


Section VI. Overarching Responses to Stressors

Responses to habitat stressors are the things people do to eliminate or mitigate those activities that stress or threaten habitat. The previous section of this Assessment discussed specific responses to specific stressors, such as invasive species programs, or soil erosion control programs. Many responses, however, are part of wide-ranging conservation and land management efforts. This section discusses those activities that are more broadly aimed at land conservation and restoration. Such programs are overarching and usually address a range of habitat stressors simultaneously. For example, merely acquiring land and keeping it from development can address the range of stressors associated with development, from habitat fragmentation to sediment and nutrient loadings.

HIGHLIGHT



The Lake St. Clair area has been targeted for increased habitat conservation and restoration by a by a number of organizations, which emphasize its globally imperiled natural communities, its importance as a staging area for migratory birds and as breeding habitat for protected species.

This section organizes these overarching responses to stressors into three general categories: 1) habitat management and restoration programs; 2) inventory and monitoring tools, and 3) planning.

Habitat management and restoration programs vary widely and include programs run by and for the public, those run by non-profits, such as conservancies and land trusts as well as public and non-profit programs aimed at providing private citizens and landholders with tools and information to improve conservation and land management practices. Inventory and monitoring tools provide essential baseline information to assess trends in habitat conditions as well as stressors.

Local planning tools such as community master plans,

natural features ordinances and overlay zones are critical to the preservation of natural areas within individual communities. When coordinated (e.g., at the county or watershed level), they are essential in the ensuring connectivity and consistency among local conservation efforts, such as through greenways.

The Lake St. Clair area has been targeted for increased habitat conservation and restoration by a by a number of organizations, which emphasize its globally imperiled natural communities, its importance as a staging area for migratory birds and as breeding habitat for protected species. At the 1996 State of the Lakes Ecosystem Conference (SOLEC), a Land of the Lakes background paper introduced the concept of Biodiversity Investment Areas to describe sections of shoreline with particularly high ecological values. At the 1998 SOLEC, specific areas were designated, including the entire Lake St. Clair/Detroit River corridor. The corridor merits particular attention to protect it from degradation; unique features cited included the area's lakeplain prairies, oak savannas and the St. Clair Flats¹.

FACT



The Eastern Habitat Joint Venture, a Canadian regional partnership established under the North American Waterfowl Management Plan has identified the Lake St. Clair area as one of Ontario's top priorities in conserving migratory wildfowl.

The Natural Areas Program of the Michigan Department of Natural Resources has recognized two sites within the project area: the Algonac prairie and savanna, which was proposed for legal dedication by Natural Resources Commission Resolution and St. John's wet prairie, which is recognized under the Nature Conservancy's Natural Areas Registry. The Eastern Habitat Joint Venture, a Canadian regional partnership established under the North American Waterfowl Management Plan has identified the Lake St. Clair area as one of Ontario's top priorities in conserving migratory wildfowl². The Important Bird Areas Program of

the Canadian Nature Federation and Bird Studies Canada has identified the majority of the Canadian portion of the project area as an Important Bird Area because of its role as critical habitat for migratory waterfowl and shorebirds and also as breeding habitat for protected species such as King Rail, Black Tern, Forster's Tern and Least Bittern³ and in the southeastern corner of the lake, the St. Clair National Wildlife Area has been designated a RAMSAR site⁴. Recognition of the area's significance alone is not sufficient to protect or increase habitat regionally, but many of these organizations are also involved in far more extensive habitat acquisition, management and restoration efforts.

VI. A. Existing Habitat and Land Management Programs

An incredible array of programs exists with the ultimate goal of conserving existing habitat and restoring additional habitat on public and private lands and public waterways. In some cases, programs provide funding for the acquisition

HIGHLIGHT

The non-profit organization Restoring America's Estuaries has prepared a comprehensive account of federally funded restoration programs in the U.S., which is available online at www.estuaries.org/objects/FFGFY2003FullFinalv2.pdf.

of lands by state/provincial, regional or local entities. Other programs focus specifically on the fine details of managing or restoring particular parcels of land. Still others provide financial incentives and technical assistance to private land owners to help them improve habitat quality or conserve critical resources on their own lands.

While agencies, programs and their beneficiaries cover an incredible range, the most successful projects are characterized by a broad range of partners and networking between many different stakeholders. Additionally, they often address multiple concerns such as improving water quality, reducing soil erosion, providing

habitat for a particular species or group of species, connecting existing habitat and/or increasing the acreage or quality of a particular natural community. The non-profit organization Restoring America's Estuaries has prepared a comprehensive account of federally funded restoration programs in the U.S., which is available online at: www.estuaries.org/objects/FFGFY2003FullFinalv2.pdf.

The following sections provide an overview of the existing areas with high quality habitat in the project area, their management plans, programs to facilitate the acquisition, conservation and restoration of additional lands and selected conservation and restoration efforts.

VI. A. 1. Walpole Island First Nation

The largest areas of high quality habitat in the project area occur on the territory of Walpole Island First Nation, ranging from tallgrass (lakeplain) prairie to oak savanna (lakeplain oak opening) to Carolinian Forest to Great Lakes marsh. Because their lands are so significant, they have already been described in greater detail as part of the characterization of natural community types within the project area in Section IV. (See case study in Section IV. A. 4. b.). As part of

FACT

On Walpole Island much of the land has survived with its ecological functions and thriving populations of rare and endangered species intact.

this Assessment, a Potential Conservation Area (PCA) analysis identified and prioritized undeveloped lands in terms of their habitat quality (See Section VI. C.) and the top-ranking sites were located on Walpole Island. Two sites received the maximum possible score and an additional three sites received just one point less, including the largest single parcel in the study area, comprised of 11,366 acres (4,600 hectares) of Great Lakes marsh on the southern portion of the island complex.

It is a credit to the entire community that so much of the land has survived with its ecological functions intact and its populations of rare and endangered species thriving, particularly as it faces the same pressures of population growth,

HIGHLIGHT

Community input is seen as being of prime importance because actions are unlikely to be successful without endorsement from the population, whereas an engaged community will provide much of the habitat protection required.



increased housing demand and need for economic development as its neighbors on both sides of the lake. Most of the prairie and savanna on the Island is held by private landholders, while the majority of the marsh is owned by Walpole Island band members collectively. Traditional management practices and cultural values are largely responsible for both the survival and high quality of the Island's natural areas, but in recent years, more formal management programs have been instituted as well⁵.

The Natural Heritage Program of the Walpole Island Heritage Centre has undertaken a number of initiatives including inventorying plant and animal species, con-

trolling invasive species such as purple loosestrife and sweet white clover and leasing significant private lands. Recent terrestrial programs have been funded largely by the federal Habitat Stewardship Program for Species at Risk, but partnerships with local universities and other organizations have provided additional resources. Partnerships with the Royal Ontario Museum and the National Water Research Institute of Environment Canada have been instrumental in inventorying and studying the Island's marshes and aquatic habitats.⁶

Habitat Stewardship Program for Species at Risk

As part of the National Strategy for the Protection of Species at Risk, the Canadian federal government established the Habitat Stewardship Program (HSP) for Species at Risk in 2000-2001, which funds projects that conserve and protect species at risk and their habitats.

The HSP provides funding to "stewards" for implementing activities that protect or conserve habitats for species designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as nationally "at risk" (endangered, threatened or of special concern). These activities must take place on private lands, provincial Crown lands, Aboriginal lands, or in aquatic and marine areas across Canada.

The Walpole Island Heritage Centre has developed an Ecosystem Recovery to provide a framework for existing stewardship efforts and plan for long-term management of the Island's natural areas. The Ecosystem Recovery Strategy is in the process (2005) of being presented to band members and the Walpole Island Band Council for community adoption.

Community input is seen as being of prime importance because actions are unlikely to be successful without endorsement from the population, whereas an engaged community will provide much of the habitat protection required. Traditional respect for the natural world and Native philosophies of interacting with nature are fundamental to the identity of First Nations and are

considered sacred obligations; conservation or natural habitat issues cannot be separated from cultural issues within the community⁷.

VI. A. 2. Public Land Management Programs

For public sector land managers, land trusts and conservancies, responses include finding resources to manage and enhance the land that they already control or acquiring additional lands to improve overall ecological function and connectivity. Levels of land management can vary tremendously between different land managers, but simple acquisition and protection of existing habitat is the first step to maintaining a network of lands in an undeveloped state. Although conservation and restoration planning will be discussed later in extensive detail (See Section VIII.), existing protected lands should provide the backbone of any regional conservation planning and a brief listing of most of the major parcels within the project area follows.

HIGHLIGHT

The St. Clair National Wildlife area, along with its neighboring private marshes, was the only Canadian site outside of Walpole Island First Nation to receive the maximum possible score in the Potential Conservation Area Report.

the single largest parcel of high quality habitat, but there are also sizable provincial, municipal and Conservation Authority sites as well.

CASE STUDY

Proposed Wetland Restoration - Lake St. Clair¹⁰

The Eastern Habitat Joint Venture, a regional partnership of the North American Waterfowl Management Plan has identified the Lake St. Clair area as one of Ontario's top priorities for migratory waterfowl habitat conservation. Its Technical Committee has initiated a study investigating the possible socioeconomic and biological implications of undertaking a wetland restoration project of approximately 1,000 acres in the vicinity of the Canadian portion of the Lake St. Clair shoreline. The primary goal of the restoration project is to increase the availability of waterfowl staging habitat within approximately 8 km of the shore.

The study's objectives were to identify:

- The economic and social effects that the restoration of a wetland of this size will have on the local area, including agriculture, tourism and recreation
- The environmental benefits on local, regional and continental scales of restoring a wetland in this type of landscape and socioeconomic setting.

Results suggest that the proposed project would provide substantial environmental and social benefits and would provide high quality spring and fall staging habitat for resting and feeding migratory waterfowl. Restoration would include the acquisition of agricultural land, construction of three to six wetland cells separated by dykes and additional habitat types which could include mudflat, tallgrass prairie, swamp and upland forest. The project would be expected to provide habitat for 135 additional animal species and 399 plant species. Benefits for people would include enhanced recreational opportunities such as birding nature observation and hunting.

marsh results in a patchwork of meadow, emergents and open water and upland habitat with grasses, forbs and large trees occurs along the dikes⁹. Although the primary role of NWAs is conservation rather than recreation, the St. Clair NWA has a loyal following among regional birders and amenities include trails along the dike, an observation tower and educational materials. The Canadian Wildlife Service also manages two additional sites as part of the St. Clair NWA: the Bear Creek Unit, with an additional 107 acres (43.3 hectares), along the *Chenal Ecarte* and the recently acquired Pigeon Marsh (57 acres / 23.2 hectares), which abuts the Bear Creek Unit along the Sydenham River (personal communication, Gary McCullough, 2004).

The Potential Conservation Area (PCA) analysis conducted as part of this project prioritized undeveloped lands throughout the project area in terms of their habitat quality (See Section VI. C.) and a number of these parcels are publicly held. In the Michigan portion of the project area, the state holds the vast majority of lands containing significant habitat, although the area also contains one Metro Park and a number of municipal and township parcels. Walpole Island First Nation, as discussed above, contains the most and highest quality habitat in the entire area. In the Ontario portion of the project area, the federal government holds

Ontario

The St. Clair National Wildlife Area (NWA) lies just north of the mouth of the Thames River and is part of a larger system of marshes that extends along the eastern shore of Lake St. Clair. Along with its neighboring private marshes, it was the only Canadian site outside of Walpole Island First Nation to receive the maximum possible score in the Potential Conservation Area Report (See Section VII. C. 4.). It was established in 1974, shortly after the passage of the Canada Wildlife Act, which authorized the establishment of National Wildlife Areas to conserve essential habitat for migratory birds and other wildlife in the national interest. NWAs are managed by the Canadian Wildlife Service, the unit of Environment Canada that is responsible for protecting and managing migratory birds, nationally significant habitat and endangered species and most (including the St. Clair NWA) have detailed management plans⁸.

The St. Clair NWA occupies 603 acres (244 hectares) of marsh in the southeast corner of Lake St. Clair, just north of the Thames River. The entire marsh is diked and divided into two cells so that water levels can be manipulated independently. The marsh consists largely of cattails, but there are 40 small meadow communities scattered along sandy beach ridges, as well as patches of prairie vegetation. The variation in depth within the

North American Waterfowl Management Plan

The North American Waterfowl Management Plan is a strategy to restore waterfowl populations through habitat protection, restoration and enhancement. Developed in response to plummeting waterfowl populations and increased awareness of the wetland destruction, the plan represents an acknowledgment that waterfowl are the most prominent and ecologically important group of migratory birds in North America.

The plan is implemented by regional partnerships, called Joint Ventures, which involve federal, state/provincial, tribal and local governments, businesses, conservation organizations and individuals in developing implementation plans that focus on areas of concern that have been identified in the plan.

Management efforts to date have focused on maintaining a mix of emergent marsh and open water with submergent vegetation and keeping populations of both aggressive native plant species such as cattail and non-native species such as *Phragmites*, purple loosestrife and Eurasian water milfoil in check. Non-native animals such as carp and mute swans are also a problem. The primary tool for maintaining open water consists of manipulating water levels to expose the beach ridges, cutting or burning the cattails and then reflooding the area. Complete drawdown is avoided because it appears to stimulate germination of purple loosestrife. Along the dikes, where *Phragmites* has invaded, cutting and water level manipulation are also used for control.

Invasive species management is impeded somewhat by the fact that Rodeo, the aquatic form of glyphosate (Roundup) most commonly used in the United States has not been approved for use in Canada. Mute swans are managed by a combination of techniques including nest destruction, oiling eggs and removing adult birds under permit (personal communication, Gary McCullough, 2004).

Ojibway Prairie Complex

The Ojibway Prairie Complex is located on the outskirts of Windsor and is comprised of 5 separate units, totaling 834 acres (521 hectares), which are ecologically related and in close proximity to one another. The Windsor prairies,

oak savannas and woodlands are remnants of the extensive wet prairies that historically lined the shores of the Detroit River and eastern Lake St. Clair. Present day communities range from wet and wet mesic prairie and woodlands to drier prairies and savanna. The site contains 110 provincially rare species, making it the floristically richest site in Ontario.

FACT

The Ojibway Nature Centre has undertaken mark and recapture studies of eastern massasauga and eastern fox snakes using radiotelemetry in the area.

The Ojibway Prairie Provincial Nature Reserve, occupying 230 acres (105 hectares), contains a mixture of tallgrass prairie and black oak savanna. It is managed

by Ontario Parks and management activities include prescribed fire by the OMNR Fire Management Unit and control of invasive species such as black locust (Ross Hart, 2004, personal communication).

The City of Windsor owns and manages an additional three units: Ojibway Park, Tallgrass Prairie Heritage Park and Black Oaks Heritage Park, which total 315 acres (127 hectares). It is also in the process of acquiring private holdings within the fifth unit - the Spring Garden Life Science Area of Natural and Scientific Interest, with a combination

of municipal and federal funds, through the Habitat Stewardship Program for Species at Risk. Life Science Areas of Natural and Scientific Interest (ANSI-LS) are privately owned sites that have been identified by the Ontario Ministry of Natural Resources as having provincially or regionally significant representative ecological features.

Endangered Species Recovery Fund

The Endangered Species Recovery Fund (ESRF) is a collaborative effort led by Environment Canada and WWF to save Canada's wildlife at risk.

The Endangered Species Recovery Fund (ESRF) sponsors high-priority conservation projects to assist the recovery and protection of endangered Canadian wildlife and their natural habitats. Currently, 456 Canadian species are listed as being "at risk" by the Committee on the Status of Endangered

Although nature related recreation is the primary focus of the municipally owned parcels, stewardship of

the land is a priority. Prescribed burning by local contractors is used to maintain prairie and woodland. A variety of volunteer stewardship activities are coordinated through the Nature Centre, including invasive species removal, native seed collection, plant propagation and restoration projects in the park and surrounding community. Many of these activities occur in cooperation with the Natural Habitat Restoration Program of the Essex County Field Naturalists. The Nature Centre also has undertaken studies of eastern massasauga and eastern fox snakes in the area. Funding for mark

and recapture studies using radiotelemetry are funded through the Endangered Species Recovery Fund (Personal Communication, Paul Pratt, 2004).

HIGHLIGHT

St John's Marsh, St. Clair Flats and Algonac State Park ranked highest as Potential Conservation Areas for the Michigan portion of the project area.

Michigan

The largest holdings of undeveloped lands in the Michigan portion of the project area are held by the Michigan Department of Natural Resources (MDNR) and of these lands, St John's Marsh, St. Clair Flats and Algonac State Park ranked highest as Potential Conser-

vation Areas for the Michigan portion of the project area (See Section VII. C. 3.). State Lands within the project area fall into two categories: State Parks and State Game Lands.

State Parks

Two State Parks lie within the project area; Algonac State Park and Wetzel State Park. State Parks are administered by the Recreation and Parks Bureau and both natural and cultural resources within the parks are managed by the State Park Stewardship Program (SPSP). The primary goals of the SPSP are to inventory all natural and cultural resources within the park system, to protect these resources, to restore and manage native ecosystems and to preserve the native species within them. Inventories have been completed for all of the State's Parks and detailed management plans have been developed for many of them, including Algonac State Park.

Algonac State Park lies just north of the city of Algonac along the St. Clair River, occupying about 1500 acres (607 hectares), with a half-mile of river frontage¹¹. Although the park was established primarily to provide recreational facilities, it contains some of the best examples of lakeplain prairie and lakeplain oak opening (savanna) in the entire state, with

at least 22 endangered, threatened or special concern species, including cerulean warbler, eastern fox snake and the only known population of Gattinger's gerardia in the entire state. The park contains a number of separate prairie and oak opening units, which were originally part of a complex that covered over 4,500 acres (1821 hectares)¹².

HIGHLIGHT

Algonac State Park contains some of the best examples of lakeplain prairie and lakeplain oak opening (savanna) in the entire state, with at least 22 endangered, threatened or special concern species.

In 2001, a detailed ten-year stewardship management plan was completed for the park, including a history of the sites ecosystems, site descriptions, plant and animal inventories, threats and recommended management activities¹³. Threats to the survival or reestablishment

of the park's rare natural communities include disrupted hydrology, fire suppression, invasive species, inholdings by private landowners and surrounding development and potentially increased recreation pressure by park visitors.

Proposed management activities for the park include restoration of lakeplain prairie, lakeplain oak opening and Great Lakes marsh, monitoring, education, volunteer stewardship, research and inventory and funding. The plan includes short-term objectives for restoring lakeplain prairie, lakeplain oak opening and Great Lakes marsh and monitoring methods to measure the extent to which goals have been met. Priorities for the actual lakeplain restoration include

using prescribed fire to reduce the tree density to less than one tree per acre and the relative dominance of trees and shrubs such as native hawthorns, hazelnut, native dogwoods and prickly-ash to less than 15 percent cover. Current restoration activities will be discussed in greater detail below.

FACT

Historically, St. John's Marsh was dominated by lakeplain prairie, until it was drained for agriculture. When agricultural activities ceased, the hydrology in the area had been altered and the land reverted to marshlands.

Game areas are managed by the Wildlife Division of the Department of Natural Resources, in accordance with management plans developed by the Division's Natural Heritage Program. The Chesterfield Mini-game Area occupies about 110 acres of which two thirds are open lands. The St. Clair Flats Game Area is considerably larger and more extensive information follows.

CASE STUDY

Coastal Habitat Restoration

Restoration work presently underway in Algonac State Park and the St. Clair Flats provides an excellent example of the benefits of partnerships between state and federal agencies, nonprofit organizations such as Ducks Unlimited, the Nature Conservancy, Wildlife Habitat Council and Pheasants Forever, private landowners and businesses. A North American Wetlands Conservation Act (NWCA) grant to Ducks Unlimited was matched by funding from the multiple partners to protect and restore wetlands and adjacent habitat on public lands within the Lake St. Clair and western Lake Erie watersheds, including the Detroit River.

The broader project focused on protecting and restoring Great Lakes coastal marshes and their associated habitats along shoreline areas, expanding existing state and federal wildlife areas and restoring and enhancing small wetlands and associated uplands important for waterfowl production on private lands throughout the watershed. The project includes components within 10 counties in Michigan and Ohio. Funded activities included land acquisition, restoration of marsh and prairie habitats, invasive species control and management agreements with private landowners.

Within the project area, efforts are focused on Algonac State Park and St. Johns Marsh, within the St. Clair Flats Wildlife Area. The restoration sites are closely associated with remnant lakeplain prairie and lakeplain oak openings/savanna's. These areas comprise a complex landscape of wet prairies, forested wetlands, savanna-like uplands and marsh and provide important breeding and migration habitat for grassland birds, waterfowl and other migratory birds. Upland restoration and enhancement involves prescribed burning, mechanical and chemical plant control (woody and noxious) and planting of native prairie (cont.)

Wetzel State Park is located in Harrison Township in Macomb County and is largely undeveloped, providing areas for hiking, hunting, snowmobiling and cross-country skiing¹⁴. Within its 900 acres (364 hectares), 120 acres (49 hectares) are slated for wetland restoration and an additional 300 acres (121 hectares) of old farm land will be restored as prairie (Ernie Kafkas, 2004, personal communication).

State Game Lands

The St. Clair Flats Game Area and the Chesterfield Mini-game Area both occur within the project area.

The St. Clair Flats State Game Area includes St. John's Marsh (2,300 acres / 931 hectares) and most of the Michigan portion of the St. Clair delta, including a large portion of Harsen's Island (7,971 acres / 3,226 hectares) and most of Dickinson Island (3000 acres / 1214 hectares)¹⁵.

Historically, St. John's Marsh was dominated by lakeplain prairie, until it was drained for agriculture. When agricultural activities ceased, the hydrology in the area had been altered and the land reverted to marshlands. Although the majority of the marsh is undiked, it is partially separated from the lake by roads and developed areas. Water levels in the undiked portion fluctuate with those of Lake St. Clair, but the marsh does not experience the wave action typical along undeveloped shorelines. In the northeast corner of St. John's Marsh, a series of dikes, ditches, water control structures and channels have been constructed to establish food plots and high quality nesting, brood and migration habitats. Approximately 12% of the marsh is diked. A little over a third of this area is managed for food production and is planted with a mix of annuals, big bluestem (a native grass) and crops such as corn and buckwheat. A comparable area is managed as a green tree reservoir, where wetland trees such as pin oak, swamp white oak and ash are flooded in fall to provide natural food and habitat for waterfowl such as wood ducks and

(cont.) grasses and forbs to provide nesting areas for waterfowl and other grassland-dependent migratory birds.

At the St. Johns Marsh Wildlife Area, MDNR is restoring 92 acres of natural plant communities. The new restoration site consists of 67 acres of shrubbed-in wet prairies and other wetland communities. The prairie will be restored primarily through mechanical and chemical removal of shrubs and young trees, planting of native prairie species and prescribed burning.

The MDNR will restore 184 acres at Algonac State Park. The new restoration sites are composed of 80 acres of heavily shrubbed-in wet prairies and 10 acres of young forest that was formerly open savanna. The grass and forb seed bank largely remains in most former prairie areas and large old oak trees still exist within the matrix of young trees and brush in the oak openings. Restoration of the gross vegetation structure is the major restoration step needed in these areas. Future enhancement may be needed in some areas to re-establish missing prairie species and the sites will be maintained with prescribed burning. The prairie areas (80 acres) will be restored primarily through mechanical removal of shrubs and young trees and prescribed burning. The oak openings (10 acres) will be restored by cutting and herbiciding young trees and brush and by follow-up prescribed burning to create a savanna structure.

The North American Wetlands Conservation Act

The North American Wetlands Conservation Act (NAWCA) of 1989 provides matching grants to organizations and individuals who engage in partnerships to implement wetland conservation projects in the United States, Canada and Mexico. The Act was passed in part, to provide funding for activities initiated under the North American Waterfowl Management Plan; projects must focus on long-term wetland acquisition, restoration and or enhancement and partners must provide at least a 50 percent match.

park system. Field surveys are underway to inventory rare plant species and exemplary natural communities. The surveys will be used to develop a management strategy for the natural areas.

FACT

Metro Beach Metro Park is one of the top 10 birding sites in Michigan with a variety of birds during migration, including warblers, waterfowl and hummingbirds.

Threatened) is known to breed here also. Although an inventory and management plan have not yet been completed, the park has begun to use prescribed fire and a volunteer invasive species removal program has been initiated (Personal communication Julie Champion, Dave Moilanen, 2004).

mallards. The remainder of the diked area consists of managed marsh (Personal communication, Ernie Kafkas, 2004). Lakeplain prairie is being restored in part of the undiked portion of the marsh and will be discussed below. Prescribed fire by MDNR Fire Officers from the Forest Management and Fire Management Division is used for both waterfowl habitat management and lakeplain prairie restoration.

Historically, Dickinson and Harsen's Island consisted primarily of Great Lakes marsh. Lakeplain prairies were found along the eastern edge of both islands and small patches of oak-hickory forest were found on the east side of Harsen's Island¹⁶. Aside from Dickinson Island, much of the of the area's presettlement character has been dramatically altered. Within Dickenson Island, about 15% of the marsh has been diked by the Army Corps of Engineers for used as a Confined Disposal Facility, to hold dredged materials from the shipping canal. The remainder of the island remains in a natural condition, although shallow areas which experience drawdown have been invaded by *Phragmites*, or giant reed (Personal communication, Ernie Kafkas, 2004). Although much of Harsen's Island has been developed for vacation homes and hunting facilities, small amounts of lakeplain prairie and oak forest and extensive marshes and remain, although about 1800 acres of the marsh has been diked.

The Huron Clinton Metro Park Authority manages 13 regional parks which cover almost 24,000 acres. Although their primary focus is recreation, the Authority is working with Michigan Natural Features Inventory to survey and evaluate the natural areas within the

Metro Beach Metro Park, the only Metro Park within the project area, occupies 770 acres of which approximately 300 acres are in a natural state. The park contains both Great Lakes marsh and wetland hardwood forest. The park is one of the top 10 birding sites in Michigan and is host to a variety of birds during spring and fall migration, including warblers, waterfowl and hummingbirds. Rare birds that breed in the park include least bitterns (State Threatened) and Forster's terns (State Threatened). The eastern fox snake (State

Belle Isle Park in the City of Detroit is literally an island of habitat, in an extremely urbanized landscape. The island includes 200 acres (81 hectares) of wetland forest, about 50 acres (20 hectares) of submergent marsh in the island's inland lagoons and canals and rare species present include pumpkin ash (State Threatened), Sullivant's milk-

CASE STUDY

Spring Stopover sites

Because of the region's importance for migratory birds, identifying spring stopover sites for waterfowl, shorebirds, wading birds, songbirds, colonial nesting birds and raptors has been identified as a priority goal by a number of organizations. Identifying and prioritizing these sites, however, first requires a rigorous list of quantifiable and valid attributes of high quality sites for each of these species groups.

Accordingly, the Nature Conservancy and Ducks Unlimited will be conducting a literature review, interviewing experts and developing such a list, which will be made available to managers and policy makers to assist them in site prioritization and management. The project is funded by the Coastal Program of the U. S. Fish and Wildlife Service (Personal communication, Robert Kavetsky, 2004).

weed (State Threatened), Shumard oak (Species of Special Concern) and Blanding's turtle (Species of Special Concern). The island is managed by the Detroit Recreation Department, which has no staffing for natural areas management. Accordingly, natural areas management and restoration activities are performed sporadically on a contract basis and generally funded by grants. Threats to Belle Isle's natural communities include invasive species such as the emerald ash borer and Phragmites, as well as the excessive use of road salt. Aquatic invasives such as Eurasian water milfoil, however, are being successfully controlled and the island's wild celery beds are thriving.

Habitat restoration around the Blue Heron Lagoon, at the far eastern end of the island, is being funded by a Michigan Coastal Management Program grant from

NOAA, which is part of the U.S. Department of Commerce. The site contains relict lakeplain prairie species and efforts will focus on protecting existing habitat, restoring additional prairie and oak opening and improving connections to the river. A variety of oaks and shrubs grown from seed collected on the island will be included in the plantings. The lagoon itself is utilized extensively by overwintering waterfowl, particularly canvasbacks and redheads. This project continues work initiated by the U.S. Fish and Wildlife Service's Coastal Program, which included shoreline plantings, plant inventory and the establishment of a native plant nursery in the Island's greenhouses.

VI. A. 3. Aquatic Habitats

There are several significant differences between restoring terrestrial habitat and aquatic habitats: all bottomlands are owned by the State or Province so land cannot be acquired; flows (of nutrients, toxins, etc.) coming onto the site from elsewhere can have a much greater impact in aquatic habitats than in terrestrial habitats and be correspondingly more difficult to control. In most cases, maintaining the quality of aquatic habitats is accomplished by regulating activities that might affect water quality and substrate condition such as dredging, filling, construction adjacent to waterways and the discharge of chemicals and/or waste products into lakes and rivers. Targeted enhancements, however, can increase breeding or foraging habitat in many cases, including the local projects profiled below.

Goose Bay Fish Habitat Enhancement – Ontario

The City of Windsor and the Essex Region Conservation Authority cooperated in a project that combined both shoreline stabilization and aquatic enhancements to improve fish spawning and refuge habitat in Goose Bay Park. The

municipal park is located in Goose Bay, one of the last remaining sheltered embayments along the Canadian side of the Detroit River. The project will aid in delisting the impaired beneficial use "loss of fish and wildlife habitat".

Restoration and rehabilitation work involved the protection of the shoreline using a combination of rip-rap and native plants. This work also included submerged enhancements to improve fish spawning and refuge

HIGHLIGHT

Habitat improvements in Windsor's Goose Bay Park will aid in delisting the impaired beneficial use "loss of fish and wildlife habitat".



habitat. Submerged enhancements include groynes, rock apron and cobble stone. Using these methods, the embayment is protected from swift current regimes and wave actions. The work, costing \$161,000 and completed in 2000, was funded by Environment Canada's Great Lakes Cleanup Fund and the City of Windsor¹⁷.

Belle Isle/Detroit River Sturgeon Habitat Restoration, Monitoring and Education Project

Sturgeon habitat restoration on Belle Isle in the Detroit River is being implemented by the U.S. Geological Service's Great Lakes Science Center, Michigan Sea Grant and a consortium of federal, state, university, local and non-governmental agencies and organizations. The project consists of three related components: construction of three demonstration

HIGHLIGHT

The Detroit River sturgeon project will include three demonstration spawning reefs, a monitoring program and a public information/education component.

lake sturgeon spawning reefs, a monitoring program and a public information/education program. Historically, lake sturgeon were abundant in the connecting waters between Lake Huron and Lake St. Clair, but their populations in Michigan are estimated to be at about one percent of their former abundance.

The project team has constructed three demonstration spawning reefs of the southeastern shore of Belle Isle in the upper Detroit River. The reefs are constructed of

three different substrates: screened, "shot rock" limestone, 6-24 inches in diameter, free of all fines; 4-6 inch igneous cobble; and screened, 1-3 inch, coal cinders, which have been successfully used by spawning sturgeon elsewhere.

Data from lake sturgeon captured and released at the project site will supplement data on the overall Detroit River sturgeon population and spawning success at the project site will provide quantitative estimates for comparison with

such data collected at two active coal-cinder sturgeon spawning sites in the St. Clair River. Also, it will provide quantitative data on the extent to which the three different substrates are used by spawning sturgeon.

Great Lakes Fishery Trust

The mission of the Great Lakes Fishery Trust (GLFT) is to provide funding to enhance, protect and rehabilitate the Great Lakes fishery. The GLFT provides funding to educational institutions, non-profit organizations and government agencies for projects related to Great Lake fisheries for public education, research on the Great Lakes fishery, with special emphasis on rehabilitation of lake sturgeon and lake trout, fishery habitat protection and restoration and increased fishing access.

Major funding from the project came from the Michigan Coastal Management Program and the Great Lakes Fishery Trust, with in-kind services provided by the University of Michigan, Michigan State University, the U.S. Geological Survey, the U.S. Army Corps of Engineers-Detroit District, the Michigan Department of

Natural Resources, DTE Energy, a regional gas and electric utility, the Greater Detroit American Heritage River Initiative of the Metropolitan Affairs Coalition and others.

VI. A. 4. Land Acquisition

Whenever possible, it is generally most cost effective to conserve resources and habitat in existing natural areas, rather than restoring or creating habitat on lands which have been already cleared. There are a number of programs intended to conserve lands, natural resources and healthy ecosystem function within the project area and often the simplest approach is simply to remove land from the potential pool of lands to be developed. This may occur in a number of ways: through outright purchase, acquisition of a conservation easement, or by agreements which limit the uses of a given piece of land for a specified period of time.

A major source of funding for public lands acquisition in Michigan is the Michigan Natural Resources Trust Fund (MNRTF). The Fund, using revenues from the development of State-owned mineral resources, provides funding to the Department of Natural Resources (MDNR) and local governments to acquire lands for natural resources and open space protection and outdoor recreation. Since no more than 25 percent of the available revenues can be used for devel-

HIGHLIGHT

The support of non-profit groups is critical for raising private donations and in the many additional aspects of habitat acquisition.

opment, the majority is designated for land acquisition projects. Only MDNR and local governments can apply to the MNRTF for assistance in acquiring property, individuals; groups and organizations may nominate specific land parcels for consideration¹⁸.

In Ontario, some funding for wetland acquisition is available from the Eastern Habitat Joint Venture (EHJV), a regional partnership formed to implement provisions of the North American Waterfowl Manage-

ment Plan. (See description on p. 153) In Ontario, EHJV partners include the Ontario Ministry of Natural Resources, the Canadian Wildlife Service, Ducks Unlimited Canada, Wildlife Habitat Canada, Ontario Ministry of Agriculture, Food and Rural Affairs, Nature Conservancy of Canada and Agriculture and Agri-Food Canada¹⁹. The Habitat Stewardship Program (HSP) for Species at Risk, which is administered jointly by Environment Canada, Parks Canada and Fisheries and Oceans Canada, provides funding to secure important habitat as part of its mandate. Recent additions to the Ojibway Prairie Complex were funded by the HSP, with matching funds from the City of Windsor (Personal communication, Paul Pratt, 2004).

Finally, the support of non-profit groups is critical, both in raising private donations and in multiple aspects of habitat acquisition. Often, non-profit organizations such as the Nature Conservancy/Nature Conservancy of Canada, Ducks Unlimited/Ducks Unlimited of Canada or the Trust for Public Land can facilitate the purchase of lands that are sometimes turned over to public agencies, using both public and private funding. Just south of the project area, for example, the Trust for Public Land paid \$4.8 million to obtain Humbug Marsh, on the lower Detroit River. The Trust will eventually be repaid with a combination of federal monies, grants and donations and Humbug ownership will be turned over to the Detroit River International Wildlife Refuge²⁰.

VI. A. 5. Conservancies

There are a number of land trusts and conservancies operating within the project area, ranging from national organizations such as The Nature Conservancy/Nature Conservancy of Canada, to regional groups such as the Michigan Nature Association or Canada South Land Trust to groups which restrict their efforts to a single county such as Macomb Land

HIGHLIGHT

As private entities, land conservancies and land trusts can often act more quickly and cost-effectively than public agencies.

Conservancy or Lambton Wildlife Inc. Land conservancies and land trusts can purchase land for resale to public agencies, buy options to protect land temporarily, receive land donations, put together land deals and provide technical assistance. As private entities, they can often act more quickly and cost-effectively than public agencies.

In addition, many conservancies and land trust make extensive use of conservation easements to protect pri-

vate held lands. Conservation easements are a legal agreement between a landowner and a conservancy or government agency that permanently limit the uses of the land in order to protect specific characteristics of the land. Conservation easements offer great flexibility; they may prohibit any development or may permit some specified uses²¹.

In Michigan, many landowners receive a federal income tax deduction for the gift of a Conservation Easement. The Internal Revenue Service allows a deduction if the easement is perpetual and donated “exclusively for conservation purposes.” The amount of the tax deduction is determined by the value of the conservation easement. In addition, the donor may have estate and property tax relief²².

In Ontario, under the provisions of the Income Tax Act (Canada), the Ecological Gifts Program provides favorable income tax treatment to donors of ecologically sensitive lands (ecogifts), including conservation easements. Donated land or easements must be certified by Environment Canada staff, who will provide certification for inclusion with the donor's income tax return²³.

Michigan

The **Macomb Land Conservancy** (www.savingplaces.org/contact.html) was founded in 2000, by a group of concerned citizens working to preserve a 63-acre parcel of mature upland and swamp forest along Coon Creek, in Ray Township. Their mission includes identifying and preserving significant natural areas and habitat, supporting the preservation of farmland and the agricultural economy of Macomb County, assisting local communities to plan for growth and development and conducting public education programs that encourage residents and communities to become stewards of public and private land. The Macomb Land Conservancy uses conservation easements and donations of land to meet these objectives.

Incorporated in 1988, the **Southeast Michigan Land Conservancy** (www.bendior.org/smlc.html) is dedicated to the preservation and stewardship of natural and agricultural land in the seven county of southeast Michigan. They operate in Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw and Wayne Counties and have preserved over 1,500 acres through 24 projects, including eight nature preserves, eight conservation easements through cooperative efforts with private owners and ten land donations. They focus on open spaces close to home and their activities also include participation in coalition efforts to coordinate land use policy, protect open space, preserve scenic beauty and defend watersheds from harmful development and pollution.

The **Michigan Nature Association** (MNA) (www.michigannature.org) is the state's first land preservation organization and has protected Michigan's rare native species and unique natural habitats for over 50 years. MNA currently protects over 8,000 acres statewide in 160 different nature sanctuaries which they own and manage. Their 70 acre Shadbush Tract Nature Study Area lies along the Clinton River in Macomb County and contains more than 50 species of trees and shrubs. They utilize volunteer stewards to maintain trail, control invasive weeds and lead field trips.

Founded in 1951, **The Nature Conservancy** (TNC) (<http://nature.org>) works to protect the state's finest wetlands, forest, shoreline and prairies through purchase, partnership or donations. It has protected 83,856 acres of critical lands statewide. The Conservancy protects habitat through gifts, exchanges, conservation easements, purchases, as well as management agreements and partnerships with large private and public landowners to protect the important natural features of their land. Although TNC does not own preserves within the project area, their science-based ecoregional planning process has identified Algonac State Park, St. Clair Flats and Metro Beach Metro Park as Conservation Priorities – sites of global ecological significance. They have played a major role in the establishment of the Southeast Michigan Stewardship Network (See Section VI. A. 8.).

Ontario

The **Canada South Land Trust** (<http://canadasouthlandtrust.org>) is the newest of the land trusts operating in the project area: it was registered as a conservation charity with Environment Canada in May, 2003 and emphasizes the preservation of natural heritage within the County of Essex, the City of Windsor, Pelee Island and the Municipality of Chatham-Kent. A grant from the Ontario Trillium Foundation is funding a "Resource and Strategy Guide" for the land trust which will guide the organization's activities over the next five years. The guide will show the natural areas, core areas and corridors and where restoration could significantly enhance these areas in Essex County and the Municipality of Chatham- Kent. This document would suggest areas where the Canada South Land Trust might focus, providing strategies the land trust might take to protect and preserve natural habitat, especially in areas where other conservation groups are not working or would not work to protect natural habitat.

Lambton Wildlife Inc. (LWI) (www.lambtonwildlife.com) is a nonprofit, volunteer, naturalist organization, founded in 1966 and is licensed as a charitable corporation under the Income Tax Act. They are dedicated to the conservation, preservation and protection of the natural environment in Lambton County. LWI owns and/or manages several environmentally important or unique properties in Lambton County including Mandaumin Woods, the Port Franks Forested Dunes, the Karner Blue Sanctuary and the Howard Watson Nature Trail. In addition LWI was instrumental in the establishment of the Ausable Valley Trail, the creation of the Wawanosh Wetlands, the purchase of the Mystery Falls property near Arkona and the establishment of Centennial Park.

The **Nature Conservancy of Canada** (NCC) (www.natureconservancy.ca) has been working for over 40 years, to protect Canada's most threatened natural habitats and the endangered species that call them home. In 1998 they identified the Carolinian zone, or southern Ontario, as a priority area for action in securing habitat. Among their recent acquisitions is a rare 762-acre forest, Bickford Oak Woods - the largest private woodland in Lambton County and the largest Clay Plain forest in the Carolinian Zone, outside of First Nations land. NCC is Canada's only national charity dedicated to preserving ecologically significant areas through outright purchase, donations and conservation easements.

VI. A. 6. Watershed-based Organizations

Effective stewardship efforts recognize that rivers and lakes defy political boundaries. Anchor Bay and the Clinton, St. Clair, Sydenham and Thames Rivers drain directly into Lake St. Clair; its watershed encompasses approximately 3,927,175 acres (1,589,270 hectares) in Michigan and Ontario, partially or wholly draining 14 counties and numerous municipalities. There are a variety of watershed-based organizations involved in protecting these streams, rivers and

ultimately Lake St. Clair. In some cases, they are nonprofit citizen-based advocacy groups, drawing resources from a mix of private and grant funds and relying heavily on volunteer efforts. In other cases, they consist of working partnerships of stakeholders and political entities or governmental agencies charged with protecting resources under international treaty.

In Ontario, under the federal Accord for the Protection of Species at Risk, Recovery Plans must be prepared for nationally endangered and threatened species. The

Plans are prepared by a Recovery Team and include a recovery strategy and a coordinated action plan. An ecosystem approach to recovery planning for aquatic species was pioneered within the project area in the Sydenham River Recovery Plan and was followed by the Thames River Recovery Plan²⁴.

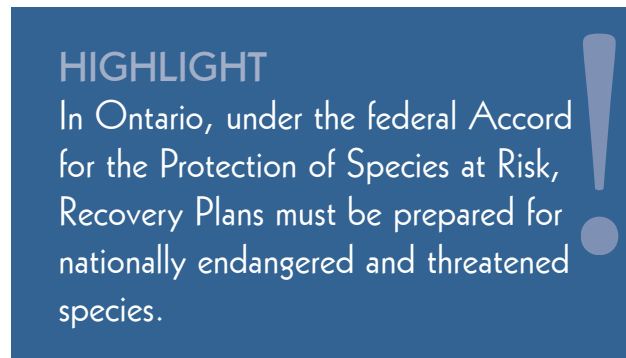
Some sorts of watershed groups are limited to either Michigan or Ontario. In Michigan, in response to requirements of the Michigan Department of Environmental Quality Phase II Watershed-based Storm Water Permit process (See Section V. A. 2.), a number of communities have cooperated to form subwatershed advisory groups. In Ontario, the Regional Conservation Authorities tend to be organized by watershed and are active in multiple habitat, drainage and water quality issues. Increasingly, these diverse groups are working together, to leverage resources and support common goals.

St. Clair River

Although technically not a watershed-based initiative, work under the St. Clair River Remedial Action Plan Process to clean up the St. Clair River Area of Concern has involved activities at the watershed-scale. The St. Clair River Remedial Action Plan Habitat Sub-Committee and the St. Clair River Binational Public Advisory Council commissioned two studies relating specifically to habitat concerns within the watershed: *A Natural Heritage System for the St. Clair River Watershed* (www.friendsofstclair.ca/pdf/nhs.pdf) and *The St. Clair River Area of Concern: Binational Habitat Management*

HIGHLIGHT

In Ontario, under the federal Accord for the Protection of Species at Risk, Recovery Plans must be prepared for nationally endangered and threatened species.



CASE STUDY

MacDonald Park Restoration

A wetland and prairie restoration project was carried out in MacDonald Park on the *Chenal Ecarte* along the St. Clair River through the St. Clair River Remedial Action Plan (RAP) process in order to help restore fish and wildlife habitat in the St. Clair River watershed. This particular site was chosen due to its high potential for a variety of aquatic and upland restoration techniques, the visibility and accessibility along a commonly traveled roadway, and the strong interest of the landowner (St. Clair Parkway Commission). The project involved the creation of 1 ha (2.5 acres) of wetland, 1 ha (2.5 acres) of Tallgrass Prairie complete with an interpretive trail, improvement of 200 m (219 yards) of shoreline riparian area, and interpretive signs and brochures.

The wetland component included a variety of wildlife and fisheries components; spawning mounds, submerged habitat structures, aquatic vegetation plantings, and basking logs. Shoreline areas were reshaped, gently sloped, and stabilized using live willow stakes and brush bundles to establish riparian cover and as a means to reduce erosion. Planting of aquatic vegetation in the nearshore waters adjacent to these areas occurred in a subsequent phase. Experimental biolog floating barriers and bogmat islands were installed to establish in-water structure and provide erosion protection to local shoreline areas.

In the 1 ha (2.5 acres) upland site, 22,000 Tallgrass Prairie plugs of 23 different forb (flower) and grass species were planted. A slightly elevated horseshoe shaped trail system was constructed using excavated material from the wetland area to allow trail users an improved view of the prairie plant species, at the height of their growing season²⁵.

ernments' efforts to protect and improve the river basin and in 1994, the council reorganized to become a 501(c)3 nonprofit organization. This allowed additional revenue to come from grants, businesses and individual membership contributions.

Today, CRWC organizes stewardship efforts, such as River Day, Adopt-A-Stream and Clinton Clean-Up and provides education and watershed management programs for local governments, organizations, businesses and individuals.

CASE STUDY

Adopt-a-Stream

The Clinton River Watershed Council Adopt-a-Stream is a volunteer-based program that empowers community members to protect local streams and rivers by monitoring their health. Volunteers are teamed up in Stream Teams, are assigned sites, given equipment, data sheets and protocols, and are sent out to gather information on streamside habitat and macroinvertebrate populations.

Twice a year (in May and October), Stream Teams visit their adopted sites and collect data, including physical and chemical information. They collect and identify macroinvertebrates that live in the streambed and surrounding vegetation. A stream's health can be determined by the number and types of bugs that (cont.)

Plan (www.friendsofstclair.ca/pdf/hab_mgmt_plan.pdf) that address a broad range of habitat related issues and options for increasing ecological integrity.

The **Friends of the St. Clair River** (www.friendsofstclair.ca) is an all-volunteer registered Canadian charitable organization, whose purpose is to promote conservation, beautification and other environmental activities associated with the St. Clair River and assist in the development and implementation of the St. Clair River Remedial Action Plan (RAP). Their membership consists of approximately 30 people who are the Canadian members of the St. Clair River Binational Public Advisory Committee (BPAC). Their website posts information relating to the RAP, including meeting minutes and the documents noted above.

Clinton River

The **Clinton River Watershed Council** (CRWC) (www.crw.org) is a non-regulatory, non-governmental environmental education organization, whose mission is to protect, enhance and celebrate the Clinton River, its watershed and Lake St. Clair. The Clinton River drains 760 square miles in Macomb, Oakland, St. Clair and Lapeer Counties and its watershed includes over 1,000 miles of streams in addition to the 80-mile-long main branch. The Council was established initially in 1972 as a communication forum to coordinate local gov-

ernments' efforts to protect and improve the river basin and in 1994, the council reorganized to become a 501(c)3 nonprofit organization. This allowed additional revenue to come from grants, businesses and individual membership contributions. Today, CRWC organizes stewardship efforts, such as River Day, Adopt-A-Stream and Clinton Clean-Up and provides education and watershed management programs for local governments, organizations, businesses and individuals. They provide programs and workshops to hundreds of individuals, groups, businesses and local governments each year on water quality and land management issues and also offer one-on-one technical assistance, including site visits, plan reviews and permit application reviews.

Detroit River

Efforts to restore the Detroit River Area of Concern have engendered the establishment of several organizations, including the **Detroit River Canadian Cleanup Committee** (DRCCC) or **Canadian Public Advisory Council** (www.drccc.info), the **Detroit River Remedial Action Team** (www.msue.msu.edu/wayne/detroitriver.html), and the **Friends of the Detroit River** (www.friendsofdetroitriver.org).

(cont.) live in it. The data are used by CRWC, municipalities and the state to assess the health of our streams and rivers and make decisions regarding their protection and restoration.

Citizen involvement in water quality monitoring activities has resulted in positive change across the nation, the state, and right here in the Clinton River watershed. For example, water quality data collected by volunteers for the Clinton River Coldwater Conservation Project has been used to select locations for trout habitat restoration, and students in our Stream Leaders program have helped identify and resolve soil erosion problems.

detroitriver.org) which is working in support of the Detroit River International Wildlife Refuge and is in the process of identifying remaining significant habitat along the river for protection and possible acquisition.

Thames River

The **Thames River Recovery Plan** (www.thamesriver.org/Species_at_Risk/species_at_risk.htm) was initiated under the mandate of both federal and provincial governments and the Upper and Lower Thames Conservation Authorities are taking a significant role²⁶. A

Recovery Team has been assembled to prepare an Ecosystem Recovery Strategy for aquatic species at risk within the river. Several species that live in the Thames are found almost nowhere else in Canada, but their numbers are shrinking as a result of development pressure; a number of species which were historically present have not been sighted in many years. Twenty-four aquatic species found in the Thames River have been nationally listed as extirpated, endangered, threatened, or of special concern²⁷.

The team, comprised of experts, stakeholders and governmental representatives will prepare a recovery strategy – a science-based document that identifies the goals, objectives and approaches for recovery. They then will prepare one or more recovery action plans, which outline the specific actions needed to achieve

FACT

Several species that live in the Thames are found almost nowhere else in Canada, but their numbers are shrinking as a result of development pressure.

the goals of the strategy²⁸. Actions will include activities such as raising awareness about the diversity of species, involving the community in species recovery and improving aquatic habitat and monitoring for changes in species populations²⁹.

Sydenham River

The **Sydenham River Recovery Plan** was initiated in 1999 and its Recovery Strategy, completed in 2003, was the first to utilize an ecosystem approach for aquatic species³⁰. Members of the Recovery team took this approach for a number of reasons: 14 species designated at risk occur in the river; threats to species at risk and their habitat appeared to be directly related to land use throughout the entire watershed; and a multi-species approach was more efficient than implementing a series of single-species plans, allowing stakeholders to participate in a single planning exercise rather than separate exercises for each species.

HIGHLIGHT

The Sydenham River Recovery Plan was initiated in 1999 and its Recovery Strategy was the first to utilize an ecosystem approach for aquatic species.

In preparation for recovery planning, the Sydenham team synthesized existing information on four key elements deemed essential to understanding the watershed and its associated aquatic species: species at risk, land use, water quality and stream channel structure.

The synthesis provided the team with an overview of the health of the river's ecosystem and its major anthropogenic stresses, allowing the development of the recovery strategy. While the strategy takes a broad view of the watershed, it retains its focus on individual species and examines factors that might benefit one species at the expense of another. Long-term monitoring and ongoing research will improve knowledge of the watershed, its species at risk and how the system responds to recovery actions. New information will be integrated into the next revision of the recovery strategy, which is updated on a five-year cycle³¹.

Michigan

In response to the Phase 2 Stormwater Program (see section VI. C. 3.), the municipalities that lie within the subwatersheds on the Michigan side of Lake St. Clair have cooperated in the formation of Subwatershed Advisory Groups, in order to develop Stormwater Management Plans. Within the Clinton River watershed, groups include the **Upper Clinton/Headwaters** (www.crowc.org/programs/phase2/Subwatersheds/upperclinton.html), **Stony Creek/Paint Creek, Clinton/Main, North Branch, Clinton River East** (www.crowc.org/programs/phase2/Subwatersheds/crew.html) and **Red Run** (www.crowc.org/programs/phase2/Subwatersheds/redrun.html) **Subwatershed Advisory Groups**. Additional groups in the area include the **Lake St. Clair Direct Drainage** (www.crowc.org/programs/phase2/Subwatersheds/LSC.html) and **Anchor Bay Direct Drainage Subwatershed Advisory Groups**. Their potential impact on habitat quality is twofold; by planning for responsible stormwater planning they can eliminate sources of environmental degradation such as non-point source pollution, erosion and sedimentation and also, many of the methods that can be utilized (vegetative swales, buffer strips, wetland creation) create additional habitat.

HIGHLIGHT

Responsible stormwater planning can eliminate sources of environmental degradation such as non-point source pollution, erosion and sedimentation and many of the methods that can be utilized such as vegetative swales, buffer strips, and wetlands provide additional habitat.

The **Macomb-St. Clair Inter-county Watershed Management Advisory Group** is comprised of representatives of the Macomb and St. Clair County Water Quality Boards. These citizen-led boards were authorized by their respective County Boards of Commissioners to coordinate county water quality programs, collect and respond to citizen concerns and advocate for water quality improvements.

In their combined role within the Macomb-St. Clair Inter-county Watershed Management Advisory Group, they have not been delegated any formal authority by either county's Board of Commissioners but work on a consensus basis with an emphasis on sharing information with local decision makers. Some of the group's

specific initiatives have included support for development of a watershed management plan for the Anchor Bay portion of Lake St. Clair and development of a monitoring inventory and strategic plan for the U.S. portion of Lake St. Clair³².

Ontario

In Ontario, there are three regional Conservation Authorities which engage in a wide range of activities (See Section II. A. 2.). Conservation Authorities were created in 1946 by an act of the Provincial Legislature and initially focused on flood and erosion control. Their role has evolved considerably and they are mandated to ensure the conservation, restoration and responsible management of Ontario's water, land and natural habitats through a broad range of programs that balance human, environmental and economic needs. Public lands which were initially acquired in connection with flood control initiatives are now used extensively for recreation and provide valuable wildlife habitat as well in many cases³³.

Conservation Authorities have the authority to implement regulations for filling and construction within floodplains and to regulate construction within the waterway. Their staffs provide technical assistance and plan review services for landowners and developers and also cooperate with other governmental entities to assure consistency in watershed related issues in official plans, zoning bylaws, etc.

The **St. Clair Region Conservation Authority (SCRCA)** (www.scrca.on.ca/AboutUs.htm) is located in southwestern Ontario and includes the Sydenham River watershed and thirteen smaller watersheds draining directly into southern Lake Huron, the St. Clair River and northeastern Lake St. Clair. Recent habitat-related projects have included wetland restoration, bioengineering and reforestation initiatives. The St. Clair Region Conservation Authority owns or oper-

ates 15 Conservation Areas and 6 Habitat Management Areas. Their Conservation Areas include wetlands, forests and urban parks.

The **Lower Thames Valley Conservation Authority (LTVCA)** (www.lowerthames-conservation.on.ca) has jurisdiction over the watersheds of all streams which drain into the Thames River from the village of Delaware to Lake St. Clair. The Authority has encouraged the planting of trees for windbreaks, small woodlots and wildlife shelter. Since 1985, over 1.5 million trees have been planted in the watershed. LTVCA owns and manages over 1,000 acres of conservation land at 20 sites for public use across its watershed.

The **Essex Region Conservation Authority (ERCA)** (www.erca.org) owns or manages 12 publicly accessible properties throughout the Essex region. The areas, totaling over 1000 hectares, protect some of the most important woodlands, marshes and shoreline areas in the region. Two of those directly border Lake St. Clair: Ruscom Shores Conservation Area and Tremblay Beach Conservation Area. Natural habitats within the Conservation Areas are actively managed for the maintenance and enhancement of biodiversity through the use of prescribed burns, drawdown and water level manipulation in wetlands and native plantings to create additional habitat.

VI. A. 7. Programs for Private Landowners

Michigan

Ducks Unlimited (DU) (www.ducks.org) conserves, restores, and manages wetlands and associated habitats for North America's waterfowl. These habitats also benefit other wildlife and people. Ducks Unlimited biologists combine administrative and biological expertise in the planning and delivery of on-the-ground habitat restoration projects.

HIGHLIGHT

Ducks Unlimited biologists combine administrative and biological expertise in the planning and delivery of on-the-ground habitat restoration projects.

Providing technical assistance to private landowners; incorporating wildlife ecology into habitat-based project design, and providing wetland restoration management services are just some of the skills and services offered by DU biologists³⁴. For additional information on DU's work within the project area, see the case study describing the Lake St. Clair/Western Lake Erie Watershed Project in Section VI. A. 2.

The **Landowner Incentive Program (LIP)** was developed by the Michigan Department of Natural Resources' Wildlife Division to assist private landowners and non-profit organizations in enhancing, restoring and protecting wetland and grassland habitats on their lands. They provide advice, technical assistance, management plans and financial assistance for conducting prescribed burns on grasslands and wetlands, managing to remove exotic/invasive species and restoring remnant prairies, savannas and wetlands. Within the project area, only portions of St. Clair County have been designated as priority areas, but they are also willing to consider large parcels of suitable habitat in other counties³⁵.

The U.S. Fish and Wildlife Service's **Partners for Fish and Wildlife Program** (<http://partners.fws.gov/pdfs/PFW04actsheet4.pdf>) is a partnership program that helps private landowners restore wetlands and other important fish and wildlife habitat on their own lands by providing financial and technical assistance through voluntary cooperative agreements. Typical partners include the Natural Resource Conservation Service, Michigan Department of Natural Resources and Ducks Unlimited. The program focuses on improving habitat for migratory birds and federally listed species. In Michigan, wetland restoration has been a primary goal, but grassland, stream channel and riparian corridor restorations are increasing³⁶.

The **Forest Land Enhancement Program (FLEP)** (www.midnr.com/Publications/pdfs/ForestsLandWater/ForestStewardship/FLEPfactsheet.pdf) is authorized under the U.S. Farm Security and Rural Investment Act of 2002, popularly known as the 2002 Farm Bill and is administered the Michigan Department of Natural Resources to encourage

wise management of non-industrial private forests. The program offers cost-share for management plan development, reforestation, forest stand improvement, water quality improvement and watershed protection, fish and wildlife habitat improvement, forest health and protection, invasive species control and wildfire and catastrophic event rehabilitation.

The **2002 Farm Bill** offers a number of additional conservation programs through the Natural Resources Conservation Service (NRCS), the Farm Service Agency, USDA Service Centers and County Conservation Districts to provide incentives to farm owners to engage in a wide variety of stewardship activities and several are described below:

CASE STUDY

Lakeplain Prairie Restoration and the Conservation Reserve Program

In Michigan, CRP has a specific program to restore lakeplain wet prairie because of the rarity of this natural community within the state and its value as habitat for a variety of wildlife, particularly waterfowl, upland gamebirds and songbirds. To be eligible for this practice, the lands must be within a half mile of lands that were identified as lakeplain prairie on the state's presettlement vegetation maps. Lands must be planted with at least 5 native grasses or sedges, at least 10 native wildflower species and the hydrology of the site must be restored. The program also includes a management requirement for activities such as burning, light discing, interseeding of wildflowers, etc. according to a prescribed management plan³⁷.

The **Conservation Reserve Program (CRP)** (www.fsa.usda.gov/dafp/cepd/crp.htm) is a voluntary program for agricultural landowners. CRP offers annual rental payments and cost-share assistance of up to 50 percent to establish long-term, resource conserving covers on eligible farmland. CRP is designed to protect topsoil from erosion, safeguarding groundwater and improving the condition of lakes, ponds and streams. Offers for CRP contracts are ranked for consideration on the basis of their anticipated wildlife habitat and water quality benefits as well as a number of other criteria.

The **Grassland Reserve Program (EQIP)** (www.nrcs.usda.gov/programs/GRP) is a voluntary program offering landowners the opportunity to protect, restore and

enhance grasslands on their property. The Natural Resources Conservation Service, Farm Service Agency and Forest Service are coordinating implementation of GRP, which helps landowners restore and protect grassland, rangeland, pastureland, shrubland and certain other lands and provides assistance for rehabilitating grasslands. The program will conserve vulnerable grasslands from conversion to cropland or other uses and conserve valuable grasslands by helping maintain viable ranching operations.

The **Wetlands Reserve Program (WRP)** (www.nrcs.usda.gov/programs/wrp) is a voluntary program offering landowners the opportunity to protect, restore and enhance wetlands on their property. The USDA Natural Resources Conservation Service (NRCS) provides technical and financial support to help landowners with their wetland restoration efforts. The NRCS goal is to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the program. This program offers landowners an opportunity to establish long-term conservation and wildlife practices and protection.

The **Wildlife Habitat Incentives Program (WHIP)** (www.nrcs.usda.gov/programs/whip) is a voluntary program for people who want to develop and improve wildlife habitat primarily on private land. Through WHIP USDA's Natural Resources Conservation Service provides both technical assistance and up to 75 percent cost-share assistance to establish and improve fish and wildlife habitat. WHIP agreements between NRCS and the participant generally last from 5 to 10 years from the date the agreement is signed.

Ontario

Ducks Unlimited Canada (DUC) (www.ducks.ca) has been committed to wetland conservation for more than 65 years. Like Duck Unlimited in the U.S, DUC conserves, restores, and manages wetlands and associated habitats for North America's waterfowl. Despite this, wetland loss continues across Canada. As much as 70 per cent of Canada's original wetlands have been lost in some areas of the country.

DUC's conservation efforts take many forms. On-the-ground work is guided by the wetland and environmental research of DUC's scientists. DUC works to change policy in favour of wetland and habitat conservation. DUC also

delivers wetland and environmental education programs to teach Canadians about wetlands and the need to conserve them.

The **Regional Conservation Authorities**, which were discussed in the previous section (See Section VI. A. 6.) provide information and technical assistance on subject ranging from habitat restoration, native plants, development of naturalized ponds to invasive species control and may also provide information on potential funding resources.

The Ontario Ministry of Natural Resources initiated **Ontario Stewardship** (www.ontariostewardship.org), a program comprised of community stewardship councils, to link landowners, land interest groups and agencies to encourage responsible land care on private lands. Three of these operate within the project area:

The **Rural Lambton Stewardship Network** (RLSN) (www.ontariostewardship.org/LAMBTON/lambton.htm) is a grass-roots communication and partnership organization dedicated to the care of Lambton County's varied natural resources. Begun in 1994 as one of the pilot projects for the Private Land Stewardship Project, the RLSN has been involved in numerous comprehensive, multi-partner, stewardship projects. The focus of these projects is habitat restoration, conservation and enhancement. Projects have included making no-till equipment available to farmers for testing, transfer and adaptation of prairie rehabilitation and restoration technologies, establishment of a self-sustaining nursery to produce a source for indigenous seed to restore tallgrass prairie in Ontario and reintroducing and managing a population of northern bobwhite quail.

Stewardship Kent (www.ontariostewardship.org/KENT/kent.htm) exists to provide rural landowners in Chatham-Kent with the tools to achieve natural resource management objectives, which contribute to sustainable agriculture and a healthy landscape for fish, wildlife and forestry. Stewardship Kent is partnering with a number of other organizations in the Sydenham River Stewardship Initiative to provide landowners along the river with funding for a variety of project intended to improve habitat value and overall water quality.

The **Essex County Stewardship Network** (www.ontariostewardship.org/Essex/essex.htm) is working to sustain and improve the remaining natural features of the county, while at the same time assisting landowners to achieve their land management objectives. Supporting productive farming practices while incorporating enhancements and protection for the area's natural resources is the network's main directive. Recent projects have included the development of a "Landscape Strategy for the Wetlands of the Western Basin of Lake Erie", a Crown Land Demonstration Farm and a tree planter loan program.

VI. A. 8. Training, Technical Assistance and Additional Resources for Public and Private Habitat Projects

Michigan

The **Michigan Stewardship Network** (www.snre.umich.edu/stewardshipnetwork) is a partnership of groups and individuals in the area working to foster land and water stewardship, dedicated to preserving and restoring natural areas in southeast Michigan. They provide networking opportunities through Steward's Circles -- regular informal gatherings of volunteer and professional land stewards that focus on particular topics of interest such as managing invasive species, seed collection, prescribed fire, herbicide and managing volunteers.

HIGHLIGHT

The Michigan Stewardship Network offers periodic training workshops on effective natural areas management techniques for restoring an area's native biodiversity.

The Stewardship Network also offers periodic training workshops on effective natural areas management techniques for restoring an area's native biodiversity. Courses combine classroom sessions with hands-on experience in the field.

USDA's **Natural Resource Conservation Center** (NRCS) (www.nrcs.usda.gov) provides leadership in a partnership effort to help people conserve, maintain and improve natural resources and the environment. NRCS provides technical expertise and assistance on topics that range from soil bioengineering techniques and conservation buffers to backyard habitat creation. Their Resource Conservation and Development program focuses on improvement of quality of life achieved through natural resources conservation and community development. NRCS can provide grants for land conservation, water management and environmental needs in designated RC&D areas.

The **St. Clair Conservation District** (www.cis.stclaircounty.org/government0029.asp) is a "unique" local unit of State Government that utilizes state, federal and private sector resources to solve today's conservation problems. The guiding philosophy of all Conservation Districts is that decisions on conservation issues should be made at the local level, by local people, with technical assistance provided by government. Created to serve as a steward of natural resources, the St. Clair Conservation District takes an ecosystem approach to conservation and protection, playing a role in urban and non-urban areas where land use change is taking place.

The **Macomb Conservation District** (www.macombcd.com) operates under the Soil Conservation District Law and its mission is to ensure that land, water, forest and wildlife and all natural resources of the county are managed for sustained use for future generations. They provide of information for farmers, coordinating federal, state and local technical. They also have begun a Macomb Buffer Initiative designed to improve water quality in Macomb County by installing urban conservation buffers. They are funded in part by the proceeds of annual tree and native plant sales.

The **Wayne Conservation District** (WCD) (www.waynecd.org) is a local agency of state government assisting land-owners and residents with the conservation and management of our county's natural resources. The Wayne CD was formed in 1969 to assist the USDA with organization and distribution of the county soil survey. Since, the CD has expanded to address conservation issues relating to soil, water, air, plants and wildlife, in rural, suburban and urban Wayne County.

VI. B. Inventory and Monitoring Tools

Monitoring and inventory efforts which provide valuable information for conservation planning and restoration. There are a number of different organizations that engage in environmental monitoring within the Lake St. Clair watershed; programs range from volunteer sampling of stream invertebrates to local health departments' test results for Escherichia coli levels on public beaches to the U.S. Environmental Protection Agency's Toxic Release Inventory. Several key monitoring and inventory tools for Lake St. Clair are discussed below.

VI. B. 1. Lake St. Clair Monitoring Inventory

In order to meet the increasing need for coordination, collaboration and prioritization among monitoring agencies, the Great Lakes Commission, at the initiation of the U.S. Army Corps of Engineers - Detroit District, developed a Lake St. Clair Monitoring Inventory with the cooperation of a number of other federal, state/provincial and local

HIGHLIGHT

The Lake St. Clair Monitoring Inventory is a web-based, searchable database containing descriptive information on over 90 environmental monitoring programs in the area.

organizations. Efforts were directed primarily at creating a comprehensive inventory of U.S. monitoring programs, although some program information regarding Canadian monitoring programs was included. In conjunction with the inventory, the Commission also performed a gap analysis to identify critical gaps in existing monitoring programs and then incorporated the results of this analysis into the Lake St. Clair Monitoring Strategic Plan, which examines opportunities to better coordinate monitoring programs to meet previously identified needs.

Monitoring Inventory

The Lake St. Clair Monitoring Inventory is a web-based, searchable database containing descriptive information on over 90 environmental monitoring programs in the area. The searchable database contains a variety of descriptive characteristics, including, but not limited to contact information, program description, parameters, geographic characteristics, program funding and data collection procedures. The types of monitoring programs included range from long-term, basin wide programs run by federal agencies to local-scale programs run by non-governmental organizations. Data from each of the listed sources are not held within the inventory, but contact information and direct hyperlinks to the web (when available) provide ready access. The inventory's website is hosted by the Great Lakes Information Network at: <http://mapserver.glc.org/website/lkstclair/search.htm>

The monitoring inventory can be easily searched; keywords can be used to locate projects by monitoring organization, project title and project description. A particular monitoring medium can be selected from a list which includes air, biota, land, sediments, soil, wildlife and water. Monitoring categories covered include chemical, fish or aquatic invertebrates, land uses, microbiological, physical and other wildlife. Categories of particular relevance to habitat and

biodiversity concerns include macroinvertebrate sampling, assessment of habitat and natural communities and monitoring fish and wildlife community health.

GAP

In compiling the Lake St. Clair Monitoring Inventory, the Great Lakes Commission found that there has been little effort to coordinate monitoring programs addressing key environmental issues in the watershed.

GAP Analysis

Knowing the extent of current monitoring programs and understanding where gaps in monitoring lie can improve resource management decisions and inspire better coordination and collaboration among monitoring activities. A gap analysis based on a comparison of previously identified monitoring needs and the inventory of current monitoring programs was per-

formed to address these issues. The gaps identified and recommendations to address them are discussed in the Lake St. Clair Monitoring Gap Analysis and Strategic Plan document, which is currently available at www.glc.org/monitoring/stclair/pdf/StrategicPlan.pdf

VI. B. 2. Michigan Natural Features Inventory

Michigan Natural Features Inventory (MNFI - <http://web4.msue.msu.edu/mnfi>) maintains records on the status and location of vulnerable natural communities and endangered, threatened and special concern species in Michigan. The Michigan Natural Features Inventory (MNFI) is uniquely qualified to conduct surveys for rare and exemplary natural features throughout the state of Michigan. MNFI has a team of experts in ecology, botany, zoology and aquatic zoology to prepare for and conduct field surveys for rare vascular plants and animals (insects, mammals, birds, mussels, snails, reptiles, amphibians and fish), as well as rare and/or high quality natural communities. MNFI has more than 20 years of experience conducting natural features inventories on a variety of scales including state parks, state forests, large military installations and entire counties.

GAP

Although MNFI maintains the most comprehensive database on rare species and natural communities in Michigan, this information is not complete.

Why conduct a natural features inventory?

Although MNFI maintains the most comprehensive database on rare species and natural communities in Michigan, this information is not complete. Data collection spans a long time frame (late 1800's to present) and many places have never been surveyed (or the information was never recorded). This is especially true for private land. An inventory can update older

CASE STUDY

Macomb County Michigan Natural Features Inventory

Michigan Natural Features Inventory (MNFI) performed in-depth research on the condition of natural features within Macomb County that included wetlands, woodlands, soils, rare plant and animal species and steep slopes. The program was initiated in Summer 2003 to assist county agencies and local municipalities to conduct more effective land use planning. The first draft was made available through the MNFI program in January 2004. It is available in Geographic Information Systems (GIS) format and supporting text is forthcoming. Following is the web link to the Macomb County MNFI report: http://macombcountymi.gov/gis/Documents/Macomb_County_MNFI_report.pdf

spring through fall, depending on the best time to document the presence and condition of each natural feature. The whole process typically spans a 2-year time period which allows for suitable survey conditions to be selected.

HIGHLIGHT

Michigan Natural Features Inventory compiles, maintains and provides information on rare, threatened and endangered species and spaces in Michigan while the Natural Heritage Information Centre does this for Ontario.



records, fill in the gaps where there are no documented survey information and provide a more accurate picture of biodiversity in a given area. This more complete package of information provides a strong foundation for making sound land use, natural resource management and conservation decisions.

How long does an inventory take?

Field inventory includes preparation (detailed aerial photo review, potential habitat delineation, development of rare species models and aerial flights to confirm or eliminate sites that lack merit for ground surveys) as well as the actual field work. Preparation can take anywhere from 3-6 months depending on the scale of work. The field inventory is typically conducted from

How much does an inventory cost?

Local municipalities, regional units of government and/or conservation organizations can negotiate a contract with MNFI to conduct an inventory of natural features in their region. The type of surveys can range from a targeted group of animals such as rare grassland or forest birds to a comprehensive effort that incorporates natural communities, plants and animals. Costs are dependent on several factors including: size of the area to be surveyed, degree of effort, number and type of species targeted and number of sites. Other factors include: acres of natural vegetation, size and configuration of vegetation blocks, fragmentation of ownership and access to property.

VI. B. 3. Ontario Natural Heritage Information Centre

The Natural Heritage Information Centre (NHIC) of the Ontario Ministry of Natural Resources, is the Ontario counterpart to the Michigan Natural Features Inventory described above. As such, NHIC compiles, maintains and provides information on rare, threatened and endangered species and spaces in Ontario. This information is stored in a central repository containing a computerized database, map files and an information library, which are accessible for conservation applications, land use planning, parks and protected areas planning, etc. NHIC belongs to a network of similar centers established in each Canadian province, U.S. state and numerous Latin American and Caribbean countries, known as Natureserve.

The NHIC's overarching goal is to generate a permanent and dynamic atlas and data bank on the character, distribution and conservation status of natural areas, critical flora, communities and special features in Ontario. They assemble and organize information on endangered species and spaces from all available sources, ranging from atlas projects, naturalist groups, universities, museums and inventory monitoring programs by public and private sector agencies and organizations. Information is organized to be accessible for ecologically sound land use planning and in support of biodiversity protection programs.

Much of the collected information is available online through their website at: www.mnr.gov.on.ca/MNR/nhic/nhic.cfm. Users can search for information on occurrences of particular rare species, vegetation communities or natural areas in a variety of ways including by site name and by jurisdiction, such as township or county. With the use of the Mapguide plug-in, a link to which is available on the site, users can conduct geographic queries for species, plant communities and natural areas. Users can also create range maps of rare species. Finally, reports of rare species or vegetation communities can also be submitted online through the site.

The NHIC has provided facilities and scientific/technical input to numerous cooperative projects. Most recently, the NHIC was instrumental in The Big Picture 2002 Project, a Geographic Information System (GIS)-based landscape analysis, aimed at identifying the key natural heritage areas in southern Ontario and the most promising linkages between them. The maps produced through this project will help guide conservation efforts such as restoration, land securement and landuse planning. The Nature Conservancy of Canada has supported the project with funding and scientific input. A number of other organizations (Federation of Ontario Naturalists, Ducks Unlimited, Carolinian Canada, Ontario Power Generation and Ontario Parks) have provided valuable input through a peer review committee.

Downloadable products from the project include a Powerpoint Presentation, poster, methodology, PDF images and GIS coverages.

FACT

The Centre also maintains the Ontario Herpetofaunal Atlas, which was initiated in 1984 as an attempt to consolidate existing information and gather new data on Ontario's amphibians and reptiles.

The Centre also maintains the Ontario Herpetofaunal Atlas (or Summary) (OHS), which was initiated in 1984 as an attempt to consolidate existing information and gather new data on Ontario's amphibians and reptiles. The primary purpose of the OHS project was to produce detailed distribution maps of the province's amphibians and reptiles. Field data submitted by volunteers has been supplemented by specimen records

from museum and university collections in Ontario (e.g. Royal Ontario Museum and University of Guelph) and elsewhere (e.g. University of Michigan) and all were entered into the OHS database. In addition, records were extracted from published (e.g. journal articles) and unpublished (e.g. theses, park and natural area inventory reports) literature. Limited access to records in the Ontario Herpetofaunal Summary database is available for conservation, education, or research purposes.

VI. B. 4. USGS Great Lakes Gap Analysis Program

Initiated in 2001, the U.S. Geological Survey, in cooperation with several state natural resource-management agencies, began a Gap Analysis Program (GAP) in the Great Lakes Basin to evaluate the biological diversity of aquatic habitats and identify gaps in the distribution and protection of vulnerable species and their habitats. The GAP program aims to keep common species common by identifying those species and communities not adequately represented in existing conservation areas. The approach recognizes that protecting regions already rich in natural habitat enables protection of the animal and plant species that depend on them.³⁸ The GAP program has three distinct, yet interrelated components: the Great Lakes Regional Aquatic GAP; the Great Lakes Coastal GAP and the Great Lakes Riverine GAP.

Great Lakes Regional Aquatic GAP

The goal of Great Lakes Regional Aquatic GAP project valuate biological diversity of Great Lakes aquatic habitats and identify gaps in the distribution and protection of these species and their habitats. This effort supports an integrated approach in which common methods and protocols are established and results are comparable across the Great Lakes landscape. USGS aims to accomplish this through, building and maintaining partnerships with Gap stakeholders; delineation and mapping of ecologically similar drainage areas; classification of habitats in riverine and coastal areas, using regionally consistent methods; development of a central biological database for fish and invertebrates; mapping

known and predicted species distributions (modeling); completing an aquatic gap analysis and serving the data and analysis results on the Internet and on CD-ROM.

Great Lakes Riverine Gap

There are thousands of rivers and streams within the Great Lakes basin, providing habitats for fish and other aquatic organisms throughout various stages of their life cycles. These streams vary from warm water streams that support bass to cold water streams that support breeding populations of native trout. The purpose of the Riverine Aquatic

FACT

There are thousands of rivers and streams within the Great Lakes basin, providing habitats for fish and other aquatic organisms throughout various stages of their life cycles.

Gap Analysis project is to identify gaps in the conservation of fish and other aquatic species in the rivers and streams of the Great Lakes basin. Riverine Gap projects are underway in Michigan, New York, Ohio and Wisconsin with completion scheduled for 2006. Gap Analysis in Minnesota, Illinois, Indiana and Pennsylvania is scheduled for 2004 to 2009. The Riverine Gap is collaborating with the Great Lakes Commission on Lake St. Clair, especially to address the riverine portion of the 10-mile buffer around Lake St. Clair.

Coastal Gap

The coastal zone is an important buffer and link between the open water and inland ecosystems of the Great Lakes basin and consists of a wide variety of habitats. The geomorphology of the coast ranges from sandy beaches and mud flats to sheer cliffs and headlands. This rich environment is home to approximately 120 native or established fish species, most of which use the nearshore areas throughout

their life cycle.

GAP

Despite the various data and information sources, much is still unknown and undocumented about Great Lakes coastal habitats. The USGS Coastal Aquatic Gap Pilot Project is being undertaken to fill these gaps and thereby improve understanding of coastal habitats and enhance their diversity and protection.

Despite the various data and information sources, much is still unknown and undocumented about Great Lakes coastal habitats. The USGS Coastal Aquatic Gap Pilot Project is being undertaken to fill these gaps and thereby improve understanding of coastal habitats and enhance their diversity and protection. This project is intended to extend the Aquatic Gap Analysis tools being developed for riverine habitats to the nearshore habitats of the Great Lakes coasts. For this study, the nearshore zone will encompass the area from the shoreline to approximately 10 meters of depth. Nearshore fish distributions and assemblages are coupled with deep-water fish surveys by the USGS Great Lakes

Science Center. The focus of the pilot projects is on the nearshore regions of western Lake Erie and eastern Lake Ontario and will be extended to all Great Lakes in the future. The Coastal Gap is collaborating with the Great Lakes Commission on the Coastal Habitat Conservation and Restoration Plan for Lake St. Clair.

Regional Central Database

Geospatially referenced biological and habitat data used for Aquatic Gap Analysis in the eight Great Lake states are being imported into a unified database structure in a regional central database at the USGS Great Lakes Science Center in Ann Arbor, Michigan. An Oracle™ relational database with the capability to export the data into a Microsoft Access® database is being used. The database structure is based in part on the Nature Conservancy (TNC) and National Biological Information Infrastructure of USGS-BRD database designs, as well as the structure currently in use for the Ohio Aquatic Gap Analysis project. Protocols and mechanisms for data sharing based on ownership of the data are be-

ing developed. The Great Lakes Aquatic Gap project is capable of serving data to Great Lakes Aquatic Gap investigators using client-server or web-enabled tools.

Applications for Conservation of Biodiversity in the Great Lakes Region

Biodiversity conservation is of growing concern in the Great Lakes region and elsewhere because the focus of conservation has expanded beyond rare and endangered species to the full range of species or biodiversity. In 2000, The Nature Conservancy identified 271 sites as important for Great Lakes biodiversity, of which 60% were deemed “irreplaceable.” Only 5% of these sites were protected.

HIGHLIGHT

In 2000, The Nature Conservancy identified 271 sites as important for Great Lakes biodiversity, of which 60% were deemed “irreplaceable.” Only 5% of these sites were protected.

The Great Lakes Aquatic Gap project has been working closely with non-government agencies, universities, tribes and state and federal agencies charged with management of natural resources to provide useful tools for biodiversity conservation efforts. The Great Lakes Aquatic Gap Analysis Project will work with decision support system specialists in the National GAP program to develop appropriate decision support tools based on the GAP data and information generated.

decision support system specialists in the National GAP program to develop appropriate decision support tools based on the GAP data and information generated.

VI. C. Local Planning Tools for Protecting Habitat

Local governments have been granted authority to plan and adopt ordinances protecting the public health, safety and welfare of residents. Over the last 20 years, there has been a growing recognition among local governments of the importance of sustainable land use practices to meet their health, safety and welfare responsibilities. Local governments have used their planning authority to develop community master plans, local ordinances and other programs that benefit their communities, including programs and practices to maintain and protect natural resources (upland and aquatic) in the form of parks for recreational opportunities, ensure clean groundwater and surface water as potable water sources and retain and replace trees in the urban areas to moderate temperatures, sequester carbon and to provide psychological relief from concrete and asphalt.

HIGHLIGHT

Although the focus and examples in this section are U.S. based, Canadian planning products, including Official Plans and Zoning by-laws, offer a similar and equally important framework for habitat conservation and restoration.

Section II. D. 1. describes land use laws and the planning processes in the U.S. and Canada. This section describes how particular products of the U.S. local planning process establish an overarching framework for habitat conservation and restoration. Although the focus and examples in this section are U.S. based, Canadian planning products, including Official Plans and Zoning by-laws, offer a similar and equally important framework for habitat conservation and restoration.

Section II. D. 1. describes land use laws and the planning processes in the U.S. and Canada. This section describes how particular products of the U.S. local planning process establish an overarching framework for habitat conservation and restoration. Although the focus and examples in this section are U.S. based, Canadian planning products, including Official Plans and Zoning by-laws, offer a similar and equally important framework for habitat conservation and restoration.

VI. C. 1. Community Master Plans

Effective regulation of land use that provides for protection of the environment begins with comprehensive planning. The community master plan, sometimes referred to as a comprehensive plan, should reflect the community’s vision of itself and how it wants to grow or develop. The strength and effectiveness of the master plan is determined by its

CASE STUDY

St. Clair County Master Plan

The St. Clair County Comprehensive Master Plan, adopted by the County Board of Commissioners in 2000, defines long-range goals and intentions of the community regarding the nature and direction of future physical development and public investment within the county. It consists of elements addressing land use and land use change, transportation, the environment, the economy and public facilities services and infrastructure. Several maps developed for the master plan have bearing on coastal habitat conservation and preservation. Directions on obtaining copies of the master plan, technical reports and maps can be found online at:
www.stclaircounty.org/offices/metro/comprehensive.asp

goals, policies and recommended projects, as well as the established link between them. A zoning plan is a required element of city and village master plans, while township and county master plans may consist simply of generalized future land use maps. Michigan law now requires that every community have a land use master plan (See Section II.D.1). The communities must evaluate their plan every five years to determine its continued relevancy to the community.

Communities can use the master planning process to effectively maintain and shape their community character. Establishing natural resource protection policies is an important aspect of that process. Local governments, depending upon their situation, can use the

master plan to address such environmental issues as habitat preservation, wetland protection, wellhead protection, sanitary sewer planning, woodlands preservation and establishment of greenways.

A capital improvements plan (CIP) is an important tool for financing capital improvements such as water and sewer infrastructure and other capital projects. A CIP should describe the capital improvement projects and list sources of revenue and expenditures by year. Communities should consider integrating the CIP into their master plan. In doing so, capital improvement projects are linked to the goals and policies of the master plan as well as to the overall responsibility of protecting the health, safety and welfare of residents. A CIP, for example, can include policies for the protection of natural resources that regulate placement of utilities to minimize disruption of important habitat areas as well as reduce the threat of contamination to ground water and surface water resources.

VI. C. 2. Local Ordinances

A master plan, through its goals, policies and recommended projects, provides the vision for how a community will develop. Regulations governing development (i.e., land use and subdivision control regulations) for a community are found in the Zoning Ordinance and or other related special ordinances.

Studies have shown that the patterns of development in Michigan and particularly in coastal areas of Michigan are highly land consumptive. Michigan has one of the nation's highest ratio's of urbanized land per capita (i.e., low number of persons per urbanized acre). Researchers and planning experts have criticized Michigan for its low density, land con-

sumptive, high impact development patterns. While zoning ordinances have often driven this trend, they can also be used to correct this trend, through planning tools such as compact development, open space preservation and natural features ordinances.

HIGHLIGHT

Researchers and planning experts have criticized Michigan for the predominance of local ordinances that foster low density, land consumptive, high impact development patterns.

Local ordinances often contain design standards. These guidelines and regulations determine the design requirements for projects. For example, a storm water management ordinance may require the use of best management practices (BMPs), such as vegetated

swales for controlling runoff. The design standards of the ordinance may establish guidelines for the construction of the swale as well as the desired velocity of the water's movement through the structure.

CASE STUDY

Model Environmental Ordinances for Macomb County Communities

As part of a recently completed planning initiative, a five part series of model ordinances provides a “suite” of environmental applications that will assist Macomb County communities in completing the second part of the MNFI program and will assist the county in meeting many parts of the Phase II requirements of their storm water National Pollutant Discharge Elimination System (NPDES) permit. The model ordinances consist of the following samples: a) Storm Water Management; b) Woodlands/Tree Ordinance; c) Resource Overlay District; d) Natural Feature Setback/Buffering; e) Floodplain Management; and f) Native Landscaping Ordinance and Guidelines. These model ordinances are designed to allow local communities to determine how they might best fit within their own communities or if they are even appropriate for their particular needs.

HIGHLIGHT

A community can regulate the impacts of development on the environment most effectively through the tandem use of its master plan and local ordinances that have been developed and revised with efficient land development and habitat protection in mind.

Michigan are regulated by the federal Phase II Storm Water Rule. The rule, which was issued by the U.S. Environmental Protection Agency, required municipalities and other public bodies that operate a separate storm water drainage system within a U.S. Census-defined Urbanized Boundary to obtain a storm water permit by March 10, 2003. This permit program is administered by the Michigan Department of Environmental Quality (MDEQ). Under the program, communities needed to apply for one of two different kinds of permits:

HIGHLIGHT

Watershed based permits offer the advantages of maximum flexibility in determining and prioritizing actions, greater cost sharing options and grant funding opportunities. Most communities in southeast Michigan are regulated by the Phase II Storm Water Rule are operating under the watershed-based permit.

While the regulations of a local ordinance can be challenged in court, a community strengthens its case if the ordinance is based on and reflects the provisions of its master plan.

A community can regulate the impacts of development on the environment most effectively through the tandem use of its master plan and local ordinances that have been developed and revised with efficient land development and habitat protection in mind. Communities in Southeast Michigan are encouraged to protect their natural resources by updating their master plans as well as through the establishment of local ordinances. A number of resource publications developed by SEMCOG can assist in this effort:

- *Land Use Tools and Techniques: A Handbook for Local Communities*
- *Opportunities for Water Resource Protection in Local Plans, Ordinances and Programs: A Workbook for Local Governments*
- *Opportunities for Water Resource Protection in Local Plans, Ordinances and Programs: A Workbook for Local Governments*

They are described in greater detail in the Endnotes³⁹ of this section and are available online at www.semco.org/Products/Publications/index.htm.

VI. C. 3. Watershed Planning

Approximately 170 local governments across Southeast Michigan are regulated by the federal Phase II Storm Water Rule. The rule, which was issued by the U.S. Environmental Protection Agency, required municipalities and other public bodies that operate a separate storm water drainage system within a U.S. Census-defined Urbanized Boundary to obtain a storm water permit by March 10, 2003. This permit program is administered by the Michigan Department of Environmental Quality (MDEQ). Under the program, communities needed to apply for one of two different kinds of permits:

Watershed based permits offer the advantages of maximum flexibility in determining and prioritizing actions, greater cost sharing options and grant funding opportunities. Most communities in southeast Michigan are regulated by the Phase II Storm Water Rule are operating under the watershed-based permit. This option requires cooperation among communities within the subwatershed to perform the necessary planning and implementation. This includes such components as a watershed management plan, an illicit discharge elimina-

tion plan (IDEP), public involvement plan (PIP), public education plan (PEP) and a storm water pollution prevention initiative (SWPPI) requiring the identification of storm water control activities that the community will undertake.

Jurisdictional-Based Permits require the submission of a storm water management plan (SWMP). The SWMP must include such components as an illicit discharge elimination plan, construction storm water runoff controls, public involvement plan and a public education plan. This permit does not require cooperation with neighboring communities or submission of a watershed management plan, but the permit requires more prescriptive control measures for storm water management.

Most communities in Southeast Michigan that are regulated by the Phase II Storm Water Rule are operating under the watershed-based permit. Communities across the seven county SEMCOG region are collaborating in 26 subwatershed groups.

Preservation of habitat is an important tool for maintaining water quality and is often incorporated into watershed or subwatershed plans. These plans become the vision and road map for improving the watershed and achieving the requirements of the Phase II Storm Water Rule. Establishing recommended projects that preserve, create or enhance habitat is an effective way to promote habitat protection through the watershed planning process.

Public Education and Involvement

The Phase II Storm Water Rule has a number of public education and involvement requirements. It is recognized that individuals' actions play a key role in successfully eliminating pollution and preserving habitat. Local govern-

ments involved in the watershed planning process are collaborating on the development of public education and participation materials that can be used by all watershed groups to help meet their public education and participation requirements.

CASE STUDY

Southeast Michigan Partners for Clean Water

This partnership, composed of representatives of local and county government, watershed councils and consulting experts, formed to collaborate for developing public education and involvement materials that can be used by all watershed groups to help meet these Phase II permit requirements. The partnership recently launched a number of successful outreach efforts to both inform the public as well as gauge public knowledge on water quality issues. The first initiative is a public education outreach campaign entitled "Our Water. Our Future. Ours to Protect.—Seven Simple Steps to Clean Water." The campaign uses tip cards, brochures, posters and displays to raise public awareness of how individuals can all help maintain and improve our water resources.

The second initiative consisted of a regional water quality outreach survey to determine the water quality perspectives of the public. The information garnered from the survey will assist the partners in developing new programs to assist them in complying with the requirements of their storm water permit. More information on the "Our Water. Our Future. Ours to Protect." public education campaign is available online at: www.semcog.org/OursToProtect/OurstoProtect.htm

Two resource publications by SEMCOG that support watershed planning in the study are:

- *Comparing 2000 Census and 2030 Regional Development Forecast by Watershed*
- *Managing Fertilizer to Protect Our Water Resources*

They are described in the Endnotes⁴⁰ of this section and are available online at: www.semcog.org/Products/Publications/index.htm.

Macomb and St. Clair Counties play both a fiduciary as well as facilitative role in the watershed planning process. In Macomb County, the Department of Public Works oversees the distribution of the federal grant for watershed planning from the Army Corps of Engineers. County staff members also facilitate meetings of the six subwatershed groups. In St. Clair County, the

Division of Environmental Health acts as the fiduciary agent for the watershed planning process. County health staff also facilitates meetings of the four subwatershed groups.

VI. C. 4. Regional Planning Process

The regional planning process provides a framework for informing as well as coordinating local government collaboration on planning issues. SEMCOG, the Southeast Michigan Council of Governments, either facilitates or provides significant input to many of these regional coordinating functions.

SEMCOG is the regional planning agency for Southeast Michigan. SEMCOG is a council of governments in which local officials from 147 communities participate to prepare and adopt regional plans and policies on issues that cross jurisdictional boundaries. This includes such issues as water quality, air quality, land use issues such as solid waste and transportation.

SEMCOG's water quality planning activities are guided by the *Water Quality Management Plan for Southeast Michigan* (October 1999). The provisions of the federal Clean Water Act of 1977 required SEMCOG to prepare an areawide water quality plan that would bring local governments into conformance with the Act. The *Water Quality Management Plan*

HIGHLIGHT

Regional planning offers the opportunity to maximize benefits of protection and minimize impacts of development on coastal habitat.

for Southeast Michigan (the Plan) was adopted in 1978 and focused mainly on controlling point sources from such facilities as publicly owned treatment works. In the 1999 update, the Plan shifted emphasis from point source to nonpoint source pollution and from end of pipe control strategies to improved water quality through watershed planning and management.

The Plan provides the basis for SEMCOG's water quality planning initiatives. It led to development of the

publications listed throughout this section and providing assistance in water quality protection to Southeast Michigan governments. SEMCOG has developed three documents that assist local governments in meeting their water quality and environmental protection responsibilities:

Putting Southeast Michigan's Water Quality Plan Into Action: Tools for Local

Investing in Southeast Michigan's Quality of Life: Sewer Infrastructure Needs

Options for Local Government Funding of Water Quality Activities

They are described in the Endnotes⁴¹ of this section and are available online at:

www.semco.org/Products/Publications

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Opportunities for Water Resource Protection in Local Plans, Ordinances and Programs: A Workbook for Local Governments (August 2002): This workbook provides planning and design tools for addressing water quality protection. It is designed to provide local governments with a continuum of options for preserving and restoring water resources and demonstrating the connections between plans and ordinances.
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Managing Fertilizer to Protect Our Water Resources (December 2002): This paper describes fertilizer as a potential pollutant source, clarifies local government's capabilities to reduce this pollutant source, outlines options to reduce the impacts through education and regulation and recommends ways to resolve these issues.
41. *Putting Southeast Michigan's Water Quality Plan Into Action: Tools for Local Government* (June 2000): This document builds on the goals, policies and recommendations from the Water Quality Management Plan that focus on local governments' actions in water quality protection.

Investing in Southeast Michigan's Quality of Life: Sewer Infrastructure Needs (April 2001): This document identifies the fiscal resources needed to sustain and improve Southeast Michigan's aging sewer system over the next 25 years. Maintaining and improving the sewer infrastructure is an important tool for improving water quality and the aquatic habitats of Southeast Michigan's lakes and rivers.

Options for Local Government Funding of Water Quality Activities (April 2003): This document summarizes the types of local water quality programs in need of funding, the options available for raising the local revenue and some advantages and disadvantages for local officials to consider.