

Draft Environmental Assessment

Necedah National Wildlife Refuge Little Yellow River Restoration Plan

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DRAFT Environmental Assessment for Restoring the Little Yellow River

This draft Environmental Assessment (EA) is being prepared to evaluate the effects associated with the proposed action and complies with the National Environmental Policy Act 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. The National Environmental Policy Act (NEPA) requires examination of the effects of proposed actions on the natural and human environment.

Proposed Action

The U.S. Fish and Wildlife Service (Service) is proposing an action to restore the portion of the Little Yellow River that flows through the Necedah National Wildlife Refuge (refuge) in central Wisconsin (Appendix B, Figure 1) and may also include portions of the Meadow Valley Wildlife Area (WA; aka Necedah Wildlife Management Area) which is federal land managed by the state as a coordination area and is considered part of the National Wildlife Refuge System. The completion of a Water Resources Inventory Assessment (WRIA; Swenson 2019) and the refuge's Habitat Management Plan (HMP; USFWS 2020) have highlighted the importance of restoring the hydrology of the Little Yellow River and its associated wetlands in accordance with the mission of the National Wildlife Refuge System (NWRS). The protection and restoration of headwater streams and connected wetland basins are also objectives identified in the Master Plan for the Meadow Valley Wildlife Area (WDNR 2011). To restore the function of these wetlands, the refuge proposes to disable specific ditches at strategic locations and to redirect the water back into the natural waterway and recreate the historic wetting and drying process in the associated wetlands. Meadow Valley WA lies at the upper end of the watershed (only 15% of MV is within the Little Yellow River's watershed) also with ditches that could be disabled to redirect water to natural channels. Most of this project would occur on the refuge, of which 95% is within the Little Yellow River's watershed. Restoring the Little Yellow River and its' associated wetlands would result in a substantial improvement in the ecological function and biological integrity of the watershed.

A proposed action may evolve during the NEPA process as the agency refines its proposal and gathers feedback from the public, tribes, 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 and outlined in the final EA.

Background

National wildlife refuges are guided by the mission and goals of the NWRS, the purposes of an individual refuge, Service policy, and laws and international treaties. Relevant guidance includes the NWRS Administration Act of 1966, as amended by the NWRS Improvement Act of 1997, Refuge Recreation Act of 1962, and selected portions of the Code of Federal Regulations and U.S. Fish and Wildlife Service Manual. President Franklin D. Roosevelt established the Necedah National Wildlife Refuge, for the purpose of “a refuge and breeding ground for migratory birds and other wildlife”. (Executive Order 8065, dated March 14 1939). The mission of the NWRS, as outlined by the National Wildlife Refuge System Administration Act (NWRSA), as amended by the National Wildlife Refuge System Improvement Act (16 U.S.C. 668dd et seq.), is “... 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” . Additionally, the NWRSA mandates the Secretary of the Interior in administering the NWRS (16 U.S.C. 668dd(a)(4)) to

- Provide for the conservation of fish, wildlife, and plants, and their habitats within the NWRS;
- Ensure that the biological integrity, diversity, and environmental health of the NWRS are maintained for the benefit of present and future generations of Americans;
- 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;
- Ensure effective coordination, interaction, and cooperation with owners of land adjoining refuges and the fish and wildlife agency of the states in which the units of the NWRS are located;
- Assist in the maintenance of adequate water quantity and water quality to fulfill the mission of the NWRS and the purposes of each refuge;
- 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;
- Ensure that opportunities are provided within the NWRS for compatible wildlife-dependent recreational uses; and monitor the status and trends of fish, wildlife, and plants in each refuge.

Prior to 1900, a portion of the Little Yellow River more than 15 miles long (nearly 50% of its total 32 miles) flowed through the sedge meadows and wetlands, on what is now the Necedah National Wildlife Refuge and Meadow Valley WA. The gently sloping and sand ridges caused

the river to meander east and west nearly as much as it travelled south. The wetlands within the Little Yellow River's floodplain served as both sponge and filter, absorbing large flood events and sediments. The Little Yellow River steadily moved water downstream and it was important to the plant and animal communities that lived there.

Nearly a century ago steam-powered dredges dug deep ditches designed to hasten the Little Yellow River south in an effort to turn wetlands into farmlands. The waters of the Little Yellow River still flow through that network of ditches. While the Little Yellow River slowly meandered across the landscape the ditch was cut in a straight line through those meanders to direct the water off the land as quickly as possible. This drainage network drastically altered the hydrology in the region and continues to reduce the biological diversity, integrity, and health of the Little Yellow River watershed. The ditch network increases the volume and speed of water traveling through and exiting the refuge.

Purpose and Need for the Action

The purpose of this proposed action is to restore the natural hydrology in the Little Yellow River and its associated wetlands as emphasized in the WRIA and HMP written for the refuge and also in support of the associated objectives in the Master Plan for Meadow Valley WA.

The need for the proposed action is to meet the Service's priorities and mandates as outlined by the NWRSA. Additionally, the proposed action is needed to provide resiliency to the increased frequency of large precipitation events forecasted under climate change. The restored wetlands would better moderate the large inflows by slowing the water and causing it to dissipate much of its energy as it moves through the meandering river corridor. This will also allow additional time for the water to soak into ground or be taken up by plants reducing the potential for damaging downstream flooding. In addition, the restoration would reduce the amount of refuge infrastructure on the landscape that could be damaged or fail during high flow events.

Alternatives

Alternative A – Status Quo – [No Action Alternative]

Under the No Action alternative, the refuge would not implement any additional restoration of the Little Yellow River. The Little Yellow River's natural hydrology patterns and additional flood storage capacity would not be recreated. The volume and speed with which water exits the refuge would remain unchanged except by changes in weather patterns.

Alternative B – Little Yellow River Restoration – [Preferred Alternative]

Under the Preferred Action Alternative, the refuge will use high-resolution elevation data (LiDAR, RTK GPS), recent and historic aerial imagery, historic survey maps and on-site assessments to determine, as accurately as possible, the location of the Little Yellow River on the refuge and WA prior to 1900. Once located, the restoration of this portion of Little Yellow River and associated wetlands within the watershed would be done using U.S. Department of Agriculture Natural Resource Conservation Service (USDA NRCS) approved wetland restoration practices (e.g., ditch plug, ditch fill) under permit/approval by the Wisconsin Department of Natural Resources (WDNR) and the U.S. Army Corps of Engineers. The restoration of the Little Yellow River will require restoring, to the extent possible and practicable, the (a) natural hydrology conditions and (b) morphology of the Little Yellow River.

Historically the hydrologic patterns of the Little Yellow River would have included a more consistent volume and reduced velocity of water moving through the river. Currently, the substantial drainage network consolidates groundwater from thousands of acres of wetlands into the ditches where it flows rapidly downstream, increasing volume and velocity. Disabling specific ditches at strategic locations would temporarily store precipitation in wetlands and ground water so it can seep into the Little Yellow River over a period of weeks instead of days. Restoring the morphology of the Little Yellow River would generally require 3 steps. First, spoil deposited in the path of the Little Yellow River during the historic ditching process would be removed from the riverbed. Second, spoil material would be used to plug the existing ditch immediately downstream from the locations where it intersected the historic stream bed of the Little Yellow River. In combination, these actions would reroute the water currently flowing through the ditch back into the former streambed. Finally, any remaining dredge spoil along the length of the ditch would be placed back into the existing ditch to restore the wetlands it buried and to allow the Little Yellow River to function more naturally.

The use of heavy equipment would be necessary to complete the proposed action. To avoid undesirable disturbance of the areas, several mitigative measures would be taken. First, heavy equipment would access the project areas along the existing ditch spoil banks or other upland ground. These spoil banks are typically more than 3' above the elevation of the adjacent wetlands and provide suitable footing for equipment even during non-frozen conditions.

Second, work that would be conducted at similar elevation to the wetland (e.g., final grading of ditch spoil banks) would be conducted during frozen ground conditions to further avoid disturbance to sensitive soils. All equipment would be cleaned and inspected to be free of weeds prior to its use in the project area to prevent introducing non-desirable plant species.

Presently the Little Yellow River flows through several impoundments on the refuge. Restoration of the Little Yellow River would not result in substantive changes to current management of the large impoundments (i.e., Goose Pool, West Sprague Pool, Pool 2; Appendix B, Figure 2). These impoundments are already managed with occasional seasonal drawdowns that are not expected to negatively impact the restoration of flow to the historic Little Yellow River riverbed. Several of the smaller impoundments that the Little Yellow River flows through have not been functional for several years due to failing infrastructure (i.e., Pool 18 west, Pool 19 and Canfield Pool) or are nearing the end of their useful lifespan and will be costly to replace (i.e. Dam 31). Instead of repairing these pools, the preferred action alternative includes removal of impoundment infrastructure (water control structures and associated dikes) in favor of restoring the Little Yellow River. Pools 9 and 13 are partially influenced by the Little Yellow River. These pools receive a portion of their water from the Little Yellow River. Restoring the Little Yellow River would result in reducing the surface area of these impoundments by less than 25% but retain the refuge's ability to manage the remaining impoundments as described in the Habitat Management Plan (USFWS 2020).

Measures to Avoid Conflicts:

- Restoring the hydrology of the entire length of the Little Yellow River on the refuge would yield the greatest ecological benefit. However, doing so would require substantial changes to refuge infrastructure (roads, impoundments and water control structures) and municipal infrastructure (roadways and culverts). The proposed action is limited to the restoration of segments of the Little Yellow River watershed within the refuge and the WA that would not result in unmitigated impacts to municipal infrastructure (Appendix B, Figure 2).
- The refuge and WA have increased visitation during Wisconsin's annual 9-day gun deer season. To avoid conflicts with these refuge users, no restoration activities would be conducted during that period.
- Work requiring the use of heavy equipment near potential whooping crane nesting habitat would be conducted outside of the nesting season (i.e., fall and winter) to avoid conflicting with the conservation efforts for the experimental Eastern Migratory Population of Whooping Cranes.

To evaluate the potential effects of the proposed action, the refuge conducted a pilot project by restoring a 2-mile segment of the West Branch of the Little Yellow River at the northern boundary of the refuge in 2021. After consulting with Service staff (e.g., Ecological Services Program, Historic Preservation Officer, Hydrologists) and other Federal and State partners the

refuge began the pilot restoration following the methods described in the preferred action alternative. During the fall of 2021, water monitoring wells were installed at the restoration site and a nearby control site. The restoration was completed in the winter of 2021 and monitored for the following year. Monitoring data from this project showed substantial changes to hydrology of the system. Surface water clarity improved, and flow rates were moderated in the restored segment compared to those conditions observed in a reference reach.

Affected Environment and Environmental Consequences

This section is organized by affected resource categories and for each affected resource discusses both (1) the existing environmental and socioeconomic baseline in the action area for each resource and (2) the effects and impacts of the proposed action and any alternatives on each resource. The effects and impacts of the proposed action considered here are changes to the human environment, whether adverse or beneficial, that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action or alternatives. This Environmental Assessment 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.” Any resources that will not be more than negligibly impacted by the action have been dismissed from further analyses.

The refuge consists of 62 square miles in Juneau County, Wisconsin (See map at Appendix B, Figure 1). Meadow Valley WA is 90 square miles in Juneau and Monroe Counties, Wisconsin. The refuge and the WA are primarily riparian wetland, sedge wetlands, oak-pine barrens and sand prairies (Appendix B, Figure 3). The proposed action is located along the Little Yellow River which runs north to south through the refuge and WA (Appendix B, Figure 2). For more specific information regarding the characteristics of the environment in the project area environment, please see chapter 2 of the refuge’s Habitat Management Plan (USFWS 2020) or Master Plan for Meadow Valley Wildlife Management Area (WDNR 2011).

The following resources either (1) do not exist within the project area or (2) would either not be affected or only negligibly affected by the proposed action:

- **Air Quality (negligible affect):** The air quality in the area is consistently good and the proposed action would only have a negligible short-term impact on it from the exhaust produced by the heavy equipment used during the restoration activities. No long-term impacts would result from the proposed action.
- **Wilderness (does not exist):** The refuge does not include designated wilderness areas.

Natural Resources

Terrestrial Wildlife and Aquatic Species

Affected Environment

Description of Affected Environment for the Affected Resource

The terrestrial and aquatic species present are discussed in the refuge's CCP (USFWS 2004) and Master Plan for Meadow Valley Wildlife Area (WDNR 2011). Since the proposed action would occur in wetland communities special focus is given here to species which use the wetlands and aquatic communities on the refuge and WA.

More than 230 species of birds have been observed on the refuge and WA. Many of these are wetland-dependent bird species such as: ducks, geese, swans, shore birds, secretive marsh birds and cranes. The wetlands also support a variety of mammals (e.g., muskrat, mink, otter, and beaver) that contribute to the ecological, economic, and aesthetic value of central Wisconsin. Although many species of reptile exist in or around the refuge's aquatic communities, the Blanding's turtle is the most prominent and of greatest conservation concern. The fish species known to occur on the refuge and wildlife area are generally considered common warm-water species like Northern pike, largemouth bass, black crappie, and mud minnows. However, it's important to recognize that a detailed inventory of fishes has not been conducted. There may be rare species of plants that have not been identified on the refuge, particularly those that may be living in remote locations. While several studies have been done on plant abundance and distribution, a comprehensive inventory of plants is needed. The refuge and the Yellow River area are known to have several populations of rare and declining plant species.

Description of Environmental Trends and Planned Actions

The main factors affecting the wildlife on the refuge and WA are land use practices and recreational hunting and fishing. Land use practices in the area around the refuge and MA are not expected to change substantially. Urban development is minimal with most private property being rural residential or recreational. Local agriculture is primarily cranberry farming and there are no major changes to land use practices expected. Therefore, the environmental trends are not expected to influence the terrestrial wildlife resources.

In their current state, the environment for aquatic species is influenced by the effects of the existing drainage network as well as the impounded wetlands. The drainage network, along with the sandy, permeable soils, has resulted in a "flashy" system that quickly moves water out of wetlands and consolidates it in impoundments as surface water. This results in very unpredictable habitat conditions along the ditched wetlands but very static conditions in the impounded wetlands. In spite of the proposed action resulting in the abandonment of 4 smaller impoundments, the general practice for managing the impounded wetlands described

in the refuge's HMP (USFWS 2020) is not expected to change substantially under the proposed action. Likewise, the proposed action is not expected to impact the desired management actions or capabilities for impoundments and moist soil units on Meadow Valley Wildlife Area (WDNR 2011). Therefore, the environmental trends are not expected to influence the aquatic wildlife resources.

Impacts on Affected Resource

Alternative A

Presently, the water conditions (e.g., volume, speed, transparency, temperature) found in the ditched portions of the Little Yellow River watershed change rapidly in response to precipitation or lack thereof. Few species of aquatic wildlife can tolerate the extremely unpredictable water conditions. Beaver populations take advantage of the existing ditch banks as "high points" to anchor their dams. Ditch banks also constrain beaver ponds from spreading the water laterally as they historically would have. As a result, a 50' long beaver dam, built in a ditch, can impound water over a mile upstream where it could impact roads or other infrastructure. Under the no action alternative, the amount of habitat available to many aquatic species would remain at the current level. Water quality and quantity would continue to be highly variable in response to precipitation and runoff events. Where existing infrastructure built for water management on the refuge or MA allows, the impoundments would continue to consolidate water creating consistently inundated conditions.

Alternative B

Under the preferred alternative, the strategic drainage ditches in the Little Yellow River watershed within the refuge [and MA] would be disabled and the hydrologic patterns in the wetlands of the Little Yellow River watershed would be more natural. The wetlands and the Little Yellow River would provide more favorable habitat for aquatic wildlife resources. Beaver dams would still be present as a natural part of the ecosystem, however, they would less likely to negatively impact roads due to the lack of ditch banks confining the water. Further, the shallower water would increase the benefits of the beaver ponds to wildlife. The quality of the water exiting the restored segment of the Little Yellow River would be improved as water transportation rates decrease, reducing turbidity and wetland filtration rates increase. Downstream flood events would be muted by the additional water storage capacity in the wetlands and groundwater. By restoring a more natural and stable hydrology pattern, the preferred alternative is expected to result in a cascade of positive changes for wildlife. Water conditions (i.e., temperature, dissolved oxygen, clarity, and permanence) are expected to be more conducive for a stable and healthy community of aquatic insects, mussels and fishes. The restored hydrology would also increase the diversity of native wetland plants and provide important wetland communities that were nearly lost from the project area, such as floodplain wetlands, and tamarack bogs which depend on more consistent water levels to survive. The preferred alternative is expected to increase the reproductive success of the experimental

population of the federally endangered whooping cranes on the refuge, which are hampered by abundant populations of black flies (simuliidae spp.) which feed on avian blood. Blackflies are an annual species that require flowing water for part of their lifecycle. In many streams, black fly populations are held in check by longer-lived predaceous insects like stoneflies or dragonflies. The extensive network of ditches may provide flowing habitat for the annual black flies but not stable enough to support their predators.

Threatened and Endangered Species, and Other Special Status Species

Affected Environment

Description of Affected Environment for the Affected Resource

Many of the species with special state, federal and refuge specific designations are discussed in the refuge's CCP and HMP (USFWS 2004, USFWS 2020). The refuge's HMP identifies 20 priority species of concern, of which, 11 are associated with wetland communities. Whooping Cranes and Blanding's turtles are priority resources of concern that are commonly associated with the wetlands on the refuge. The Service's IPaC tool (<https://ipac.ecosphere.fws.gov/>) was used to identify the federally listed species present on the proposed project area. As of 15 March 2023, IPaC showed six federally Threatened or Endangered species occur in the area of the proposed action. In addition to the species listed in IPaC, the tri-colored bat was also considered in this analysis.

Gray Wolf (*Canis lupus*) – Federal Endangered. Gray Wolf occur on the project area throughout the year, and across the northern 2/3 of the state of Wisconsin. Gray Wolf habitat consists of forested and non-forested natural areas.

Northern long-eared bat (*Myotis septentrionalis*) – Federal Endangered. Northern long-eared bats occur on the refuge during the summer. The species population is in decline due to high over-winter mortality rates caused by white-nose syndrome. Northern long-eared bat habitat in the project area consists of forested areas with decadent trees, snags and open areas for foraging. Oak wilt disease has resulted in many standing oak snags in central Wisconsin which will continue to provide roosting and pup-rearing habitat for the species. Trees large enough to provide roosting or pup-rearing habitat typically only occur in upland vegetation communities on the refuge.

Tri-colored bat (*Perimyotis subflavus*) - On 14 September 2022, the Service published a proposal in the Federal Register to list the tricolored bat as endangered under the Endangered Species Act (ESA). The Service has up to 12-months from the date the proposal published to make a final determination, either to list the tricolored bat under the Act or to withdraw the proposal. The Service determined the bat faces extinction primarily due to the range wide impacts of white-nose syndrome, a deadly fungal disease affecting cave-dwelling bats across North America. Acoustic surveys conducted in 2016 detected tri-colored bats at 4 sites disbursed across the refuge.

Whooping crane (*Grus Americana*) – Federal Experimental Population Non-essential. Whooping crane occur on the refuge during their breeding season between March – October. The Eastern Migratory Population of whooping crane is receiving continued intensive monitoring, management, and reintroduction efforts by the Services and partners. Whooping crane habitat on refuge includes shallow wetlands for foraging, roosting and nesting.

Eastern Massasauga rattlesnake (*Sistrurus catenatus*) – Federal Threatened. Not known to occur on the project area. No wild Eastern Massasauga have been detected on the refuge in more than 30 years despite having potentially suitable habitat. Historic persecution along with wetland drainage and degradation are leading factors limiting the species.

Karner blue butterfly (*Lycaeides melissa samuelis*) – Federal Endangered. Karner blue butterflies exist on the refuge throughout the year. Adult Karners are found on the refuge during the summer. The population is receiving continued intensive monitoring and habitat management directed toward increasing the abundance of wild lupine and in-turn Karner blue butterfly habitat. Refuge populations are stable or growing and secure.

Monarch butterfly (*Danaus plexippus*) – Federal Candidate. Monarch butterflies are found on the project area during the summer. Monarch habitat consists of upland vegetation communities where milkweed (*asclepias* spp.) is present for reproduction.

Blanding's turtle (*Emydoidea blandingii*) - State Protected. Blanding's turtles are found in many of the aquatic communities on the refuge. The species' federal status is currently under review. At the state level the species was recently down-listed from "threatened" to "protected". Blanding's turtles are slow to reach reproductive age and have a relatively low reproductive rate making them a resource of concern on the refuge.

Description of Environmental Trends and Planned Actions

U.S. Fish and Wildlife Service, State, and Federal partners have developed management and recovery plans for the conservation of the wildlife in the area (USFWS 2004, WDNR 2011, WDNR 2015, USFWS 2020, WDNR 2023). These plans provide land managers with guidance regarding conservation strategies that can be used in managing species and habitats. These plans establish regional population and habitat conservation objectives and provide estimates of the size and types of habitats required to increase and sustain wildlife populations at target levels. Species identified in these plans, and their associated objectives and strategies, were considered during evaluation specific to the refuge and in the development of the HMP objectives and strategies. Refuge staff will continue to manage habitats on refuge for the benefit of threatened, endangered, and special status species.

Impacts on Affected Resource

Alternative A

The status quo (no action alternative) is expected to have little to negligible effect on threatened and endangered species on the refuge. The status quo would not include any of the

proposed physical changes to the current water regime and habitats within the Little Yellow River watershed within the refuge. Indirectly, however, threatened and endangered species and habitats may degrade under certain climate change scenarios that result in higher and faster water flows through the refuge.

Alternative B

This alternative is expected to have a negligible effect on listed or proposed listed Federal threatened and endangered species that depend on upland vegetation communities (i.e.; gray wolf, Karner blue butterfly, monarch butterfly, Northern long-eared bat, tri-colored bat). However, restoring the Little Yellow River watershed would require the removal of trees which have grown on the narrow strips of higher ground created when the ditches were dredged. To avoid potential impacts to Northern long-eared bats tree removal would be conducted during the winter. In addition, the increased water levels experienced in wetlands is expected to cause some mortality in trees that have invaded the drained wetlands, and as such may increase the potential habitat for Northern long-eared and tri-colored bats. This alternative would create open wetlands in proximity to forested areas which will create ideal foraging habitat for several bat species.

This alternative is expected to benefit threatened and endangered species that depend on wetlands (i.e. whooping cranes). Meandering streams along with their floodplains would offer an abundance of shallow wetlands ideal for roosting and foraging. At present, the deep and steeply sided ditch does not offer suitable habitat for whooping cranes and simultaneously creates corridors for terrestrial predators to access wetlands.

In 2021, under the provisions of Section 7 of the Endangered Species Act, an Intra-Service Consultation was completed for the restoration of a 2-mile segment of the West Branch of the Little Yellow River using the outlined restoration techniques. The Section 7 Consultation found these restoration actions would not likely adversely affect threatened and endangered species.

If selected, the preferred alternative would be implemented in phases over a period of years. To accommodate for changes in the listing status, population trends, and ecological understanding, Section 7 consultations would be conducted for each distinct phase of the preferred action. This would allow the Service to tailor the actions to better meet conservation concerns for threatened and endangered species as well as species of other special status.

Habitat and Vegetation (including vegetation of special management concern)

Affected Environment

Description of Affected Environment for the Affected Resource

The vegetation communities and non-native plants of concern are thoroughly discussed in the refuge's HMP (USFWS 2020), and the state's property and landscape conservation plans (WDNR 2011, WDNR 2023). The areas immediately adjacent to the Little Yellow River are typically open sedge-meadow wetlands or shrub-carr vegetation communities. In some places the

floodplain wetlands of the Little Yellow River are hardwood forests comprised of maple and swamp white oak. These vegetation communities are typically maintained by the natural hydrologic periods of flooding, which keeps more terrestrial species in check. However, in areas where these communities had undergone drainage, woody vegetation can become established that can shade out native sedges and forbs.

Description of Environmental Trends and Planned Actions

The vegetation communities on the refuge are monitored annually to track the conditions and response to planned habitat management actions. Invasive plant species monitoring is conducted as part of annual prairie and barrens vegetation monitoring as well as through stand-alone invasive plant treatment and monitoring actions. Timber sales, prescribed fires, mechanical treatments, seeding, and where necessary, herbicide treatments are implemented by refuge staff to maintain vegetation communities and habitat for resources of concern.

Impacts on Affected Resource

Regardless of the alternative chosen, invasive species will likely continue to threaten the ecological integrity of the project area's habitats. Some invasive plant infestations are currently beyond the capabilities of the refuge staff to completely eradicate, and therefore they will continue to have a negative influence on vegetation communities. The refuge's HMP identifies and prioritizes non-native plants based on their potential negative impact as well as the likelihood they can be controlled. Presently, reed canary grass (*Phalaris arundinacea*) is a non-native species common to wetland communities on the refuge. This species is still widely used and planted for forage and soil stabilization in agricultural areas outside the refuge. To control species like reed canary grass, the refuge frequently implements habitat management actions such as prescribed fire and water level manipulation that promote native species as opposed to suppressing non-natives. Presently, reed canary grass can be found on many ditch banks throughout the refuge.

Alternative A

The refuge's HMP discusses the effect of the status quo on vegetation communities and invasive plant species (USFWS 2020). In summary, under this alternative, the non-native vegetation community and its distribution on the project area would remain on its present trajectory. Reed canary grass would remain established along the spoil banks throughout the Little Yellow River watershed. The consistently drier conditions would increase competition between native sedges and non-native upland plants.

Alternative B

Under this alternative, restored riparian wetlands would have a more natural, and less flashy, hydrologic pattern. Species like reed canary grass have been shown to outcompete native vegetation particularly well in areas with "flashy" hydro-period and disturbed communities. Restoring the historic dynamics of the Little Yellow River will increase the competitive ability of native species throughout the watershed. Over time, natural water flows should promote a

healthier and more diverse plant community consisting of sedges, rushes, grasses and forbs that will in turn provide better habitat for wildlife. Previous wetland restoration actions on private land adjacent to the refuge have found that restoring the hydrology and removing the reed canary grass can allow native plant species to become dominant again.

Geology and Soils

Affected Environment

Description of Affected Environment for the Affected Resource

The refuge is located on the dry bed of an ancient glacial lake, and its topography is a “ridge-swale” pattern of rolling sand dunes interspersed with areas of lower elevations. The sandy soils, ridge-swales and shallow water table, create a diverse mix of upland and wetland communities (USFWS 2020). Most (85%) of the ground and surface waters of the refuge come from local rainfall events (Hunt et al. 2000). Historically, the refuge would have had many individual wetlands that were isolated from each other by the sand “ridges”. The stable water conditions allowed these wetlands to accumulate peat (USFWS 2004). Peat soils in the wetlands would have provided water storage and filtration and slowed downstream water flows and accumulated carbon. After the drainage ditches were created much of the peat soils were dried and subsequently burned to clear the land for agriculture (USFWS 2004).

Description of Environmental Trends and Planned Actions

Climate scientists predict that in the next 40 years the refuge will experience nearly 50% more days with greater than 4 inches of rainfall (WICCI 2021). The increase in large precipitation events in central Wisconsin would result in increased rates of soil erosion and flooding throughout the Little Yellow River watershed.

Impacts on Affected Resource

Alternative A

Under the no action alternative, the rate of soil erosion into and within the ditches on the refuge is expected to increase in response to large precipitation events. Within the refuge, much of this erosion would be evident as sediment build up within the refuge’s impounded wetlands. The natural hydrologic conditions in sedge meadow wetlands allow these communities to capture carbon in dead vegetation and organic soils. Under the no action alternative, the persistent drainage effects of the ditches would limit the potential carbon sequestered by the wetlands in the coming years.

Alternative B

Under the preferred alternative, the wetlands associated with the Little Yellow River would experience a higher water table and a more natural hydroperiod. The changes to the hydrology and the restoration of the Little Yellow River to its meandering path is expected to reduce the amount of soil erosion occurring in the ditched system. In addition, the higher water table

would offer increased protection to the existing peat soils and allow for additional carbon sequestration (Swenson 2019).

Water Quality / Floodplains

Affected Environment

Description of Affected Environment for the Affected Resource

Data collected along a ditched portion of the Little Yellow River in the refuge revealed that the existing drainage ditches rapidly draw surface water and groundwater into the drainage network and move it downstream. This effect is in part due to the sandy soils of the area, allowing for rapid subsurface water movement in combination with the massive capacity and extent of the existing drainage network. By its design the drainage network is presently drawing water from the Little Yellow River watershed. The Executive Order 11988 – Floodplain Management, 42 Fed. Reg. 26951 (1977) specially requires federal agencies to evaluate the potential impacts of their actions on floodplains with particular emphasis on avoiding actions that would reduce the ability of the floodplain to function and perform naturally and increase flood hazards.

Description of Environmental Trends and Planned Actions

The Wisconsin Initiative on Climate Change Impacts forecasts that central Wisconsin will experience more annual precipitation and more frequent large precipitation events in coming years than it has historically (WICCI 2021). In recent years (e.g., 2019), heavy rain events have strained the existing drainage network and caused localized flooding. Refuge data (unpublished) showed that the transparency of the water increased after flowing through a restored portion of the Little Yellow River but decreased after flowing through a portion that remained ditched. Water transparency is one component of water quality important to instream vegetation and wildlife on the refuge. Floodplain and other wetlands are known to trap and filter out sediments, detoxify chemical pollutants and remove nutrients from water flowing through them.

Impacts on Affected Resource

Alternative A

Under the no action alternative, the water clarity would continue to be highly variable in response to precipitation and runoff events. Where infrastructure allowed, the impoundments would continue to consolidate water creating consistently inundated conditions. The water quality leaving the refuge would be dependent on the magnitude and frequency of precipitation events. Under high flow events, water clarity would be expected to decrease as the greater speed and volume found in the ditched system would create more erosion, increasing the sedimentation load carried by the river. Although this action would not further impair the floodplain of the Little Yellow River it would allow the floodplain to continue to exist in its impaired state.

Alternative B

Under the preferred alternative, the filtering ability of the floodplain wetlands associated with the Little Yellow River would be restored. The restoration would change the system in three primary ways that would improve water quality. First, once restored, the change in elevation gradient would result in water from the floodplain moving more slowly into the Little Yellow River than it currently flows into the ditch. This would result in more efficient water filtration by the floodplain wetlands. Second, once in the Little Yellow River, water flowing through the river's meanders would move more slowly than it can through the linear ditch network, in-turn, reducing its erosive force. Finally, the restored stream would have a longer total length than the ditch. This would mean that water not only moved slower but also had a longer path to travel before it exited the refuge. The preferred alternative would moderate the amount and the rate at which water moved through the project area's wetlands. In turn this would allow more time for wetlands to perform the ecosystem functions of water filtration and evapotranspiration. Importantly, the preferred alternative would also result in mitigating large storm events and reducing downstream flooding by allowing floodwaters greater access to the river's floodplain wetlands and their storage capacity. Although this action would occur in a floodplain, the outcome of restoring the original meandering Little Yellow River from the current ditch system would improve the functioning of the floodplain, decrease flood hazards and strain on infrastructure that Executive Order 11988 – Floodplain Management, 42 Fed. Reg. 26951 (1977) was written to protect.

The preferred action would change how the water moves through the project area. The implementation of the action would be in such a way to greatly reduce deleterious flooding off of lands owned by the U.S Fish and Wildlife Service. Fortunately, Little Yellow River's watershed north of Wisconsin State Highway 21 is almost entirely within the boundaries of federally-owned land (i.e., Necedah NWR and Meadow Valley State Wildlife Area; Appendix B, Figure 4). Therefore, this alternative does not affect water availability or uses off refuge.

Visitor Use and Experience

Affected Environment

Description of Affected Environment for the Affected Resource

The refuge and WA offer multiple trails, overlooks and boardwalks for wildlife dependent recreational opportunities. The refuge and WA see most of their visitors in spring when many people enjoy watching for migratory birds and again in fall during the hunting seasons. Overall, hunting and fishing opportunities on the refuge follow State and Federal seasons and regulations with only a few additional restrictions. Regardless of the season, public access to the refuge occurs along township-maintained roads. Some of these township roads (e.g., 4th St, 9th St, 11th St and Grand Dike Rd) intersect the Little Yellow River or ditches within the Little Yellow River's watershed. Transportation infrastructure that is resistant or resilient to high

water is important to maintaining public access to the refuge. In its current state, the Little Yellow River does not attract much attention from the visiting public.

Description of Environmental Trends and Planned Actions

Petenwell and Castlerock Flowages form the eastern boundary of Juneau County, Wisconsin (Appendix B). For the past several decades these areas have become increasingly developed for residential vacation homes. This trend is expected to continue and result in a small but persistent increase in visitation to the refuge. Another recent change is how the public accesses the refuge. Offroad utility vehicle use has increased in the area, local municipal officials have expressed concern over the potential increase in damage to roadways. In addition, the above-average rainfall over the past decade have caused flooding and damage to the local municipality's transportation infrastructure. Many of these roads were constructed more than 100 years ago with materials and techniques that cannot hold up to today's environmental and traffic conditions.

Impacts on Affected Resource

Alternative A

Under the no action alternative, the visitor use, and experience would remain unchanged. The unexpected flooding caused by the high flow events and occasional beaver dams are expected to continue to inundate and damage roads and thereby limit access by the public. There would be lost opportunities for visitors to experience the historic natural environment and the benefits of a healthy ecosystem through recreation, scenery, and education. Although Bog Haunter and Lupine Loop trails on the refuge have viewsheds over the Little Yellow River, the river itself is still confined to the ditches and is often obscured from view by the spoil banks. Goose and Main Sprague Pool and Goose Pool with its ADA accessible pier and kayak launch would remain open for fishing in their current impounded state.

Alternative B

Under the preferred action alternative, the restoration of the Little Yellow River would have increased aesthetic value compared to the ditch and would provide greater opportunities for environmental interpretation. Increased wetland wildlife habitat may result in an increase in wildlife-dependent recreational opportunities like trapping, hunting, and wildlife viewing on the refuge. Portions of Bog Haunter and Lupine Loop trails that follow the Little Yellow River would offer public viewing opportunities with a greater aesthetic value. Although many of the portions of the Little Yellow River are not currently accessible to the public, future public use could allow additional access to some areas of the restored river. In its current condition the Little Yellow River looks like many of the ditches that exist on the refuge and in the surrounding area. However, recreational paddling groups have started to draw attention to opportunities along adjacent rivers like the Yellow and Lemonweir Rivers. It's possible that with increased public awareness the Little Yellow River would attract additional visitors to the refuge. The proposed action would not change refuge-specific regulations or result in additional restrictions

to public use or access. The proposed action to restore the Little Yellow River would result in more consistent water levels and reduced strain to transportation infrastructure caused by high volume flows and flash flooding events, possibly increasing public use. Fishing is currently allowed in West Sprague Pool. If restored, the free-flowing segment of the Little Yellow River within what is now West Sprague Pool would remain open to fishing offering a different type of fishing experience than is currently available. Goose and Main Sprague Pool and Goose Pool with its ADA accessible pier and kayak launch would remain open for fishing in their current impounded state.

Cultural Resources

Affected Environment

Description of Affected Environment for the Affected Resource

The project area is a riparian floodplain wetland that extends through much of the refuge. Archeological investigations on the refuge have included “shovel tests” and have identified historic artifacts in several upland locations across the refuge. Artifacts found on the refuge have included shaped and charred wood, shards of pottery and burial mounds. However, no artifacts have been identified from wetland areas like the proposed project area.

Description of Environmental Trends and Planned Actions

No relevant trends or planned actions exist.

Impacts on Affected Resource

Alternative A

Under the “no action” alternative there would be no effect on cultural resources as no new activities are proposed.

Alternative B

There are no items of historic significance known to exist in the project area at this time. In addition, the proposed action would be restricted to areas of previously disturbed soil (dredge spoil piles circa 1920), making the possibility of affecting cultural resources even more remote.

In 2021, the refuge worked with our regional historic preservation officer to evaluate the proposed restoration of a 2-mile segment of the West Branch of the Little Yellow River using the previously described restoration techniques. After evaluating the project, the Service concluded the project posed no potential damage to cultural resources and created a plan to restore the segment of the Little Yellow River that also complied with the National Historic Preservation Act.

If selected, the preferred alternative would be implemented in phases over a period of years. To ensure that historic and culturally significant resources are protected to the greatest extent possible, the refuge will consult with the regional historic preservation officer to evaluate each

segment of the restoration for compliance with section 106 of the National Historic Preservation Act prior to its restoration.

Management, Operations and Administration

Land Use on the Refuge and WA

The refuge land cover and infrastructure are described in depth in the refuge's HMP (USFWS 2020) and CCP (USFWS 2004), while the management on the WA are found in the state's master plan (WNDR 2011). Typical management actions on both the refuge and WA include prescribed burning, mowing, pesticide application, water level manipulation and timber harvesting. These management actions are typically implemented within distinct management units that are often bordered by roads, trails, ditch banks or natural barriers. Presently, there is no farming or grazing land use on the refuge or WA. Wetland management is conducted by planned manipulations to water levels that create habitat conditions to benefit various resources of concern on the refuge including whooping crane and Blanding's turtles.

Affected Environment

Description of Affected Environment for the Affected Resource

The refuge and WA are staffed similarly, with each having fewer than 12 full-time employees. Nearly all staff are affected by the water resources on the refuge. Visitor services staff frequently interact with the public regarding concerns over flooded roads, drained wetlands, or wildlife resources. Staff work to meet management objectives with the aging water control infrastructure and a flashy watershed. Throughout the Little Yellow River watershed, staff work to maintain water control structures and culverts to remedy unpredictable flooding and inadequate infrastructure. Impoundment management includes occasional drawdowns and reflooding to encourage moist soil plant germination and create shallow water exposed shoreline conditions. This management requires both a predictable source of water as well as the ability to gradually release water downstream.

The proposed action would impact the amount, location, and flow path of some of the surface waters on the refuge. The impacts would only occur within the boundaries of Federal land and would not extend onto private property. The areas impacted by the proposed action will be floodplain wetlands that, since the 1930s, have either been artificially drained via ditch construction or artificially flooded via impoundment construction. Changes in groundwater and surface water elevations may affect some interior refuge roads (not publicly accessible and maintained by the refuge) that intersect the Little Yellow River. These roads are used by the refuge staff for access, unit boundaries and fire breaks for administering habitat management actions.

Description of Environmental Trends and Planned Actions

Presently there are no planned staffing actions that are relevant to the proposed action. Climate forecasts predict more frequent and larger precipitation events for central Wisconsin in

the future (WICCI 2021). This would require more refuge resources dedicated to the management and maintenance of water infrastructure as well as to flooding related conflicts and public concerns.

Impacts on Affected Resource

Alternative A

Under the “no action” alternative staff and budget resources would be expected to remain stable. The refuge and WA water-related infrastructure challenges would continue. The flashy nature of the watershed, high ditch banks, and abundant beaver populations would result in unpredictable changes in surface water. This would continue to strain the project area water impoundment and transportation infrastructure by restricting both the inlet and outlets of management impoundments. Over time, the No Action alternative would require a greater number of water control structures in need of costly replacement or repairs.

Alternative B

Under the “preferred alternative”, the surface waters of the portions of the Little Yellow River on the refuge, which are presently consolidated in 8 impoundments (Appendix B, Figure 2), will be distributed more evenly in the floodplain wetlands and as groundwater across the landscape. In addition, water will move more slowly through the restored Little Yellow River system and the surface water elevation of this waterway would be less sensitive to beaver activity. Some of the smaller impounded wetlands in the flow-path of the Little Yellow River would be restored to a free-flowing river (Appendix B, Figure 2) and would therefore require the water controlling infrastructure to be replaced or removed. Larger impoundments along the flow-path of the Little Yellow River (Appendix B, Figure 2) would require minor changes to their management to allow consistent flow through the Little Yellow River. For example, installing gaps in stoplog water control structures would enable the balanced management of the Little Yellow River as well as the impounded wetlands. By reducing the number of water control structures, the cost and time required to manage and maintain the water resources in the project area would be reduced. Under the preferred alternative water levels around roads would be more predictable and flood related damage to roads would be less frequent. Road maintenance costs would be expected to decrease.

Prescribed fire is the primary tool used to manage terrestrial and upland vegetation communities on the refuge. Occasionally, spoil banks along the ditched Little Yellow River served as containment lines during prescribed fires. Although the preferred alternative would eliminate these spoils banks, prescribed fires will still occur but may require the use of different strategies or containment lines.

Socioeconomics

Local and Regional Economies

Affected Environment

Description of Affected Environment for the Affected Resource

The leisure and hospitality industries are major employers in Juneau County. With the abundant natural resources, Juneau County attracts visitors year-round for hunting, fishing, boating, sightseeing, ATVing and golfing. There are also natural resource dependent industries in Juneau County. These include logging, timber product manufacturing and cranberry agriculture.

The refuge contributes substantially to the county's tourism industry. Data collected prior to the COVID-19 pandemic indicate nearly 200,000 people visited the refuge annually. In 2017, the total economic output of the Necedah NWR was estimated to be 5.6 million dollars annually and created the equivalent of 64 jobs (Caudill and Carver 2019). Deer hunting was first opened on the refuge in the 1950s and since that time, hunting the refuge has become an annual tradition for thousands of hunters. Birding and wildlife viewing are also favorite activities of refuge visitors. The refuge is home to many unique species of wildlife like red-headed woodpecker, Blanding's turtle, and gray wolf. Perhaps the most high-profile species is the Whooping Crane. The refuge is one of the few places in the United States that someone can come see breeding Whooping Cranes in the wild. The chance to see whooping cranes draws visitors from across the world to the refuge.

Description of Environmental Trends and Planned Actions

Presently there are no known trends or planned actions that would influence the socioeconomics of the area.

Impacts on Affected Resource

Alternative A

Under the "no action" alternative, there would be no immediate changes to the refuge landscape, or current trends in eco-tourism or economic contributions from the refuge. However, over time the expected increase in large precipitation events would strain the refuges aging water management infrastructure and the township-maintained transportation infrastructure. Collectively these conditions could reduce the public's ability to access popular portions of the refuge and in-turn result in dwindling economic impacts.

Alternative B

The preferred alternative would result in a substantial and noticeable change to the Little Yellow River on the refuge. Even without changes to the public use infrastructure (new trails, interpretive panels, etc.) several segments of the restored river would be visible and accessible from existing public use facilities. The improved wildlife habitat and increase in aesthetic

beauty is expected to substantially increase the public visitation and in turn the local tourism economy.

Environmental Justice

Affected Environment

Description of Affected Environment for the Affected Resource

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.

Most of the census tracts with the Little Yellow River watershed were reported to have a median household income that was similar to the national median. Likewise, the percent of families living below the poverty line is below the national median throughout the Little Yellow Watershed with one exception. Census tract 1003.02, where the Little Yellow River and Yellow River confluence with the Wisconsin River in Castlerock Flowage had 11.3% of families living below the poverty line, higher than the national average.

Although more than 90% of the population in Juneau County is reported to be white (non-Hispanic), the Ho-Chunk Nation lands are within 10 miles of the refuge. Data show 19% of families in the Ho-Chunk nation are below the poverty line (10% more than the national average), and the median household income is \$10,000 below the national median.

<https://headwaterseconomics.org/tools/usfws-indicators/>

Description of Environmental Trends and Planned Actions

Impacts on Affected Resource

Alternative A

Under the “no action” alternative, the refuge would not restore any additional segments of the Little Yellow River. The wetlands would remain in their current drained state and the biodiversity and ecosystem services would not be enhanced. This alternative would not disproportionately affect human health or environmental effects on minorities and low-income populations and communities.

Alternative B

Under the preferred alternative the restoration of the Little Yellow River would result in less frequent flooding and increased water quality to the downstream communities. In addition, in previously restored segments of the Little Yellow River a positive biological response was noticeable in less than 1-year post restoration. Native wetland plants like wild rice and native sedges recolonized the restored stream rapidly improving the biological integrity, diversity and

ecosystem health. The preferred alternative will not disproportionately impact any communities and will provide indirect environmental benefits such as improved water quality and increased aesthetics.

Cumulative Effects

Cumulative effects are defined as the incremental, additional effects to the environment that result from implementing any of the alternatives under consideration. The cumulative impact analysis must consider this incremental impact of the proposed action, and any alternative actions, in addition to the impact of past, present, and reasonably foreseeable actions regardless of the jurisdiction of their origin. Like most landscape restorations, altering an important ecological component like hydrology has direct, indirect and cumulative effects. We assess the potential linkages between the abiotic, biotic and socioeconomic resources and the potential cumulative effects.

Abiotic Resources

The abiotic resources of the Little Yellow River Watershed are most influenced by the hydrologic disturbance patterns. The relationship between ground and surface water flows has indirect and cumulative effects on the area's water quality, sediment transportation, erosion, nutrient cycling and even air quality. For example, although the peat dominated soils in the area had been resilient to fires for thousands of years under the natural hydrology patterns, after they were drained (~1910) fires were able to consume much of the peat and dramatically alter the soil nutrients and composition. Similarly, restoring the Little Yellow River watershed would increase ground water infiltration and slow surface water which is expected to impact the quality and transparency of surface water. Increased transparency will result in additional sunlight penetration in the water, more submerged aquatic plant growth, increased nutrient uptake and carbon capture. This is expected to result in a positive feedback loop and a net positive cumulative effect on the abiotic resources of the watershed.

Biological Resources

Abiotic effects of the alternatives will certainly result in changes to the biotic resources. Improved water quality and increased habitat diversity will impact aquatic plants, insects, fish and wildlife species. For example, the rapidly changing conditions in the wetlands in the Little Yellow River watershed favor short-lived aquatic macroinvertebrates like dipterans (flies, mosquitos, etc.) Large populations of some species of dipteran have been shown to cause nest abandonment in whooping crane and other wildlife. Restoring wetlands and reducing the total amount of flowing surface water is expected to increase biological diversity and favor longer lived macroinvertebrates like dragonfly and stoneflies which prey upon dipteran species.

Community and Socioeconomic Resources

Water quality and flooding are prime examples of cumulative effects on the community. Flooding and water quality often can't be attributed to a single ditch, or one action, but the

sum of the effects of many ditches combined to exacerbate downstream flooding and degrade water quality. Presently there are hundreds of miles of ditch on the refuge and adjoining WA that contribute to the downstream flood conditions. Furthermore, the poor water quality and erosion impact the aesthetic and the communities' perceptions of the refuge and the natural resources therein.

Alternative A

Under the “no action” alternative, wetland drainage continues to reduce the biological diversity, integrity and ecosystem health of the refuge and the adjoining WA. The ditches will continue to transport sediment and nutrients downstream into the Wisconsin River, contributing to the harmful algae blooms in Castlerock Flowage and eventually all the way downstream to the Gulf of Mexico where it will contribute to the gulf hypoxia zone. Locally, the rapid surface water will continue to strain public and private infrastructure, especially under further predicted climate model with more frequent large precipitation events. This will require costly repair and maintenance to taxpayer funded infrastructure (federal, state and municipal). The wetlands reduced ability to capture and sequester carbon will leave more atmospheric carbon and continued climate impacts.

Alternative B

The preferred alternative is expected to result in several positive cumulative effects to the abiotic, biotic, and socioeconomic communities. The restoration of the Little Yellow River watershed is expected to result in rapid local improvements to water quality and water storage capacity. These changes would reduce the nutrient loading entering the Wisconsin River system from the Little Yellow River watershed. In addition to improving water quality, the preferred alternative would moderate downstream flooding by reducing the peak discharge and slowly releasing precipitation over a longer period. Although the restoration of the wetlands in the watershed is expected to require some tree removal and soil disturbance, the impacts of these to the biotic resources is expected to be short-lived and offset by the recolonization of native wetland plants.

Monitoring

Like all habitat management and restoration actions on the refuge, the condition of the Little Yellow River and its watershed would be monitored as part of the recurring responsibilities of refuge staff. Water quality, quantity and elevation would be monitored and recorded to document their change over time and ensure the project continues to benefit the local community and the resources of concern in the project area. Wildlife response (e.g., whooping crane) and visitor use of the Little Yellow River and its watershed would be monitored as well.

Summary of Analysis

Alternative A – Status quo – [No Action Alternative]

As described above, the status quo alternative would result in the perpetuation of a degraded ecological system that was created over 100 years ago with the ditching efforts of the Little Yellow River Drainage District. The resulting ditch network drastically altered the quality, quantity, and distribution of the water resources and wildlife habitat on the refuge. The rapidity with which the ditch network consolidates and moves water downstream causes frequent flooding, and influences water quality for humans and wildlife alike. The increased frequency of large precipitation events predicted under climate change is expected to exacerbate both upstream and downstream flooding risks. Furthermore, the existing water movement infrastructure (ditches, spoil banks, culverts, etc.) are exceptionally sensitive to impacts of beaver which causes unpredictable flooding of municipal and refuge roads. The drainage of the wetland communities on the refuge reduces the quality of habitat for wetland dependent wildlife including whooping cranes. Additionally, the drained wetlands are not able to sequester atmospheric carbon and in turn-mitigate climate change.

Alternative B – Little Yellow River Restoration – [Preferred Alternative]

As described above, restoring the Little Yellow River is within the purpose and mission of the refuge, the U.S. Fish and Wildlife Service. The proposed action's potential impacts to visitor use and infrastructure are minor and include some changes to managed impoundments and woody vegetation growing along dredge spoil piles. However, the project will minimize the negative impacts to the public by maintaining the functionality of the largest impoundments (i.e., Goose Pool, Sprague Pool and Pool 2) and only restore portions of the Little Yellow River that will not limit public access via municipal roadways.

This alternative helps meet the purpose and needs of the U.S. Fish and Wildlife Service as described above because it would restore hydrology on the project area, improve local water quality metrics (e.g. transparency) and decrease the cost of managing and mitigating high water caused by major rain events and beaver activity. This alternative will also enhance the ability to restore habitat for migratory birds that depend on wetlands, and species of special conservation concern like Blanding's turtles and whooping crane. This action will also enhance the wildlife-dependent recreational opportunities by increasing habitat diversity and decrease the risk of catastrophic flooding caused by large precipitation events which limits access for recreation. The U.S. Fish and Wildlife Service has determined that the proposed action is aligned with the purposes of the refuge and the mission of the NWRS.

List of Sources, Agencies and Persons Consulted

Josh Eash
Regional Refuge Hydrologist

U.S. Fish and Wildlife Service
Bloomington, MN

James E. Myster
Regional Historic Preservation Officer / Archaeologist
U.S. Fish and Wildlife Service
Bloomington, MN

David Palme, Regulatory Specialist
U.S. Army Corps of Engineers
Stevens Point Regulatory Field Office
Stevens Point, WI

Jeff Schure
Water Management Specialist-Division of External Services
Wisconsin Department of Natural Resources
Fitchburg, WI

Jill S. Utrup
U.S. Fish and Wildlife Service
Minnesota/Wisconsin Ecological Services Field Office

Nate Walker
Habitat and Outdoor Recreation Team Coordinator
Waterways Bureau
Wisconsin Department of Natural Resources
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List of Preparers

Brad Strobel
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Necedah National Wildlife Refuge

Jeffrey Krueger
Refuge Manager
Necedah National Wildlife Refuge

Tim Bodeen
Refuge Manager
Necedah National Wildlife Refuge

State Coordination

The refuge staff corresponded with Wisconsin Department of Natural Resources staff regarding the proposed action for the past several years and has discussed potential restoration on portions of Meadow Valley WA. Completion of the 2-mile pilot project was done under a permit issued by the WDNR water resources staff with support from DNR fisheries biologist. A formal letter and this environmental assessment will be provided to State of Wisconsin partners inviting them to provide comments on the proposed restoration of the historic Little Yellow River and its floodplain within the refuge and portions of Meadow Valley WA when the public comment period commences. Any comments, concerns, suggestions, or other feedback will be included if a substantive response is required. If the preferred action alternative is implemented the refuge staff will continue to work in close coordination with Wisconsin DNR partners.

Tribal Consultation

A formal letter and this environmental assessment will be provided to Tribal sovereign partners inviting them to provide comments on the proposed restoration of the Little Yellow River when the public comment period commences. Any comments, concerns, suggestions, or other feedback will be included in the Final Environmental Assessment if a substantive response is required. Tribes and intertribal agencies contacted include: Ho-Chunk Nation Division of Environmental Health.

Public Outreach

The draft environmental assessment will be made available for public review for thirty days on the refuge [website](#) and at the refuge headquarters. Members of the public will be notified of the availability of the draft documents through a press release sent to state news media outlets and posted on the refuge website. A hard copy of the environmental assessment will be made available at the refuge visitor center. For access to the document in an alternative format contact the refuge. Comments may be submitted in writing to:

Little Yellow River Environmental Assessment
Necedah National Wildlife Refuge
N11385 Headquarters Road
Necedah, WI 54646
or to:

Necedah@fws.gov

Any comments, concerns, suggestions, or other feedback will be included in the final Environmental Assessment if a substantive response is required.

DRAFT

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Appendix A: Policy and Compliance

Cultural Resources

American Indian Religious Freedom Act, as amended, 42 U.S.C. 1996 - 1996a; 43 CFR Part 7

Not Applicable given proposed action

Antiquities Act of 1906, 16 U.S.C. 431-433; 43 CFR Part 3

Requirements met through consultation and approval process with the regional Historical Preservation Staff.

Archaeological Resources Protection Act of 1979, 16 U.S.C. 470aa-470mm; 18CFR Part 1312; 32 CFR Part 229; 36 CFR Part 296; 43 CFR Part 7

Requirements met through consultation and approval process with the regional Historical Preservation Staff.

National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470-470x-6; 36 CFR Parts 60, 63, 78, 79, 800, 801, and 810

Requirements met through consultation and approval process with the regional Historical Preservation Staff.

Paleontological Resources Protection Act, 16 U.S.C. 470aaa-470aaa-11

Requirements met through consultation and approval process with the regional Historical Preservation Staff.

Native American Graves Protection and Repatriation Act, 25 U.S.C. 3001-3013; 43 CFR Part 10

Requirements met through consultation and approval process with the regional Historical Preservation Staff.

Executive Order 11593 – Protection and Enhancement of the Cultural Environment, 36 Fed. Reg. 8921 (1971)

Requirements met through consultation and approval process with the regional Historical Preservation Staff.

Executive Order 13007 – Indian Sacred Sites, 61 Fed. Reg. 26771 (1996)

Requirements met through consultation and approval process with the regional Historical Preservation Staff.

Fish and Wildlife

Bald and Golden Eagle Protection Act, as amended, 16 U.S.C. 668-668c, 50 CFR 22

Not Applicable given proposed action

Endangered Species Act of 1973, as amended, 16 U.S.C. 1531-1544; 36 CFR Part 13; 50 CFR Parts 10, 17, 23, 81, 217, 222, 225, 402, 450

Requirements met through intra-service section 7 consultation and approval process with the regional Ecological Services Staff.

Fish and Wildlife Act of 1956, 16 U.S.C. 742a-m

Not Applicable given proposed action

Lacey Act, as amended, 16 U.S.C. 3371 et seq.; 15 CFR Parts 10, 11, 12, 14, 300, and 904

Not Applicable given proposed action

Migratory Bird Treaty Act, as amended, 16 U.S.C. 703-712; 50 CFR Parts 10, 12, 20, and 21

Not Applicable given proposed action

Executive Order 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds, 66 Fed. Reg. 3853 (2001)

Not Applicable given proposed action

Natural Resources

Clean Air Act, as amended, 42 U.S.C. 7401-7671q; 40 CFR Parts 23, 50, 51, 52, 58, 60, 61, 82, and 93; 48 CFR Part 23

Not Applicable given proposed action

Wilderness Act, 16 U.S.C. 1131 et seq.

Not Applicable given proposed action

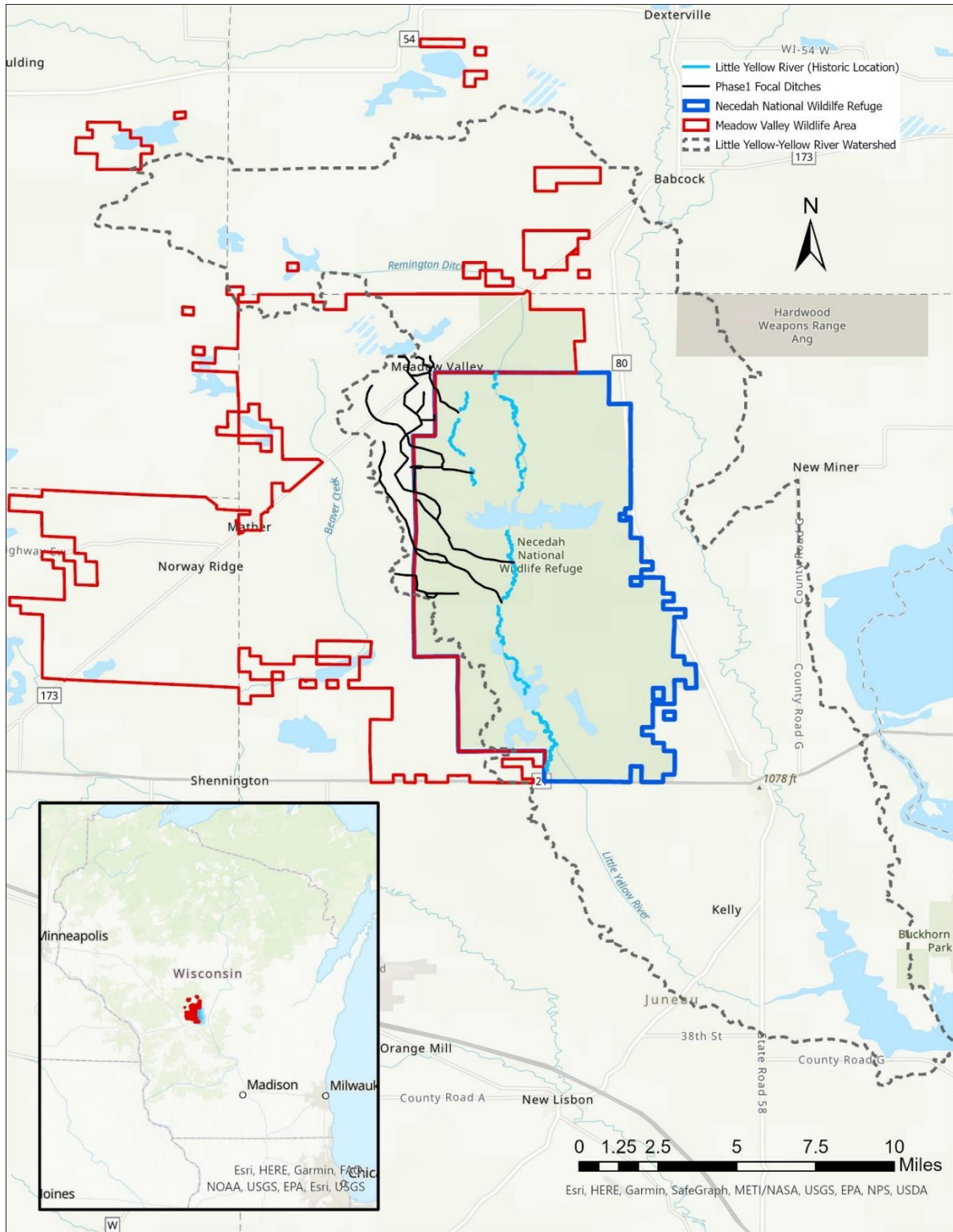
Wild and Scenic Rivers Act, 16 U.S.C. 1271 et seq.

Not Applicable given proposed action

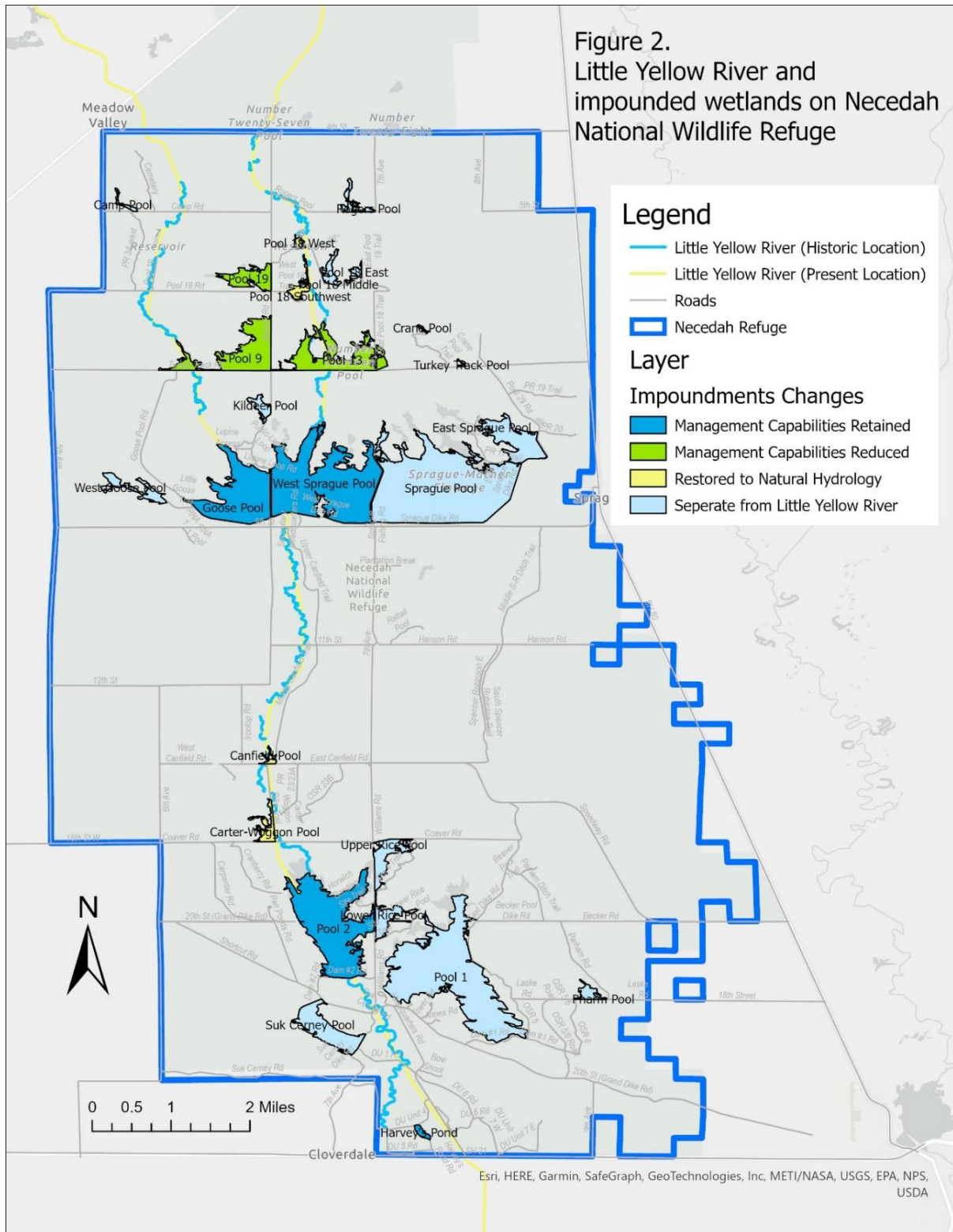
Alaska Native Interests Lands Conservation Act 94 Stat. 2371

Not Applicable given proposed action

Appendix B, Figure 1: Little Yellow River - Yellow River Watershed



Appendix B, Figure 2: Little Yellow River and Impoundments



Appendix B, Figure 3: Vegetation Communities of Necedah Wildlife Refuge and Necedah Wildlife Management Area

