Habitat Management Plan
for
Willard Wildlife Management Area
2021 - 2030


Photo: Mike Palermo

Division of Fish and Wildlife
Bureau of Wildlife
6274 East Avon-Lima Road, Avon, New York 14414

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Prepared by:

Michael Palermo, Biologist 1 (Wildlife)
Emily Bonk, Forester 1
John Mahoney, Forestry Technician 1
Forest Habitat Management

Frank Morlock, Fish and Wildlife Technician 2
Jeb McConnell, Biologist 1 (Wildlife)
Willard WMA Management

Heidi Kennedy, Biologist 1 (Wildlife)
Land Management & Habitat Conservation Team

Reviewed and approved by:

M. Wasilco — 12/23/2020

Michael Wasilco, Regional Wildlife Manager
Bureau of Wildlife — Date

James F Farquhar III. — 12/31/2020

James F Farquhar III, Chief
Bureau of Wildlife — Date

12/31/20

Tony Wilkinson, Director
Division of Fish and Wildlife — Date

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TABLE OF CONTENTS

LIST OF FIGURES

SUMMARY

Willard Wildlife Management Area (WMA) is located in Seneca County, on the east side of Seneca Lake, and consists of 154 acres. Most of the property was transferred to the Department of Environmental Conservation (DEC) in 1963 from the New York State Office of Mental Health, which had managed it as farmland for several decades. Minor additional acquisitions occurred in 1980 and 2003.

This WMA is a narrow rectangle situated in an east-west orientation and is approximately 1,000 feet by 6,600 feet (1.25 miles). Large fields compose more than half the property, providing valuable habitat to grassland-dependent birds (e.g., bobolink, northern harrier). Forest covers approximately 25% of the property and is mostly composed of an oak-hickory stand at the western end of the WMA. Approximately 10% of the property is shrubland, much of which is an abandoned apple orchard. There are also four small ponds that provide limited open water and emergent wetland habitat.

Slightly more than 1,000 feet of Seneca Lake shore is on the WMA which consists of rocky shoreline and shale bluffs. Seneca Lake is an important waterfowl winter concentration area.

Habitat management here has primarily focused on improving and maintaining the values of fields on the WMA. Small scale timber cutting and shrubland maintenance have also occurred.

This plan elaborates upon habitat objectives described in the Northern Finger Lakes Unit Management Plan (UMP).[1] Willard WMA is primarily managed to provide a diversity of upland habitats, and affords multiple recreational opportunities including hunting, trapping, fishing, and bird watching.

Habitat management goals for Willard WMA include:

- Maintaining most of the forest cover in a mature age-class to benefit associated wildlife, such as wood thrush (26% of WMA);
- Maintaining the shrubland and young forest component to benefit associated wildlife, such as American woodcock (10% of WMA, 16% of forest/shrubland acreage);
- Increasing grassland to benefit grassland-dependent birds, such as bobolink and meadowlark, and popular game species, such as pheasant and turkey (60% of WMA);
- Maintaining impounded ponds and wetlands (1% of WMA%); and
- Maintaining access features (3% of WMA).

[1] Information about the Northern Finger Lakes UMP is available at https://www.dec.ny.gov/lands/99999.html.

I. BACKGROUND AND INTRODUCTION

PURPOSE OF HABITAT MANAGEMENT PLANS

BACKGROUND

Active management of habitats to benefit wildlife populations is a fundamental concept of wildlife biology and has been an important component of wildlife management in New York for decades. Beginning in 2015, NYS Department of Environmental Conservation (DEC) Division of Fish and Wildlife (DFW) initiated a holistic planning process for wildlife habitat management projects. Habitat Management Plans (HMPs) are being developed for WMAs and other properties administered by DFW Bureau of Wildlife, including select Multiple Use and Unique Areas. The goal of HMPs is to guide habitat management decision-making on those areas to benefit wildlife and facilitate wildlife-dependent recreation. HMPs guide management for a ten-year time period, after which the plans and progress on implementation will be assessed and HMPs will be modified as needed.

HMPs serve as the overarching guidance for habitat management on WMAs. These plans incorporate management recommendations from Unit Management Plans (UMPs), existing WMA habitat management guidelines, NY Natural Heritage Program's WMA Biodiversity Inventory Reports, Bird Conservation Area guidelines, and other documents available for individual WMAs.

SCOPE AND INTENT

Primary purposes of this document:

- Provide the overall context of the habitat on the WMA and identify the target species for management;
- Identify habitat goals for WMA-specific target species, considering juxtaposition of all habitat types to guide the conservation and management of popular game species and sensitive or unique species or ecological communities;
- Identify acreage-specific habitat goals for the WMA to guide management actions;
- Provide specific habitat management prescriptions that incorporate accepted best management practices;
- Establish a forest management plan to meet and maintain acreage goals for various forest successional stages;
- Address management limitations such as access challenges (e.g., topography); and
- Provide the foundation for evaluating the effectiveness of habitat management.

The draft Northern Finger Lakes UMP was completed and submitted for approval to the DEC Central Office in early 2018. As of the writing of this HMP, approval is still pending. A public comment period and public meeting were included in the drafting process. The UMP addresses habitat objectives detailed in this HMP, as well as management provisions for facilitating compatible wildlife-dependent recreation, access, and facility development and maintenance.

The effects of climate change and the need to facilitate habitat adaptability and resilience under projected future conditions will be incorporated into the habitat management planning process and will be considered in any actions that are recommended in HMPs. Changing conditions that may affect habitat composition include warmer temperatures, milder winters, longer growing seasons, increased pressure from invasive species, more frequent intense storms, and moisture stress. It is also important to consider landscape level effects to maintain the connectedness of habitats to allow range adjustments of both plant and animal species.

This plan and the habitat management it recommends will be in compliance with the State Environmental Quality Review Act (SEQRA) 6NYCRR Part 617 (see Appendix B). The recommended habitat management also requires review and authorization under the Endangered Species Act (ESA), National Environmental Policy Act (NEPA), and State Historic Preservation Act (SHPA), prior to implementation. Definitions are provided in Appendix A.

WMA Overview

Location

Willard WMA is in DEC Region 8, Town of Ovid in Seneca County (Figure 1 and Image 1).

Total Area

154 acres

Habitat Inventory

A habitat inventory of the WMA was conducted in 2012 and is proposed to be updated every ten to fifteen years to document the existing acreage of each habitat type and to help determine the location and extent of future management actions.

Table 1 summarizes the current acreage by habitat type and the desired acreage after management. Desired conditions were determined with consideration of habitat requirements of targeted wildlife, current conditions on the WMA, and conditions in the surrounding landscape (see Landscape Context section below).

Image 1: Location of Willard WMA.

Table 1. Summary of current and desired habitat acreage on Willard WMA.

Habitat Type	Current Conditions (as of 2012)			Desired Conditions	
	Acres	Percent of WMA	Miles	Acres	Percent of WMA
Forest [a]	40	26%		40	26%
Young forest	0	0%		1	<1%
Shrubland	15	10%		14	9%
Grassland	77	50%		92	60%
Agricultural land	15	10%		0	0%
Wetland (impounded)	2	1%		2	1%
Wetland (natural)	0	0%		0	0%
Shoreline/Bluff	1	<1%		1	<1%
Streams	0	0%		0	0%
Roads and parking	4	3%	1	4	3%
Total Acres:	154	100		154	100

[a] Forest acreage includes all mature and intermediate age classes of natural forest, plantations, and forested wetlands. Young forest is reported separately. Definitions are provided in the Forest section of this plan.

ECOLOGICAL RESOURCES

Fish and Wildlife Overview:

Willard WMA primarily supports wildlife species associated with fields and forest within an agricultural landscape. The large fields provide habitat for grassland-dependent breeding birds and the existing crop acreage provides supplemental food for deer, turkey, and migrating geese. Although forest cover is not expansive on the WMA or in the landscape, there is a contiguous, narrow band of forest along Seneca Lake that supports songbirds more often associated with larger forests. The shrubland here supports many species associated with young forest, a habitat that is lacking throughout New York state.

Species likely occurring on the WMA include:

- Small and big game (e.g., American woodcock, cottontail rabbit, gray squirrel, white-tailed deer, wild turkey)
- Furbearers (e.g., coyote, gray and red foxes, opossum, raccoon, skunk)
- Small mammals (e.g., deer mouse, white-footed mouse, big brown bat, eastern red bat)
- Grassland-dependent birds (e.g., bobolink, eastern meadowlark, savannah sparrow, vesper sparrow, northern harrier)
- Young forest songbirds (e.g., brown thrasher, common yellowthroat, eastern towhee)
- Mature forest songbirds (e.g., black-capped chickadee, eastern wood-pewee, red-eyed vireo, scarlet tanager, wood thrush)
- Waterfowl (e.g., Canada goose, wood duck)
- Amphibians and reptiles (e.g., common garter snake, milk snake, red-spotted newt, green frog, spring peeper, painted turtle, snapping turtle)

Wildlife and Plant Species of Conservation Concern:

There are no federally listed Endangered or Threatened species known to occur on the WMA. The following state listed Endangered (E), Threatened (T), or Special Concern (SC) species and/or Species of Greatest Conservation Need (SGCN) may occur on the WMA (Table 2). [2] Species listed below have been documented on or within the vicinity of the WMA and are likely to occur in suitable habitat on the WMA. Other species of conservation concern may also be present. Data sources include: the NY Natural Heritage Program, NY Breeding Bird Atlases,[3] NY Reptile and Amphibian Atlas,[4] DEC wildlife surveys and monitoring, and eBird.[5]

Table 2. Species of conservation concern that may be present on Willard WMA, including state and federal Endangered (E) and Threatened (T) species, state Species of Special Concern (SC), High Priority SGCN (HP), and SGCN (x).

Species Group	Species [a]	Federal Status	NY Status	NY SGCN Status
Birds	American black duck			HP
	American kestrel			x
	American woodcock			x
	Bald eagle		T	x
	Blue-winged warbler			x
	Bobolink			HP
	Brown thrasher			HP
	Cooper's hawk		SC	
	Eastern meadowlark			HP
	Grasshopper sparrow		SC	HP
	Horned lark		SC	HP
	Northern harrier		T	x
	Osprey		SC	
	Ruffed grouse			x
	Scarlet tanager			x
	Sharp-shinned hawk		SC	
	Vesper sparrow		SC	HP
	Wood thrush			x
Mammals	None known to occur			
Amphibians and reptiles	Eastern ratsnake (black rat snake)			x
	Common mudpuppy			x
	Snapping turtle			x
	Southern leopard frog		SC	x
	Western chorus frog			x
Fish	None known to occur			

[2] The 2015 New York State Wildlife Action Plan identifies 366 Species of Greatest Conservation Need (SGCN) including 167 High Priority SGCN. Available online at http://www.dec.ny.gov/animals/7179.html.
[3] Available online at http://www.dec.ny.gov/animals/7312.html.
[4] Available online at http://www.dec.ny.gov/animals/7140.html.
[5] Available online at http://ebird.org/content/ebird/about/. © Audubon and Cornell Lab of Ornithology.

Table 2. Continued

Species Group	Species	Federal Status	NY Status	NY SGCN
Invertebrates	None known to occur			
Plants	None known to occur			

Significant Ecological Communities:

There are no known rare and significant natural communities located on Willard WMA as identified by the NY Natural Heritage Program (Figure 2). Additional information about ecological communities is available in the Willard WMA Biodiversity Inventory Final Report (1998) prepared by the NY Natural Heritage Program.

Soils and Topography:

Most of the soils on Willard WMA are of the following soil types:

- Honeoye Silt Loam (39%)
- Darien-Danley-Cazenovia Silt Loam (27%)
- Lima Silt Loam (23%)
- Cazenovia Soils (7%)
- Appleton Silt Loam (4%)

According to the National Soil Survey, most of the soils on the WMA are classified as prime farmland (77%), while 11% are farmland of statewide importance, 8% are not prime farmland, and 4% are prime farmland if drained.[6] These classifications describe the suitability of soils for farmland, not the current land use or cover.

Elevations of land on the WMA range from approximately 450 feet above sea level at the lakeshore and 770 feet at County Road 131. The terrain is generally flat or gently sloping on most of the WMA but becomes very steep at the bluffs just above the lake. Management actions on steep slopes will generally be avoided.

Special Management Zones:

Special Management Zones (SMZs) are areas adjacent to wetlands, perennial and intermittent streams, vernal pool depressions, spring seeps, ponds and lakes, recreational trails, and other land features requiring special consideration. Approximately 17 acres of SMZs are known on Willard WMA, which includes four ponds, the shore of Seneca Lake, and a few intermittent streams. Water quality standards will be adhered to on all streams and near the lake.

Guidelines for habitat management projects within these areas are outlined in the Division of Lands and Forests *Rules for Establishment of Special Management Zones on State Forests and Wildlife Management Areas.*[7] Some habitat management activities may either be prohibited or

[6] National Soil Survey data is available online at https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.
[7] Available online at http://www.dec.ny.gov/outdoor/104218.html.

restricted in order to protect these features. Any deviations from these guidelines will be addressed in the individual stand prescriptions.

LANDSCAPE CONTEXT

The goals of this HMP have been developed with consideration of surrounding landscape features, the availability of habitats, and other conservation lands adjacent to Willard WMA.

The landscape within three miles is primarily composed of these cover types (Figures 4 and 5):

- Open water (32%)
- Cultivated crops (25%)
- Pasture/hay and grassland (20%)
- Forest, combining deciduous, evergreen, and mixed (11%)
- Developed (6%)
- Early-successional shrubland (4%)
- Wetland, combining emergent and woody (2%)

Three other public conservation lands occur within 3 miles of the WMA (Figure 4).

- Bonavista State Park (250 acres) - half golf course, half forest and old fields.
- Lodi Point State Park (11 acres) – lake shore, developed recreation facilities.
- Sampson State Park (2,048 acres) - partially within 3-mile radius of WMA, includes forest, old fields, lakeshore, and developed recreation facilities.

Willard WMA is located on the eastern shore of Seneca Lake in the Finger Lakes region. Nearby lakes include Keuka to the west and Cayuga to the east. Very little shoreline of the Finger Lakes is public conservation land and opportunities to acquire private lands adjacent to the WMA should be considered.

The WMA is within the Finger Lakes Region Grassland Focus Area.[8] Grassland focus areas are regions of the state that support key, residual populations of grassland birds and within them habitat work to benefit grassland bird populations is encouraged on both private and public land. In many areas, grasslands are fragmenting and disappearing due to changing land-use patterns, natural vegetative succession, and development. It is an important goal of this HMP to maintain and enhance the habitat value of grasslands on the WMA.

Most of the dry land within three miles of the WMA is used for agricultural purposes, with small woodlots interspersed throughout. A large percentage of these agricultural fields are used for hay or pasture, providing an expanse of open grassy habitat that attracts grassland birds. Fields on the WMA, where best management practices that benefit grassland birds are implemented, have a greater value because they are part of this large concentration of habitat.

[8] Morgan, M. and M. Burger. 2008. A Plan for Conserving Grassland Birds in New York: Final Report to the New York State Department of Environmental Conservation. Audubon New York, Ithaca, NY. Available online at http://ny.audubon.org/conservation/grassland-bird-conservation-program.

Forest composes just 11% of the surrounding landscape and most of this is composed of small, fragmented woodlots that have mature structure. However, there is a band of connected forest along the shore of Seneca Lake that provides important habitat to wildlife that require larger, unfragmented forest acreages (this includes the WMA forested area). It is an important goal of this HMP to maintain the connectivity of the mature forest on the WMA to this larger forested area, while also enhancing stand-level habitat values to benefit associated species.

Shrubland and young forest only compose 4% of the landscape surrounding the WMA and mostly occur in areas of field abandonment. These areas are not anticipated to be maintained into the future and will likely either revert to mature forest or be reclaimed for agricultural production. Shrubland and young forest habitats have steeply declined in the northeast over recent decades, leading to the decline of several associated wildlife species. It is an important goal of this HMP to maintain the existing shrubland/young forest component on the WMA.

II. Management Strategies by Habitat Type

DEC will continue active management of wildlife habitats on Willard WMA to provide the following benefits:

- Maintain habitat characteristics that will benefit wildlife abundance and diversity within the New York landscape.
- Promote Best Management Practices for targeted wildlife and habitats.
- Provide opportunities for wildlife-dependent recreation such as trapping, hunting, and bird watching compatible with the ongoing habitat management practices and species management considerations.
- Improve habitat quality by reducing invasive species.

Forest

Forested acreage includes the following forest types:

Natural forest: naturally forested acres, including hardwoods and softwoods. Includes any upland forested acreage that is not young forest, i.e., pole stands, other intermediate forest age classes, mature forest, and old growth forest.
Plantation: planted forested acres, generally planted in rows dominated by one or two species.
Forested wetland: wetland acres where forest vegetation accounts for greater than 50% of hydrophytic vegetative cover and the soil or substrate is periodically saturated or inundated.
Young forest: young or regenerating forested acres, which are typically aged 0-10 years since a disturbance or regeneration cut, depending upon the site conditions. May include both natural forest and plantations.
Young forest (forested wetland): young, regenerating forested wetland acres.

Forest management on Willard WMA incorporates an approach to create and/or maintain the diversity of forest age classes that are required to support a diversity of wildlife. In 2015, DEC launched the Young Forest Initiative (YFI) to increase the amount of young forest on WMAs to benefit wildlife that require this transitional, disturbance-dependent habitat. [9]

MANAGEMENT OBJECTIVES

- Maintain most forest cover (40 acres) in a mature age class to benefit associated wildlife and protect sensitive resources (e.g., shale bluff, intermittent streams, lake shore).
- Establish a young forest component (1 acre) to complement the existing shrubland acreage and benefit associated wildlife.
- Control non-native invasive vegetation to maintain forest biodiversity.

DESCRIPTION OF EXISTING FOREST HABITAT AND TARGET SPECIES

There are 40 acres of forest covering approximately 26% of Willard WMA (Figure 6). Table 3 provides a summary of the forested areas, including the most common tree species present.

Most of this forest cover is located on the western end of the WMA and includes three primary forest types. Just above the Seneca Lake shore there is a shale talus slope woodland, which occupies the steepest terrain on the property and has a sparse canopy mostly composed of oaks and red cedar. Two small gullies draining the hillside support a hemlock-northern hardwood forest type; however, the hemlock component is severely declined from hemlock woolly adelgid infestation. The remaining area and majority of the forest cover is an oak-hickory forest, composed of sawtimber-sized oak and hickory, with a lesser component of sugar maple and basswood (Photo 1).

Photo 1: Most of the forest here is an oak-hickory type primarily composed of sawtimber oaks with an understory of hophornbeam and young sugar maples.

Photo: Michael Palermo, DEC

The understory is varied throughout the woodlot. In some areas it is well developed and has high vertical structure composed of young or small trees (e.g., sugar maple, hornbeam, hophornbeam) or shrubs (e.g., witch-hazel, viburnum). In other parts the understory is more open and deeply shaded. There is a sufficient component of large downed logs throughout some of the woodlot, but most areas could be improved (Photo 2).

[9] Additional information about DEC's Young Forest Initiative and the YFI Strategic Plan is available online at http://www.dec.ny.gov/outdoor/104218.html.

Overall, the presence of invasive vegetation is not significantly degrading forest habitat values here; however, they are dense in some sections of the stand and should be controlled to prevent further spread and degradation. Invasive species of concern at this WMA are barberry, bittersweet, buckthorn, honeysuckle, multiflora rose, swallow-wort, privet, and tree of heaven.

Photo 2: Some sections of the forest are lacking sufficient snag and downed log habitat and could be enhanced.

Photo: Michael Palermo, DEC

Young, regenerating forest is absent from the WMA but there are a couple opportunities to establish a small component while still maintaining the value of the WMA's mature forest. Within the existing shrubland stands there are pockets of mature aspen that can be cut to encourage spread and create young forest.

Wildlife using the forest here include species associated with small woodlots in an agricultural landscape as well as species associated with larger forested tracts. Popular game, such as white-tailed deer, wild turkey, and gray squirrel are quite abundant, while black bear and ruffed grouse may occasionally occur. The connectivity of this forest to the larger band of forest along Seneca Lake provides suitable acreage for breeding wood thrush and scarlet tanager; both are species of greatest conservation need (SGCN). Likewise, due to the proximity to a large lake and the surrounding open landscape, this band of forest cover is likely an important stopover site for migrating songbirds each fall and spring.

Table 3. Summary of acreage and dominant overstory species present on Willard WMA.

Forest Type	**Acres (as of 2012)**	**Desired Acres**	**Overstory species**
Natural forest (mature/intermediate)	40	40	Oak, hickory, maple, white ash, basswood, black walnut, white pine
Plantation	0	0	Currently not present on WMA
Forested wetland (mature/intermediate)	0	0	Currently not present on WMA
Young forest	0	1	Currently not present on WMA
Young forest (forested wetland)	0	0	Currently not present on WMA
Total Forested Acres:	40	41[a]	

[a] This increase in total forest is due to the planned conversion of 1 acre of shrubland to young forest.

Table 4. Target species for forest management on Willard WMA and their habitat needs.

Age Class	Target Species	Beneficial Habitat Structure
Mature forest	Wood thrush	*Nesting*: hardwood forest of intermediate to old age with tall shrub and sapling layer to conceal nest
		Foraging: thick leaf litter on open forest floor for invertebrates, and fruit-bearing trees and shrubs for migration
Young forest	American woodcock	*Nesting*: Young, open, second growth woodlands
		Foraging: Moist, rich soils with dense overhead cover
		Singing ground: open areas, such as fields or recent clearcuts

These species were designated as targets because they are SGCN that have well-studied habitat requirements with established best management practices. These species were also selected because they can be considered umbrella species, meaning habitat management to maintain, enhance, or create their habitat will also benefit numerous other species that utilize similar habitats. Shrubland also benefits most young forest wildlife and the acreage of shrubland/young forest planned to be managed constitutes 16% of all woody habitats on the WMA.

MANAGEMENT HISTORY

DEC management of Willard WMA began in 1963 and has included some forest management actions. A timber stand improvement cut occurred in 1977 to provide better growing conditions for released trees. In 1982 and 1983 an outbreak of gypsy moth caused severe defoliation over much of the forest and a 25-acre harvest in 1987 salvaged weakened and declining trees.

IMPLEMENTATION PLAN AND ANTICIPATED SCHEDULE

The following management is proposed during the timeframe of this plan:

- **Management planned for 2021-2025** (Figure 6):
    - Convert two patches of shrubland to young forest (1 acre).
        - This action targets aspen within shrublands to regenerate and expand aspen patches, creating a dense thicket of young tree growth (further discussed in the Shrubland section). Future actions can regenerate these aspen patches every 20-30 years to ensure persistence.
    - Control invasive vegetation in Stand A-11(40 acres).
        - Controlling swallow-wort and tree of heaven before they become widespread is a priority.
- **Management planned for 2026-2030** (Table 5, Figure 6):
    - Timber stand improvement in Stand A-11 (25 acres).
        - This action is intended to enhance habitat features within the stand while retaining the overall mature structure. Select trees will be cut and left on-site to create downed logs. Cutting these trees will also create small canopy gaps which would increase understory sunlight and should stimulate understory/midstory development (vertical structure). Most of the retained canopy will be oak and hickory, but a diversity of species should be included (e.g., maple, basswood, white pine).

Table 5. Forest management scheduled for the second five-years of this HMP (2026-2030).

Stand	Acres	Size Class	Forest Type		Treatment Type
			Current	Future	
A-11	25	Medium Sawtimber 19"-24" DBH	Oak-Hickory	Oak- Hickory / Transition Hardwood	Timber Stand Improvement

BEST MANAGEMENT PRACTICES

Forest management on all WMAs follows Best Management Practices to protect soil and water resources, promote quality wildlife habitat, and establish healthy forests (Table 6).

Table 6. Best management practices for forest management on WMAs.

Resource	Guidance Document [10]
Soils	*Rutting Guidelines for Timber Harvesting on Wildlife Management Areas*
Water quality	*NYS Forestry Best Management Practices for Water Quality*
Wildlife	*Retention Guidance on Wildlife Management Areas*
Plantations	*Plantation Management Guidance on Wildlife Management Areas*

Wildlife Considerations:

Sensitive species known to be present on or near Willard WMA that warrant special consideration include:

- *Forest raptors*. Surveys will be conducted and if nesting is documented, tree cutting activities nearby may be adjusted to occur outside the breeding season and nest buffers may be established.
- *Indiana, northern long-eared, and tri-colored bats*. There are no known occurrences of these species on the WMA. However, surveys will occur in suitable habitat prior to tree cutting activities to detect presence or probable absence, or cutting will take place in winter to avoid potential impacts.

Due to the sensitivity of endangered, threatened, and special concern species, and SGCN, special management guidelines may be implemented if additional species become known to occur in or within close proximity to the forest stand to be cut.

Forest Health Considerations:

Forest pests, diseases, and invasive vegetation are an ongoing problem for habitat management. When pests or diseases attack forests in high numbers and cause decline and mortality, habitat values can shift to the detriment of many resident wildlife species. Likewise, as invasive plants invade an area, outcompeting and dominating native vegetation, a lower diversity plant community is created (Photo 3). This decrease in habitat values means less wildlife may be able to utilize the area. All efforts to manage habitats on the WMA must consider pests, diseases, and invasive

[10] All guidance documents referenced here are available online at http://www.dec.ny.gov/outdoor/104218.html.

species and ensure that measures are taken to control their presence or prevent their establishment. One way to protect against current and future forest health issues is to promote species diversity, so when a pest or disease outbreak occurs, it only impacts part of a forest.

Photo 3: If left uncontrolled, swallow-wort has the potential to completely dominate a forest understory, pushing out native plants and degrading habitat values.

Photo: Chris Evans, University of Illinois, Bugwood.org

Infestations of introduced insects such as emerald ash borer (EAB), gypsy moth, hemlock woolly adelgid (HWA), pear thrips, and pine shoot beetle are of present concern and bear persistent monitoring. Gypsy moth and pear thrips densities fluctuate and occasionally can reach outbreak levels where complete defoliation of host trees can occur. Gypsy moth most commonly attacks oak and aspen species while pear thrips favors sugar maple. Hemlock woolly adelgid is present on the WMA and has already caused severe decline and mortality of the minor hemlock component; it is too late to implement control measures. EAB is also present on the WMA, but ash is not a large component of the forest and the effects of ash mortality should not significantly alter habitat values.

Native insect species such as eastern tent caterpillar and fall cankerworms are cyclic in population and may impact vegetation through defoliation at some time in the future. Both species feed on a wide range of tree species including: ash, basswood, beech, black cherry, maples, and oaks.

Oak wilt is a fungal disease that can infect and kill oak trees. Although rare in New York, the disease was identified in Ontario County in 2016 and 2018, and Yates County in 2019. Oak wilt primarily spreads in two ways: 1) through root connections with adjacent oak trees, and 2) from beetles that spread spores to open wounds on other oak trees. Current recommendations for treating affected areas include removing infected trees and severing root connections to reduce the chance of spread. This WMA should be monitored over the next several years to spot any signs of oak wilt. To prevent spread to the WMA, seasonal tree cutting restrictions may be needed to avoid creating wounds on oaks during the months when these beetles are active.

Invasive plants that are known to be on or near the forested areas of the WMA include: autumn olive, barberry, common buckthorn, garlic mustard, honeysuckle, multiflora rose, oriental bittersweet, privet, swallow-wort, and tree of heaven. Management of invasive vegetation may include mechanical, chemical, and/or biological methods.

Pre- and Post-treatment Considerations:

Active forest management requires suitable conditions to ensure that desired species will establish and succeed. Non-native invasive vegetation and interfering native vegetation (e.g., fern, hophornbeam) are present in the understory here and may have the potential to interfere

with forest habitat goals. Pre-treatment herbicide application may be necessary prior to the planned timber stand improvement cut to ensure desirable trees and shrubs are able to establish.

Conifers are a minor component of the WMA and are primarily represented by hemlock and white pine (the hemlock component is severely declined) with red and white cedar also present. Most of the white pine should be retained during the planned timber stand improvement cut and where practical, conifers (including non-native species) may be planted.

Deer herbivory appears to be a moderate issue at Willard WMA, with evident damage on many desirable tree seedlings (e.g., aspen, oak, maple). Downed trees left scattered throughout the forest understory following the planned cut should provide protection for seedling tree and shrub growth. Aspen being cut in shrublands to create young forest should be left on site to provide protection from deer browse; however, it is expected that the resulting sucker formation will be vigorous and grow above deer browse height within a couple years. Efforts to promote deer hunting on the WMA to manage the local deer herd at desired levels will continue.

If it is concluded post-treatment that desired tree species are not regenerating in a high enough frequency, or that undesirable species are dominating the area and suppressing regeneration, then the stand may be re-treated. This may include mechanical and/or herbicidal control of undesirable species, removal of additional trees to increase available sunlight, scarification of forest floor to stimulate seedling establishment, and/or the direct seeding of desired tree species.

Pre- and post-treatment actions to promote the desired forest regeneration will be addressed in detail in the silvicultural prescriptions.

MANAGEMENT EVALUATION

In order to determine whether the desired forest regeneration and wildlife response(s) have been achieved by the management outlined above, pre- and post-management assessments may be conducted. Regeneration assessments will be conducted within one year of cutting completion, three, and five years after the cut or until the forester determines adequate natural or artificial (i.e., planting) regeneration has been securely established. Wildlife monitoring to assess response to management may include songbird point counts and woodcock singing ground surveys.

SHRUBLAND

Shrublands are early successional upland habitats dominated by woody plants typically less than ten feet tall with scattered open patches of grasses and forbs that provide floristic diversity. Shrublands are typically characterized by >50% cover of shrubs and <25% cover of trees.

MANAGEMENT OBJECTIVES

- Maintain 14 acres of shrubland to provide dense cover and abundant soft mast.
- Convert 1 acre of shrubland to young forest to diversify early-successional habitats to benefit associated species.
- Control invasive vegetation and promote dominance of native shrub species.

DESCRIPTION OF EXISTING SHRUBLAND HABITAT AND TARGET SPECIES

There are currently 15 acres of shrubland located in two patches on Willard WMA (Figure 6).

Shrubland Stand A-2 is at the east end of the WMA by County Road 131 and is primarily composed of small shrubs with a sparse overstory of black walnut. The shrub component includes a mix of native species (e.g. blackberry, dogwood, sumac) and non-native, invasive species (mostly honeysuckle). Some white cedar (arborvitae) and other ornamental plantings are present in this stand at the old farmstead site.

Shrubland Stand A-7 is toward the center of the WMA and is composed of an old apple orchard (some still in good health) and a good mix of native and invasive shrubs. Abundant native shrubs include gray dogwood and nannyberry, while the worst invasive shrubs are common buckthorn and privet. There is also a component of red cedar naturally regenerating. An overgrown, abandoned railroad bed goes through this shrubland.

Photo 4: Gray dogwood is abundant on the WMA, establishes dense thickets, and provides abundant berries each fall that are important to migrating songbirds.

Photo: Denise Ellsworth, The Ohio State University, Bugwood.org

A narrow hedgerow composed mostly of shrubs and some trees is also present on the WMA's north boundary, along the gravel road.

Shrublands are a valuable habitat type that is uncommon in the surrounding landscape (just 4%). They are important to numerous wildlife species because they provide the dense cover and abundant food (e.g., twig browse, insects, berries) that many depend upon (Photo 4). The prolific flowers produced by these shrubs are also highly beneficial to various pollinator species. Currently, shrubland constitutes 16% of woody habitat (forest and shrubland combined) on the WMA.

Each of these two shrubland stands contain small patches of mature aspen trees which provide an opportunity to create small sections of young forest to complement the existing shrubland habitat. The primary difference between these habitats is that young forests are mostly composed of trees whereas shrublands are mostly composed of shrubs, but both are important to a similar suite of associated wildlife species. Aspen is particularly beneficial to some species (e.g., ruffed grouse) and in general is uncommon on the WMA. Due to the potential for aspen to prolifically sprout from their root system after cutting, there is potential to increase the amount of aspen on the WMA and create approximately 1 acre of young forest.

Table 7. Target species for shrubland management on Willard WMA.

Target Species	Beneficial Habitat Structure
American woodcock	*Nesting*: Stands of an acre or more with woody stem density of at least 6,000 stems per acre, on mostly dry soil.
	Foraging: Moist, rich soils with dense overhead cover and abundant earthworms.
	Singing ground: Open areas, such as fields or recent clearcuts near nesting and foraging habitat.
Eastern cottontail	*Breeding and escape cover*: Dense, young woody vegetation near food sources. Brush piles are important in winter when herbaceous cover has died back.
	Foraging: During the growing season, grasses and forbs are most important. During the winter, woody plant material is most important. Food should be within 300 feet of cover.

These species were selected as targets because they are either SGCN (woodcock) or popular game species (both woodcock and cottontail). Each of these species utilize shrublands for breeding and foraging, and much of their habitat requirements overlap. Managing shrublands on the WMA targeting these species is expected to promote several additional SGCN, including black-billed cuckoo, brown thrasher, blue-winged warbler, ruffed grouse, and black rat snake. White-tailed deer, wild turkey, and various pollinator species are also expected to benefit.

MANAGEMENT HISTORY

The old apple orchard on the WMA was planted by the Geneva Experiment Station in the late 1960s and the related experiment ended in the late 1970s. The old Lehigh Valley Railroad bed adjacent to the apple orchard was acquired and added to the WMA in 1980. Some management has occurred to clear vegetation around apple trees to release them from competition, but otherwise the area surrounding the orchard and the old railroad has been allowed to revert naturally and become dominated by mostly shrubs.

The shrubland closest to County Road 131 was previously farm fields, lawn, and farm buildings that went unmaintained under DEC management. The buildings were demolished and removed in 2018.

IMPLEMENTATION PLAN AND ANTICIPATED SCHEDULE

- **Management planned for 2021-2030** (Figure 6):
    - Throughout shrubland stands, perform maintenance as needed.
        - Brush cutting using a rotary mower or forestry cutter should be utilized to stimulate dense shrub regrowth and to maintain an interspersion of openings and travel corridors.

        - Young trees that would eventually dominate and shade out shrubs should be selectively cut; stumps should be removed or cut low to facilitate future maintenance. Small stands of trees may be left as islands.
        - When and where feasible prescribed fire may be utilized.
    - Throughout shrubland stands, promote the dominance of native shrub species.
        - Control of invasive vegetation will be accomplished through mechanical removal, prescribed fire, and/or herbicide application. Native shrubs may be planted to replace invasives.
    - Convert 1 acre of shrubland to young forest by clearcutting aspen (Figure 6).
        - This will occur in both shrubland stands A-2 and A-7 and each patch will create approximately 0.5 acres of young forest.
        - Aspen should be cut during the winter to encourage root suckering and felled trees should be left scattered on site to provide protection from deer browse. Surrounding woody vegetation should also be cut to reduce competition with aspen suckers.

BEST MANAGEMENT PRACTICES

In order to minimize disturbance to shrubland wildlife during management activities, brush-cutting and tree removal, if possible, should be done outside the bird nesting and brood rearing part of the year (April 15 to August 15). However, management may occur within this timeframe if it is to be done for long term benefits to the habitat/wildlife, such as invasive species management. It is often most effective to cut well-established invasive shrubs between flowering and fruit set to prevent seed production and dispersal.

MANAGEMENT EVALUATION

Current monitoring of shrubland habitat on the WMA is informal and data are often derived opportunistically, and will be continued. However, the establishment of periodic wildlife surveys would be beneficial to better understand species diversity and habitat use.

GRASSLAND

Grasslands are open, grassy areas with a minimal amount of shrub and tree cover (<35%) that are maintained, or could be maintained, without significant brush cutting. Grasslands may include areas where hay is harvested by late season mowing once per year.

MANAGEMENT OBJECTIVES

- Increase grassland acreage from 77 acres to 92 acres by converting 15 acres of agricultural land to grassland.
- Maintain grasslands to encourage favorable herbaceous species and prevent reversion to shrubland and forest.
- Encourage a diversity of grasses and forbs beneficial to target species.
- Identify and control invasive plant species to prevent their dominance in fields.

DESCRIPTION OF EXISTING GRASSLAND HABITAT AND TARGET SPECIES

There are currently 77 acres of grassland habitat on Willard WMA (Figure 6). This is primarily composed of two large fields (59 acres and 12 acres) and a couple grass strips (6 acres) between agricultural fields.

Habitat condition and quality varies within these fields. Some sections are dominated by warm-season grasses, some by cool-season grasses, while others are mostly forbs (e.g., legumes and wildflowers). Some areas are being encroached upon by shrub and tree seedlings and need maintenance. Some sections are well-drained and dry most of the year, while others are seasonally wet.

These large fields (Photo 5) provide important habitat for SGCN grassland-dependent birds (e.g., bobolink and eastern meadowlark). Grassland-dependent bird species typically require large patches (25+ acres) of grassland with low perimeter-to-area ratios in an open landscape. There is an opportunity on this WMA to increase the amount of available grassland habitat and field size by converting the existing agricultural fields to grassland. The WMA would then provide two large patches of grassland (59 acres and 33 acres).

Photo 5: The WMA's large grasslands located within an open agricultural landscape provide important habitat to grassland-dependent birds, many of which are SGCN.

Photo: Michael Palermo, DEC

Numerous other wildlife besides grassland-dependent birds also utilize and benefit from these grasslands. White-tailed deer regularly use these fields for bedding, forage, and fawning cover. Wild turkey use them for strutting during the mating season and then for brood rearing. There are also a few small ponds located within these fields and the nearby herbaceous cover provides nesting for waterfowl, such as mallard. Since the edges of these fields border forest and shrubland, they are used by woodcock as singing grounds and roosting sites. Pollinators and various other insects also thrive in these fields and provide an important high-protein food source for many other wildlife. Pheasant, and several other wildlife species, benefit from the abundant seeds and herbaceous cover that persists in grasslands throughout the winter.

Table 8. Target species for grassland management on Willard WMA.

Target Group	Example Species	Beneficial Habitat Structure
Grassland-dependent breeding birds	Bobolink, eastern meadowlark, horned lark, vesper sparrow, and northern harrier	Large grassland patches, generally greater than 25 acres, with a low perimeter-to-area ratio. A diversity of grass types (e.g., warm and cool season), with varying height and density, provide for a greater range of species use.
Wintering raptors	Northern harrier, rough-legged hawk	Large grassland patches, generally greater than 30 acres, that support high populations of small mammals (e.g., meadow vole and deer mouse).
Upland game	Pheasant, white-tailed deer, and wild turkey	Fields that support abundant insects are important protein sources for turkey poults. Cool-season grasses offer early cover for fawns. Warm-season grasses provide valuable winter cover for pheasant.
Pollinators	Bees, butterflies, and moths	Abundant and diverse native wildflowers that bloom consistently throughout spring, summer, and fall. Alternating annual mowing regimes.

MANAGEMENT HISTORY

The fields that occur on the WMA were likely forested when settlers first arrived in the 1790s but were quickly cleared and put into agricultural use. Farming of these fields continued under the management of New York State Office of Mental Health until 1963 when the property was transferred to DEC.

Under DEC management, agriculture (crops and hay) still occurred and revenue from this helped pay for road, trail, and parking upgrades. Since the late-1990s, the acreage used for crops has decreased and field sections were planted to herbaceous cover preferred by wildlife, such as switchgrass. Routine mowing has been the primary method to maintain these fields and prevent woody plant encroachment; however, there have been instances where herbicide was applied.

IMPLEMENTATION PLAN AND ANTICIPATED SCHEDULE

- **Management planned for 2021-2030** (Figure 6):
    - Throughout grassland fields, routinely perform maintenance actions.
        - Mow fields every 1-3 years to prevent establishment of woody vegetation and provide desired habitat conditions.
            - Mowing of fields heavily invaded by woody plants may be most effective if conducted in early spring and again before senescence.
        - Incorporate prescribed burning in those fields with a warm-season grass component. Burning will control undesirable woody vegetation growth and promote warm-season grasses which are known to have a high food and cover value for wildlife.
        - Control invasive vegetation mechanically, biologically, and/or with herbicide.

        - Consider opportunities to incorporate rotational livestock grazing as a means to control invasive vegetation and maintain grasslands.
        - As needed: lime, fertilize, disk, and replant grasslands. Promote native herbaceous species by following best management practices.
    - Replant 15 acres of existing agricultural lands to grass and forb mixes favored by target wildlife (2026-2030).
    - Throughout all grassland stands, control invasive vegetation as needed.
        - Depending on the species, invasive vegetation can be controlled mechanically, biologically, and/or with herbicide.
        - Control of common reed near ponds is a priority.
    - As needed: grassland fields can be temporarily (3 to 5 years) converted to agricultural lands as a means to restore grassland quality.
        - Over a few years, the repeated tilling associated with cultivated crops disrupts root systems and depletes the seed bank of woody vegetation and other undesirable plants. This provides a clean slate for seeding desired herbaceous plants to establish a grassland of improved habitat value.

BEST MANAGEMENT PRACTICES

The following sub-sections provide guidelines for grassland habitat management on all WMAs in NY. For more detailed information and recommendations see *A Plan for Conserving Grassland Birds in New York*.[11] In particular, refer to the plan for species-specific habitat requirements and recommendations regarding grassland management and restoration techniques.

General Management Recommendations

- Target management for grassland bird species known to be in the vicinity and consider the needs of both breeding and wintering grassland bird species.
- Consider the surrounding landscape when making management decisions.
- Conduct baseline grassland bird surveys on newly acquired fields or fields targeted for management changes to determine species present.
- Increase field size by hedgerow removal, removing trees, etc. to benefit species that require large fields.
- Conduct invasive species control (e.g., reed canarygrass, thistle, Phragmites, wild parsnip, etc.) to improve habitat quality.
- Consider a variety of factors, such as the targeted grassland bird species, pollinators, seed mix (warm versus cool season grasses, forbs, wildflower mixes, grass height and density), timing of planting, existing conditions, and vegetation removal techniques (including herbicide and intensive disking) in developing grassland planting or restoration projects.
- Utilize mowing, haying, disking, burning, and grazing for maintaining grassland habitat, after evaluating the appropriateness of these methods relative to site conditions and management objectives. In particular, burning cool season grasses is not advisable in most situations in New York.

[11] Morgan, M. and M. Burger. 2008. A Plan for Conserving Grassland Birds in New York: Final Report to the New York State Department of Environmental Conservation under Contract #C005137. Audubon New York, Ithaca, NY.

Timing of Management

- Fields over 25 acres (including all contiguous fields) or fields with a history of listed (federally listed and/or state E/T or SC) grassland bird species within the last 10 years, including fields of any size AND contiguous fields. Can also include nearby fields if deemed necessary:
    - Mowing or other management should be avoided between April 23 and August 15 unless at least one of the following criteria are met and the fields are assessed or surveyed to confirm there is no active nesting by E/T/SC grassland birds:
        - Management is to be done for long term benefits to the habitat/wildlife (such as invasive species management).
        - Nesting locations can be avoided, such as using spot treatment for invasive species, reducing any negative impact to the species of concern.
- Fields under 25 acres (including all contiguous fields) with no history of listed species:
    - Fields can be managed/mowed between April 23 and August 15, if necessary, to:
        - Control the growth of invasive vegetation in fields where grassland habitat value is degraded.
        - Ensure that suitable grass cover will be present to provide important winter habitat for grassland birds and ring-necked pheasants.
        - If early management is proposed, then the habitat requirements and nesting periods of other species should be considered (e.g., nesting waterfowl, American bittern, reptiles and amphibians).
- Due to the possible presence of state listed wintering raptors, including short-eared owl and northern harrier, late winter/early spring mowing should be delayed or certain areas should be avoided until these birds leave the area.

Additional Mowing Guidelines

- Frequency of mowing, size of area mowed, and mowing techniques should be based on species present and current and desired habitat conditions.
- Block or spot mowing is preferred, and strip mowing should be limited (especially in fields over 25 acres).
- Unmowed blocks should be in the shape of a square as opposed to long rectangles.
- When mowing, consider mowing from one side of the field to the other side or start in the center and mow outwards to avoid concentrating animals in the area yet to be mowed.
- In general, mow grass to a residual height of 6-12 inches.

MANAGEMENT EVALUATION

Current monitoring of grassland habitat use at Willard WMA is informal and data are often derived opportunistically and will be continued. However, the establishment of periodic grassland bird surveys would be beneficial to better understand species diversity and habitat use. Monitoring of invasive vegetation control efforts will be necessary to ensure success and prevent future spread.

AGRICULTURAL LAND

Agricultural lands on WMAs include any acreage on which crops are grown, primarily areas that are under cooperative agreements or farming contracts, but also including wildlife food plots.

MANAGEMENT OBJECTIVES

- Convert 15 acres of agricultural land to grassland.
- As needed, temporarily convert sections of grassland fields to agricultural lands to facilitate restoration of grassland habitat quality.

DESCRIPTION OF EXISTING AGRICULTURAL LANDS AND TARGET SPECIES

There are currently 15 acres of agricultural lands on Willard WMA (Figure 6), located on the east end and arranged in three blocks.

Agriculture on WMAs is usually implemented by local farmers under a cooperative agreement, contract, or other arrangement. Crops are generally rotated each year and typically include types that are beneficial for wildlife, such as corn, hay, or soybeans. It is required that some grain and cover be left for wildlife after harvest (typically at least 10%). Cover crops (e.g., clover, buckwheat, ryegrass) are sometimes planted to improve soil health or to stabilize soil over winter (Photo 6).

Photo 6: A clover cover crop planted on the WMA in 2020.

Photo: Michael Palermo, DEC

Crops (e.g., corn, grains) do provide useful habitat for some wildlife, including supplemental forage for deer, turkey, and migrating geese. Crops can also benefit some grassland bird species that prefer a higher amount of bare soil, such as horned lark and vesper sparrow. However, high-quality grassland would provide better habitat for more wildlife species overall, including SGCN, while still providing valuable habitat to deer and turkey.

In the future, temporary implementation of agriculture (i.e., crop planting) throughout sections of grassland as a means to restore grassland habitat quality may be necessary and beneficial. This would occur as needed and typically last for 3 to 5 years.

MANAGEMENT HISTORY

Prior to DEC management, fields on the WMA had been in agricultural use since the 1800s. DEC management continued using most of these fields for crops and hay until the late-1990s

when this acreage decreased, and more acreage was planted as grassland. The most recent crop planting agreement included approximately 15 acres and began in 2013.

Implementation Plan and Anticipated Schedule

- **Management planned for 2021-2025** (Figure 6):
    - Maintain the current agricultural component by renewing the agreement with a local farmer (15 acres).
- **Management planned for 2026-2030** (Figure 6):
    - Convert the existing agricultural land to grassland by planting a grass and forb mix favored by grassland-dependent wildlife (15 acres).
    - As needed, temporarily (3 to 5 years) cultivate crops to restore grassland quality.
        - Control undesirable plant growth through repeated tilling and crop planting, with the eventual reseeding of desired herbaceous vegetation.

Best Management Practices

Agricultural activities involve mowing, tilling, and the use of pesticides, which have potential to impact wildlife and the environment; therefore, guidelines to minimize impacts would be followed and provided within any cooperative agreements or contracts. For Willard WMA this would include soil conservation practices, buffers between crops and wetlands or waterways, review of planned pesticide and/or fertilizer use, no fall plowing without a winter cover crop, and no harvest of hay, alfalfa, or other grasses prior to August 15.

Management Evaluation

Annual agricultural activities, such as timing of mowing and crops planted, should be tracked. Fields should be monitored for control of invasives to prevent spread to adjacent areas, or in preparation for rotating agricultural fields to grassland.

Wetlands (Natural and Impounded)

Wetland acreage includes ponds, emergent marsh, and scrub-shrub wetlands, and is categorized as natural or impounded.

Natural wetland: includes areas where the soil or substrate is periodically saturated or covered by water, the vegetative community is predominantly composed of hydrophytes, and hydrologic processes have not been greatly altered by human construction.
Impounded wetland: are areas similar to natural wetlands, but where water is held back by a berm, road, or other human-made structure.

Management Objectives

- Manage approximately 2 acres of impounded wetlands to provide pond habitat for associated wildlife.
- Maintain integrity of impoundment berms.
- Identify and control invasive plant species to maintain and enhance biodiversity.

DESCRIPTION OF EXISTING WETLAND HABITAT AND TARGET SPECIES

There are 2 acres of impounded wetlands (four small ponds) and no natural wetlands on Willard WMA (Figures 3 and 6).

These ponds are all mostly open water with a fringe of emergent vegetation (e.g., cattails, rushes) around the edges (Photo 7). They provide a reliable water resource for upland wildlife, especially during dry months of the year when water may be limited elsewhere on the property. Numerous insects (e.g., mosquitos, dragonflies, mayflies) are present in an around these wetlands (having aquatic larva that emerge as flying adults) and are an important food source to many wildlife species, including bats and songbirds. Limited numbers of waterfowl utilize these wetlands, primarily mallard, which sometimes nest in the nearby fields and then rear their brood on the water. Common frog, toad, and turtle species are also present, and beaver and muskrat occur in low numbers.

Photo 7: There are four small ponds on the WMA that provide aquatic habitat for wildlife.

Photo: Michael Palermo, DEC

Current fish assemblages are unknown at this time; however, it is possible that minnow and/or shiner species, brown bullheads, and panfish (e.g., pumpkinseed sunfish and bluegills) currently inhabit these small ponds.

Table 9. Target species for wetland management on Willard WMA.

Target Group	Example Species	Beneficial Habitat Structure
Waterfowl	Mallard	Herbaceous cover adjacent to open water for nesting.
Amphibians	Frogs, toads, salamanders, and newts	Shallow water bodies lacking fish provide the best conditions for successful reproduction.

MANAGEMENT HISTORY

The ponds on the WMA were constructed by DEC. The two ponds east of the old railroad were constructed in 1976 and the two west of the railroad in 1982. DEC management has been minimal and primarily includes routine mowing of the impoundment berms to prevent woody growth and ensure they remain stable.

IMPLEMENTATION PLAN AND ANTICIPATED SCHEDULE

- **Management planned for 2021-2030** (Figure 3 and 6):
    - Maintain integrity of existing wetland impoundments.
        - Mow berms annually to prevent establishment of woody vegetation.
        - Inspect berms and spillways annually and repair as needed.
    - Monitor for invasive vegetation and as needed control mechanically, biologically, and/or with herbicide (e.g., common reed and purple loosestrife).

BEST MANAGEMENT PRACTICES

Management activities within wetlands will take into consideration the timing of wildlife breeding and hibernating seasons and when practicable these periods of time will be avoided. Wetland management will follow guidelines established in the General Permit GP-0-20-005: Habitat Management by NYSDEC, and any necessary permits will be obtained.

MANAGEMENT EVALUATION

Current monitoring of wetland habitat use at Willard WMA is informal and data are often derived opportunistically and will be continued. However, the establishment of periodic surveys for amphibian, reptile, and waterfowl presence would be beneficial to better understand species diversity and use.

SHORELINE, BLUFFS, AND STREAMS

Shoreline is defined as where the land and Seneca Lake meet, including dry land below the mean high-water mark. Bluffs are defined as steep areas of exposed substrate that is actively eroding. Streams are defined as any watercourse on the WMA, including both year-round and intermittent flows. For management purposes and habitat acreage calculations, some small streams are lumped within surrounding habitat stands (e.g., an intermittent stream that flows through a forest stand is included in that stand's acreage calculation).

MANAGEMENT OBJECTIVES

- Maintain the natural condition and quality of shoreline, bluffs, and streams on the WMA.

DESCRIPTION OF EXISTING STREAM HABITAT AND TARGET SPECIES

There is approximately 1,000 feet of Seneca Lake shoreline, 1 acre of bluffs, and two minor, intermittent streams on the WMA (Figure 6).

The shoreline on the WMA is narrow and rocky and varies as lake levels fluctuate throughout the year. The bluff is very steep and primarily composed of eroding shale and glacial till. The streams are located within the forest and drain down the slope to the lake.

Maximum stream flows occur in spring and after heavy precipitation events. Substrate for these streams is primarily soil, gravel, and some shale, and they generally dry up by late summer.

MANAGEMENT HISTORY

There has been no DEC management of the shoreline, bluff, or streams on the WMA. DEC management has used best management practices to prevent erosion and sedimentation of streams during other activities.

IMPLEMENTATION PLAN AND ANTICIPATED SCHEDULE

- **Management planned for 2021-2030** (Figure 6):
    - Maintain the natural condition and quality of the shoreline, bluff, and streams.
        - All habitat management activities on the WMA will adhere to the Environmental Conservation Law and follow best management practices.

BEST MANAGEMENT PRACTICES

All management activities on the WMA will comply with the New York State Freshwater Wetlands Act (ECL Article 24) and Water Resources Law (ECL Article 15, Title 5). Guidelines for special management zones will be adhered to.

MANAGEMENT EVALUATION

There is no evaluation planned for these habitats.

HABITAT MANAGEMENT SUMMARY

In summary, Table 10 lists the habitat management actions planned for Willard WMA over the next ten years. Any substantive changes will be appended to this HMP annually or as needed (Appendix D).

Table 10. Summary of habitat management actions recommended for Willard WMA, 2021-2030 (also see Figure 6).

Habitat	Management Action	Acres	Timeframe
Forest	Timber stand improvement of Stand A-11	25	2026-2030
Forest	Monitor and control invasive vegetation throughout all forest stands	≤ 41	2021-2030, ongoing
Shrubland	Maintain shrublands by releasing apple trees and periodic brush cutting	≤ 14	2021-2030, as needed
Shrubland	Convert shrubland to young forest in Stands A-2 and A-7	1	2021-2025
Shrubland	Monitor and control invasive species throughout all shrubland stands	≤ 14	2021-2030, ongoing
Grassland	Maintain grassland acreage with mowing and potentially prescribed fire	≤ 92	Annual, biennial, or triennial
Grassland	Improve grassland quality (e.g., lime, fertilize, disk, and/or reseed)	≤ 92	2021-2030, as needed
Grassland	Monitor and control invasive species throughout all grassland fields	≤ 92	2021-2030, ongoing
Grassland / Agricultural	Plant 15 acres of existing agricultural land to grass and forbs	15	2026-2030
Grassland / Agricultural	Temporarily (3 to 5 years) convert grasslands to crops as a means to restore grassland quality		2026-2030, as needed
Wetlands	Maintain impoundment berms (e.g., inspect, mow, burn, and repair)	900 ft	Annually
Wetlands	Monitor and control invasive species	≤ 2	2021-2030, ongoing
Shoreline, Bluff, Streams	Avoid negative impacts	1	2021-2030

III. FIGURES

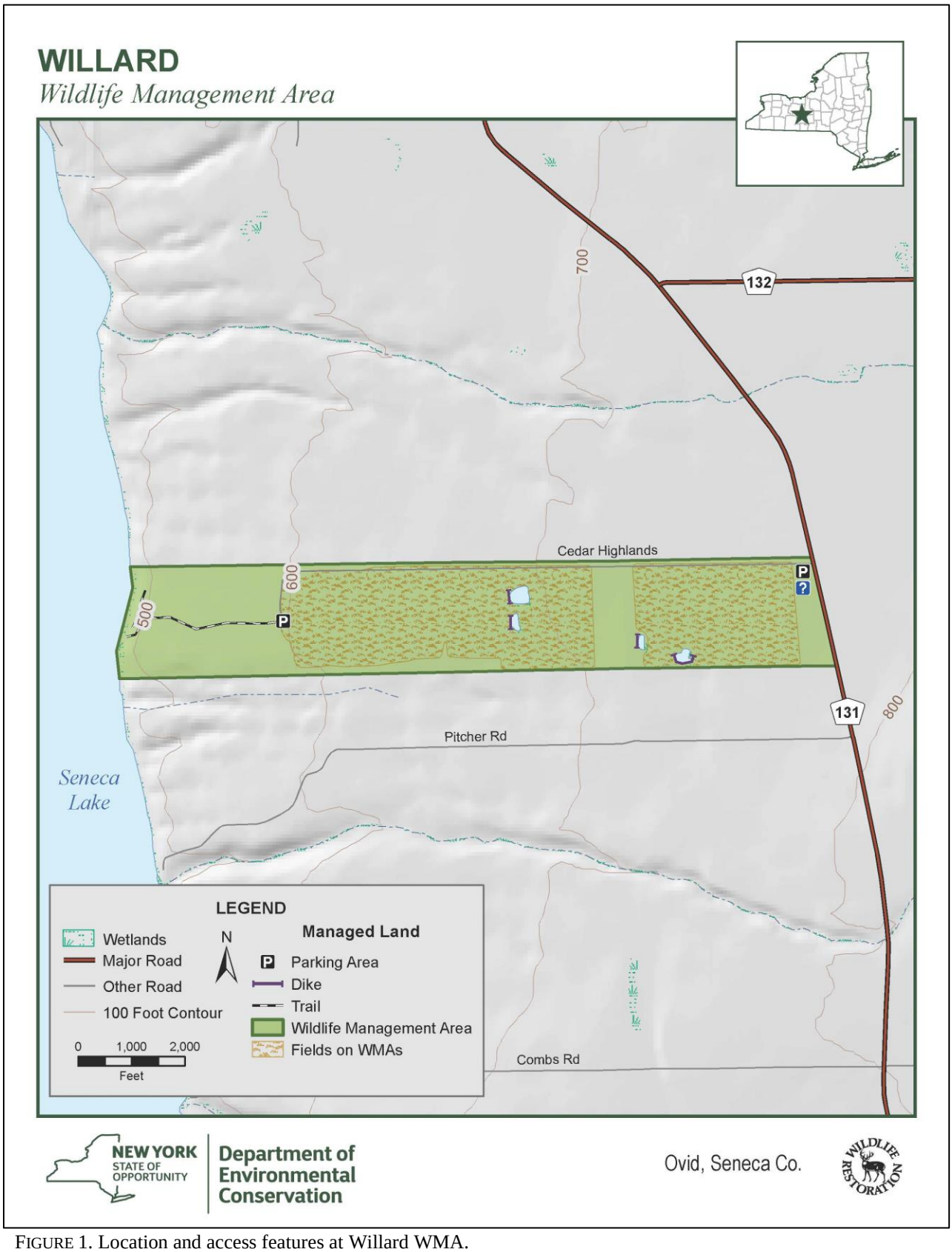

FIGURE 1. Location and access features at Willard WMA.

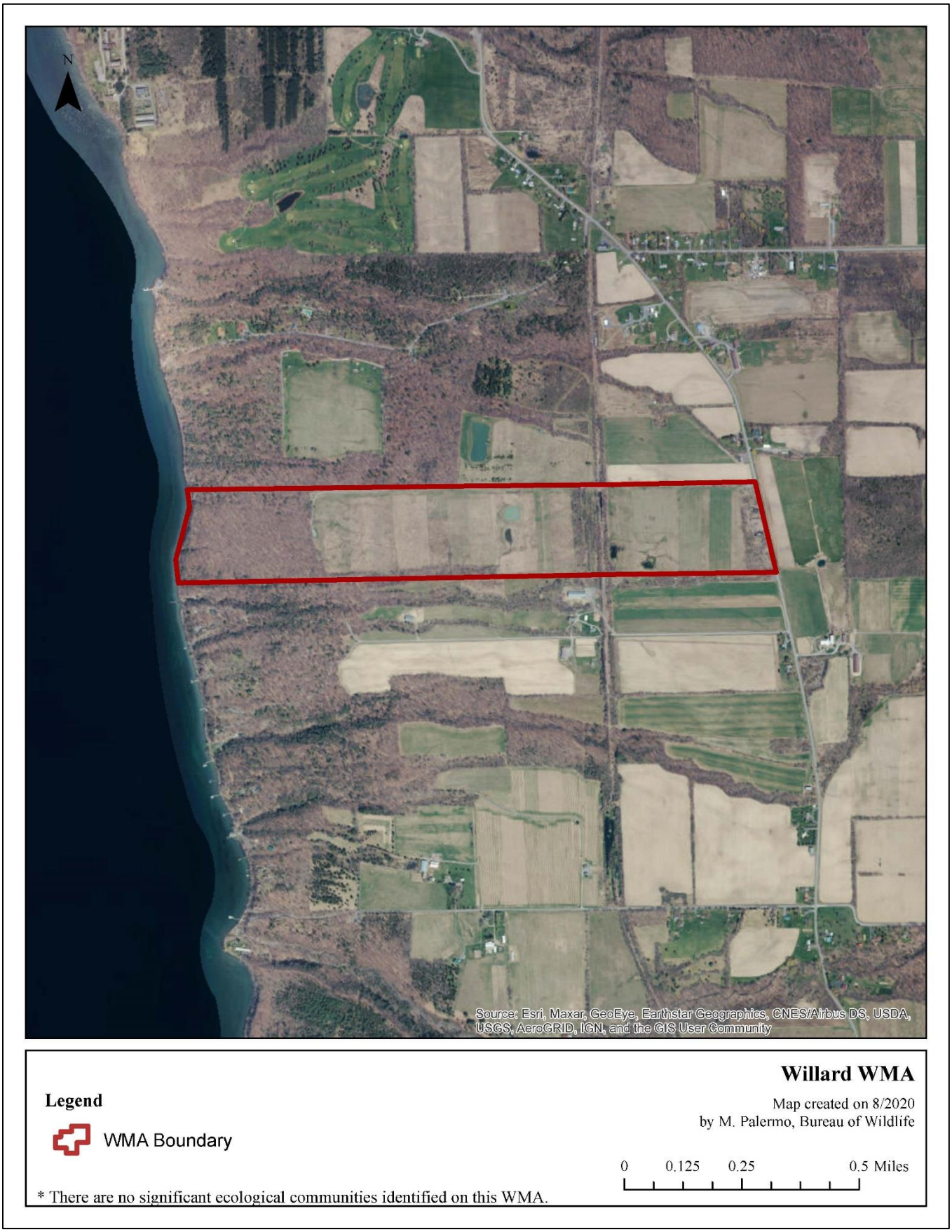

FIGURE 2. Significant ecological communities on Willard WMA. Data from the NY Natural Heritage Program.

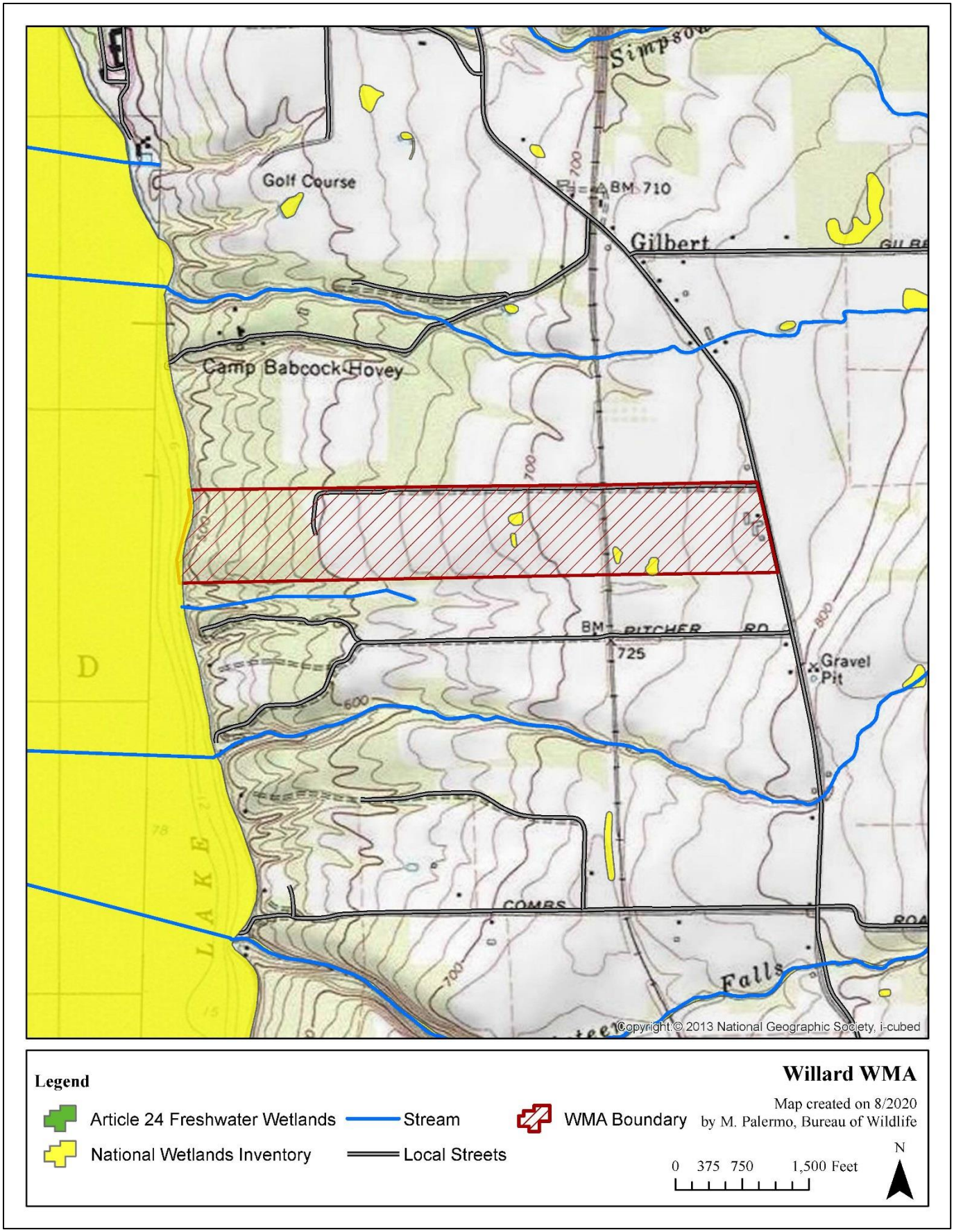

FIGURE 3. Wetlands, open water, and streams of Willard WMA. Note: Wetland boundaries are not exact and may not be used for regulatory purposes without a current delineation.

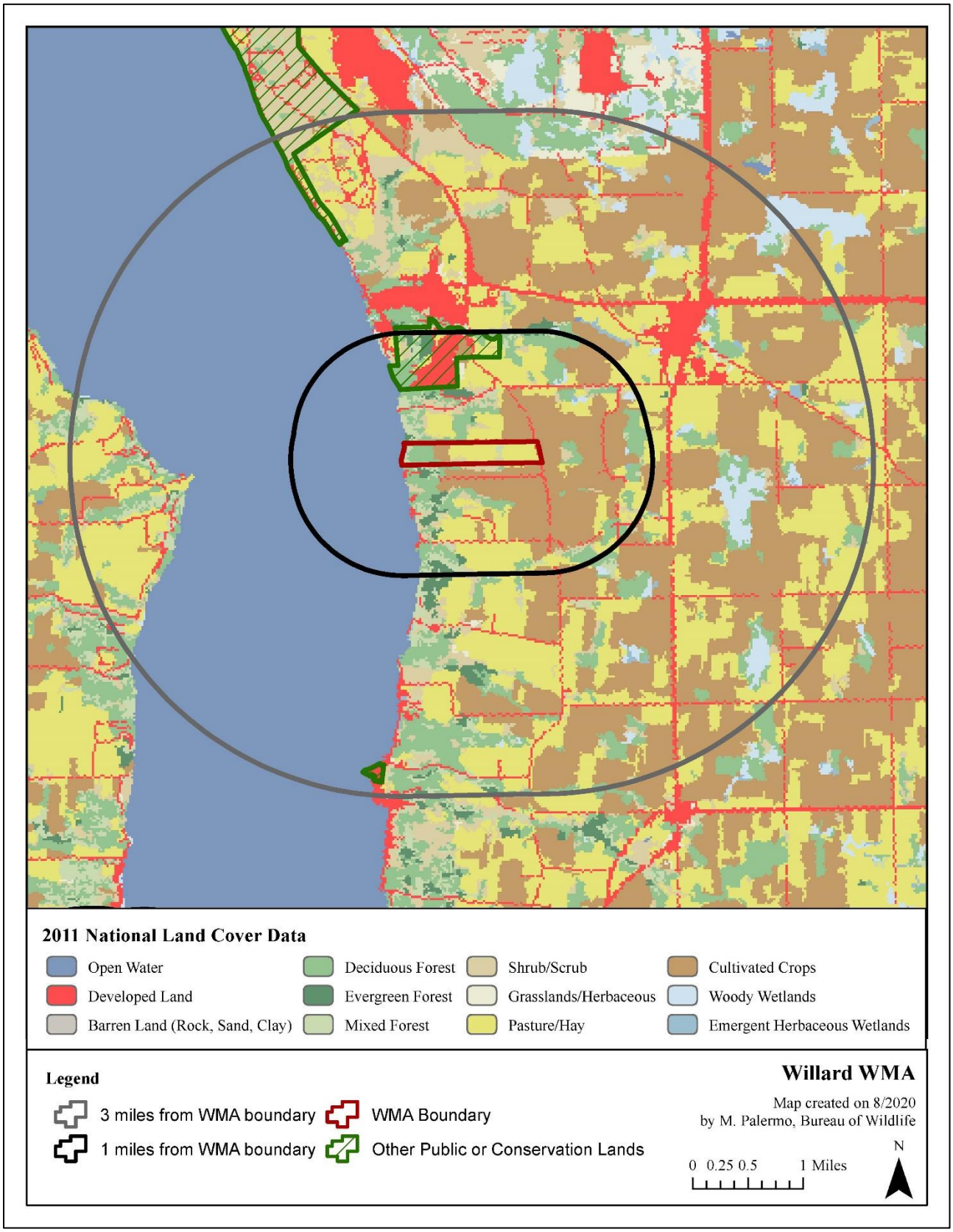

FIGURE 4. Land cover types and conservation lands in the landscape surrounding the WMA. Conservation lands are from the NY Protected Areas Database available at http://www.nypad.org/. Land cover types are from the 2011 National Land Cover Data (NLCD) and differ from the habitat types used in the WMA habitat inventory. NLCD definitions are available online at https://www.mrlc.gov/data/legends/national-land-cover-database-2011-nlcd2011-legend.

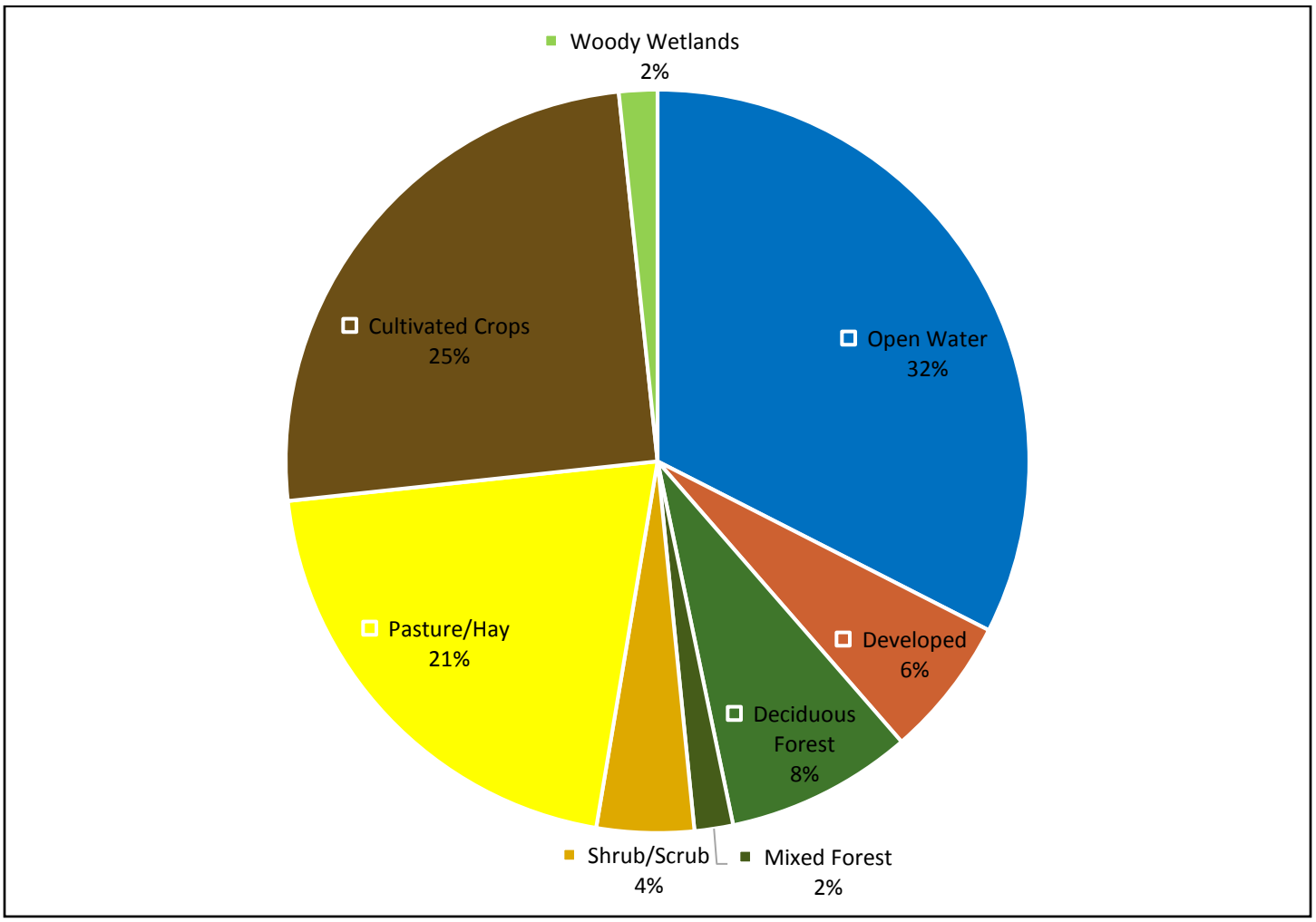

FIGURE 5. Percent cover of land cover types within three miles of Willard WMA. Land cover types are from the 2011 National Land Cover Data (NLCD) and differ from the habitat types used in the WMA habitat inventory. NLCD definitions are available online at https://www.mrlc.gov/data/legends/national-land-cover-database-2011-nlcd2011-legend.

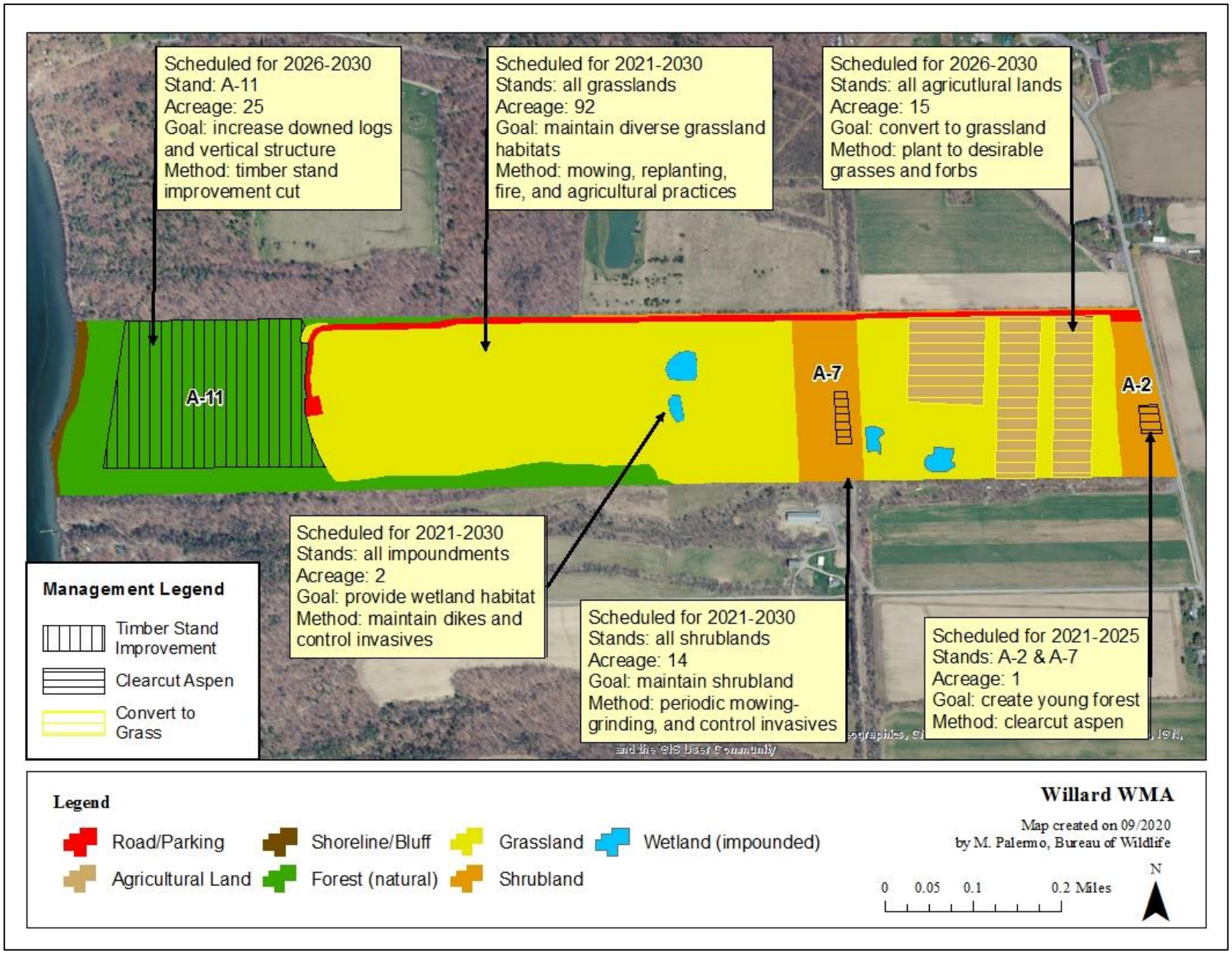

FIGURE 6. Habitat types and location(s) of proposed management on Willard WMA. Numbers indicate the stand number from habitat inventory.

IV. APPENDICES

APPENDIX A: DEFINITIONS

The following key words were used in the development of this Habitat Management Plan. Definitions are from The Dictionary of Forestry, Society of American Foresters, J. A. Helms, Editor, unless otherwise noted.

Best Management Practices: (BMP) A practice or combination of practices that are determined to be the most effective and practicable means of avoiding negative impacts of habitat management.

Biodiversity: The variety and abundance of life forms, processes, functions, and structures of plants, animals, and other living organisms, including the relative complexity of species, communities, gene pools, and ecosystems at multiple spatial scales.

Clearcut: A forest regeneration or harvest method that entails the cutting of essentially all trees, producing a fully exposed microclimate for the development of a new age class. Depending on management objectives, a clearcut may or may not have reserve trees left to attain goals other than regeneration.

Community: An assemblage of plants and animals interacting with one another, occupying a habitat, and often modifying the habitat; a variable assemblage of plant and animal populations sharing a common environment and occurring repeatedly in the landscape. (NY Natural Heritage Program)

Endangered Species: Any species listed on the current state or federal endangered species list as being in danger of extinction throughout all or a significant portion of its range.

Forb: Any broad-leafed, herbaceous plant other than those in the Poaceae (Gramineae), Cyperaceae, and Juncaceae families (i.e., not grass-like).

Forest: An ecosystem characterized by a dense and extensive tree cover, often consisting of stands varying in characteristics such as species composition, structure, age class, and associated processes, and commonly including meadows, streams, fish, and wildlife.

Forest Health: The condition of a forest derived from concerns about such factors as its age, structure, composition, function, vigor, presence of unusual levels of insects or disease, and resilience to disturbance.

Grassland Focus Area: Regions of NY that support key, residual populations of grassland birds. There are currently eight focus areas, within which there is a concentrated conservation effort for these species. (A Plan for Conserving Grassland Birds in New York, Audubon NY)

Habitat: A place that provides seasonal or year round food, water, shelter, or other environmental conditions for an organism, community, or population of plants or animals.

Hardwood: A broad leaved, flowering tree belonging to the botanical group Angiospermae, such as red maple, yellow birch, American beech, black cherry, etc.

Impoundment: A pond caused by a dam across a stream and used for purposes such as water supply, water power, or wildlife habitat. (Edinger et al. 2002. Ecological Communities of New York State, Appendix B)

Landscape: A spatial mosaic of several ecosystems, landforms, and plant communities across a defined area irrespective of ownership or other artificial boundaries and repeated in similar form throughout.

Mast: The fruit of trees considered as food for wildlife. Hard mast is the fruits or nuts of trees such as oak, beech, walnut, and hickories. Soft mast is the fruits and berries from plants such as dogwood, viburnum, elderberry, huckleberry, hawthorn, grape, raspberry, and blackberry.

Multiple Use Area: Lands that were acquired by DEC to provide outdoor recreation and wherever possible the conservation and development of natural resources. As their name suggests, they are to be managed for a broader range of public use. (Public Use of Lands Managed by the Bureau of Wildlife)

Native: A plant or animal indigenous to a particular locality.

Old Growth Forest: Forest with an abundance of late successional tree species, at least 180 - 200 years of age in a contiguous forested landscape that has evolved and reproduced itself naturally, with the capacity for self-perpetuation, arranged in a stratified forest structure consisting of multiple growth layers throughout the canopy and forest floor, featuring canopy gaps formed by natural disturbances creating an uneven canopy, and a conspicuous absence of multiple stemmed trees. (Adapted from the NYS Strategic Plan for State Forest Management)

Pole: A tree of a size between a sapling (1" to 5" diameter at breast height) and a mature tree.

Regeneration Cut: A cutting procedure by which a new forest age class is created; the major methods are clearcutting, seed tree, shelterwood, selection, and coppice. The Young Forest Initiative includes these silvicultural treatments: clearcuts, seed tree cuts, and shelterwood cuts. Salvage (following a natural disturbance) will be considered based on the size and scope of the disturbance.

Seed Tree Method: A forest regeneration or harvest method that entails cutting of all trees except for a small number of widely dispersed trees retained for seed production and to produce a new age class in fully exposed microenvironment.

Shelterwood Method: A forest regeneration or harvest method that entails the cutting of most trees, leaving those needed to produce sufficient shade to produce a new age class in a moderated microenvironment.

Shrubland: A community dominated by woody plants typically less than ten feet tall with scattered open patches of grasses and forbs that provide floristic diversity. Typically characterized by >50% cover of shrubs and <25% canopy cover of trees. (Adapted from Edinger et al. 2002. Ecological Communities of New York State, Appendix B)

Softwood: A coniferous tree belonging to the botanical group Gymnospermae, such as white pine, Eastern hemlock, balsam fir, red spruce, etc.

Special Management Zone: A vegetation strip or management zone extending from wetland boundaries, high-water marks on perennial and intermittent streams, vernal pool depression, spring seeps, ponds and lakes, and other land features requiring special consideration. (Adapted from DEC Division of Lands and Forests Management Rules for Establishment of Special Management Zones on State Forests)

State Rank of Significant Ecological Communities:

S1 = Typically 5 or fewer occurrences, very few remaining individuals, acres, or miles of stream, or some factor of its biology making it especially vulnerable in New York State.
S2 = Typically 6 to 20 occurrences, few remaining individuals, acres, or miles of stream, or factors demonstrably making it very vulnerable in New York State.
S3 = Typically 21 to 100 occurrences, limited acreage, or miles of stream in New York State.
S4 = Apparently secure in New York State.
S5 = Demonstrably secure in New York State.
SH = Historically known from New York State, but not seen in the past 15 years.
SX = Apparently extirpated from New York State.
SE = Exotic, not native to New York State.
SR = State report only, no verified specimens known from New York State.

SU = Status unknown.
(Edinger et al. 2002. Ecological Communities of New York State, Appendix A)

Stand: In forestry, a contiguous group of trees sufficiently uniform in age class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable and manageable unit. In this HMP, the term "stand" is also applied to other habitat types (e.g., grassland, shrubland) to describe an area composed of similar vegetation composition and structure, as delineated during the habitat inventory.

Stand Prescription: A planned series of treatments designed to change current stand structure to one that meets management goals. Note: the prescription normally considers ecological, economic, and societal constraints.

Target Species: A suite of high priority wildlife species of conservation interest that are being targeted to benefit from management of a particular habitat type. For example, forest target species at Willard WMA include: American woodcock and wood thrush.

Unique Area: Lands that were acquired by DEC for their special natural beauty, wilderness character, geological, ecological, or historical significance for inclusion in the state nature and historical preserve. The primary purpose of these lands is to protect the feature of significance that led to the land being acquired by the state. (Public Use of Lands Managed by the Bureau of Wildlife)

Upland: Sites with well-drained soils that are dry to mesic (never hydric). (Edinger et al. 2002. Ecological Communities of New York State, Appendix B)

Wetland: "Freshwater wetlands means lands and waters of the state as shown on the freshwater wetlands map which contain any or all of the following:

(a) lands and submerged lands commonly called marshes, swamps, sloughs, bogs, and flats supporting aquatic or semi-aquatic vegetation of the following types: wetland trees, wetland shrubs, emergent vegetation, rooted, floating-leaved vegetation, free-floating vegetation, wet meadow vegetation, bog mat vegetation, and submergent vegetation;
(b) lands and submerged lands containing remnants of any vegetation that is not aquatic or semi-aquatic that has died because of wet conditions over a sufficiently long period, provided that such wet conditions do not exceed a maximum seasonal water depth of six feet and provided further that such conditions can be expected to persist indefinitely, barring human intervention;
(c) lands and waters substantially enclosed by aquatic or semi-aquatic vegetation as set forth in paragraph (a) or by dead vegetation as set forth in paragraph (b) the regulation of which is necessary to protect and preserve the aquatic and semi-aquatic vegetation as set forth in paragraph (a) or by dead vegetation as set forth in paragraph (b) the regulation of which is necessary to protect and preserve the aquatic and semi-aquatic vegetation; and
(d) the waters overlying the areas set forth in (a) and (b) and the lands underlying."

(Refer to NYS Environmental Conservation Law, Article 24 § 24-0107 for full definition.)

Wildlife Management Area: Lands that were acquired by DEC primarily for the production and use of wildlife, including hunting and trapping. These areas provide and protect wildlife habitats that are particularly significant in their capacity to harbor rare, threatened or endangered species, host unusual concentrations of one or more wildlife species, provide an important resting and feeding area for migratory birds, provide important nesting or breeding area for one or more species of wildlife, or provide significant value for wildlife or human enjoyment of wildlife. (Public Use of Lands Managed by the Bureau of Wildlife)

Young Forest: Forests that result from a regeneration cut, typically having a dense understory where tree seedlings, saplings, woody vines, shrubs, and herbaceous vegetation grow together. Young forests are typically 0-10 years old. (Adapted from www.youngforest.org). It is acknowledged that "young forests" will differ in their character in different ecological areas of the state and that 0-10 years is a continuum into more mature forest types. (Refer to: A DEC Strategic Plan for Implementing the Young Forest Initiative on Wildlife Management Areas 2015-2020)

APPENDIX B: COMPLIANCE WITH STATE ENVIRONMENTAL QUALITY REVIEW

This plan identifies habitat management activities to be conducted on the Wildlife Management Area. These activities were analyzed in the 1979 *Programmatic Environmental Impact Statement on Habitat Management Activities of the Department of Environmental Conservation; Division of Fish and Wildlife* (PEIS), as updated and amended in 2017 by the *Supplemental Final Environmental Impact Statement* (SFEIS).[12] Any activity that exceeds the thresholds of, or was not analyzed in the 1979 PEIS as amended in 2017, will require individual, site-specific environmental review. Environmental assessment forms prepared as a result of this review will be posted on the Environmental Notice Bulletin (ENB).[13]

The activities recommended in this plan:

- Will not adversely affect threatened or endangered plants or animals or their habitat.
    - Prior to implementation of any activity, staff review the NY Natural Heritage Program's "Natural Heritage Element Occurrence" database and perform field surveys when necessary. If a protected species is encountered in a project area, staff may establish buffer zones around the occurrence, move the project area, follow time-of-year restrictions, or cancel the project.
- Will not induce or accelerate significant change in land use.
    - All lands and waters within the WMA system are permanently protected as wildlife habitat.
- Will not induce significant change in ambient air, soil, or water quality.
    - Activities are designed to protect air, soil, and water quality through careful project planning, use of appropriate Best Management Practices, and establishment of Special Management Zones around sensitive land and water features requiring special consideration.
- Will not conflict with established plans or policies of other state or federal agencies.
    - Activities will follow established plans or policies of other state and federal agencies, including all relevant U.S. Fish and Wildlife Service rules and regulations.
- Will not induce significant change in public attraction or use.
    - The WMA system is part of a long-term effort to establish permanent access to lands in New York State for the protection and promotion of its fish and wildlife resources. Proposed activities will continue to protect, promote, and maintain public access to WMAs and their wildlife resources.
- Will not significantly deviate from effects of natural processes which formed or maintain an area or result in areas of significantly different character or ecological processes.
    - Activities will be conducted in a manner that maintains, enhances, or mitigates ecological processes and/or natural disturbances as appropriate for each WMA and habitat type. Some activities, such as even-aged forest management, intentionally result in areas of different character and ecological processes; however, they are not considered significant because they are ephemeral or transitional and will not permanently alter the landscape.
- Will not affect important known historical or archeological sites.
    - Activities that may result in ground disturbance are reviewed by DEC's State Historic Preservation Officer (SHPO) and/or the NYS Office of Parks, Recreation and Historic Preservation (OPRHP) to identify potential impacts to historical or archeological sites. Sensitive sites will be protected under the direction of DEC's SHPO and the OPRHP Archaeology Unit.
- Will not stimulate significant public controversy.
    - It is not anticipated that activities on WMAs will stimulate significant public controversy. A public comment period was held during development of both the PEIS and the SFEIS; no relevant comments in opposition of proposed management activities were received during the SFEIS public comment period. Staff also hold a public information session after completing each HMP, consider feedback from these sessions, and may adjust management as deemed appropriate. Kiosks, signs, webpages, articles, demonstration areas, and other outreach materials also raise awareness about habitat management activities.

[12] Available online at http://www.dec.ny.gov/regulations/28693.html.
[13] Available online at http://www.dec.ny.gov/enb/enb.html.

APPENDIX C: FOREST MANAGEMENT PRESCRIPTIONS

PRESCRIPTION FOR WILDLIFE MANAGEMENT AREA TIMBER HARVEST

Region: **Wildlife Management Area:** **Stand number:** **Stand acreage:**

Species composition:

Basal area: **Trees per acre:** **Mean stand diameter:**

Stand inventory or analysis date:

Regeneration data:

Natural Heritage Element Occurrence layer review:

SMZ layer review:

Retention data:

Soil types and drainage:

Interfering vegetation:

Acres to be treated: **Target basal area:**

Technical guidance/stocking guide:

Treatment purpose:

Management Objective: Even aged or Uneven Aged

-If even aged, specify treatment (i.e. shelterwood, seed tree, clearcut)

Clearcut acreage and configuration: (if applicable)

Natural Heritage /MHDB considerations and mitigation: (if applicable)

Retention considerations and adjustments:

Treatment descriptions:

Name and Title of Preparer:

Central Office Lands and Forests Staff **Date**

Regional Wildlife Manager **Date**

PRESCRIPTION NOTES

Species Composition: At a minimum, the three most common species found in the overstory should be included, assuming at least three species comprise the stand. Species that individually constitute less than 5% of the stand may be lumped together as "Other" or "Miscellaneous." For instance, if beech, hemlock and yellow birch each make up 3% of the stand, they may be lumped together as "Other – 9%."

Natural Heritage Element Occurrence layer review: List those species that the Natural Heritage Element Occurrence (EO) data layer indicates are or were known to be present in the stand, or could be affected by treatments to the stand. For instance, if a rare fish was indicated in a water body that is a short distance downstream of a creek that flows through the stand, it should be listed in the prescription.

SMZ layer review: The SMZ data layer includes Special Management Zones around all streams and wetlands, as well as vernal pools, spring seeps and recreation areas that staff have mapped and digitized. If any of these features are mapped incorrectly or are missing from current data layers, staff can correct their locations by editing their office layers.

Retention data: Include numbers of existing snags, cavity trees, Coarse Woody Material, Fine Woody Material, and legacy trees. Ocular estimates are acceptable.

Soil types and drainage: Specifically named soil types are useful, but not necessarily required. "Flat, sandy, well-drained hilltop" or "Steep, gravelly, moderately well-drained mid-slope" may be just as useful as "Hershiser-Koufax Sandy Silt Loam" in describing the soil conditions as they relate to management decisions. The important point is to note those characteristics that may limit equipment operation or establishment of regeneration. Soil type data is available for some counties on the Data Selector.

Interfering vegetation: Indicate the existing amount of interfering vegetation such as beech, striped maple, fern, etc. This may be quantified using mil-acre plots or by ocular estimate.

Technical guidance used: This may include stocking guides, articles found in technical journals, textbooks or other silviculture-related publications. Other sources of guidance may be acceptable as well.

Treatment purpose: As used here, "treatment purpose" and "management objective" (see below) are two different things. Also, "treatment purpose" is not what is to be done (i.e., "reduce basal area by 25%" or "remove every third row"), but rather is an explanation of why it is being done (i.e., "stimulate regeneration and increase growth of residual stand" or "regenerate current stand and convert to young forest").

Management objective: As used here, the term "management objective" is somewhat general. At a minimum, the prescription should indicate the desired future age structure and stand type. An entry as general as "Even aged hardwood" is acceptable, but regional staff may be more specific if they so choose. The management objective for a stand may be specified in the Habitat Management Plan (HMP) for the Wildlife Management Area in question. If the existing HMP does not specify the management objective regional staff should choose the management objective when the prescription is written.

Clearcut acreage and configuration: If the harvest involves one single clearcut, indicate the total contiguous area, in acres. If the harvest comprises more than one clearcut, indicate the total combined area of clearcuts, as well as the area of the largest clearcut.

Natural Heritage/MHDB considerations: Indicate what measures will be taken to protect those elements or features that were found in the review of the Natural Heritage Element Occurrence and Special Management Zone (not applicable yet) layers.

Retention considerations: Indicate whether or not existing levels meet the standards set forth in the Division's policy on Retention on State Forests, or whether they are expected to do so as a result of the proposed treatment. Also indicate if or how the treatment was adjusted in order to improve compliance with the policy standards.

Treatment description: The intended treatment should be clearly described. The amount of information necessary to accomplish this will vary greatly. For instance, in a row thinning of a pole timber sized plantation that had no SMZs or other special features, it may be sufficient to simply indicate "Remove two out of every six rows, taking two adjacent rows and leaving four rows between successive pairs being removed." An intermediate thinning in a sawtimber sized hardwood stand with a recreational trail, two streams and a known occurrence of an endangered plant community would require significantly more detail. One rule of thumb that could be used is to describe the treatment so that a qualified forestry professional could use it to assist in marking the harvest.

Additionally, since we are focused on creating young forests you should also address the presence/absence of advanced regeneration. If you are planning on clearcutting without advanced regeneration, address how you are going to mitigate that. For example, "This aspen stand will be clearcut and it is anticipated that future regeneration will be established through aspen root sprouting". Or, "This stand will be clearcut and replanted with Norway spruce to establish conifer cover."

Furthermore, if you are planning on conducting a shelterwood or seed tree cut, please indicate when you are planning on returning to the stand to conduct the final harvest (overstory removal).

APPENDIX D: AMENDMENTS

Any substantive changes to the habitat management described in this plan will be amended to the plan annually or as needed. Such changes may include: land acquisition, unforeseen natural disturbance, or any other change that alters the need for or the scope, method, or timing of management.