Appendix C: Whittlesey Creek NWR Habitat Management Plan, Chapter IV

Note that page numbers references used within this appendix (C) refer to the original document's page numbering and not the page numbering of this comprehensive conservation plan.

IV. Habitat Goals, Objectives and Strategies

Habitat and population goals were adopted for the Whittlesey Creek NWR when the Interim Comprehensive Conservation Plan was written. Revisions to the original goals were made for this plan, only to clarify, add watershed approaches or merge similar habitats into one goal. The intent and direction of the original goals were not altered.

The goals and objectives discussed in this document were developed with an understanding that upstream events, both past and present, directly impact the streams and floodplain within the refuge. Our goals, objectives and strategies must be based on flows and sediments entering the refuge from upstream. As engaged landowners continue to restore habitats that reduce flows and sediments, our objectives can be better defined.

The Service will gain a much better understanding of the dynamics of sediment entering the stream once a sediment transport study has been done. This study will identify sediment sources, quantify the amount, and model the movement of sediment entering and moving through the system. Until this study is done, stream restoration objectives within the Whittlesey Creek NWR will not be set, because anything we might try to do could be negated with excess sediment buildup or simply lost to high flood flows.

Goals, objectives and strategies are divided into two categories based on land ownership: Whittlesey Creek NWR and private lands. Private lands here refer to lands that are upstream of the refuge boundary and located within the surface water drainage area of Whittlesey Creek (Figure 2). The Service has no jurisdiction or authority over private land actions, but it can provide financial and technical assistance to landowners who are interested in restoring fish and wildlife habitat.

Several resources were used to redraft goals and draft objectives:

- Refuge staff convened a group of scientists that have expertise in hydrology, geomorphology, fisheries biology or wildlife biology to identify stream reaches and describe potential habitat and geomorphic characteristics for each reach. They were extremely helpful in formulating stream goals and objectives. A list of participants is provided in Appendix C.

- We convened another group of scientists that have expertise in plant ecology and soils to help us identify historic and potential native plants for the floodplain. A list of participants from this group is provided in Appendix C.

- We relied on data collected for the Whittlesey Creek hydrology study, as well as results of the analysis from this work (Lenz et al. 2003). Faith Fitzpatrick of USGS and coauthor of the Whittlesey Creek hydrology study (Lenz et al. 2003) and Marty Melchoir of inter-fluve, inc. provided valuable insight and helped us quantify objectives for the stream.

- Other reports and studies were used as references, such as the "Bayfield Peninsula Stream Assessment" (inter-fluve, inc. and Graber 2003) and "Guidelines for Evaluating Fish Habitat in Wisconsin Streams" (Simonson et al. 1993).

Steam objectives are set to provide habitat for coaster brook trout. If these objectives are not reachable by slowing overland flow and reducing sediment inputs, then the Service assumes the stream will still provide habitat for other fish and wildlife species, such as wood turtle, black duck and coho salmon.

A. Habitat Goals

Habitat Goal 1 – Stream: Restore watershed[1] and stream hydrologic functions that improve fish and wildlife habitat within the stream and the refuge, with an emphasis on native species.

Brook Trout Population Goal: Establish a self-sustaining brook trout population in the Whittlesey Creek watershed that exhibits a migrating life history.

Objectives and Strategies are laid out in the document titled, "An experiment to establish a self-sustaining brook trout population in Whittlesey Creek that exhibits a migrating life history (coaster) by stocking, enacting protective regulations and implementing habitat improvements." Specific objectives are:

1) By 2030, establish a self-sustaining migratory brook trout population. A population is considered self-sustaining when it supports itself for at least two life spans after stocked fish no longer contribute to recruitment.

2) Stocking Objective: Establish 25 spawning pairs of brook trout exhibiting the migratory life history.

Assessment needs, stocking schedules and monitoring requirements are specified in the Whittlesey Creek Brook Trout plan mentioned above.

Habitat improvements will improve the chances of success for Coaster Brook Trout and other species of concern, such as wood turtle and northern water shrew. The following habitat objectives are laid out to improve brook trout survival.

<u>Objectives for Entire Whittlesey Creek:</u>

Objectives for Whittlesey Creek are to slow the flow of water over the upland and within the stream. These objectives are measured with geomorphic terms. In the next 30 years, Whittlesey Creek will have:

1) A 20 percent reduction in flood peaks in Whittlesey Creek, as measured by 2 to 10 year flood events.

2) In-channel roughness of 0.06 (using Manning's roughness coefficient). [2]

3) Roughness coefficient of overland flow increased to 0.5 (using overland flow coefficient calculated in SWAT model (Lenz et al. 2003)).[3]

[1] Watershed in goals, objectives and strategies refers to the surface-water contributing portion of the watershed only.
[2] Manning's roughness coefficient represents the resistence [sic] to flood flows in a stream channel. A streambed with a lot of debris, boulders, rubble or vegetation will have a higher roughness coefficient. A rough stream will slow flood flows and the erosive power of a stream. The Manning's coefficient of 0.6 corresponds to a stream with a large amount of large woody debris. North Fork Reach 2 is the most important stretch for increasing channel roughness in the Whittlesey watershed.

Objectives for Whittlesey Creek Within Refuge:

Within the next 30 years, Whittlesey Creek will have:

4) Whittlesey Creek Reach 1: A moving, dynamic channel and delta with the channel freely meandering in the floodplain. Conditions allow spawning adult fish to pass to spawning sites. Adjacent wetlands and floodplains are dominated by native tree, shrub and emergent vegetation.

5) Whittlesey Creek Reach 2: A naturalized stream channel, with variable depth and cover. Habitat rated as good to excellent when using Simonson et al. (1993) quantitative habitat assessment for Wisconsin streams.[4] Native riparian vegetation with a diversity of tree age classes and good shrub cover. The floodplain reconnected to the stream.

Objectives for Whittlesey Creek Within Private Lands:

The Service will work with partners and private landowners to restore the Creek toward:

6) Whittlesey Creek Reaches 3 – 5: Complex in-stream habitat with good cover (large woody debris, undercut banks, boulders, and macrophytes), pools, gravel and overhead riparian cover (rating of good to excellent when using Simonson et al. (1993) quantitative habitat assessment for Wisconsin streams). Riparian forest maturing naturally, to include conifers co-dominant with hardwoods. The floodplain reconnected to the stream.

7) Whittlesey Creek Reaches 6 and 7: Sediments entering the stream from this reach significantly reduced.[5] Complex in-stream habitat with good cover (large woody debris, undercut banks, boulders), especially good pool structure and overhead riparian cover (rating of good when using Simonson et al. (1993) quantitative habitat assessment for Wisconsin streams). Riparian forest maturing naturally, with conifers co-dominant with hardwoods. Stream water temperatures below 70 °F.

8) North Fork Reach 1: Same as Whittlesey Creek reaches 3 - 5.

9) North Fork Reach 2: Adequate fish passage between North Fork Reaches 2 and 3, without creating incision problems below Cozy Corner Rd. Complex in-stream habitat with good cover (large woody debris, undercut banks, boulders, and macrophytes), pools, gravel and overhead riparian cover (rating of good to excellent when using Simonson et al. (1993) quantitative habitat assessment for Wisconsin streams). Riparian forest maturing naturally, with conifers co-dominant with hardwoods.

10) North Fork Reach 3: Large upstream wetland protected and maintained.

Objectives for Terwilliger and Little Whittlesey Creeks Within the Refuge:

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[3] Overland flow is also referred to as sheetflow. It is surface runoff from rain that is not absorbed (infiltrated into the ground) but insead [sic] fills small depressions and runs downslope into streams. In the SWAT model, the overland flow is related to vegetation type and soil type.

[4] Refuge staff will consider each habitat variable on a case-by-case basis and use those that fit well with Whittlesey Creek specifically and Bayfield peninsula streams generally.

[5] We will need to complete a sediment transport study to give us amounts of sediments that are entering and flowing through the system. Then we can set quantifiable objectives for this reach.

Within the next five years, the Service will have determined the potential to restore Little Whittlesey and Terwilliger Creeks as tributaries to Whittlesey Creek within reach 2, as they may have done historically.

Strategies for Whittlesey Creek Within Refuge:
Clear, quantifiable strategies cannot be identified for the stream within the refuge until a sediment transport study is completed (objective 1, page 45). This study will not only identify quantity, flow and deposition of sediments, but will also provide recommendations for how to meet our objectives for reaches 1 and 2. In the meantime, broad strategies are placeholders for future, specific strategies. Many private lands strategies will also apply to appropriate habitats within the refuge.

Stream Strategy 1: Reach 1 – Investigate the possibility of removing spoil banks that were deposited when the stream was channelized, along with other man-induced barriers, to allow the stream to meander within the floodplain.

Stream Strategy 2: Reaches 1 and 2 - Restore natural stream channel as recommendations are provided in the sediment transport study (objective 1, page 45).

Stream Strategy 3: Reach 2 – Improve stream habitat in conjunction with or in addition to natural stream channel restoration work. Determine specific work to be conducted as part of stream restoration design.

Strategies for Whittlesey Creek on Private Lands[6]:
Private Lands Strategy 1: Slow overland flow
This strategy will help fulfill objective 3 (page 40) regarding slowing overland flow by increasing surface "roughness." Upland roughness can be increased by adding obstructions that will slow water as it flows over the watershed's clay soils. Wetlands, wooded land, surface micro-topography, and shrubs are examples of such obstructions that reduce flow (Lenz et al. 2003; Fitzpatrick et al. 1999) and can also be good wildlife habitat. The Service will work with willing landowners and other partners to add these features in appropriate places. The Service, in cooperation with partners, will rerun the SWAT model (from Lenz el al. 2003) and the watershed health/open lands model[7] (Kroska 2005) adding restored habitat features to determine if we can sufficiently increase overland roughness to slow the flow. We will also analyze our actions on a subwatershed basis to help set priorities. Until these models are rerun, we will give priority to uplands around North Fork 2 and Whittlesey Creek 6 and 7 reaches. This is also the highest priority strategy to implement.

Private Lands Strategy 1a: Restore wetlands and create detention ponds.

Private Lands Strategy 1b: Plant trees and shrubs on abandoned fields and open lands (new clearcuts), encouraging conifers such as red pine, white pine and white spruce, as much as possible.

[6] All strategies on private lands will be conducted with willing landowners who voluntarily agree to work with the Service and other partners to participate in habitat projects. Also, these projects will be limited to the surface-drainage portion of the watershed.
[7] This model was developed in 2004 and 2005 as part of the project titled: Comparative Analysis of Subwatersheds in the WI Portion of the Lake Superior Watershed. The project is a joint effort of the Wisconsin Coastal Management Program (Wisconsin Department of Administration), the Great Lakes Protection Fund (Wisconsin DNR) and the Ashland/Bayfield/Douglas/Iron Counties Land Conservation Department.

Private Lands Strategy 1c: Restore hydrology of old fields (by filling old ditch networks) that were leveled and drained, but are no longer used for agriculture.

Private Lands Strategy 1d: Experiment with other new techniques as they are developed (infiltration ponds, detention wetlands, etc.)

Private Lands Strategy 2: Reduce gully erosion

This strategy will help us meet the sediment reduction goal (page 45). Measurable objectives were not developed for this goal, but practices to reduce sediment inputs can still be implemented. The Bayfield Peninsula Stream Assessment report noted that gully erosion of tributaries, especially those near open land, is a source of sediments into Bayfield streams (inter-fluve and Graber 2003). Inter-fluve inc. also provided recommendations for actions that can reduce erosion and restore hydrology to these tributaries. One of their recommendations is incorporated into this plan: that the Wisconsin DNR's best management practice of 35 foot no-harvest buffers around intermittent streams (Wisconsin DNR 1995) be increased to 50 feet for Whittlesey Creek because of steeper slopes and heavy clay soils. They also recommended a selective harvest buffer (no clearcuts) within 300 feet of intermittent streams in the Whittlesey watershed.

Several landowners in the Whittlesey watershed have replaced stream and tributary crossings that were eroding and/or causing increased erosion downstream of the crossing. Additional opportunities to stem erosion from gullies, either at crossings or elsewhere likely exist. The Service will work with interested landowners and partners to provide technical and financial assistance to fix such sites. Priority will be given to problems that affect Whittlesey Creek reaches 6 and 7, and North Fork reaches 2 and 3.

Private Lands Strategy 2a: Identify roads that cross stream tributaries or are near the stream bank. Note crossings and roads that are exacerbating gully erosion, and restore hydrology and habitat to reduce erosion where possible.

Private Lands Strategy 2b: Identify other gully erosion problem areas, such as those created by field drainages, and use appropriate technology to fix them.

Private Lands Strategy 2c: Encourage no-cut zones of at least 50 feet around steep gullies and tributaries and recommend selective harvest within 300 feet of them.

Private Lands Strategy 2d: Where there are no trees near steep gullies, tributaries, and high terraces, plant buffer zones of trees and shrubs that are at least 100 feet wide (interfluve inc. and Graber 2003).

Private Lands Strategy 3: Reduce bank and slump erosion

This strategy will also help meet the sediment reduction goal (page 45). There are a few locations that have large slumps creating substantial bank erosion. The Service is not suggesting that we armor banks that are eroding – that is often counterproductive to stream dynamics and if not done correctly, will reduce in-stream habitat. There are some locations, however, where proper technology can reduce erosion from slumps. U.S. Geological Survey has successfully installed flow-deflecting vanes[8] in the North Fork of Fish Creek to stop erosion from 100 foot tall banks (Fitzpatrick et.al, 2004). The

[8] Vanes are vertical plates that protrude from a stream-bed about one-third of the bankfull depth, are oriented at an angle to the local stream velocity, and are distributed in a group along the stream near the eroding bank. They deflect the flow and cause sedimentation at the toe of a cut bank, preventing further undercutting and helpint [sic] to stabilize the bank.

Service and Partners have incorporated large woody debris to stabilize a slump that was eroding in reach 5 of Whittlesey Creek. The partners do not know yet whether that action will be successful. All actions to reduce slump erosion must be carefully designed and placed appropriately.

> **Private Lands Strategy 3a:** Identify locations of bank slumps that add large sediment loads and use appropriate technology to fix them.

Private Lands Strategy 4: Install large woody debris and riffle grade structures in appropriate areas to reduce flood power.
This strategy will help meet objective 2 regarding channel roughness (page 40) under habitat goal 1. Flood power is a function of water's specific weight, flow and channel slope. When the roughness of the channel increases, flood power is reduced. Inter-fluve inc. and Graber (2003) note that prior to settlement, channel roughness was likely very high due to complex log jams in the channel and floodplain. The addition of properly sized and placed log jams is an appropriate means to add channel roughness to Bayfield peninsula streams. Whittlesey Creek has substantial access difficulties, with steep slopes and few roads to the creek. This confounds large woody debris projects in Whittlesey Creek. One project has been done where Whittlesey Creek flows through Galligan Farms in Reach 5. There are likely other locations that are possible large woody debris project sites if landowners are interested. The best location for these projects is above the regional groundwater discharge area (upper end of reach 5, reaches 6 and 7), where excess sand can accumulate and not affect spawning sites.

Private Lands Strategy 5: Protect groundwater discharge areas by purchasing conservation easements from willing sellers.
The largest groundwater discharge area (about 18 cfs) is located around the confluence of Whittlesey Creek and the North Branch (Lenz et al. 2003). These groundwater upwellings are also important spawning and nursery areas for trout and salmon in Whittlesey. In-stream habitat is better here than anywhere else within the drainage, but there remain limiting factors, such as shallow pools and sparse overhanging vegetation (inter-fluve, inc. and Graber 2003). Much of the riparian vegetation is nearing maturity (70 to 80 years old), and could be a good source of large woody debris.

The most effective means to protect this groundwater discharge area is to leave it alone. An appropriate easement would restrict any activity such as trails, roads, buildings, and logging within and near the discharge area. Easements are purchased only from willing landowners.

Private Lands Strategy 6: Purchase development rights from willing landowners on lands with development potential that are located in sensitive portions of the watershed.
The SWAT analysis showed that daily mean flow on peak flood days would increase up to 12 percent if the basin were developed to 25 percent urban (Lenz et al. 2003). Whereas this substantial change from rural residential and agriculture to urban is not likely to happen within the next 20 years, concerns remain about roads that increased housing development could bring. Roads channelize flows and often increase erosion and sedimentation. Housing development often fragments habitats, which can reduce wildlife populations that require large blocks of habitat. Human habitation will bring in domestic cats and dogs that prey on wildlife. The Service will therefore purchase development rights from willing landowners, especially in the upper portion of the watershed.

Private Lands Strategy 7: Find or develop a program that provides incentives and technical assistance for sustainably managing forests along riparian corridors and upland buffers.

Retention of existing forest cover in the basin will help keep peak flows at current levels.[9] Most landowners obtain income from their forests, and if they are following a management plan, are also required to harvest timber to improve stands and diversity. The Service will encourage the use of existing state programs to maintain sustainable forestry, but not all forest lands are or can be included in state program. The Service proposes to work with partners to provide additional incentives to either forgo timber harvest in some areas, such as steep slopes, or to provide an additional means to manage forests. It will be important to include tributaries of Whittlesey Creek in this program. It will also be important to emphasize growth of conifers, such as white pine, red pine, white spruce and white cedars, as much as possible. Mature trees will eventually fall into the stream bank to provide large woody debris.

Habitat Goal 2 - Sediments: Reduce sediment loads into Whittlesey Creek to historic (pre-European settlement) range of variability.

Sediment Objective:

Within the next five years, conduct a sediment transport study to determine the amount and supply of sediment load in the stream, and to determine the proper sizing and geomorphology of Whittlesey Creek through the refuge.

Habitat Goal 3 – Floodplain and Wetland Hydrology: Restore to the extent possible floodplain function in the coastal wetlands and floodplains of the refuge.

Hydrology Objective:

Restore habitat by reconnecting the floodplain to the stream and allowing overbank flooding onto all stream floodplains within the refuge at least once a year.

Hydrology Strategy 1: Within the next five years, review road and bridge infrastructure within the refuge to identify how transportation needs and habitat restoration needs can overlap.

Hydrology Strategy 2: Within the old golf course, remove fill, especially in areas that have high groundwater to restore flooded conditions. Consider re-contouring the bottoms of some of the deep ponds to provide one-half to three feet of water.

Habitat Goal 4 – Floodplain Habitat: Restore native species composition of trees and shrubs in the floodplain that will provide heterogeneous vertical and horizontal structure for migratory bird habitat.

Floodplain within the refuge includes lowland forest, lowland shrub, riparian forest and coastal wetland. These habitats can provide for several species of concern: northern waterthrush, veery, northern black current, marsh horsetail, and black duck. The habitat objectives for lowland forest and shrub are based on habitat needs of veery.

Objectives for Lowland Forest and Shrub:

Over the next 50 years, aim for a mosaic of native trees and shrubs, both deciduous and coniferous, that provide a relatively open tree canopy (25 to 60 percent canopy cover) and a dense

[9] Increasing forest cover is provided in strategy 1b.

shrub canopy cover (25 to 50 percent). Habitat patches should be at least 250 acres contiguous with adjacent Wisconsin DNR and Northern Great Lakes Visitor Center lands.

Objective for Riparian Forest:

Remove exotic trees and shrubs and restore native tree and shrub canopy cover at a rate that provides a 75 percent canopy cover on the stream through the refuge; allow these trees to mature and drop into the stream to produce large woody debris.

Objective for Coastal Wetland:

Eliminate invasive plant species and allow the native plants to follow a natural successional pathway.

Coastal Wetland Strategy: Eliminate invasive species according to invasive free zone objectives and strategies, and provide native species restoration when necessary and possible.

Strategies for Floodplain within the Refuge:

Floodplain Strategy 1. Replace reed canarygrass with native species.
Floodplain objectives are to restore hydrology (page 45) and native species (see objectives under floodplain habitat goal, page 45). Over 50 percent of the floodplain is infested with varying densities of reed canarygrass, which seriously inhibits native species growth. This invasive species is most prevalent where land had been logged, drained, farmed and then abandoned. Reed canarygrass was likely planted for cattle forage in some of these fields. Reed canarygrass has dominated these fields for many years, so the seed bank will be very dense.

The Service's goal is to eliminate all invasive plant species on refuge and Northern Great Lakes Visitor Center lands. A more detailed description of the invasive project is provided later (page 47). The invasive species inventory, and control and monitoring plan will be appended to this document once it is completed (late 2006). That plan will provide details on location and timing of strategies recommended in this section.

Recent studies of reed canarygrass have provided excellent guidelines for its control and for restoring native species in its place (Reinhardt and Galatowitsch 2004; Tu 2004). It is expected that reed canarygrass control will take several years. The Service's preliminary strategy is to:

- Annually treat reed canarygrass as seed heads emerge, typically in August, with Rodeo or a similar glyphosate herbicide using selective (weed wiper) application techniques. At this growth stage the species is most susceptible to systemic herbicides.
- Continue annual herbicide application to control both established plants and new plants arising from the seed bank. Monitoring, described below, will guide the decision to discontinue herbicide treatment and proceed with habitat restoration.
- Remove the duff layer, either by mowing or burning during the year prior to habitat restoration.
- Till to prepare for planting.
- Replant to adapted woody and herbaceous native species. Lists of such species will be developed for use in various floodplain locations.

Floodplain Strategy 2. Plant native conifers along stream corridor.
Plant red pine, white spruce and other adapted conifers interspersed with hardwood shrubs and trees. Plant cedar and hemlock in patches that can be protected from deer browsing with techniques such as exclosures or repellent sprays.
Note: This strategy should not be implemented until decisions have been made on stream and floodplain hydrological restoration.

Floodplain Strategy 3. Allow natural succession to take place.
Some areas within the floodplain are dominated by native species. Native trees and shrubs are reestablishing themselves in former agricultural fields that haven't been in production for many years. Where native species make up greater than 50% of the tree and shrub canopy, plants will be left alone to follow natural successional pathways. Where trees and shrubs make up less than 50% of the canopy, but where it appears their cover is increasing, consider allowing natural succession to take place. Where appropriate, speed succession by inter-planting swamp conifers such as cedars and protect them from deer browsing with exclosures or repellent sprays.

Strategies for All Refuge Lands and Habitats - Invasive Free Zone Development:
The U.S. Fish and Wildlife Service, U.S. Forest Service and partners of the Northern Great Lakes Visitor Center (Center) are establishing the Whittlesey Creek NWR and the lands of Center as a model Invasive Free Zone, covering 720 acres. The model will include inventory and control of terrestrial and emergent aquatic plants that are non-native invasives, along with an education program about invasive species. The project will integrate inventory and control programs of two federal agencies on their adjacent lands and cooperate with private landowners to participate in inventory and control efforts. The Center will be used as a platform to demonstrate invasive species control and prevention, as well as native habitat restoration.

The Invasive Free Zone includes: inventory of invasive species known or suspected to be present, initial control of targeted species that are present, development of a plan to prevent further spread on Invasive Free Zone lands, development of education and interpretive programs to be given at the Center, and presentation of the project's successes and failures to Lake Superior basin agencies and interested parties. Future work will include: continued control and prevention of newly-found invasive species on federal and private lands, additional delivery of education and interpretive programs at the Center and refinement of our model based on successes and failures. Our experience and results will be used to produce a "case study" which will be circulated widely to serve as a template for other interested parties.

Invasive Free Zone Strategy 1: Comprehensive inventory of terrestrial and emergent aquatic plant invasive species.
Standardized methods will be used to ensure systematic GPS mapping and documentation of invasive species. All collected data will be managed via the refuge's geographic information system.

Invasive Free Zone Strategy 2: Control of known invasive species
Target exotic buckthorn, exotic bush honeysuckle, purple loosestrife and reed canarygrass for initial control. Generally, the following techniques will be used:

- Buckthorn and Honeysuckle – Cut stems and apply herbicide to the stumps. Marking paint will also be applied to monitor treatment efficacy.

- Purple loosestrife – Large infestations are found at the mouth of Whittlesey. Smaller infestations are found along road rights-of-way. Control larger infestations with *Galerucella sp.* beetles. Small infestation will be treated with Rodeo or similar herbicide using selective (weed wiper) application techniques.

- Reed canarygrass – Strategies are provided in the Floodplain strategy section (page 46).

Invasive Free Zone Strategy 3: Design a monitoring program for all species.
Monitoring will be targeted by species. Spatially referenced locations will be established for long-term monitoring of invasive control and habitat restoration results. Monitoring techniques will include transects, quadrats, photo-points and possibly aerial photo interpretation. Monitoring will guide follow up control, restoration and maintenance efforts.

Invasive Free Zone Strategy 4: Develop a plan for prevention of spread and future control.
A thorough literature search, consultations and experience will guide the U.S. Fish and Wildlife Service and the U.S. Forest Service in formulating prescriptions to eradicate terrestrial and emergent aquatic invasive plant species within the Invasive Free Zone. The plan will include recommended techniques, a control schedule, expected costs and a monitoring program as described above. Restoration of appropriate native flora will be included. The plan will also identify and incorporate additional partners for the project.

Invasive Free Zone Strategy 5: Demonstrate lessons learned and provide education about invasive species.
The partnership between federal agencies and private landowners within the refuge, as well as educational opportunities provided at the Center, make this an ideal setting to demonstrate this model of cooperation and to educate visitors about the need to stop invasive species. An education program will be developed cooperatively with the U.S. Forest Service and partners of the Center.

Invasive Free Zone Strategy 6: Promotion
A plan to market the project beyond our boundaries will be developed that will include outreach to other agencies and organizations who can lead future prevention and control efforts.