Saginaw River/Bay Area of Concern
Habitat Restoration Plan

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Prepared for
The Partnership for the Saginaw Bay Watershed
Saginaw, Michigan

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Contents

Purpose of the Plan

This restoration plan summarizes years of work that have contributed to the imminent restoration of two beneficial use impairments (BUIs) in the Saginaw Bay and River Area of Concern (AOC). These BUIs relate to physical habitat degradation and related population reductions of key fish and wildlife species.

This plan also discusses and updates restoration targets that were initially set by the Partnership for the Saginaw Bay Watershed in 2000. The restoration targets set in 2000 include indicators for coastal wetlands and marshes and for key fish and wildlife species. Analysis of data related to the targets and previously completed restoration work indicate that substantial progress has been made in preserving and protecting remaining coastal wetlands and positively impacting dependent fish and wildlife species. Nevertheless, this project has resulted in the conclusion that only the coastal wetlands and marshes target remains an appropriate target for gauging AOC restoration.

Fish and wildlife *species-specific* targets are no longer a suitable proxy for AOC restoration due to the impact of invasive species and food web disruptions that have negatively affected the target species and are occurring throughout the Lake Huron system. Thus, while the species-specific targets will remain important indicators of ecosystem health, they are not assessed here for AOC delisting purposes.

The fish and wildlife targets that are not used for delisting purposes and other key priorities that should be addressed to continue restoration and preservation of the Saginaw River and Bay watershed beyond delisting are included in the Appendix to this report.

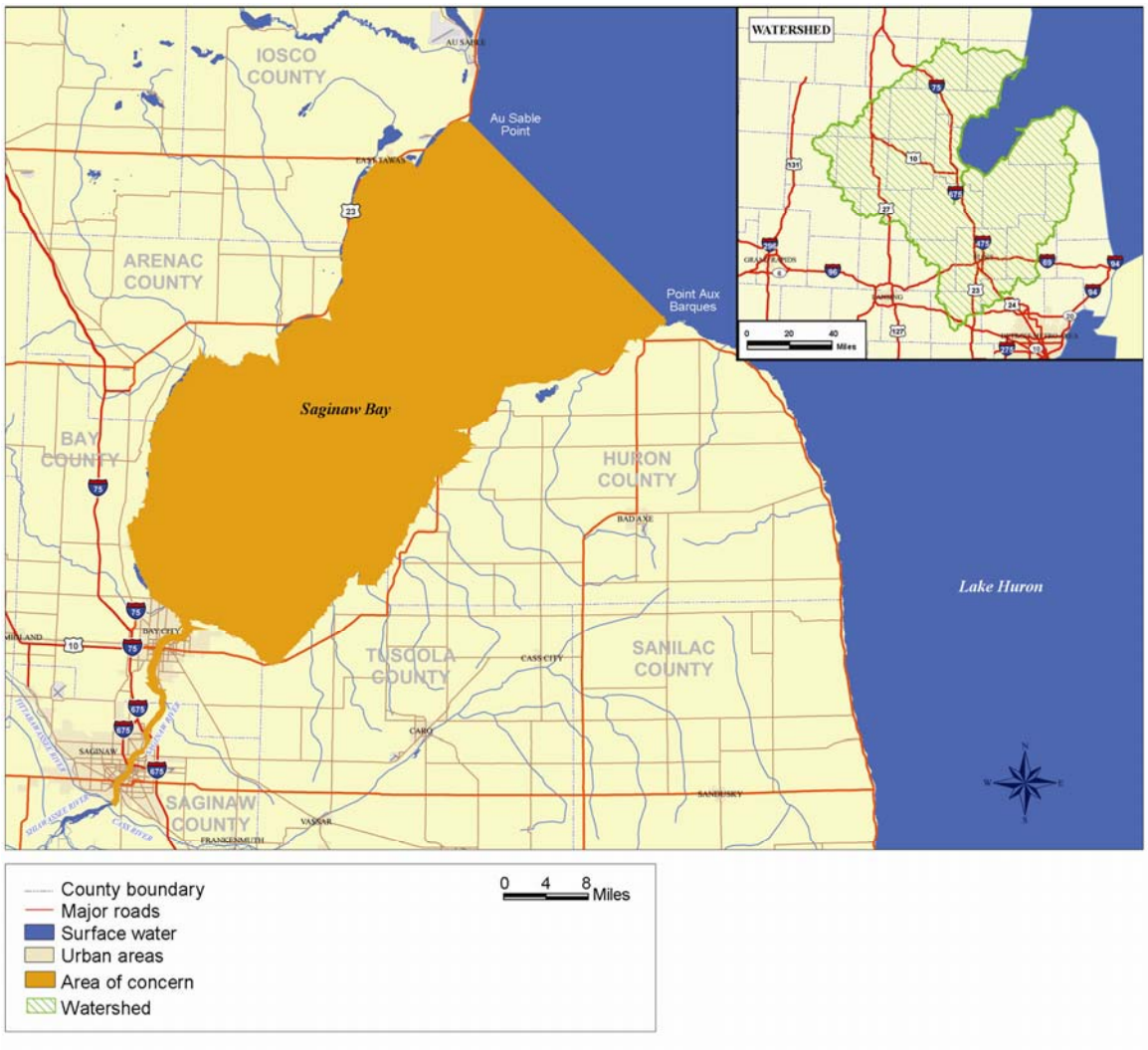
The report also includes a work plan that details activities that must be completed before formal delisting of these BUIs can commence. The work plan includes specific projects and general recommendations for completing the work.

While reading this document it is important to consider that the restoration targets discussed are the *minimum* needed to remove the impaired status of the beneficial use. In order to ensure that the AOC does not backslide to “impaired status,” continued efforts to improve fish and wildlife habitat are **essential**. Such efforts include continuing to acquire and restore wetlands, create fish passage at dams, and address land use–related impacts on the watershed. Ongoing, long-term monitoring of the quantity and quality of protected wetlands will be extremely important to ensure the success of restoration and protection efforts.

Background

Saginaw River/Bay was designated as a Great Lakes Area of Concern (AOC) in 1987. It is one of 14 AOCs in Michigan identified as "toxic hot spots" in need of comprehensive remediation and restoration to improve water quality in the Great Lakes. The physical boundary of the Saginaw River/Bay AOC is defined as extending from the head of the Saginaw River, at the confluence of the Shiawassee and Tittabawassee Rivers upstream of the city of Saginaw, to its mouth, including all of Saginaw Bay out to its interface with Lake Huron, at an imaginary line drawn between Au Sable Point and Point Aux Barques (see Exhibit 1).

EXHIBIT 1
Map of the Saginaw River/Bay AOC



SOURCE: USEPA GLNPO. Data modified from the Michigan Department of Natural Resources, 1988; the Michigan Center for Geographic Information, Department of Information Technology, 2004; and ESRI, 2005.

Twelve beneficial use impairments (BUIs)[1] were identified in the Saginaw River/Bay AOC, including "Degradation or Loss of Fish and Wildlife Habitat" (Habitat) and "Degradation or Loss of Fish and Wildlife Populations" (Populations). At the time the AOCs were designated, no quantitative criteria for listing or delisting particular BUIs existed. BUIs were often identified based on largely qualitative or anecdotal information. This is particularly true for both the Habitat and Populations BUIs.

In 2005, the Michigan Department of Environmental Quality (MDEQ) developed *Guidance for Delisting Michigan's Great Lakes Areas of Concern* (*Guidance*). The *Guidance* document includes restoration criteria for the 14 BUIs identified under the Great Lakes Water Quality Agreement. For 12 of the BUIs, the *Guidance* includes measurable targets for demonstrating restoration success across Michigan's AOCs However, for the Habitat and Populations BUIs, it was not practical to have statewide targets for restoration because of the local nature of these impairments.

The restoration criteria in the statewide *Guidance* for these BUIs are the guidelines for local Public Advisory Councils (PACs) to set locally derived restoration targets and plans for fish and wildlife habitat and populations. Local PACs, with the assistance of a technical committee, are responsible for deciding the type and location of necessary restoration activities within the AOC. The statewide *Guidance* outlines the six components required in the restoration plans (see page 4).

The Partnership for the Saginaw Bay Watershed was formed in 1995. It is a local watershed group comprising citizens, government representatives, and members of the environmental community. The Partnership serves as the PAC for the Saginaw River/Bay AOC and has taken the lead on developing this fish and wildlife plan in partnership with a technical committee made up of members from the following organizations:

- The Conservation Fund (TCF)
- Ducks Unlimited (DU)
- Michigan Department of Environmental Quality (MDEQ)
- Michigan Department of Natural Resources (MDNR) Fisheries Division
- Michigan Department of Natural Resources(MDNR) Wildlife Division
- The Saginaw Basin Land Conservancy (SBLC)

FISH AND WILDLIFE PLAN FOR DELISTING

The statewide *Guidance* requires the development and implementation of local restoration plans for addressing Fish and Wildlife (F&W) impairments. The F&W plan developed for each AOC with these impairments must be part of the Remedial Action Plan (RAP) for the AOC, and contain at least the following components (taken from the *Guidance*, p. 45):

[1] For the full list of BUIs and current status, please reference the U.S. Environmental Protection Agency's information page on the Saginaw River/Bay AOC, available at *http://epa.gov/glnpo/aoc/sagrivr.html#Beneficial_*.

1. A short narrative on historical fish and wildlife habitat or population issues in the AOC, including how habitat or populations have been impaired by water quality.
2. Description of the impairment(s) and location for each aquatic habitat or population site, or for multiple sites where determined appropriate at the local level to address all habitat or population issues identified in the RAP and RAP Updates.
3. A locally derived restoration target for each impacted habitat or population site. Sources of information for targets may include data from social science surveys, if appropriate. Habitat restoration targets may be based on restoration of fish and wildlife populations, if appropriate.
4. A list of all other ongoing habitat or population planning processes in the AOC, and a description of their relationship to the restoration projects proposed in the plan.
5. A scope of work for restoring each impacted aquatic habitat or population site. The scope of work should describe **specific habitat or population restoration action(s) to be completed**, including:
    a. Timetable
    b. Funding
    c. Responsible entities
    d. Indicators and monitoring
    e. Evaluation process based on indicators
    f. Public involvement
6. A component for reporting on habitat or population restoration implementation action(s) to the MDEQ.

Delisting of the habitat and populations BUIs will be based on achievement of full implementation of actions in the steps above. Habitat values and populations need not be fully restored prior to delisting, as some may take many years to recover after actions are complete. In addition, actions already implemented in AOCs are also reported and evaluated in this document.

Summary of Past Fish and Wildlife Population Issues in the Saginaw AOC

When the Saginaw River/Bay was designated as an Area of Concern (AOC) in 1987, "Degradation or Loss of Fish and Wildlife Habitat" (Habitat) and "Degradation or Loss of Fish and Wildlife Populations" (Populations) were identified as two of the 12 beneficial use impairments (BUIs) in the AOC. These two BUIs were listed for the following reasons:

- Decline and impairment of fish and wildlife populations, particularly fish-eating birds, from high levels of toxic contaminants in the water and sediments of the river and bay
- Decline in populations of key recreational and commercial fisheries due to low dissolved oxygen from nutrient enrichment in the Saginaw Bay
- Loss and degradation of coastal wetlands from land use change
- Loss and degradation of fish spawning areas in the bay and tributaries from sedimentation and decreased access to spawning areas when tributaries were dammed

These were the primary issues that resulted in the AOC designation, and were subsequently addressed in the original 1988 Remedial Action Plan (RAP), as well as RAP updates in 1995 and 2001.

The 1988 RAP focused primarily on fish and wildlife issues related to toxic contamination and nutrient enrichment. While the vital importance of the Saginaw Bay wetland complex to fish and wildlife was discussed, none of the 101 recommendations in the original RAP were directly related to habitat preservation or restoration. By the time the 1995 RAP update was written, however, preservation and restoration of coastal wetlands and the need for restoration of critical fish spawning areas were both identified as key components of increasing and improving fish and wildlife populations in the AOC.

Great Lakes–wide factors affecting fish and wildlife populations, such as invasive species, over-fishing, and subsequent changes in the predator-prey balance of the fish community, are not part of the basis for the BUIs because their impacts are not localized within the AOC boundary.

TOXIC CONTAMINANTS AND NUTRIENT ENRICHMENT

At the time Saginaw River/Bay was designated an AOC, high levels of toxins in the water column and sediments were impacting fish and wildlife through bioaccumulation in the food chain. The effects were high tissue concentrations of contaminants and deformities and/or reproductive problems in migrating and local species of wildlife in the Saginaw Bay watershed. This issue was a primary focus of the original 1988 RAP for the Saginaw River/Bay AOC, and many of the document's 101 recommendations were aimed at addressing sediment contaminant remediation. The effects of both toxic contamination and nutrient enrichment on fish and wildlife in the AOC are addressed through two other BUIs—"Restrictions on Fish and Wildlife Consumption" and "Bird and Animal Deformities or Reproductive Problems." Thus, they will not be a focus of the

restoration plan for fish and wildlife habitat and populations for the Saginaw River/Bay AOC.

Similarly, nutrient enrichment of the Saginaw River and Bay from wastewater treatment plant discharge and runoff from the substantial agriculture surrounding the river and bay historically resulted in abundant algae growth in the bay and subsequent low levels of dissolved oxygen with algae die-off. Fisheries were impacted by nutrient enrichment because the traditional sport fish species could not survive in the low dissolved oxygen levels in the water. This, too, was a significant focus of the original RAP and 1995 RAP Update for the AOC, and significant progress has been made on this front since the Saginaw River and Bay were designated as an AOC. Communities in the watershed continue to upgrade wastewater treatment plants, and watershed plans and best management practices have helped to reduce some of the runoff from agricultural and suburban areas within the watershed (MDNR 1995), though there remains considerable work to do on this issue. Nutrient enrichment is addressed through a separate BUI, "Eutrophication or Undesirable Algae," and is not the focus of this restoration plan.

LOSS OR DEGRADATION OF COASTAL WETLANDS

Prior to European settlement Saginaw Bay contained one of the most extensive wetland and wet prairie complexes in the Great Lakes. The Saginaw Bay watershed was estimated to be covered with roughly 700,000 acres of wetlands, with nearly 37,000 acres of emergent vegetation around Saginaw Bay. Changes in land use, as agriculture and urban development have increased, have resulted in significant losses of wetlands along the Saginaw River and Bay in the last 150 years (PSC 2000, PSC 2002).

The original 1988 RAP for the Saginaw River/Bay identified the importance of the expansive coastal wetlands in the Saginaw Bay to fisheries and migrating waterfowl, as well as to other aquatic species. The document noted that during spring and fall migration, groups of more than 250,000 ducks were counted in the bay. While there were still significant coastal wetlands within the AOC at that time, conversion to agriculture and increasing urbanization had already reduced much of this important habitat (MDNR 1988). The RAP identified the importance of protecting and restoring coastal wetlands as a measure of improving the fish and wildlife populations in the AOC. While none of the original 101 recommendations in the RAP were targeted specifically toward habitat preservation and restoration, several of the recommendations were aimed at restoring or improving hydrologic conditions and reducing nonpoint source impacts on fish and wildlife in the bay, both of which can be accomplished through restoration of historic wetlands and lakeplain prairie.

Specific recommendations for habitat conservation or restoration were not included in the RAP until subsequent updates in 1995 and 2001. In those documents, loss and degradation of habitat was identified as a significant issue in the AOC. In particular, the updated RAPs focused on the impacts to critical nursery and spawning areas of historically important fish species in Saginaw Bay, including walleye, yellow perch, lake herring, and lake trout. Waterfowl identified as most significant included mallards, teal, and Canada geese (MDNR 1995, PSC 2002).

In the 1995 RAP Update, the Habitat Technical Advisory Committee identified four major categories of habitat issues that needed to be addressed in the AOC: (1) land use, (2) coastal shoreline, (3) habitat fragmentation, and (4) threatened and endangered species. While no specific habitat density targets or specific geographic areas were identified for habitat restoration within the AOC, the update emphasized the importance of coastal wetland areas, and areas with threatened or endangered species (MDNR 1995).

Several reports that followed the 1995 RAP Update began to focus on and prioritize specific areas and types of coastal wetland habitat in the Saginaw River and Bay for protection and restoration. In 2000, the Wildlife Stewardship Task Group of the Saginaw Watershed Initiative Network developed a Saginaw Bay Watershed Wildlife Habitat Conservation Framework, which identified habitat lakeward/riverward of the 585-foot contour[2] as the highest priority for habitat conservation and restoration in the watershed. The majority of this land is near the Saginaw Bay shoreline and inland at Fish Point, Quanicassee, and Wigwam Bay, and upstream in the Saginaw River, particularly at Crow Island and Shiawassee Flats (Nelson 2000).

Also in 2000, the Partnership for the Saginaw Bay Watershed (Partnership) contracted with Public Sector Consultants (PSC) to conduct a study, *Measures of Success: Addressing Environmental Impairments in the Saginaw River and Saginaw Bay* (PSC 2000), which described progress that had been made in addressing BUIs in the AOC since 1988 and identified specific targets for restoring the original 12 BUIs, including "Degradation or Loss of Fish and Wildlife Habitat," and "Degradation or Loss of Fish and Wildlife Populations."

The Partnership again worked with PSC to incorporate the targeted restored conditions developed in the 2000 *Measures* report into a 2001 RAP update for the AOC entitled *Targeting Environmental Restoration in the Saginaw River/Bay Area of Concern: 2001 Remedial Action Plan Update* (PSC 2002). In both of these documents, coastal wetlands were identified as a priority for preserving and restoring lost habitat for fish and wildlife within the AOC. The primary goal identified for habitat protection and enhancement was to protect existing fish and wildlife habitat, particularly wetlands and other spawning and nursery areas. Restoration of critical habitat—particularly coastal marshes and wet prairies—to make up for previous loss of wetlands was identified as a secondary goal for the AOC (PSC 2000, PSC 2002). The resulting restoration goal was set to permanently protect 60 percent of the existing wetlands in the AOC and prioritize the remaining 40 percent for protection.

Finally, the Michigan Department of Environmental Quality (MDEQ) funded a study in 2003 to evaluate potential coastal wetland habitats in Saginaw Bay for possible restoration. This report evaluated 12 sites along Saginaw Bay to determine baseline characteristics of those sites and begin to identify sites in public ownership that have the highest potential for restoration (Burton et al. 2003).

[2] The 585-foot contour refers to record high levels of Lakes Huron and Michigan (581.10 feet, according to the U.S. Geological Survey Datum in 1986) plus about 2 feet to account for storm surge with a strong northeast wind. Thus, the 100-year floodplain in this area is 585.2' USGS. Anything below that level would be subject to flooding.

LOSS OR DEGRADATION OF FISH SPAWNING AREAS

In addition to loss of wetland habitat, degradation or loss of other critical fish spawning areas has been identified as a source of fishery impairment in the Saginaw River/Bay AOC. The sedimentation of valuable rock reefs in the inner Saginaw Bay is of particular concern, as is diminished access to historic spawning areas caused by the construction of dams on many of the Saginaw River's tributaries.

Historically, Saginaw Bay had honeycombed rock reefs, occurring in water from six to 120 feet deep, which provided valuable spawning and nursery areas for key recreational and commercial fisheries, including walleye. These areas, particularly at the mouth of the Saginaw River along the Coryeon Reef and near Charity Island, were prime spawning areas for Lake Huron fisheries as a whole (MDNR 1988). As surrounding land was developed for agriculture and suburban development, and the hydrologic flow of the Saginaw River was altered by increased rates of storm runoff resulting from poor land-use practices, vast amounts of sediment washed into the inner Saginaw Bay and covered these rock reefs. As a result, critical fish spawning habitat was eliminated. While much progress has been made in controlling upland sediment erosion into the Saginaw River and tributaries, high sedimentation rates are still problematic in the AOC (PSC 2000).

In addition to the degradation of the inner bay reefs, upstream spawning areas for the Lake Huron and Saginaw Bay fisheries have been severed by the construction of more than 300 dams on Saginaw River tributaries. These dams were constructed without fish passage devices, and thus eliminated tributary spawning access for walleye, lake sturgeon, and several other key fish species. Many of these dams have outlasted their original use or capacity, and have been considered for modification or removal to reconnect tributary spawning areas. In 2005 PSC conducted a study, *Enhancing Fish Passage over Low-head Barrier Dams in the Saginaw River Watershed*, which evaluated the potential for creating fish passage or removing some tributary dams as a means of opening access to historic spawning areas, primarily for walleye and lake sturgeon. The City of Frankenmuth, on the Cass River, participated as a case study for the evaluation. The Chesaning Dam on the Shiawassee River and the Dow Dam on the Tittabawassee River were also included as focus areas. The report concluded that enhancing fish passage on some of the Saginaw River's tributaries would be socially and economically acceptable, and could provide important access to historical fish spawning areas necessary to rebuild self-sustaining fish populations (PSC 2005). Based on the results of the study, the City of Frankenmuth has proposed a project to retrofit the Frankenmuth Dam to open up 73 miles of stream for fish passage.

Restoration Targets for Delisting

The primary types of impaired habitat in the Area of Concern (AOC) are coastal wetlands, associated upland buffers, and other fish spawning areas such as reefs and upstream tributaries. The restoration targets for "Degradation or Loss of Fish and Wildlife Habitat" (Habitat) and "Degradation or Loss of Fish and Wildlife Populations" (Populations) beneficial use impairments (BUIs) for the Saginaw AOC focus on coastal wetlands and other fish spawning areas, consistent with the restoration targets identified in previous reports.

COASTAL WETLANDS

In the 2000 PSC report, *Measures of Success*, and the 2001 RAP update for the AOC, coastal wetlands were identified as a priority for preserving and restoring lost habitat for fish and wildlife within the AOC. The primary goal identified for habitat protection and enhancement was to protect existing fish and wildlife habitat, particularly wetlands and other spawning and nursery areas. Restoration of critical habitat—particularly coastal marshes and wet prairies—to make up for previous loss of wetlands was identified as a secondary goal for the AOC.

The ***habitat restoration targets*** identified in these previous documents were:

- at least 60 percent of the coastal marsh areas (below the 585-foot contour) and adequate upland buffers representing essential fish and wildlife habitat are preserved through public ownership, covered under conservation easements, or otherwise protected under agreements with landowners; and
- the most vulnerable portions of the remaining 40 percent of the essential coastal marsh areas have been clearly identified so that governmental agencies, local conservation/ environmental organizations, and concerned citizens can monitor their status, enhance enforcement of existing laws, and conduct public educational programs to better protect these areas (PSC 2000).

In 2001, progress on this goal was assessed by Ducks Unlimited (DU). That research suggested that approximately 20–30 percent of coastal wetlands were protected at that time (PSC 2002).

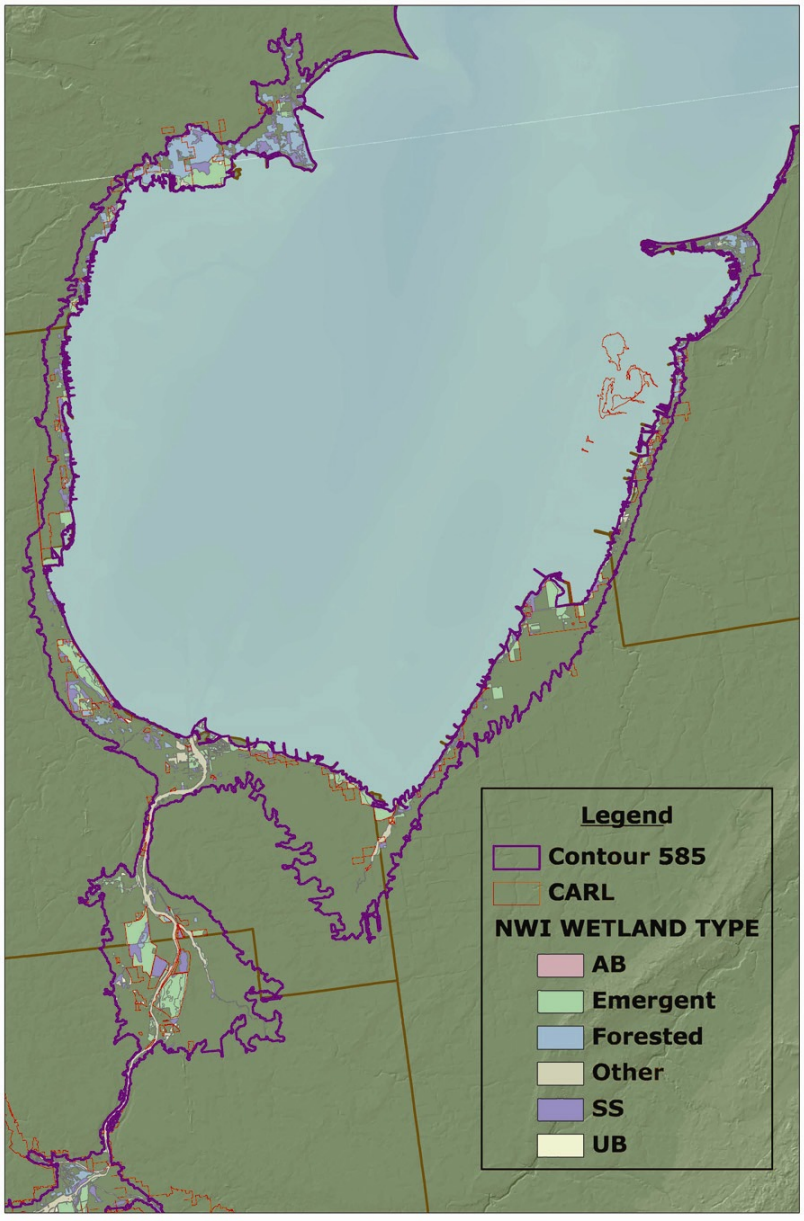
Since then, conservation and restoration activities have continued. In 2007, DU conducted another assessment of this target (DU 2007) and found that approximately 58 percent of the wetlands areas below the 585-foot contour have been protected under public ownership and permanent easements (see Exhibits 2 and 3).

EXHIBIT 2
Protected Wetlands in the Saginaw Bay Watershed

Protection type	Wetland type						Totals*
	Forested	Emergent	Shrub	Open water	Aquatic bed	Other	
Federal	1,842	2,508	452	92	0	1,162	**6,056**
State	5,702	8,923	2,417	81	17	458	**17,597**
County	2	93	109	0	0	49	**254**
Local	11	11	48	35	0	32	**136**
Nongovernmental organizations	8	44	0	0	0	0	**53**
Private—Conservation easement or wetlands reserve program	4	161	7	5	0	0	**177**
Private—Sportsman's/gun/ hunting/fishing club	226	58	1	0	0	15	**299**
Protected wetlands	7,794	11,798	3,034	213	17	1,717	**24,572**
Unprotected wetlands	5,057	6,050	2,392	595	1	3,834	**17,929**
Total wetlands	12,851	17,848	5,426	807	18	5,551	**42,501**
Percentage protected	**61%**	**66%**	**56%**	**26%**	**94%**	**31%**	**58%**

SOURCES: Protection Type was determined from Ducks Unlimited/TNC CARL layer for Michigan (see *http://glaro.ducks.org/CARL*). Wetland Type was determined from Ducks Unlimited's updated National Wetlands Inventory (NWI) layer (see *http://glaro.ducks.org/NWI*).
*Totals may not equal sum of columns due to rounding.
NOTE: The 585 contour line was created from USGS Digital Elevation Models (DEMs) and the DEQ shoreline data sets.

EXHIBIT 3
Protected Wetlands below the 585 Contour 2008



SOURCE: Image courtesy of Ducks Unlimited. Wetland Type was determined from Ducks Unlimited's updated National Wetlands Inventory (NWI) layer (see *http://glaro.ducks.org/NWI*). CARL is the Conservation and Recreation Lands Database developed by Ducks Unlimited and the Nature Conservancy, *http://glaro.ducks.org/CARL*).

The most vulnerable portions of the remaining 40 percent will be prioritized by the *five-county project* of the MDEQ's Saginaw Bay Coastal Initiative, using wetland restoration criteria that are currently being determined.

Previous Targets

In previous reports, fish and wildlife species-specific targets were developed in order to measure restoration. Due to increasingly complex ecosystem changes caused by invasive species and food web alteration, these targets are no longer reliable indicators of achievable restoration in the Area of Concern (AOC). Below is an explanation of the technical committee's determination that the previous targets are no longer relevant for BUI delisting. It is important to note that although these targets will not be used for delisting they will remain important indicators of ecosystem health.

FISH SPECIES-SPECIFIC TARGETS

The 2000 *Measures of Success* and 2001 Update reports included ***species-specific restoration targets*** for three fish species—walleye, yellow perch, and lake sturgeon—which were identified as the best indicator species for determining recovery of conditions necessary to sustain general fish populations in the bay. Protection and restoration of critical spawning areas for these species have been identified as key measures for attaining these targets within the Saginaw AOC.

Walleye

The goal for walleye is increased abundance in the bay, ultimately through natural reproduction, such that growth rates more closely approximate statewide averages for this species and reflect improved use of available forage in the bay. When this target was set, walleye growth rates were approximately 120–130 percent of the statewide average. This was an indication of an imbalance in the predator-prey relationship in the bay ecosystem.

Historically, walleye populations collapsed in the mid-1940s due to a combination of pollution, commercial over-fishing, and the proliferation of invasive species including alewife and rainbow smelt. Populations were rebuilt by an aggressive stocking program conducted by the Michigan Department of Natural Resources (MDNR) in cooperation with local angling groups, beginning in the late 1970s. This stocking program succeeded in producing a world-class walleye sport fishery and building a large broodstock of adult walleye that were able to take advantage of the changing bay environment and reproduce successfully. Walleye has not been stocked in the bay since 2005 because natural reproduction has met management goals. This is largely a result of the collapse of the Lake Huron population of alewife, which are extremely effective predators on the newly hatched fry of walleye and many other native fish species. The alewife collapse likely resulted from alteration of the food web due to colonization of the lake by non-native zebra and quagga mussels, which remove plankton that alewife require for food from the water. The walleye population in the bay is now entirely reliant on natural reproduction, due in large part to the availability of contiguous spawning habitat.

The measurable recovery target for walleye was set to achieve a population density such that walleye grow no faster than 110 percent of the state average mean length at age three. The walleye population met this goal for the first time in 2006, and again in 2007, but it is not known whether this goal will be sustainable in the future, as the food web continues to change. For this reason, the technical committee concluded that the walleye

target can no longer be used as a relevant target for monitoring restoration of these BUIs. While walleye population cannot be used as a proxy for delisting, it remains an essential indicator for the health of the Saginaw Bay system overall, and will be included in the Appendix as an ongoing priority for restoration.

Yellow Perch

The recovery target initially set for yellow perch called for a sustained annual harvest of 750,000 pounds per year with increasing abundance of larger, faster-growing individuals.

Since the target was set in 2000, managers have determined that the target is problematic because it focuses on sustained annual harvest rather than the overall health of the yellow perch population. The technical committee recommends that this goal should be amended to parallel the walleye goal; it should focus on an increase in abundance, sustained natural reproduction, and a growth rate that approximates the statewide average.

Yellow perch populations have also been impacted by the recent collapse of the alewife. Perch natural reproduction has increased as a result of decreased perch fry predation by alewives. Yellow perch reproduction has resulted in extremely large hatches in recent years. However, due to the absence of alewives as food for adult walleye and other predator species, young-of-the-year perch are now subject to high rates of predation by many species.

Additionally, due to the decrease in available plankton for food resulting from the colonization of invasive mussels, many young perch do not grow fast enough during their first summer to accumulate sufficient energy reserves to survive their first winter.

As a result of these factors, the perch population in the Saginaw Bay is unstable. While it does exhibit high rates of natural reproduction, survival to yearling size is poor as a result of the combined effects of food web alteration and high mortality due to predation. Growth rates of perch surviving past the age of one are very good, but numbers of larger perch are near historic lows. Based on this information it is likely that perch are impacted by predator-prey imbalances, rather than a lack of available spawning habitat.

Finally, the issues presenting challenges to the yellow perch populations of the Saginaw River and Bay are not distinguishable from those impacting populations in greater Lake Huron, including food web disruption and competition from aquatic invasive species. For this reason, the technical committee concluded that the yellow perch target can no longer be used as a relevant target for monitoring restoration of these BUIs. While yellow perch cannot be used as a proxy for delisting, it remains an essential indicator for the health of the Saginaw Bay system overall, and will be included in the Appendix as an ongoing priority for restoration.

Lake Sturgeon

The recovery target set in 2000 for lake sturgeon called for documented evidence of natural reproduction in Saginaw Bay.

The technical committee recommended that this target should be amended to include tributaries because sturgeon may not spawn again in the bay proper. One young-of-the-

year sturgeon was found in the Rifle River in 2002. Commonly, sturgeon are found singly, and no evidence of natural reproduction has been documented.

Again, the challenges to the sturgeon recovery in the Saginaw River and Bay are indistinguishable from those impacting sturgeon populations beyond the AOC boundary, including lack of access to historic spawning locations and a limited population of sexually mature sturgeon. For this reason, the technical committee concluded that sturgeon target can no longer be used as a relevant target for monitoring restoration of these BUIs. While sturgeon cannot be used as a proxy for delisting, sturgeon populations remains an essential indicator for the health of the Saginaw Bay system overall, and will be included in the Appendix as an ongoing priority for restoration.

WILDLIFE-SPECIFIC RESTORATION TARGETS

The restoration targets established for wildlife species in previous reports focused on limitations to reproduction resulting from bioaccumulation of chemical contamination. The species of interest were fish-eating birds, specifically bald eagles and herring gulls. The chemical contamination issues are addressed under another BUI, “Bird or Animal Deformities” or “Reproductive Problems.”

Suggested Priorities for Protection or Restoration Activities

Fish and wildlife habitat restoration for the Saginaw River and Bay Area of Concern (AOC) is focused on the areas of historical degradation and loss. Specifically, fish and wildlife restoration goals are focused primarily on habitat-related impacts to fisheries.

This report highlights the fact that the restoration goals for coastal wetlands are nearly attained, and subsequent delisting of the "Degradation or Loss of Fish and Wildlife Habitat" (Habitat) and "Degradation or Loss of Fish and Wildlife Populations" (Populations) beneficial use impairments (BUIs) is imminent. Therefore, the following section outlines priorities for continuing protection and restoration in the watershed. Proposed activities listed in this section of the plan include those that will safeguard the work already accomplished and promote additional protection and restoration in the watershed beyond that which was outlined in the restoration goals.

Based on the analysis of currently protected wetlands (see page 10), restoration for purposes of BUI delisting requires protection of an additional 2 percent, or 850 acres, of wetlands in the watershed below the 585-foot contour. Ongoing activities are continually contributing toward meeting that goal. Activities that are currently planned include those listed below.

In addition to the projects identified below, organizations, agencies, and local units of government must permanently protect an additional 1 percent (approximately 432 acres) of wetlands before the impairments to the coastal marsh wetlands can be considered restored and the related Habitat and Populations BUIs delisted. The Saginaw Bay Coastal Initiative wetlands prioritization project should be used as a reference for directing future action.

When selecting additional tracts for protection, connectivity of already protected wetlands and associated uplands should be given highest priority. Connectivity is essential to maximize the use of the protected lands for habitat benefits.

Finally, the remaining 40 percent of wetlands in the AOC must be formally prioritized using the criteria being developed in 2008 by the five-county work group of the Michigan Department of Environmental Quality's Saginaw Bay Coastal Initiative.

PROPOSED ACTIVITIES TO MEET DELISTING CRITERIA

The following measures to protect an additional 417.7 acres, or approximately 1 percent, of the wetlands below the 585-contour are currently planned.

Wildfowl Bay Nature Preserve (Osentoski property)

- Timetable for completion: December 31, 2008
- Acres: 139

- Funding (source and amount): National Coastal Wetlands Conservation grant, $930,000; Public Interest Research Group in Michigan (PIRGIM), $50,000; Ducks Unlimited (DU), $5,000; The Nature Conservancy (TNC), $6,550
- Responsible entities: Saginaw Basin Land Conservancy (SBLC) and the Michigan Department of Natural Resources (MDNR)
- Indicator and Monitoring: The SBLC will monitor the preserve four times per year.
- Public Involvement: The grant will require public education events and opportunities, but nothing is scheduled at this time. Also, the SBLC usually organizes a commemoration ceremony, but none has been scheduled at this time.

Oak Grove Beach LLC (Maciag) Conservation Easement

- Timetable for completion: October 1, 2008
- Acres: 53.3
- Funding (source and amount): Clean Michigan Initiative grant, $85,608
- Responsible entities: SBLC and the Michigan Department of Environmental Quality (MDEQ)
- Indicator and Monitoring: The SBLC will monitor the easement annually.
- Public Involvement: None.

Au Gres Nature Preserve (Bilacic property)

- Timetable for completion: December 31, 2008
- Acres: 67.4
- Funding (source and amount): North American Wetlands Conservation Act (NAWCA) small grant, $75,000 (pending)
- Responsible entity: SBLC
- Indicator and Monitoring: The SBLC will monitor the preserve four times per year.
- Public Involvement: The SBLC usually organizes a commemoration ceremony, but none has been scheduled at this time.

Additions to Shiawassee National Wildlife Refuge (SNWR)

Two tracts along the Cass River will be added to the SNWR using funds from the NAWCA grant program.

- Timetable: If the grant is awarded, both tracts will be transferred to the United States Fish and Wildlife Service (USFWS)–Shiawassee National Wildlife Refuge by early 2009.
- Acres: 118
- Funding: The first tract was already acquired by The Conservation Fund (TCF) for approximately $76,000 and will be *donated* to the USFWS *if* the NAWCA grant is awarded and the USFWS acquires the second tract from TCF. The second tract already has been acquired by TCF for approximately $170,000. The USFWS will acquire the tract from TCF if the grant is awarded at the bargain price of $153,500.
- Responsible entities: TCF, USFWS, and DU. DU will serve as the grant recipient.

- Indicator and Monitoring: USFWS personnel will be responsible for monitoring habitat conditions on both tracts as part of the SNWR.
- Public Involvement: None is currently planned.

Unspecified Tract Preservation under NAWCA Grant

- Timetable: If the grant is awarded, then this acquisition of a yet-to-be identified property would occur by late 2009.
- Acres: 40
- Funding (source and amount): SBLC, $10,000; $122,500 NAWCA grant funds through DU.
- Responsible entities: SBLC and DU.
- Indicator and Monitoring: The SBLC will monitor the preserve four times per year.
- Public Involvement: None is currently planned.

Recent and Ongoing Planning and Restoration Efforts

Since the Saginaw River/Bay was designated as an Area of Concern (AOC), and degraded fish and wildlife habitat and populations were designated as beneficial use impairments (BUIs), significant progress has been made in conserving and restoring habitat within the AOC and in the surrounding watershed. Numerous local, state, and federal actions have permanently protected and restored large areas of fish and wildlife habitat, and there has been significant private and nonprofit investment of time and resources to protect and restore coastal wetland and fish spawning habitat within the AOC boundary and in the contributing watershed outside the AOC boundary.

Recent and ongoing projects or activities in the watershed are described below. They have been arranged in chronological order with the most recent project first. It is important to note that activities outside the AOC boundary have been included in this section because they positively impact the conditions within the downstream AOC.

LARGE-SCALE FISH AND WILDLIFE HABITAT PLANNING EFFORTS (COMPLETED AND ONGOING)

The Saginaw Bay Coastal Initiative, 2007

Lead Agency/Organization: Michigan Department of Environmental Quality (MDEQ), numerous state agencies, and other stakeholders

This initiative was undertaken to promote environmentally sound economic development and resource restoration in the Saginaw Bay area. The Saginaw Bay Coastal Initiative (SBCI) covers Arenac, Bay, Huron, Saginaw, and Tuscola Counties. Focus work groups, consisting of various state and federal agencies, local governments, nongovernmental organizations, and interested citizens, were developed as part of the initiative. Focus areas include tourism and recreation; beach and wetland issues; and regulatory improvements.

A technical work group has been formed to identify high-priority wetland acquisition areas in Saginaw Bay that should be preserved. The group will produce a map of the five counties showing the high-priority wetland areas. The group has established ecological and social criteria that will be used as an evaluation mechanism. Mapping will be completed in 2008. Along with the map, this work group will develop a manual that discusses various options for preservation and restoration, lists potential funding sources, and provides advice on planning and carrying out a wetland protection project.

Michigan Coastal and Estuarine Land Conservation Plan, 2007

Lead Agency/Organization: MDEQ, Coastal Zone Management Program

The Coastal and Estuarine Land Conservation Program (CELCP) was established in 2002 by the National Oceanic and Atmospheric Administration (NOAA) to protect coastal and estuarine lands considered important for their ecological, conservation, recreational,

historical, or aesthetic values. The program provides state and local governments, conservation districts, tribal governments, and state colleges and universities with matching funds to purchase significant coastal and estuarine lands, or conservation easements on such lands, from willing sellers. Lands or conservation easements acquired with CELCP funds are protected in perpetuity so that they may be enjoyed by future generations. Michigan has prepared a draft plan that establishes priorities throughout the state's shoreline and is waiting for approval of the plan from NOAA. Michigan's CELCP plan is based on the results of many previously existing conservation recommendations and plans that have been produced throughout the state.

Saginaw Bay Watershed Initiative Network Publications

The Saginaw Bay Watershed Initiative Network (WIN) provides resources to conduct studies on important issues in the Saginaw Bay watershed. Those relevant to this summary include:

- *The Economic Values of Saginaw Bay Coastal Marshes, 2005*
- *A Vision of Green for Michigan's Bay, Midland and Saginaw Counties, 2005*
- *Saginaw Bay Watershed Wildlife Habitat Conservation Framework, 2000*

These documents are available online at: *http://www.saginawbaywin.org/docs*.

2006 Annual Report: *Evaluation of Lake Sturgeon Spawning in the Saginaw River Watershed, 2005–2006*

Lead Agency/Organization: USFWS

In 2005 and 2006, the USFWS conducted an evaluation of sturgeon spawning activities in the Cass, Saginaw, Shiawassee, and Tittabawassee Rivers. The objectives were to determine whether sturgeon are using the Saginaw River for spawning; determine the location of spawning, if any; and determine whether habitat is sufficient for successful survival for sturgeon eggs, larvae, and young. No sturgeon eggs were detected during the sampling, and only two sturgeon fish were counted.

Saginaw Bay Walleye Recovery Plan, 2004

Lead Agency/Organization: Michigan Department of Natural Resources (MDNR)

In 2004, the MDNR adopted a plan for walleye recovery. The goal was to restore the balance between predator and prey species by increasing walleye stocking to the extent possible, providing fish passage and/or dam removal where appropriate, reducing sediment delivery to the bay and its tributaries, and rehabilitating nearshore reefs, if feasible.

Study: Monitoring and Evaluation of Coastal Habitats for Potential Restoration Activities, 2003

Lead Agency/Organization: Funded by the MDEQ; principal investigators were David Kenaga, Tom Burton, Donald Uzarski, and Dennis Albert

These researchers endeavored to identify converted or disturbed wetland sites that could be suitable for restoration. The study included 12 sampling sites in Saginaw Bay.

Shiawassee National Wildlife Refuge—Comprehensive Conservation Plan (2001)

Lead Agency/Organization: USFWS

This is a 15-year plan identifying goals and objectives for the refuge. The refuge's mosaic of wetland, bottomland hardwood forest, and grassland habitats draws more than 260 bird species, more than 30 mammal species, more than 20 species of reptiles and amphibians, and more than 70 species of fish.

Saginaw Bay Watershed Wildlife Habitat Conservation Framework, 2000

Lead Agency/Organization: WIN Wildlife Stewardship Task Group

The framework was developed from existing plans and activities of various federal, state, and local governments, nongovernmental organizations, and private landowners. The goal was to establish a set of priorities for the protection and restoration of Saginaw Bay watershed habitat.

The framework did not identify specific habitat sites for protection or restoration, but stated that the highest priority is for *protection/conservation* of habitat lakeward or riverward of the 585-foot contour. The second highest priority is for *restoration* of habitat lakeward or riverward of the 585-foot contour. These goals were later reflected in the 2000 report, *Measures of Success: Addressing Environmental Impairments in the Saginaw River and Bay*, and the 2002 report, *Targeting Environmental Restoration in the Saginaw River/Bay Area of Concern* (PSC).

Partners for Fish and Wildlife, ongoing

Lead Agency/Organization: USFWS

The Partners for Fish and Wildlife Program provides financial and technical assistance on private land to protect and restore habitat for federal trust species, such as migratory birds, interjurisdictional fish, and federally endangered, threatened, or otherwise imperiled wildlife. In its twentieth year of operation, this ongoing grant program continues to be important in the Saginaw Bay (see Exhibit 4).

EXHIBIT 4
USFWS Partners Projects in the Saginaw Bay Watershed, 2007

Type of project	Date range of projects	Number of projects	Total acres impacted
Wetland projects	1991–2007	482	1,937
Upland projects	1999–2007	20	338
Total projects	1991–2007	502	2,275

SOURCE: USFWS Habitat Information Tracking System (HabITS) project database, 2007.
NOTE: The database is evolving, and may not include all projects done through the Partners for Fish and Wildlife program since program inception in the late 1980s.

Partners projects are typically classified as wetland, upland, or stream. There is no specific category for coastal marsh but most, if not all, USFWS Partners wetland projects are interior wetlands.

Upper Mississippi River & Great Lakes Region Joint Venture Implementation Plan, 1998

Lead Agency/Organization: USFWS

The Joint Venture was established in 1998 in response to the needs of breeding and migrating waterfowl in the northern part of the Mississippi Flyway, including the Great Lakes. Saginaw Bay is part of the region where the plan's focus is to improve and restore habitat for migrating waterfowl.

This joint venture under the North American Waterfowl Management Plan (NAWMP) calls for the restoration and enhancement of 20,000 acres of wetlands and grasslands in the Saginaw Lake Plain in order to meet NAWMP objectives. In addition, the plan calls for another 20,000 acres of wetlands and grasslands in the Huron Clay Plain. Parts of both of these areas are included in the Saginaw River/Bay AOC.

Strategic Plan for the Saginaw Bay, Ongoing

Lead Agency/Organization: Ducks Unlimited (DU)

Ducks Unlimited has developed a strategic plan for Saginaw Bay. DU's current conservation goal of 22,300 acres is watershed-wide and based primarily on waterfowl production and migration habitat. DU recently conducted a two-year study on spring migrating waterfowl in the Great Lakes and, as a result, the habitat conservation goal is expected to increase, perhaps substantially, in order to meet the nutritional requirements of spring migrating ducks and geese.

Conservation Reserve Enhancement Program, Ongoing

Lead Agency/Organization: U.S. Department of Agriculture (USDA)

This ongoing USDA program is dedicated to buffering surface waters in the watershed from agricultural, suburban, and urban runoff. The Saginaw Bay watershed has more than 40,000 acres enrolled in the Conservation Reserve Enhancement Program (CREP),

resulting in significant progress in reducing sediment loads to Saginaw Bay. Practices include native grass plantings, wetland restoration, buffer strips, wind breaks, shallow water areas, and sediment retention. It is important to note that land enrolled in this voluntary program can be pulled out of the program and put back into agricultural production if market forces warrant; these are not permanently protected acres.

Watershed, Forest, and Park Plans

Lead Agency/Organization: MDEQ or MDNR

State-approved plans for a variety of land uses also exist in the watershed, and the MDEQ oversees these plans. Watershed plans approved by the MDEQ in the watershed include the following:

- Cedar River
- Eastern Sanilac Coastal Tributary
- Kawkawlin River
- Michigan Lake Huron Initiative
- Pinnebog River
- Rifle River
- Sebewaing River
- Sturgeon Creek

The MDNR oversees planning efforts for both state forests and parks.

SIGNIFICANT SINGLE-SITE PROJECTS COMPLETED, UNDER WAY, OR PLANNED

Saginaw Basin Land Conservancy Acquisitions and Restorations

The Saginaw Basin Land Conservancy (SBLC) is a regional nonprofit organization devoted to protecting the land and water resources in the 22-county Saginaw Bay watershed. The SBLC uses a variety of creative land-protection tools, such as easements, in addition to outright purchase of land for conservation, to achieve conservation goals while meeting the needs of both landowners and the community. The SBLC currently holds permanent easements on approximately 3,300 acres in the watershed.

Recent Projects

The SBLC has been an integral player in federally ordered wetland mitigation in Arenac County. The entire area—three parcels totaling 176 acres of formerly agricultural land—has been flooded under the guidance of the U.S. Environmental Protection Agency.

Preserves

The SBLC has acquired 155 acres in fee title, referred to as preserves (see Exhibit 5).

EXHIBIT 5
SBLC Preserves

Preserve name	Date of acquisition	Acres	Township	County
Standish	5/29/2003	24.8	Standish	Arenac
Pinconning	8/17/2004	38.5	Pinconning	Bay
Saganing	5/24/2006	38.4	Standish	Arenac
Pressprich	6/19/2006	48.2	Sims	Arenac
Shaw-Marsh	6/22/2007	5.1	Lovells	Crawford
		155.0		

SOURCE: SBLC, 2007.

Easements: Filter Strips

The SBLC has acquired easements on 249 acres in the Saginaw Bay watershed for use as filter strips (see Exhibit 6).

EXHIBIT 6
SBLC Filter Strip Easements

Date of acquisition	Acres	Township	County
2/10/2004	14.1	Maple Grove	Saginaw
6/7/2004	6.1	Au Gres	Arenac
1/21/2005	2.0	Akron	Tuscola
5/31/2005	12.7	James	Saginaw
10/28/2005	27.0	Koylton	Tuscola
12/16/2005	16.8	Elmwood	Tuscola
3/15/2006	29.2	Akron	Tuscola
3/22/2006	5.7	Elkland	Tuscola
6/26/2006	17.6	Ellington	Tuscola
6/29/2006	15.4	Chapin	Saginaw
6/30/2006	5.4	Chesaning	Saginaw
9/20/2006	19.4	Maple Grove	Saginaw
9/29/2006	19.8	Turner	Arenac
3/28/2007	16.1	Columbia	Tuscola
10/18/2007	26.2	Au Gres	Arenac
10/18/2007	15.7	Whitney	Arenac
	249.2		

SOURCE: SBLC, 2007.

Easements: Wetland Restoration

The SBLC holds easements to restored wetlands totaling 1,886 acres (see Exhibit 7).

EXHIBIT 7
SBLC Wetland Restoration

Date of acquisition	Acres	Township	County
2/10/2004	6.7	Maple Grove	Saginaw
6/7/2004	3.5	Au Gres	Arenac
10/20/2004	34.7	Maple Grove	Saginaw
10/25/2004	12.2	Elmwood	Tuscola
10/29/2004	18.5	Mt. Forest	Bay
11/19/2004	18.0	Brookfield	Huron
11/19/2004	30.7	Elmwood	Tuscola
11/23/2004	84.3	Fairhaven	Huron
1/21/2005	69.8	Akron	Tuscola
1/26/2005	191.1	Winsor	Huron
1/26/2005	28.1	Elmwood	Tuscola
3/21/2005	14.6	Columbia	Tuscola
5/25/2005	90.8	Elmwood	Tuscola
5/31/2005	129.9	James	Saginaw
8/26/2005	48.2	Turner	Arenac
12/16/2005	349.0	Elmwood	Tuscola
3/15/2006	191.4	Akron	Tuscola
3/22/2006	14.0	Elkland	Tuscola
3/31/2006	24.7	Fairgrove	Tuscola
6/27/2006	20.7	Fraser	Bay
6/29/2006	59.6	Chapin	Saginaw
6/30/2006	32.5	Chesaning	Saginaw
9/18/2006	59.9	St. Charles	Saginaw
9/20/2006	12.7	Maple Grove	Saginaw
9/29/2006	143.0	Turner	Arenac
3/28/2007	59.6	Columbia	Tuscola
7/27/2007	84.5	Turner	Arenac
10/18/2007	53.1	Au Gres	Arenac
10/18/2007	3.8	Whitney	Arenac
	1,886.1		

SOURCE: SBLC, 2007.

Easements: Riparian Buffers

The SBLC holds easements on riparian buffers on 461 acres (see Exhibit 8).

EXHIBIT 8
SBLC Riparian Buffers

Date of acquisition	Acres	Township	County
9/20/2006	20.4	Maple Grove	Saginaw
9/7/2007	240.4	Richland	Ogemaw
9/7/2007	170.9	Burleigh	Iosco
10/18/2007	29.7	Whitney	Arenac
	461.4		

SOURCE: SBLC, 2007.

Other Easements

Other easements held by the SBLC that do not fit neatly into the above categories total 247 acres (see Exhibit 9).

EXHIBIT 9
SBLC Miscellaneous Easements

Date of acquisition	Acres	Township	County
1/27/2004	28.3	Hampton	Bay
10/29/2004	1.2	Mt. Forest	Bay
11/19/2004	1.5	Brookfield	Huron
11/19/2004	3.0	Elmwood	Tuscola
12/16/2005	1.8	Elmwood	Tuscola
3/22/2006	1.0	Elkland	Tuscola
6/26/2006	2.1	Ellington	Tuscola
6/29/2006	1.5	Chapin	Saginaw
6/30/2006	0.8	Chesaning	Saginaw
9/18/2006	1.7	St. Charles	Saginaw
2/16/2007	200.0	Chippewa	Mecosta
10/18/2007	4.2	Whitney	Arenac
	247.1		

SOURCE: SBLC 2007.

2006 Saginaw Bay Wetland Initiative North American Wetlands Conservation Act, Phase II

This project occurred throughout the 22 counties of the Saginaw Bay watershed: Arenac, Bay, Clare, Clinton, Genesee, Gladwin, Gratiot, Huron, Iosco, Isabella, Lapeer, Livingston, Mecosta, Midland, Montcalm, Ogemaw, Osceola, Roscommon, Saginaw, Sanilac, Shiawassee, and Tuscola.

The Saginaw Bay Wetland Initiative NAWCA Phase II grant was awarded to Ducks Unlimited, on behalf of a coalition of 17 conservation partners, in February 2001. This grant concluded on February 22, 2006, and resulted in the conservation of **4,125 acres** of wetlands and associated grasslands on public and private land throughout the project area. Included in the accomplishments is the acquisition and permanent protection of 1,631 acres of existing or restorable waterfowl habitat and the restoration or enhancement of 2,494 acres of wetlands and native grasslands. In total, 220 projects were completed, 161 on private land and 59 on public land.

Land Protection

Twenty-one projects totaling 1,631 acres were completed under this grant component at a total cost of $3,850,793.50 (grant, match, and non-match). A description of these projects follows.

- **Dost Tract Wetlands Reserve Program (WRP) easement**: USDA-Natural Resources Conservation Service contributed non-match funds to the Flint River Dike Board to acquire permanent WRP conservation easements on the two parcels totaling 156.8 acres that make up the Dost tract.
- **Case Tract**: This 52.2-acre tract of wetlands was donated to the Shiawassee National Wildlife Refuge (SNWR) in 1998.
- **Roney Tract**: General Motors purchased and then donated this 105.5-acre parcel of land to the Saginaw-Chippewa Indian Tribe of Michigan (SCIT) as part of the Saginaw Bay/River Natural Resources Damage Settlement.
- **Bordeaux and Pinconning Tracts**: Saginaw Basin Land Conservancy purchased the 24.8-acre Bordeaux and 38.5-acre Pinconning tracts and incorporated these parcels into its system of managed lands.
- **Sillman Tract:** Hampton Township acquired the 25-acre Sillman tract using funds from Bay Area Community Foundation, DU, and SBLC in addition to the NAWCA grant.
- **Badour I**, **Badour II**, **Collon**, **Rievert**, **Robinson**, **Hughes-Wilson,** and **Wild**: General Motors purchased these seven parcels as part of the Saginaw Bay/River Natural Resources Damage Settlement and donated the land to the MDNR. Badour I (106.5 acres) and Badour II (34.2 acres) are located at Tobico Marsh State Game Area (SGA); Collon (40 acres) is located at Fish Point SGA; Rievert (46 acres) is located at Wildfowl Bay State Wildlife Area; Robinson (203.9 acres) is located at Wigwam Bay Wildlife Area; Hughes-Wilson (98.6 acres) and Wild (83.4 acres) are located at Quanicassee Wildlife Area.
- **Dietrich**, **McClure**, **Stackpole**, and **VanHove**: The MDNR purchased these four parcels. Dietrich (115 acres) and McClure (80 acres) are located at Shiawassee River SGA; Stackpole (40 acres) is located at Verona SGA; and VanHove (45 acres) is located at Fish Point Wildlife Area.
- **Goeky, Motz,** and **Mulligan**: The MDNR acquired these three parcels for inclusion into existing state wildlife areas by pooling additional dollars with the NAWCA grant funds. Goeky (78 acres) is located at Fish Point Wildlife Area; Motz (85 acres) is located at Gratiot-Saginaw SGA; and Mulligan (160 acres) is located at Sanilac SGA.

- **Hines/WAT**: The MDNR acquired this 12.5-acre parcel from DU for inclusion into Wildfowl Bay State Wildlife Area using MDNR funds and NAWCA grant funds. DU purchased this tract from a willing seller and then sold it to the MDNR at a below-market-rate price.

Public Upland Restoration

Seven projects totaling 280 acres were completed under this grant component at a total cost of $47,864.13 (grant and match). A description of these projects follows.

- **Fish Point SGA Lakeplain Prairie**: Saginaw Bay WIN contributed a cash match to assist the MDNR restore 55 acres of lakeplain prairie habitat in two locations at Fish Point SGA.
- **State Game Area Grasslands**: Michigan Duck Hunters Association, Pheasants Forever, and the MDNR contributed new match (combination of cash and value of donated grass seed) and pooled it with NAWCA grant funds to restore 225 acres of native grassland at six locations. Completed projects are **Arms Road** (17 acres) at Quanicassee State Wildlife Area; , **Marsh Creek** (90 acres), **McClure** (34 acres), and **Wolf Creek** (52 acres) at Shiawassee River SGA; **Rievert** (10 acres) at Wildfowl Bay State Wildlife Area; and **Robinson** (22 acres) at Wigwam Bay Wildlife Area.

Public Wetland Restoration

Ten projects totaling 826 acres were completed under this grant component at a total cost of $490,770.12 (grant and match). A description of these projects follows.

- **Davis, Marsh Creek**, **McClure**, **Wolf Creek**, and **Zone 29**: DU, Shiawassee Flats Citizens and Hunters Association, and Saginaw Bay WIN contributed match (combination of cash and in-kind engineering) and pooled it with NAWCA grant funds to complete these five restorations totaling 408 acres. Davis is located at Crow Island SGA and Marsh Creek, McClure, Wolf Creek, and Zone 29 occurred at Shiawassee River SGA. DU provided the engineering and delivery services for these projects.
- **Badour I**, **Badour II, Rievert**, and **Robinson**: General Motors provided funding through the Saginaw Bay/River Natural Resources Damage Settlement to complete these four wetland restoration projects totaling 274 acres. Badour I and II are located at Tobico Marsh SGA, Rievert is located at Wildfowl Bay State Wildlife Area; and Robinson is located at Wigwam Bay Wildlife Area. **Dost**: DU provided funding to the Flint River Dike Board to relocate a dike along the Flint River that restored 144 acres of this property to emergent, forested, and seasonally inundated floodplain wetlands; this dike relocation occurred prior to the land being enrolled in the Wetlands Reserve Program.

Public Upland Enhancement

Seventeen projects totaling 187 acres were completed under this grant component at a total cost of $15,392.22 (grant and match). A description of these projects and associated expenses follows.

- **Refuge Unit**: Shiawassee Flats Citizens and Hunters Association contributed funds to assist the MDNR in enhancing this 60-acre grassland at Shiawassee River SGA.
- **Verona Grasslands (16 projects)**: Pheasants Forever and the MDNR contributed a cash match and pooled it with NAWCA grant funds to enhance 127 acres of native grasslands at 16 locations on Gagetown, Rush Lake, Rieck Mini, Scharf Mini, and Verona SGAs. Collectively, these projects are called Verona Grassland Enhancement.

Public Wetland Enhancement

Four projects totaling 420 acres were completed under this grant component at a total cost of $295,390.36 (grant and match). A description of these projects follows.

- **Fish Point SGA** and **Nayanquing Point SGA Shorebird Management Units**: The Bay Area Community Foundation, the Kantzler Foundation, and Saginaw Bay WIN contributed a cash match to help the MDNR develop two 5-acre shallow, managed wetlands to provide migration habitat for waterfowl and shorebirds.
- **Triangle Unit**: The Shiawassee Flats Citizens and Hunters Association contributed a combination of cash match and volunteer labor to assist the MDNR-led enhancement of this 160-acre emergent wetland at Shiawassee River SGA.
- **F-K Unit**: DU and the Shiawassee Flats Citizens and Hunters Association contributed a combination of cash, volunteer labor, and engineering as match to help the MDNR enhance this 250-acre managed emergent marsh at Shiawassee River SGA. The NAWCA grant funds also contributed to this project which was designed and implemented by DU engineering staff.

Private Land Wetland and Grassland Restoration

Projects on 160 private parcels totaling 781 acres (469 wetland and 312 grassland) were completed under this grant component at a total cost of $298,050.64 (grant, match, and non-match). DU and the USFWS contributed cash and staff time and pooled it with NAWCA grant funds to complete these projects through the USFWS Partners for Fish and Wildlife Program.

2004 Saginaw Bay Wetland Initiative North American Wetlands Conservation Act, Phase I

The Saginaw Bay Wetland Initiative NAWCA Phase I grant was awarded to DU, on behalf of a coalition of 10 conservation partners, in February 1998. This grant concluded on August 18, 2004, and resulted in the conservation of 4,178 acres of wetlands and associated grasslands on public and private land throughout the Saginaw Bay watershed. Included in the accomplishments is the acquisition and permanent protection of 1,231 acres of existing or restorable waterfowl habitat and the restoration or enhancement of 2,947 acres of wetlands and native grasslands. In total, 298 projects were completed, 274 on private land and 24 on public land.

This project occurred throughout the 22-county watershed of the Saginaw Bay. This effort was undertaken to protect, restore, or enhance 3,332 acres of wetlands and 846 acres of associated grasslands to provide breeding and migration habitat for waterfowl,

shorebirds, songbirds, state and federally listed threatened or endangered species, and other wildlife.

The following is a description of conservation accomplishments under the grant by project category.

Fee Title Acquisition

Eleven properties totaling 1,231 acres were acquired and permanently protected under this grant at a cost of $1.7 million ($268,723 NAWCA).

- The MDNR contributed four acquisition projects as match. These included **Brabant** (327 acres, Shiawassee River SGA); **Hanover** (106 acres, Maple River SGA); **Sattler** (235 acres, Fish Point Wildlife Area); and **Zimmerman** (119 acres, Gratiot/Saginaw SGA). These new tracts contain habitat similar to the original parcels and are located within the project area.
- The five parcels described below were purchased by the MDNR using a combination of NAWCA and MDNR funds. These include **Chrcek** (23.9 acres, Shiawassee River SGA); **Dake** (50 acres, Nayanquing Point Wildlife Area); **Jacobs** (48.2 acres, Quanicassee Wildlife Area); **Sawatzki** (40 acres, Shiawassee River SGA); and **Taggett** (240 acres, Shiawassee River SGA).
  - The 23.9-acre **Chrcek** tract was acquired using NAWCA funds with the MDNR contributing the remaining funds. This floodplain parcel along the shore of the Cass River was in agricultural production at the time of acquisition. The 40-acre **Sawatzki** parcel was acquired using a combination of NAWCA and MDNR funds. Sawatzki also was in agricultural production at the time of acquisition and offers an excellent opportunity to restore native prairie in close proximity to brood-rearing wetlands. The MDNR purchased both of these properties within the acquisition boundary of Shiawassee National Wildlife Refuge (SNWR) to facilitate a longstanding land exchange between the MDNR and the USFWS. This exchange has taken place and the Chrcek and Sawatzki parcels are now in federal ownership as part of the SNWR. The Chrcek tract is located adjacent to the Leech tract that was acquired under the NAWCA grant and is now managed to allow for natural Cass River flooding regimes. In addition, five acres of emergent wetlands were restored on Chrcek and Leech under this grant.
  - The 50-acre **Dake** tract was acquired using NAWCA funds and DU non-match funds. This property is located approximately 500 feet west of Saginaw Bay in Bay County and primarily contains coastal marsh transition habitat, including coastal lowland forest and scrub-shrub wetland, emergent wetland, and coastal wet prairie. Dake has been incorporated into the 1,150-acre Nayanquing Point Wildlife Area.
  - The 48.2-acre **Jacobs** tract was acquired using a combination of NAWCA funds and MDNR funds. This Saginaw Bay coastal property contains nearly one-half mile of high-quality emergent wetland on the Saginaw Bay. The remainder of this parcel was in agricultural production when acquired but has since been taken out of production and has been allowed to revert to wetland. Acquisition of this parcel for inclusion into the 1,300-acre Quanicassee Wildlife Area permanently

protected important coastal wetland habitat, consolidated state ownership, and increased public recreational opportunities.

- The MDNR purchased the 240-acre **Taggett** property at a cost of $238,081.64. No NAWCA funds were used to acquire this land. This large agricultural in-holding at the Shiawassee River SGA contained excellent restoration potential when acquired. Since acquisition, through activities not related to this grant, the MDNR has restored a 40-acre emergent wetland and established approximately 15 acres of native warm season grasses on this tract.

- The USFWS provided NAWCA funds to acquire the 32.6-acre **Leech** tract for Shiawassee National Wildlife Refuge. This property is located in the 100-year floodplain of the Cass River, is adjacent to other refuge property, and was in agricultural production at the time of acquisition. Leech has been taken out of agricultural production and is now managed to allow natural Cass River flooding regimes to occur, thereby providing diverse wetland habitat for waterfowl, shorebirds, and other wetland wildlife. In addition, five acres of emergent wetlands were restored on Leech and an adjacent tract under this grant (see Chrcek tract).
- Bay County purchased the 9-acre **Keit Wetlands Park** using funds from the Michigan Natural Resources Trust Fund (MNRTF), Bay Area Community Foundation (BACF), and the NAWCA. The BACF and the NAWCA split the 25 percent cost-share required of the MNRTF grant that was awarded to Bay County to buy this property. This property contains about 5.25 wetland acres and 3.75 acres of adjacent upland. The wetland habitat includes a linear emergent wetland that had been impacted by fill material; one acre of this wetland was successfully restored under this grant. The upland portions of this parcel were under heavy threat of development but are now protected under a permanent conservation easement held by the MDEQ and managed by Bay County as parkland along with the wetland habitat.

Wetland Restoration on Public Lands

Ten projects totaling 1,170 acres were completed under this project component at a total cost of $609,494 ($165,015 NAWCA).

- **Keit Wetlands Park**: Bay County used NAWCA funds to restore one acre of emergent wetland habitat at this property owned and managed by Bay County. Restoration activities included removing fill (asbestos, concrete, tires, etc.) from and enlarging the south end of the wetland. Fill material was hauled off-site to a certified disposal facility. The restored wetland area was graded to a gradual slope, seeded to prevent soil erosion, and is now dominated with beneficial wetland plant species.
- **Maple River Sedimentation Basin and Wetland Enhancement Project**: The Gratiot County Drain Commissioner, DU, and the MDNR completed this project in the summer of 1995. This project was completed in conjunction with a larger project being conducted by the drain commissioner and developed to reduce the amount of eroded soil entering the Maple River and to restore 67 acres of floodplain habitat previously dominated by reed canary grass. Approximately 5,300 feet of low-head dike were constructed adjacent to the Maple River on MDNR property to capture overflow water during spring and fall runoff. The Gratiot County Drain Commissioner and DU contributed funds toward this project.

- **Shiawassee National Wildlife Refuge (SNWR) Projects**: Four wetland restoration/ enhancement projects were completed at SNWR.
  - Hydrology was restored to the 57-acre **Kaufmann** tract in the fall of 1998. This tract had been in agricultural production before purchase by the USFWS and was becoming dominated by undesirable wetland plants. Restoration involved the construction of 1,200 feet of low-level earthen berm to impound water and to prohibit flooding adjacent private lands and the repair of a 200-foot break in an existing agricultural levee. The levee break was filled and armored with rip-rap and now serves as the emergency spillway but also allows normal backwater from the Shiawassee River to flood the entire unit. A 36-inch flap-gate structure that was preventing flood water from entering this tract was reversed to allow natural flooding to occur. This wetland now follows natural Shiawassee River flooding regimes. The project was completed using funds from the NAWCA grant, DU, and the USFWS.
  - Water level management capability was restored and enhanced on 280 acres of **Moist Soil Management Units 1 and 2**. This project involved rehabilitating one mile of cross dike and constructing one mile of low-level dike along an existing drainage ditch. The low-level dike created three wetland cells that can be managed independently of one another. In addition, stop-log water control structures were installed in each unit to allow for optimum water level management. Emergency spillways also were constructed in each unit. Prior to this project, the inability to provide adequate water levels during key periods of the growing season resulted in populations of purple loosestrife and other undesirable plant species. These wetlands are now effectively managed to provide a diversity of wetland vegetation and water regimes for waterfowl, shore, and wading birds and other wetland wildlife. This project was completed at a cost of $13,388.89; DU paid $4,993.43 of this cost and the USFWS paid the remaining $8,395.46.
  - The NAWCA and the USFWS contributed funds to rip-rap portions of the **Pool 2** (115 acres) **and Pool 1A** (140 acres) levees in the summer of 1999. Certain sections of these levees had been severely eroded from past Shiawassee River flood events and were in need of enhancement before washing out completely. Rip-rapping the levees effectively protected the wetland values of the affected management units, which are now managed to provide high-quality waterfowl breeding and migration habitat.
  - The final wetland project at SNWR occurred on the **Chrcek** tract and restored five acres of emergent wetland providing excellent brood-rearing habitat for ducks nesting in the area. Restoration included plugging an agricultural ditch, creating a rock rip-rap spillway, and creatively borrowing soil for the ditch plugs from within the wetland basin in order to increase the size of the wetland and add needed diversity in wetland depth. Funds from the NAWCA and DU contributed to this project.

- Wetland restoration projects were completed on land owned and managed by the MDNR. The MDNR used $1,350.64 of NAWCA funds to restore the 300-acre **Baldpate Unit** at Crow Island SGA. The Baldpate Unit once was a large emergent floodplain wetland adjacent to the Saginaw River but had been converted to

agricultural production by building a system of levees around the wetland to keep out floodwaters. In addition, a pump was in place to allow complete drainage of the unit. The MDNR had entered the property into a long-term farm lease that expired in 1997, allowing for restoration to occur. Restoration was accomplished by repairing and reversing the agricultural pump. This wetland unit is now a productive marsh managed to provide production and migration habitat for waterfowl.

- The 150-acre **Panko Wetland** at Crow Island SGA was restored at a total cost of $90,758.63. DU paid $61,758.63 of this cost, Michigan Duck Hunters Association paid $4,000, and NAWCA funds covered the remaining $25,000. The Panko unit is located adjacent to the Saginaw River and had been intensively farmed for many years. Restoration of this shallow emergent marsh was accomplished by replacing a nonfunctioning agricultural pump and refurbishing a dilapidated pump station. Water levels and aquatic vegetation can now be effectively managed in this large marsh which is adjacent to more than 175 acres of prairie, including 150 acres (Panko Prairie) that were planted as part of this NAWCA grant.
- Two wetlands were restored at Fish Point SGA—the 15-acre **Unit 8** and the 40-acre **Invertebrate Pool**. Both wetlands were in agricultural production and flooded during the fall as part of the managed hunting at the SGA. Unit 8 was restored to shallow emergent marsh by installing a water control structure and adding height to an existing dike. The Invertebrate Pool was restored to moist soil wetland by replacing two water control structures. Also, a low-level dike was constructed to provide wheelchair access to an accessible hunting/photo blind. Both wetlands are now managed to provide production and migration habitat for waterfowl and are in close proximity to nesting grasses, including the 9-acre Sattler Prairie restored as part of this grant. These two projects were completed at a cost of $34,370.16, with DU contributing $10,720.80 of this cost and NAWCA covering the remaining $23,649.36.

Upland Restoration on Public Lands

Three projects totaling 212 acres were completed under this project component at a cost of $17,108 ($14,212 NAWCA).

- The 53-acre prairie restoration on the **Houlihan** tract of the Shiawassee National Wildlife Refuge was completed in the summer of 2004 using NAWCA and USFWS funds. Restoration of this retired agricultural field previously managed to attract geese during the hunting season included applying an herbicide and then no-till drilling big and little bluestem, Indian grass, switchgrass, and a variety of native wildflowers.
- The 150-acre prairie restoration on the **Panko** tract of Crow Island SGA was completed using a combination of NAWCA and Pheasants Forever funds. Establishment of the prairie on this retired agricultural field was accomplished by no-till drilling a variety of native warm-season grasses. In addition, two cool-season grass plots of timothy were planted. Both Sattler and Panko are now providing excellent waterfowl nesting habitat near suitable brood-rearing wetlands on areas managed by the MDNR.
- The 9-acre lakeplain prairie restoration on the **Sattler** tract of Fish Point Wildlife Area was completed with NAWCA funds. Restoration included a combination of

herbicide application and mowing followed by burning to control brush and other invasive species and to stimulate the germination of prairie seeds.

Private Land Wetland and Upland Restoration

All private land projects completed were accomplished through the USFWS Partners for Fish and Wildlife Program. The wetland restoration projects generally occurred in agricultural settings with hydrological restoration requiring simple and cost-efficient tile breaks and ditch plugs. Restoration generally resulted in small (less than five acres), shallow (less than four feet deep) emergent wetlands.

Grasslands were established in close association with wetlands and generally were planted to a mix of big and little bluestem, Indian grass, and switchgrass to provide duck nesting cover. A total of 274 upland restoration projects on 1,565 acres were completed under this project component at a cost of $571,547. In addition, the MDNR and Soil and Water Conservation Districts (SWCD) funded SWCD biologists to work with private landowners to restore wetlands in the project area.

Wetland restoration occurred on 427 acres of private land at a cost of $154,905. DU contributed and the USFWS partnered on the funding. In addition, the USFWS completed 198 projects restoring 904 wetland acres in combination with 234 upland acres. These projects cost $416,641.33, and funding came from DU, the USFWS, and NAWCA. In addition, NAWCA funds were used to hire personnel to implement wetland restoration projects on private land.

Saginaw Bay Natural Resource Damage Assessment—Tobico Marsh Restoration

Lead Agency/Organization: USFWS and the Saginaw Bay Natural Resource Damage Assessment (NRDA) Trustees.

Wetlands totaling 900 acres were restored in Tobico Marsh at Bay City State Recreation Area. Modifications of flap gates and culverts restored hydrology, improving fish passage between the marsh and Saginaw Bay.

Shiawassee National Wildlife Refuge—Trinklein Unit Restoration

Lead Agency/Organization: USFWS.

In 1994, renovation of Trinklein Unit dikes converted cropland back to 240 acres of restored wetlands, adding three managed wetland units to the refuge.

Saginaw Bay Natural Resource Damage Assessment (NRDA)[3]

Lead Agency/Organization: USFWS and Saginaw Bay NRDA Trustees.

More than 1,600 acres of high-quality habitat were purchased and protected around the bay at 15 sites, including Big and Little Charity Islands, shown in Exhibit 10 below. This includes between 200 and 400 acres of coastal wetland and lakeplain prairie restoration.

[3]Some of this information duplicates that discussed under the Saginaw Bay NAWCA grants, but is listed here to illustrate the work that counted under the NRDA.

EXHIBIT 10
NRDA Projects in the Saginaw Bay Watershed, 2001

Parcel	Owner	County	Acres	Features
Sieja	MDNR	Arenac	280	Largely wooded Wetlands near bay
Big Charity Island	USFWS	Arenac	250	Wooded island in bay Interior pond Mix of sand, rock, and vegetated shoreline
Robinson	MDNR	Arenac	204	Restoration of coastal wetland and lakeplain prairie along bay Wooded ridge Potential grassland restoration
Hughes; Wild	MDNR	Bay	182	One mile of coastline Wetlands and beach ridge
Blount; Borroughs	MDNR	Huron	138	Coastal wetland Forested upland
Eastman/KBC Tool	MDNR	Arenac	130	Largely wooded Several small ponds
Roney	Saginaw Chippewa	Arenac	110	Coastal wetland and lakeplain prairie along bay Wooded ridge Saganing Creek
Badour 2	MDNR	Bay	107	Restoration of wetland Wetland connected to Tobico Marsh Footbridge added for access Small wooded area that may expand
Gunden	MDNR	Huron	100	Wetlands and upland Old beach ridge
Rievert	MDNR	Huron	46	Restoration of coastal wetland and lakeplain prairie along bay Has peninsula into bay
Collon	MDNR	Tuscola	40	Upland Old beach ridge
Fritz	MDNR	Bay	40	Wooded Contiguous with Tobico Marsh
Badour 1	MDNR	Bay	34	Restoration of wetland Wetland connected to Tobico Marsh Footbridge added for access
Timmons	MDNR	Tuscola	10	Upland Old beach ridge
Little Charity Island	USFWS	Arenac	5.4	Wooded island Bird nesting colony

SOURCE: U.S. Fish and Wildlife Service, 2001.

Reporting

The Partnership for the Saginaw Bay Watershed will take an active role in reporting any activities related to restoration of coastal marshes in the Area of Concern (AOC) to the to the coordinator of the Michigan Department of Environmental Quality (MDEQ) Remedial Action Plan (RAP).

In addition, the MDEQ RAP coordinator will contact the organizations listed in the project list in this plan annually and inquire about additional restoration activities. These organizations are:

- Ducks Unlimited
- The Conservation Fund
- Local units of government
- Michigan Department of Agriculture
- Michigan Department of Environmental Quality
- Michigan Department of Natural Resources
- The Nature Conservancy
- The Saginaw Basin Land Conservancy
- United States Fish and Wildlife Service

Finally, the map and related table shown in Exhibits 2 and 3 above should be recreated every two years until 60 percent protection of wetlands has been documented.

Summary

Extensive progress has been made toward restoring wetland habitat in the Saginaw River and Bay Area of Concern (AOC). At the time of this report, 24,572 acres of wetland have been permanently protected through public ownership and permanent easements. An additional 418 acres are in the process of being protected. The prioritization process for the final 432 acres will be in place by the end of 2008. There is every reason to believe the dedicated organizations actively pursuing restoration and protection of wetland habitat in the Saginaw Bay watershed, and specifically the AOC, will continue their work, and the restoration target may be met in as few as two years.

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Appendix:
Restoration Priorities beyond Delisting

Delisting an Area of Concern (AOC) for a particular beneficial use impairment (BUI) serves only as a recognition that the AOC is not among the "worst of the worst" sites in the Great Lakes. Essentially, it means that the conditions found in the AOC for the particular use are not distinguishable from the surrounding lake environment. The Great Lakes and the watersheds they depend upon are being threatened in many ways while AOC restoration continues. Thus, even as formal delisting of the "Degradation or Loss of Fish and Wildlife Habitat" (Habitat) and "Degradation or Loss of Fish and Wildlife Populations" (Populations) BUIs progresses, there are several key priorities that should be addressed to continue restoration and preservation of the Saginaw River and Bay watershed. Foremost among them are restoration of fish passage at key dams in the watershed; watershed-sensitive education for local residents and decision makers; watershed-sensitive land use planning and zoning ordinances in the watershed; and continued habitat improvement.

FISH PASSAGE

- Continue 2006 project addressing fish passage on the Cass River, which was funded through the Saginaw Bay Watershed Initiative Network ($50,000) and the United States Fish and Wildlife Service ($70,000). This ongoing project will open 73 miles of river for fish habitat and spawning.
- Create fish passage at low-head barrier dams in the watershed, especially the Chesaning and Dow Dams. Fish passage must allow sturgeon, as well as walleye, to pass at each of these locations.

EDUCATION

- Implement the Michigan environmental education curriculum series (MEECS) at local schools.
- Encourage attendance at Michigan State University Extension's Citizen Planner program by decision makers in Saginaw Bay counties to support habitat planning for wetland impacts of development choices.

LOCAL LAND USE PLANNING AND ZONING

- Encourage use of site plan review by local planning boards where no consistent land use controls are in place for habitat and water quality. The site plan review process should include active involvement of the drain commissioner.
- Create local ordinances for land use or preservation, using Michigan Department of Environmental Quality (MDEQ) compilation of model ordinances available on MDEQ nonpoint source Web page.

HABITAT IMPROVEMENT

- Identify, protect, and restore critical spawning areas in the Saginaw Bay and its tributaries. Specific areas need to be identified for protection and/or restoration.

- Protect wetlands to eliminate and prevent fragmentation and create connectivity among protected wetlands, uplands, and related habitats.
- Implement floodplain protection (from *Saginaw Bay Watershed Wildlife Habitat Conservation Framework*, see *http://www.saginawbaywin.org/uploads/habitat_framewk.pdf)* to enhance wildlife corridors, including the following specific actions:
  - United States Fish and Wildlife Service (USFWS) acquisition of the lower Cass, Flint, Shiawassee, and Tittabawassee River floodplains as described in the Shiawassee National Wildlife Refuge expansion plan, which proposes a 7,500-acre expansion in addition to the current 9,200 acres.
  - Michigan Department of natural Resources (MDNR) expansion of the Crow Island State Game Area (SGA) dedicated boundaries to support additional acquisition and provide a more substantive habitat connection between Saginaw Bay and the Shiawassee River SGA and the Shiawassee National Wildlife Refuge. This would also maintain a strong link to nature for urban residents in Saginaw, Bay City, and surrounding suburbs.
  - Seek Michigan Natural River designation for the Cass River upstream from Vassar. The Cass connects five state game areas (Cass City, Deford, Sanilac, Tuscola, and Vassar), has good water quality compared to other Thumb-area rivers, and is a valuable corridor for wildlife travel. Safeguarding the corridor, including through the expansion of the five game areas, will in turn safeguard the quality of water entering Saginaw Bay. While the game areas contained 22,058 acres in July 2000, less than 3 percent of the acreage has been added since 1990. A more concerted effort at land acquisition is needed to maintain the integrity of the corridor. Natural River designation and additional land acquisition will also create a more recognized outdoor recreation resource, promoting canoeing, fishing, nature observation, etc.
- Restore wetlands, grasslands, forests, and other habitats on land to be acquired by the USFWS and the MDNR at Shiawassee National Wildlife Refuge, Crow Island SGA, and Shiawassee River SGA.
- Ensure that the yellow perch population rebounds. The goal for population restoration requires healthy, self-sustaining populations in the bay, such that growth rates closely approximate statewide averages for this species and reflect improved use of available forage in the bay.
- Ensure that the lake sturgeon population in the Saginaw Bay and its tributaries continues to recover, ultimately through natural reproduction, to a healthy, self-sustaining population.

MONITORING

- Utilize the Great Lakes Coastal Wetland Consortium monitoring protocols to monitor the quality of protected coastal wetland resources in the Saginaw Bay on an ongoing basis to ensure that these resources are adequately protected and are providing essential habitat functions necessary to sustain fish and wildlife populations (see *http://www.glc.org/wetlands/*).