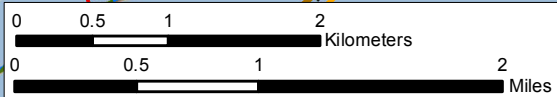
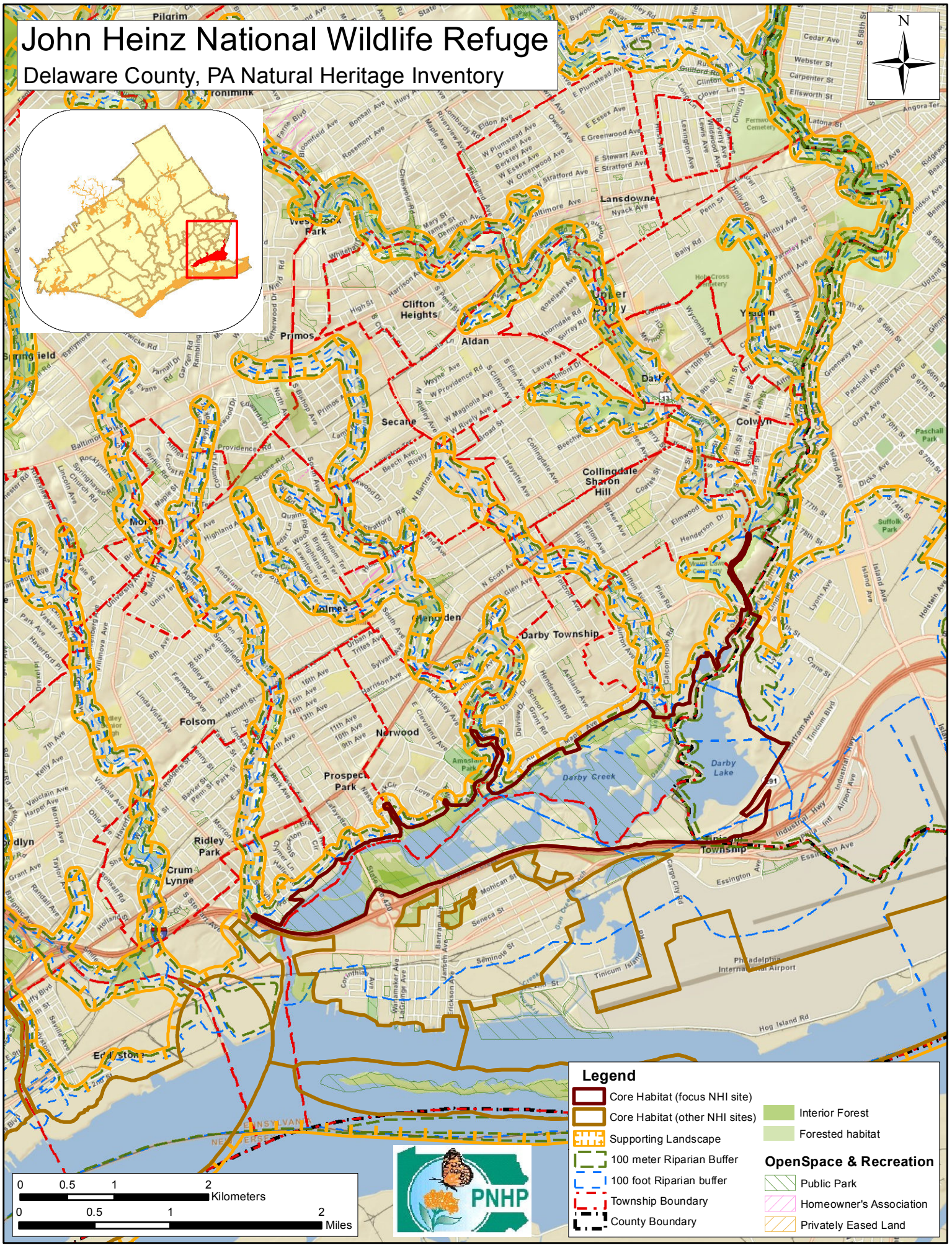


John Heinz National Wildlife Refuge

Delaware County, PA Natural Heritage Inventory



Legend

- Core Habitat (focus NHI site)
- Core Habitat (other NHI sites)
- Supporting Landscape
- 100 meter Riparian Buffer
- 100 foot Riparian buffer
- Township Boundary
- County Boundary
- Interior Forest
- Forested habitat

OpenSpace & Recreation

- Public Park
- Homeowner's Association
- Privately Eased Land

John Heinz National Wildlife Refuge – Exceptional significance

Species of Concern:	Taxa ¹	PNDI Rank ²		Legal Status ²	Last Seen	Quality ²
		Global	State	State (Proposed)		
Freshwater intertidal marsh Natural Community	C	G3G4	S1	N	2010	B
Great Egret <i>(Ardea (Casmerodius) albus)</i>	B	G5	S1B	PE (PE)	1984	E
American Bittern <i>(Botaurus lentiginosus)</i>	B	G4	S1B	PE (PE)	1989	E
Marsh Wren <i>(Cistothorus palustris)</i>	B	G5	S2S3B	N (CR)	2004	E
Least Bittern <i>(Ixobrychus exilis)</i>	B	G5	S1B	PE (PE)	1991	A
Virginia Rail <i>(Rallus limicola)</i>	B	G5	S3B	N	1991	E
Waterhemp ragweed <i>(Amaranthus cannabinus)</i>	P	G5	S3	PR (PR)	2009	C
Velvety panic-grass <i>(Dichanthelium scoparium)</i>	P	G5	S1	PE (PE)	2008	BC
Walter's barnyard-grass <i>(Echinochloa walteri)</i>	P	G5	S1	PE (PE)	1986	BC
A eupatorium <i>(Eupatorium rotundifolium)</i>	P	G5	S3	TU (TU)	1986	B
Shrubby camphor-weed <i>(Pluchea odorata)</i>	P	G5	S1	TU (PE)	2008	B
River bulrush <i>(Schoenoplectus fluviatilis)</i>	P	G5	S3	PR (PR)	2001	A
Wild senna <i>(Senna marilandica)</i>	P	G5	S3	TU (PR)	2007	BC
Indian wild rice <i>(Zizania aquatica)</i>	P	G5	S3	PR (PR)	1991	BC
Sensitive species of concern ³	---	---	---	---	2009	E
Sensitive species of concern ³	---	---	---	---	1991	E
Sensitive species of concern ³	---	---	---	---	1991	E
Sensitive species of concern ³	---	---	---	---	1991	E
Sensitive species of concern ³	---	---	---	---	1998	E
Sensitive species of concern ³	---	---	---	---	2001	E
Sensitive species of concern ³	---	---	---	---	2000	E

¹ A = Amphibian; B = Bird; C = Community; F = Fish; L = Lepidopteran; O = Odonate; P = Plant; M = Mammal; R = Reptile, U = Unionoid (Mussel)

² Please refer to Appendix III for an explanation of PNHP ranks and legal status

³ This species is not named by request of the jurisdictional agency overseeing its protection

Location: This area is roughly bounded by the extent of the John Heinz National Wildlife Refuge above Interstate 95.

- Municipalities:
 - Colwyn Borough (Delaware County)
 - Darby Township (Delaware County)
 - Folcroft Borough (Delaware County)
 - Norwood Borough (Delaware County)
 - Prospect Park Borough (Delaware County)
 - Ridley Township (Delaware County)
 - Sharon Hill Borough (Delaware County)
 - Tincum Township (Delaware County)
 - Eastwick Borough (Philadelphia County)
- USGS Quadrangles:
 - Bridgeport Quadrangle
 - Lansdowne Quadrangle
- Watersheds:
 - Darby Creek
- 1992 Delaware County Natural Areas Inventory reference:
 - “John Heinz National Wildlife Refuge” (Lansdowne Quadrangle)
 - “SP538” (Bridgeport Quadrangle)
- 1998 Delaware County Natural Areas Inventory Update reference:
 - None

Description: Tincum Marsh, part of the John Heinz National Wildlife Refuge (NWR), is what remains of the vast freshwater tidal wetland that covered the southern portion of Philadelphia and Delaware Counties at the time of colonization. This marsh covered between 10 and 20 square miles (6,400-12,800 acres) and supported an untold diversity and density of plants and animals. This large marsh was just part of an extensive marsh system that extended up the Delaware River from the Delaware Bay to well past Philadelphia. Today the Refuge is undergoing active restoration to manage invasive species, remove fill, restore wetland species, mitigate the effects of past chemical and oil spills, and increase the availability of the space for public use.

The Tincum Marsh system, both within the John Heinz NWR and on Little Tincum Island, hosts a suite of species which in Pennsylvania are found only along the tidal Delaware River. These species, while common in healthy freshwater tidal ecosystems, are limited to the marsh and a few nearby locations in Pennsylvania because they are the limit of tidal influence within the Commonwealth. This marsh also provides a critical spring and fall migratory bird stopover along the Atlantic flyway.

Species of Concern Considerations: These species fall into three general groups: plants; birds, and herptiles.

- The wetland-dependent plants of concern are found in different portions of the marsh depending on their specific habitat needs. Some, such as subulate arrowhead (*Sagittaria subulata*) and multi-flowered mud-plantain (*Heteranthera multiflora*), depend on regular exposure and inundation by the tide of the mudflats they live on. A few species specialize on the permanently water-saturated shoreline habitat, such as Smith's bulrush (*Schoenoplectus*

smithii) and Walter's barnyard-grass (*Echinochloa walteri*). Others, like annual wild rice (*Zizania aquatica*), are marsh obligate species that have managed to maintain a foothold in the Refuge.

- Among the bird species of concern are three general groups. The first is the group that feeds along the interface between water and vegetation like Great Egret (*Ardea (Casmerodius) albus*). The second group, composed primarily of rails such as the Virginia Rail (*Rallus limicola*), utilize the flooded vegetation for foraging and nesting. A third group prefers the more grassland-like structure of the marsh. Among these species is the Marsh Wren (*Cistothorus palustris*).
- The marsh supports several additional sensitive species of concern that are not named at the request of the jurisdictional agency overseeing their protection. These species depend on the continued cleanup and restoration of the marsh to survive. Additionally, they also require control of predators (such as skunks, opossums, and raccoons) around their breeding areas to increase the survival chances of their young.
- All of these species of concern depend in one way or another on the natural communities that occur on the Refuge. Two of these natural communities are of conservation concern due to their limited distribution in Pennsylvania. Freshwater intertidal marsh and freshwater intertidal mudflat, are only found in a very limited area of the Commonwealth along the Delaware River. This area is also highly urbanized, making the remaining areas of these communities even rarer and more important to preserve and maintain.

Forest Cover / Natural Communities: The plant community types depicted are approximations delineated from 2005 aerial photography interpretation and were followed up with minimal selective ground-truthing. Community types follow “Terrestrial & Palustrine Plant Communities of Pennsylvania” (Fike 1999) where appropriate, and otherwise describe general land cover types (*).

- Terrestrial (upland) communities:
 - modified successional forest*
- Palustrine (wetland) communities:
 - Freshwater intertidal marsh*
- Most of the forest patches are in the long process of reverting from past disturbances.

Ownership:

- This large area is managed as the John Heinz National Wildlife Refuge. The consolidated ownership of this large piece of the green infrastructure of Delaware County can be tremendously helpful towards implementation of consistent conservation action across this significant piece of the landscape.

Habitat Disturbances:

- Historic:
 - The marsh was left relatively undisturbed until the early 1800’s when the city began to construct ditches and levees throughout the marsh on the east bank of the Schuylkill River. In the mid-1800’s the city grid system of roads extended over the area, with Broad Street extending south to League Island (then still an island) and by 1886 the area was covered with farms, factories, rail lines, and shipyards. By the 1926 sesquicentennial celebration in Philadelphia, League Island and the entire marsh east of the Schuylkill River were gone.
 - The marsh on the west bank of the Schuylkill River survived for a much longer period of time. Though extensively diked and levied during the 1800’s, it remained tidally influenced and marsh-like over much of the area. Major degradation of the area started with the construction of a massive shipyard on Hog Island during World

War I. Abandoned during the Great Depression, the island was bought by the city of Philadelphia from the federal government and expanded the original Philadelphia Municipal Airport, which reopened in 1940. Closed during World War II, the airport reopened in 1945 for the beginning of the jet age and quickly expanded over the marsh.

- Over the years the Refuge has weathered many insults from leaking landfills, oil spills, pipeline breaks, and invasive species, and yet it still survives and supports a diverse range of rare and important species.
- The small remaining pieces of tidal marsh below the confluence of Darby and Cobbs Creeks were severely threatened in 1969 with the planned expansion of Interstate 95 directly through the marsh and the expansion of a landfill into the marsh. Through the coordinated efforts of a large number of people this area was designated by the US Congress as the Tinicum National Environment Center in 1972. This forced the redirection of I-95 and the closure and capping of the landfill. In 1991 the center was rededicated in memory of Pennsylvania Senator John Heinz who had worked very hard to see that the marsh was protected.
- With major expansion projects at the airport every decade continuing to the present, much of the wetland in this area is underneath the over 4-square mile airport.
- Current:
 - An expansion of Interstate 95 was constructed along the southern edge of the marsh.
 - The continued expansion of the Philadelphia International Airport has decreased the available marsh habitat, decreased air quality and increased noise pollution in this Important Bird Area.
 - Two oil spills have affected the marsh in recent history. In the winter of 2000 a pipeline that travels under the eastern end of the Refuge ruptured, spilling 192,000 gallons of oil into the area. In 2004 the oil tanker Athos I hit an abandoned and uncharted anchor, ruptured its hull, and spilled 30,000 gallons of oil into the Delaware River.
 - A significant change in the flooding regime has occurred as a result of the diking and impounding of portions of the marsh. These areas no longer maintain the same pattern of tidal exchange they once did, and as a result cannot support tidal marsh species. In a similar manner, the massive increase in impermeable surface around the Refuge has resulted in a significant increase in stormwater runoff and a noticeable decrease in base flow from Darby Creek and other groundwater sources. Both of these hydrologic changes have negatively impacted the health of the marsh.
 - A significant source of historic disturbance to the marsh was the draining and filling of large sections of habitat. Most of these areas are unrecoverable, but some have to be actively dealt with. One, the 45-acre Folcroft Landfill, potentially contains toxic substances and is monitored for leakage.
 - Rapid development outside of and on the periphery of the core habitat area has fragmented the landscape with additional buildings, roads and infrastructure and increased the amount of impervious surface and edge habitat in the immediate watershed. Stormwater runoff from the highly developed surrounding communities flows into the creek system with little opportunity to be slowed or filtered. This results in increased downstream flooding and erosion and is a potentially significant non-point source of pollution. Runoff from these sources has significantly higher levels of sediment, nutrients, pesticides, herbicides and other pollutants than runoff filtered through natural vegetation.
 - Exotic Species:

- A primary disturbance is the significant areas of non-native invasive plants, particularly common reed and purple loosestrife, that dominate vast areas of the marsh and do not provide the same type and quality of habitat as the native species they displace. Some of the primary invasive species occurring in this location include:
 - Norway maple (*Acer platanoides*)
 - tree-of-heaven (*Ailanthus altissima*)
 - porcelain berry (*Ampelopsis brevipedunculata*)
 - Asiatic bittersweet (*Celastrus orbiculatus*)
 - Japanese hops (*Humulus japonicus*)
 - privet (*Ligustrum* sp.)
 - Japanese honeysuckle (*Lonicera japonica*)
 - amur honeysuckle (*Lonicera maackii*)
 - purple loosestrife (*Lythrum salicaria*)
 - Japanese stiltgrass (*Microstegium vimineum*)
 - white mulberry (*Morus alba*)
 - mile-a-minute weed (*Persicaria perfoliata*)
 - common reed (*Phragmites australis*)
 - multiflora rose (*Rosa multiflora*)
 - narrowleaf cat-tail (*Typha angustifolia*)
- Control options for invasive plants range from mechanical to chemical. High priority for invasive species control at this site should be targeted towards removing small populations of newly established invasive plants in the most weed-free areas of the Natural Heritage Area. Invasive species control efforts should try to maintain weed-free areas first, and then concentrate on removing invasive species in lightly infested areas, continually pushing back the line of invasion. Invasive species removal should be conducted in coordination with native species replacement to avoid denuding the understory vegetation. This needs to be a continual and sustained process of monitoring and control efforts.

Conservation Actions:

- Conservation and restoration goals at Tinicum Marsh should be approached as either short-term or long-term in scope. Short-term goals are achievable on the current Refuge with a limited to moderate commitment of resources, while long-term goals are potential projects within and outside the Refuge that will increase the health of the marsh system and its sustainability, but will require a much greater commitment of resources.
- In the short-term, ongoing efforts to systematically remove invasive species from the Refuge and replace them with native tidal marsh species should be continued and expanded. To facilitate this process an on-site grow-out station for native plants should be investigated.
- Ongoing efforts to collect trash brought in by the tide and by storm events within the Darby and Cobbs Creeks watershed should be continued and expanded as possible. Trash collection events should be looked at as excellent opportunities to involve the community in the care of the Refuge.
- The continued promotion of the John Heinz National Wildlife Refuge as an environmental education center is also vital. Not only is it important for the Refuge to maintain its place as a critical aspect in local curriculum, but promoting and pervading the understanding that Tinicum Marsh is a vital link in the national chain of natural areas will strengthen its place in the community.

- Over the long-term, more ambitious and resource demanding goals should be examined. Primary among these is the reestablishment of tidal marsh within as much of the Refuge as is feasible. This restoration process will mandate the removal of large areas of fill and the extensive reworking of the hydrology of the sites along with the replanting of native tidal species and the management of non-native invasive species. Additionally, adjoining pieces of property should be examined for purchase or easement with the intent to increase the natural buffer around the Refuge.
- Over the long-term, the storm surges from Darby Creek will need to be addressed. These flows result from poorly managed stormwater in the highly developed watershed and antiquated sewage management infrastructure. To address these issues will require systemic changes across the watershed that address how development is permitted and how stormwater is managed.
- Monitoring the effect of climate-change induced sea level rises on the marsh system will be important in directing the conservation of the marsh. With most of the Refuge near, at, or below sea level, even a small increase in the mean water level stands to adversely affect the marsh and the species that depend upon it. Assessing how sea level changes are progressing and how they are affecting the marsh will help direct conservation efforts.
- Conserve and expand the forested riparian buffers of the tributaries leading to the marsh. Establish at least a 100 foot buffer of woody vegetation along the creek to help reduce erosion, sedimentation, and pollution. Additionally, best management practices (BMPs) that focus on limiting the introduction of non-point sources of pollution into surface and groundwater should be applied to the surrounding area.
- Potential Restoration Activities:
 - Streams through forested areas in the watershed should be considered high priority for conservation. The forested riparian corridor helps to regulate the temperature of the stream and creates streamside conditions that contribute to improved water quality and aquatic habitat. Streams through non-forested areas should be restored with native trees and shrubs appropriate to the habitat.
 - Riparian Buffers:
 - An ideal vegetated stream buffer should be at least 100 meters (328 feet) in width from the edge of the 100-year floodplain.
 - An intermediate vegetated stream buffer should be at least 100 feet in width from the edge of the 100-year floodplain.
 - A minimum vegetated buffer should be at least 35 feet in width from the edge of the 100-year floodplain.
 - Remove invasive species of plants. Aggressive invasive species can have a significant impact on the available habitat for the species of concern. Control of invasive species in the area will require extensive and continual effort. Focus non-chemical control efforts on selected areas surrounding species of concern.
 - Target pioneer populations of invasive plants for immediate and continued removal, particularly common reed, purple loosestrife and narrowleaf cattail. It is much easier and more effective to keep a place invasive-free than to try and repair a heavily infested habitat.
 - Invasive species management needs to be coordinated by individuals familiar with the rare species as well as the invasive species present.
 - Continual invasive species monitoring and control will be necessary.



Photo: Andrew Strassman (PNHIP)

A stand of wild rice (*Zizania aquatica*) among other tidal marsh species and a backdrop of the invasive plant common reed (*Phragmites australis*).