Draft Environmental Assessment
For
Water Management and Habitat Restoration

Swan Lake National Wildlife Refuge

Sumner, Missouri

March 8, 2023

U.S. Fish & Wildlife Service
Midwest Region 3

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This Draft Environmental Assessment (EA) is being prepared to evaluate the effects associated with this proposed action and complies with the National Environmental Policy Act (NEPA) in accordance with Council on Environmental Quality regulations (40 CFR 1500-1509) and Department of the Interior (43 CFR 46; 516 DM 8) and U.S. Fish and Wildlife Service (550 FW 3) regulations and policies. NEPA requires examination of the effects of proposed actions on the natural and human environment with a comparison of alternatives considered.

Proposed Action

The U.S. Fish and Wildlife Service (Service) is proposing to make changes to the water management infrastructure and restore floodplain connectivity to the Grand River and Yellow Creek on Swan Lake National Wildlife Refuge (Refuge). This could involve a variety of changes to include removing infrastructure, lowering levees/dikes/dams, constructing new dikes, expanding and adding spillways, changing water management delivery systems and converting some agricultural grounds into wetlands and other native habitats.

For the purposes of this document, a **'dam'** is a barrier designed to impound large volumes of deep water, a **'dike'** or **"berm"** is a barrier designed to impound small volumes of shallow water, and a **'levee'** is a barrier designed to keep floodwater out. In some cases a levee may be used for both keeping exterior flood waters out and impounding small volumes of shallow water inside the levee.

A proposed action is often iterative and may evolve during the NEPA process as the agency refines its proposal and gathers feedback from the public, tribes, partners, and other agencies. Therefore, the final proposed action may be different from the original. The proposed action will be finalized at the conclusion of the public comment period for the EA.

Background

A. Refuge Information

National Wildlife Refuges are guided by the mission and goals of the National Wildlife Refuge System (NWRS), the purposes of an individual refuge, Service policy, and laws and international treaties. Relevant guidance includes the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, Refuge Recreation Act of 1962, and selected portions of the Code of Federal Regulations and Fish and Wildlife Service Manual.

Swan Lake National Wildlife Refuge was established pursuant to Executive Order 7563 on February 27, 1937 by Franklin D. Roosevelt. The primary purpose of the Refuge was originally to provide for the needs of migratory birds and other wildlife and has since evolved alongside the National Wildlife Refuge System to include ecosystem-wide needs, as well as providing opportunities for the public to enjoy wildlife-dependent recreation.

The Refuge is responsible for managing over 12,000 acres of fee title (owned) property, the majority of which consists of 10,670 acres of contiguous land in Chariton County, near the town of Sumner in north-central Missouri (Figure1). The Refuge encompasses the site of the Proposed Action and consists of bottomland forest, grasslands, and wetlands within the Grand River (GR) floodplain, which are home to a diverse wildlife community that attracts thousands of hunters, anglers, and wildlife watchers.

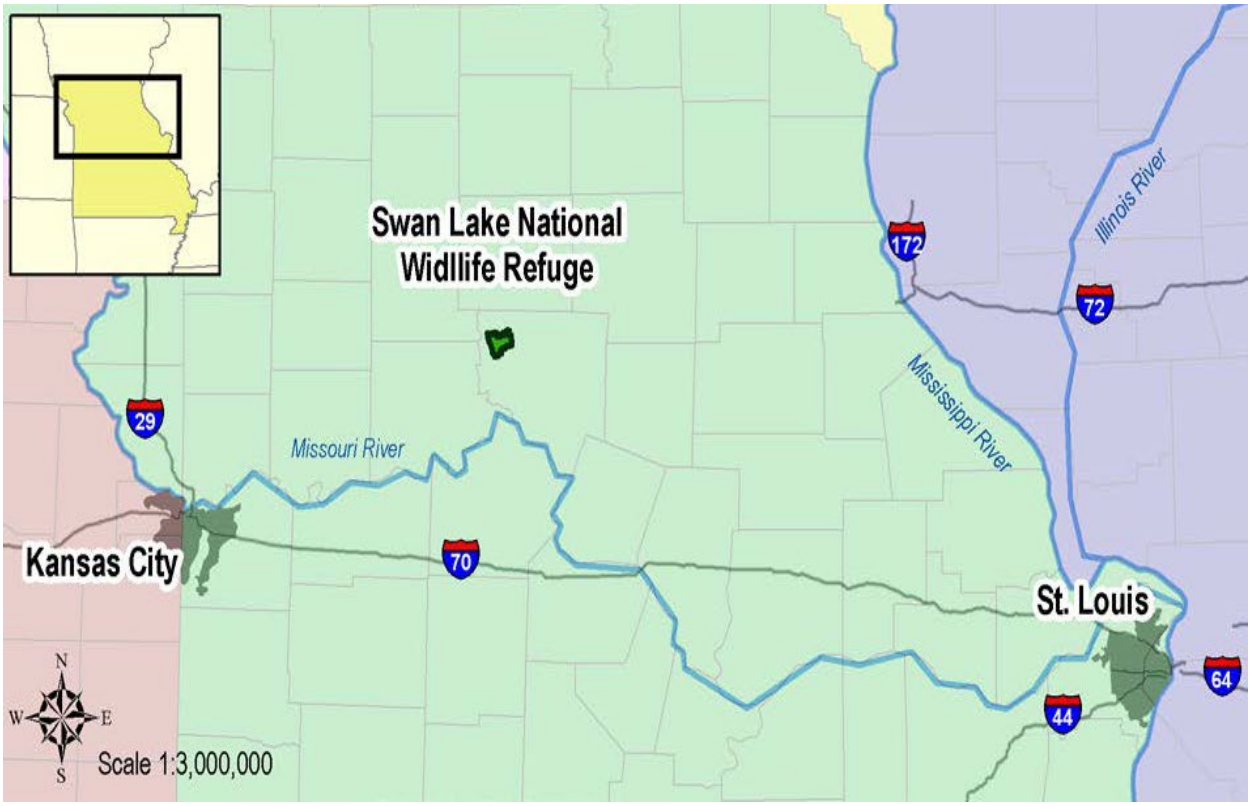

Figure 1 Location of Swan Lake NWR

The mission of the NWRS, as outlined by the National Wildlife Refuge System Administration Act (NWRSAA), as amended by the National Wildlife Refuge System Improvement Act (16 U.S.C. 668dd et seq.), is to:

"... to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans"

The Refuge's vision statement and goals were revised in the most recent Comprehensive Conservation Plan (CCP), published in 2011.

The current Refuge vision statement describes what the Refuge unit should be, or what is hoped to be done based upon the mission of the NWRS and specific refuge purposes, as well as other mandates, and is as follows:

Diverse and abundant wildlife flourishes within a mosaic of grass, trees, and wetlands recalling an earlier era when the Grand River meandered across its broad, open floodplain. Visitors enjoy recreation dependent on wildlife and show their appreciation by supporting conservation and Swan Lake National Wildlife Refuge.

The Refuge goals include:

Habitat: Wetlands, grasslands, and bottomland forests providing habitat for migratory birds, threatened and endangered species, and other wildlife within the Grand River floodplain.

Wildlife: Diverse wildlife teeming within native habitats of the Grand River floodplain.

People: Visitors enjoy wildlife-dependent recreation and understand the natural and cultural resources of the Refuge and its role in their conservation.

B. National Wildlife Refuge System

The National Wildlife Refuge System Administration Act mandates the Secretary of the Interior in administering the National Wildlife Refuge System to (16 U.S.C. 668dd(a)(4)):

a. Ensure that the mission of the NWRS described at 16 U.S.C. 668dd(a)(2) and the purposes of each refuge are carried out;
b. Assist in the maintenance of adequate water quantity and water quality to fulfill the mission of the System and the purposes of each refuge;
c. Provide for the conservation of fish, wildlife, and plants, and their habitats within the System;
d. Ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations of Americans;
e. Recognize compatible wildlife-dependent recreational uses as the priority general public uses of the NWRS through which the American public can develop an appreciation for fish and wildlife.

Purpose and Need for the Proposed Action

The purpose of this proposed action is to reduce habitat degradation and infrastructure damage on the Refuge, as well as adverse impacts to neighboring lands caused by the current trend of increased flood frequency, intensity and duration being experienced on the Refuge and in the Refuge's watershed. The problems the Proposed Action would resolve are the results of an increase in flood frequencies, intensity, and inundation periods from the Grand River and Yellow Creek on Swan Lake NWR. Current Refuge infrastructure (water control structures, culverts and levee heights and slopes) are inadequate to effectively handle the more frequent and more intense flood events. Dewatering the Refuge in a timely manner after flood events is critical to the long-term viability of Refuge habitats.

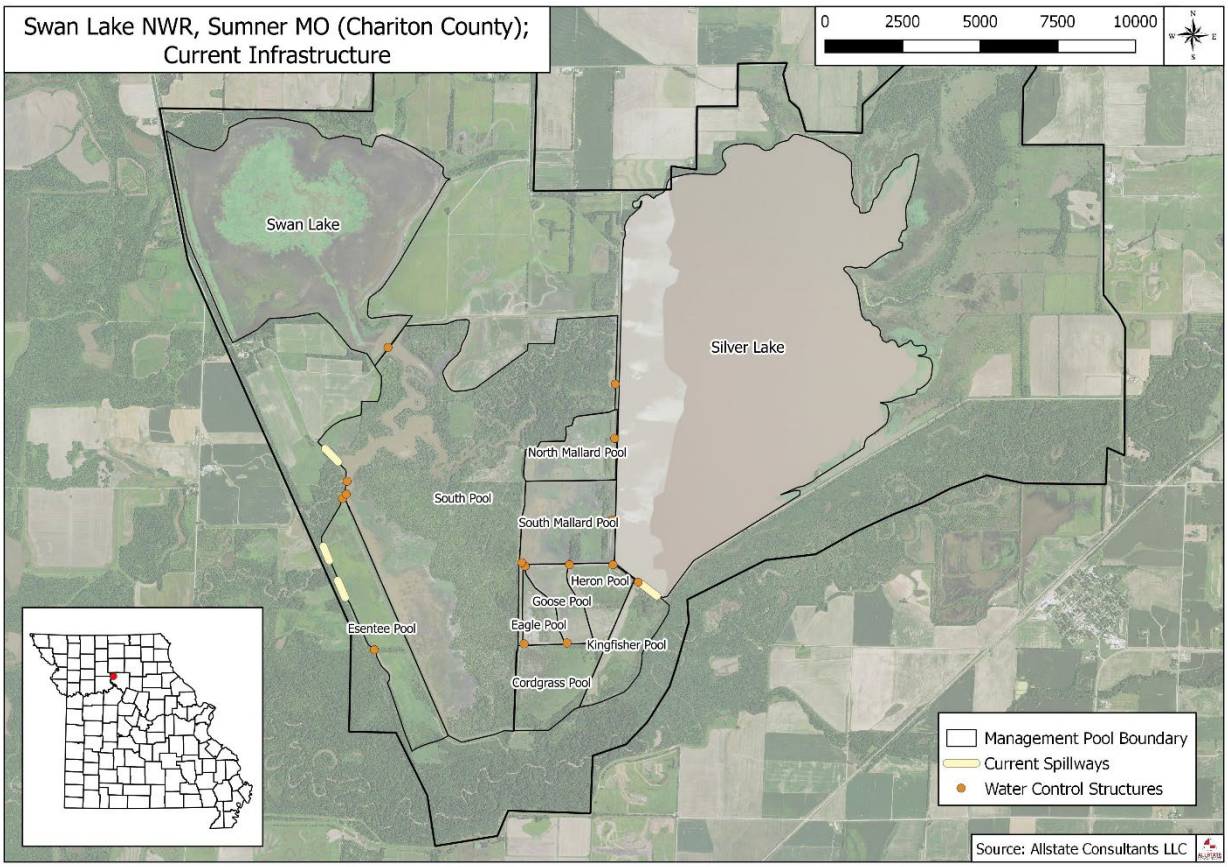

Figure 2 Current Infrastructure Swan Lake NWR

Most of the Refuge levees, berms and dikes were designed to serve two purposes. The first being as flood protection from Grand River and Yellow Creek floods and secondly, to impound water for moist soil management and other seasonal wetlands. However, flood events capable of overtopping Refuge levees have increased on the Refuge over the past several decades, resulting in more frequent and severe impacts to Refuge infrastructure and habitats. The Grand River is showing a statistically significant increase in annual discharge. In addition, there is a change in the magnitude and timing of peak flood events on the river, with flood peaks being larger and occurring anytime throughout the year in more recent years. The Refuge experiences frequent levee-topping flood events from the Grand, and it is possible that peak stage is increasing more rapidly than peak discharge. As such, the frequency and intensity of floods on the Refuge can be expected to increase in the future, and the associated impacts would likely worsen.

These flood impacts have created the following issues on Swan Lake NWR.

Issue #1. Habitat Degradation

a. **Perennial Emergent Marsh-** Perennial emergent marsh habitats on the Refuge are the least intensively managed wetland habitats. These habitat types are probably the least impacted habitat type from the longer flood inundation periods.

To maintain the health of these units, they are dried and disturbed every 4-6 years. Sometimes those intervals are not achievable due to the long dewatering periods in some years caused by the current trend of increased flooding and duration.

b. **Moist Soil Habitats-** To maintain quality shallow water moist soil habitats the units require drying out for part of the year. These drying out and mechanical disturbance actions ensure the long-term quality of these habitats. If these habitats are not dried out and disturbed at least every 2-4 years their long-term viability declines. Currently, it often takes too long to dewater these units for them to dry and be disturbed resulting in habitat degradation.

c. **Wet Prairie-** This habitat type is tolerant to some flooding. In the lower parts of the Refuge, floods tend to have longer inundation periods. The long inundation periods can be detrimental to the long-term quality of wet prairie on the Refuge.

d. Bottomland Hardwood Forest- Bottomland hardwood forest are primarily located along the Yellow Creek floodplain and in lower portions of the Refuge by South Pool and along the remnant stream channels of Elk and Turkey Creek. The long flood inundation periods are killing some of these remnant timber stands and preventing regeneration of less flood tolerant species such as oak and hickory species.

e. **Agriculture-** Portions of the Refuge are currently being farmed until they can be restored to more beneficial habitats for migratory birds and other USFWS trust species. These lands are located in areas that are susceptible to frequent floods and are not providing significant habitat values for migratory birds.

Issue #2. Infrastructure Damage

a. **Levee Damage**- When flood waters overtop the taller levees on the Refuge that were built by the US Fish and Wildlife Service for flood protection of Refuge habitats it can cause extensive damage to them. This requires a lot of staff time to repair and is expensive. The levees are damaged by water overtopping and eroding them on the low water side, and by wave damage once water is impounded inside the levees.

b. **Road Damage-** When flood waters overtop the Refuge public and administrative roads it causes structural damage to the roadbeds and washes gravel away. These are time consuming and expensive repairs that result in prolonged closures of public access roads.

c. **Decreased Public Access-** the 20-mile tour loop that goes through the Refuge is closed to through-traffic most of the time because of water flowing over the Silver Lake Spillway requiring that portion of the road to be closed.

Issue #3. Impacts on Neighboring Private & Public Lands
There are private properties located around the Refuge as well as county, township, and state roads/highways impacted by flooding from the Grand River and Yellow Creek. Additionally, there is the Yellow Creek Conservation Area abutting the Refuge on the Southwest corner. Actions taken to keep flood waters out of Swan Lake NWR can have negative impacts on surrounding properties. Actions taken would consider impacts to flooding issues on surrounding private and public properties.

The purpose of this Proposed Action is:

a. Increase water management efficiency on the Refuge.
b. Expand moist soil unit management capabilities by adding new units and enhancing existing units.
c. Reduce flood damage to Refuge infrastructure and habitats.
d. Decrease inundation periods of managed moist soil units, bottomland hardwood forest, and other historically native habitats to improve these habitat types.
e. Restore floodplain connectivity, improve habitats for waterfowl and other migratory birds, and increase the diversity and resilience of native habitats to benefit a wide suite of wildlife species.
f. Decrease maintenance cost for upkeep and repair of levees, dikes, dams, water distribution ditches, and water control structures.

The Proposed Action is aligned with the goals, objectives, and strategies described in the Swan Lake National Wildlife Refuge CCP. The need for the Proposed Action is to meet the Service's priorities and mandates as outlined by the National Wildlife Refuge System Administration Act to "ensure each refuge be managed to fulfill the mission of the System, as well as the specific purposes for which that refuge was established; assist in the maintenance of adequate water quantity and water quality to fulfill the mission of the System and the purposes of each refuge; ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations of Americans; to recognize compatible wildlife-dependent recreational uses as the priority general public uses of the NWRS through which the American public can develop an appreciation for fish and wildlife; and to ensure that opportunities are provided within the NWRS for compatible wildlife-dependent recreational uses," 16 U.S.C. 668dd(a)(4)).

Additional needs for the Proposed Action include the need to address aging water management infrastructure and shortcomings of the current water management infrastructure with regards to current and future predicted flood frequencies.

Alternatives

A. Alternatives Considered

Alternative A- Infrastructure Softening [Proposed Action Alternative/Preferred Alternative]

Under the Proposed Action Alternative (PAA) the following actions are proposed to be taken:

Set back levees/dikes to reconnect floodplain of Yellow Creek and reduce Silver Lake outflow constrictions.

Lower levees/dikes and add spillways to increase floodplain connectivity along the Grand River and Yellow Creek and decrease flood inundations periods on the Refuge and surrounding properties.

With the help of proposed infrastructure changes, adapt habitat management to increase the quality of habitats on the Refuge.

Promote and restore natural hydrologic processes on the Refuge, such as sheet flow, short duration flooding and shallow inundation.

Convert some current agricultural grounds to moist soil and native habitats.

See map in the Figure 3 below that identifies project areas for the Proposed Action Alternative.

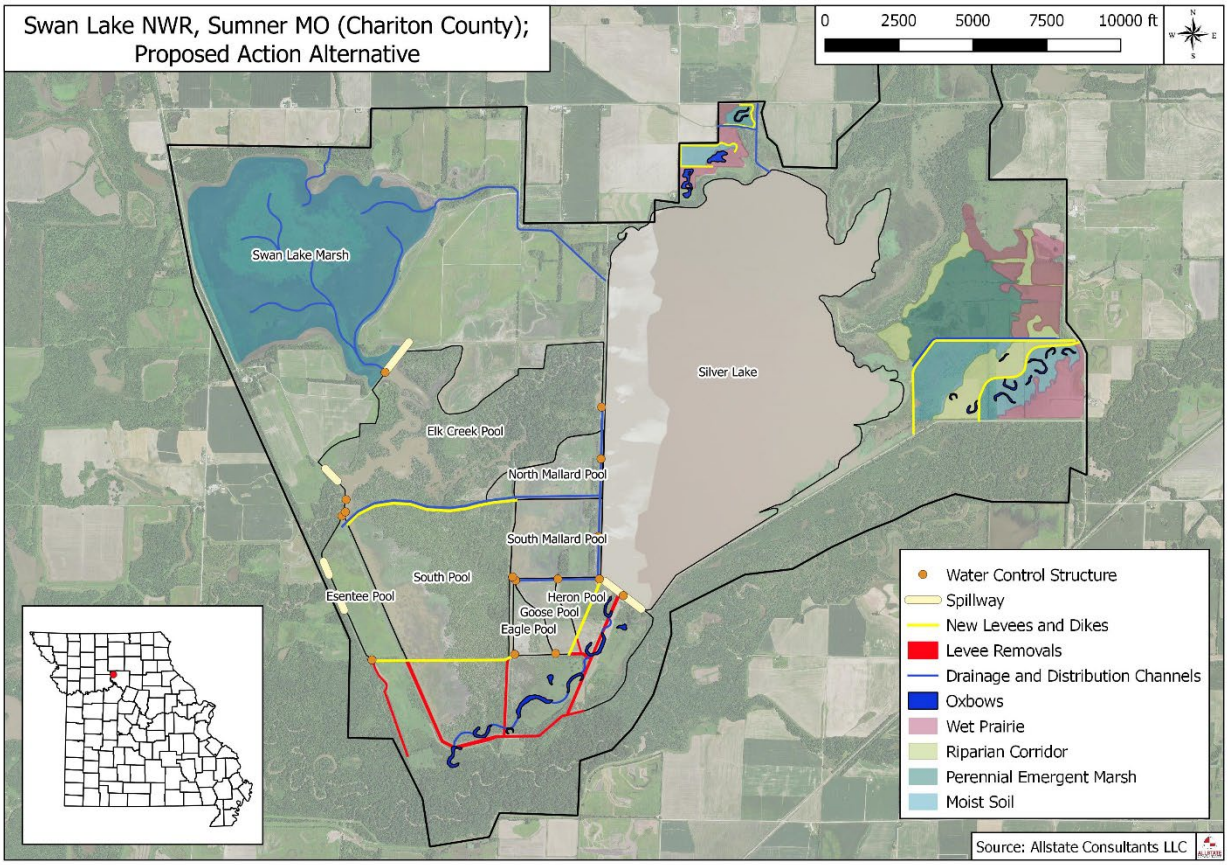

Figure 3 Proposed Action Alternative

The specific projects of the Proposed Action Alternative include the following:

Swan Lake Marsh

1) Lower and construct a spillway in the southern portion of the Swan Lake Dam adjacent to the existing outlet structure.
2) Explore a range of restoration techniques within the marsh to allow for more natural function and higher quality habitat for waterfowl and other migratory birds. Techniques may include, creative borrow and fill, recreation of stream channels, moist soil techniques and micro-infrastructure such as small contour levees, and others action that would improve habitat conditions. One of several potential examples of in-marsh restoration design is outlined in the Figure 2, below.

Desired outcomes

1) Improve drainage from inflowing tributaries.
2) Decrease inundation times on Refuge, other public lands as well as affected private property from Grand River floods.
3) Decrease damage to dikes from inflowing and outflowing floods and wind fetch by decreasing duration of flood inundation.
4) Improve habitat quality within the unit for waterfowl and other migratory birds.
5) Increase drawdown efficiency to improve habitat management capabilities.

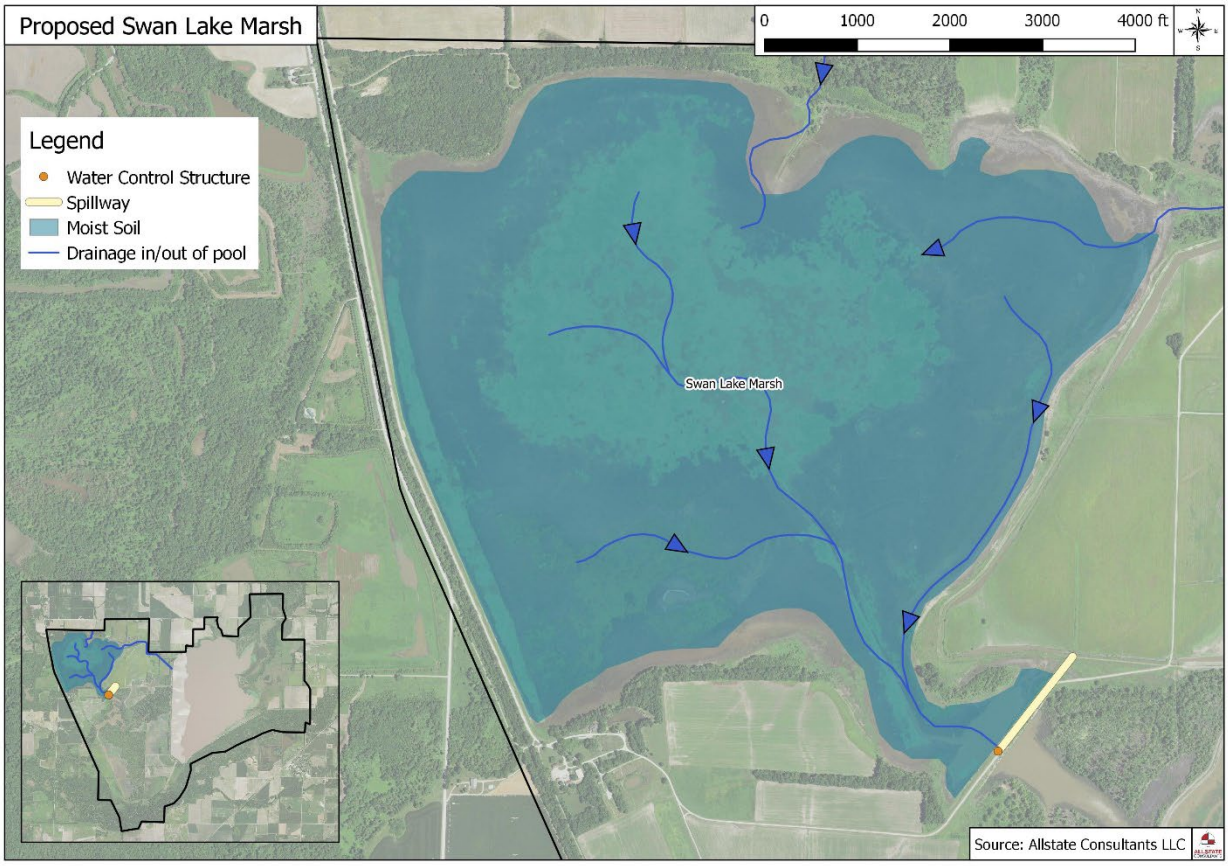

Figure 4 Swan Lake Marsh

Moist Soil/ Prairie Restoration

These projects would occur on northern portions of the Refuge just west of Taylor Point (Figure 3) and areas to the east of Silver Lake, Southeast Restoration (Figure 4).

1) Construct dikes for new moist soil units with low profile structures on some current agricultural units and grassland units.
2) Restore native prairie on some current agricultural units and grassland units.

3) Reroute east drainage ditch to extend the life of the reservoir for the following goals: align with new moist soil units in the southeast restoration.
4) Reduce the need for hardened infrastructure, isolating use to small areas, only where necessary for infrastructure protection.
5) Provide access to Silver Lake to fill the units via a transportable pump unit.

Desired Outcomes

1) Increase wetland habitats on the Refuge to provide mission critical migration habitat for waterfowl and other migratory birds.
2) Increase the diversity and resilience of native habitats to benefit a wide suite of wildlife species.

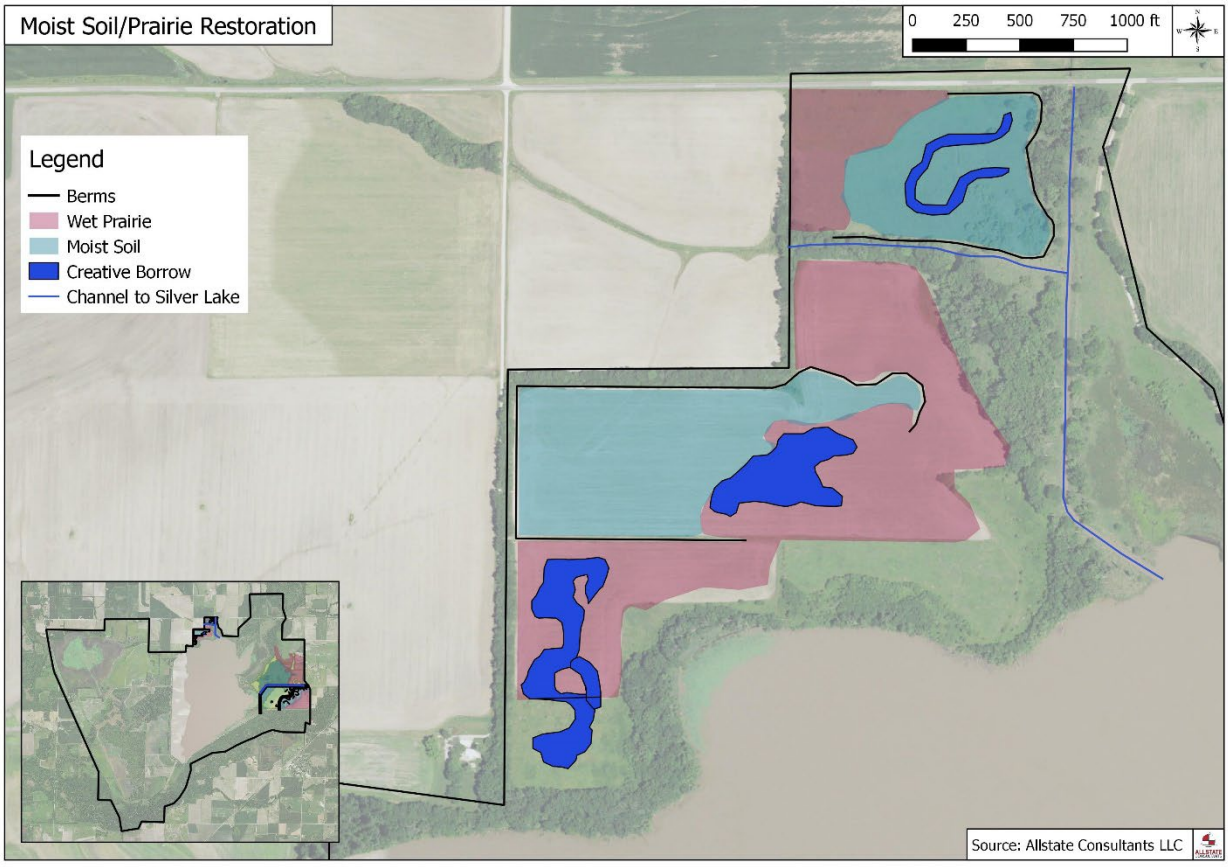

Figure 5 Moist Soil Prairie Restoration North Side

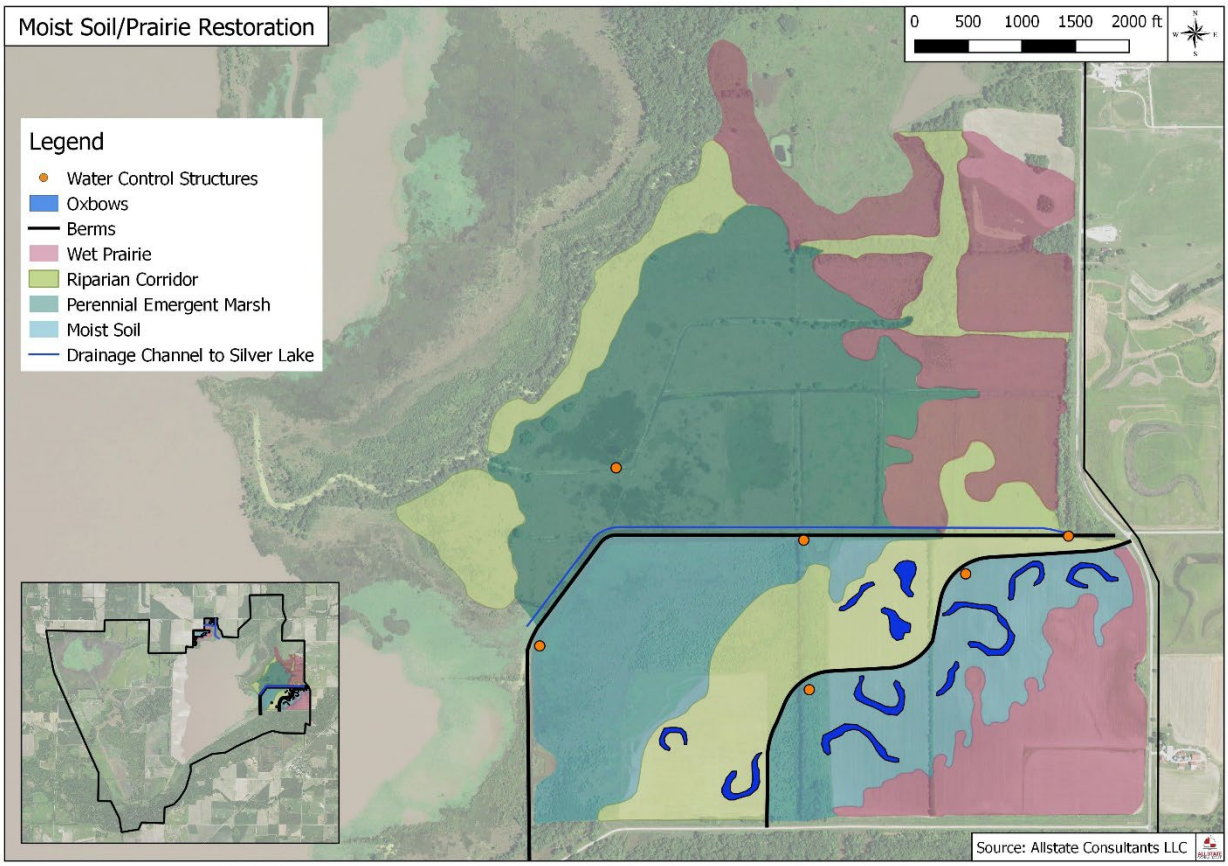

Figure 6 Moist Soil Prairie Restoration East Units

Silver Lake Spillway, Water Supply Efficiency Upgrades, & Training Levee Setback

1) Widen spillway on Silver Lake.
2) Upgrade water delivery structures utilized on Silver Lake to fill wetland management units.
3) Set Training Levee back to the west approximately 25 to 500 yards to include:
   a. Tapering the Training Levee height from north to south.
   b. Placing rip rap on Training Levee where necessary.
   c. Shorten the Training Levee to not extend as far south.

Desired Outcomes

1) Reduce duration of water levels above full pool on Silver Lake for the following benefits:
   a. Reduce periods of backwater in the Turkey & Elk Creek channels.
   b. Reduce extended closure time of spillway crossing due to high water levels.
   c. Allow for better management of the new eastside wetland management units.
2) Improve water supply efficiency from Silver Lake to wetland management units.

3) Upgrade water supply pipes and valves so valves are on the lake side of the pipes to reduce pressure on internal pipes when valves are closed to prevent chance of Silver Lake Dam failure.
4) In areas outside the new levees provide for wetland habitats by creating creative borrows that would be less intensively managed by soil manipulation but ensure capabilities to supply water to the borrow areas during dry years.
5) Decrease restrictions to floodplain on Yellow Creek and waters flowing out of Silver Lake spillway for the following benefits:
    a. Reduce damage to Refuge Training Levee and management dikes behind the Training Levee, which commonly occur when the Training Levee is breached during Yellow Creek, Elk Creek, and Turkey Creek flood events.
    b. Reduce flood impacts on adjacent lands along Yellow Creek.

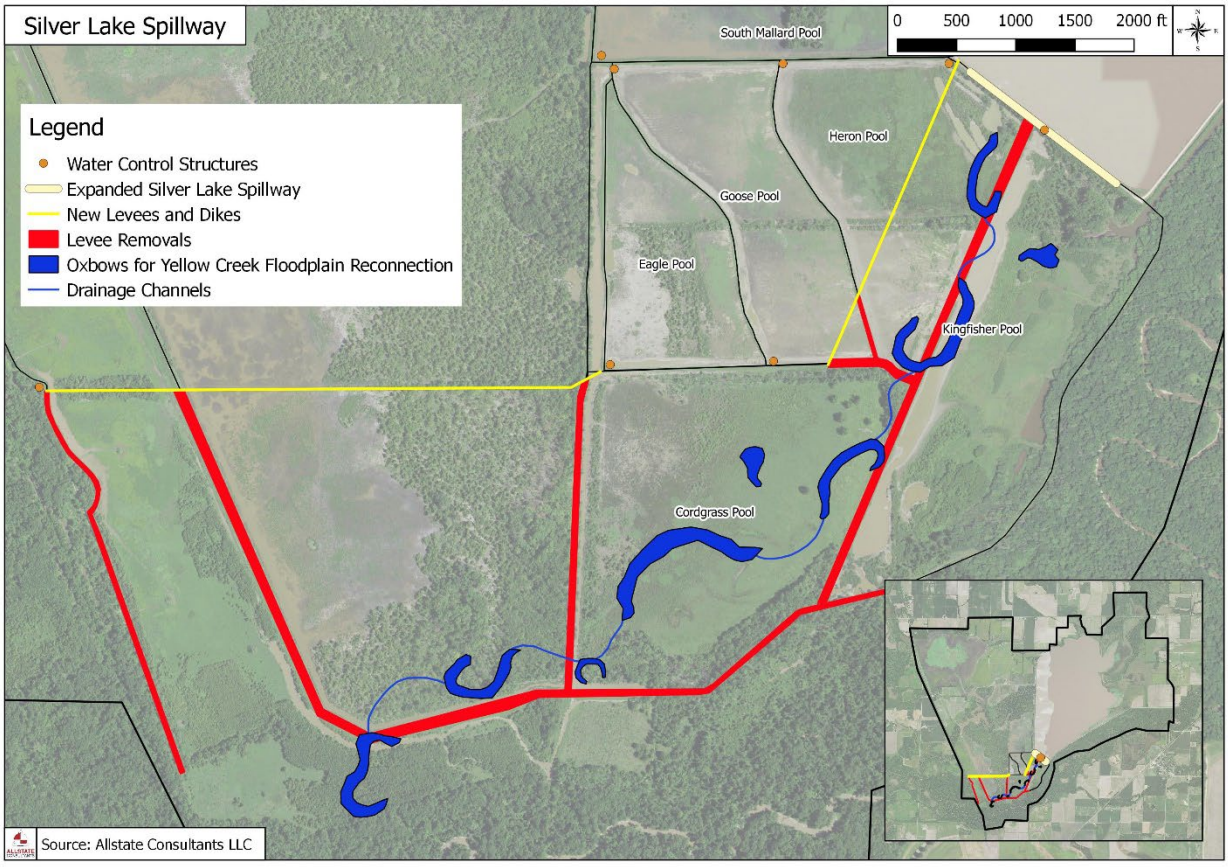

Figure 7 Silver Lake Spillway, Water Supply Efficiency Upgrades, & Training Levee Setback

South Levee Setback & Redesign of South Pool

1) Remove levees along southern portions of South Pool and Essentee Pool. Remove Cordgrass Pool infrastructure.

2) Place new low-profile dike along south ends of pools Essentee, South, Eagle, Heron, and Goose.
3) Convert the west South Pool levee designed to keep flood water out into a dike utilized for water level management in South Pool.
4) If deemed necessary during final design and modeling, incorporate small spillways on the new South Pool dikes on the south end and west side.
5) Lower levee on Elk Creek outlets and upgrade outlet structures.
6) Use hardened infrastructure at a minimum isolated to small areas only where necessary for infrastructure protection.
7) Divide South Pool into two separate units that can be managed independently.
    a. The north unit would include the area along the old Elk Creek channel.
    b. The south unit would be the south portion of the current South Pool, See Figure 8 below.

Desired Outcomes:

1. Reduce damage to levees from overtopping and washing out.
2. Decrease inundation times inside South Pool levee.
3. Manage the moist soil habitat more efficiently in South Pool.
4. Widen the floodplain along Yellow Creek to improve habitat and reduce flood impacts.
5. Distribute water more efficiently when filling and dewatering wetland units.
6. Prevent the Yellow Creek head cut from rechanneling over into the Elk Creek Channel.

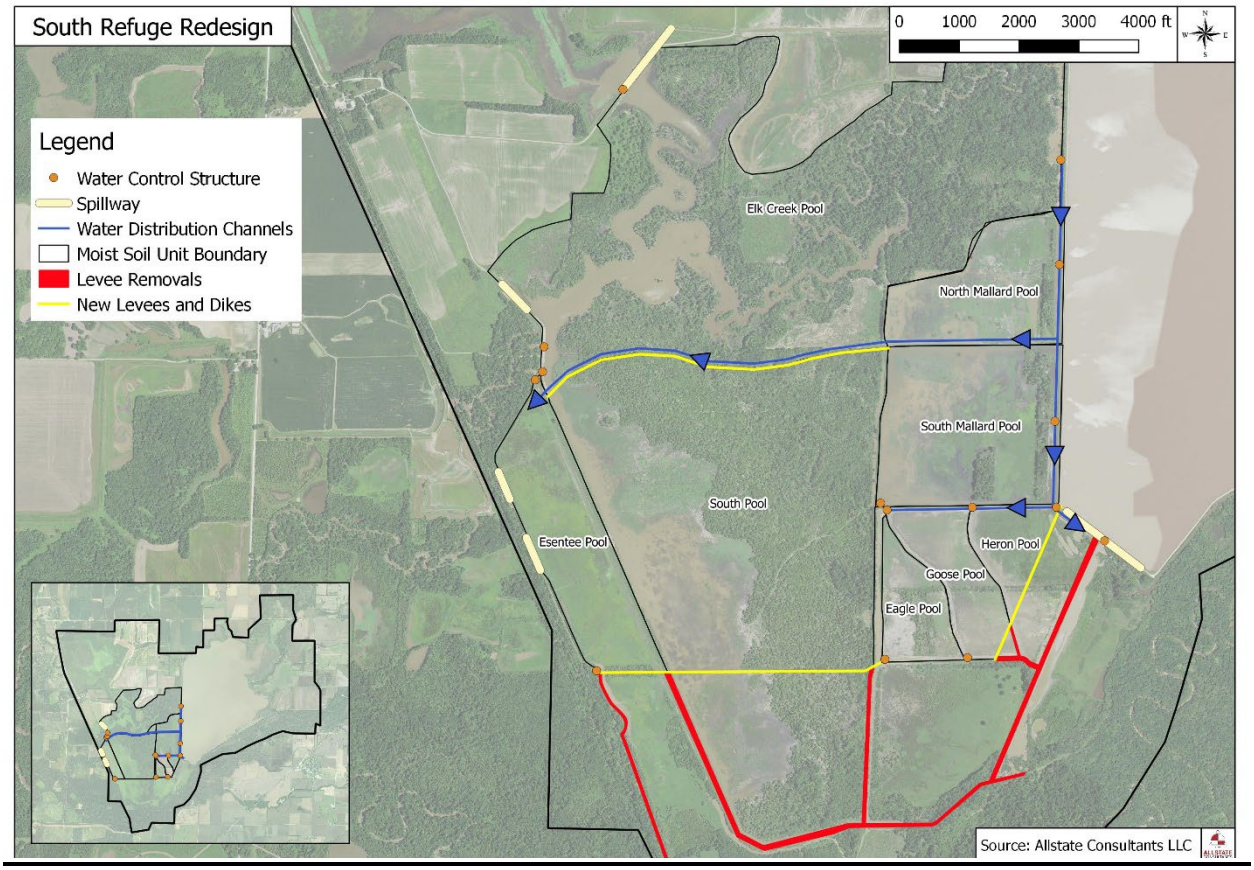

Figure 8 South Levee Setback & Redesign of South Pool

Moist Soil Unit Enhancements-North Mallard, South Mallard, Eagle, Goose, And Heron Pools Redesign

1. Expand North Mallard Unit to include area to the west of existing unit.
2. Redesign South Mallard and North Mallard Levees to a lower profile dike.
3. Upgrade current dikes on Eagle, Goose, and Heron Pools to reduce slopes.
4. Reduce the need for hardened infrastructure, isolating use to small areas, only where necessary for infrastructure protection.
5. Upgrade inlet and outlet pipes on each unit to provide adequate water conveyance to fill and draw down the units in a timely manner.
6. Improve habitat inside units by creating micro-topography so the wetland habitat is diversified with a variety of depths to provide habitat for a broad range of migratory bird species.

Desired Outcomes

1) Reduce infrastructure damage to dikes during flood events.
2) Reduce the height and duration of inundation during flood events.
3) Enhance floodplain connectivity to the Grand River and Yellow Creek.

4) Improve bottomland hardwood forest habitat along Yellow Creek.
5) Enhance habitat to benefit waterfowl and migratory birds.
6) Increase the diversity and resilience of native habitats to benefit a wide suite of wildlife species.

These actions would reduce flow constriction points that necessitate hardened infrastructure. Instead, lowering infrastructure to allow flood levels to rise and fall without constriction. Hardened infrastructure would be limited to small areas where necessary for infrastructure protection.

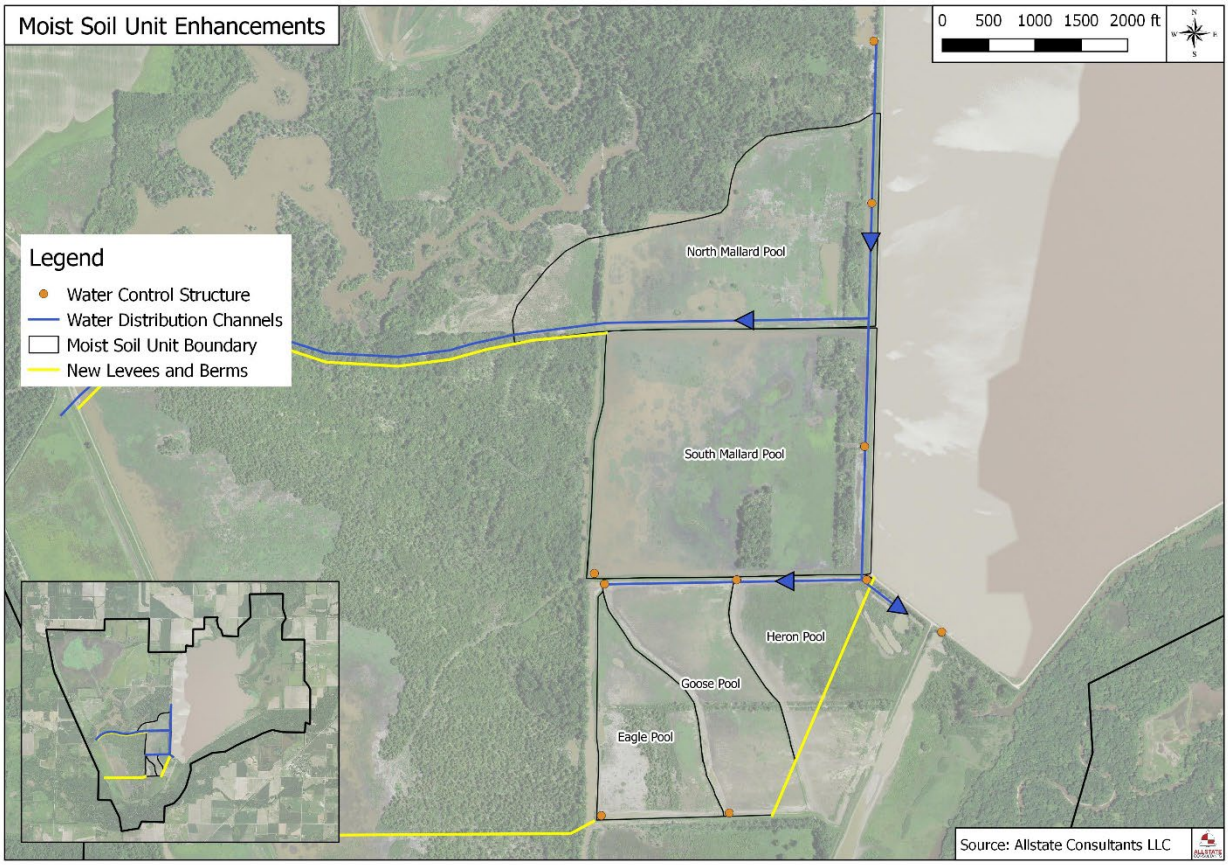

Figure 9 Moist Soil Unit Enhancements

Alternative B - Infrastructure Hardening

Under this alternative existing water management and flood control infrastructure would remain in place but be hardened to prevent flood damage. "Hardening" infrastructure is the concept of leaving it in place and physically improving or retrofitting it to make it more capable of withstanding damage from flooding frequency, severity, and duration. This would also involve

extensive applications of rip rap rock to prevent damage to levees. Earlier in the document Figure 2 showed existing infrastructure. Figure 10 below shows that infrastructure and what potential hardening measures would reasonably be required in the future, For example, in some cases existing levees/dikes would be raised to keep Yellow Creek and Grand River flood waters from overtopping the improved levees and protect habitats within the levees from flood impacts. Pump stations would have to be strategically placed to pump excess waters built up inside the levees during large flood events and rainfall activity.

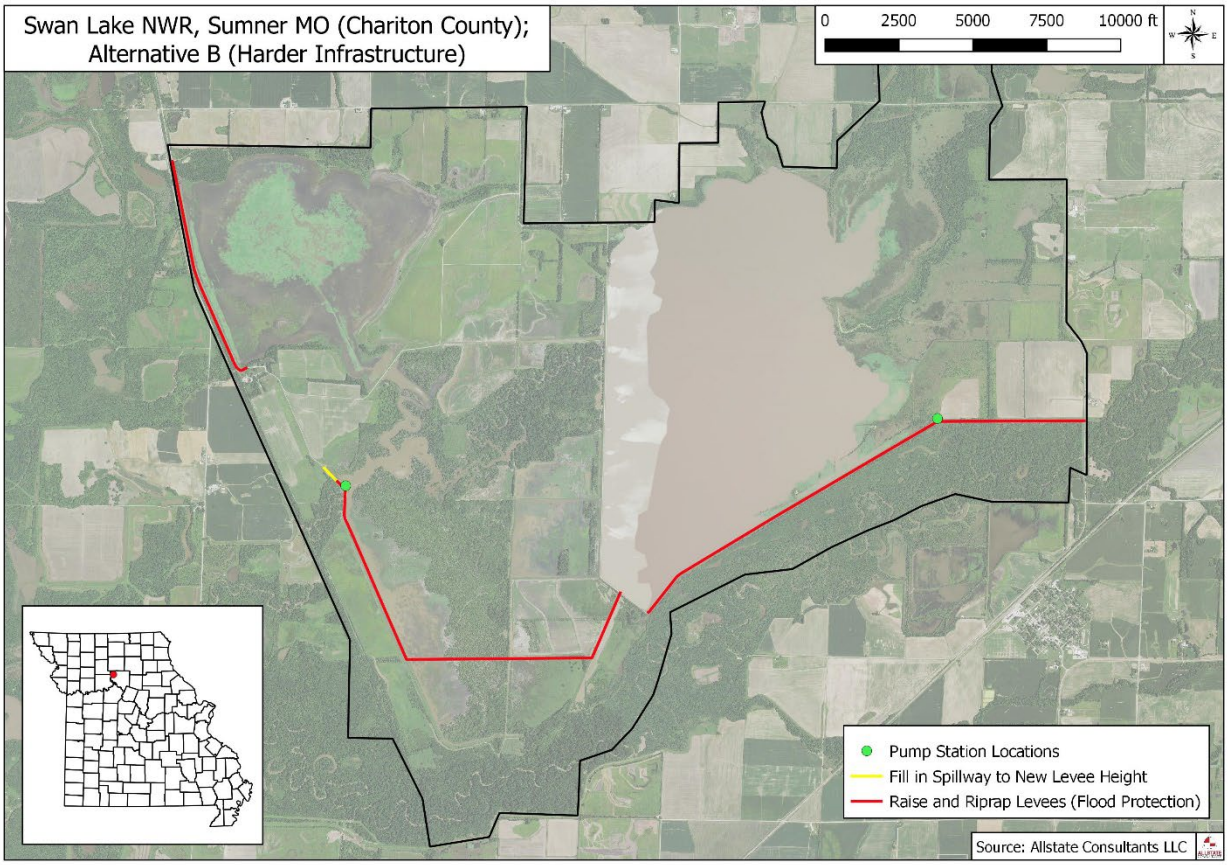

Figure 10 Alternative B Hardened Infrastructure

Alternative C – Continue Current Management – [No Action Alternative]

Under the No Action Alternative, no changes would be made on water management infrastructure. Infrastructure would be maintained in its current status (Figure 2) with the capabilities to deliver and mange water unchanged. Based on past experience and the knowledge of future predicted flood regimes in the area, damages would likely increase and repairs would be made as necessary and budgets and staff allow.

B. Alternative(s) Considered, But Dismissed From Further Consideration

Numerous flood damage reduction and habitat improvement ideas were identified during scoping meetings. The following actions which could have formed additional alternatives were dismissed following preliminary evaluations of their feasibility and additional scoping:

- Lowering of Swan Lake NWR entrance road/levee.
  This would reduce access to private property during flood events. Often times the Refuge entrance road is their only terrestrial access to their properties.
- Placing large culverts in the Swan Lake west levee/entrance road.
  Through some modeling evaluations it is not clear this would be beneficial in achieving our goals of flood plain connectivity. This coupled with the high cost makes this less feasible.
- Lowering of the Silver Lake Dam.
  This would not be cost effective as the benefits would be minimal and it would not achieve our goals of flood plain connectivity.
- Installing larger water control structures in Silver Lake Dam.
  This would not be cost effective and goals it would achieve are being achieved with a widened spill way on Silver Lake.
- Periodic drawdowns of Silver Lake.
  It was determined not to include any management objectives beyond water supply and delivery for Silver Lake. This is a controversial issue and we determined because of the complexities associated with it, that it should be addressed as a stand-alone project outside the scope of the proposed action.
- Utilizing Swan Lake Marsh as a water supply reservoir. Dividing the Swan Lake Marsh into different management units built along contour lines
  It was determined to hold off on any issues within the basin of the Swan Lake Marsh until we can determine the effects to the unit of the additional spillways and lowered levees on the unit if that alternative is selected through this NEPA process. Therefore, any specific habitat management or water storage capabilities would be best determined later in a stand-alone project once we see the changes to infrastructure makes on that unit.

Affected Environment and Environmental Consequences

The Refuge consists of approximately 17 square miles in Chariton County, Missouri.

Swan Lake National Wildlife Refuge is primarily bottomland forest, agricultural, grasslands (native and exotic) and wetland habitat. The Proposed Action is located throughout the Refuge, in disturbed areas and where habitat values are being limited by the shift in historic flooding regimes creating impacts on infrastructure.

This section analyzes the environmental consequences of the action on each affected resource, including direct and indirect effects from alternatives A through C described above. This EA includes the written analyses of the environmental consequences on a resource only when the impacts on that resource could be more than negligible and therefore considered an "affected resource" or are otherwise considered important as related to the Proposed Action. Any resources that would not be more than negligibly impacted by the Proposed Action have been dismissed from further analyses.

Tables1-5 provide:

1. A brief description of the affected resources in the Proposed Action area, and
2. Direct and indirect impacts of all alternatives considered, including the Proposed Action Alternative (also known as the preferred alternative), on those resources.

Table 6 provides a brief description of the anticipated cumulative impacts of all alternatives considered including the Proposed Action Alternative (also known as the preferred alternative).

Impact Types:

- *Direct effects* are those which are caused by the action and occur at the same time and place.
- *Indirect effects* are those which are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable.
- *Cumulative impacts* result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions.

Table 1 - Affected Natural Resources & Anticipated Impacts of the Proposed Action Alternative and All Other Alternatives Considered

Affected Resource
Terrestrial & Aquatic Wildlife Species The Refuge supports a wide variety of wildlife species, including game and nongame species, reptiles, amphibians, and freshwater mussel species which are important contributors to the overall biodiversity on the Refuge. A complete list of wildlife species and rare plant species found on the Refuge can be found in the Refuge's Comprehensive Conservation Plan (US Fish and Wildlife Service 2011). Songbirds and raptors breed at the Refuge, whereas shorebirds, wading birds and waterfowl primarily utilize the Refuge as wintering and migratory stop over habitat. Federally listed and candidate species as well as other species of special concern are addressed in a separate section below.

ANTICIPATED DIRECT AND INDIRECT IMPACTS

Alternative A Softened Infrastructure (Proposed Action Alternative/Preferred Alternative)-
Impacts of Alternative A would be positive with regards to wildlife. Decreased inundation periods would result in better quality wildlife habitat on the Refuge. The floodplain connectivity afforded by this alternative would improve habitat for aquatic and terrestrial species that depend upon these habitats for survival. Softened infrastructure will result in less damage during flood events and would allow Refuge resources to be more focused on habitat management rather than infrastructure maintenance and repair. Tree species would need to be removed in numerous areas associated with this effort. Even though there may be some short-term side effects, it is anticipated that the proposed action would have long term benefits for forest dependent wildlife species due to greater overall forest health on the Refuge and adjacent areas. Tree species would be removed only during periods of time when bat species are absent. Construction and other disturbance such as access, timing of access would be limited during key migratory bird stopover periods to minimize disturbance and displacement of wildlife during these times. During construction short-term noise impacts would also be encountered but is not expected to result in significant impacts to wildlife.

Alternative B: Hardened Infrastructure

Impacts of Alternative B would have some positive impacts on habitats. Hardening the infrastructure would result in less inundation days due to flood protection, although localized rains would still trap waters inside levees that would not be able to be evacuated until river flood waters recede. Aquatic species would not benefit as much as under Alternative A due to a continued loss of connectivity to the floodplain. Construction and other disturbance would be limited during key migratory bird stopover periods to minimize disturbance and long-term displacement during these times. During construction short-term noise impacts would also be encountered, but is not expected to result in significant impacts to wildlife.

Alternative C: Continue Current Management [No Action alternative]

Impacts from Alternative C would be minimal in the short term but negative in the long term. Infrastructure would continue to be repaired as needed and any noise or habitat destruction would be short-term and limited during key migratory bird stopover periods to minimize disturbance and long-term displacement during these times. Flood impacts on the Refuge would continue with long inundation periods decreasing the diversity of terrestrial and aquatic wildlife species.

Affected Resource

Threatened and Endangered Species and Other Special Status Species

Records indicate three federally listed and other special status species occurring on the Refuge: the recently delisted Interior Least Tern (*Sterna antillarum athalassos),* and the endangered Indiana Bat (*Myotis sodalis*), Tricolored Bat *(Perimyotis subflavus)*, Monarch Butterfly *(Danaus plexippus)*, and Northern Long-eared Bat (*Myotis septentrionalis*). These records indicate presence on areas of the Refuge near sites of other alternatives that were considered, but dismissed, due to such presence. Interior Least Terns - Colonies utilize un-vegetated sandbars for nesting, which do not occur on the Refuge. Terns have only occasionally been observed foraging within large, shallow lakes in summer months.

Indiana and Northern long-eared bats - These species hibernate in caves or mines between November 1 to March 31, and roost in trees that have exfoliating bark, cracks, crevices, and/or hollows with 3–5-inch diameter at breast height from April 1 to October 31. In addition to woodland habitats, potential active season habitats may also include adjacent emergent wetlands and edges of agricultural fields. Prior to beginning any specific project associated with any alternative, a Section 7 Intra-service Consultation will be completed with the local US Fish and Wildlife Service Endangered Species Program Office to ensure any potential impacts to these species are addressed.

ANTICIPATED DIRECT AND INDIRECT IMPACTS

Alternative A Softened Infrastructure (Proposed Action Alternative/Preferred Alternative)-

There would be no anticipated impacts on threatened and endangered species under this alternative. Any work involving dead trees would be very minimal and if necessary, conducted outside the time frame (November 1- March 31) Indiana Bats and Northern Long Eared Bats occur on the Refuge.

Alternative B: Hardened Infrastructure

There would be no anticipated impacts on threatened and endangered species under this alternative. Any work involving dead trees would be very minimal and if necessary, conducted outside the time frame Indiana Bats and Northern Long Eared Bats occur on the Refuge. A positive impact with this Alternative is with the water inundation periods extending in duration there are lots of large hardwood trees dying. These trees would make good bat habitat for roosting purposes in the future.

Alternative C: Continue Current Management [No Action alternative]

There would be little to no anticipated impacts on threatened and endangered species under this alternative. A positive impact with this Alternative is with the water inundation periods extending in duration there are lots of large hardwood trees dying. These trees would make good bat habitat for roosting purposes in the future.

Affected Resource

Floodplains

The Refuge lies in the floodplain of the Grand River near its confluence with the Missouri River and is bordered on the south by Yellow Creek. Flooding is common, especially during spring and summer periods. The Refuge acreage is divided into five major habitat types: 3,100 acres of bottomland hardwoods; 3,050 acres of wetlands and moist soil units; 1,365 acres of croplands; 2,100 acres of open water; and 1,250 acres of grasslands. Silver Lake serves as the Refuge's reservoir pool. Flowage ditches and water control structures can easily transfer the water from this lake to smaller but more manageable wetland units.

ANTICIPATED DIRECT AND INDIRECT IMPACTS

Alternative A Softened Infrastructure (Proposed Action Alternative)-

Alternative A would widen the floodplain on both the Yellow Creek and Grand River floodplains within the Refuge. It would allow for greater connectivity to these riverine ecosystems and allow for more natural floodplain processes to occur on Refuge lands. Neighboring lands would see benefits with less intense floods and fewer inundation days.

Alternative B: Hardened Infrastructure

Alternative B would keep the floodplain constricted along Yellow Creek and the Grand River. It would increase flood heights and inundation periods on the current floodplains on both the Refuge and neighboring lands. It would pose negative impacts on neighboring private and public lands as well as others in the extended Yellow Creek and Grand River floodplains. Local floods from Elk Creek, Turkey Creek, Tuff Branch and other ditches that enter the Refuge would cause flooding inside the levees. This would require cost-prohibitive pumping to remove water in many cases. Eventually heightened levees would overtop during flood events causing extensive damage and trapping large quantities of water inside the levees increasing inundation periods.

Alternative C: Continue Current Management [No Action alternative]

Alternative C would keep the floodplains along Yellow Creek and the Grand River constricted. This would put more pressure on Refuge levees and neighboring lands adjacent to the Refuge.

Table 2 - Affected Visitor Use and Experience and Anticipated Impacts of the Proposed Action Alternative and All Other Alternatives Considered

Affected Resource
Visitor Use The Refuge provides a wide variety of wildlife dependent recreational opportunities, including hunting, fishing, wildlife observation, wildlife photography, and environmental education. The Refuge offers the following hunting programs: disabled hunter deer hunts, youth deer hunts, waterfowl hunting, squirrel hunting, and managed public deer hunts. Averaging over 25,000 visitors annually, the Refuge serves as a vital resource for the rural communities nearby. **ANTICIPATED DIRECT AND INDIRECT IMPACTS** **Alternative A: Softened Infrastructure (Proposed Action Alternative/Preferred Alternative)-** Alternative A would improve public access to much of the Refuge by reduction in damage from floods to public roads and foot trails. It would add additional wetland habitats in open hunting areas for waterfowl that would add to the quality of the waterfowl hunting program. This Alternative would provide for additional and enhanced wildlife viewing and photography opportunities on the Refuge by expanding habitats and improving management of existing habitats. This project would extend the time that visitors can pass through the Silver Lake spillway allowing the loop drive to be open to thru traffic for longer periods. **Alternative B: Hardened Infrastructure** This alternative would have the same effects as Alternative A on Refuge recreational opportunities. Inundation periods would still be an issue as flood waters would get trapped inside the management levees and could not be drawn down until flood waters recede. **Alternative C: Continue Current Management [No Action alternative]** Under Alternative C public use access and facilities would continue to degrade due to increasing flood frequencies and impacts to infrastructure. This alternative would leave public roads closed for longer periods due to outflow from Silver Lake spillway and waters trapped inside levees.

Table 3 - Affected Cultural Resources & Anticipated Impacts of the Proposed Action Alternative & All Other Alternatives Considered

Affected Resources

CULTURAL RESOURCES

North-central Missouri contains archeological evidence for the earliest suspected human presence in the Americas, the Early Man cultural period prior to 12,000 B.C.; and extending through the Paleo-Indian, Archaic, Woodland, Mississippian, and historic Western cultures. Although a complete cultural survey of the Refuge has not been performed, earlier partial surveys have located 30 historical and archeological sites. Prior to any construction involving ground disturbance an Archeological Survey will be conducted.

ANTICIPATED DIRECT AND INDIRECT IMPACTS

Alternative A Softened Infrastructure (Proposed Action Alternative/Preferred Alternative)-

Alternative A would have no impact on cultural resources as all project areas affected had been disturbed prior to the existence of the Refuge. An archeological survey was performed in September of 2022 on all sites that would be affected by construction of the Proposed Action (Preferred) Alternative. Based on this survey, an archaeological review was completed, and information based upon this review will be provided to, and clearance will be obtained from the US Fish and Wildlife Service Regional Historic Preservation Officer / Archaeologist as well as clearance from the Missouri State Historic Preservation Office prior to any ground disturbing activities being undertaken.

Alternative B: Hardened Infrastructure

There would be no impact on cultural resources as all the areas affected have been disturbed since before the existence of the Refuge.

Alternative C: Continue Current Management [No Action alternative]

There would be no effect from Alternative C to Cultural Resources as all the areas affected have been disturbed since before the existence of the Refuge.

Table 4 - Affected Refuge Management & Operations & Anticipated Impacts of the Proposed Action Alternative & All Other Alternatives Considered

Affected Resource

Land Use, Habitat and Vegetation

The Refuge acreage is divided into five major habitat types: 3,100 acres of bottomland hardwoods; 3,050 acres of wetlands and moist soil units; 1,365 acres of croplands; 2,100 acres of open water; and 1,250 acres of grasslands. Land use around the Refuge is predominantly agriculture with soybeans, corn, and wheat as the major crops. Beef cattle and hogs are the principal livestock.

ANTICIPATED DIRECT AND INDIRECT IMPACTS

Alternative A Softened Infrastructure (Proposed Action Alternative/Preferred Alternative)-

Alternative A would improve land use on the Refuge. By reducing flood inundation periods, it would enhance existing habitats and expand habitats including native prairie, shrub swamp, bottom land hardwood forest, perennial marsh and managed wetlands. These reduced inundations periods would also provide positive benefits to adjacent public and private lands and downstream lands along the Yellow Creek and Elk Creek channels. This Proposed Action Alternative would reduce the number of acres currently being farmed by 240 acres. With current restrictions on non-GMO seed and neonicotinoid treated seed many of these acres are difficult to farm for the maximum benefits to wildlife. Converting these farmed Refuge acres to wetland and grassland habitats would provide much more benefit to waterfowl and other trust species. The impact of this alternative on surrounding lands/land use would be reduced flood duration on adjacent lands as the softened infrastructure would allow flood waters to recede more rapidly, therefore reducing risk of crop failure or other flood damage. In addition, improved habitats will increase wildlife use on-refuge, and in turn improve hunting opportunities off-refuge, which may result in increased income for leased hunting operations.

Alternative B: Hardened Infrastructure

Alternative B would improve land use on the Refuge. By reducing flood inundation periods, it would enhance existing habitats and expand habitats including native prairie, shrub swamp, bottom land hardwood forest, perennial marsh and managed wetlands. This alternative would, however, have negative impacts on surrounding private and public lands by increasing the intensity of flood peaks off Refuge due to a heightening of levees to protect Refuge lands from flooding. This would result in additional off Refuge acres being negatively impacted by floods. Even with hardening these taller levees there would still be overtopping in some areas that could result in levee failures due to more frequent overtopping and damage to public

infrastructure (roads, utilities, etc.) to be more intensified. These impacts would be less destructive with hardening of levees in specific locations.

Alternative C: Continue Current Management [No Action alternative]

There would be no change to the current progression of impacts on lands under Alternative C. This alternative would result in the continued degradation of habitats on the Refuge. In addition, impacts to surrounding public and private land use would continue to degrade by prolonged flooding directly impacting neighboring lands and degraded refuge habitats limiting recreational use on private lands.

Affected Resource

Administration

Refuge staff consist of three permanent employees, including the refuge manager, wildlife technician, and a maintenance worker. In addition, a variety of seasonal employees are hired to assist the permanent refuge staff in management activities.

ANTICIPATED DIRECT AND INDIRECT IMPACTS

Alternative A Softened Infrastructure (Proposed Action Alternative/Preferred Alternative)-

Alternative A would allow for more efficient management on Refuge wetlands and water management infrastructure. The increased efficiency and decreased maintenance from this softening of infrastructure would decrease the staff workload associated with the upkeep of facilities and infrastructure that would result from a structural solution. It would also save money through decreased maintenance required to replace old infrastructure as needed and routine repairs needed from frequent flood damage.

Because this alternative meets the criteria to serve as mitigation for the approved Roy Blunt Reservoir as described in the Environmental Impact Statement AND Record of Decision published May 11, 2022 the cost for the construction/developments associated with this project would be funded up to 75% by the Natural Resources Conservation Services (NRCS) and up to 25% by the Missouri Department of Natural Resources (MDNR) through the Missouri Resources Fund administered by the MDNR. This would cover all planning, engineering, design, contracting, and construction of the project. Ongoing care, maintenance, management and monitoring would be conducted by the US Fish and Wildlife Service.

Alternative B: Hardened Infrastructure

Alternative B would allow for more efficient management on Refuge water management by repairing, replacing and improving current old and failing infrastructure to be able to handle the increasing flooding intensity, duration and frequency. It would, however, increase the staff

workload associated with maintaining water management infrastructure because of increased maintenance requirements on larger levees.

The cost of these projects would need to be funded through resources that come available within the US Fish and Wildlife Service funding and other funding sources that might come available such as federal highways and special funding sources to repair and prevent future flood damage. This alternative would more than like be funded mostly through partnership opportunities such as North American Wetlands Conservation Act in partnership with Ducks Unlimited and other partners such has been done in the past at Swan Lake NWR.

Alternative C: Continue Current Management [No Action alternative]

Under Alternative C there would continue to be a large workload on maintaining water management infrastructure and water delivery systems due to their age and being undersized and under-engineered for the increased flooding intensity, duration and frequency. It would also require a lot of staff time performing repairs on levees after large flood events which have become much more frequent and intense.

Table 5 Affected Socioeconomics & Anticipated Impacts of the Proposed Action Alternative & All Other Alternatives Considered

Affected Resource

Socioeconomics

The Refuge is located in Chariton County, a county with a population of 7,426 and about 12.5% of its population living at or below the poverty level (USCB, 2019). The Refuge is approximately 6 miles from the city of Mendon, Missouri to the southeast and an equidistance from Sumner, Missouri to the northwest with populations of 323 and 131, respectively (USCB, 2019). The predominant land uses in the vicinity of the Refuge are grazing and irrigated farming. The Refuge is tied to the local economy largely through the public's use of the Refuge for recreational opportunities. These opportunities typically come in the form of subsistence activities such as fishing and hunting, as well as recreational activities like wildlife viewing and sightseeing. The combined visitation to the Refuge for these uses Refuge averages about 25,000 people per year.

ANTICIPATED DIRECT AND INDIRECT IMPACTS

Alternative A Softened Infrastructure (Proposed Action Alternative/Preferred Alternative)-

Under Alternative A wetlands would be improved, enhanced, and expanded on the Refuge. This would result in improved habitats and additional habitats that attract a diversity of waterfowl. Waterfowl hunting is a major economic driver in Northwest Chariton County. This provides benefits to the local economy and Swan Lake NWR is a major contributor by attracting the large numbers of birds on the Refuge.

Alternative B: Hardened Infrastructure

Under Alternative B wetlands would be improved, enhanced, and expanded on the Refuge. This would result in improved habitats and additional habitats that attract a diversity of waterfowl. Waterfowl hunting is a major economic driver in Northwest Chariton County. This provides a lot to the local economy and Swan Lake NWR is a major contributor to that by attracting the large numbers of birds on the Refuge. There would be additional cost in maintenance and repair of the taller levees considered under this alternative.

Alternative C: Continue Current Management [No Action alternative]

Alternative C would eventually lead to a decline in waterfowl use on Swan Lake NWR because of habitat degradation due to current flood frequencies and inundation periods. This would have negative impacts upon the local economy and what waterfowl hunting does to impact the local economy.

Affected Resource

ENVIRONMENTAL JUSTICE

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires all Federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities.

ANTICIPATED DIRECT AND INDIRECT IMPACTS

Alternative A Softened Infrastructure (Proposed Action Alternative)-

Alternative A, which is primarily habitat driven would have no to little impact on environmental justice. Some of the peripheral work to public roads could have positive impacts on Refuge visitors which tend to be mostly local. Minority or low-income populations are not disproportionately impacted by this alternative.

Alternative B: Hardened Infrastructure

Alternative B, which is primarily habitat driven would have no to little impact on environmental justice. Some of the peripheral work to public roads could have positive impacts on Refuge visitors which tend to be mostly local. Minority or low-income populations are not disproportionately impacted by this alternative.

Alternative C: Continue Current Management [No Action alternative]

Alternative C would have little to no effect or impact on environmental justice. Minority or low-income populations are not disproportionately impacted by this alternative.

Cumulative Impact Analysis

Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7).

Alternative A (Proposed Action Alternative/Preferred Alternative): No long-term negative cumulative impacts would occur to Refuge resources or to any wildlife species due to activities associated with this alternative or similar action by the Service or other agencies.

Overall, construction under Alternative A would not result in any loss of existing habitat. It would increase habitat on Swan Lake NWR as well as enhance existing wildlife habitat. This Alternative A would increase, substantially, the long-term positive effects and viability of wetlands and other habitats on the Refuge. This Alternative would provide positive impacts to Refuge neighboring landowners by decreased flood inundation periods on their properties as well. Over the long term this Alternative would provide positive cumulative impacts on Refuge lands as well as neighboring private and public lands.

Alternative B: No long-term negative cumulative impacts would occur to Refuge resources or to any wildlife species due to activities associated with this alternative or similar action by the Service or other agencies.

Alternative C (No Action alternative):
This alternative could have negative cumulative impacts on neighboring private lands as it would result in less floodplain storage on the Refuge side of Yellow Creek pushing more flood waters onto other properties. This problem would be compounded over time with negative impacts on habitats and infrastructure in the floodplain.

Table 6 Anticipated Cumulative Impacts of the Proposed Action Alternative & All Other Alternatives Considered

Cumulative Impacts

Past, Present, and Reasonably Foreseeable Activity Impacting Affected Environment

Climate Change

Changing weather patterns, whether natural or due to anthropogenic causes, are expected to have a variety of effects to natural processes and resources. However, the complexity of ecological systems means that there is a tremendous amount of uncertainty about the impact climate change will have. In particular, the localized effects of climate change are still a matter of much debate. That said, the combination of expected increased frequency and severity of flooding events in the Grand River floodplain and the Midwest in general (Downer, et al. 2014, EPA 2016) could dramatically change hydrological systems on the Refuge increasing the need for softer infrastructure to enhance wetland habitat management and protection of native habitats.

Descriptions of Anticipated Cumulative Impacts

As described in earlier sections of this Environmental Assessment flooding has become more frequent in recent years at the Refuge and these flooding events are expected to increase in both frequency and severity in the coming years (Downer, et al. 2014, EPA 2016). This would exacerbate already existing maintenance issues, by softening infrastructure it would enhance management, save Refuge staff time and money on maintenance of infrastructure and enhance habitats on the Refuge.

Alternative A Softened Infrastructure (Proposed Action Alternative/Preferred Alternative)
Alternative A would allow for greater flexibility to adjust our habitat management objectives as flood regimes and climatic patterns change over time. This Alternative softens much of the Refuge's infrastructure to function with natural flooding and prevent damage and off Refuge negative impacts from occurring.

Alternative B: Hardened Infrastructure
Alternative B would be a continuation of what has historically happened at the Refuge. As flood waters become more frequent, infrastructure is raised. This causes negative impacts on Refuge neighbors by impounding waters for a longer period of time due to the limited ability of the refuge to drain once infrastructure becomes overtopped. It also requires a continual maintenance and raising of levees as things change over time.

Alternative C: No Action Alternative

This Alternative would have increasingly negative impacts due to climate change. Increasing flood regimes would continue to degrade our habitat and infrastructure as floods become more frequent and intense.

Mitigation Measures and Conditions

The following mitigation measures would be implemented on this project:

1. The implementation of the Missouri Department of Conservation's best management practices for construction near streams and rivers.
2. The minimizing of impacts through seasonal restrictions for tree felling and general construction.
3. Performing on-site work outside of times that would negatively impact bats and peak waterfowl migration periods and taking actions to prevent other disturbances to wildlife.

Monitoring

The Refuge currently conducts multiple monitoring efforts to assess environmental changes and impacts associated with a variety of disturbances (e.g. human interactions, predation, and storm events). These surveys include hydrologic surveys, year-round surveys for water bird species, winter waterfowl ground surveys, and ad-hoc presence/absence surveys for migratory bird and bat species. The Refuge also avoids conflicts related to biological resources by adopting the "wildlife first" principle explicitly stated in the National Wildlife Refuge System Improvement Act through the monitoring of species population trends via direct observation of populations, consultation with State and Service species specialists, and review of current species survey information and research. These ongoing monitoring efforts can be used to identify any direct, indirect, or cumulative impacts arising from the Proposed Action.

Summary of Analysis

The purpose of this EA is to briefly provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI). The US Fish and Wildlife Service will make this document available for a minimum of 30 days to receive public comment. Once feedback is received from the public, appropriate changes will be made to the Environmental Assessment and a determination will be made on whether to proceed with a Finding of No Significant Impact or an Environmental Impact Statement.

Alternative A – Proposed Action Alternative (Preferred Alternative)

As described above, this Alternative would have minor potential impacts to wildlife and aquatic species, threatened and endangered species or other special status species and floodplains due to associated construction activities. These impacts are expected to be minimal and short-lived, and restoration would result in a net increase in habitat on the Refuge. No impacts are expected for cultural resources or in terms of environmental justice, and positive impacts to land use, visitor use, administration and local and regional economies are anticipated. The Refuge's carbon footprint is also expected to decrease, resulting in some additional positive impacts.

This alternative helps meet the purpose and needs of the Service as described above, because it would provide additional beneficial impacts to wildlife by enhancing and adding native habitats and enhanced management of wetland habitats.

Alternative B – Hardened Infrastructure

This Alternative would protect habitats from floodwaters of Yellow Creek and the Grand River but would still be impacted by localized rains trapping water inside the levees. The cumulative impacts of impounding water inside the taller levees would lead to degradation of the habitat within the units. It would also increase siltation in the floodplain nearer the creek channel of Yellow Creek and eventually result in negative impacts on neighboring properties.

Alternative C - No Action Alternative
As described above, the No Action Alternative would have negative impacts to wildlife and aquatic species, threatened and endangered species or other special status species. No impacts are expected for cultural resources, land use, local and regional economies, or in terms of environmental justice. The Refuge's carbon footprint is also expected to remain the same, resulting in no impacts in terms of climate change. This alternative does not fully meet the purposes and needs of the Service as described above, because it would continue the decline of Refuge wildlife habitats for migratory birds and other wildlife species.

Planning and Coordination

List of Sources, Agencies and Persons Consulted

Josh Eash, Regional Hydrologist, National Fish and Wildlife Refuge System Region 3
James Stack, Hydrologist, USFWS Region 3
Vince Capeder, USFWS Region 3, Hydrology
Jason Wilson, Project Leader, Big Muddy National Fish & Wildlife Refuge
Chris Woodson, Wildlife Biologist, Big Muddy National Fish & Wildlife Refuge
Mike McClure, Wetland Service Biologist. Missouri Department of Conservation
Chris Freeman, Missouri Department of Conservation
Mike Moore, Friends of Swan Lake NWR
Terry Milford, Chariton County Western District Commissioner
Mark Flashpohler, Regional Director, Ducks Unlimited
Dave Graber, Ducks Unlimited
Mickey Heitmeyer, Wetland Scientist and Owner, Greenbrier Wetland Services

Jenna Roe, Allstate Consultants, LLC
Greg Pitchford, Allstate Consultants, LLC

List of Preparers

William Moody, Wildlife Refuge Specialist, Swan Lake National Wildlife Refuge
Cole Hoover, Biological Science Technician, Swan Lake National Wildlife Refuge
Steve Whitson, Refuge Manager, Swan Lake National Wildlife Refuge
Jenna Roe, Allstate Consultants, LLC

State Coordination

The Service consulted with the Missouri Department of Conservation in developing the Preferred Action Alternative. Communications and discussions as well as site tours with a variety of local, regional and Headquarters MDC staff were conducted in addition to the Missouri Department of Natural Resources staff. Allstate Consultants, the lead partner for this project, has also consulted and kept informed the Office of the Governor of the State of Missouri and other state elected officials.

The Service sent a letter to the State Historic Preservation Office on 4/17/2021 requesting Cultural and Archaeological Resource consultation and received concurrence from the office. A archeologist was contracted and did site surveys to determine archeological remnants in these areas. This information will be utilized moving forward with the project.

Tribal Consultation

Pursuant to the NEPA, the National Historic Preservation Act, the Fish and Wildlife Service's Native American Policy, Secretarial Order 3206 (American Indian Tribal Rights, Federal-Trust Responsibilities, and the Endangered Species Act), and Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), the Service initiated consultation with the Osage Tribe and Geoffrey Standing Bear of Missouri in a letter dated June 2022; no response has been received to date.

This EA will be provided to the Osage Tribe and Geoffrey Standing Bear of Missouri as part of the public review process.

Public Outreach

Prior to writing this EA and during the process of developing alternatives the Refuge Manager has met with neighboring Refuge property owners, other stakeholders, and conservation and civic groups with an interest in the area. Their feedback was utilized to develop this plan and construct the Proposed Action Alternative put forth in this EA.

The Service is making the draft EA available for public review and comment for 30 days. An information release will be posted on the Refuge website, circulated through an email distribution list of stakeholders, and shared with local civic institutions, such as the Mendon and

Sumner public libraries. An open house open to the public will be conducted as part of the public review process. The distribution list includes local and regional media contacts, congressional staff, local and state government partners, federal and state agencies, non-profit organizations, and other partners and stakeholders.

Determination

[This section will be filled out upon completion of the public comment period and at the time of finalization of the Environmental Assessment.]

☐ The Service's action will not result in a significant impact on the quality of the human environment. See the attached **"Finding of No Significant Impact".**

☐ The Service's action **may significantly affect** the quality of the human environment and the Service will prepare an Environmental Impact Statement.

Preparer Signature: _____Date:_____

Name/Title/Organization: _____

_____

Reviewer Signature: _____Date:_____

Name/Title: _____

References

Darnell, R.M. 1976. Impacts of Construction Activities in Wetlands of the United States. U.S. Environmental Protection Agency, Office of Research and Development, Corvallis Environmental Research Laboratory. Narragansett, RI.

Downer, C., Gaden, M., Iverson, L., Nordstrom, R., Patz, J., Robertson, G. P., Pryor, S.C., and D. Scavia (2014). National Climate Assessment: Midwest Region. U.S. Global Change Research Program, Washington, D.C. Available online at https://nca2014.globalchange.gov/report/regions/midwest

Environmental Protection Agency (EPA). 2016. Climate Change Indicators 2016. Environmental Protection Agency, Washington, D.C. Available online at https://www.epa.gov/sites/production/files/2016-08/documents/climate_indicators_2016.pdf

Hupp, C.R., Pierce, A.R., and G.B. Noe. 2009. Floodplain Geomorphic Processes and Environmental Impacts of Human Alteration Along Coastal Plain Rivers, USA. Wetlands, 29(2): pp. 413-439.

Natural Resources Conservation Service (NRCS) Web Soil Survey website (http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm), accessed October 2020.

Notice Nature. 2016. Wildlife, Habitats, & Development: Guidelines for the Protection of Biodiversity in Construction Projects. Available online at https://www.noticenature.ie/wpcontent/uploads/2016/05/Construction_v12.pdf

Schaffer, J.A., C. R. Loesch, and D. A. Buhl. 2019. Estimating offsets for avian displacement effects of anthropogenic impacts. Ecological Applications, 29(8): e01983

United States Census Bureau (USCB). 2019. ACS 5-Year Estimates Detailed Tables. Web. 15 March 2021 < https://data.census.gov/>

U.S. Fish & Wildlife Service, Swan Lake National Wildlife Refuge, 2011 Comprehensive Conservation Plan, February 2011