note: The refuge will be developing a CCP and a listing will be prepared as part of the CCP and included here.]

5.0 REFERENCES

- Ducks Unlimited, Inc. 2000. Management plan: Montezuma Wetlands Complex. Prepared in partnership with the U.S. Fish and Wildlife Service and the New York State Department of Environmental Conservation. Ducks Unlimited, Inc. Seneca Falls, New York.
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GLOSSARY AND ACRONYMS

Fire Management Plan (FMP): A strategic plan that defines a program to manage wildland and prescribed fires and documents the fire management program in the approved land-use plan. The plan is supplemented by operational plans such as preparedness plans, preplanned dispatch, prescribed fire plans, and prevention plans.

Manual Fuels Reduction (or Treatment): Manipulation or removal of fuels to reduce the likelihood of ignition and/or lessen potential damage and resistance to control. Methods include, but are not limited to, lopping, piling and burning, thinning, and hand removal.

Mechanical Fuels Treatment: Manipulation or removal of fuels with machinery to reduce the likelihood of ignition and/or lessen potential damage and resistance to control. Methods include, but are not limited to, chipping, felling, limbing, crushing, lopping, and removing.

Minimum Impact Suppression Techniques (MIST). The application of strategy and tactics that effectively meet suppression objectives with the least environmental, cultural, and social impacts.

Mitigation: Actions taken with the objective of reducing impacts. Mitigating actions include the following.

Avoiding the impact altogether by not taking a certain action or parts of an action.

Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

Compensating for the impact by replacing or providing substitute resources or environments.

Prescribed Fire: Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements must be met before ignition.

Prescription: Measurable criteria that define conditions under which a prescribed fire may be ignited. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social, or legal considerations.

Values to Be Protected: Include property, structures, physical improvements, natural and cultural resources, community infrastructure, and economic, environmental, and social values.

Wildland Fire: Any nonstructure fire, other than prescribed fire, that occurs in the wildland. This term encompasses fires previously called both wildfires and prescribed natural fires.

Wildfire: An unplanned, unwanted wildland fire including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out.

Wildland fire: Any non-structure fire that occurs in the wildland. Includes both wildfire and prescribed fire.

Wildfire Suppression: A response to wildfire that results in curtailment of fire spread and eliminates all identified threats from the particular fire. All wildfire suppression activities provide for firefighter and public safety as the highest consideration but minimize the loss of resource values, economic expenditures, and/or the use of critical firefighting resources.

APPENDICES

Appendix A. Annual Habitat Work Plan, Montezuma NWR

ANNUAL HABITAT WORK PLAN

2011

**MONTEZUMA NATIONAL WILDLIFE REFUGE
SENECA FALLS, NEW YORK**



Waterfowl flushing from the Main Pool during a detectability survey on November 9, 2010 (USFWS).

Approved by: _____
Refuge Manager

Date

Introduction

The Montezuma National Wildlife Refuge (NWR) is located at the north end of Cayuga Lake in the heart of the Finger Lakes Region of central New York State. The refuge encompasses more than 9,000 acres and lies within New York's 25th U.S. Congressional District in Seneca, Cayuga, and Wayne Counties—35 miles west of Syracuse, 40 miles north of Ithaca, and 45 miles east of Rochester, NY. The refuge headquarters is located on US Route 20 and NY Route 5 near the Menard Memorial Bridge over the Seneca River. The New York State Barge Canal system, NY State Route 5, US Route 20, NY State Route 89, and the New York State Thruway pass through the interior of the refuge. Since the early 1990s, more than 2,500 acres of lands have been added to the refuge. Many of these parcels are scattered tracts within the original boundaries of the historic Montezuma marshes.

Although established primarily for migratory waterfowl, Montezuma NWR provides habitats for an abundance of wildlife species. The mix of wooded wetlands, emergent marshes, and mixed successional stages of vegetation all contribute to the species diversity of the wildlife community found at Montezuma. The Montezuma Wetlands Complex (MWC), of which the refuge is a part, was recognized for supporting one of the largest migratory concentrations of waterfowl in the Northeast and as a significant stopover site for migrating shorebirds in upstate New York. The MWC was New York's flagship project in the Atlantic Coast Joint Venture after the adoption of the North American Waterfowl Management Plan. The National Audubon Society identified the MWC as New York's first Important Bird Area (IBA).

The refuge is managed for a variety of habitats to fulfill the needs of wildlife of greatest conservation concern. At present, Montezuma NWR has 15 manageable impoundments totaling more than 4,000 acres of freshwater wetland habitat. The remainder of the refuge's acreage consists of forests, grasslands, and early successional habitats ranging from old fields to young forests. Active habitat management is necessary to provide the best possible habitat for native wildlife species. In most impoundments, water levels are manipulated to provide high quality mudflat, emergent marsh, and open water wetland habitats primarily for waterfowl, shorebirds, water birds, marshbirds, and bald eagles (*Haliaeetus leucocephalus*). Water levels are managed within and between years in an attempt to mimic natural wetland hydro-periods or to provide the best possible habitat for priority wildlife species.

2010 Weather Overview

Higher than average precipitation during late summer made it difficult to maintain proposed water levels and made work in the Dry Marsh difficult. Overall, average high and low temperatures were close to average, average rainfall was up 5 inches, and snowfall was up approximately 21 inches (table 1).

Table 1. Weather recorded from the NOAA Online Weather Data in Auburn, NY (<http://www.nws.noaa.gov/>). Approximately 10 miles East of MNWR.

| Month | 2010 Temperature | | 29-Yr Temperature | | 2010 Snowfall Inches | 2010 Precipitation Inches | 29-Yr Average Snowfall Inches | 29-Yr Average Precipitation Inches |
|--|------------------|-------------|-------------------|-------------|----------------------|---------------------------|-------------------------------|------------------------------------|
| | Average High | Average Low | Average High | Average Low | | | | |
| January | 29.7 | 16.3 | 30.5 | 14.1 | 52.2 | 2.95 | 30.2 | 2.88 |
| February | 30.2 | 18.1 | 34.0 | 16.1 | 43.7 | 3.54 | 18.3 | 2.31 |
| March | 48.1 | 27.9 | 43.5 | 24.3 | 0.3 | 2.52 | 16.6 | 2.97 |
| April | 62.4 | 37.3 | 55.8 | 34.9 | 0.2 | 2.00 | 2.9 | 3.48 |
| May | 72.3 | 47.3 | 71.7 | 47.4 | 0.9 | 2.45 | 0.9 | 2.98 |
| June | 76.8 | 56.3 | 76.6 | 54.5 | 0.0 | 7.08 | 0.0 | 3.90 |
| July | 83.8 | 63.0 | 80.7 | 59.9 | 0.0 | 3.40 | 0.0 | 4.34 |
| August | 79.3 | 60.5 | 78.7 | 58.3 | 0.0 | 6.23 | 0.0 | 3.60 |
| September | 71.3 | 52.5 | 71.0 | 50.9 | 0.0 | 3.34 | 0.0 | 5.42 |
| October | 59.1 | 41.6 | 59.4 | 39.7 | 0.0 | 6.51 | 0.8 | 3.64 |
| November | 47.9 | 31.0 | 47.7 | 31.7 | 1.2 | 2.94 | 7.9 | 3.25 |
| December | 30.8 | 19.4 | 35.3 | 19.6 | 41.3 | 4.31 | 20.3 | 3.68 |
| Avg. Temp./Total Snowfall/Precip. | 57.6 | 39.3 | 57.1 | 37.6 | 139.8 | 47.27 | 97.9 | 42.45 |

Habitat Management Goals, Objectives, and Strategies

Goal 1 Provide high quality mudflat and freshwater emergent marsh and open water wetland habitats dominated by native plants for migrating and breeding waterfowl, shorebirds, waterbirds, marshbirds, and bald eagles provided through water level control.

Objective 1.1 Emergent (Hemi-) Marsh – Migrating Waterfowl

Each year, provide a minimum of 1,000 acres of spring (March through April) and fall (October through November) waterfowl migration and staging habitat consisting of shallow flooded wetlands (less than or equal to 12 inches) with a mix of vegetation and open water (hemi-marsh) dominated by native emergent vegetation such as millets (*Echinochloa* spp.), sedges (*Carex* spp. and *Cyperus* spp.), beggarticks (*Bidens* spp.), spikerushes (*Eleocharis* spp.), American water plantain (*Alisma subcordatum*), and smartweeds (*Polygonum* spp.).

Objective 1.2 Shallow Water Mudflats

Provide a minimum of 100 acres of shallow water (less than 3 inches) mudflats with sparse (less than 25 percent) vegetation and high invertebrate biomass in at least two patches twice annually during spring and again during late summer and early fall to benefit migrating shorebirds including semipalmated sandpipers (*Calidris pusilla*), greater yellowlegs (*Tringa melanoleuca*), and short-billed dowitcher (*Limnodromus griseus*), among other shorebirds.

Objective 1.3 Open Water

Each year, provide open water on a minimum of 1,000 acres, consisting of at least 2 patches greater than or equal to 100 acres from March through November. This will provide feeding habitat for bald eagles, particularly important during their fledging in mid to late summer, and migratory habitat for diving ducks.

Objective 1.4 Emergent Marsh – Breeding Marshbirds

Each year, provide a minimum of 800 acres of habitat for breeding marshbirds (especially black tern (*Chlidonias niger*), pied-billed grebe (*Podilymbus podiceps*), least bittern (*Ixobrychus exilis*), and American bittern (*Botaurus lentiginosus*)) consisting of an average mix of 50 to 70 percent vegetation and 30 to 50 percent open water (hemi-marsh) with an average water depth of 10 to 20 inches and at least 5 muskrat (*Ondatra zibethicus*) lodges per acre. Additionally, this habitat should be provided in a minimum of 3 patches greater than 100 acres each.

Goal 1 Strategies

Proposed and actual water levels for 2010 and proposed water levels for 2011 are listed in appendix A. Table 2 summarizes planned actions for 2011 in the refuge's 13 emergent marsh

impoundments to meet the four objectives listed above. A biological calendar was created to further detail management actions on the refuge (available upon request).

Table 2. Summary of planned management in each impoundment for 2011 and the habitat objective each action is intended to meet.

| Unit | Acres | Management Action | Habitat Objectives | | | | | |
|------------------------|-------|---|--|--|--|--|---|--|
| | | | 1.1 Emergent Hemi-Marsh – Spring Migrating Waterfowl | 1.1 Emergent Hemi-Marsh – Fall Migrating Waterfowl | 1.2 Shallow Water Mudflats - Spring Migrating Shorebirds | 1.2 Shallow Water Mudflats - Fall Migrating Shorebirds | 1.3 Open Water - Bald Eagles & Diving Ducks | 1.4 Emergent Marsh - Breeding Marshbirds |
| Main Pool | 1,663 | Full pool. | X | X | | | X | X |
| Tschache Pool | 1,270 | Spring slow drawdown. Fall flood up. | X | X | X | | | |
| Sandhill Crane Unit | 448 | Full pool. | X | X | | | X | X |
| Knox Marsellus Marsh | 228 | Late slow drawdown. | X | X | | X | | X |
| May's Point Pool | 199 | Full pool or late slow drawdown. | X | X | | ? | | X |
| Puddler Marsh | 95 | Late slow drawdown. | X | X | | X | | X |
| Millennium | 70 | Full pool. | X | X | | | | X |
| Visitor Center Wetland | 26 | Spring slow drawdown. Summer disk. Shallow flood late summer. | X | X | X | X | | |
| Shorebird Flats | 20 | Spring slow drawdown. Summer disk. Shallow flood late summer. | | | X | X | | |
| Benning Marsh | 18 | Full pool | X | X | | | | |
| Box Elder Bog | 10 | Full pool. | X | X | | | | |
| Lesser Yellowlegs | 8 | Full pool. | X | X | | | | |
| Display Pool | 2 | Full pool. | X | X | | | | |

Monitoring Strategies for Goal 1 in All Units

Weekly waterbird counts will be conducted in all refuge emergent marsh impoundments from March into November per the Integrated Waterbird Management and Monitoring (IWMM) protocol (2010, <http://iwmmprogram.ning.com>). Vegetation surveys will be conducted once in the spring and twice in the fall in all refuge emergent marsh impoundments per the IWMM protocol. Black tern breeding colony surveys will be conducted in all refuge impoundments with suitable habitat per the protocol used by the NY State Department of Environmental Conservation. Breeding marshbird surveys will be conducted for secretive marshbirds in the seven largest refuge impoundments per the standardized protocol developed by Conway (2009, http://www.fws.gov/bmt/documents/marshbird_monitoring_protocol.pdf). Point locations were established by the FWS Division of Migratory Birds as part of a pilot study to develop a national survey that will be applicable to biologists and land managers at the national, regional, and refuge scales.

Management Strategies for Goal 1 in All Units

Muskrat and beaver trapping will be permitted in all refuge impoundments to protect the dikes from muskrat damage, to protect water control structures and stop logs from beaver damage, and to extend the life of the hemi-marsh stage of the wetlands.

Main Pool (1,663 acres)

2010 Management Results: The Main Pool was slowly drained from April to the end of May. Draining the Main Pool allowed restoration to continue in the Dry Marsh. This project involves digging potholes and removing muck soil to provide a greater interspersion of open water and emergent marsh habitats in the northern portion of the Main Pool along the Wildlife Drive. Restoration of the Dry Marsh was hindered by unusually wet conditions during late summer. However, 10 percent of the total 75 acres was completed. Flooding of the Main Pool began in late August.

On April 4, vegetation in the Dry Marsh portion of the Main Pool ignited due to an unknown human cause at the north end of the Wildlife Drive next to the New York State Thruway, I-90. The fire burned for approximately 12 hours and consumed all available fuel in a 694-acre area and then died when it could not cross the open water and ditches surrounding the Main Pool. The fire was early enough in the year to have minimal impacts on nesting wildlife. The burn removed accumulated cattail (*Typha* spp.) biomass and stimulated regeneration.

Volunteers, Larue St. Clair, Jackie Bakker, and Frank Morlock conducted waterbird counts and avian mortality surveillance two times per week from March 10 through December 3 along the Wildlife Drive and at other refuge impoundments. A detectability survey was conducted in the Main Pool on November 9. Breeding marshbird surveys were conducted in the southern portion of the Main Pool, near black lake, in May and June of 2010.

2010 Vegetation and Wildlife Response: The 2010 drawdown resulted in dense cover of cattail, smartweed, beggartick, sedges, and millets in the Main Pool, providing excellent habitat for fall migrating waterfowl.

The results of the weekly waterbird counts are available upon request. As usual, waterfowl use of the Main Pool was phenomenal during both spring and fall migration. Spring migration peaked on March 10, with almost 26,000 individuals of 18 species counted. Although large numbers of waterfowl took advantage of the abundant food in the Main Pool during fall migration, counts were low because the dense vegetation made it difficult to see the birds. Results of the November 9 detectability survey indicated that only 20 percent of the birds present were actually being counted. Table 3 shows the minimum peak numbers of waterfowl species of concern for both spring (March and April) and fall (October and November) migration and includes adjusted numbers for fall migration based on the detectability survey.

Table 3. Peak numbers of waterfowl species of conservation concern detected in the Main Pool in 2010. Only species with peaks greater than 100 are included. Adjusted numbers based on the November 9 detectability survey are included in parentheses.

| Species | Spring Migration | | Fall Migration | |
|-------------------|------------------|---------------|----------------|----------------------------------|
| | Peak Date | Peak Number | Peak Date | Peak Number |
| Green-winged teal | April 23 | 268 | Oct. 26 | 34 (170) |
| Canada goose | March 10 | 13,500 | Nov. 23 | 3,820 (19,100) |
| Canvasback | March 19 | 12,000 | Nov. 16 | 76 (380) |
| Mallard | March 10 | 625 | Oct. 5 | 78 (390) |
| Northern pintail | March 10 | 2,650 | Nov. 2 | 387 (1,935) |
| Redhead | March 23 | 620 | Oct. 19 | 355 (1,775) |
| Ring-necked duck | March 10 | 650 | Nov. 16 | 4,000 (20,000) |
| Scaup | April 2 | 42 | Nov. 23 | 150 (750) |
| Tundra swan | March 12 | 1,100 | Nov. 30 | 600 (3,000) |
| Total Waterfowl | March 10 | 25,853 | Oct. 26 | 10,141 (50,705) |

Few shorebirds utilized the Main Pool in the spring due to dry conditions and in the fall due to full pool conditions. No focal marshbirds were detected using the southern portion of the Main Pool.

Bald eagles were a common occurrence on the Main Pool with observations greater than 30 recorded, and one pair nesting successfully on Maple Island.

2011 Management Strategy: Water will be kept in the Main Pool to provide habitat for waterfowl during spring and fall migration and throughout the summer for nesting marshbirds, especially black tern, pied-billed grebe, least bittern, and American bittern, and foraging bald eagles. We will experiment with techniques to continue restoration work in the Dry Marsh with water (i.e. partial drawdown) in the Main Pool.

Tschache Pool (1,270 acres)

2010 Management Results: A spring drawdown was considered but not conducted due to the Main Pool drawdown. Tschache Pool was held at full pool to provide habitat for spring and fall migrating waterfowl, bald eagles, and breeding marshbirds. Muskrat trapping was permitted in the interior of Tschache Pool to prevent muskrats from removing too much emergent vegetation and creating too much open water.

Volunteers with the Montezuma Alliance for the Restoration of Species and Habitat (MARSH!) spent nine workdays removing common frogbit (*Hydrocharis morsus-ranae*) from a 21-acre area in the northwest portion of the impoundment. MARSH! volunteer efforts were focused on the removal of common frogbit from the impoundment with more than $\frac{3}{4}$ tons removed.

2010 Vegetation and Wildlife Response: Tschache Pool has not been drawn down since 2005. The impoundment has some cattail and sedge cover for waterbirds but is mainly open water and is in need of a drawdown to promote vegetation growth.

Waterfowl numbers were similar to previous years with species of concern present (eg, American black duck (*Anas rubripes*), green-winged teal (*Anas crecca*), blue-winged teal (*Anas discors*), Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), and redhead (*Aythya americana*).

The cover of purple loosestrife (*Lythrum salicaria*) in Tschache Pool has been greatly reduced by the introduction of biological control beetles (*Galerucella* spp.).

American bittern, common moorhen (*Gallinula chloropus*), pied-billed grebe, and Virginia rail (*Rallus limicola*) were detected during breeding marshbird surveys within the impoundment, and five black tern nests were confirmed during a colony survey.

Bald eagles used Tschache Pool extensively and there were two active nests in the vicinity. The weekly waterbird surveys had counts of at least 30 bald eagles using the impoundment.

2011 Management Strategy: Tschache Pool will be drawn down in the spring for northbound shorebirds and to promote vegetative growth throughout the summer. A fall flood-up will provide habitat for southbound waterfowl, weather permitting.

The interior of the unit will be inspected for common frogbit. If the frogbit is present and accessible, it will be hand pulled by staff and MARSH! volunteers.

Breeding bird surveys will be conducted in the interior of Tschache Pool to determine if obligate grassland breeding birds nest in this impoundment when it is drained.

This impoundment may be surveyed in the summer to determine bottom elevations.

Sandhill Crane Unit (former Foster Malone Tract) (448 acres)

2010 Management Results: The Sandhill Crane Unit was held as high as possible to limit woody plant growth and provide habitat to migrating and nesting waterbirds.

2010 Vegetation and Wildlife Response: In March, thousands of waterfowl including mallard, American black duck, green-winged teal, American wigeon (*Anas americana*), northern pintail, and Canada goose used the Sandhill Crane Unit.

American bittern, common moorhen, least bittern, pied-billed grebe and sora (*Porzana carolina*) were detected during marshbird callback surveys. A survey also was conducted for black terns with 2 nests found and an additional probable nest. Horned larks (*Eremophila alpestris*) were identified in the unit in April and may have bred in the higher areas.

Winter raptor surveys were conducted in December 2010 through March 2011 with short-eared owl (*Asio flammeus*) (also common in the spring and fall), northern harrier (*Circus cyaneus*), red-tailed (*Buteo jamaicensis*) and rough-legged hawk (*Buteo lagopus*), and northern shrike (*Lanius excubitor*) detected utilizing the impoundment.

2011 Management Strategy: Various techniques including high water levels, chemical spot treatments, and cutting with an amphibious excavator are being explored to eliminate woody vegetation from the interior of the Sandhill Crane Unit. A new water control structure will be installed in the ditch on the west side of the unit to divert water into the impoundment. Weather permitting, the Sandhill Crane Unit will be held as high as possible to assist in eliminating woody vegetation and also to provide habitat for migrating waterfowl and breeding marshbirds.

Knox Marsellus Marsh (228 acres)

2010 Management Results: Knox Marsellus Marsh was held at full pool to provide habitat for spring migrating waterfowl, bald eagles, and breeding marshbirds then slowly drained beginning in July to provide habitat for migrating shorebirds.

Beavers (*Castor canadensis*) were active in the southwest corner and repeatedly dammed up the culvert under Towpath road. A trapper was issued a special use permit prior to and through the state trapping season to remove beavers.

2010 Vegetation and Wildlife Response: Knox Marsellus Marsh provided habitat for spring migrating waterfowl and shorebirds, and extremely good habitat for fall migrating shorebirds with thousands counted at a time. Species included greater yellowlegs, lesser yellowlegs (*Tringa flavipes*), least (*Calidris minutilla*), semipalmated, stilt (*C. himantopus*), pectoral (*C. melanotos*), spotted (*Actitis macularia*), and solitary (*Tringa solitaria*) sandpiper, short-billed dowitcher,

American golden-plover (*Pluvialis dominica*), black-bellied plover (*P. squatarola*) and Wilson’s (*Phalaropus tricolor*) and red-necked (*P. lobatus*) phalarope. Table 4 shows the minimum peak numbers of shorebirds detected in Knox-Marsellus Marsh in 2010.

Table 4. High counts of shorebirds in Knox-Marsellus and Puddler Marshes reported by birders and volunteers in 2010 (www.ebird.org). Only species with a high count greater than 100 are included.

| Species | Approximate Peak Date | Peak Number |
|------------------------|-----------------------|-------------|
| Killdeer | July 22 | 130 |
| Least sandpiper | July 22 | 1,350 |
| Lesser Yellowlegs | July 22 | 800 |
| Pectoral Sandpiper | September 8 | 350 |
| Semipalmated Plover | August 13 | 273 |
| Semipalmated Sandpiper | August 22 | 400 |

No marshbird callback surveys were completed due to the lack of suitable habitat.

Wildlife highlights are listed under Puddler Marsh.

2011 Management Strategy: Knox Marsellus Marsh likely will be managed similarly to last year, but management will be flexible depending on the weather and habitat needs.

Puddler Marsh (96 acres)

2010 Management Results: Puddler Marsh was held at full pool to provide habitat for spring migrating waterfowl, bald eagles, and breeding marshbirds. A partial drawdown was conducted throughout the summer and early fall to provide mudflats for migrating shorebirds.

2010 Vegetation and Wildlife Response: Little vegetation provided good mudflats late in the fall migration and shorebirds responded to the habitat. The water level was kept high enough through the summer to limit the growth of Eastern cottonwood trees (*Populus deltoids*) throughout the impoundment. Puddler had a slower response of migrating birds, compared to Knox-Marsellus Marsh.

Some additional highlights for both Knox Marsellus and Puddler Marshes include:

- Dozens of black-crowned night-herons (*Nycticorax nycticorax*) roosting in the cattails through the fall,
- More than 4,500 unique snow geese (*Chen caerulescens*) during fall migration,
- More than 25,000 unique Canada geese during fall migration,
- More than 4,000 unique Northern pintail during fall migration,
- More than 3,500 unique mallards during fall migration,
- Almost 1,500 unique shorebirds during fall migration of 17 species,
- Nine probable and one confirmed black tern nests,
- At least 20 unique sandhill cranes (*Grus canadensis*) through the fall, and
- A family of North American river otters (*Lontra canadensis*).

2011 Management Strategy: If possible, Puddler Marsh will be held lower than last year to promote vegetative growth and possibly to provide additional shorebird habitat. Management will be flexible depending on the weather and habitat needs.

May's Point Pool (199 acres)

2010 Management Results: May's Point Pool was held at full pool to provide habitat for spring migrating waterfowl, bald eagles, and breeding marshbirds and lowered throughout the summer to provide habitat for migrating shorebirds. To facilitate restoration in the Dry Marsh, water was pumped under the New York State Thruway (I-90) into May's Point Pool.

Common frogbit was discovered within the impoundment in late summer. MARSH! volunteers attempted to hand pull the plant but found it to be difficult because the plant was dying (leaves broke off the stems) and because most of the plants were buried under muck soils (out of water, on the shoreline). One MARSH! work day was spent hand pulling common frogbit from the shoreline of the pool. *Galerucella* beetles were released in May's Point Pool to control purple loosestrife.

2010 Vegetation and Wildlife Response: May's Point Pool did not drain enough to provide mudflats for migrating shorebirds but did provide excellent habitat for breeding marshbirds and migrating waterfowl. This pool had a good mixture of open water, submerged and emergent vegetation, and cattail cover for breeding marshbirds, including black tern, pied-billed grebe, and common moorhen, and migrating waterfowl. One black tern nest was identified with another nest probable. Some migrating shorebirds were sighted through fall migration.

May's Point Pool had a waterbird (waterfowl and shorebird) species richness of 37. Highlights included one little blue heron (*Egretta caerulea*) and numerous Great Egrets (*Ardea alba*) frequenting the pool.

May's Point Pool provided the most consistent duck trapping sites for preseason banding with 690 ducks banded. This accounted for more than 58 percent of the total ducks banded in 2010 (1,176 total ducks).

2011 Management Strategy: May's Point Pool likely will be managed similarly to last year, but management will be flexible depending on the weather and habitat needs.

Common frogbit was documented in May Point Pool in 2010 and control will be attempted in 2011 by the MARSH! program.

Millennium Marsh (70 acres)

2010 Management Results: Millennium Marsh was drawn down in the spring to facilitate habitat restoration work in the Dry Marsh and then flooded in the fall from North Spring Pool for southbound waterfowl.

2010 Vegetation and Wildlife Response: Millennium Marsh received consistent use by northbound waterfowl in March and April. Despite excellent vegetative response to the summer draw down, few waterfowl were observed through fall migration. This may not be representative of the entire impoundment because visibility from the Wildlife Drive is poor.

Marshbird callback surveys were conducted at the North end of the impoundment; no focal species were identified.

2011 Management Strategy: Millennium Marsh will be held at full pool for migrating waterfowl and breeding marshbirds.

Visitor Center Wetland (26 acres)

2010 Management Results: The Visitor Center Wetland was drawn down in the spring for northbound shorebirds. Water from the Main Pool was pumped via Crisafulli pump into this unit in April and May to keep it moist through the spring shorebird migration. Common reed (*Phragmites australis*) in the interior of the unit was sprayed with glyphosate in July with an ATV sprayer. The unit was disked in early August and then flooded by pumping water from the Main Pool to create mudflats for southbound shorebirds. The water level was increased in late fall to cover the impoundment for the winter months.

Thanks to the refuge's emphasis on early detection/rapid response for invasive species, flowering rush (*Butomus umbellatus*) was identified near the inlet of the Visitor Center Wetland. All the plants observed were either dug up or chemically treated with Clearcast (active ingredient: imazamox) to control this invasive emergent plant. We will continue to monitor the effectiveness of our treatments and potentially eradicate this new invasive from the refuge. Photo monitoring points were established to monitor the spread of this invasive plant.

2010 Vegetation and Wildlife Response: Migrating shorebirds and waterfowl consistently utilized the Visitor Center Wetland as the impoundment was flooded for spring and fall migration. Over the course of the year, 31 species were present in the wetland. Dunlin, long-billed dowitcher, yellowlegs, pectoral, semipalmated, spotted and stilt sandpiper, black-bellied plover, and Wilson's phalarope foraged on the mudflats while American black duck, green-winged teal, American wigeon, Canada goose, gadwall (*Anas strepera*), mallard, northern pintail, northern shoveler (*Anas clypeata*), and wood duck (*Aix sponsa*) foraged in the deeper water (still less than 4 inches). Numbers peaked for shorebirds on August 17 with 111 individuals including 103 yellowlegs. Waterfowl peaked on October 26 with more than 1,647 individuals counted including 1,230 Canada geese, 145 green-wing teal, and 100 mallards.

One pre-season duck banding trap was placed on the dike, and 81 ducks were caught throughout the season.

2011 Management Strategy: The Visitor Center Wetland will be drawn down in the spring for northbound shorebirds. Water from the Main Pool may be pumped via Crisafulli pump into this unit in April and May to keep it moist through the spring shorebird migration. In late June, July, or as soon as the unit is dry enough, vegetation may be disked thoroughly, and later flooded to create mudflat habitat for southbound shorebirds. Whenever the unit becomes too dry for

shorebirds, additional water will be pumped in. Water may be kept high enough to provide some waterfowl habitat during fall migration.

Shorebird Flats (20 acres)

2010 Management Results: Shorebird Flats is a new impoundment that was completed in the fall of 2010 and was managed for fall migrating shorebirds. Water was pumped into the unit via a Crisafulli pump from the Main Pool.

2010 Vegetation and Wildlife Response: Heavy equipment used to complete the impoundment set back all vegetation within the unit providing prime mudflats for southbound shorebirds. Numbers peaked on September 28 with 178 killdeer (*Charadrius vociferous*) and on October 26 with 172 dunlin. Other species present include American golden plover, black-bellied plover, buff-breasted sandpiper, greater and lesser yellowlegs, least, pectoral, white-rumped, and semipalmated sandpiper, and Wilson's snipe.

2011 Management Strategy: Management will be similar to the Visitor Center Wetland for migrating shorebirds.

Benning Marsh (18 acres)

2010 Management Results: A slow drawdown was initiated in March and continued until the impoundment was drained in mid-June. It was disked in late July, but was too wet to complete more than one pass with the equipment. Benning was flooded through a structure from the Main Pool although it was difficult to hold water due to muskrat damage on the East dike. The unit was slowly drained to provide fall shorebird habitat. On August 1, the unit was flooded to provide better habitat for waterfowl.

2010 Vegetation and Wildlife Response: The spring drawdown resulted in lush vegetative growth within the impoundment. Despite the inability to properly disk the marsh, shorebirds used the impoundment through the middle of August with the following species observed: killdeer, Wilson's snipe (*Gallinago delicata*), least, pectoral, and semipalmated sandpipers, dunlin and greater and lesser yellowlegs.

The lush vegetation that resulted from the disking provided good dabbling habitat for fall migrating waterfowl. Species observed include: mallard, American wigeon, northern pintail, green-winged teal, American black duck, northern shoveler, gadwall and Canada goose.

2011 Management Strategy: Benning Marsh will be managed for migrating waterfowl. The vegetation in the unit resulting from last year's drawdown should provide good waterfowl habitat during both spring and fall migration.

Box Elder Bog (10 acres)

2010 Management Results: Box Elder Bog is part of the Riparian Forest Corridor Habitat Management Unit, thus, the intention is to reforest this emergent marsh impoundment. The bog was kept dry for the majority of the year to promote woody vegetation.

2010 Vegetation and Wildlife Response: The majority of this 10-acre impoundment was dominated by reed canary grass (*Phalaris arundinacea*) in 2010 which limited the growth of woody vegetation. No control methods were conducted to control the invasive vegetation. The unit was flooded for fall migration of waterfowl.

2011 Management Strategy: Box Elder Bog will be held at full pool until it can be prepared for seeding and planting native species to promote its reforestation. The surrounding area is dominated by reed canary grass with common buckthorn (*Rhamnus cathartica*) growing adjacent to the Clyde River. Invasives need to be controlled and native species planted in the entire area to increase the likelihood of success. In the meantime, this small impoundment will continue to provide habitat for migrating waterfowl.

Lesser Yellowlegs Unit (Formerly Shorebird Unit, 8 acres)

2010 Management Results: The Lesser Yellowlegs Unit was filled at the end of March to provide habitat for migrating shorebirds and then drained in May in attempts to disk the unit. The unit was, although still wet, disked in July to mix existing vegetation back into the ground to provide food for aquatic invertebrates when flooded. Disking also set back the regrowth of vegetation. Natural precipitation filled the Lesser Yellowlegs Unit to provide habitat for fall migrating waterfowl and cover the unit for the winter months.

Due to wet soil, the vegetation within the unit was not disked thoroughly. In combination with limited water added to the unit due the Main Pool being dry, regrowth was quick and dense.

2010 Vegetation and Wildlife Response: Shorebirds including spotted, solitary and least sandpipers, Wilson's snipe and greater and lesser yellowlegs were observed in the Lesser Yellowlegs Unit throughout the year, and numerous species of waterfowl were commonly found using the impoundment. It was difficult to keep the unit flooded because the Main Pool was drained, and the impoundment is lower in elevation on the northern and southern ends than in the middle. Not being able to add enough water caused vegetative growth which reduced the number of shorebirds utilizing the unit. The vegetation provided habitat for waterfowl that consistently used the unit.

2011 Management Strategy: Water in the Lesser Yellowlegs Unit will be held high (approximately 12 inches) for waterfowl.

Display Pool (2 acres)

2010 Management Results: Water was held in the Display Pool and slowly dropped throughout the summer to provide habitat for migrating shorebirds in the fall.

2010 Vegetation and Wildlife Response: Very little vegetative growth or wildlife use occurred in the Display Pool in 2010.

2011 Management Strategy: Water will be kept in the Display Pool to provide foraging habitat for wading birds in the summer and waterfowl in the fall.

Goal 2 Restore and maintain bottomland hardwood forests (forested wetland), the riparian forests along the Seneca and Clyde Rivers, and upland forests to increase block size and connectivity and reduce fragmentation to support nesting waterfowl and songbirds, breeding amphibians, and uncommon plant communities.

Goal 2 Strategies

The U.S. Forest Service (USFS) conducted a Forest Health Assessment in the Nash, Cerulean, Esker Brook, and Jackson Forests (Dodds and Dubois 2011). Important findings are described separately for each unit.

Jackson Property – East, West, North Central, and South Central Former Agricultural Fields (43 acres)

2010 Management Results: MARSH! volunteers and refuge staff spent five days in October and November planting 950, 3 to 5 foot tall native tree saplings in two former agricultural fields totaling 25 acres. Hackberry (*Celtis occidentalis*), American sycamore (*Plantus occidentalis*), white oak (*Quercus alba*), swamp white oak (*Quercus bicolor*), bur oak (*Quercus macrocarpa*), northern red oak (*Quercus rubra*), and shagbark hickory (*Carya ovate*) were planted. In April and May refuge staff and MARSH volunteers cut garlic mustard (*Alliaria petiolata*) and on July 2, refuge staff sprayed pale swallow-wort (*Cynanchum rossicum*) along the field edges to prevent these invasive plants from invading the fields and thwarting our reforestation efforts. Prior to planting, a cooperative farmer mowed the fields high to stimulate the growth of woody vegetation, reduce the vigor of herbaceous vegetation, and prepare the fields to plant trees.

2010 Vegetation and Wildlife Response: In 2009, MARSH! volunteers and refuge staff planted 450 trees in two former agricultural fields totaling 18 acres. These trees were monitored for mortality in July 2010. At least 76 percent of the trees planted had survived. Unfortunately, a miscommunication with the cooperative farmer who was to mow only the fields that had not yet been planted, led to the already planted fields being mowed and resulted in 21percent of the trees being mowed down (killing the trees).

The USFS conducted a Forest Health Assessment in 47 acres of existing forest at the Jackson Property. The dominant trees are common buckthorn, white ash (*Fraxinus americana*), and

maple (*Acer* spp.), and the main concern is invasive species. Common buckthorn, in particular, is likely to influence tree regeneration and future forest conditions.

2011 Management Strategy: Mortality surveys will continue for trees planted in 2009 and 2010 to determine the success of each planting. A protocol will be developed to monitor reforestation sites not only for the survivorship of planted trees but also to measure natural regeneration.

Objective 2.1 Bottomland Floodplain Forest

Maintain and restore, as necessary, a minimum of 1,000 acres of mature bottomland floodplain forest dominated by red maple (*Acer rubra*), American elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), and swamp white oak (*Quercus bicolor*), by allowing natural processes and controlling non-native invasive species to provide breeding habitat for cavity nesting waterfowl (primarily wood duck), migratory songbirds (especially cerulean warbler (*Dendroica cerulean*), and breeding amphibians. The New York Natural Heritage Program identified the Montezuma floodplain forest as a significant ecological community.

Objective 2.1 Strategies

Unit 17 East (344 acres)

2010 Management Results: The intention was to maintain the water level in Unit 17 East at 383.0' during 2010 to keep water in the ditch surrounding the unit but drained from the interior of the unit. Conditions kept the water level higher in the unit and made it difficult to drain the interior. A breeding bird survey was conducted in this unit per the standardized protocol developed by Knutson et. al (2008). An emerald ash borer trap was placed in the crown of a trap tree and monitored by the U.S. Forest Service.

2010 Vegetation and Wildlife Response: This unit was over one foot higher than proposed from late summer into fall because the Cayuga Lake Connector Canal was opened to fill the Main Pool and the control structure was rotten. The unit still provided great nesting and foraging habitat for wood ducks and great blue herons (*Ardea herodias*); a heron rookery was present. The following species of conservation concern were detected during breeding bird surveys: wood thrush (*Hylocichla mustelina*), Baltimore oriole (*Icterus galbula*), Northern flicker (*Colaptes auratus*), rose-breasted grosbeak (*Pheucticus ludovicianus*), scarlet tanager (*Piranga olivacea*), black-throated blue warbler (*Dendroica caerulescens*), red-headed woodpecker (*Melanerpes erythrocephalus*) and song sparrow (*Melospiza melodia*). The abundance of wood thrush, a focal species for this habitat type, was 1.36. More information about the results of this breeding bird survey can be found in the Breeding Bird Surveys in Forested Wetlands Progress Report (Ziembra and Bakker 2011). The emerald ash borer trap placed in the crown of a trap tree was negative.

2011 Management Strategy: We will attempt to keep the interior of Unit 17 East drawn down again this year to encourage seedling growth. The structure was patched to facilitate filling the Main Pool but to be efficient, the structure should be replaced. Ditches will remain flooded to provide habitat for nesting waterfowl such as wood ducks. Breeding bird surveys will be conducted in this unit, and results will be compared to those for other units as well as results of

previous years' surveys to facilitate adaptive management. The emerald ash borer trap tree will be cut and debarked during the spring 2011. A fish survey may be done in the ditches surrounding this unit.

Unit 17 West (266 acres)

2010 Management Results: The northern outlet structure is rotten so we have limited water level control in this unit. A breeding bird survey was conducted in this unit per the standardized protocol developed by Knutson et. al (2008).

2010 Vegetation and Wildlife Response: This unit provided great nesting and foraging habitat for wood ducks. The following species of conservation concern were detected during breeding bird surveys: wood thrush, Baltimore oriole, Northern flicker, rose-breasted grosbeak, scarlet tanager, red-headed woodpecker, willow flycatcher (*Empidonax traillii*) and song sparrow. The abundance of wood thrush, a focal species for this habitat type, was 0.55.

2011 Management Strategy: Same as Unit 17 East.

Main Pool Forest (457 acres)

2010 Management Results: The Swamp Woods Natural Area was recognized by the NY Natural Heritage Program as a red maple-hardwood swamp that is “significant on a statewide level due to large size, good diversity, good species condition, and good microtopography.”

This area is influenced by the water level in the Main Pool and so 2010 was a dry year for this unit since the Main Pool was drawn down. A breeding bird survey was conducted in this unit per the standardized protocol developed by Knutson et. al (2008).

2010 Vegetation and Wildlife Response: The following species of conservation concern were detected during breeding bird surveys: Baltimore oriole, black-billed cuckoo (*Coccyzus erythrophthalmus*), Northern flicker, red-headed woodpecker, rose-breasted grosbeak, scarlet tanager, song sparrow, willow flycatcher, and wood thrush. The abundance of wood thrush, a focal species for this habitat type, was 0.45.

2011 Management Strategy: This area is directly influenced by the water regime of the Main Pool, which will be held at full pool throughout the year. Breeding bird surveys will be conducted in this unit and compared to results of previous surveys as well as results in Units 17 East and West to facilitate adaptive management.

Beech-Maple Knoll (69 acres)

2010 Management Results: The Beech-Maple Knoll was designated a Research Natural Area in 1967 because it is a prime example of a mature, northern hardwood beech-maple forest cover type. The beech-maple association provides a unique habitat type not found elsewhere on the refuge. In September, the USFS established a vegetation transect to monitor potential impacts of deer browse.

2010 Vegetation and Wildlife Response: A lack of stems less than 2 inches DBH was found in this unit indicating high negative impacts caused by white-tailed deer.

2011 Management Strategy: The vegetation transect to monitor potential impacts of deer browse will be revisited in the spring and again in the fall to monitor changes to the vegetative community over time.

Esker Brook (229 acres)

2010 Management Results: The USFS conducted a Forest Health Assessment on a 37-acre forest stand in this unit.

2010 Vegetation and Wildlife Response: Black walnut (*Juglans nigra*), white ash, and American elm were the only overstory trees present. Black walnut accounted for 96 percent of the basal area in the stand and 77 percent of the stems. Portions of this stand were thickly covered with invasive honeysuckle species (*Lonicera* spp.) in the understory. With this thick shrub layer of honeysuckle, it may be difficult for forest tree species to effectively regenerate.

2011 Management Strategy: None.

Cerulean Forest (215 acres)

2010 Management Results: The USFS conducted a Forest Health Assessment on a 37-acre forest stand in this unit. The NYNHP considers this forest unit to be a significant occurrence of a silver maple-ash swamp.

2010 Vegetation and Wildlife Response: Dominant trees in this stand include bitternut and shagbark hickory and red maple. This forest stand represents a relatively intact native plant community with a very low invasive species load.

2011 Management Strategy: The USFS may establish vegetation transects to monitor potential impacts of deer browse in the Cerulean Forest.

Other Areas

There are several areas throughout the refuge that also provide forested wetland habitats. These areas are not managed or monitored.

Objective 2.2 Riparian Forest Corridor

Where practical, maintain and restore, as necessary, at least a 150m-wide (Fischer 2000) corridor of riparian forest along the Seneca and Clyde Rivers dominated by native species to maintain connectivity of bottomland hardwood forest and the riverine habitat and to protect the water quality of the river, and provide nesting habitat for wood duck, cerulean warbler, bald eagle, and other species of conservation concern.

Objective 2.2 Strategies

Seneca Trail Area (40 acres)

2010 Management Results: A contractor sprayed the pale swallow-wort growing throughout the entire area with Garlon 4 Ultra (active ingredient: triclopyr) during the growing season. Common buckthorn was treated with Garlon 4 Ultra mixed with bark oil and applied to the basal bark. MARSH volunteers removed all Japanese stiltgrass (*Microstegium vimineum*) from the area.

2010 Vegetation and Wildlife Response: Restoration of the Seneca Trail Area is a long-term project requiring a long-term perspective regarding vegetation and wildlife response. The swallow-wort response to repeated herbicide treatments has been slow in that it returns every year, but the density was much lower this year than in previous years. Herbicide application will continue in an effort to control the plant. Native trees planted in 2008 and 2009 continue to grow in areas where common buckthorn was removed.

2011 Management Strategy: Invasive plant control will continue in 2011. Native trees and shrubs will be planted as time and funding permit.

May's Clyde River Forest Corridor

2010 Management Results and Vegetation and Wildlife Response: No management action occurred within the unit in 2010.

2011 Management Strategy: The Restoration Tree Trust has been contacted in an effort to secure funding to control invasive species and reforest this corridor. The not-for-profit organization's purpose is to foster urban and rural reforestation. When resources become available, this corridor will be reforested. More information about the Restoration Tree Trust and a summary of the Montezuma project can be found at: <http://www.restorationtreetrust.com/>.

Other Areas

There are several areas along both the Seneca and Clyde Rivers on the refuge that meet this objective. These areas currently are not managed.

Objective 2.3 Mature Upland Forest

Provide 300 acres of mature-late successional upland forest (greater than 150 years old) dominated by native species, especially sugar maple, oaks, hickories, and white ash to benefit migratory breeding birds including wood thrush, cerulean warbler, and black-billed cuckoo. Focus forest management and restoration on parcels within 500-acre blocks of forest or more, if possible, with an emphasis on those parcels with minimal edge, and maintain forests in close proximity to one another.

Objective 2.3 Strategies

Lawrence Property (65 acres)

2010 Management Results: The southern 25 acres of this field were mowed in October to prepare for planting native shrubs and trees. Planting did not occur due to limited resources. The Conservation Fund and the Restoration Tree Trust were contacted and may fund the planting of the total 65-acre field in 2011.

Vegetation and Wildlife Response: No wildlife or vegetation surveys were conducted.

2011 Management Strategy: Conversion from post agricultural to successional forest will begin on the Lawrence Property in the spring of 2011. Working in the south and north ends of the field, 38 acres will be planted with bareroot seedlings purchased from the New York State Department of Environmental Conservation Tree Nursery in Saratoga, NY. Northern red oak (*Quercus rubra*), sugar maple (*Acer saccharum*), red maple, silver maple (*Acer saccharinum*), black cherry (*Prunus serotina*), buttonbush (*Cephalanthus occidentalis*), and red osier dogwood (*Cornus sericea*) seedlings will be stocked at a rate of 100/acre. A fall planting also will be conducted. Available resources will determine the extent of this planting.

Nash Forest (211 acres)

2010 Management Results: A 16-acre portion of this unit was enrolled in the cooperative farming program in 2010 to keep the area free of invasive plants until the refuge has the resources to plant native trees and monitor the regenerating area for invasives. The USFS conducted a Forest Health Assessment and also established a transect to monitor impacts of deer browse on vegetation.

2010 Vegetation and Wildlife Response: Of the three vegetation transects established to monitor deer impacts (Nash Forest, Beech-Maple Knoll, and Clark's Ridge), the Nash Forest was least impacted by deer browse. Indeed, this tract was identified during the health assessment as "a unique forest containing large diameter tulip poplar and sugar maple."

2011 Management Strategy: The same 16-acre portion of this unit will be enrolled in the cooperative farming program in 2011 as in 2010. We are working with the Restoration Tree Trust to raise funds to purchase trees to reforest this area. We will continue to monitor the vegetation transect to determine if deer are overbrowsing this unit.

Goal 3 Provide a diverse mix of grasslands and shrublands within the Montezuma Wetlands Complex juxtaposed to reduce fragmentation and edge effect and to enhance habitat quality for priority species of conservation concern.

Objective 3.1 Grasslands

Maintain a minimum of 350 acres of grassland habitat dominated by native species with a mix of cool and warm season grasses, less than 20 percent forbs and less than 3 percent shrub cover to provide habitat diversity, nesting cover for waterfowl and other grassland nesting birds

(especially bobolink (*Dolichonyx oryzivorus*)), habitat for pollinators, and improved wildlife viewing opportunities for the visiting public. Focus grassland management on large (greater than 20 acres) fields, with an emphasis on those fields with minimal edge, less surrounding forest, and more surrounding open habitats (old fields, emergent wetlands), and where possible maintain grasslands in close proximity to one another.

Objective 3.1 Strategies

Wilgoose (including the Winery Field, 173 acres total)

2010 Management Results: The intention was to burn North Wilgoose (30 acres) and the western half (21 acres) of Wilgoose Central in the spring to promote the growth of warm season grasses because these areas are dominated by cool season grasses and a more diverse mix is desirable. The burn was conducted on April 2; however, due to wet conditions in Wilgoose Central, only North Wilgoose was burned. On July 5, a 1/3-acre area in North Wilgoose adjacent to Route 89 was sprayed with Garlon 4 Ultra to control pale swallow-wort. On July 2, seven patches of Canada thistle (*Cirsium arvense*) totaling two acres were cut to control this invasive plant. In July, 3,500 *Galerucella* beetles were released in the north to south oriented swale in the northern 2/3s of the field (22 acres) to control purple loosestrife. The southern 44 acres of Wilgoose and 11 acres of the Winery Field were mowed at the end of August to control goldenrod, which has become dominant in those portions of the grassland. Breeding bird and wintering raptor surveys were conducted.

2010 Vegetation and Wildlife Response: This grassland still has a higher component of forbs and woody vegetation than is desirable. Table 5 shows the obligate grassland breeding birds detected in Wilgoose. Other species of conservation concern that were detected using the field are song sparrow and willow flycatcher.

Table 5. Obligate grassland breeding birds detected during surveys in the Wilgoose Grassland.

| Species | Abundance | Frequency |
|---|-----------|-----------|
| Bobolink | 0.67 | 0.33 |
| Savannah sparrow (<i>Passerculus sandwichensis</i>) | 3.33 | 1.00 |
| Vesper sparrow (<i>Pooecetes gramineus</i>) | 0.83 | 0.50 |

Short-eared owls, northern harriers, and red-tailed and rough-legged hawks were detected foraging in the unit through the winter depending on the weather and snow cover. The number of short-eared owls detected peaked in late fall when nine were observed roosting in the southern portion of Wilgoose.

2011 Management Strategy: Trees growing in the unit will be cut by Morrisville College students under their professor’s supervision using chainsaws. If pale swallow-wort is observed in the unit, it will be sprayed with Garlon 4 Ultra in June. Canada thistle will be mowed twice, first at the early-bud stage (i.e., late June) and then in early fall (i.e., September). Wetlands in the unit will be monitored for purple loosestrife, and biological control beetles will be released if necessary. The field will be monitored for goldenrod, and any large patches will be mowed when the plant is in the bud stage (i.e., August).

Mowing may occur to set back succession, removing woody vegetation under 3 inches in diameter. Breeding bird, vegetation, and wintering raptor surveys will be completed to assist with adaptive management.

Waugh I and II (66 acres)

2010 Management Results: Waugh II was scheduled to be burned in the spring to promote warm season grass growth, but there was too little fuel in the unit to carry a fire. Both Waugh tracts were mowed in August to decrease the cover of woody vegetation. Breeding bird and wintering raptor surveys were conducted.

2010 Vegetation and Wildlife Response: Cool season grasses and low shrubs were dominant in Waugh I. Waugh II primarily consisted of forbs with some grasses.

Obligate grassland birds detected in Waugh include two bobolink, one horned lark, and eight savannah sparrows. Other species of conservation concern detected using the field include song sparrow and willow flycatcher.

Northern harriers, red-tailed and rough-legged hawks, and peregrine falcons (*Falco peregrines*) were detected utilizing the grassland during winter raptor surveys.

2011 Management Strategy: Both Waugh Tracts will be burned in spring 2011 to promote the growth of the warm season grasses that were seeded in Waugh II and to decrease the cover of woody vegetation in Waugh I. Breeding bird, vegetation, and wintering raptor surveys will be conducted in both tracts this year.

Sub-headquarters Fields (57 acres)

2010 Management Results: The fields were mowed on August 1 to reduce warm season grass cover. Breeding bird and wintering raptor surveys were conducted.

2010 Vegetation and Wildlife Response: The Sub-headquarters Fields were dominated by a dense stand of warm season grasses with some forbs and woody species in 2010. Breeding bird surveys were conducted at two points. One lone savannah sparrow was the only obligate grassland bird detected.

Winter Raptor Surveys were conducted from December 2010 to March 2011, with observers detecting the following raptor species: red-tailed hawk, rough-legged hawk, and northern harrier.

2011 Management Strategy: Breeding bird, vegetation, and wintering raptor surveys will be conducted. If warranted, the vegetation will be mowed again in late summer to suppress warm season grasses.

Avery Tract (56 acres)

2010 Management Results: The Avery Tract was mowed in August to reduce warm season grass cover. Breeding bird and wintering raptor surveys were conducted.

2010 Vegetation and Wildlife Response: The mowing and removal of above-ground biomass in 2010 increased the structural and plant species diversity in the field, and six savannah sparrows were detected during the breeding season. Other species of conservation concern that were detected using the field are song sparrow and willow flycatcher.

Short-eared owls and red-tailed, rough-legged, and cooper's hawks (*Accipiter cooperii*) were observed foraging over the Avery Tract and adjacent Knox-Marsellus Marsh during winter raptor surveys completed in December 2010 through March 2011.

2011 Management Strategy: Same as Sub-headquarters Fields.

Objective 3.2 Shrublands

Provide 100 acres of shrubland habitat dominated by native species with a mix of shrubs and herbaceous vegetation throughout the refuge to provide breeding habitat for shrubland-dependent birds, especially brown thrasher (*Toxostoma rufum*), field sparrow (*Spizella pusilla*), and blue-winged warbler (*Vermivora pinus*) and to provide food sources for migrating songbirds.

Objective 3.2 Strategies

Esker Brook Thicket (61 acres)

2010 Management Results: No management occurred in the Esker Brook Thicket in 2010. Breeding bird surveys were conducted.

2010 Vegetation and Wildlife Response: The Esker Brook Thicket was previously managed as three separate units; therefore different parts of the field are in different successional stages. The southern-most portion of the field is dominated by a mix of cool season grasses, forbs, and woody species; whereas the northern-most portion of the field consists of a dense stand of shrubs. Field and song sparrow, willow-flycatcher, and wood thrush (all species of concern) were detected during breeding bird surveys within this unit.

2011 Management Strategy: Breeding bird surveys will be conducted.

Clark's Ridge Old Field (23 acres)

2010 Management Results: No management occurred in Clark's Ridge Old Field in 2010. Breeding bird surveys were conducted.

2010 Vegetation and Wildlife Response: The field includes a diverse mix of herbaceous cover and has a large stand of thick woody shrubs and trees.

Baltimore oriole, song sparrow, willow flycatcher, wood thrush and cerulean warbler were detected within the shrubland during breeding bird surveys.

2011 Management Strategy: Breeding bird surveys will be conducted.
Waugh III (14 acres)

2010 Management Results: No management occurred in Waugh III in 2010. Breeding bird surveys were conducted.

2010 Vegetation and Wildlife Response: This field includes a diverse mix of herbaceous and woody cover. Species of conservation concern detected during breeding bird surveys in this unit include: song sparrow, willow flycatcher, and Baltimore oriole. Cerulean warblers were using trees adjacent to the unit.

2011 Management Strategy: Breeding bird surveys will be conducted.

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Appendix A. Proposed and actual water levels for 2010 and proposed levels for 2011, Montezuma NWR. DD = Drawdown, HP = Half Pool, FP = Full Pool.

| Approximate Date | Benning Marsh | | | Knox Marsellus | | | Lesser Yellowlegs Unit | | |
|------------------|---------------|------------------|---------------|----------------|-------------|---------------|------------------------|-------------|---------------|
| | 2010 Proposed | 2010 Actual | 2011 Proposed | 2010 Proposed | 2010 Actual | 2011 Proposed | 2010 Proposed | 2010 Actual | 2011 Proposed |
| 1-Jan | 381.0 | 381.0 | 381.5 | 376.8-379.3 | 377.6 | 376.8-377.3 | 382.2 | 380.6 | 382.2 |
| 15-Jan | 381.0 | 381.3 | 381.5 | 376.8-379.3 | | 376.8-377.3 | 382.2 | 380.8 | 382.2 |
| 1-Feb | 381.0 | 381.2 | 381.5 | 376.8-379.3 | 378.0 | 376.8-377.3 | 382.2 | 380.8 | 382.2 |
| 15-Feb | 381.0 | 381.2 | 381.5 | 376.8-379.3 | | 376.8-377.3 | 382.2 | NO DATA | 382.2 |
| 1-Mar | 381.2 | 381.2 | 381.5 | 376.8-379.3 | 377.6 | 376.8-377.3 | 382.2 | 380.6 | 382.2 |
| 15-Mar | 381.2 | 381.1 | 381.0 | 376.8-379.3 | 377.9 | 377.3-378.3 | 382.2 | 380.6 | 382.2 |
| 1-Apr | 381.4 | 381.1 | 381.0 | 376.8-379.3 | 377.8 | 377.6-378.3 | 381.7 | 381.7 | 382.2 |
| 15-Apr | 381.4 | 381.0 | 381.0 | 376.8-379.3 | 377.6 | 377.6-378.3 | 381.7 | 381.7 | 382.2 |
| 1-May | 381.4 | 380.4 | 381.0 | 376.8-379.3 | 377.4 | 377.6 | 381.3 | 381.5 | 382.2 |
| 15-May | 380.5 | 380.7 | 381.0 | 376.8-379.3 | 377.4 | 377.3 | 380.9 | 380.4 | 382.2 |
| 1-Jun | 380.2 | 380.4 | 381.0 | 376.8-379.3 | 377.1 | 377.1 | 379.4 | DRAINED | 382.2 |
| 15-Jun | 380.2 | 380.2 DRAINED | 381.0 | 376.8-379.3 | 377.1 | 377.1 | 379.4 | 380.0 | 382.2 |
| 1-Jul | 380.4 | | 381.0 | 376.6 | 377.1 | 377.0 | 381.3 | 379.9 | 382.2 |
| 15-Jul | 380.4 | | 381.0 | 376.6 | 376.7 | 376.7 | 381.1 | DRAINED | 382.2 |
| 1-Aug | 380.6 | 381.2 | 381.0 | 376.4 | 376.4 | 376.5 | 381.0 | 381.3 | 382.2 |
| 15-Aug | 380.6 | 381.2 | 381.0 | 376.4 | 376.5 | 376.4 | 380.9 | 381.5 | 382.2 |
| 1-Sep | 380.8 | 381.4 | 381.0 | 376.2 | 376.3 | 376.3 | 380.9 | 381.3 | 382.2 |
| 15-Sep | 380.8 | 381.3 | 381.0 | 376.2 | 376.2 | 376.2 | 380.9 | 381.4 | 382.2 |
| 1-Oct | 381.0 | 381.5 | 381.0 | 376.0 | 376.5 | 376.0 | 381.3 | 381.6 | 382.2 |
| 15-Oct | 381.0 | 381.5 | 381.0 | 376.0 | 375.9 | 375.9 | 381.3 | 381.6 | 382.2 |
| 1-Nov | 381.2 | 381.5 | 381.0 | 375.8 | 376.1 | 376.8-377.3 | 382.2 | 381.5 | 382.2 |
| 15-Nov | 381.2 | 381.3 | 381.0 | 375.8 | 376.5 | 376.8-377.3 | 382.2 | 381.5 | 382.2 |
| 1-Dec | 381.0 | 381.7 | 381.5 | 376.8 | 376.8 | 376.8-377.3 | 382.2 | 381.4 | 382.2 |
| 15-Dec | 381.0 | 382.6 | 381.5 | 376.8 | 377.1 | 376.8-377.3 | 382.2 | 382.1 | 382.2 |

| Approximate Date | Main Pool | | | May's Point Pool | | | Millennium Marsh | | |
|------------------|-----------|------|------|------------------|------|------|------------------|------|------|
| | 2010 | 2010 | 2011 | 2010 | 2010 | 2011 | 2010 | 2010 | 2011 |
| | | | | | | | | | |

| | Proposed | Actual | Proposed | Proposed | Actual | Proposed | Proposed | Actual | Proposed |
|--------|-------------|---------|----------|-------------|--------|----------|-------------|---------|----------|
| 1-Jan | 379.0 | 379.4 | 381.2 | 383.5-383.8 | 384.0 | 382.5 | 384.0 | 384.3 | 383.5 |
| 15-Jan | 379.0 | 379.4 | 381.2 | 383.5-383.8 | 384.1 | 382.5 | 384.0 | 384.4 | 383.5 |
| 1-Feb | 379.0 | 378.9 | 381.2 | 383.5-383.8 | 383.6 | 382.5 | 384.0 | 384.6 | 383.5 |
| 15-Feb | 379.0 | NO DATA | 381.2 | 383.5-383.8 | 383.6 | 382.5 | 384.0 | NO DATA | 383.5 |
| 1-Mar | 381.0 | 379.0 | 381.2 | 383.5-383.8 | 383.4 | 382.5 | 384.0 | 384.2 | 383.5 |
| 15-Mar | 381.0 | 381.1 | 381.2 | 383.5-383.8 | 383.5 | 382.5 | 384.0 | 383.5 | 383.5 |
| 1-Apr | 381.0 | 381.4 | 381.2 | 382.5-383.5 | 383.5 | 382.5 | 383.0 | 383.8 | 383.5 |
| 15-Apr | 381.0 | 381.0 | 381.2 | 382.5-383.5 | 383.3 | 382.5 | 383.0 | 382.3 | 383.5 |
| 1-May | 377.0-381.2 | 377.0 | 381.2 | 382.5-383.5 | 383.0 | 382.5 | 381.6 | 381.6 | 383.5 |
| 15-May | 377.0 | 377.5 | 381.2 | 382.5-383.5 | 382.9 | 382.5 | 381.6 | 381.8 | 383.5 |
| 1-Jun | 377.0 | 376.9 | 381.2 | 382.5-383.5 | 382.6 | 382.5 | 381.6 | 381.8 | 383.5 |
| 15-Jun | 377.0 | 376.8 | 381.2 | 382.5-383.5 | 382.4 | 382.5 | 381.6 | DRAINED | 383.5 |
| 1-Jul | 377.0 | 377.0 | 381.2 | 382.5-383.5 | 382.3 | 382.5 | 381.6 | 381.9 | 383.5 |
| 15-Jul | 377.0 | NO DATA | 381.2 | 382.5-383.5 | 382.0 | 382.5 | 381.6 | DRAINED | 383.5 |
| 1-Aug | 377.0 | NO DATA | 381.2 | 382.5 | 381.9 | 382.5 | 381.6 | DRAINED | 383.5 |
| 15-Aug | 377.0 | DRAINED | 381.2 | 382.5 | 381.9 | 382.0 | 381.6 | DRAINED | 383.5 |
| 1-Sep | 377.0-381.0 | 380.0 | 381.2 | 381.5-382.5 | 381.6 | 381.5 | 381.6-384.2 | DRAINED | 383.5 |
| 15-Sep | 377.0-381.0 | 380.2 | 381.2 | 381.5-382.5 | 381.6 | 381.0 | 384.0 | DRAINED | 383.5 |
| 1-Oct | 381.0 | 380.6 | 381.2 | 381.5-382.5 | 381.8 | 381.0 | 384.0 | DRAINED | 383.5 |
| 15-Oct | 381.0 | 381.2 | 381.2 | 381.5-382.5 | 383.0 | 381.0 | 384.0 | 383.8 | 383.5 |
| 1-Nov | 381.0 | 381.3 | 381.2 | 381.5-382.5 | 383.0 | 382.5 | 384.0 | 384.0 | 383.5 |
| 15-Nov | 381.0 | 381.2 | 381.2 | 381.5-382.5 | 383.0 | 382.5 | 384.0 | 384.1 | 383.5 |
| 1-Dec | 379.0 | 381.4 | 381.2 | 382.5-383.5 | 382.6 | 382.5 | 384.0 | 384.1 | 383.5 |
| 15-Dec | 379.0 | 381.7 | 381.2 | 382.5-383.5 | 382.7 | 382.5 | 384.0 | 384.0 | 383.5 |

| Approximate Date | Puddler Marsh | | | Sandhill Crane Unit | | | Shorebird Flats* | | |
|------------------|---------------|-------------|---------------|---------------------|-------------|---------------|------------------|-------------|---------------|
| | 2010 Proposed | 2010 Actual | 2011 Proposed | 2010 Proposed | 2010 Actual | 2011 Proposed | 2010 Proposed | 2010 Actual | 2011 Proposed |
| 1-Jan | 376.7-378.9 | 377.1 | 376.7-377.6 | Drained | 378.7 | 380.0 | | | 384.0 |

| | | | | | | | | | |
|--------|-------------|---------|-------------|-----------|---------|--------|--|--|---|
| 15-Jan | 376.7-378.9 | NO DATA | 376.7-377.6 | Drained | NO DATA | 380.0 | | | 384.0 |
| 1-Feb | 376.7-378.9 | NO DATA | 376.7-377.6 | Drained | 379.0 | 380.0 | | | 384.0 |
| 15-Feb | 376.7-378.9 | NO DATA | 376.7-377.6 | Drained | NO DATA | 380.0 | | | 384.0 |
| 1-Mar | 376.7-378.9 | 377.2 | 376.7-377.6 | Filling | 378.4 | ≥380.0 | | | 384.0 |
| 15-Mar | 376.7-378.9 | 377.4 | 376.7 | Full Pool | 379.1 | >380.0 | | | 384.0 |
| 1-Apr | 376.7-378.9 | 377.4 | 376.7 | Full Pool | 379.1 | >380.0 | | | 384.0 |
| 15-Apr | 376.7-378.9 | 377.2 | 376.7 | Full Pool | 379.3 | >380.0 | | | 384.0 |
| 1-May | 376.7-378.9 | 377.0 | 376.7 | Full Pool | 379.3 | >380.0 | | | 384.0 |
| 15-May | 376.7-378.9 | 376.9 | 376.7 | Full Pool | 379.3 | >380.0 | | | Shorebird Habitat |
| 1-Jun | 376.7-378.9 | 376.7 | 376.5 | Full Pool | 379.0 | >380.0 | | | Shorebird Habitat |
| 15-Jun | 376.7-378.9 | 376.7 | 376.5 | Full Pool | 379.0 | >380.0 | | | DRAINED |
| 1-Jul | 376.4 | 376.7 | 376.5 | Full Pool | 378.9 | >380.0 | | | Shorebird Habitat (Disk, Pump, Whatever's needed) |
| 15-Jul | 376.4 | 376.5 | 376.5 | Full Pool | 378.7 | >380.0 | | | |
| 1-Aug | 376.2 | 376.3 | 376.3 | Full Pool | 378.7 | >380.0 | | | |
| 15-Aug | 376.2 | 376.0 | 376.0 | Full Pool | 378.4 | >380.0 | | | |
| 1-Sep | 376.0 | 375.9 | 375.8 | Full Pool | 378.3 | >380.0 | | | |
| 15-Sep | 376.0 | 375.8 | 375.7 | Full Pool | 378.1 | >380.0 | | | |
| 1-Oct | 375.8 | 376.1 | 375.7 | Full Pool | 378.1 | >380.0 | | | |
| 15-Oct | 375.8 | 375.8 | 375.7 | Full Pool | 379.1 | >380.0 | | | 384.0 |
| 1-Nov | 375.6 | 375.9 | 376.7-377.6 | Full Pool | 379.0 | >380.0 | | | 384.0 |
| 15-Nov | 375.6 | 375.9 | 376.7-377.6 | Full Pool | 376.2 | >380.0 | | | 384.0 |
| 1-Dec | 376.7 | 376.3 | 376.7-377.6 | Full Pool | 378.9 | >380.0 | | | 384.0 |
| 15-Dec | 376.7 | 376.6 | 376.7-377.6 | Full Pool | 379.3 | >380.0 | | | 384.0 |

*Created in 2010.

| Approximate Date | Tschache Pool | | | Unit 17 East | | | VC Wetland | | |
|------------------|---------------|-------------|---------------|---------------|-------------|---------------|---------------|-------------|---------------|
| | 2010 Proposed | 2010 Actual | 2011 Proposed | 2010 Proposed | 2010 Actual | 2011 Proposed | 2010 Proposed | 2010 Actual | 2011 Proposed |
| 1-Jan | 384.4 | 385.2 | 384.4 | 383.0 | 383.7 | 383.0 | 384.0 | 383.9 | 384.0 |
| 15-Jan | 384.4 | 385.0 | 384.4 | 383.0 | NO DATA | 383.0 | 384.0 | 383.9 | 384.0 |

| | | | | | | | | | |
|--------|-------|-------|--------------------------|-------|---------|-------|-------------|---------|-------------------|
| 1-Feb | 384.4 | 384.5 | 384.4 | 383.0 | 384.0 | 383.0 | 384.0 | 383.9 | 384.0 |
| 15-Feb | 384.4 | 384.5 | 384.4 | 383.0 | NO DATA | 383.0 | 384.0 | 383.9 | 384.0 |
| 1-Mar | 384.0 | 384.6 | 384.4 | 383.0 | NO DATA | 383.0 | 384.0 | 384.0 | 384.0 |
| 15-Mar | 384.0 | 384.1 | 384.4 | 383.0 | 383.8 | 383.0 | 384.0 | 384.1 | 384.0 |
| 1-Apr | 384.0 | 384.0 | 384.0 | 383.0 | NO DATA | 383.0 | 383.5-383.7 | NO DATA | 384.0 |
| 15-Apr | 384.0 | 383.8 | 383.0 | 383.0 | 383.6 | 383.0 | 383.5-383.7 | 383.7 | 384.0 |
| 1-May | 384.0 | 383.9 | 382.5 | 383.0 | 383.1 | 383.0 | 383.5-383.7 | 383.9 | 384.0 |
| 15-May | 384.0 | 384.0 | 381.5 | 383.0 | 383.6 | 383.0 | 383.5-383.7 | 383.8 | Shorebird Habitat |
| 1-Jun | 384.4 | 383.8 | <381.5 DRAINED | 383.0 | 383.7 | 383.0 | 381.5 | DRAINED | |
| 15-Jun | 384.4 | 384.3 | | 383.0 | 383.1 | 383.0 | < 383.3 | DRAINED | < 383.3 |
| 1-Jul | 384.4 | 384.3 | | 383.0 | 383.1 | 383.0 | < 383.3 | DRAINED | Shorebird Habitat |
| 15-Jul | 384.4 | 384.2 | | 383.0 | 383.1 | 383.0 | < 383.3 | DRAINED | |
| 1-Aug | 384.4 | 384.3 | Fill to 384.4 - 384.8 | 383.0 | 383.6 | 383.0 | < 383.3 | NO DATA | |
| 15-Aug | 384.4 | 384.4 | | 383.0 | 384.4 | 383.0 | < 383.3 | 384.4 | |
| 1-Sep | 384.4 | 384.3 | | 383.0 | 384.5 | 383.0 | 381.5 | 383.8 | |
| 15-Sep | 384.4 | 384.3 | | 383.0 | 384.4 | 383.0 | 383.5-383.7 | 383.5 | |
| 1-Oct | 384.4 | 385.0 | | 383.0 | 384.7 | 383.0 | 383.5-383.7 | 384.0 | |
| 15-Oct | 384.4 | 384.9 | | 383.0 | 384.4 | 383.0 | 383.5-383.7 | 383.6 | |
| 1-Nov | 384.4 | 384.8 | | 383.0 | 383.6 | 383.0 | 383.5-383.7 | 383.6 | 384.0 |
| 15-Nov | 384.4 | 384.6 | | 383.0 | 383.5 | 383.0 | 383.5-383.7 | 383.7 | 384.0 |
| 1-Dec | 384.0 | 384.2 | 383.0 | 383.8 | 383.0 | 384.0 | 383.8 | 384.0 | |
| 15-Dec | 384.0 | 384.7 | 383.0 | 383.7 | 383.0 | 384.0 | 383.9 | 384.0 | |

Appendix B. Map of Burn Units, Montezuma NWR



Appendix C. Rare Animals, Plants, and Significant Ecological Communities, Montezuma NWR

| New York Natural Heritage Report on Rare Animals, Rare Plants, and Significant Ecological Communities of MONTEZUMA NATIONAL WILDLIFE REFUGE | | | |
|--|--|------------------|----------------|
|  | | | |
| Prepared February, 2006 from the Biodiversity Databases of the New York Natural Heritage Program, 3755 DEC, 625 Broadway, Albany, NY, 12233-4757. | | | |
| COMMON NAME | SCIENTIFIC NAME | NY STATE LISTING | NY STATE RANK* |
| Montezuma National Wildlife Refuge | | | |
| <i>Documented on the Refuge since 1985</i> | | | |
| Birds | | | |
| Pied-billed Grebe | <i>Podilymbus podiceps</i> | Threatened | S3 |
| Bald Eagle | <i>Haliaeetus leucocephalus</i> | Threatened** | S2S3 |
| Black Tern | <i>Chlidonias niger</i> | Endangered | S2 |
| Short-eared Owl | <i>Asio flammeus</i> | Endangered | S2 |
| Dragonflies and Damselflies | | | |
| Blue-tipped Dancer | <i>Argia tibialis</i> | | S1 |
| Plants | | | |
| Holly-leaved Naiad | <i>Najas marina</i> | Endangered | S1 |
| Ecological Communities | | | |
| Floodplain Forest | | | S2S3 |
| <i>Other Species and Community Types Documented near the Refuge since 1985</i> | | | |
| Birds | | | |
| Sedge Wren | <i>Cistothorus platensis</i> | Threatened | S3 |
| Great Blue Heron | <i>Ardea herodias</i> | | S5 |
| Moths | | | |
| Imperial Moth | <i>Eacles imperialis imperialis</i> | | SU |
| Plants | | | |
| Kentucky Coffee Tree | <i>Gymnocladus dioica</i> | Endangered | S1 |
| Big Shellbark Hickory | <i>Carya laciniosa</i> | Threatened | S2 |
| Seaside Bulrush | <i>Bolboschoenus maritimus</i> ssp. <i>paludosus</i> | Endangered | S2 |
| Salt-meadow Grass | <i>Leptochloa fusca</i> ssp. <i>fascicularis</i> | Endangered | S1 |
| Ecological Communities | | | |
| Inland Salt Pond | | | S1 |
| Inland Salt Marsh | | | S1 |
| Shrub Swamp | | | S5 |

| COMMON NAME | SCIENTIFIC NAME | NY STATE LISTING | NY STATE RANK* |
|---|---|------------------|----------------|
| <i>Documented on or near the Refuge (precise locations unknown) before 1940.</i> | | | |
| Plants | | | |
| Golden Dock | <i>Rumex maritimus</i> | Endangered | S1 |
| Log Fern | <i>Dryopteris celsa</i> | Endangered | S1 |
| Communities | | | |
| Inland Salt Marsh | | | S1 |
| <i>Documented near the Refuge before 1970; current status unknown.</i> | | | |
| Birds | | | |
| Northern Harrier | <i>Circus cyaneus</i> | Threatened | S3 |
| Plants | | | |
| Button-bush Dodder | <i>Cuscuta cephalanthi</i> | Endangered | S1 |
| Seaside Crowfoot | <i>Ranunculus cymbalaria</i> | Endangered | S1 |
| Marsh Valerian | <i>Valeriana uliginosa</i> | Endangered | S1S2 |
| Pink Wintergreen | <i>Pyrola asarifolia</i> ssp. <i>asarifolia</i> | Threatened | S2 |
| Sartwell's Sedge | <i>Carex sartwellii</i> var. <i>sartwellii</i> | Threatened | S1S2 |
| <i>Documented near the Refuge at one time, but now extirpated from those locations.</i> | | | |
| Plants | | | |
| Seaside Crowfoot | <i>Ranunculus cymbalaria</i> | Endangered | S1 |
| Marsh Arrow-grass | <i>Triglochin palustre</i> | Threatened | S2 |
| Marsh Valerian | <i>Valeriana uliginosa</i> | Endangered | S1S2 |

* Rarity in NYS as ranked by NY Natural Heritage Program on a 1 to 5 scale:
 S1 = Critically imperiled; S2 = Imperiled; S3 = Rare or uncommon;
 S4 = Abundant and apparently secure; S5 = Demonstrably abundant and secure;
 SH = Historical records only; no recent information available;
 SU = Not yet ranked.

** Also Federally Listed.

Natural community occurrences in this report are all ranked as being of excellent quality, and therefore are considered significant from a statewide perspective. By meeting specific, documented significance criteria, the NY Natural Heritage Program considers this occurrence to have high ecological and conservation value.



Appendix D. Land Use Map, St. Lawrence WMD Vicinity

