

Final Amendment to the  
Natural Resource Damage Assessment Restoration Plan  
for the Crab Orchard Wildlife Refuge

Crab Orchard National Wildlife Refuge

Marion, Illinois

November 2023

United States Department of the Interior

Fish and Wildlife Service

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## 1.0 Introduction

This Final Restoration Plan Amendment (“Amendment”) describes potential changes to restoration actions approved in the Final Natural Resource Damage Assessment Restoration Plan for Crab Orchard National Wildlife Refuge (USFWS 1997) (“1997 Plan”). This Amendment to the 1997 Plan is being proposed by the U.S. Fish and Wildlife Service (USFWS), acting in its capacity as a natural resource trustee (the “Trustee”) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§ 9601-9628 (as amended). This amendment is part of the CERCLA natural resource damage assessment and restoration (NRDAR) process undertaken at the Crab Orchard National Wildlife Refuge (“refuge” or “Crab Orchard NWR”) for the PCBs operable unit. As a reminder, restoration of resources injured, and services lost due to the release of hazardous substances is the goal of the NRDAR process. At this time there remains approximately \$718,000 in recovered Restoration Funds from a settlement resolving potential natural resource damages liability with Schlumberger Industries, Inc. The Trustee is proposing to spend the remaining funds on two restoration alternatives: reforestation and grassland/savanna/woodland restoration. These two alternatives were selected as part of the 1997 Plan; however, the Trustee is proposing additional locations and updated techniques as part of this Amendment.

The background, need for restoration, and other NRDAR information can be found in the 1997 Plan and are incorporated herein by reference. The 1997 Plan selected the restoration alternatives of: reforestation; shoreline and riparian restoration; grassland restoration; public education/outreach program; and land acquisition. These activities were chosen to provide benefits to aquatic and wildlife species to compensate the public for loss of natural resources and the services they provide. In addition, the Crab Orchard National Wildlife Refuge has management plans (i.e., Comprehensive Conservation Plan and Draft Habitat Management Plan) that complement the 1997 Plan and this Amendment.

To date, the Trustee has expended approximately \$2 Million of recovered Restoration Funds to achieve restoration described in the 1997 Plan. This Amendment to the 1997 Plan summarizes the restoration achieved to date, future targets for reforestation and grassland restoration, and identifies additional acres that are available for restoration. The refuge anticipates completing all restoration activities in the next five years, although weather and staffing issues could affect this timing.

The Trustee selected two alternatives in this Amendment: Alternative B (Reforestation) and Alternative C (Grassland/Savannah/Woodland Restoration). This document describes the evaluation process for this decision, details where these restoration actions would occur, and the estimated cost for each alternative.

### 1.1 Public Participation

Public participation is an important step in the NRDAR process. The Trustee has prepared this Amendment to provide the public with updated information on the status of the restoration and to communicate with the public on proposed changes. Public review of the Draft Amendment is

consistent with applicable federal laws and regulations, including CERCLA and the guidance for restoration planning found within 43 C.F.R. Part 11.

The Draft Amendment was available for public comment and review for 30 days from the date of publication (September 11, 2023) at [https://www.fws.gov/refuge/crab\\_orchard/](https://www.fws.gov/refuge/crab_orchard/). No comments were received from the public. The Illinois Department of Natural Resources (IL DNR) and the Illinois Environmental Protection Agency (Illinois EPA) provided comments and support for the Amendment (See Appendix B) and the Trustee's responses can be found in Appendix C. The Trustee may amend the Final Amendment if significant changes are made to the type, scope, or impact of the projects. In the event of a significant modification to the Final Amendment, the Trustee will provide the public with an opportunity to comment on that particular amendment.

## 1.2 Organization of the Amendment to the 1997 Plan

Chapter 2.0 provides a brief summary of the 1997 Plan and Chapter 3.0 provides a summary of prior restoration actions undertaken by the Trustee pursuant to the 1997 Plan. Chapter 4.0 describes the proposed restoration alternatives the Trustee identified and evaluated to return the resources injured and services lost to their pre-release condition and to compensate for the losses pending restoration. Section 4.3 includes a summary of the criteria with which the Trustee evaluates restoration alternatives (43 C.F.R. § 11.82(d) and § 11.93). Section 4.4 describes compliance with the National Environmental Policy Act (NEPA). Section 4.5 presents a conclusion of the Trustee's evaluation, including the selected alternatives.

## 2.0 1997 Plan Summary

In 1994, the Crab Orchard National Wildlife Refuge hosted a public scoping meeting to receive input and ideas from the public on various restoration alternatives that would be considered during the preparation of the Restoration Plan. The Trustee prepared a Draft Environmental Assessment and Natural Resource Damage Assessment Restoration Plan for the Crab Orchard National Wildlife Refuge in 1997. The Trustee accepted public comments on the Draft Plan for 30 days and hosted a public meeting on June 30, 1997. The Final Environmental Assessment and Natural Resource Damage Assessment and Restoration Plan was issued in July 1997. The selected alternatives included: Reforestation, Grassland Restoration, Shoreline and Riparian Restoration, Public Education/Outreach Program, and Land Acquisition.

### 2.1 Reforestation Restoration

The Reforestation Alternative included planting of native hardwood seedlings, primarily oaks and hickories, on up to 1,520 acres of refuge land to provide larger tracts of contiguous forested land, particularly for neotropical migrant songbirds. This restoration activity included preparation of the soil for planting, actual planting, planting equipment, tree shelters, tree mats, maintenance of the planted area, prescribed burns, and herbicide use. The goal of reforestation was to accelerate ongoing reforestation efforts by the refuge under existing refuge management plans. At the time of the 1997 Plan, existing refuge management plans identified 500 acres of cropland and pasture for reforestation, the

conversion of 3,000 acres of pine plantations to forest, and 8,500 acres of shrub brush (primarily autumn olive) to reforest naturally.

## 2.2 Grassland Restoration

This restoration activity included the enhancement of 550 acres of existing refuge pasture and grazing land. Enhancement activities included site preparation, prescribed burning, purchase and planting of native prairie and savanna grass and forb seeds and seedlings, equipment, labor, and, if necessary, herbicide use to treat invasive species in order to improve the likelihood of success of the plantings. At the time, the existing refuge management plans identified 300 acres of pasture or grazing land for grassland restoration, thus this restoration would allow the refuge to improve 250 additional acres of grassland habitat. The 1997 Plan estimated that grassland restoration of 550 acres would cost \$110,000.

## 2.3 Shoreline and Riparian Restoration

A severe erosion problem existed along the shoreline of Crab Orchard Lake and adjoining streams, and to a lesser extent along Little Grassy and Devil's Kitchen Lakes. This restoration activity was to include the stabilization and restoration of approximately four miles of lake shoreline and riparian streambank on the refuge, with the exact locations and methods to be identified through additional assessment of the watershed. The 1997 Plan estimated that four miles of streambank and lake shoreline could be restored for an estimated cost of \$640,000.

## 2.4 Public Education/Outreach Program

This restoration activity included various public education and outreach efforts associated with restoration, such as exhibits, brochures, slide presentations, nature trails and outdoor amphitheater, advertising, and organizing a volunteer/stewardship program to assist with the habitat restoration projects. The 1997 Plan estimated that the Public Education/Outreach Program would cost \$210,000.

## 2.5 Land Acquisition

This restoration activity included the acquisition and/or enhancement of approximately 200 acres of land either adjacent to the refuge or lands identified as privately owned inholdings. The acquired land would be managed according to existing refuge management plans and benefit natural resources, especially migratory birds by providing additional supporting habitat for their migratory/overwintering needs. The 1997 Plan estimated the costs for land acquisition to be \$780,000.

### 3.0 Summary of Natural Resource Restoration Efforts at Crab Orchard National Wildlife Refuge (1997-Present)

As mentioned earlier, the Trustee selected five restoration alternatives in the 1997 Plan: reforestation; shoreline and riparian restoration; grassland restoration; public education/outreach program; and land acquisition. This section summarizes the status of that restoration, describes changes, if any, that were made in implementing the selected alternatives, and funds expended by each restoration alternative. Table 1 below summarizes these efforts and Appendix A expands on the in-kind contributions leveraged for restoration.

*Table 1. Summary of restoration efforts to date at Crab Orchard National Wildlife Refuge.*

	<b>Proposed Acres or Miles</b>	<b>Implemented Acres or Miles</b>	<b>Proposed Cost</b>	<b>Implemented Cost</b>
Reforestation	Up to 1,520 acres	~800	\$760,000	\$722,199
Shoreline and Riparian Restoration	4 miles	3.12 miles	\$640,000	\$512,221
Grassland Restoration/Enhancement	550 acres	606 acres	\$110,000	\$231,380
Public Education/Outreach Program	Not applicable	Not applicable	\$210,000	\$50,000
Land Acquisition	200 acres	322.79	\$780,000	\$622,480

#### 3.1 Reforestation Restoration (1997-Present)

To date, approximately 800 acres have been restored using a mix of techniques ranging from active planting of oak and hickory seedlings, more diverse hardwood plantings, and natural regeneration on several sites. Follow-up treatments and monitoring were conducted on a limited number of sites (See Figure 1: NRDAR Reforestation Sites). Maintenance of the plantings, to ensure a greater likelihood of success, included treatments to reduce invasive species competition: prescribed fire, herbicide, and mowing. The most pervasive invasive species are mature autumn olive trees and multiflora rose infestations. Figure 2 and Figure 3 indicate status of autumn olive and multiflora rose infestations as determined by the USFWS Forest Invasive Adaptive Management (FIAM) Project. The FIAM inventory, partially funded by Restoration Funds, assessed the distribution and level of infestation of over 52 invasive species throughout the forested lands on Crab Orchard National Wildlife Refuge. The data acquired is being used to inform planning efforts and to prioritize and address forest invasive plants across the refuge as well as within and surrounding NRDAR restoration sites. Locations of autumn olive clearing can be viewed in Figure 4.

The refuge and the USFWS Region 3 Fire Program funded prescribed fire work from 2020-present and has achieved burning of almost 5,300 acres in 2023, 5,100 acres in 2022, 3,780 acres in 2021, and 1,875 acres in 2020. Total acres burned per year, from 2013 to 2023, can be viewed in the chart in Figure 5. Restoration Funds were expended to achieve 1,100 acres burned in 2019 and close to 700-1,100 acres per year burned in the period of 2016-2019. Very little burning occurred prior to 2015, when the fire program began dramatically expanding operations. On average, 90% to 95% of the total acreage burned annually occurs within forested habitats. In addition to direct labor costs associated with conducting prescribed fires, fire lines were cleared and prepped throughout the period of 2015-2019 that set the stage for the massive increases in acres burned as depicted in Figure 5. Labor funding for prescribed burns, fire line creation, snag tree removals, etc. utilized approximately \$236,952 of Restoration Funds from 2016-2019. Restoration Funds spent during that time interval will continue to provide benefits to prescribed fire operations and forests on the refuge well into the foreseeable future.

Approximately 14 miles of firelines have been created to allow prescribed burning to occur. Firelines have been expanded to existing roads where feasible to reduce annual mowing and maintenance expenses. This work led to increased acreages of burn units and reduced costs per acre to conduct prescribed fire. Additionally, this action facilitated the use of aerial ignition on some burn units. Snagging of firelines (the felling of dead standing trees that could fall on or across a fireline) has occurred across the 14 miles of firelines and along at least 11 miles of roads utilized as firelines. Two fire technicians were partially funded from Restoration Funds for four years to facilitate much of the fireline preparations and to conduct prescribed fires.

Forests at Crab Orchard NWR are fire dependent communities that depend on regular return intervals to maintain and/or restore their ecological health and diversity. Fire has largely been excluded from the refuge's landscape since the 1800's. The literature is replete with evidence that repeated prescribed burning can restore degraded and invaded forests and it is the cheapest and most cost-effective means for restoration on a per acre basis. Prescribed fire was used at these locations to treat invasive species, and to increase germination and recruitment of native herbaceous, shrub, and hardwood tree species. Fire selects against less desirable softwood species and favors hardwood trees.

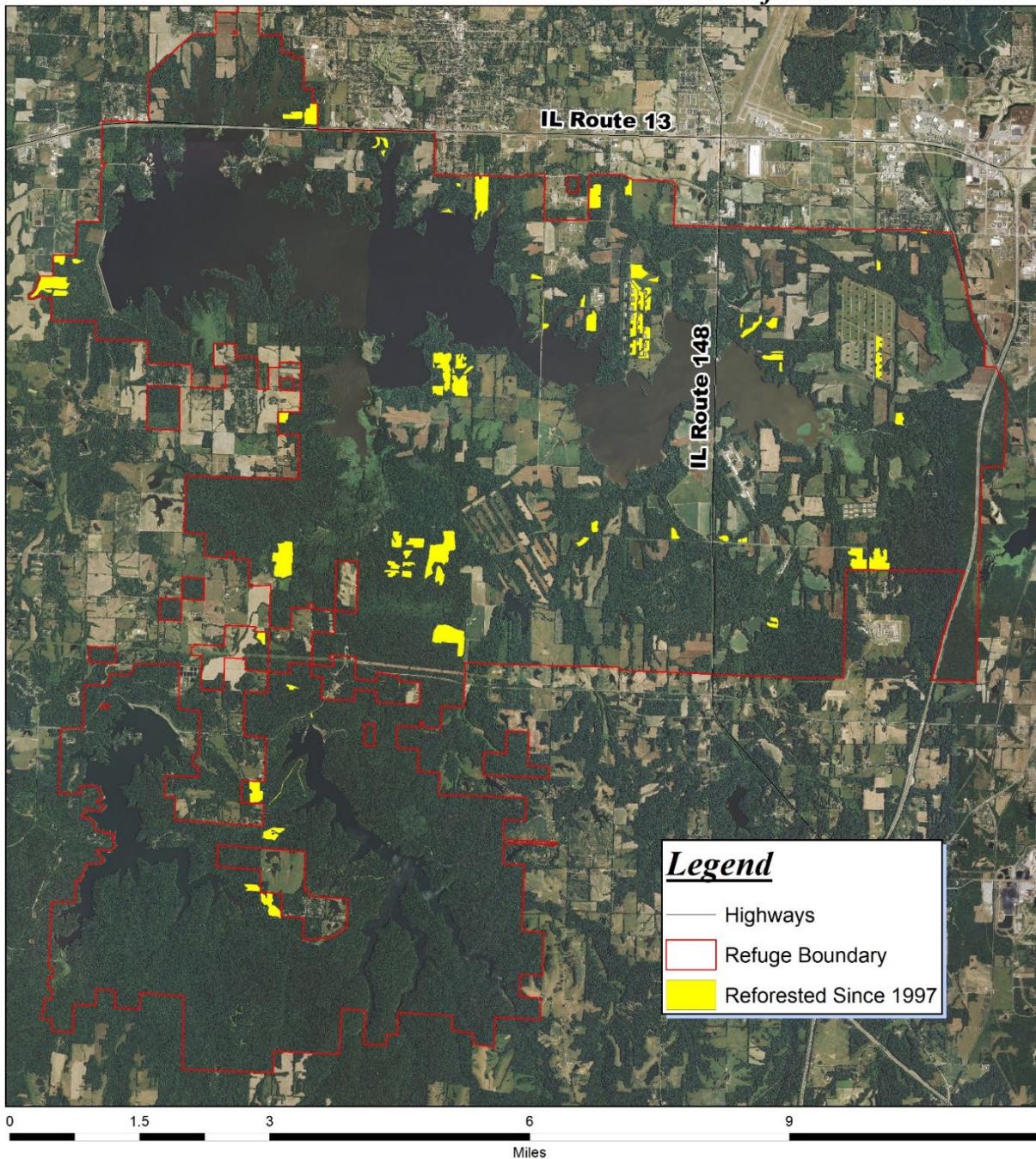


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Crab Orchard National Wildlife Refuge

NRDAR Restoration

799.64 Acres Reforested Since 1997



Produced at Crab Orchard National Wildlife Refuge, Marion, Illinois  
Author: Dan Wood  
Produced: April 18, 2023  
Basemap: 2012 NAIP  
File: CONWR\_Master\_Restoration\_Sites.mxd  
Location: O:\BIO\GIS\NRDAR\2019NRDARReporting

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The purpose of this map is to provide visual reference to key  
features of the Refuge to assist in management decisions.

Figure 1. Locations of Restoration Funded Forest Restoration (1997-Present).



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Crab Orchard National Wildlife Refuge

NRDAR Restoration

Multiflora Rose Distribution Related to Acres Reforested Since 1997

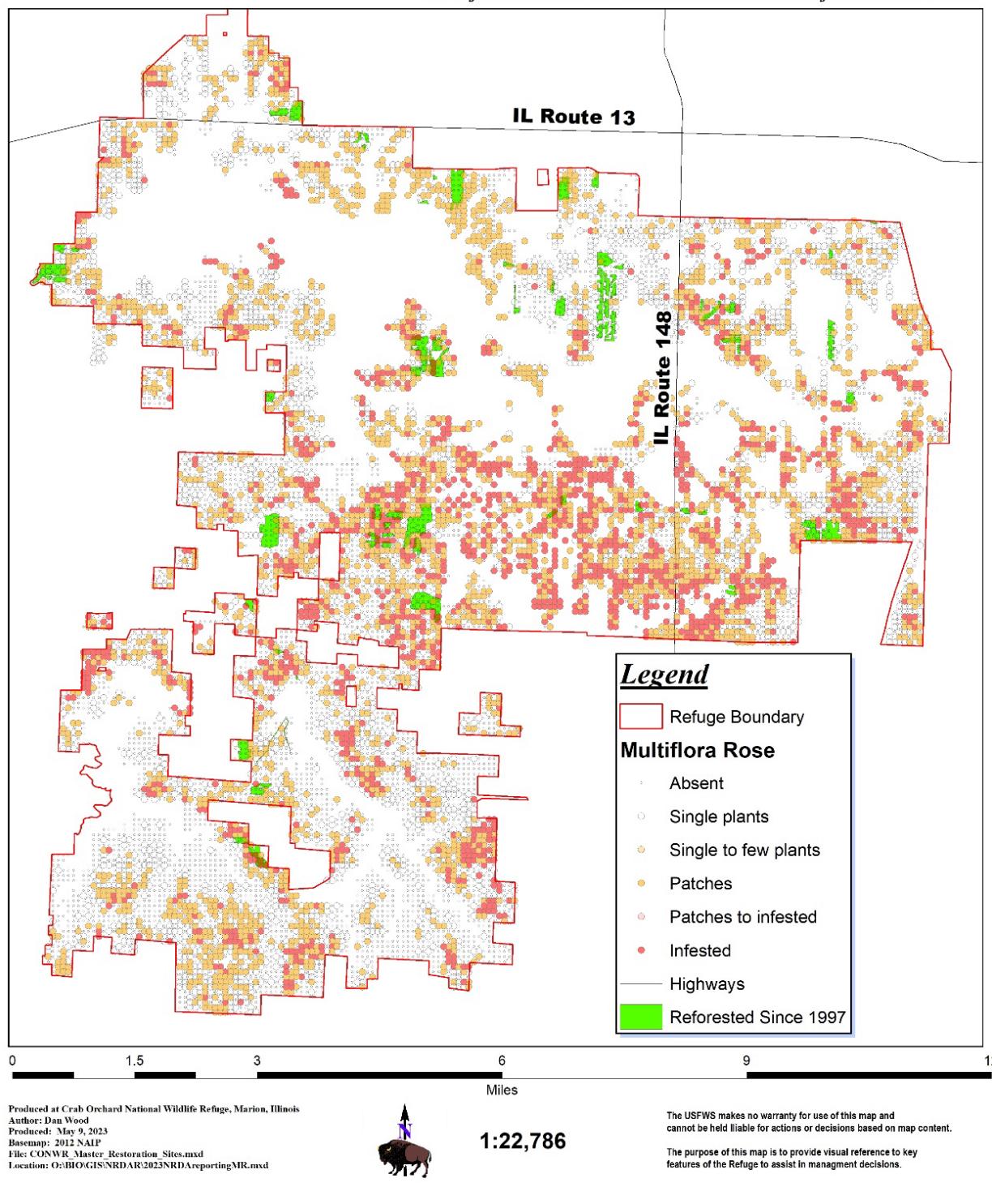


Figure 2. Multiflora Rose Distributions in Relation to Reforestations.

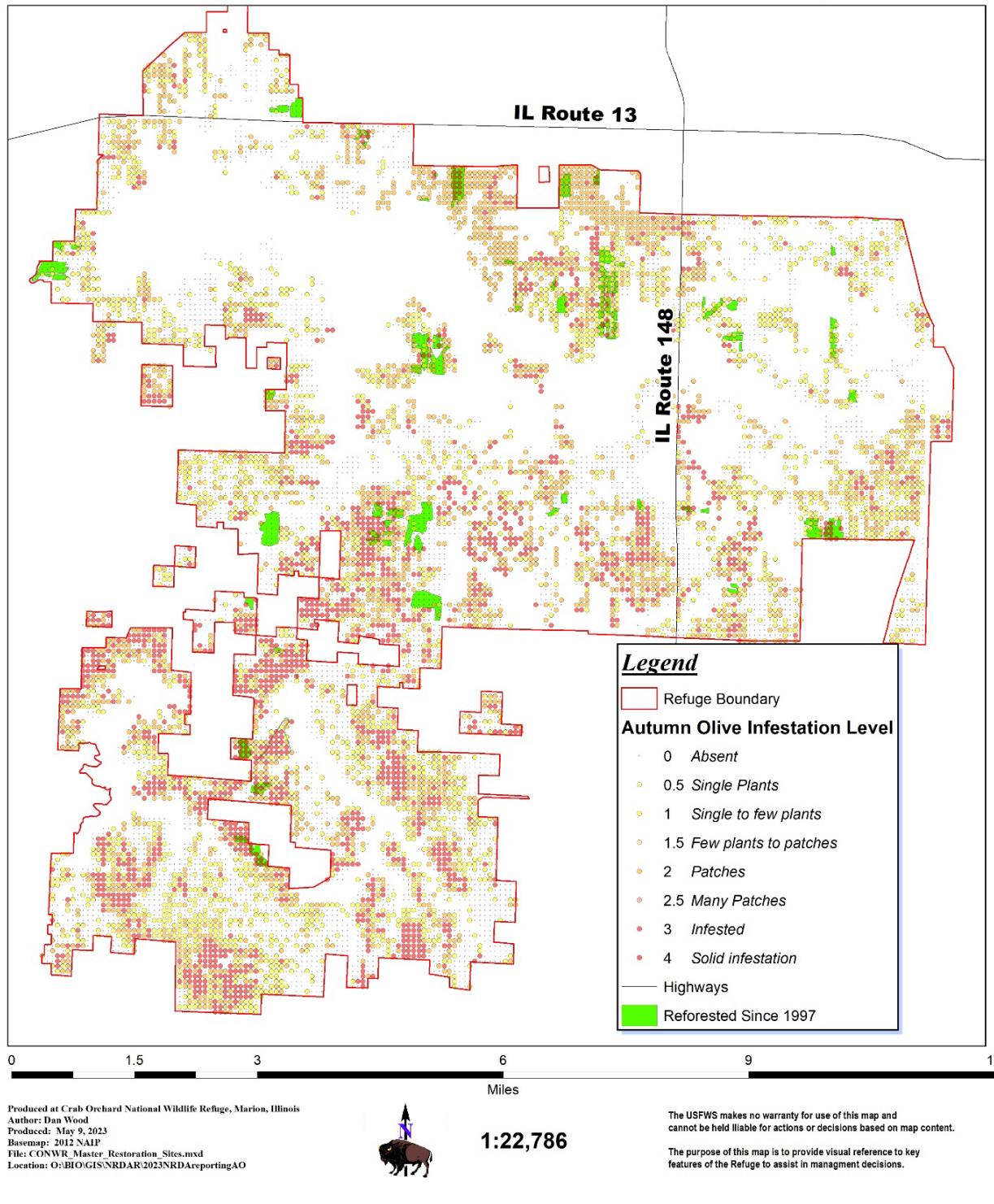


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Crab Orchard National Wildlife Refuge

NRDAR Restoration

*Autumn Olive Distribution Related to Acres Reforested Since 1997*



*Figure 3. Autumn Olive Distributions in Relation to Restorations.*



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## NRDAR Autumn Olive Removal and Spraying

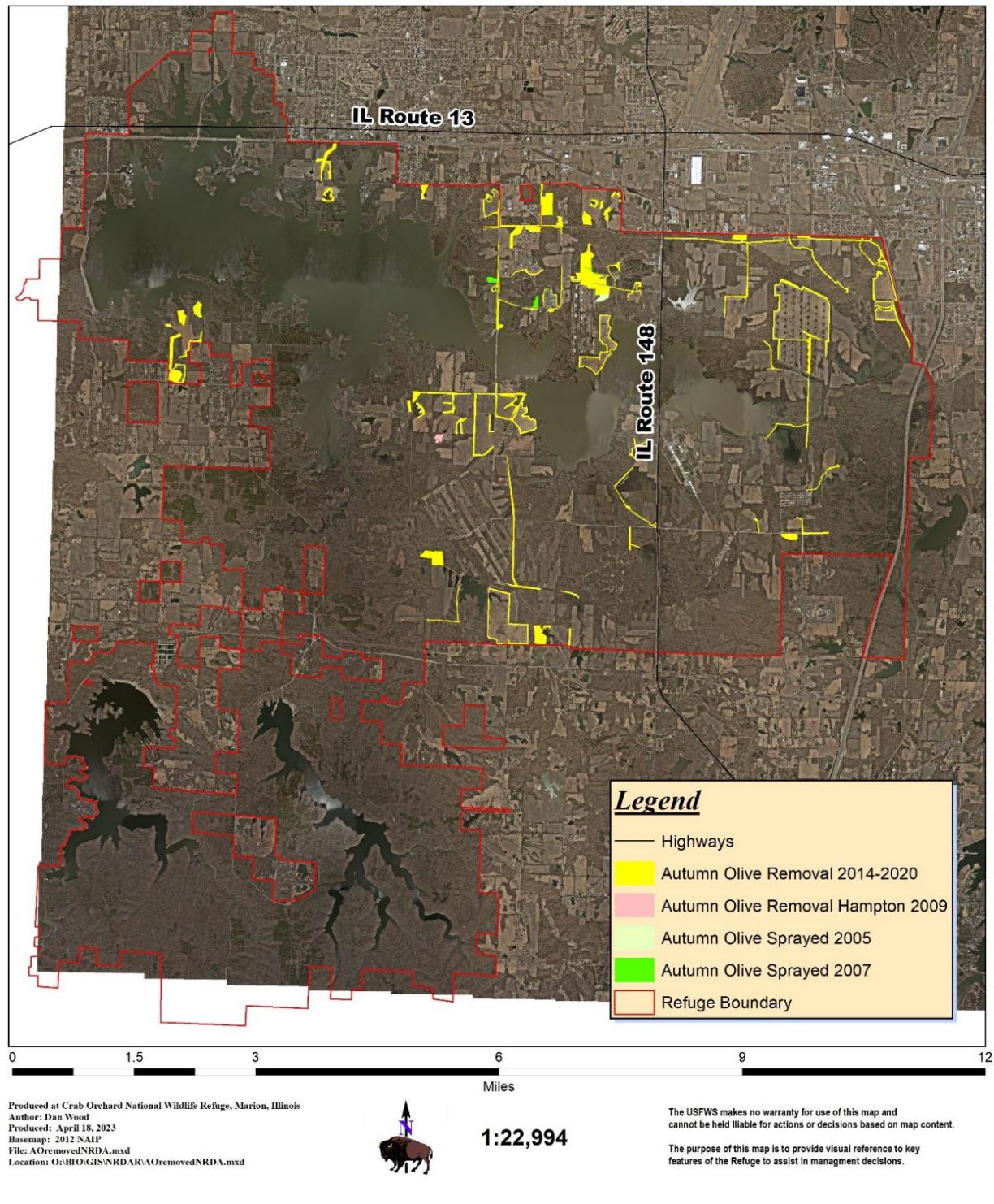


Figure 4. Areas cleared of Autumn Olive (approximately 700 acres).

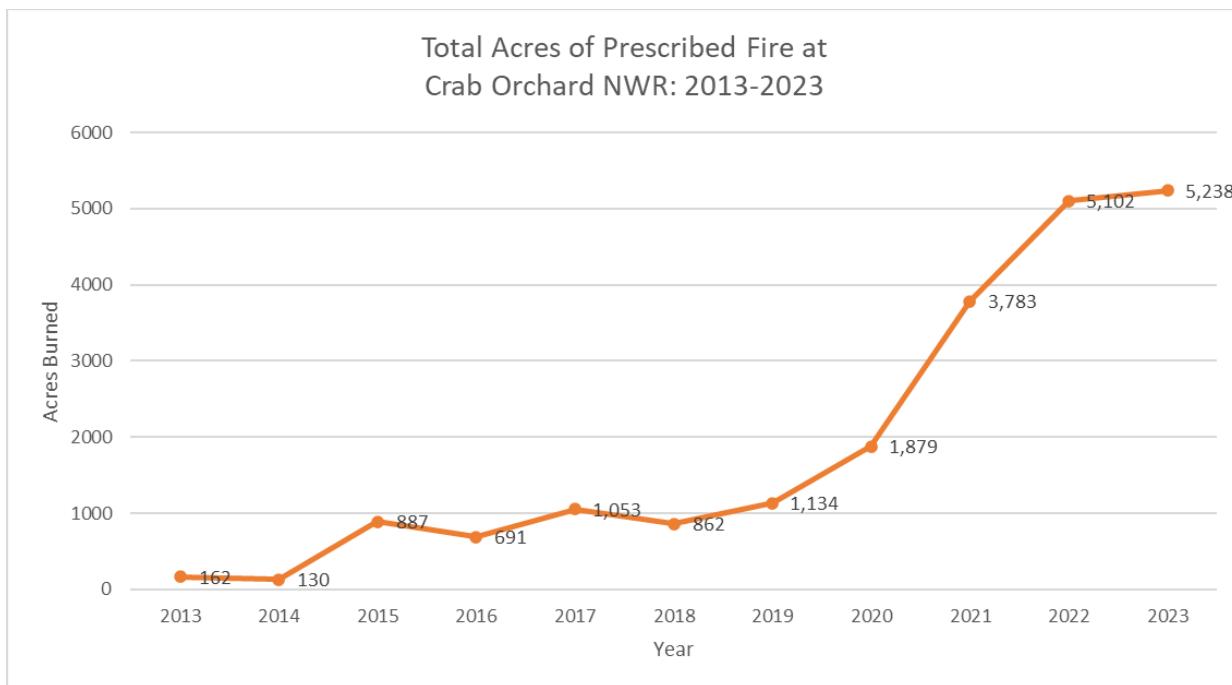


Figure 5. Graph showing total acres of prescribed fire from 2013 to 2023.

### 3.2 Grassland Restoration (1997-Present)

The Trustee successfully completed this restoration action. Grassland restoration was undertaken at several locations on the refuge for a total of 605 acres, although some locations were outside of the original 550 acres identified as a result of technical feasibility issues related to the presence of unexploded ordinance (UXO). Actions included broadcast seeding, drilling seeds, planting plugs, herbicide, mechanical treatments of invasive species, mowing of autumn olive, mowing woody vegetation, tree line removals via chainsaw, and repetitive prescribed burning. One restoration location, Bass Ponds Prairie, required a helicopter to apply herbicide to thin invasive phragmites and willows. The 76-acre Hampton Prairie Restoration has produced a beautiful, diverse, native prairie (See photos in Figure 6) that was completed by 2017. Natural Resource Conservation Service biologists indicate that it is the best example of a native prairie in the Southern half of Illinois. Locations and size of the restorations are summarized in Table 2 below and shown as native grassland restorations in Figure 7.

Table 2. Acres of Grassland, Savanna, or Woodland Restoration Completed to Date.

<b>Location Description</b>	<b>Acres of Restoration</b>
North Prairie	120
Bass Ponds Prairie	110
Portion of Unit 6 Grazing Unit (Barringer Unit)	36
Hay Unit 3 (Sizemore Restoration)	37
Hampton Prairie	76
Headquarter Prairie	12
A portion of Hay Unit 6	42
A portion of Hay Unit 7	28
Hay Unit 5 (Eastern gamma grass unit)	20
Pigeon Creek Savanna (See green areas in Figure 6)	20
Former Hay Units A-33	60
A-23	23
A-49	21
<b>TOTAL</b>	<b>605</b>



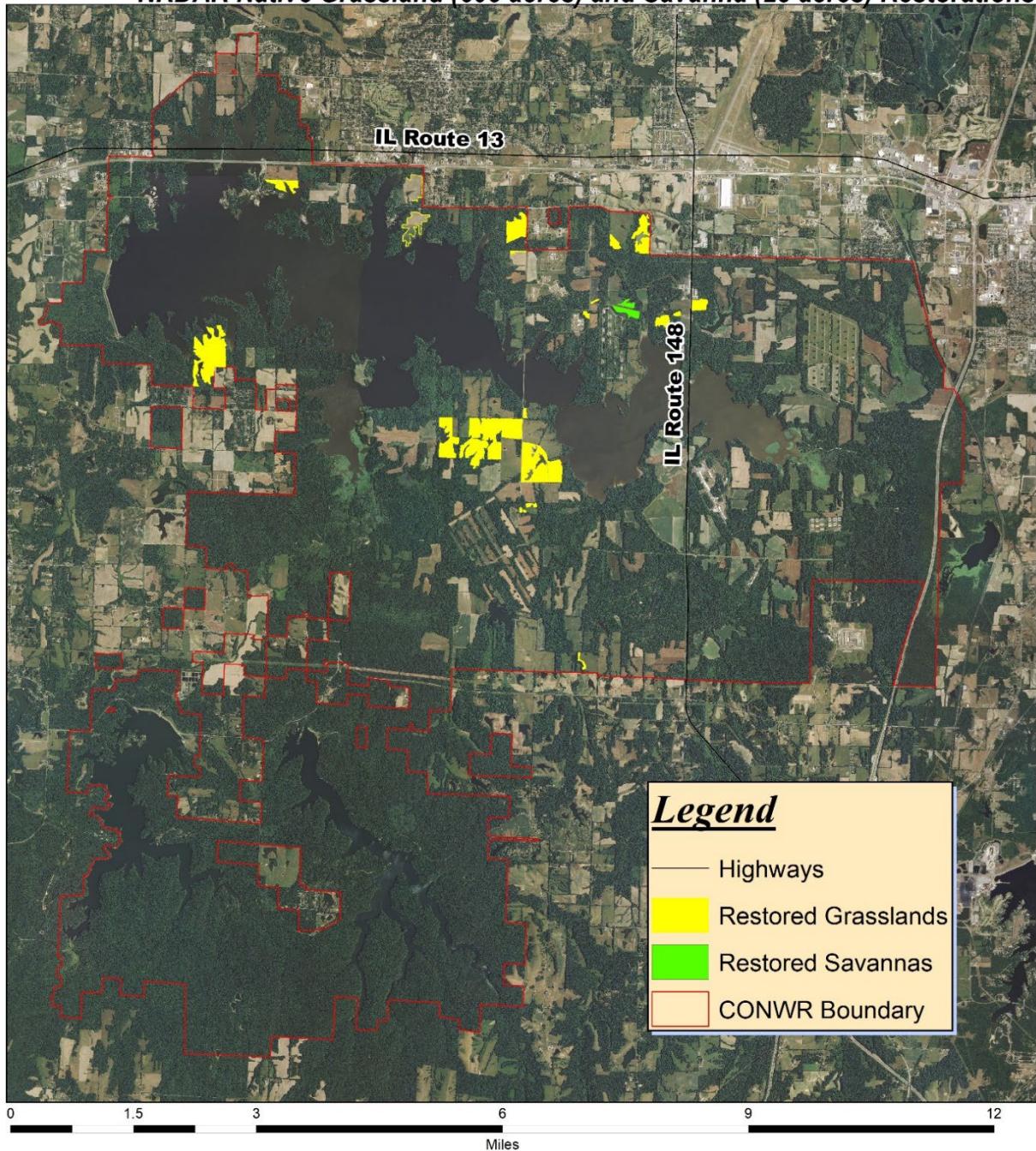
Figure 6. Photos from Hampton Prairie Restoration in 2016.



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### NRDAR Native Grassland (605 acres) and Savanna (23 acres) Restorations



Produced at Crab Orchard National Wildlife Refuge, Marion, Illinois  
Author: Dan Wood  
Produced: April 18, 2023  
Base map: 2014 NRCS Geodata 6-inch  
File: RestoredGrassSavanna.mxd  
Location: O:\BIO\GIS\NRDAR\Grassland Restoration\RestoredGrassSavanna.mxd



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The purpose of this map is to provide visual reference to key  
features of the Refuge to assist in management decisions.

Figure 7. Location of NRDAR Grassland and Savanna Restorations (1997-Present).

### 3.3 Shoreline and Riparian Restoration (1997-Present)

From 1999 to 2001, approximately 1.25 miles of shoreline restoration occurred with approximately 7,540 tons of rock and rock revetment placed along shorelines. Additional shoreline restoration was achieved between September 2014 and January 2018 when a total of 11,319 tons of rock and rock revetment were placed on approximately 9,908 linear feet of shoreline (See Table 3 for a summary; Figure 8 for locations).

*Table 3. Shoreline Restoration Summary Data.*

Date (mo./yr.)	Riprap, bedding, gravel (tons)	Location	Amount (\$)
9/99-7/01	7,540	Wolf Creek	\$200,971.00
9/14	1200	Haven	\$86,357.00
11/14	1400	Haven	\$26,180.00
11/14	960	Haven	\$18,600.00
6/15	850	Prairie Creek Recreation Area	\$15,625.00
5/16	1340	Crab Orchard Campground	\$24,928.00
5/16	655	Crab Orchard Campground	\$24,182.25
5/16	950	Haven	\$19,980.00
5/16	280	Haven	\$9,737.00
5/16	584	Bogard Point / CO Lagoon	\$13,712.50
7/17	180	Bogard Point	\$5,525.00
1/18	970	Prairie Creek	\$19,303.00
1/18	750	Prairie Creek	\$14,925.00
1/18	400	Crab Orchard Campground	\$7,520.00
1/18	620	Crab Orchard Campground	\$15,686.00
	18,859	TOTAL*	\$503,231.75

\*Note: Additional labor costs totaled \$9,288 bringing the grand total to \$512,520.75.



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NRDAR Restoration

### Shoreline Revetment Projects

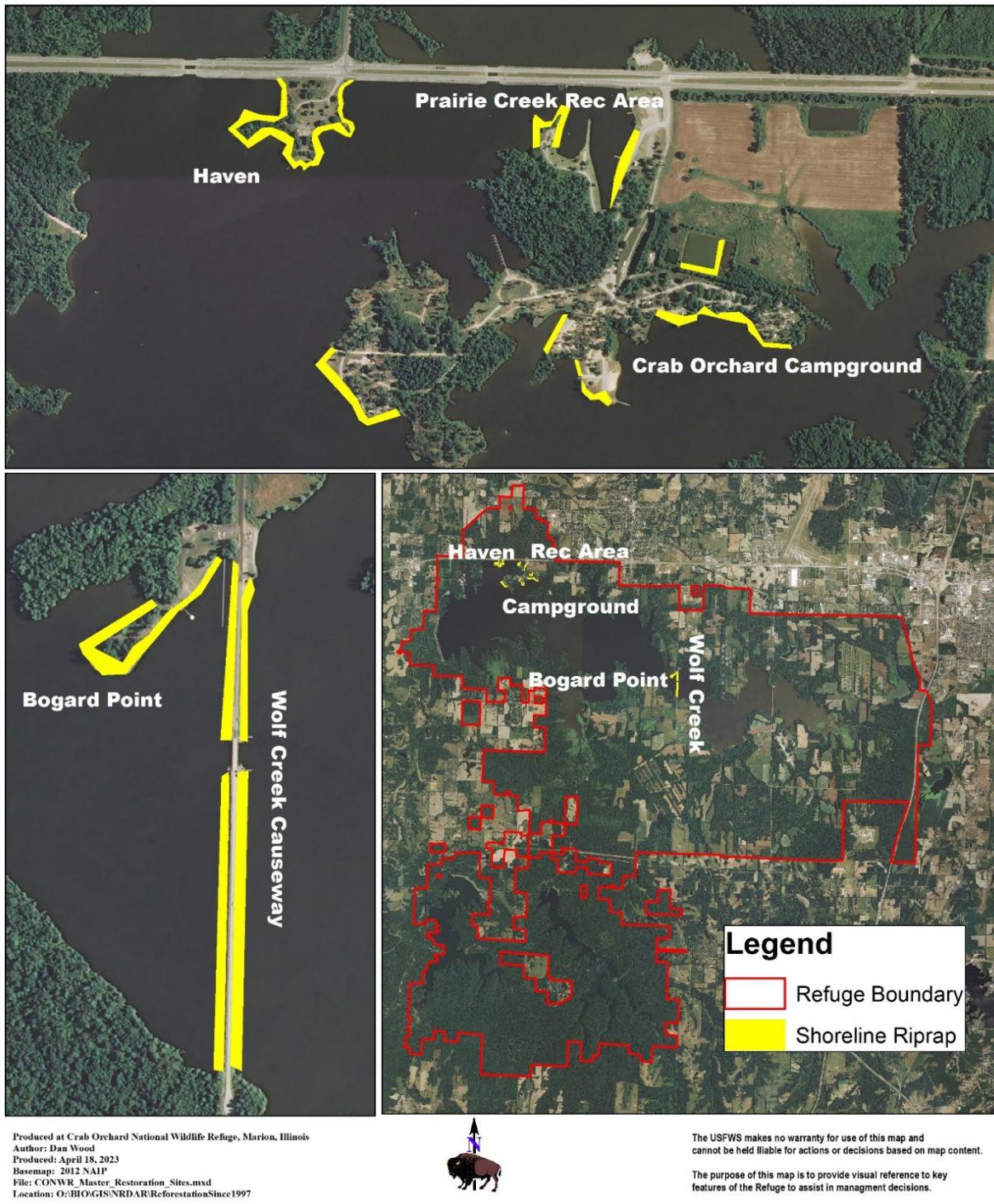


Figure 8. Locations of Restoration Funded Shoreline Restoration.

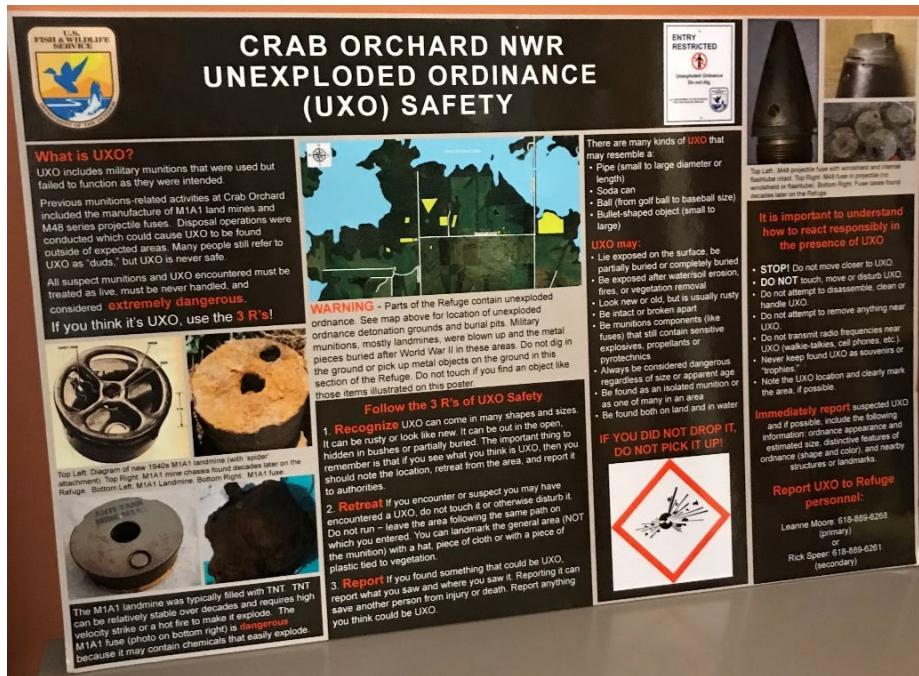
### 3.4 Public Education/Outreach Program Actions (1997-Present)

In 2003, approximately \$50,000 of Restoration Funds were spent to provide exhibits within the refuge's Visitor Center. These exhibits explain the historical land use on the refuge especially those during World War II and the munitions produced at the Crab Orchard Ordnance Plant. A photo of one of the exhibits is included in Figure 9 below.



*Figure 9. Photo of Restoration Funded exhibit at Crab Orchard NWR Visitor's Center.*

Additionally, the refuge, out of its own station funding, has developed two kiosks intended for public education and outreach that includes signage, photos, and maps describing the history and impacts of previous land uses and UXO near the Hampton COC sector. These temporary kiosks are placed at public access points when the area is opened for seasonal recreational use and stored when not in use. Various brochures, pamphlets, signs, and maps were developed and included that relay the dangers associated with contamination on the refuge. The temporary kiosks can be seen in Figure 10 below. In total, approximately \$50,000 of Restoration Funds have been expended on outreach and education.



*Figure 10. Photos of refuge funded temporary kiosks and signs.*

### 3.5 Land Acquisition (1997-Present)

The Trustee successfully completed this restoration activity. Between 1999 and 2011 the refuge acquired six tracts of property totaling 322.79 acres. A summary is provided in Table 4 and property locations are in Figure 11 and Figure 12. These properties were either inholdings or adjacent to the refuge boundary.

*Table 4. Details for 322.79 acres of Williamson County land acquired with \$622,480 of Restoration Funds.*

<b>Year</b>	<b>Tract Number</b>	<b>Acres</b>	<b>Sale Price</b>
1999	1723	216.40	\$390,416
2001	1724	11.36	\$12,364
2007	1725	20.90	\$50,100
2011	1726	74.13	\$169,600

Land acquisition generally includes additional costs beyond the purchase price and closing costs. Additional costs were incurred for each of the aforementioned acquired tracts for appraisals, surveys, and other real estate costs and were paid out of refuge funds.

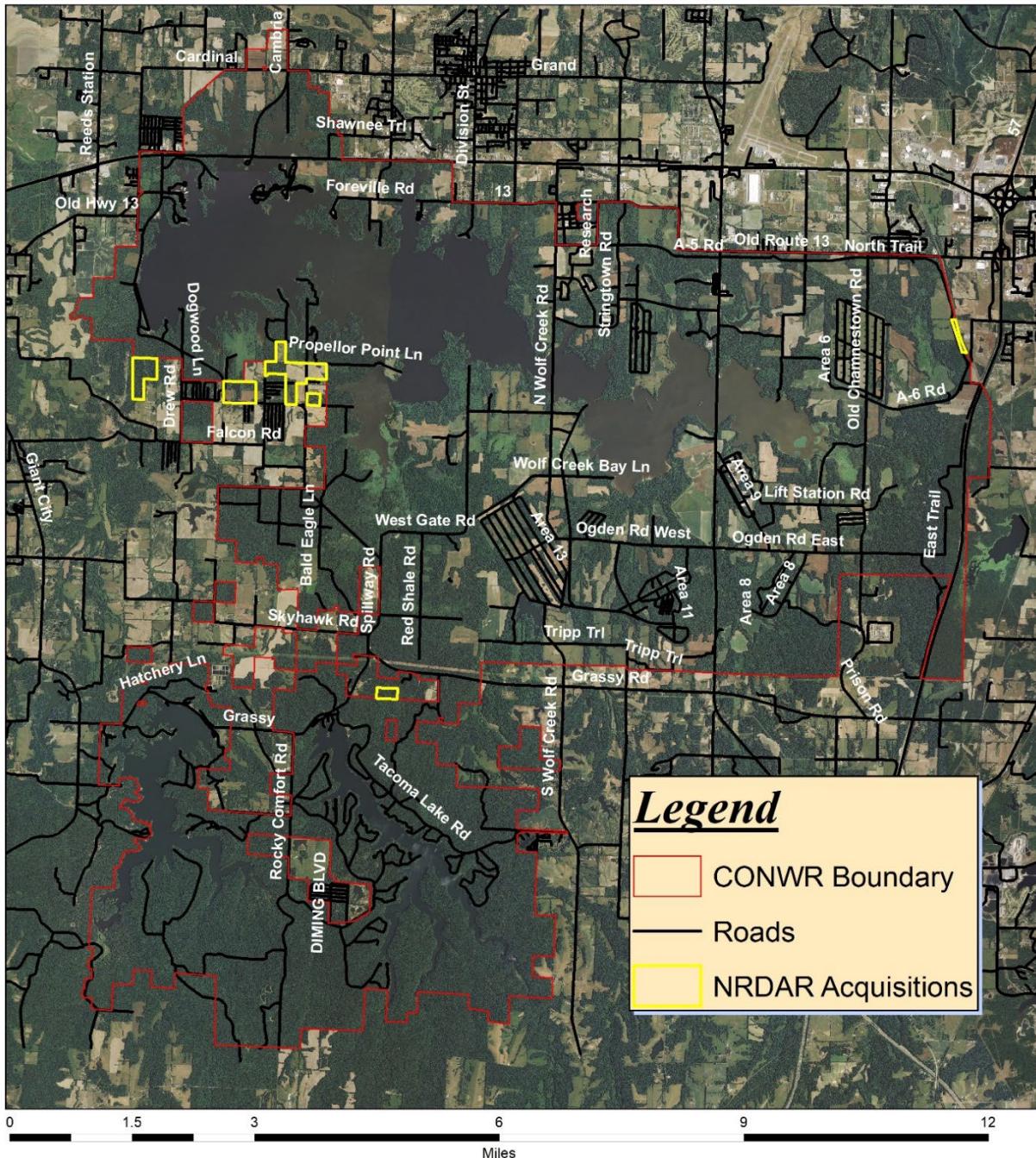


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Crab Orchard National Wildlife Refuge

NRDAR Realty

## Overview of NRDAR Land Acquisitions



Produced at Crab Orchard National Wildlife Refuge, Marion, Illinois  
Author: Dan Wood  
Produced: April 19, 2023  
Basemap: 2012 NAIP  
File: 2019NRDA\_Realty.mxd  
Location: O:\BIO\GIS\NRDAR\2019NRDA\_Realty.mxd

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Figure 11. Overview map of land acquisitions.

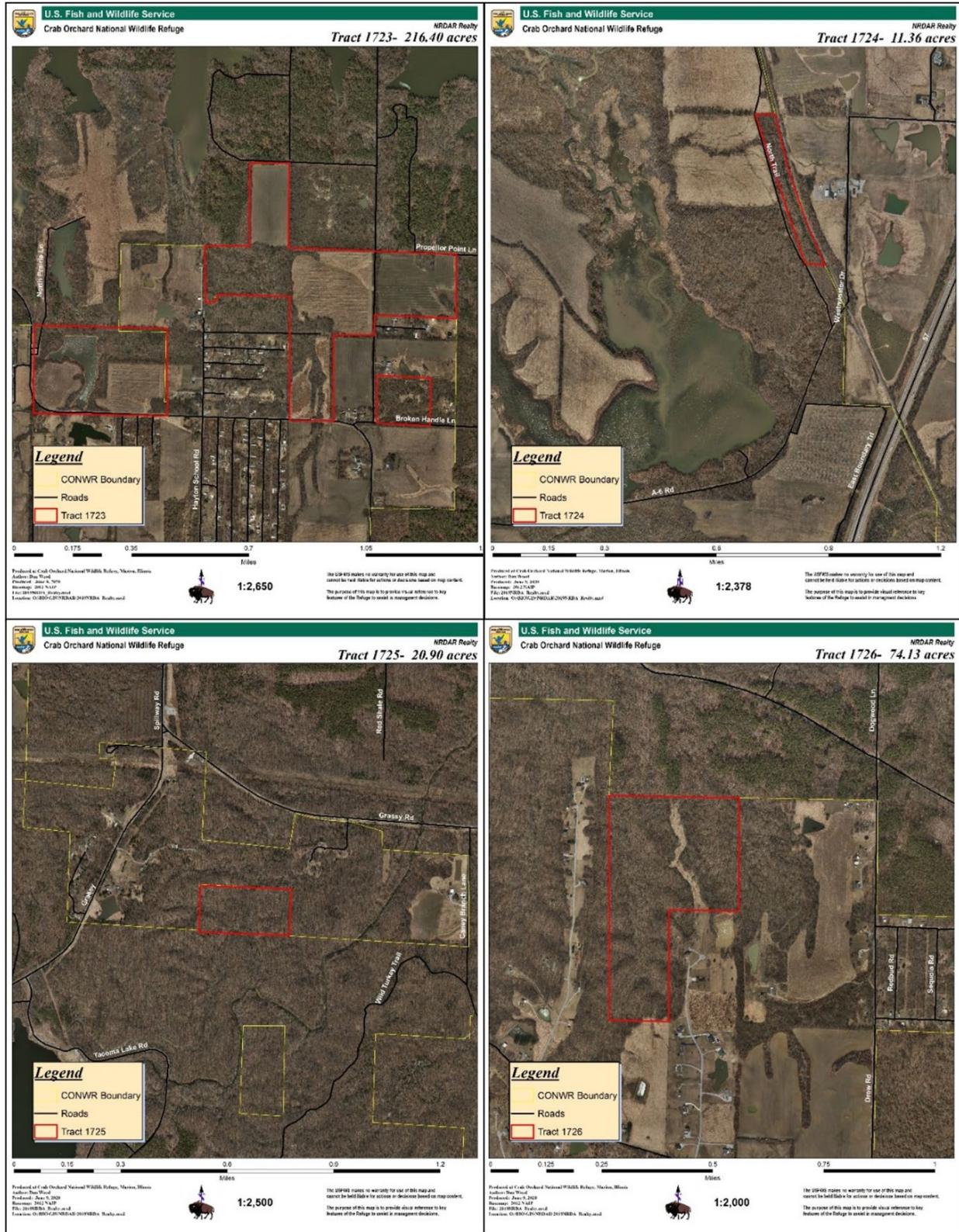


Figure 12. Zoomed in maps of land acquisitions.

## 4.0 Proposed Amendments to the 1997 Plan

The USFWS, as natural resource Trustee, proposed three restoration alternatives to further offset natural resource service losses at the Crab Orchard NWR for the remaining Restoration Funds:

- Alternative A: No Action;
- Alternative B: Reforestation; and
- Alternative C: Grassland/savanna/woodland Restoration.

The reforestation and grassland/savanna/woodland restoration alternatives were selected as part of the 1997 Plan; however, the Trustee proposed additional locations and updated techniques as part of this Amendment.

Each of the alternatives is described further below, including estimated costs for each alternative and evaluation of each alternative against CERCLA NRDAR Factors (Section 4.3; Table 8). For the Restoration Funds remaining, the Trustee is prioritizing alternatives that rehabilitate and restore supporting habitat for the injured resources, migratory birds. Thus, public education and outreach and land acquisition are not evaluated further in this Amendment. Since the 1997 Plan, some technical and feasibility considerations concerning shoreline and riparian restoration arose that caused this technique not to be retained for further analysis.

### 4.1 Restoration Alternatives

#### Alternative A: No Action

Under this Alternative, the Trustee would rely on natural recovery and would take no direct action to restore injured natural resources or compensate for interim lost natural resource services.

Natural resources would take years to go through natural succession and would not result in the desired habitat, especially with invasive species prevalence. The No Action Alternative would not compensate the public for interim ecological and human use losses. Under the No Action Alternative, no habitats would be preserved, restored, or enhanced beyond what the refuge is already doing in with limited existing resources. Upland habitat would continue to be degraded and migratory bird individuals and/or populations would continue to be adversely impacted by degradation of resting, foraging, and nesting habitat.

#### Alternative B: Reforestation (Selected)

This Alternative could continue reforestation activities on shrub brush land invaded by autumn olive, industrial phase-out areas, and former hayfields and pasturelands as described in the 1997 Plan. However, reforestation of pine plantations will not be pursued as the restoration effort for these habitats is too great to undertake within the scope of this plan. Additionally, a limited amount of former row crop fields (less than 120 acres) may be reforested, and larger blocks of forested habitat will be restored. Actions taken to establish hardwood forest include fire line preparation, snagging, physical clearing, especially of fire-retardant species such as Autumn olive, prescribed burning, or the use of herbicides on undesirable vegetation, light grass seeding (2-6 lbs. pure live seed per acre), and tree planting (rpm or bareroot of primarily oak and hickories). The Trustee

defines “undesirable vegetation” to include all invasive species, other undesirable native, and/or remnant agriculture related crops. Many of these activities would be necessary to prepare the land for planting, remove invasive species infestations, to encourage natural recruitment of native oak and hickories, restore the native herbaceous understory, and to manage the areas once trees are planted or regenerated. The proposed actions of Alternative B are included in the Crab Orchard National Wildlife Refuge Comprehensive Conservation Plan/Environmental Impact Statement (CCP/EIS)<sup>1</sup>. All actions would be taken consistent with applicable local, state, and federal laws and policies.

This Alternative includes prescribed fire applied on approximately 5,000 to 10,000 acres of forest per year for five years; this is already within the range achieved in recent years (See Figure 5: Graph showing total acres of prescribed fire from 2013 to 2023). The higher end of the range may be achievable, especially if the use of aerial ignition can be expanded to more priority acres. Forests at Crab Orchard NWR are fire dependent communities that depend on regular return intervals to maintain ecological health and diversity. Ample evidence and guidance, within published scientific literature, exists that indicates not only that repeated prescribed burning, in short succession, for seven to ten years, can restore degraded and invaded forests, but also that it is one of the most cost-effective means for restoration on a per acre basis. Returning the natural and critical ecological process of fire to the refuge’s forests will be the primary focus of the remaining Restoration Funds expenditures under this alternative. Reforestation and regeneration of native trees and herbaceous understory plants may be achieved primarily through this action. However, if necessary active tree planting may be pursued in localized areas that do not achieve the desired response and outcome.

For purposes of forest restoration described in this Amendment, the refuge has classified portions of the refuge into two types of fire units based on the method needed for conducting burns: 1) approximately 4,350 acres are in the Aerial Ignition Burn Units; and 2) approximately 12,430 acres are in other prescribed burn units (NRDAR Priority RX Forest Fire Units) (See Figure 13: Map of Priority Forest Restoration and Enhancement Units). Consistent with current practice, not all of these areas will be burned annually. Additionally, many environmental variables may inhibit burning of specific units based on prescriptions for wind direction, lift, etc. Therefore, priority prescribed burn unit acreage accounts for this by establishing enough proposed areas with differing prescriptions to allow the refuge to take advantage of as many burn days as possible.

For Crab Orchard NWR, prescribed fire through aerial ignition, is a cost-effective method. In 2019, the refuge entered into an interagency agreement with the Shawnee National Forest to provide mutual support for fire between the two entities. In 2020, approximately 800 acres, in 2021, 1,982 acres, and in 2022, 1,255 acres, were burned through aerial ignition, utilizing an airship and crew provided by the Forest Service. In 2023, no aerial ignitions were undertaken, due to a contracting issue between the Forest Service and their contractor. Future expectations are to pursue continued aerial ignitions with the Forest Service airship in combination with additional aerial ignitions using U.S. Fish and Wildlife operated drones to greatly expand treated acreage in priority forests.

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<sup>1</sup> USFWS. 2007. [Crab Orchard National Wildlife Refuge Comprehensive Conservation Plan](#).



U.S. Fish & Wildlife Service

## Crab Orchard National Wildlife Refuge

### Prescribed Fire Forest Restoration and Enhancement Focus Areas

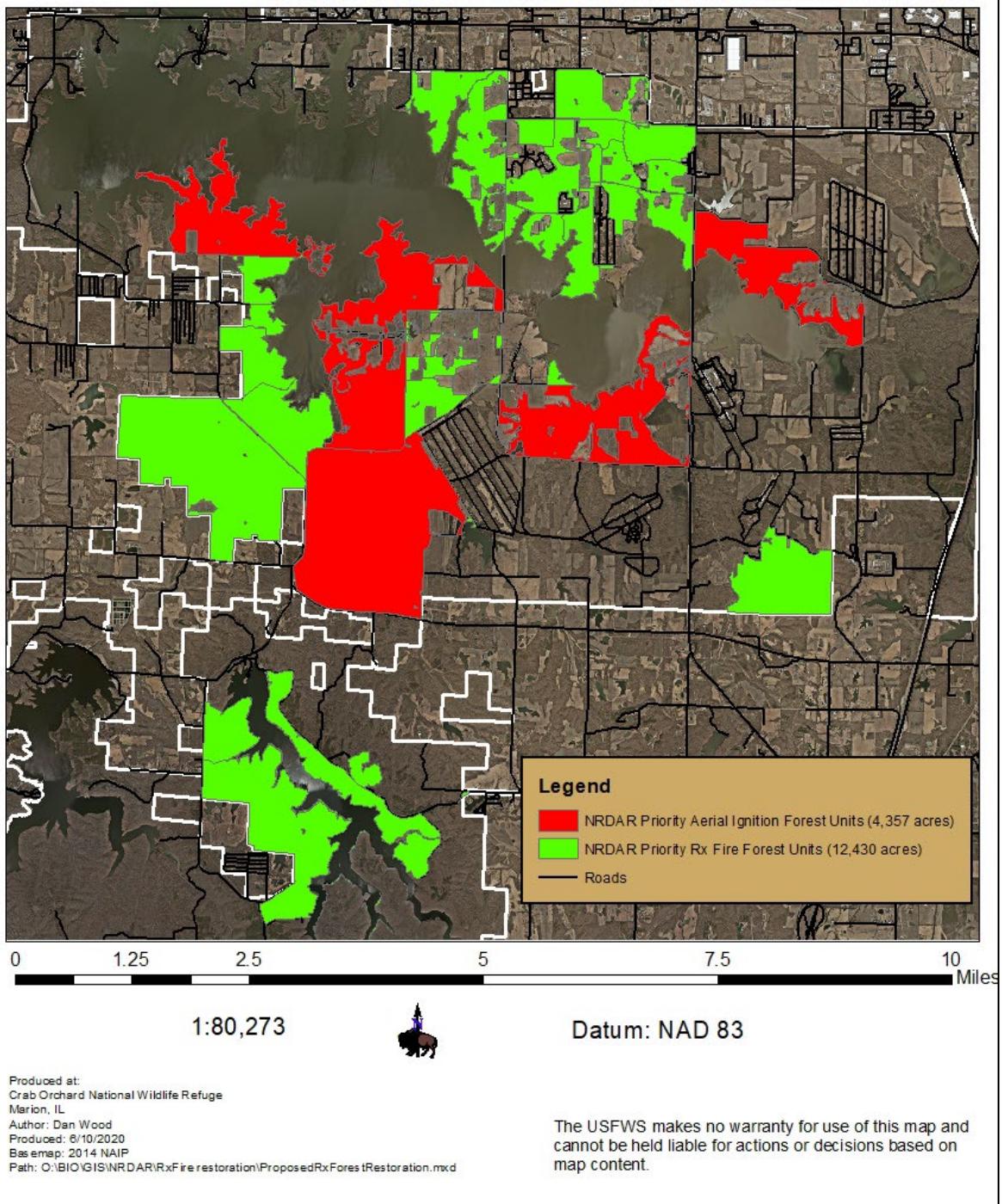


Figure 13. Map of Priority Forest Restoration and Enhancement Units.

### Alternative C: Grassland/Savanna/Woodland Restoration (Selected)

This Alternative includes the enhancement of 667 acres of grassland/savanna/woodland habitat. This will include additional enhancement of 222 acres of existing warm season grasslands within the 606 acres of grassland restoration previously achieved under the 1997 Plan bringing the total enhancement up to 1,051 acres. These 667 acres are located within the Hampton COC Sector UXO kick out zones (See Figure 14: Map of Hampton COC Sector Grassland and Savanna Restoration Locations). The proposed actions of Alternative C are included in the Crab Orchard National Wildlife Refuge CCP/EIS<sup>1</sup>.

Like the forests, grasslands and savannas at Crab Orchard NWR are fire dependent communities that depend on regular return intervals to maintain ecological health and diversity. Thus, repeated prescribed burning can restore degraded and invaded savannas, in a cost-effective manner. Returning the natural and critical ecological process of fire to the refuge's grasslands and savannas will be the primary focus of the restoration actions under this alternative.

The refuge recently undertook a Structured Decision Making (SDM) process to determine the best path forward for restoration and management of the UXO encumbered area. Land use restrictions recently placed on these acres are more stringent than those of the recent past (e.g., no soil disturbance can occur on these sites without UXO clearance). The SDM team determined that soil series should drive the restoration prescription (i.e., type of vegetation and habitat to be restored) choice. This was largely due to the influence soil type had on predicted restoration success, what type of habitats each soil type could support, and how well each prescription met fundamental objectives, especially benefits to resources of concern.

Restoration actions under this Alternative include site preparation for restoration and would include one-time surface clearance for UXO's (if UXOs are found, restoration activities will be relocated to a UXO-clear area nearby), and preparation of the land for planting, either through mowing, prescribed burning, or the use of herbicides on undesirable vegetation, including all invasive species, other undesirable native, and/or remnant agriculture related crops. These actions would be followed with restoration via the prescriptions outlined for each soil series. All actions would be taken consistent with applicable local, state, and federal laws and policies.

Final proposed alternatives, acreage, estimated costs, and generalized restoration prescriptions for each soil series are included in Table 5 and Table 6 below.

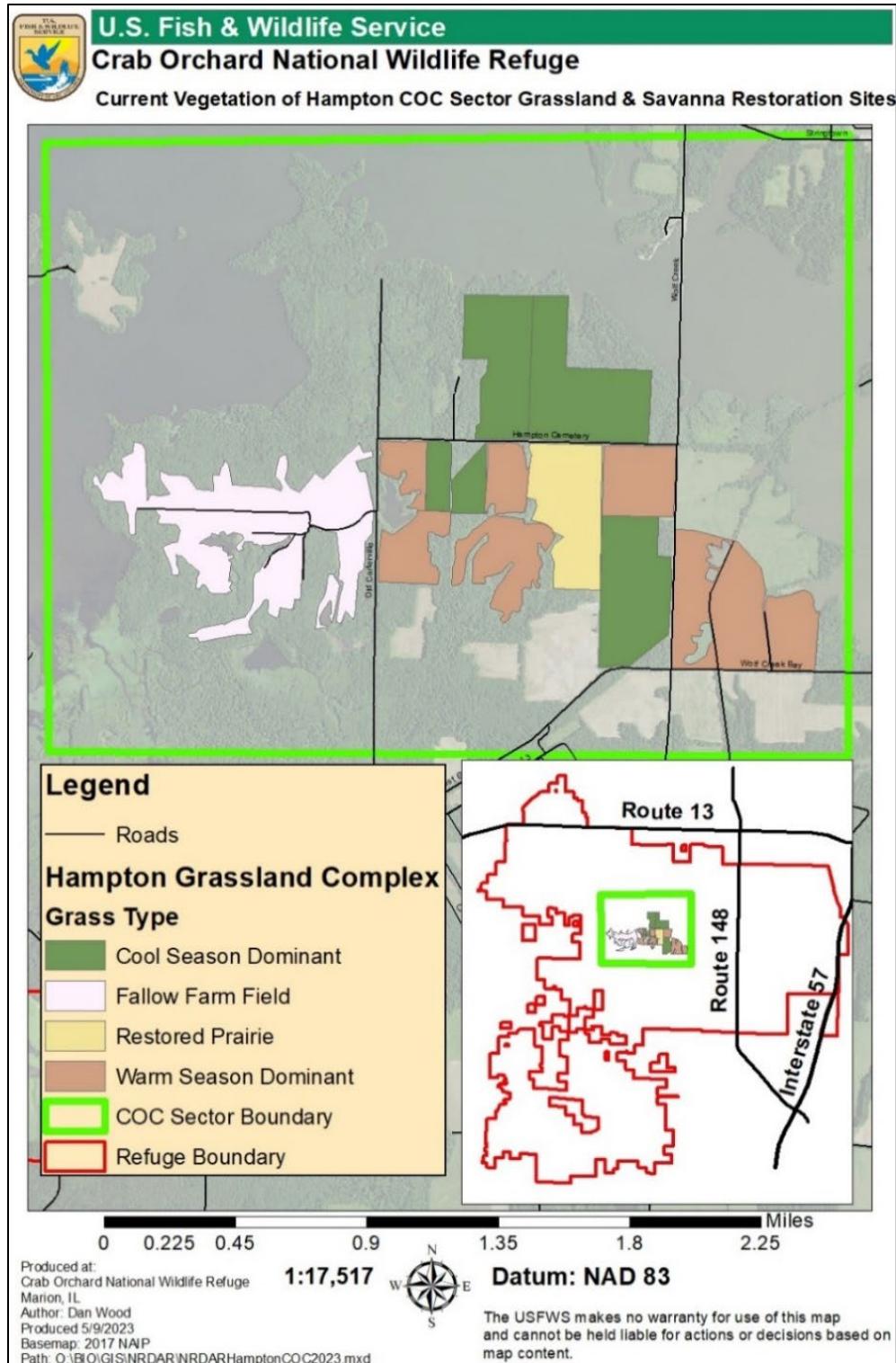


Figure 14. Map of Hampton COC Sector Grassland and Savanna Restoration Locations.

*Table 5. Prescribed burn objectives by soil series for Grassland, Woodland, and Savanna Restoration for UXO area.*

<b>Soil Series</b>	<b>Subtype</b>	<b>Acres</b>	<b>Current Vegetation</b>	<b>Prescribed burn objectives</b>
Ava	Slopes Eroded	21.5	Warm Season Grasses	Native Prairie
			Cool Season Grasses	Savanna pods
			Native Prairie	Native Prairie
			Fallow	Savanna pods
	Level gentle slopes	173	Warm Season Grasses	Native Prairie
			Cool Season Grasses	Savanna pods
			Native Prairie	Native
			Fallow	Savanna pods
Rend	Level gentle slopes	292	Warm Season Grasses	Savanna pods
			Cool Season Grasses	Woodland/savanna natural succession
			Fallow	Woodland/savanna natural succession
Plumfield	Sloped NE E	40	Warm Season Grasses	Native Prairie
	Sloped SWS	92	Native Prairie	Native Prairie
			Fallow	Native Prairie
Other soils	Poorly drained		All cover types	Woodland/savanna natural succession

*Table 6. General Prescriptions, Acres, and Costs of Grassland, Woodland, Savanna Restoration*

<b>General Prescription Target</b>	<b>Sum of acres</b>	<b>Sum of cost</b>
Native prairie	219.3	\$161,605
Savanna pods	167.0	\$170,703
Water	3.7	\$0
Open Oak Woodland /Savanna (natural succession)	286.9	\$30,700
<b>Grand Total</b>	<b>676.9</b>	<b>\$363,008</b>

Alternatives Considered, but not Further Evaluated:

The Shoreline Restoration alternative of the 1997 Plan was not further evaluated in this Amendment for several reasons. The shoreline restoration actions pursued historically consisted solely of rock revetment (hard armoring). This is problematic from a biological standpoint, as rock revetment restricts the development of native vegetation and native shoreline habitats and is often quite devoid of wildlife. It serves a valuable purpose in soil retention and staving off shoreline erosion in areas of heavy erosion where structure or infrastructure must be protected. The refuge has achieved bank stabilization in all areas where erosion threatened real property and infrastructure. However, methods of soft armoring, including re-vegetation, live staking, contour

wattling, live fascines, brush layering, or brush matting are more suitable and provide living substrates that allow natural habitats and vegetation to dominate. A large percentage of the Crab Orchard Lake shoreline has been severely eroded. The size and scope of a project to adequately address the shoreline erosion problem on the Lake is beyond the available funds available by several orders of magnitude. Additionally, the 1997 Plan allocated 26% of funds for the shoreline restoration alternative. Approximately 24% of allocated funds spent to date have been spent on this alternative roughly meeting the original target.

The Public Outreach alternative of the 1997 Plan was not further evaluated in this Amendment for several reasons. Original plans included development of self-guided trails at both a cleanup site and at a restoration site. However, regional and national visitor services guidance for refuges has changed dramatically in the period following the original plan's development. This included a reduction in the number of trails maintained on refuges and a consolidation of recreational trails to specific locations on refuges. Additionally, all outreach expenses originally considered have long-term unfunded maintenance and management costs associated with them. The refuge developed and installed several exhibits in the Visitor's Center as described using Restoration Funds. Also, the refuge developed the amphitheater with recreational fee dollar funding, produced pamphlets, informational kiosks, and presentations with refuge funding, all as outlined in the original plan. Lastly, the refuge already incorporates public outreach through educational programs, on an annual basis, that addresses issues of environmental justice and describes the contamination issues and cleanup process to students in local schools. Therefore, nearly all aspects of the original plan were achieved regarding public outreach, even though they were primarily funded outside of the Restoration Funds, except for trail development. The refuge believes that restoration of habitats as outlined in the selected alternatives, will better serve the public and the environment and therefore plans to pursue those actions in lieu of additional outreach.

The Land Acquisition alternative of the 1997 Plan was not further evaluated in this Amendment because the Land Acquisition targets were largely met under the prior plan. An original allocation of 32% was established, and approximately 29.1% of funds were spent on land acquisition. Additional lands are unlikely to become available within the small remaining budget originally allocated. Thus, this alternative is considered as successfully completed.

## 4.2 Restoration Alternatives Cost

Approximately \$727,710 remains within the DOI Restoration Fund. Cost estimates for each of the Alternatives are described below (Table 7).

*Table 7. Expense descriptions and estimated costs for each alternative.*

Alternative	Expense Category	Cost	# of Years	Subtotal	Alternative Total
<b>Alternative A - No Action</b>	N/A	\$0	0	\$0	\$0
<b>Alternative B – Reforestation (Selected)</b>	200 acres Open Oak Woodland (planting 20 to 40 trees/ac.; grass seeding)	\$83,000	1	\$83,000	\$251,702
	General labor and 5,000 acres Prescribed Fire, fireline prep, fire operations, Aerial ignition, fire techs, temporary employees, detailed employees, misc. supplies, fuel	\$20,000*	5	\$100,000	
	Equipment Rental for clearing Autumn olive	\$22,356	2	\$44,712	
	Misc. supplies, fuel, etc.	\$4,798	5	\$23,990	
<b>Alternative C – Grassland/ Savanna/ Woodland Restoration (Selected)</b>	220 acres Native Prairie; site prep, seed purchase, seeding, follow-up maintenance	\$161,605	1	\$161,605	\$476,008
	167 acres of Savanna pods; site prep, tree/shrub purchase, planting, follow-up maintenance	\$170,703	1	\$170,703	
	287 acres Woodland/Savanna natural succession; herbicide & mowing; treatment of invasive species	\$6,140	5	\$30,700	
	General labor and 700 acres Prescribed Fire; fireline prep, fire operations, aerial ignition, fire techs, temporary employees, detailed employees	\$21,000*	5	\$105,000	
	Misc. supplies, fuel, etc.	\$1,600	5	\$8,000	
				<b>Grand Total</b>	<b>\$727,710</b>

\*Does not include labor, equipment, etc. costs provided in-kind by full-time dedicated fire staff.

### 4.3 Restoration Alternatives Evaluation (NRDAR Factors)

To ensure the appropriateness and acceptability of restoration options, the Trustee evaluated each restoration alternative against the Restoration Evaluation Criteria, below. The criteria used to evaluate the potential restoration projects described in this Amendment as part of the NRDAR process reflect the “factors to consider when electing the Alternative to pursue” (NRDAR factors) as described in 43 C.F.R. § 11.82(d)(1-10) and § 11.93. The following table (8) presents the Trustee’s evaluation of these factors.

*Table 8. Restoration alternatives and explanation of NRDAR Factors.*

<b>Alternative</b>	<b>Criteria and Evaluation</b>
<b>Alternative A - No Action Alternative</b>	<ol style="list-style-type: none"> <li>1. Technical Feasibility: Not applicable.</li> <li>2. Cost/Benefit: Not applicable.</li> <li>3. Cost Effectiveness: Not applicable.</li> <li>4. Likelihood of Success: Interim losses not compensated.</li> <li>5. Additional Injury: Additional interim loss would occur.</li> <li>6. Recovery Period: 100 years.</li> <li>7. Recovery Ability: Limited, would require many decades.</li> <li>8. Public Health and Safety: Not applicable.</li> <li>9. Policy Consistency: Fail. Restoration is feasible under CERCLA.</li> <li>10. Regulatory Compliance: Not applicable.</li> </ol>
<b>Alternative B - Reforestation Alternative (Selected)</b>	<ol style="list-style-type: none"> <li>1. Technical Feasibility: High.</li> <li>2. Cost/Benefit: High.</li> <li>3. Cost Effectiveness: High; demonstrated effectiveness based on past results.</li> <li>4. Likelihood of Success: High; proven techniques.</li> <li>5. Additional Injury: Temporary impacts due to thinning and prescribed fire.</li> <li>6. Recovery Period: 10-20 years</li> <li>7. Recovery Ability: High.</li> <li>8. Public Health and Safety: Pass.</li> <li>9. Policy Consistency: Pass; consistent with refuge CCP/EIS.</li> <li>10. Regulatory Compliance: Pass; consistent with refuge CCP/EIS.</li> </ol>
<b>Alternative C - Grassland/ Savanna/ Woodland Restoration Alternative (Selected)</b>	<ol style="list-style-type: none"> <li>1. Technical Feasibility: High.</li> <li>2. Cost/Benefit: High.</li> <li>3. Cost Effectiveness: High; demonstrated effectiveness based on past results.</li> <li>4. Likelihood of Success: High; proven techniques.</li> <li>5. Additional Injury: Temporary impacts due to mowing, site preparation, herbicides, and prescribed fire.</li> <li>6. Recovery Period: 5-20 years</li> <li>7. Recovery Ability: High.</li> <li>8. Public Health and Safety: Pass.</li> <li>9. Policy Consistency: Pass; consistent with refuge CCP/EIS.</li> <li>10. Regulatory Compliance: Pass; consistent with refuge CCP/EIS.</li> </ol>

#### 4.4 National Environmental Policy Act (NEPA) Compliance

In general, actions undertaken by a federal trustee to restore natural resources or services under CERCLA are subject to the NEPA (42 U.S.C. § 4321 et seq.) and other federal laws. The Trustee is evaluating this Amendment pursuant to two categorical exclusions (516 DM 8 section 8.5 (B)(4) and (5)) for prescribed burning and fire management activities. In addition, in the Crab Orchard NWR CCP, the Preferred Alternative (E) is “Reduce Habitat Fragmentation/Consolidate and Improve Recreation.” This alternative adopts objectives and strategies for reforestation, management of pine plantations, management of early successional habitat, and management for native warm-season grasslands from the CCP’s Alternative B (page 43 of CCP/EIS<sup>1</sup>), and includes specific strategies discussed in this Amendment, such as prescribed burning, invasive species control to promote hardwood regeneration, and prescribed burns to maintain native grasslands and early successional habitat.

A Record of Decision (ROD) for the Final Comprehensive Conservation Plan and Environmental Impact Statement for Crab Orchard National Wildlife Refuge (CCP/EIS) was issued on October 27, 2006 and the CCP/EIS was signed and approved on January 4, 2007. This Amendment tiers<sup>2</sup> from and incorporates by reference<sup>3</sup> the analysis in the Crab Orchard NWR CCP/EIS. To the extent additional analysis is warranted in the future, and as appropriate, the public will have the opportunity to comment.

#### 4.5 Selected Alternatives

The Trustee has proposed both Alternative B (Reforestation) and Alternative C (Grassland/Savanna/Woodland) as the selected alternatives for implementation. Alternatives B and C are achievable with the remaining Restoration Funds and will result in long term benefits to resources injured and services lost by the releases of hazardous substances. Under the No Action Alternative, remaining settlement dollars would not be spent. Natural succession would require many years, and existing restoration efforts would be threatened by invasive species present within the refuge. This Amendment to the 1997 Plan would allocate approximately 50% of remaining funds towards reforestation and 50% towards grassland restoration. Alternatives B and C meet the objectives of the refuge CCP and Habitat Management Plan and are deemed acceptable and appropriate per the CERCLA NRDAR restoration criteria (Table 8).

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<sup>2</sup> The NEPA regulations define “tiering” as referring to “the coverage of general matters in broader environmental impact statements (such as national program or policy statements) with subsequent narrower statements or environmental analyses (such as regional or basin wide program statements or ultimately site-specific statements) incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared.” 40 C.F.R. §1508.28.

<sup>3</sup> The NEPA regulations state the following regarding “incorporation by reference”: “Agencies shall incorporate material into an environmental impact statement by reference when the effect will be to cut down on bulk without impeding agency and public review of the action. The incorporated material shall be cited in the statement and its content briefly described. No material may be incorporated by reference unless it is reasonably available for inspection by potentially interested persons within the time allowed for comment. Material based on proprietary data which is itself not available for review and comment shall not be incorporated by reference.” 40 C.F.R. §1502.21.

## APPENDIX A. RESTORATION ACCOMPLISHED AT CRAB ORCHARD NATIONAL WILDLIFE REFUGE (1997-2020)

In Table A-1, the Trustee has summarized the restoration that was selected in the 1997 Plan, projected costs, the restoration that was accomplished, and the estimated total expended on restoration. Note that where possible, the refuge augmented Restoration Funds through use of refuge-owned equipment and staff time. Additionally, the refuge looked for opportunities to leverage Restoration Funds with other funding sources whenever possible in order to stretch the Restoration Funds.

*Table A-1. Restoration Accomplished at Crab Orchard National Wildlife Refuge (1997-2020). The Restoration Preferred Alternatives were proposed in the 1997 Crab Orchard Restoration Plan.*

Preferred Alternative	Proposed Acres/ Miles	Proposed Cost	Restored Acreage/ Mileage	Restoration Funds utilized	In-kind contributions leveraged	Final Cost (Estimated) <sup>4</sup>
Reforestation	1,520 acres	\$760,000	800	\$722,199	\$375,000 in fire program dollars, for planning, supervision, oversight, implementation labor. \$76,000 forest invasive inventory through refuge/regional funds.	\$1,173,199
Shoreline and Riparian Restoration	4 miles	\$640,000	3.12 miles	\$512,521	Approximate \$23,000 in labor from refuge funds	\$534,521
Grassland Restoration	550 acres	\$110,000	605 acres	\$231,380	Most implementation and monitoring labor were provided from refuge funds. Maintenance and management of sites provided entirely from refuge funds.	\$631,000
Public Education/Outreach	n/a	\$210,000	n/a	\$50,000	Amphitheater (\$30,000) and kiosk construction (\$2,400) and maintenance; Pamphlet and presentation development and printing; annual outreach to local schools.	\$82,400
Land Acquisition		\$780,000	322.79 acres	\$622,480	Appraisals, surveys, and other real estate costs were paid out of refuge funds	\$653,604
					\$460,000 in planning, administration, and oversight (excluding fire program dollars accounted above)	\$460,000
<b>TOTAL</b>				<b>\$2,138,579</b>		<b>\$3,534,724</b>

<sup>4</sup> These costs are estimated as a 2014 flooding event at the refuge destroyed many of the cost records and refuge budget tracking systems changed since 1997 without the migration of historic records.

## APPENDIX B. ILLINOIS DEPARTMENT OF NATURAL RESOURCES AND ILLINOIS ENVIRONMENTAL PROTECTION AGENCY COMMENTS AND SUPPORT



Illinois  
Department of  
**Natural  
Resources**

JB Pritzker, Governor • Natalie Phelps Finnie, Director  
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[www.dnr.illinois.gov](http://www.dnr.illinois.gov)

October 23, 2023

Aleshia Kenney  
Regional Spill Response and NRDAR Coordinator  
U.S. Fish and Wildlife Service, Midwest Region 3  
Located at IL-IA Ecological Services Field Office  
1511 47th Avenue  
Moline, IL 61265

Dear Ms. Kenney:

Thank you for the opportunity to review the Department of the Interior and Fish and Wildlife Service *Amendment to the Natural Resource Damage Assessment Restoration Plan for the Crab Orchard Wildlife Refuge, Marion, IL (August 1, 2023)*.

The Illinois Department of Natural Resources (IL DNR), supports both Alternative B (Reforestation) and Alternative C (Grassland/Savanna/Woodland). IL DNR shared the document and requested feedback from the Illinois co-Natural Resource Trustee, Illinois EPA. Illinois EPA is not only a Trustee but is also actively involved with remediation work at Crab Orchard. Attached is an Illinois EPA memorandum (Attachment 1) with comments on and support of the amendment. The Illinois EPA project manager is copied on this response.

All approaches outlined in the amendment seem to be sound and ecologically beneficial restoration alternatives. In general, these proposed alternatives focus on prescribed fire activities, clearing/treatment of undesirable exotic vegetation, and seeding/planting of native species for restoration, supporting both the Natural Resource Damage Assessment and Restoration (NRDAR) and Crab Orchard NWR goals, and adding many ecological benefits to the region. The restoration of grassland/savanna areas is very beneficial, as Crab Orchard NWR provides resources for grassland-dependent wildlife that are somewhat scarce in this region. The draft amendment notes the expansion of the Refuge's prescribed fire operations in recent years; this has been a positive development as well.

Both Illinois EPA and IL DNR provide the following additional comments for consideration for inclusion in the plan amendment or for future collaboration:

IL EPA primary comments for consideration are relative to: 1) permanent unexploded ordinance signage rather than use of websites/QR codes, and 2) targeting additional invasive species for control, not limiting the efforts to autumn olive and multiflora rose. The Agency memorandum provides additional explanation (Attachment 1).

IL DNR primary comment for consideration is also relative to targeting additional invasive/exotic species for control. The restoration of functional grassland could be deterred if dominant stands of sericea or Phragmites are present. For reforestation areas, attention to round-leaved bittersweet should be considered. More explanation is provided in Attachment 2.

IL DNR understands it would take some time to come up with a restoration plan for wetlands, considering actions such as ephemeral wetland creation in grassland and forested areas, water level manipulation, and vegetation management; however, Crab Orchard NWR contains wetland resources which provide noteworthy habitat for amphibians and

migratory birds. If timing does not allow for incorporation into this amendment, perhaps wetland restoration will be a collaborative planning effort in the future. More explanation is provided in Attachment 2.

IL DNR also offers an opportunity to collaborate: FWS and IL DNR could collectively investigate some of the existing Crab Orchard complex natural communities of good quality including a flatwoods by Wolf Creek and the woodlands and barrens around Devil's Kitchen Lake to develop a management schedule. Additional explanation is provided in Attachment 3.

Thank you again for the opportunity to review. Please contact Beth Whetsell with questions and/or concerns. Her contact information is included below.

Sincerely,



Chris Young  
Illinois Department of Natural Resources  
Office of Resource Conservation, Director

Cc: Angellic Mandell, Illinois EPA Bureau of Land  
Beth Whetsell, IL DNR Contaminant Assessment Section (email: [beth.whetsell@illinois.gov](mailto:beth.whetsell@illinois.gov); phone: 217-993-1238)



## ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

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JB PRITZKER, GOVERNOR

JOHN J. KIM, DIRECTOR

### MEMORANDUM

**DATE:** September 29, 2023

**TO:** Beth Whetsell, Illinois Department of Natural Resources

**FROM:** Angelic Mandell, Illinois Environmental Protection Agency

**SUBJECT:** 1998620014 – Williamson  
Crab Orchard National Wildlife Refuge  
Superfund/Technical

### Amendment to the Natural Resource Damage Assessment Restoration Plan for the Crab Orchard Wildlife Refuge

The Illinois EPA has reviewed the *Amendment to the Natural Resource Damage Assessment Restoration Plan for the Crab Orchard Wildlife Refuge* dated August 1, 2023. This document seeks to replace the *Final Restoration Plan, Crab Orchard National Wildlife Refuge*, dated July 1997. The Illinois EPA has no objection to the proposed amendment but does have the following comments:

1. **3.4 Public Education/Outreach Program Actions (1997-Present):** Permanent unexploded ordnance (UXO) signage that is not tech dependent, e.g., clear printed signs with pictures versus websites/QR codes that can become outdated, would be preferable to portable kiosks as these hazards are still present and lost visitors/trespassers are still an at-risk group.
2. **4.1 Restoration Alternatives:** Invasive species control is mentioned, with multiflora rose and autumn olive being named as species of interest. Due to the presence of phragmites being noted in the phytoremediation areas A and D in the region identified as the 'East Swale', Illinois EPA would like to see this species also noted as targeted for removal. While Illinois EPA agrees with the plan to remove autumn olive and multiflora rose in impacted areas, including phragmites as a species of concern would benefit the overall restoration efforts as this is very aggressive non-native species that degrades the habitats it encroaches on.
3. **4.1 Restoration Alternatives:** Alternatives not considered: Species reintroduction has been omitted from this draft altogether. In the original 1997 document, species reintroduction was mentioned in several Habitat Restoration Alternatives but was omitted entirely in the current Plan. While bison reintroduction may have not met the standards set forth in 43 CFR 11.93 (b) and the river otter has repatriated the Refuge

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independently, some mention of why this portion of the Plan was omitted and not updated would appropriate as it constitutes significant departure from the original.

If you have any questions or need further assistance, please contact Angelic Mandell at (217) 558-0098 or at [angelic.mandell@illinois.gov](mailto:angelic.mandell@illinois.gov).

cc: Agency File  
Christopher Hill  
Paul Lake

## **Attachment 2.**

Regarding exotic invasive species, the plan's focus on exotic invasives was solely on woody species and did not include herbaceous species like sericea (*Lespedeza cuneata*), which is prevalent in the Headquarters Prairie and threatens the otherwise excellent forb and grass community there. There was mention of an extensive invasives list in the Amendment; however, no discussion about addressing problematic species outside of autumn olive and multiflora rose. IL DNR recommends adding herbaceous threats and planned treatments to the plan. Such species need to be addressed if they could jeopardize the restoration efforts from reaching desired goals of intact ecological communities.

For example, the restoration of functional grassland could be substantially delayed or unattainable if dominant stands of *Sericea* or *Phragmites* are not controlled. In the case of reforestation areas, the targeted species may be round-leaved bittersweet. This vine is uniquely abundant in and around IL DNRs Giant City State Park, which shares a boundary with the Refuge; In fact, it may be fairly abundant in some areas of the Refuge. This species can cause the outright loss of forested areas when left unchecked.

The Refuge is likely aware of various exotic species concerns, and in planning these alternatives, focus should be on species that could potentially cause the restoration plans to fail to create the structural and functional ecosystems intended.

Crab Orchard NWR contains wetland resources (apart from the major lakes) which provide noteworthy habitat for amphibians (including some Illinois Wildlife Action Plan Species of Greatest Conservation Need) as well as for migratory birds. These wetlands include ephemeral wetlands, both grassland and forested, that are used by amphibians, mudflat wetlands that are used by migratory shorebirds, and wet meadow/pond edge wetlands that have been used by the state-endangered plant *Eryngium prostratum*. If timing allows for the incorporation of wetland restoration projects into this amendment, IL DNR supports the pursuit of projects. If not at this time, perhaps wetland restoration will be a collaborative planning effort in the future.

**Attachment 3.**

From a Natural Heritage standpoint, there are several areas of relatively undisturbed natural communities in fine condition within the Crab Orchard complex that are not far from being considered for nomination to the Illinois Natural Areas Inventory with minimal management/restoration work. The restoration timeline would align well with the Amendment timeline (~five years) and the goal of habitat restoration for migratory songbirds.

If FWS is interested in collaborating, perhaps we could investigate some of these existing natural communities of good quality including a flatwoods by Wolf Creek and the woodlands and barrens around Devil's Kitchen Lake. These have excellent restoration potential, and as most are already burned on an annual or biannual basis and have few exotic concerns. The only additional work that would be required would be mesophyte control. Local field staff for the Division of Natural Heritage would be willing to advise and collaborate with NRDAR and Refuge groups to investigate these existing natural communities of good quality.

## **APPENDIX C. AMENDMENT TO THE NATURAL RESOURCE DAMAGE ASSESSMENT RESTORATION PLAN FOR THE CRAB ORCHARD WILDLIFE REFUGE: COMMENT SUMMARY AND RESPONSES**

The State's comments can be found in their entirety in the letter, memo, and associated attachments included in Appendix B of this document. The comments were organized and combined into five categories, general support and potential collaboration, unexploded ordnance signage, invasive species, wetland restoration, and species reintroductions. The U.S. Fish and Wildlife Service's (USFWS) responses to these comment categories are included below.

- 1) *The Illinois Environmental Protection Agency and Illinois Department of Natural Resources support the selection of Alternatives B (reforestation) and C (Grassland/Savanna/Woodland) in the Final Restoration Plan Amendment and offer to collaborate on planning and restoration efforts in the future.* Thank you for your support. The USFWS appreciates our State partners and our existing collaborative efforts to support mutually shared goals and objectives. The continued collaboration between our agencies is essential and integral to fulfilling our stewardship responsibilities and achieving our individual missions. The refuge consulted with many experts within the State agencies while drafting the Draft Habitat Management Plan, a result of a 2-year public. The Draft Habitat Management Plan addresses many of the areas discussed by the State in their comments and includes a Natural Area objective and a targeted inventory, investigation, and restoration feasibility process. The refuge looks forward to working with our State partners to facilitate additional wetland and grassland conservation and restoration efforts consistent with the Draft Habitat Management Plan as funds and staff allow.
- 2) *Please post permanent unexploded ordinance signage that is not technology-dependent to warn visitors of this risk.* Thank you for this comment. The refuge will alert the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Response Program to this request and concern. This signage is outside of the scope of the CERCLA natural resource damage assessment and restoration process and thus not able to be addressed through this Restoration Plan Amendment. Current signage is produced and installed based on guidance from the CERCLA Response Program and consistent with environmental the land use control plan. Additional outreach materials are planned, including UXO video for visitors, hunters, and other users, and will be available at the visitor center for viewing and online.
- 3) *The Draft Restoration Plan amendment appears to only target woody species such as autumn olive and multiflora rose as part of its invasive species control. There are other invasive species that the restoration actions should address, such as herbaceous species sericea and phragmites.* Thank for you for this comment. It was the intent of the Trustee to target a broad range of invasives, beyond autumn olive and multiflora rose in this Restoration Plan Amendment. Text has been added to the Final Restoration Plan

Amendment to clarify the broad nature of the invasive species control under the selected alternatives by defining “undesirable vegetation” to include all invasive species, other undesirable native, and/or remnant agriculture related crops (see e.g., pages [22] and [25]). The Trustee shares the State’s concern, regarding Phragmites, and to the extent any is present in the identified restoration areas, it will be treated. In addition, the refuge is addressing phragmites outside of the NRDAR. In Fiscal Year 2023 Phragmites was mapped and treated throughout the refuge, including in the Hampton Grassland Complex, with differing levels of success. The refuge also received a USFWS Region 3 competitive grant award for a two-year treatment project slated for 2024 and 2025 to control phragmites and purple loosestrife across the refuge landscape.

- 4) *The Crab Orchard NWR contains noteworthy wetland habitats, if possible, please include wetland restoration in this Amendment:* Thank you for your comment. The Trustee agrees with the importance of the wetlands located on the NWR and the refuge has undertaken a comprehensive planning process, engaging many local partners and experts within State agencies to address wetlands through the Draft Habitat Management Plan. However, wetland restoration is not within the scope of the proposed restoration activities of the Amendment to the Restoration Plan in part because of limitations of the NRDAR process and because of limited funds. Any additional step-down management plans, such as a grassland management plan, or a wetland management plan, could provide opportunities for the State and its agencies to partner in planning, monitoring, inventorying, restoring, and conserving wetland and grassland habitats on the refuge and the refuge looks forward to such collaborative efforts.
- 5) *Please explain why the Draft Amendment does not include an alternative for Species reintroductions:* While species reintroduction was an alternative considered in the original 1997 Final Restoration Plan, it was ultimately not selected. Rather the Trustee focused on habitat restoration that could support a broad range of species. In the Amendment to the Restoration Plan, habitat restoration continues to be the priority of the Trustee with the two preferred alternatives. In addition, reforestation and grassland/savanna/woodland restoration is a more cost-effective use of limited restoration funds remaining.