

Appendix A: Environmental Assessment

In this appendix:

- [A.1: Purpose and Need for Proposed Action](#)
- [A.2: Description of Alternatives](#)
- [A.3: Affected Environment](#)
- [A.4: Environmental Consequences](#)

A.1 Purpose and Need for Proposed Action

A.1.1 Purpose and Need

The purpose of this Environmental Assessment (EA) is to adopt and implement a Comprehensive Conservation Plan (CCP) for Whittlesey Creek National Wildlife Refuge (NWR, Refuge) as mandated in the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act) and that the CCP meets the purposes for which the Refuge was established, contributes to the overall mission of the National Wildlife Refuge System (NWRS, Refuge System) and adheres to U.S. Fish and Wildlife Service (FWS, Service) policies and mandates. Refuge purposes and the Refuge System mission are included in chapter 1 of the CCP. Appendix H of the CCP contains a list of key laws, orders, and regulations that provide a framework for the proposed action.

This EA addresses the need to provide guidance for future Refuge management; address significant issues; identify priorities; ensure consistent and integrated management; protect the biological integrity, diversity, and environmental health of the Refuge; evaluate the appropriateness and compatibility of public uses; and meet other requirements of the Improvement Act. The plan is needed to help achieve Refuge goals for wildlife, habitat, and people.

Adequate long-term management direction does not currently exist for the Refuge. A 1998 Interim Comprehensive Management Plan provided a general outline on how the Refuge would be operated until a more detailed plan could be completed. In addition, new threats to wildlife and habitat are emerging, new laws and policies are in place, and new scientific information is available.

A.1.2 Scoping of the Issues

In January 2013, the planning team met to develop a preliminary list of issues, concerns, and opportunities associated with management of the Refuge. A second internal scoping session was held in May 2013 with regional supervisors, biologists, planners, and other program specialists.

In April 2013, staff hosted an open house in Ashland, WI, to inform the public of the planning process and to solicit input on issues of concern. A news release was distributed to area media, informational posters were displayed in the local community, and a notice was sent to more than 600 names on the Refuge mailing list. Written comments were received from 11 stakeholders. Refuge staff also met with numerous partners to explain the importance of the CCP process and to encourage active participation.

A.1.3 Whittlesey Creek NWR Issues, Concerns, and Opportunities

Major issues identified and analyzed as part of the CCP process are summarized below. These issues were critical in framing the various alternatives considered and formed the basis for evaluating environmental effects. Additional detail on these topics can be found in chapters 2 and 3 of the CCP.

Wildlife

Coaster Brook Trout

The coaster brook trout was common prior to European settlement, but numbers soon plummeted due to overharvest and habitat degradation. The 30-year Whittlesey Creek experiment is one of the collaborative efforts begun by conservation partners in the 1990s to reestablish coaster brook trout in the Lake Superior basin. It combines four priority actions: improve habitat, establish protective harvest regulations, stock coaster brook trout, and assess and monitor. The role of the Refuge in the experiment is to restore suitable habitat in the creek and monitor the effects of habitat restoration projects.

A self-sustaining migratory coaster population has not yet been achieved, although numbers have increased, and movement into and out of Whittlesey Creek has been documented. Habitat restoration is incomplete, and the effects of competition from non-native salmonids are not well understood. Because these fish are migratory, conditions outside the local watershed could affect the likelihood of successful coaster reestablishment within Whittlesey Creek.

Migratory Birds

Restoration of forests and wetlands on the Refuge improves habitat for many migratory bird species including songbirds, raptors, waterfowl, and shorebirds. Improved water quality in Whittlesey Creek also benefits Chequamegon Bay, an important downstream staging area for migrating waterfowl.

Some improvements in habitat quality are possible (e.g., forest stand management) but may not be cost effective. Additional population benefits would be minimal because the Refuge is small, so bird-specific management actions have not been a high priority to date. Surveys and monitoring have been sporadic and not always closely tied to habitat restoration activities.

Habitat

Stream, Floodplain, and Watershed Restoration

Habitat protection and restoration are underway in the creek, on Refuge wetlands and floodplain, and within the watershed, although much work remains. Activities in recent years have centered on in-stream habitat and fish passage, especially installation of large woody debris and replacement of culverts. In addition, native conifers have been planted in some riparian zones and floodplain hayfields, and some floodplain wetlands have been restored, mainly by plugging ditches.

Facilitating surface water infiltration and controlling erosion within the upstream watershed are crucial to successful restoration of downstream fish and wildlife habitat on Refuge lands. Several easements have been acquired and conservation actions have been implemented on private lands in the watershed. Continued progress requires strong partnerships with landowners, other agencies, and conservation organizations.

The Habitat Management Plan (HMP) (FWS, 2006c) provides comprehensive guidance for habitat restoration and management on Refuge lands and conservation actions within the watershed, but does not set priorities. Management actions must focus on the highest priority projects to make the best use of limited resources and to maximize the fish and wildlife benefits of the Refuge.

Climate Change

The effects of a warming climate are expected to eliminate brook trout habitat in many Wisconsin streams by mid-century, although Whittlesey Creek is expected to remain highly suitable. Boreal and lowland forests will be subject to increased stress and may be lost altogether in northern Wisconsin. Hardwood trees are predicted to expand their range in the state.

People

Hunting and Fishing

The Refuge offers waterfowl and archery deer hunting opportunities in some locations. Should more or fewer hunting opportunities be available? Fishing is allowed within Whittlesey Creek waters in accordance with state regulations. The Refuge itself, however, has never been opened to fishing per Service regulations, so anglers must walk up the streambed to fish legally within the Refuge boundary. Should streambank fishing be allowed in the Refuge?

Wildlife Observation and Photography

Ideas to enhance wildlife observation and photography on the Refuge have included new foot trails and construction of an overlook at the mouth of the creek. Additional facilities and increased visitation on such a small Refuge must be evaluated carefully to limit wildlife and habitat disturbance.

Environmental Education and Interpretation

Environmental education has been a high priority, but capabilities are limited currently due to lack of visitor services staff. There is a need to define the vision and priorities for environmental education and interpretation on the Refuge and for Service participation in special events at the Northern Great Lakes Visitor Center (NGLVC, Visitor Center, Center). Refuge-specific interpretive exhibits and brochures are available at the NGLVC. The Coaster Classroom and one interpretive kiosk are located on Refuge land, but the Coaster Classroom is underutilized.

Northern Great Lakes Visitor Center

The NGLVC partnership provides many opportunities for mutually beneficial collaboration and enhancement of Service identity in the region, but current Service involvement in day-to-day activities is limited because the park ranger position is vacant and the refuge manager is located several hours away. The annual agreement between the Service and the U.S. Forest Service (USFS) does not address the Service's long-term commitment to the partnership nor does it provide clearly defined roles and expectations.

A.1.4 Decision Framework

This EA describes four alternatives for future Refuge management and the environmental consequences of each alternative. Each alternative has a reasonable mix of wildlife habitat

prescriptions and wildlife-dependent recreational opportunities. A summary table of action is included at the end of this section (Table A-1).

This EA is an important step in the Service's formal decision-making process. In compliance with the National Environmental Policy Act of 1969 (NEPA), the Regional Director of the Midwest Region (Region 3 of the Service) will consider the information presented in this document to select the preferred management alternative. Selection of the preferred alternative is based on its environmental consequences and ability to achieve Refuge purposes and goals.

The Regional Director will determine whether the preferred alternative is a major federal action, which would significantly affect the quality of the human environment within the meaning of Section 102(2)(c) of NEPA. If it is determined not to be a major federal action, a Finding of No Significant Impact (FONSI) will be issued. A FONSI means that the preferred alternative is selected and can be implemented in accordance with other laws and regulations. A Decision of Significant Impact would indicate the need to conduct more-detailed environmental analysis in an Environmental Impact Statement.

The planning team has recommended Alternative B ("Refuge and Watershed Restoration; Maintain Visitor Center Partnership") to the Regional Director. The Draft CCP was developed for implementation based on this recommendation.

A.2 Description of Alternatives

This section summarizes the alternatives considered by the planning team to achieve the proposed vision and goals and to address the issues. These alternatives include continuation of current management (Alternative A) and the planning team's proposed action (Alternative B).

A.2.1 Formulation of Alternatives

Alternatives are different approaches to protecting, restoring, and managing the Refuge. The planning team developed and evaluated four alternatives for Whittlesey Creek NWR based on the significant issues, concerns, and opportunities brought forth during the CCP scoping period. All are designed to achieve Refuge purposes, the vision and goals identified in the CCP, and the mission and goals of the Refuge System and the Service.

The alternatives were formulated under the assumptions that (1) a large budget increase for Refuge operations is unlikely during the life of the plan, and (2) Refuge staffing would continue to include one park ranger and one biologist position.

A.2.2 Alternative Components Not Considered for Detailed Analysis

End Participation in the Whittlesey Creek Brook Trout Experiment

The CCP planning team considered discontinuing Refuge involvement in the experimental restoration of coaster brook trout in Whittlesey Creek due to funding and staffing limitations. About 20 years remain in the 30-year experiment to re-establish a self-sustaining coaster brook trout population in Whittlesey Creek. The Refuge role in the experiment is to restore suitable habitat in the creek. Considerable staff time is required to design, organize, implement, and monitor habitat improvement projects in the creek and to work with landowners in the watershed to slow overland flow and reduce sediment input. Reducing or ending this work would allow increased focus on restoring forests and wetlands on the Refuge.

The experiment, however, is a partnership commitment between the Service and the Wisconsin Department of Natural Resources (WDNR) to reach a common goal, with shared responsibilities between the Refuge, the Service's fisheries program, and the WDNR's Division of Fish and Wildlife. The combined efforts of all three partners are critical to the success of the project. If the Refuge unilaterally ended its involvement, no other potential partner would have the resources needed to continue habitat restoration, and the experiment likely would fail.

Furthermore, creek restoration benefits not only coaster brook trout but also other Refuge resources of concern. Restoration of diverse in-stream habitat with good cover will improve conditions for all fish and wildlife species that depend on coldwater streams during their life cycle, and improving watershed health is an important component of forest and wetland restoration on Refuge lands downstream. These restored habitats and the wildlife they support will be more resilient to long-term stressors including climate change.

Fully meeting Refuge purposes and goals requires that we continue to restore Whittlesey Creek. For these reasons, this alternative was eliminated from further consideration.

Modify the Brook Trout Restoration Program

The CCP team also considered potential changes to other components of the brook trout program, such as exclusion of coho salmon from a Whittlesey Creek tributary to study coho-brook trout competition and implementation of additional protective harvest regulations in off-Refuge streams. The Refuge, however, does not have sole decision-making authority for these topics or any others not specifically related to the Whittlesey Creek habitat restoration portion of the coaster brook trout program. These broader questions lie outside the scope of this CCP. They will be addressed instead by the entire partnership as part of the ongoing evaluation of the coaster restoration program on the Wisconsin shore of Lake Superior. The Refuge will continue to participate in these programmatic discussions in partnership with the Ashland Fish and Wildlife Conservation Office (FWCO), which is the lead Service entity on the interagency team.

Trail to Lake Superior and Overlook on Shore

The CCP team considered adding a new Refuge foot trail from Highway 13 to Lake Superior and a new overlook on the lakeshore. A small parking area would be constructed next to the highway. These developments would provide easier access for visitors to view migratory birds that use the coastal wetlands and Chequamegon Bay, especially during fall migration.

A parking area on the west side of the highway, however, would require visitors to cross the busy roadway to access the trail. Locating it on the east side instead would require filling of wetlands. In addition, Chequamegon Bay and shore is an important migratory bird stopover area, and the Refuge portion includes some of the last remaining protected coastal wetlands on Lake Superior. The risk of increased disturbance to waterfowl and shorebird populations was determined to be unacceptably high. For these reasons, this alternative was eliminated from further consideration.

A.2.3 Elements Common to All Alternatives

- The team-partnership approach to experimental restoration of coaster brook trout will continue between Whittlesey Creek NWR, Ashland FWCO, and WDNR. The Refuge's role in the experiment will continue to be restoration of brook trout habitat in Whittlesey Creek.

- The habitat restoration program will be based on overall guidance developed in the HMP for the Refuge (FWS, 2006c).
- The Service will continue to acquire land and easements from willing sellers within the approved boundary.
- The Service will ensure that Refuge management complies with all federal laws and regulations that provide direction for managing units of the Refuge System.
- No adjacent landowners will be adversely impacted by any action taken by the Service without mutual agreement and adequate compensation.

A.2.4 Description of Alternatives

Alternative A: Opportunistic Restoration; Maintain Visitor Center Partnership (No Action)

Under this alternative, the current management direction of Whittlesey Creek NWR would continue. Habitat restoration activities would be opportunistic. The Service partnership with the NGLVC would continue unchanged. Visitor services opportunities would remain the same. This alternative provides the baseline against which to compare other alternatives. NEPA requires that a no-action alternative be addressed in the planning process. A detailed description of the existing programs and uses contained in this alternative is found in chapter 3 of the CCP.

These are key elements of Alternative A:

- Select habitat restoration priorities based primarily on availability of funding and other resources; targeted control of priority invasive plants during restoration.
- Complete currently planned tree planting, logjam installation, and culvert replacement projects; targeted control of priority invasives during restoration.
- Migratory birds continue to benefit from restoration of historic vegetation communities, but no bird-specific management occurs. Bird surveys and monitoring are opportunistic.
- Continue to focus watershed easement acquisition on protection of springs.
- Maintain current conservation partnerships with other agencies, landowners, and organizations.
- Maintain current Service involvement in the NGLVC; Refuge office remains on-site. Participate in partnership events when consistent with Refuge purposes.
- Continue current opportunities on the Refuge for hunting and wildlife observation. Continue to develop Refuge-specific environmental education and interpretation programs.
- Continue to educate and mentor Northland College students and Youth Conservation Corps (YCC) participants.

Alternative B: Refuge and Watershed Restoration; Maintain Visitor Center Partnership (Preferred Alternative)

Under this alternative, the Refuge would develop prioritized focus areas for future habitat restoration using best available science to achieve maximum benefits for brook trout and other priority species. Inventory and monitoring would answer management-relevant questions. Roles and expectations for Service involvement in the NGLVC would be more clearly defined. Visitor services opportunities would expand on the Refuge. Detailed objectives, strategies, and rationales associated with this alternative were developed for chapter 4 of the CCP.

These are key elements of Alternative B:

- Prioritize and integrate all future restoration actions in consultation with partners. Emphasize use of data from sediment transport model (U.S. Army Corps of Engineers, 2010), hydrology study (Lenz et al., 2003), and climate models (Wisconsin Initiative on Climate Change Impacts, 2011) to maximize long-term habitat benefits using limited resources. Examine role of off-Refuge ground-water-contributing area. Develop map of highest priority focus areas. Consider Little Whittlesey and Terwilliger Creeks.
- Complete currently planned tree planting, logjam installation, and culvert replacement projects; expand footprint of historic vegetation beyond riparian zone to increase migratory bird benefits. Targeted control of priority invasives during restoration.
- Develop monitoring plan designed to answer highest priority management questions; consider the cost/benefit of migratory bird monitoring.
- Acquire fee title land and easements from willing sellers within the approved boundary; emphasize lands within the priority focus areas.
- Develop and implement additional watershed protection tools such as buffer strips and riparian easements in partnership with the Natural Resources Conservation Service (NRCS), USFS, and private landowners.
- Build landowner support for future floodplain reconnection and re-meandered channel on the Refuge.
- Maintain current Service involvement in the NGLVC. Keep Refuge office on-site. Participate in partnership events when consistent with Refuge purposes. Develop cooperative agreement to clarify the Service's role and responsibilities.
- Continue the hunting program. Open the Refuge to fishing in accordance with state regulations.
- Continue to develop Refuge-specific education and interpretive programs; expand themes to include the watershed/trout connection. Increase use of Coaster Classroom.
- Add foot trail from NGLVC boardwalk to Coaster Classroom.
- Continue to educate and mentor Northland College students and YCC participants.

Alternative C: Watershed Restoration; Expand Visitor Center Partnership

Under this alternative, Refuge habitat priorities would focus on protection and restoration of the Whittlesey Creek watershed. Easement acquisition would increase, as would partnerships to implement conservation measures on private lands. Stream restoration would focus on the

upper reaches of the watershed. Lowland forest and coastal wetland restoration would be a lower priority. The Service would expand its participation in the NGLVC. Visitor services opportunities would increase and focus more on NGLVC priorities.

These are key elements of Alternative C:

- Focus future habitat restoration on stabilizing bluffs and slowing overland flow to reduce sedimentation and flood peaks in Whittlesey Creek
- Complete currently planned logjam and culvert projects on lower Whittlesey Creek. Design and construct logjams for erosion control on upper Whittlesey Creek.
- Allow natural regeneration of Refuge forests; no new coastal wetland restorations on the Refuge; control only problem invasives (e.g., threats to adjacent private land).
- Migratory birds benefit from restoration of historic vegetation communities, but no bird-specific management occurs. Develop volunteer-based bird surveys with NGLVC to gather basic trend data and encourage public involvement and support.
- Continue to acquire land and easements from willing sellers within the approved boundary. Focus easement acquisition on bank and bluff stabilization.
- Expand efforts to promote conservation farming and forestry practices on private lands in the watershed. Develop and implement additional watershed protection tools (e.g., buffer strips and riparian easements) in partnership with NRCS, USFS, and Partners for Fish and Wildlife.
- Expand Service involvement in the NGLVC; focus visitor services priorities on NGLVC programs and special events; provide Refuge staff at front desk. Develop cooperative agreement to clarify the Service's role and responsibilities.
- Continue the hunting program. Open the Refuge to fishing in accordance with state regulations.
- Add a limited foot trail onto Refuge property from the NGLVC boardwalk.
- Continue to educate and mentor Northland College students and YCC participants.

Alternative D: Refuge Restoration; Reduce Visitor Center Partnership

Under this alternative, Refuge habitat priorities would focus on restoring stream and floodplain habitat within the Refuge boundary. Restoration of lowland forests and coastal wetlands on the Refuge would increase. Refuge management would focus more on benefits to migratory birds. Stream restoration would focus on lower reaches within the Refuge boundary. Watershed work would continue, but would be a lower priority. The Service would reduce participation in the NGLVC; Refuge staff and programs would move off-site. Visitor services opportunities on Refuge lands would increase.

These are the key elements of Alternative D:

- Focus future habitat work on restoring natural hydrology and native vegetation on the Refuge. Climate change is a concern but not a driver of restoration priorities.

- Complete currently planned logjam and culvert projects on lower Whittlesey Creek. Design and install logjams for fish habitat on the Refuge portion of Little Whittlesey and Terwilliger Creeks.
- Create intensively managed seed production blocks for forest restoration. (This relates to managing for scattered blocks of mature native conifers that would ultimately disperse seed for forest restoration. Initially it means intensive weed and browse control, then it's mostly hands-off and low-intensity, low-input).
- Expand wetland restoration and management efforts on the Refuge.
- Increase invasive plant control efforts; work to establish the Refuge as an Invasives-Free Zone.
- Additional actions to benefit bird species of concern (northern waterthrush, veery, black duck, common tern, piping plover, sora rail, cavity nesters). Develop scientifically rigorous monitoring of migratory bird use of Refuge floodplain and coastal wetlands.
- Restore stream meanders and reconnect Whittlesey, Little Whittlesey, and Terwilliger Creeks to their floodplains.
- Continue to acquire fee title land from willing sellers. Continue limited easement acquisition and private lands conservation assistance.
- Reduce involvement in the NGLVC. Move Refuge office and programs off-site.
- Establish the Coaster Classroom as the center of visitor services information for the Refuge; establish staffed hours during peak periods.
- Develop Refuge-specific mission-relevant programming. End participation in NGLVC events.
- Add foot trail from the NGLVC to Coaster Classroom.
- Develop auto tour route with interpretive signs along Refuge roads; add small parking areas.
- Educate and mentor Northland College and YCC participants

Table A-1: Comparison of Actions by Alternative

Issues	Alternative A Opportunistic Restoration; Maintain Visitor Center Partnership (No Action)	Alternative B Refuge and Watershed Restoration; Maintain Visitor Center Partnership (Preferred Alternative)	Alternative C Watershed Restoration; Expand Visitor Center Partnership	Alternative D Refuge Restoration; Reduce Visitor Center Partnership
WILDLIFE				
<i>Coaster Brook Trout</i>	<p>Team approach to restoring coaster brook trout; Refuge role is to restore Whittlesey Creek habitat.</p> <p>Opportunistic habitat restoration based primarily on availability of grants and other resources.</p>	<p>Team approach to restoring coaster brook trout; Refuge role is to restore Whittlesey Creek habitat.</p> <p>Develop and prioritize focus areas for habitat restoration. Consult with partners. Emphasize use of data from sediment transport model and hydrology study.</p>	<p>Team approach to restoring coaster brook trout; Refuge role is to restore Whittlesey Creek habitat.</p> <p>Focus on stabilizing bluffs and slowing overland flow in the watershed to reduce sedimentation and flood peaks.</p>	<p>Team approach to restoring coaster brook trout; Refuge role is to restore Whittlesey Creek habitat.</p> <p>Focus on restoring stream and floodplain habitat within the Refuge boundary.</p>
<i>Migratory Birds</i>	<p>Birds benefit from restoration of historic vegetation, but no bird-specific management.</p> <p>Minimal, opportunistic bird monitoring.</p>	<p>Expand footprint of restored historic vegetation beyond riparian zone where feasible to increase bird benefits.</p> <p>Develop monitoring plan designed to answer highest priority management-relevant questions; consider the cost/benefit of migratory bird monitoring.</p>	<p>Birds benefit from restoration of historic vegetation, but no bird-specific management.</p> <p>Develop volunteer-based bird surveys (e.g., annual raptor migration) in partnership with NGLVC to gather basic trend data and encourage public involvement and support.</p>	<p>Expand footprint of restored historic vegetation beyond riparian zone where feasible to increase bird benefits. Implement bird-specific habitat management to benefit northern waterthrush, veery, black duck, common tern, piping plover, sora rail, etc.</p> <p>Develop scientifically rigorous monitoring of migratory bird use of Refuge floodplain and coastal wetlands.</p>

HABITAT				
<i>Stream Restoration</i>	Install remaining logjams on lower Whittlesey Creek; replace remaining bad culverts.	Install remaining logjams on lower Whittlesey Creek; replace remaining bad culverts; reestablish free-flowing North Fork by removing beaver dams. Prioritize new stream restoration activities using current science in consultation with partners; consider Little Whittlesey and Terwilliger Creeks.	Install remaining logjams on lower Whittlesey Creek; replace remaining bad culverts. Design and install logjams for erosion control on upper Whittlesey Creek.	Install remaining logjams on lower Whittlesey Creek; replace remaining bad culverts. Design and install logjams for fish habitat on the Refuge portion of Little Whittlesey and Terwilliger Creeks.
<i>Floodplain and Coastal Wetland Restoration</i>	Plant trees and restore/manage wetlands on Refuge as resources allow. Targeted control of priority invasive plants during restoration.	Complete Refuge tree planting within 10 years; prioritize new wetland restoration activities with partners. Targeted control of priority invasive plants during restoration. Build landowner support for future floodplain reconnection and restoration of stream meanders on the Refuge.	Allow natural regeneration of forests; no new wetland restoration. Control only problem invasives (e.g., threats to adjacent private lands).	Create intensively managed seed production blocks for forest restoration. Expansion of wetland restoration and management on the Refuge is a priority. Reduce Refuge acres infested with invasive plants by 95% (monitoring and maintenance mode). Restore stream meanders on the Refuge and reconnect stream to floodplain.
<i>Watershed Protection</i>	Acquire easements from willing sellers. Continue limited private lands work.	Prioritize watershed projects using current science in consultation with partners. Develop new watershed protection tools (e.g., buffer strips and riparian easements) with NRCS, USFS, and Partners for Fish and Wildlife.	Focus easement acquisition on bank and bluff stabilization. Expand efforts to promote conservation farming and forestry practices on private lands in the watershed. Develop new watershed protection tools with NRCS, USFS, and Partners for Fish and Wildlife.	Acquire easements from willing sellers. Continue limited private lands work.
<i>Climate Change</i>	No specific management driven by climate change modeling.	Climate change modeling is one tool used to prioritize and integrate all restoration actions and could affect priorities.	Climate change is a concern but not a driver of restoration priorities.	Climate change is a concern but not a driver of restoration priorities.

PEOPLE				
<i>NGLVC Partnership</i>	Continue current Service involvement.	Continue current Service involvement. Clarify roles and responsibilities; develop cooperative agreement.	Become more complete partner. Focus Refuge visitor services on NGLVC priorities, participate in seasonal tours and programs, provide staff at front desk, develop cooperative agreement.	Reduce partnership involvement. Move Refuge office and programs off-site.
<i>Welcome and Orient Visitors</i>	Visitor contact station, Refuge exhibits, and brochures provided at NGLVC.	Visitor contact station, Refuge exhibits and brochures provided at NGLVC.	Visitor contact station, Refuge exhibits, and brochures provided at NGLVC; Refuge staff works at the front desk.	Coaster Classroom is the center of visitor services information for the Refuge, with staffed hours during peak periods.
<i>Environmental Education and Interpretation</i>	Maintain Refuge-specific mission-relevant programming. Participate in NGLVC events when appropriate. Educate and mentor Northland College and YCC students.	Expand Refuge-specific mission-relevant programming; participate in NGLVC events when appropriate. Increase collaboration with Ashland FWCO; expand themes to include watershed/trout connection. Educate and mentor Northland College and YCC students.	Focus Refuge visitor services activities on support of NGLVC programs and special events. Educate and mentor Northland College and YCC student.	Expand Refuge-specific mission-relevant programming. End participation in NGLVC events. Increase collaboration with Ashland FWCO; expand themes to include watershed/trout connection. Develop auto tour route with interpretive signs and small parking areas along Refuge roads. Educate and mentor Northland College and YCC students.
<i>Wildlife Observation and Photography</i>	All Refuge lands open to visitor access on foot. No designated foot trails or overlooks.	All Refuge lands open to visitor access on foot. Add limited trail onto Refuge property from NGLVC boardwalk.	All Refuge lands open to visitor access on foot. No designated trails or overlooks.	All Refuge lands open to visitor access on foot. Add limited trail onto Refuge from NGLVC to Coaster Classroom.
<i>Hunting and Fishing</i>	Waterfowl and archery deer hunting in designated locations. Fishing officially closed.	Waterfowl and archery deer hunting in designated locations. Open Refuge to fishing in accordance with state regulations.	Same as Alternative B.	Same as Alternative B.

A.3 Affected Environment

See chapter 3 of the CCP.

A.4 Environmental Consequences

A.4.1 Effects Common to All Alternatives

Environmental Justice

Executive Order 12898 “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” establishes environmental justice as a federal government priority and directs all federal agencies to make environmental justice part of their mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs and policies, and activities on minority and low-income populations.

None of the alternatives described in this EA will disproportionately place any adverse environmental, economic, social, or health effects on minority and low-income populations. Public use activities that would be offered under each of the alternatives would be available to any visitor regardless of race, ethnicity, or income level.

Cultural Resources

The Service is responsible for managing archaeological and historic sites found on refuges. Under each of the alternatives evaluated in this EA, Refuge management would ensure compliance with relevant federal laws and regulations, particularly Section 106 of the National Historic Preservation Act. Prior to all habitat and facility projects, appropriate efforts will be made to identify and protect cultural resources within the area of potential impact by contacting the Regional Historic Preservation Officer for project review.

Climate Change

The U.S. Department of the Interior issued an order in January 2001 requiring federal agencies under its direction that have land management responsibilities to consider potential climate change impacts as part of long-range planning endeavors. Some potential impacts of climate change on the Superior Coastal Plain ecoregion in Wisconsin have been identified and are discussed in chapter 3 of the CCP.

For example:

- Increased average surface and groundwater temperatures could affect habitat quality for coldwater-dependent fish species.
- Changes in recharge and discharge patterns could affect erosion, sedimentation, and flood peaks.
- Changes in wildlife composition could occur as boreal forest plant species shift their ranges northward.

Managers and resource specialists on the Refuge need to be aware of the potential effects of climate change. When feasible, documenting long-term vegetation, wildlife, and hydrologic

changes should become a part of research and monitoring programs. Adjustments in management direction may be necessary over time to adapt to a changing climate.

Carbon Sequestration

Increased carbon dioxide in the atmosphere has been linked to global climate change. In relation to comprehensive conservation planning for refuges, carbon sequestration is one of the primary climate-related management strategies that can be considered despite uncertainty surrounding site-specific climate change effects. The U.S. Department of Energy (USDOE, 1999) defines carbon sequestration as “. . . the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere.”

Vegetation is an important factor in global carbon sequestration. Both wetlands and forests have been shown to be carbon sinks, capturing and storing carbon, thereby removing a portion of the atmospheric carbon dioxide. The USDOE report notes that ecosystem protection is important to carbon sequestration and may reduce or prevent loss of carbon currently stored in the terrestrial biosphere.

Restoration of lands previously cleared for agriculture will increase the total quantity of sequestered carbon on the Refuge under all alternatives. All alternatives would result in increased carbon storage due to continuing land acquisition and restoration.

A.4.2 Summary of Effects by Alternative

This section examines the environmental impacts of implementing each alternative. Impacts are discussed under three broad categories consistent with the CCP: wildlife, habitat, and people. A summary table of impacts is included at the end of this section (Table A-2).

Wildlife

All four alternatives would benefit Refuge species of concern, although the magnitude of benefit would vary by alternative for specific species. Alternative B provides the greatest overall benefits due to improved sequencing and integration of habitat restoration activities that would make the most effective use of limited resources.

Coaster Brook Trout

All four alternatives will improve stream habitat and thereby increase the likelihood of increasing the number of coasters in Whittlesey Creek. It should be noted, however, that coaster brook trout numbers are not solely dependent on Refuge efforts to restore stream habitat; many other factors outside Refuge control also will affect the likelihood of successfully restoring a migratory population in Whittlesey Creek.

Under Alternative B, the improvement in amount and quality of coldwater stream habitat suitable for coasters would be greatest due to improved prioritization and integration of habitat restoration activities. So, all other factors being equal, the greatest increase in coaster brook trout numbers would be expected under this alternative.

The smallest increase in coaster brook trout numbers would be expected under Alternative D. Some structural in-stream habitat improvements would continue, but water quality improvement would be smallest under this alternative due to decreased focus on upland runoff and sediment reduction.

Migratory Birds

All alternatives would benefit migratory birds as additional acres are acquired and native vegetation restoration continues on the Refuge. Northern waterthrush (lowland forest), veery (riparian forest), black duck, and sora (coastal wetland) are Refuge bird species of concern as defined in the HMP, although many other species also benefit from habitat restoration on the Refuge. Although notable local benefits accrue to migratory birds, particularly during migration, the Refuge is small, so none of the alternatives is expected to have a significant overall effect on migratory bird populations that use the area.

Under Alternatives A and B, a small increase in bird numbers would be expected on the Refuge as more acres are acquired and restored. Some additional benefits could accrue under Alternative B, depending on the habitat restoration priorities that arise from the modeling effort.

Under Alternative C, stable numbers of migratory birds would be expected as habitat focus shifts primarily to watershed erosion and runoff control rather than native vegetation restoration on the Refuge.

Under Alternative D, a medium increase in migratory bird use of the Refuge would be expected. This alternative would provide the greatest benefits due to the primary focus on restoring native plants on Refuge floodplains—emergent wetlands, lowland, and riparian forest; plus additional bird-specific management.

Habitat

All alternatives would have a positive net effect on quantity and quality of wetland, forest, and stream habitat although amount of improvement achieved over the next 15 years for each habitat type would vary by alternative. Alternatives B and C would provide the greatest benefits to stream habitat. Alternative D would provide the greatest benefit to forests and wetlands in the Refuge floodplain. Alternative C would provide the greatest reduction in watershed erosion and runoff.

Alternative B would provide the greatest overall increase in biological integrity, diversity, and environmental health of the Refuge, Whittlesey Creek, and the watershed because restoration activities would be more efficiently prioritized and integrated to target sites and activities of greatest potential impact.

The environmental effects of Whittlesey Creek NWR habitat restoration also were addressed as part of the EA developed for the HMP (FWS, 2006c)

Stream Restoration

Under Alternative A, stream habitat structure and water quality would improve due to continuing in-stream restoration and some reduced runoff and sedimentation in the watershed.

Under Alternative B, more improvement in stream habitat structure and water quality would be expected than under Alternative A due to improved sequencing and integration of restoration activities to achieve maximum benefit with limited resources.

Under Alternative C, habitat structure would improve due to continuing in-stream restoration of woody debris in upstream reaches of the creek. This alternative also would significantly improve water quality due to a primary focus on runoff and erosion reduction in the watershed.

Under Alternative D, stream habitat and water quality benefits would be smallest and localized primarily at the lower end of Whittlesey Creek on and near Refuge lands.

Floodplain and Coastal Wetland Restoration

Under Alternative A, acres of floodplain forest and restored wetland would increase as land acquisition and restoration continues. Wetland plant diversity would remain stable and invasive reed canarygrass would continue to dominate many areas due to limited wetland management activities. Invasive plants in Refuge forests and fields would remain stable or drop slightly when they are controlled during restoration projects. Herbicide use would be limited and primarily occur via direct application methods such as cut-stump treatment and by utilizing weed-wipers. Least-toxic compounds such as the aquatic glyphosate formulation would be utilized. Impacts to non-target plants and other organisms are expected to be minimal. Floodplain hydrology would remain stable or show some improvement as wetlands are restored and trees planted.

Under Alternative B, acres of floodplain forest and restored wetland would increase as land acquisition and restoration continues. Wetland plant diversity would remain stable or increase; invasive plants, for example reed canarygrass, would remain stable or decrease if prioritization efforts expand wetland management activities over the next 15 years. Invasive plants in Refuge forests and fields would remain stable or drop slightly when they are controlled during restoration projects. Herbicide use would be limited and primarily occur via direct application methods such as cut-stump treatment and by utilizing weed-wipers. Least-toxic compounds such as the aquatic glyphosate formulation would be utilized. Impacts to non-target plants and other organisms are expected to be minimal. Floodplain hydrology would remain stable or show some improvement as wetlands are restored and trees planted.

Alternative C would provide the fewest benefits to floodplain and coastal wetland habitats. Restoration activities would be focused primarily in the watershed rather than near the coast. This alternative would treat the fewest species and acres with herbicides and would have the least impact on non-target plants and other organisms.

Alternative D would provide the greatest improvement in quantity and quality of forest and coastal wetland habitat on Refuge lands. Restoration activities would focus primarily on Refuge lands in the floodplain near the coast. Forest acreage would increase. Restored wetland acreage and native plant diversity would increase significantly, accompanied by near elimination of invasive plants. Herbicide use would include numerous application methods, timings and compounds applied to diverse species. While least-toxic compounds would be selected and Best Management Practices followed, this alternative would result in the most herbicide applied and have the greatest potential impact on non-target plants and other organisms. Floodplain hydrology would improve through restoration of stream meanders and reconnection of the stream to its floodplain.

Watershed Erosion and Runoff

Alternative A would provide some reduction in sediment and overland flow due to opportunistic implementation of conservation practices on private lands and purchase of easements.

Alternative B includes more focused attention on areas of greatest concern within the Whittlesey watershed, so greater reduction in erosion and more natural water flow patterns would be expected under this alternative than under alternatives A or D, with greater habitat benefits downstream.

Alternative C would provide the greatest reduction in overland flow and erosion because watershed restoration would be the primary focus of habitat work.

Under Alternative D, some watershed work could still occur, but the priority would be restoration of Refuge lands downstream. This alternative would provide the smallest reduction in watershed erosion and runoff.

Climate Change

Climate change is likely to result in changing native vegetation communities in the Superior Coastal Plain over the long-term. Although major changes are not expected during the life of this plan, it is important to continue to build ecosystem resilience to the effects of climate change.

All four alternatives would increase resilience to outside stressors including climate change by restoring native vegetation and ecosystem function (hydrology). Under all four alternatives, Whittlesey Creek is expected to continue providing suitable coldwater habitat for brook trout due to consistent groundwater input. Stream restoration activities (logjams, sediment reduction, etc.) would enhance stream resilience to climate change under all alternatives. In addition, Alternative B would consider the potential for mitigation of climate change effects in prioritizing habitat restoration actions.

People

Hunting and Fishing

Under all four alternatives, hunting opportunities would remain the same, with waterfowl hunting and archery deer hunting allowed on some Refuge lands.

Under Alternative A, Refuge fishing would remain closed per Service regulations. Under Alternatives B, C, and D, fishing opportunities would increase because the Refuge would be open to fishing in accordance with state regulation.

Wildlife Observation and Photography

Under Alternatives A and C, wildlife observation opportunities would remain stable, with off-trail access allowed year round, but no foot trails or overlooks.

Under Alternatives B and D, wildlife observation opportunities would increase due to a trail extension from the NGLVC boardwalk and a trail from the NGLVC boundary to the Coaster Classroom.

Environmental Education and Interpretation

Under Alternative A, environmental education and interpretation opportunities would remain stable.

Under Alternative B, environmental education opportunities would expand, and quality could improve due to increased collaboration with Ashland FWCO and expanded themes to include the watershed/trout connection.

Under Alternative C, Refuge and Service-specific education and interpretive opportunities would decrease significantly because the focus would shift to NGLVC messages.

Under Alternative D, environmental education opportunities would expand, and quality could improve due to increased collaboration with Ashland FWCO and expanded themes to include the watershed/trout connection. Self-directed interpretive opportunities would increase due to the development of an interpreted auto tour route.

Public Awareness and Support

Public awareness and support for Whittlesey Creek NWR is strong in the local community. Many factors affect public awareness and support including partnerships, outreach, youth mentoring, habitat restoration, wildlife-dependent recreation opportunities, community involvement, and increased tourism and other economic effects of Refuge activities.

Under Alternative A, public awareness and support would remain stable as current Refuge programs and Service involvement in the NGLVC partnership continue.

Under Alternative B, public awareness and support could increase slightly as wildlife-dependent recreation opportunities increase.

Under Alternative C, public awareness and support could remain stable, or could decrease if some Service identity is lost as the Refuge becomes more closely integrated into the NGLVC partnership.

Under Alternative D, public awareness and support would decrease without the high public visibility afforded by the NGLVC; it could increase again over the long-term if the Refuge successfully develops a stronger individual identity separate from the NGLVC.

Cumulative Impacts

Cumulative impacts are effects that result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time.

The Council on Environmental Quality, which ensures that federal agencies meet their obligations under NEPA, requires mitigation measures when the environmental analysis process detects possible significant negative impacts on habitat, wildlife, or the human environment. None of the activities proposed are expected or intended to produce significant levels of cumulative environmental impacts that would require mitigation measures.

Biological Resources

All four alternatives are intended to maintain or improve biological resources on the Refuge. All alternatives would increase the acreage of restored Refuge floodplain forest and coastal wetland. All include working with partners to increase the conservation value of adjacent lands. The combination of our proposed management actions with those of other organizations could result in beneficial cumulative impacts through restoration and protection of stream, floodplain, and wetland habitats that are declining nationwide.

Water Resources

All alternatives would reduce erosion and runoff in the local watershed by converting fields to native vegetation, purchasing conservation easements, and encouraging adoption of additional conservation measures on privately owned agricultural land. Alternatives B and D also include measures to restore more natural hydrologic function in the floodplain over the long-term by

restoring stream meanders and reconnecting the stream to its floodplain. Improved quality of water flowing out of Whittlesey Creek could have positive local benefits in Chequamegon Bay. If many similar projects were implemented throughout the Lake Superior basin, the beneficial cumulative impacts on the lake could be significant.

Table A-2: Summary of Impacts by Alternative

Issues	Alternative A Opportunistic Restoration; Maintain NGLVC Partnership (No Action)	Alternative B Refuge and Watershed Restoration; Maintain NGLVC Partnership (Preferred)	Alternative C Watershed Restoration; Expand NGLVC Partnership	Alternative D Refuge Restoration; Reduce NGLVC Partnership
WILDLIFE				
<i>Coaster Brook Trout Population</i>	Increased.	Increased.	Increased.	Small increase.
<i>Migratory Bird Populations</i>	Small increase.	Small increase.	Stable.	Medium increase.
HABITAT				
<i>Stream</i>	Improved structure Improved water quality.	Significantly improved structure. Significantly improved water quality.	Improved structure. Significantly improved water quality.	Small improvement in structure. Small improvement in water quality.
<i>Floodplain Forest</i>	Increase in acreage .	Increase in acreage.	Small increase in acreage.	Increase in acreage.
<i>Coastal Wetlands</i>	Increase in restored acres Stable plant diversity.	Increase in restored acres. Stable or increased plant diversity.	Little or no change in restored acres. Stable or decreased plant diversity.	Significant increase in restored acres. Significant increase in diversity.
<i>Invasive Plants</i>	Stable or small reduction.	Stable or small reduction.	Increased.	Significant reduction.
<i>Floodplain Hydrology</i>	Stable or small improvement.	Stable or small improvement.	Stable or deteriorating.	Improved.
<i>Watershed Runoff and Erosion</i>	Small reduction.	Reduced.	Significantly reduced.	Stable or small reduction.
<i>Resilience to Climate Change</i>	Increased.	Increased.	Increased.	Increased.
PEOPLE				
<i>NGLVC Partnership</i>	Stable Service involvement.	Stable involvement. Increased clarity of roles/responsibilities	Expanded involvement. Potential loss of Service identity in the area.	Reduced involvement. Potential for reduced Service visibility in the area.

Issues	Alternative A Opportunistic Restoration; Maintain NGLVC Partnership (No Action)	Alternative B Refuge and Watershed Restoration; Maintain NGLVC Partnership (Preferred)	Alternative C Watershed Restoration; Expand NGLVC Partnership	Alternative D Refuge Restoration; Reduce NGLVC Partnership
<i>Welcome and Orient Visitors</i>	Service visibility remains the same.	Same as Alternative A.	Increased Service visibility in the area.	Reduced Service visibility in the area.
<i>Hunting</i>	Stable opportunities. No program changes	Same as Alternative A.	Same as Alternative A.	Same as Alternative A.
<i>Fishing</i>	Stable opportunities. Refuge open per State but not per Service fishing regulations.	Increased opportunities. Open in accordance with both State and Service regulations.	Same as Alternative B.	Same as Alternative B.
<i>Wildlife Observation</i>	Stable opportunities.	Increased opportunities.	Stable opportunities.	Increased opportunities.
<i>Environmental Education and Interpretation</i>	Stable opportunities. Stable quality.	Expanded opportunities. Increased quality.	Decrease in Refuge and Service-focused opportunities. Shift in focus to address NGLVC messages.	Expanded opportunities. Increased quality.
<i>Public Awareness and Support</i>	Stable.	Stable or small increase.	Stable or decreased. Some potential loss of Service identity.	Increased or decreased.