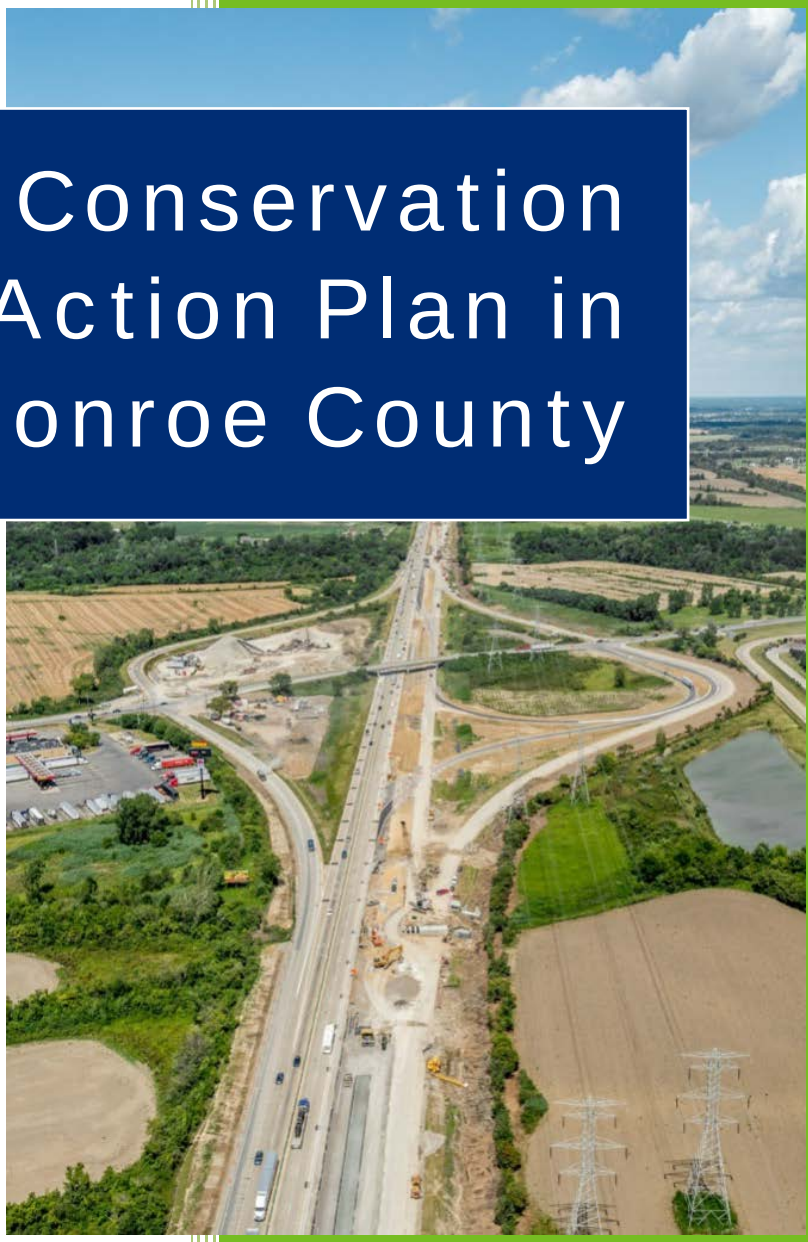
January 2017

I-75 Corridor Conservation Action Plan in Monroe County



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- Promotes informed decision making to improve Southeast Michigan and its local governments by providing insightful data analysis and direct assistance to member governments;
- Promotes the efficient use of tax dollars for infrastructure investment and governmental effectiveness;
- Develops regional solutions that go beyond the boundaries of individual local governments; and
- Advocates on behalf of Southeast Michigan in Lansing and Washington

I-75 Corridor Conservation Action Plan in Monroe County

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Abstract

The *I-75 Corridor Conservation Action Plan in Monroe County* describes existing environmental conditions, goals and strategies for implementation, and actions that MDOT can pursue through the reconstruction of I-75 to enhance strategic environmental outcomes for the region. Each chapter details the key conservation planning steps, ending with a list of future actions and discussions of what was learned about applying the conservation planning process to a major transportation improvement. Results and insights gained are included to help guide local implementation of conservation strategies in Monroe County.

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The Core Team worked with a number of contributors in developing the plan. Especially helpful among these were the members of the TAC, representing key agencies and organizations engaged in conservation and management of the region surrounding I-75 in Southeast Michigan. In addition to the core team, TAC members included: Mary Bohling - MSUE's Michigan Sea Grant, Jeff Braunscheidel- MDNR Fisheries Division, Zach Cooley - MDNR Wildlife Division, Steve Dushane - U.S. Fish and Wildlife Service (USFWS), Abby Eaton - Michigan Department of Agriculture and Rural Development, Jerry Fulcher - Michigan Department of Environmental Quality, Chris May - The Nature Conservancy, Chris Mensing (USFWS), Bob Morningstar - U.S. Army Corps of Engineers ACE, Rob Peven - Monroe County, Sally Van Lieu - Natural Resources Conservation Service, and Dave Williams (FHWA). We also thank several of the TAC members who voluntarily served as leads for one of the conservation targets. Leads included: Mary Bohling (herpetofuana connectivity), Zach Cooley (aerial migrants), Jerry Fulcher (inland wetlands), Jeff Grabarkiewicz (migratory fish), Kelly Karll (coastal tributaries), and Chris May (coastal wetlands). We are grateful for their guidance and advice, and the many hours they spent participating in meetings, webinars, and workshops.

Finally, we would like to express our gratitude to Dick Micka, a long-time resident of the area, and currently a representative of the USFWS Detroit River International Wildlife Refuge. Dick is a real sparkplug in the Monroe County region, and attended nearly every single working group and stakeholder meeting held as part of this project. His energy and positive attitude were contagious, and served as fuel to help get the core team and TAC to the finish line. We fully expect Dick to pick up this plan and share it with as many residents, visitors, and leaders who will listen.

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List of Abbreviations

AASHTO - American Association of State Highway Transportation Officials
AOC - Area of Concern
BMPs - Best Management Practices
BUIs - Beneficial Use Impairments
CAP - Conservation Action Planning
CWMAs - Cooperative Weed Management Areas
DOTs - Departments of Transportation
DRIWR - Detroit River International Wildlife Refuge
EDDMaps - Early Detection and Distribution Mapping System
EPA - Environmental Protection Agency
ESA - Endangered Species Act
FHWA - Federal Highway Administration
GIS - Geographic Information Systems
GLRI - Great Lakes Restoration Initiative
GMI - Greening Michigan Initiative
GRI - Green Ribbon Initiative
HABs - Harmful algal blooms
HUC - Hydrologic Unit Classification
HRM - Herpetological Resource and Management
IEF - Integrated Ecological Framework
KEAs - Key Ecological Attributes
LLWFA - Landscape Level Wetland Functional Assessment
LRTP - Long-Range Transportation Plan
MAEP - Michigan Agriculture Environmental Assurance Program
MBDC - Monroe Business Development Corporation
MCDC - Monroe County Drain Commission
MCRC - Monroe County Road Commission
MDARD - Michigan Department of Agriculture and Rural Development
MDEQ - Michigan Department of Environmental Quality
MDEQ OGL - Michigan Department of Environmental Quality Office of Great Lakes
MDNR - Michigan Department of Natural Resources
MDOT - Michigan Department of Transportation
MEDC - Michigan Economic Development Corporation
MISGP - Michigan Invasive Species Grant Program
MISIN - Midwest Invasive Species Information Network
MNFI - Michigan Natural Features Inventory
MPO - Metropolitan Planning Organization
MSG - Michigan Sea Grant
MSUE - Michigan State University Extension
NEPA - National Environmental Policy Act
NOAA - National Oceanic and Atmospheric Administration
NRCS - Natural Resources Conservation Service
PMA - Port of Monroe Authority
REF - Regional Ecosystem Framework
ROW - Right-of-Way
SEMCOG - Southeast Michigan Council of Governments
SHRP2 - Strategic Highway Research Program
STIP - Statewide Transportation Improvement Program
TAC - Technical Advisory Committee
TAP - Transportation Alternatives Program
TCC - Transportation Coordinating Council
TP - Total Phosphorous
TIP - Transportation Improvement Program
TNC - The Nature Conservancy
U.S. - United States
USACE - U.S. Army Corps of Engineers
USFWS - U.S. Fish and Wildlife Service
WLEB - Western Lake Erie Basin

Executive Summary

Introduction

The I-75 southeast gateway corridor into the Lower Peninsula of Michigan provides transportation services critical to the economic health of the state. Over the past 200 years, the natural lands and waters near the I-75 Corridor have experienced a tremendous amount of stress. However, this region still harbors several globally imperiled natural communities (lake-plain prairie, oak openings, wet mesic flat-woods, and Great Lakes marsh), a very productive Lake Erie coastal zone that support world-class freshwater fisheries, and some of the most significant stopover habitat for migratory birds in the Great Lakes region.

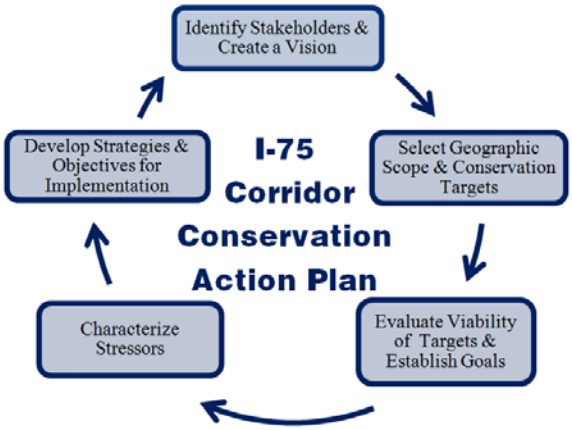
Due to the age and condition of the freeway, I-75 in Monroe County needs complete rebuilding. Over the next several decades (beginning in 2015), the Michigan Department of Transportation (MDOT) targeted this portion of I-75 (from I-275 to the Ohio border) for a multi-million-dollar full reconstruction. Given its close proximity to Lake Erie, planners recognized the importance of considering natural resource impacts and mitigation as part of the project development process.

Aerial view of I-75 reconstruction.

I-75 Corridor Conservation Action Plan in Monroe County

In 2013, MDOT, in partnership with the Southeast Michigan Council of Governments (SEMCOG), and the Michigan Natural Features Inventory MNFI), which is a part of the Michigan State University Extension (MSUE) program's Greening Michigan Institute, received a grant from the Federal Highway Administration's (FHWA) Strategic Highway Research Program (SHRP2) to apply FHWA's transportation planning framework, *Eco-Logical*, to the I-75 Corridor reconstruction in Monroe County. The goal of FHWA's Eco-Logical Framework is to develop a collaboratively based, landscape scale, conservation plan that guides transportation planning while maximizing environmental benefits (Figure 1).

Figure 1
Steps Used to Develop the I-75 Integrated Eco-Logical Framework



Decision-Making Process

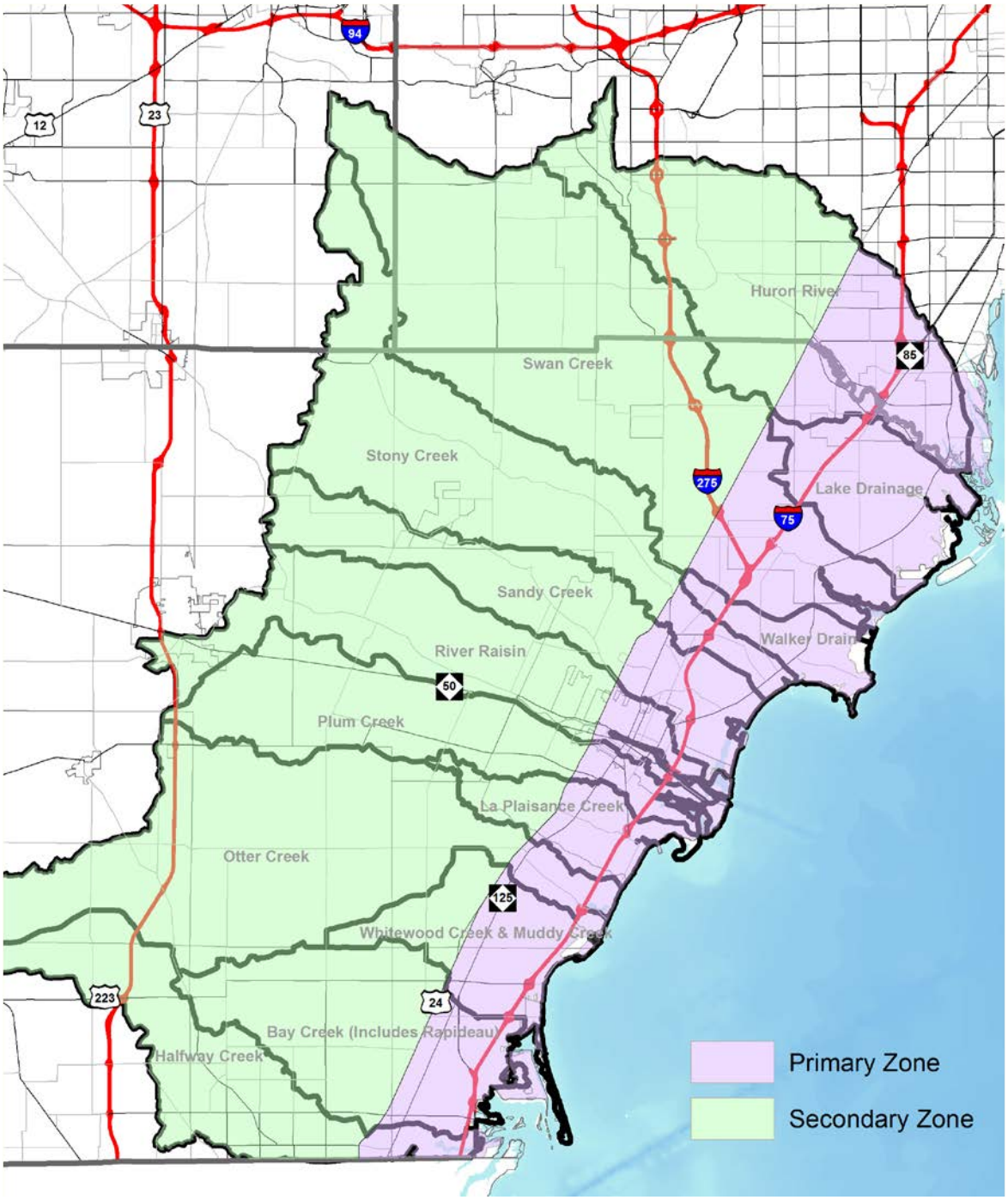
To facilitate development of the conservation plan, a Technical Advisory Committee (TAC) consisting of local, state, and federal agencies and The Nature Conservancy was established. Creating the TAC engaged key agencies and organizations whose involvement would likely lead to better outcomes, long-term ownership, implementation of key strategies, and monitoring of results. The TAC remained involved throughout the entire development of the plan by providing input at each step of the process and participating in all major decisions.

In addition to the TAC, engagement of local stakeholders was integral to developing the I-75 Corridor Conservation Action Plan. At the beginning of the planning process, an initial stakeholder input meeting addressed local interests, and multiple workshops were used throughout development of the conservation plan to gather information on important local priorities. Additionally, local stakeholders participated in work groups to identify environmental priorities or conservation targets, key stressors, and select the final conservation strategies. A final stakeholder outreach meeting was held at the end of the process to ensure that the selected strategies aligned with local priorities. Local stakeholders also helped prioritize specific areas for implementation.

Geographic Scope

The Eco-Logical planning process strongly encourages a landscape-scale approach that considers the natural assets surrounding the transportation project. After much deliberation, the TAC decided to create two conservation zones that encompassed Monroe County and portions of several surrounding counties as the geographic scope. The primary zone occurs along the coast. It is defined by the 575-foot elevation over sea level to the west and includes approximately 90,000 acres. The secondary zone occurs to the west of the primary zone, starting at Telegraph Road (US-24) and includes approximately 250,000 acres. Together, the entire study covers about 340,000 acres (Figure 2).

Figure 2
Watershed-Based Geographic Scope for the I-75 Corridor Conservation Action Plan in Monroe County



Conservation Targets, Viability, and Goals

Conservation Targets

The TAC consulted other conservation plans, such as the *Lake Erie Biodiversity Conservation Strategy*, the *State's Water Strategy*, and the *Great Lakes Water Quality Agreement* to understand other conservation efforts in the region. This research combined, with the group's expertise resulted in identification of seven conservation targets: coastal tributaries, inland wetlands, coastal wetlands, aerial migrants, globally rare natural communities, migratory fish, and herpetofauna (reptiles and amphibians) connectivity. Much later in the planning process, the TAC dropped inland wetlands from the target list, leaving six final conservation targets (Table 1).

Viability

The next step in the conservation action planning process was determining the viability, or health, of each of the conservation targets. Overall, the results of the viability assessment indicate the conservation targets range from poor to good condition. Given the large landscape conversions that have taken place over the past two centuries, the condition of the conservation targets is not surprising. Agricultural modifications have had a large impact on terrestrial and aquatic resources, particularly on the water quality and habitats of the coastal river systems and near-shore zone of Lake Erie. Overall, other land uses have replaced nearly 89 percent of the wetlands in the study area, leaving less habitat for native plants and animals.

Goals

Goals or desired future conditions of each conservation target were determined using a multi-staged approach. The first step was identifying goals from other related plans and efforts within or near the Western Lake Erie Basin (WLEB). Next, these preliminary goals were shared with the subject matter experts, and modified as needed. Finally, these recommended goals were reviewed by the TAC and core team, and finalized for each of the conservation targets. All goals have a 20-year horizon for completion. Table 1 has more details on the targets, their viability, and goals for improvement.

The TAC met with numerous stakeholders, including the National Parks Service, to learn about their priorities and goals.

I-75 is in close proximity to Monroe County's coastal resources.

Table 1
Summary of Conservation Targets, Current Viability, and Goals

Conservation Targets	Viability	Future Outcomes
Coastal Tributaries	**Fair**	Detailed watershed plans will be completed for all subwatersheds that currently lack a plan.
		Total phosphorous loading will decrease by 40% across the study area.
		Watershed conditions in the highest priority stream systems will meet federal water quality standards.
		Natural cover along high-priority streams is ≥75% of stream length within a 30-meter buffer.
Migratory Fish	**Good**	At least 50% of the total length of selected streams supports at least one species of native migratory fish.
		Each indicator fish species is represented by at least two viable populations.
Herpetofauna Connectivity	**Fair**	A minimum of three populations of each herpetofauna species known to currently exist within the primary boundary, is under conservation status, and considered viable.
		75% of highest priority herpetofauna corridors within the primary boundary provide safe passage between important habitat patches.
		100% of highest priority herpetofauna travel corridors within the I-75 Corridor are properly constructed and functioning.
		50% of highest priority herpetofauna habitat patches are under conservation status within the primary boundary and 75% within the I-75 Corridor.
Aerial Migrants	**Fair**	At least 50% of suitable habitat for migrating landbirds in the primary boundary is high quality (currently 31.6%).
		At least 40% of high-quality stopover habitat for all bird groups in the primary boundary is in conservation ownership or management (currently 26%).
		At least 50% of suitable habitat for migrating shorebirds in the primary boundary is high quality (currently 22.6%).
		At least 50% of suitable habitat for migrating waterfowl in the primary boundary is high quality (currently 22%).
Globally Rare Natural Communities	**Poor**	1,000 acres of lake plain prairie, mesic sand prairies, and lake plain oak openings will be created/restored resulting in a 100% increase of current acreage.
		50% of rare natural community acreage in the project area will be in moderate quality condition. (Based on MNFI criteria -≥ B/C rank) which indicates that the occurrence is at least considered to be in good or fair condition or viability).
		80% of rare natural community acreage in the project area will be under some sort of conservation status (currently 66%).
Coastal Wetlands	**Fair**	Coastal wetland area will increase by 15% (900 acres) compared to the existing coastal wetland area (2015).
		The average rating across coastal wetlands for each coastal wetland index (fish, heptofauna, macrophytes, marsh birds, and water quality) will reflect a good rating.

Stressors

After assessing the viability for each of the conservation targets, the TAC and local stakeholders identified and ranked key challenges, or stressors, to each conservation target. Three major criteria assisted the process: 1) scope, 2) severity, and 3) irreversibility (Salafsky, et al. 2008). After the ranking exercise, the stressors with the highest impact across the study area were: invasive species, agricultural drainage and runoff, urban development and runoff, and poorly functioning road stream crossings.

Key Landscape-Scale Strategies

Several local stakeholder working group sessions developed a full list of strategies to minimize the impact of the four key stressors on the conservation targets. Three criteria helped rank these strategies: 1) benefits, 2) feasibility, and 3) costs. The overall goal of this landscape-scale planning effort is to identify strategies that will significantly improve and enhance the condition of the conservation priorities in the study area. The top strategy to address each stressor is listed in Table 2. A final technical analysis assessed the level of benefit of each of these four strategies. Based on the analysis, it appears that the countywide initiative to "Promote the Integration of New Economic Development with Ecological Enhancement" could have the largest benefit for all conservation targets. An example would be updating local zoning codes and development ordinances to support implementation of green infrastructure in new development and redevelopment projects. Coastal wetlands, coastal tributaries, and herpetofauna connectivity could also experience the biggest benefits from implementing these four strategies. However, globally rare natural communities, inland wetlands, and aerial migrants are predicted to receive fewer benefits. Detailed action plans for each strategy are included in the Appendix.

Table 2
Strategies to Address Major Stressors and Improve the Viability of Conservation Targets

Stressor	Strategy
Invasive Species	Enhance the impact and capacity of the two existing cooperative weed management areas.
Agricultural Drainage & Runoff	Implement Demonstration "Smart" Drain Assessment Project that facilitates the use of effective Lake Plain BMPs.
Urban Development & Runoff	Create a new county initiative that takes an integrative approach to economic development and ecological enhancement.
Poorly Functioning Road Stream Crossings	Conduct a comprehensive needs assessment for road stream crossings in the county.

Potential I-75 Corridor Strategies

At the center of this conservation planning project is the I-75 Corridor and its right-of-way. MDOT has the opportunity to directly benefit several of the conservation targets as it reconstructs I-75. For example, MDOT will:

- Focus on meaningful wetland mitigation.
- Apply best management practices (BMPs) for managing stormwater runoff.
- Meet road stream crossings design standards for fishes and herpetofauna.
- Coordinate invasive species control efforts with Cooperative Weed Management Areas (CWMAs).
- Transplant rare species in the right-of-way (ROW) to appropriately managed sites.
- Install educational information at I-75 rest stop.

Focusing on meaningful wetland mitigation and adapting road stream crossing designs for fishes and herpetofauna have the highest potential positive impacts on most of the conservation targets. Coordinating invasive species control efforts with existing cooperative weed management areas (CWMAs) should also yield high impacts, particularly for coastal wetlands and herpetofauna connectivity. Managing stormwater runoff from the I-75 Corridor is another priority strategy for the long-term road reconstruction process. As the volume of runoff reaching the waterways is reduced and the quality of runoff discharging to local tributaries improves, conservation targets influenced by coastal tributaries, particularly coastal wetlands and migratory fish, should see improved health.

MDOT completed a herpetofauna survey to prioritize reptile and amphibian habitat.

MDOT is reusing soil to preserve native seed bank.

MDOT completed a culvert survey to prioritize road stream crossings to improve fish and wildlife passability.

Measures of Success

Measures of success help determine if specific strategies and their actions result in benefits for the conservation targets. To measure success, three items need tracking: 1) actions taken, 2) stressors, and 3) viability of the conservation targets. The actions are the detailed activities associated with each of the conservation strategies. Measurement includes documentation of actions and their results. The sum of these actions should lead to a decrease in the impact of one or more stressors. For example, actions could lead to fewer stream barriers, less runoff, less pollution, or less habitat fragmentation.

Lastly, the viability of each conservation target needs to be measured. Decreasing a stressor (i.e., poorly functioning road stream crossings) should result in improved health of at least one conservation target. Indicators identified in Chapter 5: Evaluating the Viability of Conservation Targets can help measure viability.

Over time, each conservation target's viability should improve from poor to fair condition, to a good condition if the conservation action plan is effective.

Next Steps

Now that the landscape-scale planning is completed, and the first portion of the conservation planning process is complete, the next step is to implement the actions identified under each of the landscape-scale strategies and measure their impacts. Some of the organizations committed to implementation are described below.

MDOT

MDOT has begun implementing many of the high-priority conservation strategies within the I-75 Corridor. For example, MDOT has identified a coastal wetland restoration opportunity in Erie State Game Area and has moved threatened native plants to a prairie restoration site in Sterling State Park. However, making progress on the broader landscape-scale strategies will require more collaboration between MDOT and the partnering groups who participated in this study. This plan will hopefully encourage state and local stakeholders by identifying possibilities for partnerships, laying out a path for measuring progress, and creating draft action plans. More MDOT actions are described in Chapter 8.

SEMCOG

SEMCOG will support implementation of each strategy by working with its members and local stakeholders and providing assistance to guide various implementation activities. SEMCOG's *I-75 Corridor Conservation Action Plan in Monroe County* website includes online resources related to this conservation planning effort including maps, summaries, contact information, and the final report.

Long-Term Monitoring

This study has identified six conservation targets that will require data collection over a period of years to decades. Sharing that data with partners, community leaders, and interested stakeholders helps maintain momentum and document progress. MDOT will collect data for its activities within the I-75 right of way, as well as for mitigation commitments outside of the right-of-way. The Michigan Department of Environmental Quality may provide a boost for data collection as they explore a new communication system for monitoring conservation activities in the WLEB with their partners at The Nature Conservancy (TNC). Fortunately, there are several large conservation agencies and organizations that manage land in

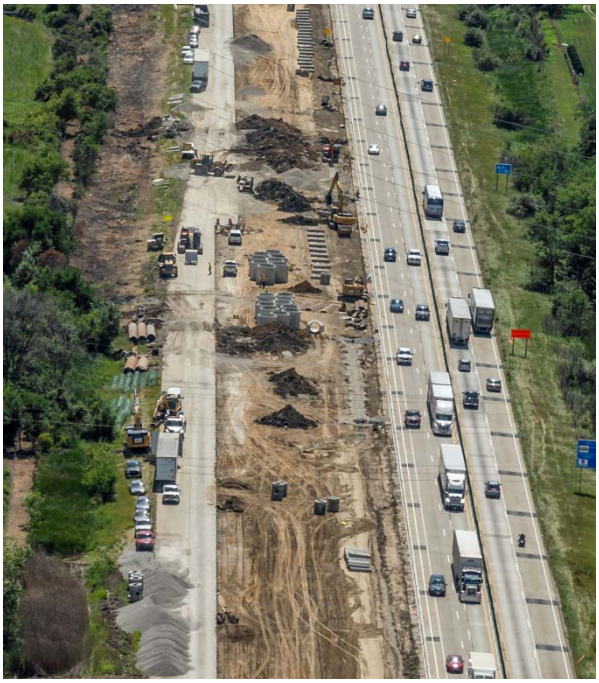
the region and have a strong interest in long-term success. These groups might also participate in long-term monitoring.

Conclusion

Overall, the I-75 Corridor Conservation Action Planning process has provided an opportunity to enhance ecological outcomes related to the reconstruction of I-75. Throughout this planning process, numerous partners, experts, and stakeholders have participated with the hope of reversing some of the past ecological losses and avoiding future degradation. This plan provides a blueprint for changing the narrative in the WLEB, from ecological exploitation to leveraging ecological assets for economic prosperity. As MDOT implements the plan, lessons learned will likely transfer to other roadway reconstruction projects occurring in sensitive natural resource areas.

While this plan was inspired by the reconstruction of the I-75 Corridor, the plan considers the larger ecological landscape and provides an opportunity to look beyond the primary boundary of I-75 and identify the best set of conservation strategies that can enhance the viability of the six conservation targets.

Protecting conservation targets using landscape-scale strategies is the vision of this conservation plan.



Aerial view of fence-line-to-fence-line construction.

Chapter 1: Introduction

I-75 in Monroe County will undergo complete reconstruction over a 20-year timeframe. The first five-mile segment began in 2015 (Figure 4). The Michigan Department of Transportation (MDOT), in partnership with the Southeast Michigan Council of Governments (SEMCOG), and Michigan Natural Features Inventory (MNFI), a program of Michigan State University Extension's Greening Michigan Initiative (GMI), received funding through the Federal Highway Administration's Strategic (SHRP2) to develop an overarching conservation plan that supports local environmental protection and restoration priorities while implementing the Eco-Logical approach.

Eco-Logical is an ecosystem approach to developing infrastructure projects that address ecosystem priorities on a landscape scale during planning.

Aerial view of I-75 reconstruction.

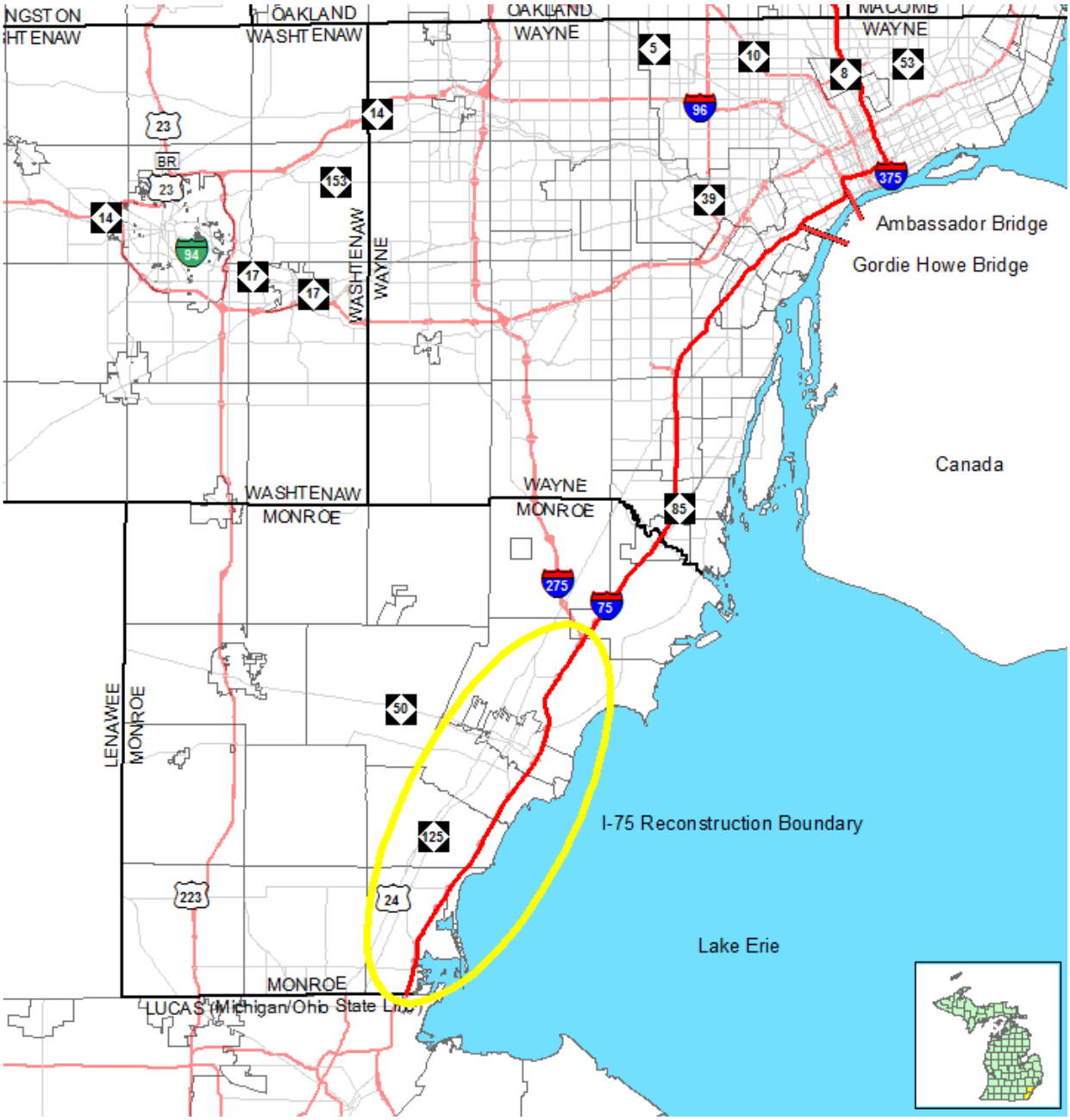
Eco-Logical is an ecosystem approach to developing infrastructure projects that addresses ecosystem priorities on a landscape scale during planning. Specifically, this conservation action plan identifies conservation and mitigation opportunities very early to support cost and time savings for the long-term reconstruction of I-75.

The conservation planning process has brought various federal, state, and local stakeholders together to look for efficiencies and partnering opportunities. Additionally, local stakeholders helped identify local priorities and provided direction on potential partnership opportunities.

Finally, the plan identifies high-impact environmental challenges and specific strategies for partnering agencies and organizations to pursue in the future to achieve long-term success.

This *I-75 Corridor Conservation Action Plan in Monroe County* represents a compendium of existing environmental conditions, goals, and strategies for implementation, along with actions that MDOT can pursue through the reconstruction process to enhance strategic environmental outcomes for the region.

Figure 3
Location of I-75 and International Border Crossings



Source: SEMCOG, 2016.

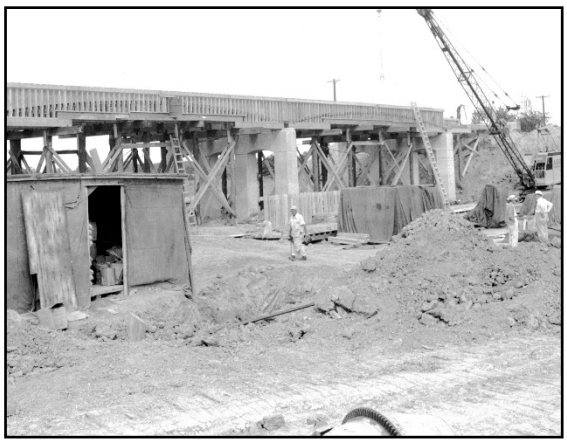
Historic construction of a bridge. (MDOT)

Historic main-line construction. (MDOT)

History of I-75 in Monroe County

Built in the early 1950s, I-75 in Monroe County connected two important industrial manufacturing cities, Detroit and Toledo. Prior to creation of the nation's interstate highway program in 1956 by President Eisenhower, the Michigan State Highway Department and the Wayne County Road Commission built freeways for Detroit area World War II factories. Following the war, the state's economy continued to rely on manufacturing, and I-75 construction was a priority for transportation development using the straightest path along the Lake Erie shoreline. Ultimately, the Michigan freeway became part of the nation's interstate system as I-75, stretching from Canada to Florida.

Historic bridge pier in the water. (MDOT)



Historic construction of overpass. (MDOT)

Background

MDOT identifies the I-75 southeast gateway corridor into the Lower Peninsula as critical to transportation and economic development in Michigan. It is also identified as a *Corridor of Highest Significance*, recognizing that improvements to the corridor can increase Michigan's economic competitiveness (2040 State Long Range Transportation Plan).

I-75 in Monroe County is a critical component of the national and North American freight distribution network. This section of freeway is the primary connection between Michigan's industrial centers in Detroit, Flint, and Bay City and the automotive and other manufacturing supply chains in Ohio, Kentucky, and Tennessee. I-75 also provides distribution access to the large population centers on the East coast.

I-75 in Monroe County is similarly an indispensable link between the U.S. and the industrial centers of Canada. I-75 connects the U.S. directly to the Ambassador Bridge, which facilitates almost 2.5 million truck trips per year and accounts for 21 percent of all U.S. exports to Canada (Figure 3). I-75's importance to the national and North American economy will only increase as the new Gordie Howe International Bridge, scheduled to open in 2020, will also connect directly to I-75.

At the same time, this corridor also exists within an ecologically significant area containing globally imperiled ecosystems, several major river systems, and a very productive Lake Erie nearshore and coastal zone. Additionally, over 67 percent of Monroe County consists of green space, including over 20,000 acres of wetlands, approximately 8,000 acres of parks, over 120,000 acres of agricultural land, and 6,000 acres of riparian corridors. Monroe County is also home to the Minong-Petersburg Prairie located within the Petersburg State Game Area.

Petersburg State Game Area

Petersburg State Game Area is one of the last and largest contiguous areas of lakeplain prairie and oak savanna in Southeast Michigan. Petersburg State Game Area's rare natural communities are home to many special plants and animals. For example, the game area is a release site for federally endangered Karner Blue Butterflies, which are captive-reared at the Detroit Zoo. The primary host plant for this butterfly is wild lupine, still found in abundance at Petersburg State Game Area.

Beach at Sterling State Park.

The location and significance of the I-75 corridor to Lake Erie and other natural and water resources provide both challenges and opportunities for transportation planning and design professionals. Over the past 200 years, this area's natural lands and water resources have experienced tremendous stress. Wetland loss, habitat degradation, introduction of invasive species, and stormwater runoff carrying pollution and sediment, have all strained the natural ecology of the area. Despite these impacts, this region still harbors several globally imperiled natural communities, including lakeplain prairies, oak openings, wet-mesic flatwoods, and Great Lakes marshes.

These imperiled communities provide habitat for a number of threatened and endangered plant and animal species, including:

- State threatened eastern fox snake
- Federally threatened prairie white-fringed orchid
- Federally endangered Indiana bat
- Federally endangered Karner Blue Butterfly
- State endangered Henslow's Sparrow

Globally-impaired natural communities

Southeast Michigan was largely forested with pockets of prairies, oak savannas, wetlands, and marshes in the 1800s. Development of the region has led to large reductions of natural areas (Wildlife Habitat Council, 2002). For example, less than one percent of the original lakeplain prairies and oak openings remain in the region. This has led to a number of native ecosystems to be globally imperiled, including Great Lakes marsh, Lakeplain prairie, Oak openings, and Wet-mesic flatwoods

Federally endangered Karner Blue Butterfly.

State endangered Henslow's Sparrow.

Other potential federally listed species that might benefit from ecologically based transportation planning include:

- Recently listed federally threatened northern long-eared bat
- State threatened spotted turtle
- State listed special concern Blanding's turtle.

The spotted and Blanding's turtles are known to occur within the region, and are associated with many of the wetland systems found near the coast. Both the spotted and Blanding's turtles are currently being considered for federal listing.

The coastal marshes in this area support world-class freshwater fisheries, including perch and walleye and some of the most significant stopover habitat for migratory birds in the Great Lakes region, particularly for waterfowl. Henslow's Sparrow is one of the migratory birds that depend on large grassland complexes such as lakeplain prairie.

Federally threatened Eastern Prairie Fringed Orchid.

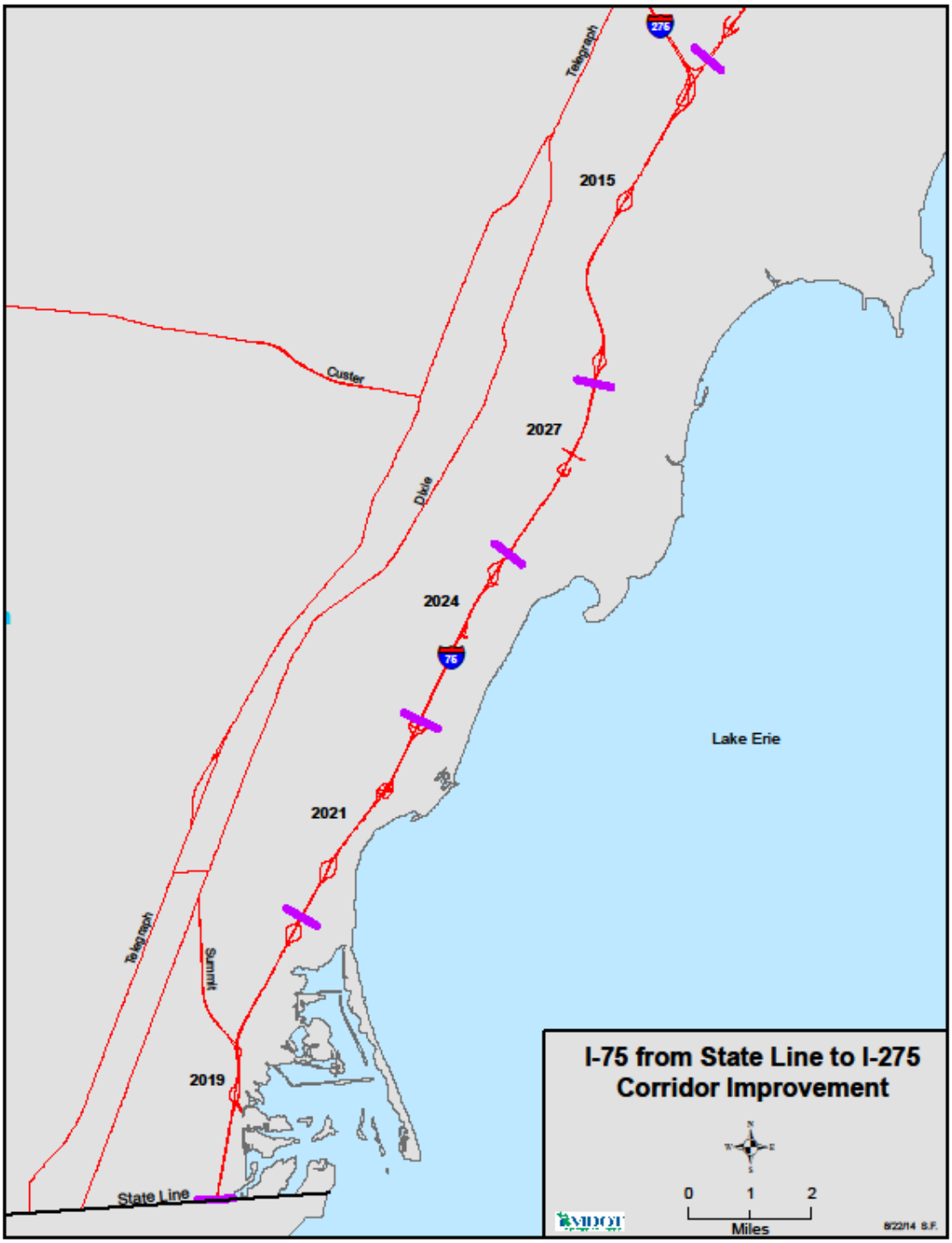
Local watershed plans, WLEB plans and studies, and the international Lake Erie Biodiversity Conservation Strategy (Pearsall et. al. 2012) have identified a consistent set of environmental priorities in this region.

Over the next several decades, MDOT plans to reconstruct 20 miles of I-75 in Monroe County in five segments. The first segment extends south of the I-75/I-275 split to Dixie Highway interchange north of Monroe. Construction began in 2015 and will finish in 2016. The remaining segments appear in Figure 4 which shows the length of each segment and the year proposed for construction. The work results in earth disturbance from fence-line to fence-line within the entire right-of-way, encompassing about 300 feet in width. Most of the aging bridges and culverts require complete replacement. The new roadway will be higher in elevation and have a completely new drainage system. Given its close proximity to Lake Erie, MDOT recognized that sensitive environmental resources might need mitigation. Mitigation requirements could include wetlands, rare plants and animals, and stormwater runoff treatment.

Environmental Priorities

- Reduce nutrients from agricultural runoff.
- Improve base flow and reduce flashiness in local waterways.
- Control invasive species.
- Improve migratory fish passage.
- Enhance the globally significant migratory bird passageway.
- Protect and restore globally imperiled natural communities.(Pearsall et. al., 2012)

Figure 4
Proposed Timeline for I-75 Reconstruction Segments



Source: MDOT, 2016.

Eco-Logical Grant Opportunity

MDOT, together with MNFI, and SEMCOG received a $250,000 grant through FHWA's SHRP2. Together, these agencies represent the Core Team for the study. FHWA and the American Association of State Highway Transportation Officials (AASHTO) offered this grant opportunity to encourage the use of landscape-based, ecological crediting practices, and to help major infrastructure projects identify environmentally sensitive alternatives and develop mitigation concepts prior to design development stages.

In 2006, the FHWA worked with eight partner agencies to create *Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects* (*Eco-Logical*), a guide to encourage federal, state, tribal, and local partners involved in infrastructure planning, design, review, and construction to explore flexibility in regulatory processes to achieve greater environmental benefits(Institute for Natural Resources, et. al. 2012).

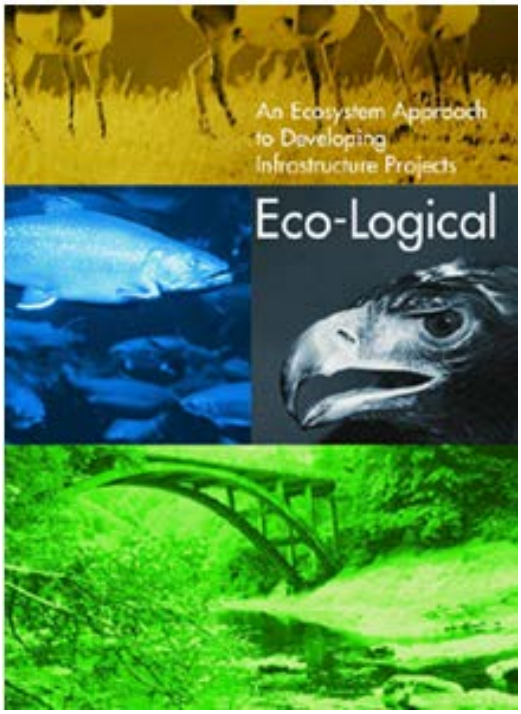
The Eco-Logical process includes development of an Integrated Ecological Framework (IEF) identifying spatially based priorities for avoidance, minimization, and mitigation of environmental impacts. The IEF uses Geographic Information Systems (GIS) technology to examine relationships between different conservation targets, the landscape, and the impacts of proposed construction work. It is a flexible tool that facilitates environmental analysis and planning. Creating an IEF may result in increased regulatory certainty and more effective environmental outcomes that mesh with local priorities.

Twenty miles of I-75 in Monroe County will be reconstructed.

The primary outcomes of the grant are to implement the first five steps of the IEF for the I-75 Corridor in Monroe County:

- Build and strengthen collaborative partnerships.
- Characterize resource status.
- Create regional ecosystem framework.
- Assess land use and transportation effects.
- Establish and prioritize ecological actions.

The full list of steps in the IEF process are detailed in Table 4.



Fortunately, much of the Lake Erie shoreline is managed by conservation groups and government agencies, such as The Nature Conservancy (TNC), the U.S. Fish and Wildlife Service (USFWS), the Michigan Department of Natural Resources (MDNR), and the U.S. Army Corps of Engineers (USACE). These groups have a strong interest in the WLEB's ecological future. By integrating MDOT's transportation planning process with the decision-making processes of other key stakeholders, the partnership will have greater successes in identifying, developing, and capitalizing on high-priority mitigation and restoration opportunities for future phases of the I-75 reconstruction. A collaborative comprehensive conservation action plan by MDOT and key stakeholders in Monroe County will strategically align many common priorities. It is anticipated that early and continuous collaboration with key partners will lead to regulatory agency buy-in; identify viable funding sources; and implement priority protection, enhancement, and restoration activities in the region.

A collaborative comprehensive conservation plan by MDOT and key stakeholders in Monroe County will strategically align many common priorities.

This comprehensive, conservation action plan provides the framework and relationships to implement conservation and mitigation strategies in the future. Over time, this will aid in restoring and maintaining this globally significant area through protection and enhancement of these special natural resources, as well as streamlining the transportation development process for I-75. Just as important, the successful completion of this pilot project in Michigan may be used as a template to integrate environmental planning early in the long-range transportation planning process. This will advance transportation, economic, and ecological outcomes across the entire seven-county SEMCOG region.

I-75 Eco-Logical grant objectives

- Develop partnerships between MDOT, resource agencies, and conservation organizations to maximize environmental outcomes.
- Identify and prioritize regionally significant conservation targets and associated goals, objectives, indicators, strategies, and actions.
- Geospatially identify places on the landscape for targeted restoration and/or protection actions.
- Effectively integrate conservation strategies and actions into the I-75 planning and design processes.

Northbound reconstruction on I-75.

Eco-Logical Roadmap

The following chapters in this report focus on the key steps and outcomes of the conservation planning process.

- **Chapter 1:** Introduction
- **Chapter 2:** Characteristics of the I-75 Eco-Logical Study Area: Background and History
- **Chapter 3:** Conservation Action Planning and the IEF
- **Chapter 4:** Selecting the Geographic Scope and Conservation Targets
- **Chapter 5:** Evaluating the Viability of Conservation Targets and Establishing Goals
- **Chapter 6:** Characterizing Stressors
- **Chapter 7:** Priority Conservation Strategies
- **Chapter 8:** Implementing the Eco-Logical Plan

Should others want to replicate this process for transportation plans, each chapter explores the key conservation planning steps in detail. This *I-75 Corridor Conservation Action Plan in Monroe County* ends with a list of future actions and a discussion of what the core team learned about applying the conservation planning process to a major transportation improvement.

Chapter 2: Characteristics of the I-75 Eco-Logical Area – Background and History

The I-75 Corridor Eco-Logical study area is primarily located in Monroe County, the southernmost of the seven counties in the SEMCOG region. It is bordered by Lake Erie to the east, Ohio to the south, Wayne County to the north, and Washtenaw and Lenawee Counties to the west.

The highway corridor is an important infrastructure asset within the county and region. This chapter describes historic land use and natural resources in Monroe County, current land use and natural resources, and the importance of the Lake Erie coastal areas.

I-75 construction in Monroe County, 2015. (MDOT)

Historic Land Use and Natural Resources

I-75 in Monroe County is only the latest of transportation links crossing through Western Lake Erie's coastal plain. Western Lake Erie's extensive natural resources attracted many Native Americans in prehistoric times to utilize the coastal plain's diverse plant and animal resources for food and materials. As prehistoric highways, Lake Erie and its tributaries provided access to an extensive geographic area. Today, 12 different tribes trace some of their history to the Western Lake Erie area, with the Pottawatomi and the Wyandot tribes most commonly noted by the early Euro-American settlers and government officials. The River Raisin provided particular advantages for both Native Americans and settlers with its wide passage and many natural resources.

Hutchison and Hutchison (2004) provide a more descriptive account of the River Raisin and the surrounding area in the early years.

"The river was full of huge sturgeon, black bass, and white fish. Ducks, geese, swans, and muskrats filled the marshes. Beaver, mink, and otter were in and around the creeks… The fall was harvest time for wild rice in the marshes."

The first French fur trader, Francis Navarre, took up residence on the south shore of the River Raisin in the 1780s. Soon French settlers built ribbon farms, long thin parcels of land providing each farmer with access to both the river and more upland resources extending back from the water highway. These farms became known as Frenchtown, located on the north side of the River Raisin near today's River Raisin National Battlefield Park.

Artist Tim Kurtz's rendition of Frenchtown, Monroe County, Michigan (NPS).

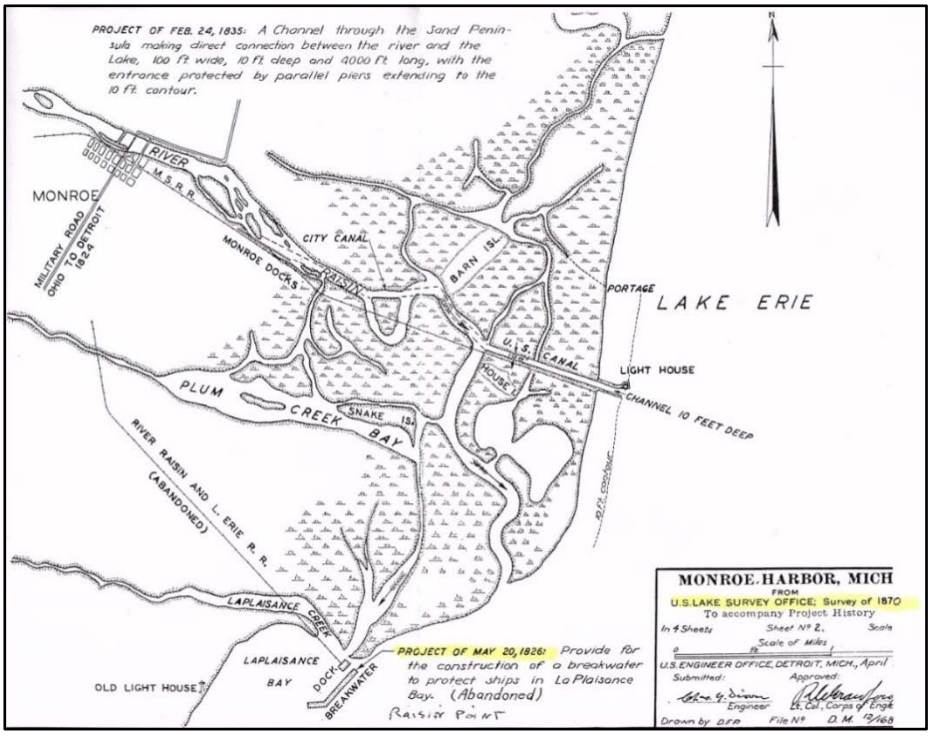
The British followed the French as the dominant force in the Great Lakes, and then the Americans successfully over threw the British during the War of 1812. The Americans built military roads through Monroe County after the war to link Detroit to Ohio. Frenchtown became Monroe, incorporated in 1817. In 1836, the Army Corps of Engineers excavated a channel through the River Raisin delta to provide direct passage from Monroe to Lake Erie (Figure 5).

The City of Monroe especially benefited from close proximity to the River Raisin, Lake Erie, and the coastal zone natural resources. Entrepreneurs created hunt clubs for waterfowl and muskrat hunters prior to industrialization. In the mid-1800s, locals would take visitors from Detroit and Toledo by boat to the famed 1,000-acre lotus beds in the delta marsh at the mouth of the River Raisin.

Once Monroe became an industrial and transportation hub, the River Raisin and the coastal zone underwent constant modifications to accommodate changing economic needs. The first paper mill in Monroe was established in 1834, and Monroe soon became an important paper mill and railroad town in the mid to late 1800s (Dodge, 1998). Some of the most significant changes to Monroe's coastal area occurred in 1932 when the Port of Monroe Authority (PMA) was established. At the time, the River Raisin delta contained over 800 acres of coastal marsh. Starting in 1947, the PMA used waste produced from nearby industrial operations to fill in these vast wetlands for the next 40 years (MDNR, 1987). Numerous industrial facilities, primarily related to the automobile industry, were built on the fill. Detroit Edison built its massive coal fired power plant within the former delta, redirecting some of the river flow for its operations. Detroit Edison remains one of the biggest land owners in the Monroe coastal zone.

When the State Highway Department brought I-75 through Monroe, it avoided the central business district and residential areas, instead threading the freeway between industrial land uses such as the wastewater treatment plant and an auto-related manufacturing facility. The freeway provided much desired access to the city with ramps located close to the River Raisin. I-75 filled many acres of former coastal marsh and divided other marshes into smaller segments altering the hydraulic dynamics of the coastal zone.

Figure 5
Map of Monroe Harbor, Michigan, 1870



Current Land Use and Natural Resources

Although the region was initially difficult to farm due to expansive, dense forests and poorly drained clay soils, it was discovered that clay lakeplain soils are very productive, once drained of excess water, for row crops, particularly corn, soybeans, and wheat.

Today, the predominant land use in Monroe County and the surrounding region is agriculture. The food and agriculture industry in Michigan contributes $91.4 billion annually to the state's economy and is responsible for 22 percent of the state's employment. Agricultural lands are a significant component of Monroe County's open space.

Land use and land cover are useful tools to support decision-making when defining environmental priorities. While agriculture dominates, the other land use characteristics are shown in Table 3 and Figure 7.

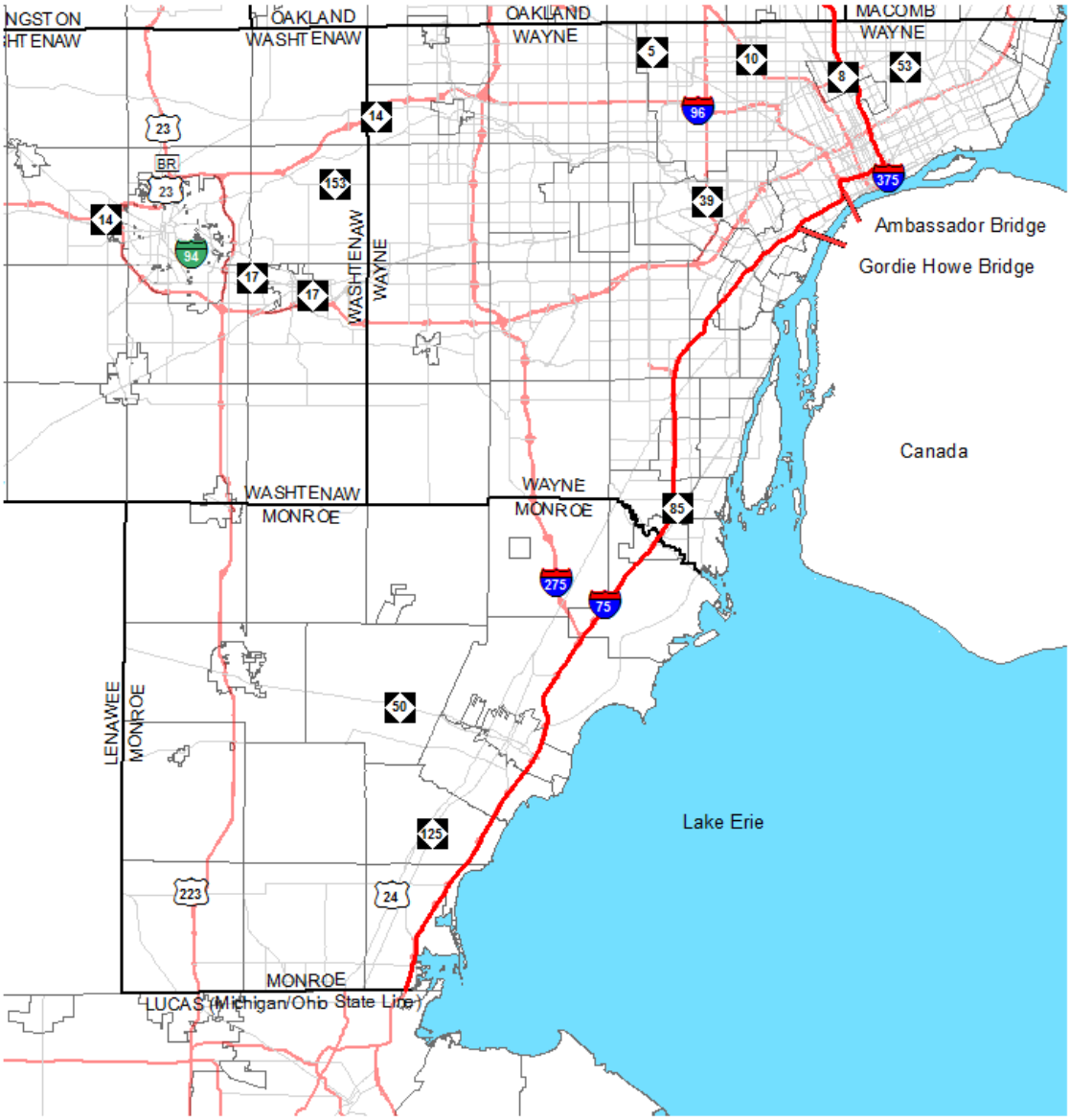
Table 3
Monroe County Land Use

Land use	Agriculture	Residential, commercial, and industrial	Government transportation and utilities	Parks recreation and Open Space	Water
Percent	55%	35%	5%	3%	2%

Monroe County agricultural production rank in Michigan

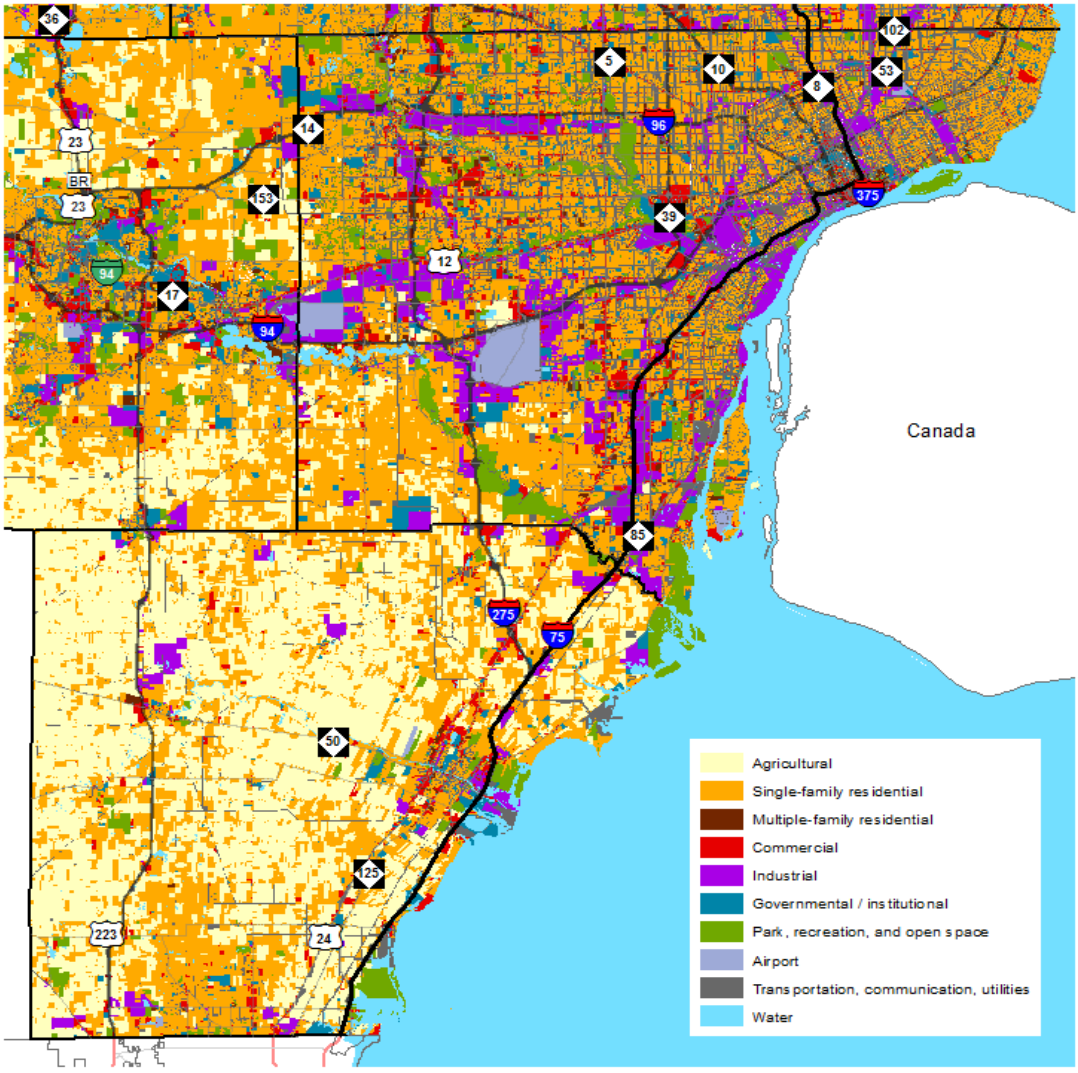
- #4 in revenue from vegetables
- #5 in revenue from nursery, greenhouse, floriculture, and sod
- #7 in acres of vegetables and acres of corn, soy, and wheat
- #8 in total crop sales

Figure 6
General Study Area



Source: SEMCOG, 2016.

Figure 7
Land Use in the General Study Area



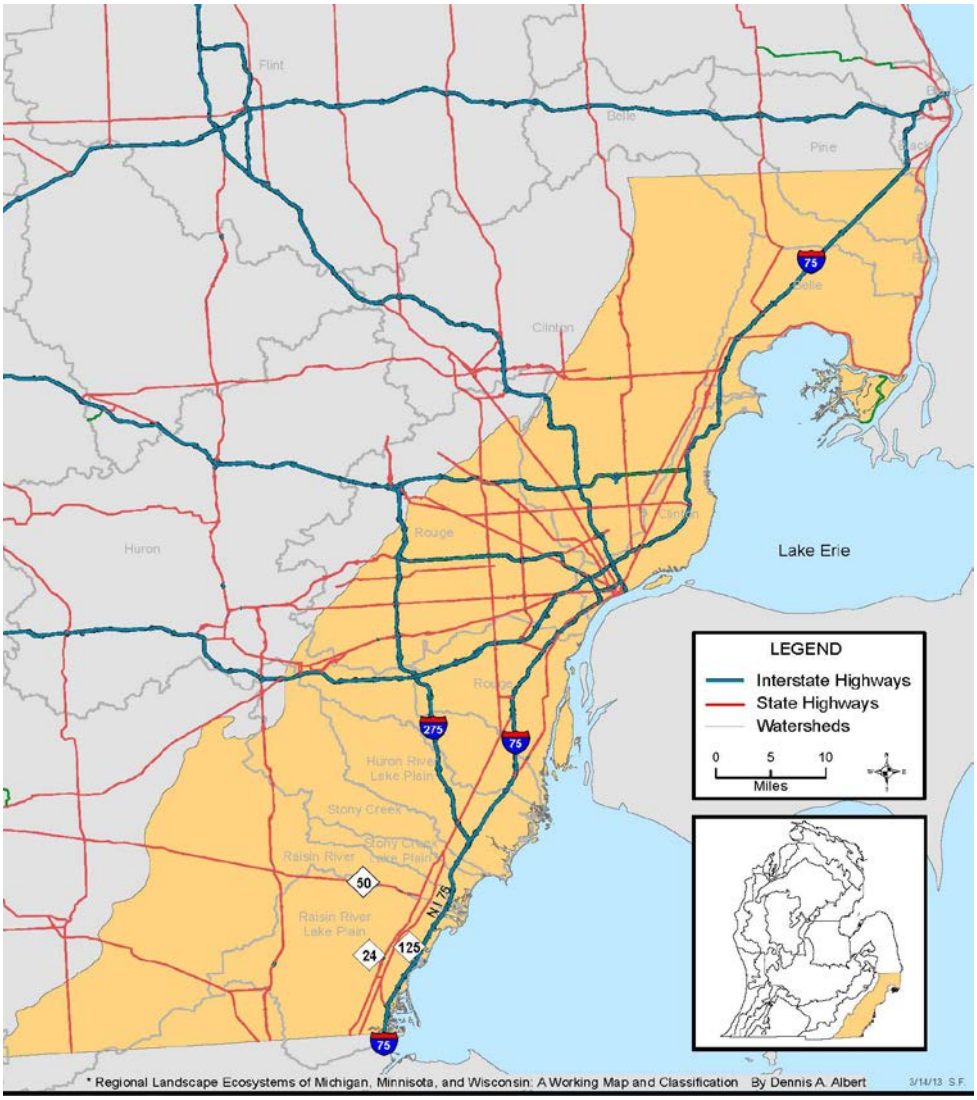
Source: SEMCOG, 2008.

Geology

The I-75 Eco-Logical study area is located within the larger Maumee Lakeplain sub-subsection (sub-subsection VI.1.1) and the Huron/Erie Lakeplains ecoregions. (Figure 8). The Maumee Lakeplain is an extremely flat landscape characterized by a narrow band of sand over clay of glacial origin. The clay plain is dissected by several broad glacial drainageways of sandy soils. Sandy beach ridges, formed by glacial lakes, are common on both the clay plain and broad drainages, particularly further inland.

Underlying the clay glacial lake bed of the Maumee Lakeplain is a deposit of Mississippian, Devonian, and Silurian bedrock. The bedrock in the study area is primarily Devonian limestone and can be located one-two feet from the surface in some areas.

Figure 8
Regional Landscape Ecosystem Subsub Section VI 1.1* Maumee Lakeplain



Woodlands and Wetlands

This landscape was created by glacial lakes. The clayplain consists of a mosaic of slight rises with well drained soils and depressions of poorly drained soils. Elevation differences of one-two feet within the lakeplain are common, allowing for development of different plant communities. Prior to European settlement in the 1800s, inland wetlands occupied approximately 149,700 acres of land, or 60 percent of the study area west of Telegraph Road.

The Maumee Lakeplain is a relatively flat, poorly drained landscape. Historically, it was dominated by a variety of both forested and open natural community types. Some of these natural communities are still considered relatively common today, such as mixed hardwood swamp and floodplain forest. Over the past 200 years, lakeplain prairie has suffered significant habitat loss and degradation due to conversion to agriculture, residential, and industrial development; alterations of groundwater hydrology; and fire suppression. Fire suppression and hydrologic alterations such as ditching and drain tiling promote shrub and tree invasion, which reduces grass cover and the fine fuels capable of carrying a fire (Kost et al, 2007). In addition, invasive plants thrive with nutrient enrichment, fire suppression, and hydrologic alteration.

Both types of lakeplain prairie are dominated by a combination of wetland and prairie species adapted to seasonally fluctuating water levels, fire, beaver flooding, and somewhat poorly to poorly drained soils. Lakeplain wet prairies occur on the glacial lakeplains of the Great Lakes in southeastern Wisconsin, northeastern Illinois, northern Indiana, southern Michigan, and northern Ohio; and in southern Ontario, Canada. Michigan's lakeplain prairies occur along the shoreline of Lake Huron in Saginaw Bay, within the St. Clair River Delta, and near Lake Erie. Lakeplain prairies are among the most diverse plant communities in Michigan, with as many as 200 plant species found within a single prairie remnant (Cohen, 2005). In addition, a disproportionately high number of rare plants and animals are associated with both of these unique natural communities.

Lakeplain Oak Openings are typically found on old sandy beach ridges formed during previous glacial periods as the Great Lakes receded, but can also occur in adjacent sandy depressions. These semi-forested communities are dominated by large, scattered oaks characterized by a mix of wetland, woodland, savanna, and prairie species. Lakeplain oak openings persist when fire, hydrology, and/or drought prevent canopy closure (Kost et al 2007).

Wet-mesic flatwoods are wetland forests found on moderately drained sandy soils, containing a unique mixture of upland and lowland hardwood species tolerant of seasonal flooding, primarily in the spring. They typically occur on a thin layer of moderately drained sandy soil over clay. Vernal pools are abundant in wet-mesic flatwoods and serve as breeding ponds for aquatic invertebrates and amphibians.

Since this system was only recently recognized as a distinct natural community type, little is known about its historic extent, but it is considered to be globally imperiled by NatureServe. (NatureServe is an international conservation organization that tracks the global and state rarity of plants, animals, and natural communities.) However, it is possible that this unique forested wetland may have been mapped as mesic southern forest (a relatively common natural community), during the statewide effort to map circa 1800 vegetation. As a result, wet-mesic flatwoods may have been somewhat common prior to European settlement. Based on that assumption, it is estimated that wet-mesic flatwoods could have covered as much as 134,759 acres or 40 percent of the project area in the early 1800s.

Mesic Sand Prairie is a fire-dependent type of grassland that prefers moderately-drained sandy soils. Sites that support mesic sand prairie experience fluctuating water tables, with relatively high water tables occurring in the spring followed by drought conditions in late summer and fall.

Dominant species include:

- Little bluestem (*Schizachyrium scoparium*),
- Big bluestem (*Andropogon gerardii*),
- Indian grass (*Sorghastrum nutans*),
- Pennsylvania sedge (*Carex pensylvanica*).

Wet-mesic flatwood forests were common on the poorly drained sandy soils. In areas with poorly drained clay soils, more common wetland types included Hardwood swamp, Southern shrub swamp, and Emergent swamp.

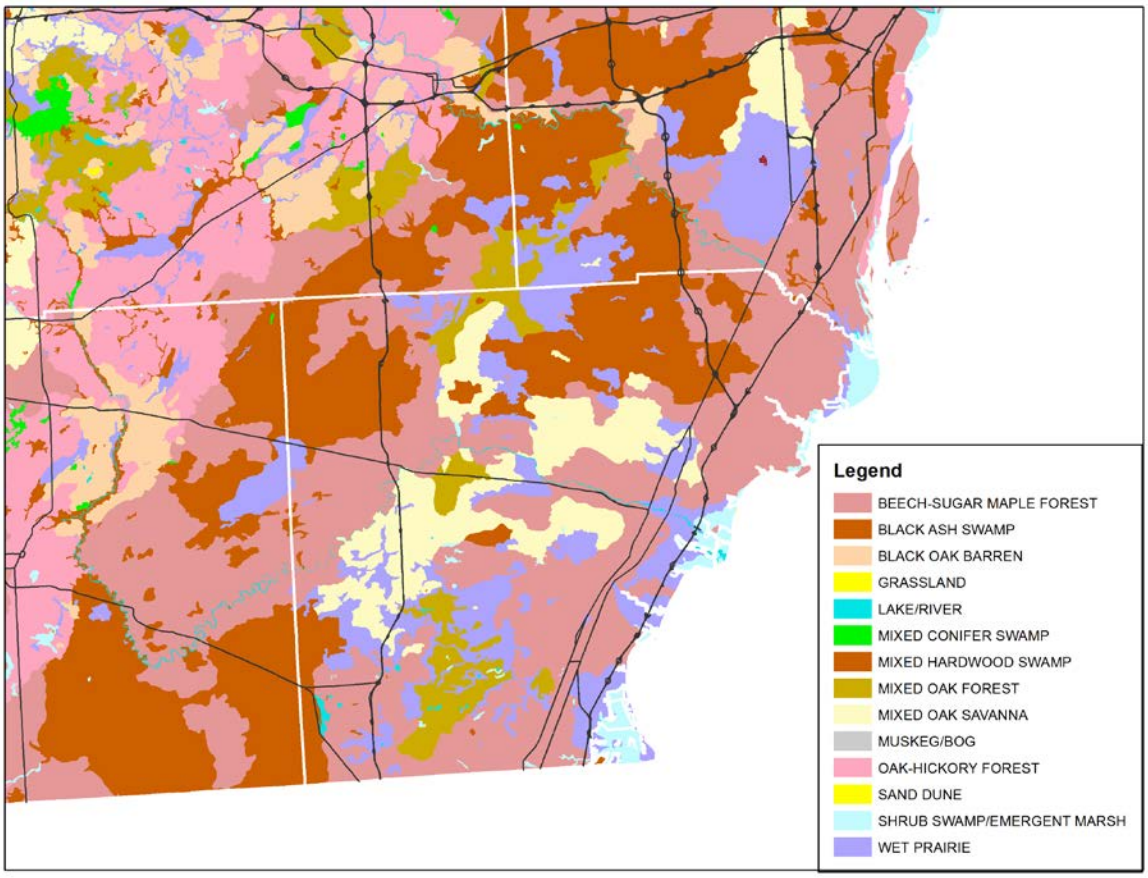
Along and near the Lake Erie coastal zone, rare wetland communities such as Great Lakes marsh and lakeplain prairie were common, along with oak openings on the slightly elevated beach ridges.

Beach ridges, created by wind and wave action when water levels were much higher during the last glacial period, can be found throughout the Maumee Lakeplain. As the ancient lakes receded, new beach ridges were formed extending far inland. Historically, these beach ridges were dominated by upland community types such as dry-mesic forest, oak openings, and, mesic sand prairie.

Swamp rose-mallow (Hibiscus moscheutos).

Stony Creek floodplain forest. (MDOT)

Figure 9
Michigan Vegetation, circa 1800, within the General Study Area



Coastal Wetlands

In the early 1800s, coastal wetlands fringed the majority of Monroe County's 22-mile Lake Erie coastline. Coastal marshes are considered to be one of the most productive natural systems in the Great Lakes region. Based on interpretation of General Land Office survey notes from the mid-1800s, Monroe County and Wayne County near the mouth of the Huron River contained about 28,615 acres of Great Lakes marsh. Due to the dynamic nature of the system, this estimate of Great Lakes marsh area also includes Lakeplain prairies located along the fringes of these marshes. During periods of high water in Lake Erie, these prairies were inundated, allowing more water tolerant plant species to eventually establish.

Vegetation patterning is very dynamic and influenced by Great Lakes water level fluctuations (Kost et al, 2007). Great Lake Marsh is a rare natural community that is globally imperiled according to NatureServe. Earthen dikes surround almost all of the remaining coastal wetlands in the Western Lake Erie Basin. Many of these dikes were created to protect coastal wetlands against high water levels experienced in the 1970s, severe storms, and waves from watercraft, as well as to provide more consistent waterfowl habitat during the fall hunting season.

Also of note, is that almost all of the remaining coastal wetlands in the area are owned and/or managed by either the Michigan Department of Natural Resources (MDNR), U.S. Fish and Wildlife Service (USFWS), or The Nature Conservancy (TNC). This public and nonprofit ownership presents opportunities for collaboration across agencies to enhance and expand these wetlands.

Great Lakes coastal wetlands are the most productive global natural systems, but are affected by Great Lakes water levels, development of shoreline areas, urban growth, industrialization, and agriculture. These near-shore water areas are very susceptible to pollution and degradation from polluted urban and agricultural stormwater runoff, industrial discharges, and sewer overflows.

Coastal wetlands in the Western Lake Erie Basin (WLEB) support a fishing industry worth 10s of millions of dollars; annual bird watching revenues are estimated at $26 million (Xie, 2012). These two activities alone support an $11.5 billion tourism industry in Ohio's seven coastal counties and a $9.6 billion coastal tourism industry in Michigan (Michigan SeaGrant, 2013). Walleye and sauger are especially popular, luring 0.6 million of the 1.7 million anglers who contributed $1.9 billion to the WLEB economy in 2011 (U.S. Department of Interior, 2011).

Water Resources

The entire I-75 Eco-Logical study area includes 13 primary subwatersheds that directly discharge into Lake Erie (Figure 10). The Huron River and the River Raisin are the largest river systems within the study area. Both of these rivers are easily navigable and are stewarded by the River Raisin Watershed Council and the Huron River Watershed Council.

Other smaller tributaries include Stony Creek, Sandy Creek, Swan Creek, Halfway Creek, Plum Creek, and Otter Creek. Due to the flat nature of the landscape, the majority of tributaries in this region are considered to be interstitial, characterized by short, low gradient, and slow-moving streams. Whitefish, lake sturgeon, white sucker, walleye, and white bass are known for spawning in the Western Lake Erie Basin tributaries.

The Western Lake Erie Basin and its tributaries are also known for harboring the highest diversity of native mussel species in Michigan (Peter Badra, personal communication). Twenty-two species of native mussels currently listed as special concern, threatened, or endangered were historically found in these tributaries (MNFI Biotics Database, 2015). This represents approximately 48 percent of the native freshwater mussel species known to occur in Michigan, and 78 percent of freshwater mussels listed as special concern, threatened, or endangered.

Many of the streams in this area have been impacted through dredging and channelization in addition to removing aquatic and riparian vegetation. These activities have supported economic activities for the region, including agriculture and commerce. Smaller drains located in headwater areas have also supported agricultural activities. Water quality and quantity in these drains are affected by stormwater runoff. At the same time, these water resources also exhibit higher-quality characteristics. For example, Stony Creek is characterized by natural sinuosity, diverse aquatic habitat, undisturbed substrate, and a relatively intact riparian zone (Stony Creek Watershed Management Plan, 2005).

The lower portion of the River Raisin was identified as an Area of Concern (AOC) in 1987 by the U.S. EPA (Selzer, 2009). The AOC stretches 2.6 miles along the Federal Navigation Channel; starting in downtown Monroe, just west of the I-75 road stream crossing at the Winchester Street Bridge, and extending into Lake Erie, along the nearshore zone (Figure 11). Local efforts within the Monroe

community have played a significant role in working to remove Beneficial Use Impairments (BUIs) in the River Raisin AOC. As of now, the Degradation of Aesthetics, beach closings, and eutrophication or undesirable algae BUIs have been removed. Additionally, in 2015 the MDEQ Office of Great Lakes submitted a Removal Recommendation for the Loss of Fish and Wildlife and Degradation of Fish and Wildlife Populations BUI.

Sterling State Beach, 1968.

Beneficial Use Impairments (BUIs) in the River Raisin AOC (USEPA, 2015)

- Restrictions on fish and wildlife consumption.
- Eutrophication or undesirable algae (removed, 2013).
- Degradation of fish and wildlife populations.
- Beach closings (removed, 2013).
- Degradation of aesthetics (removed, 2012).
- Bird or animal deformities or reproduction problems.
- Degradation of benthos.
- Restriction on dredging activities.
- Loss of fish and wildlife habitat.

Perhaps the most outstanding issue for the Lake Erie Nearshore that has re-emerged is nutrient pollution and eutrophication, with resultant Harmful Algal Blooms (HABs). Blue-green algae are cyanobacteria, the most common HABs that occur in the Western Lake Erie Basin. HABs can produce toxins that affect the health of people and pets that come into contact with water. They can cause fish kills and significantly impact coastline aesthetics. In 2011, Lake Erie experienced a significant HAB covering 1,930 square miles, three times greater than any previously observed bloom (LIAA, 2013).

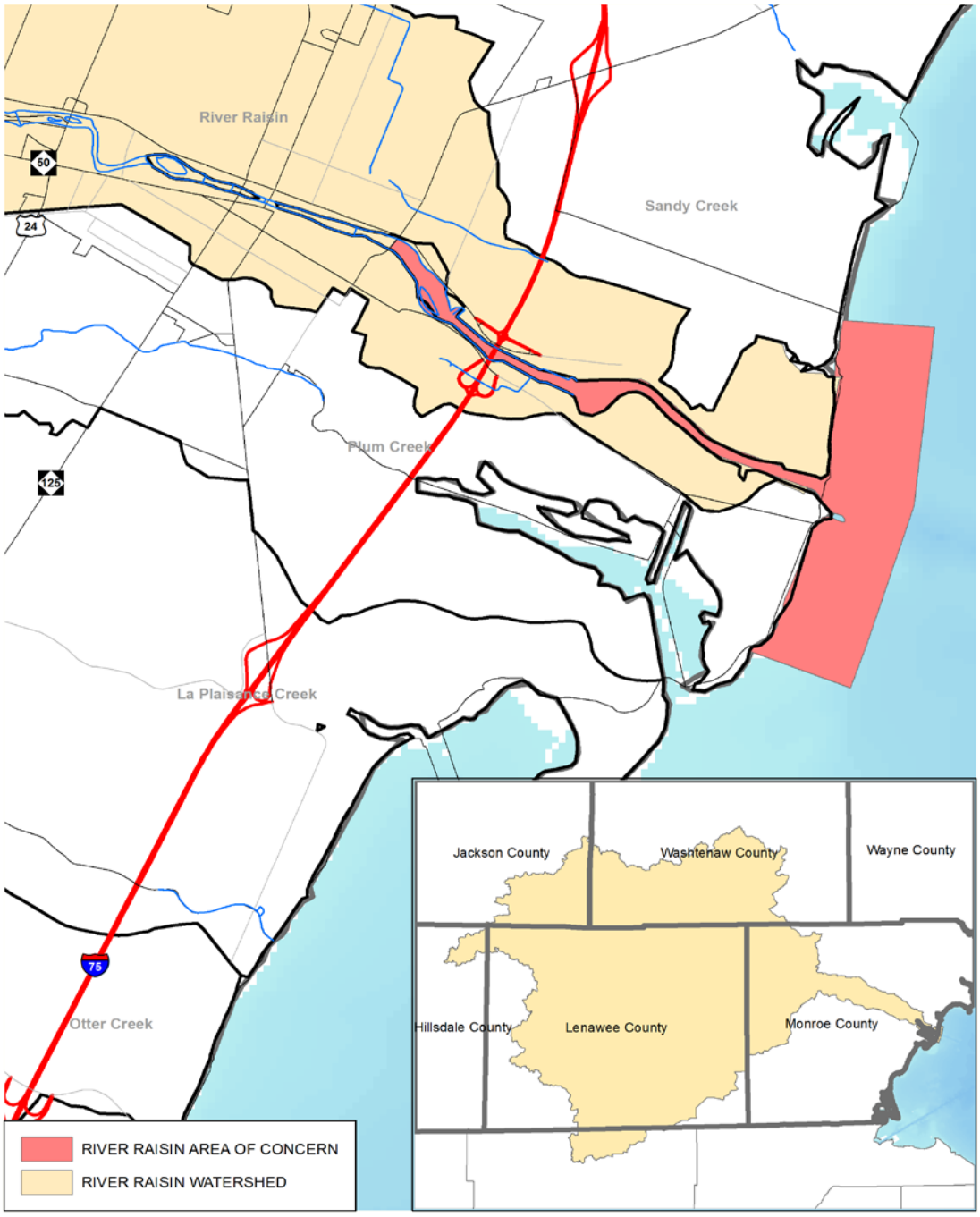
Harmful Algal Bloom in the Western Lake Erie Basin in 2013.

Algal bloom advisory sign.

Figure 10
Lake Erie Direct Drainage Subwatersheds

Source: SEMCOG, 2016.

Figure 11
River Raisin Area of Concern



Source: EPA, 2006.

Population and Employment

In addition to historical and current land use, other demographic trends such as population and employment must be considered in the *I-75 Corridor Conservation Action Plan in Monroe County*. SEMCOG's forecast from 2010-2040 shows the region emerging from the recent recession with moderate growth in households and jobs, but little population growth. According to SEMCOG's 2040 Regional Forecast, adopted in 2012, overall population growth will be just 0.8 percent, while households will grow by six percent and jobs by 12 percent over the next 30 years.

In 2016, the population of Monroe County was 149,176 (SEMCOG estimate, 2016), a 1.9 percent decline since 2010. The population of the City of Monroe was estimated to be 20,451, representing 14 percent of the county's population. Based on SEMCOG's population forecasts, some areas in the county, such as Bedford Township, Monroe Township, Frenchtown Township, and Berlin Township will see increases in population while the City of Monroe and some of the outlying townships will see modest decreases in population. Monroe County as a whole however, is expected to see an 8.4 percent increase in population by 2040.

The I-75 reconstruction project will support surrounding economic development leading to population and employment benefits. Monroe County experienced declines in employment and household income between 2000 and 2010. Median household income declined by 18.2 percent during that period (Census 2000, 2010), while the annual unemployment rate peaked at 14.6 percent in 2009. Most of this decline can be attributed to the decline of high-paying manufacturing jobs. For example, in 2008, Monroe County lost approximately 1,200 jobs at just one facility when Ford Motor Company closed its Automotive Components Holdings (ACH) plant at the mouth of the River Raisin (LIAA, 2013). However, employment has already bounced back, with the annual unemployment rate at 4.4 percent, and with approximately 73,000 people employed in 2015 (Bureau of Labor Statistics). Major employers in the area include Promedica Monroe Regional Hospital, Fermi nuclear power plant, La-Z-Boy, Gerdau-Macsteel, Tenneco Inc., Monroe County Community College, Superior Health Plans Inc., and TWB Company LLC (LIAA, 2013). Other important employers include Cabela's, Johnson Controls, the Chrysler Engine Plant, county government, and local school districts.

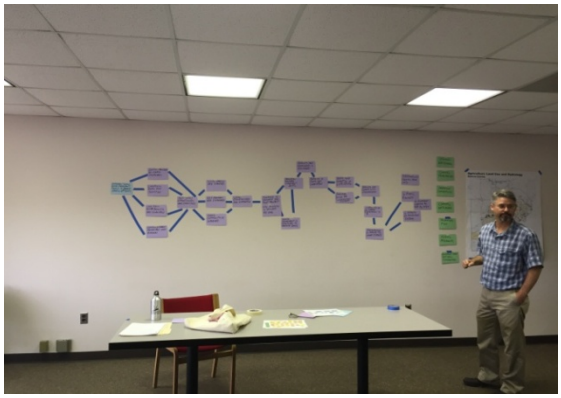
Chapter 3: Conservation Action Planning and the IEF

Integrated Ecological Framework

The *I-75 Corridor Conservation Action Plan* in *Monroe County* was based on the IEF. Its purpose is to promote integrated transportation and conservation planning while expediting transportation project delivery (Table 4).

The IEF consists of nine steps that guide state departments of transportation (DOTs), metropolitan planning organizations (MPOs), and other resource agencies in collaboratively identifying strategic transportation program needs in concert with environmental challenges and conservation opportunities within a given geographic area. As described in Chapter 1, this project focused on implementing the first five steps of the IEF transportation planning process.

[The] purpose [of the Integrated Ecological Framework] is to support and promote integrated transportation and conservation planning while expediting transportation project delivery.



Core team working on a results chain.

Core team and action team discuss I-75 Eco-Logical strategies.

Table 4
Steps in the Integrated Ecological Framework (IEF)

(Note: Shaded steps represent the I-75 corridor project scope)

Step	Purpose
Step 1: *Build and strengthen collaborative partnerships, vision*	Build support among a group of stakeholders to achieve a regional planning process that integrates conservation and transportation planning.
Step 2: *Characterize resource status; integrate conservation, natural resource, watershed, species recovery, and state wildlife action plans*	Develop an overall conservation strategy that integrates conservation priorities, data, and plans, with input from and adoption by all conservation and natural resource stakeholders identified in Step 1.
Step 3: *Create regional ecosystem framework (conservation strategy/transportation plan)*	Integrate the conservation and restoration strategy from Step 2 with transportation and land use data and plans to create the Regional Ecosystem Framework (REF). Those plans include long-range transportation plans (LRTP), statewide transportation improvement program (STIP), and transportation improvement program (TIP).
Step 4: *Assess land use and transportation effects on resource conservation objectives identified in the REF*	Identify preferred alternatives that meet both transportation and conservation goals by analyzing transportation and/or other land use scenarios in relation to resource conservation objectives and priorities.
Step 5: *Establish and prioritize ecological actions*	Establish mitigation and conservation priorities and rank action opportunities using assessment results from Steps 3 and 4.
Step 6: *Develop crediting strategy*	Develop a consistent strategy and metrics to measure ecological impacts, restoration benefits, and long-term performance.
Step 7: *Develop programmatic consultation, biological opinion, or permit*	Develop memoranda of understandings, agreements, programmatic 404 permits, or Endangered Species Act (ESA) Section 7 consultations for transportation projects.
Step 8: *Implement agreements and adaptive management; deliver conservation and transportation projects*	Design transportation projects in accordance with ecological objectives and goals identified in previous steps incorporating programmatic agreements, performance measures, and ecological metric tools to improve the project.
Step 9: *Update regional integrated plan/ecosystem framework*	Update the effects assessment to determine if resource goal achievement is still on track.

Source: Institute for Natural Resources, et.al, 2012.

Conservation Action Planning

The Conservation Action Planning (CAP) process, developed by TNC, guided the completion of the first five steps of the I-75 IEF. Conservation planners throughout the United States, the Great Lakes, and Michigan have relied on the CAP process to create small-large-scale conservation plans. For example, Nature Conservancy of Canada and MNFI, used CAP to develop biodiversity conservation strategies for each of the Great Lakes, including Lake Erie (Pearsall et al. 2012). The first two steps of the CAP process are related to the first five steps in the IEF (Figure 12, Table 5). In Figure 12, "Defining Your Project" and "Developing Strategies and Measures" relate to the first five steps of the IEF. However, MDOT implementation strategies in Chapter 8 merge into the next two steps of the CAP process.

Figure 12
Conservation Action Planning Process

CAP is a technique for planning, implementing, and measuring success of conservation projects. Based on an adaptive approach to conservation management, CAP focuses conservation strategies on clearly defined elements of biodiversity or conservation targets. Linking threats to targets and developing an adaptive process for long-term implementation of conservation strategies to reduce the threats are important components of CAP.

CAP Outcomes for I-75 Area

- Determine scope of study, i.e., stakeholders, vision, geographic area.
- Identify conservation targets and assess existing conditions/viability.
- Identify and rank threats (stresses and stressors) to conservation targets.
- Develop a clear understanding of the context for current situation (situation analysis).
- Develop strategies to abate the most critical threats and enhance health of the conservation targets.
- Determine goals for conservation targets and objectives for strategies/actions.
- Identify measures for tracking progress.

Table 5 describes the relationship between the IEF and the CAP process methodology used by the team.

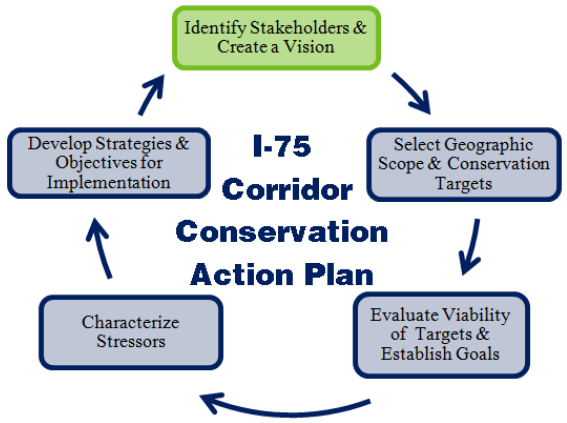
Table 5
Relationship between CAP Process and IEF

Conservation Action Planning (CAP)	Integrated Eco-Logical Framework (IEF)	Responsible Group
I. Define your project		Technical Advisory Committee
IA. Identify organizations and agencies that need to be involved	**Step 1:***Build and strengthen collaborative partnerships, vision*	Technical Advisory Committee
IB. Create a vision statement		Technical Advisory Committee
IC. Determine geographic scope		Technical Advisory Committee
ID. Identify conservation targets*****	**Step 2:***Characterize resource status; integrate conservation, natural resource, watershed, and species recovery and state wildlife action plans*	Technical Advisory Committee / Subject Matter Experts
II. Develop Strategies and Measures		Action Teams
No comparable step.	**Step 3**: *Create regional ecosystem framework (conservation strategy/transportation plan)*	Core Team
IIA. Assess viability of conservation targets		Action Teams
IIB. Identify and prioritize stressors to conservation targets	**Step 4:***Assess land use and transportation effects on resource conservation objectives identified in the REF*	Action Teams
IIC. Complete situation analysis		Action Teams
IID. Develop and prioritize conservation strategies*** **** Stakeholder input meeting***	**Step 5**: *Establish and prioritize ecological actions*	Technical Advisory Committee /Action Teams

Consistent with the IEF/CAP process shown in Table 5, the I-75 Eco-Logical study began with identifying potential partnering resource agencies, community officials, and nonprofit organizations working in the WLEB.

The rest of this chapter describes the details of identifying stakeholders and creating a study vision. The descriptions follow the outline for the CAP in Table 5 and will do so for the remaining chapters.

Figure 13
I-75 CAP Process



Define the Project

The first step of the IEF process involves identifying, building, and strengthening collaborative partnerships to identify a vision (Table 5, Figure 13). CAP also includes the following activities:

IA. Identify organizations and agencies that need to be involved (Table 5)
MDOT initiated the study, recruited the other Core Team members, and provided organizational and technical support. SEMCOG focused on developing the viability assessment for the coastal tributaries, organized stakeholder meetings, and led efforts for data collection, mapping, and website development. MNFI facilitated the IEF/CAP process, identified and worked with the various teams, contributed to geospatial data layers, and drafted the conservation plan.

The Core Team met biweekly to develop collaborative relationships, identify and resolve challenges, and ensure progress on the study. Decision-making occurred through consensus by the Core Team. The Core Team, consisting of MDOT, MNFI, and SEMCOG guided the logistical process for developing the IEF.

To facilitate development of the IEF, the Core Team established a Technical Advisory Committee (TAC) consisting of federal, state, regional, and county agencies, as well as private conservation organizations that work in the area. In deciding who to include on the TAC, the Core Team considered several factors. The TAC played a pivotal role in each milestone of the planning process, so membership had to include state and federal regulatory agencies responsible for permitting the construction projects. Permitting agencies included the MDEQ, the MDNR, the USFWS, and the U.S. Army Corps of Engineers (ACOE). Without these agencies engaged, MDOT would have difficulty tying the results of the conservation plan to the I-75 projects. These agencies had to buy into the process and its results since they have ultimate authority over the identification of natural resources impacts and mitigation required by law.

The TAC provided many insights into local conservation activities, sources and quality of data on conservation targets, and integration with other initiatives.

The Core Team also recognized the importance of agriculture in the corridor, inviting the Michigan Department of Agriculture and Rural Development (MDAR), Michigan Sea Grant (MSG), and the Natural Resources Conservation Service (NRCS) to join the TAC. Other organizations such as TNC and the USFWS's Detroit River International Wildlife Refuge are pursuing large coastal restoration initiatives in the WLEB and offered insight into conservation priorities and challenges. Monroe County staff rounded out the TAC by providing a broad local perspective on conservation planning and a host of other relevant local initiatives.

The TAC identified the geographic area of study and conservation target viability, along with conservation priorities, and strategies for minimizing and mitigating adverse effects. The TAC provided many insights into local conservation activities, sources and quality of data on conservation targets, and integration with other initiatives. The TAC met a total of nine times from October 2013-September 2015. A full list of TAC representatives and their respective agencies/organizations can be found in the Appendix. In addition to the TAC, several sets of Action Teams formed around key tasks associated with the planning process. Action Teams provided essential input into assessing viability of conservation targets, identifying and measuring the impact of various stressors, and developing priority landscape-scale strategies.

To ensure local stakeholders were engaged in this initiative, two stakeholder meetings were held in Monroe County targeting local leaders, decision-makers, and agencies. Stakeholder meetings raised awareness of this large-scale effort, but also guided the Core Team about local priorities and activities. One stakeholder meeting was held in Fall, 2014; the second meeting was held in Fall 2015.

(Left) Core team meets with local Action Team. *(Right)* Final stakeholder meeting at Monroe Community College.

Technical Advisory Committee (TAC)

- Michigan Department of Transportation
- Michigan Natural Features Inventory
- Southeast Michigan Council of Governments
- Michigan Department of Natural Resources
- Michigan Department of Environmental Quality
- Michigan Department of Rural and Agricultural Development
- Michigan SeaGrant
- Federal Highway Administration
- The Nature Conservancy
- Natural Resources Conservation Service
- US Army Corps of Engineers
- Monroe County
- U.S. Fish and Wildlife Service
- Detroit River International Wildlife Refuge

Action Team members

- Monroe County
- Monroe County Business Development Corporation
- City of Monroe
- Monroe County Planning
- Monroe County Drain Commission
- Monroe County Road Commission
- Monroe County Conservation District
- Detroit River – Lake Erie cooperative Weed Management Area
- Oak Openings Region Green Ribbon Initiative
- Southeast Michigan Land Conservancy
- Oak Openings Cooperative Weed Management Area
- The Nature Conservancy of Ohio
- Detroit International Wildlife Refuge
- IHM Sisters
- Toledo Metropolitan Area Council of Governments

IB. Create a vision statement
The TAC began its work by developing a vision statement for the study (Table 5).

Vision statement: "Develop and implement a collaboratively based landscape scale conservation plan that facilitates rebuilding the I-75 corridor while maximizing conservation and restoration outcomes in the region."

The TAC discussed and agreed to the vision statement during its first meeting in Fall 2013. The vision statement started every TAC meeting thereafter and appeared prominently at stakeholder outreach meetings to keep everyone focused and moving ahead in the planning process.

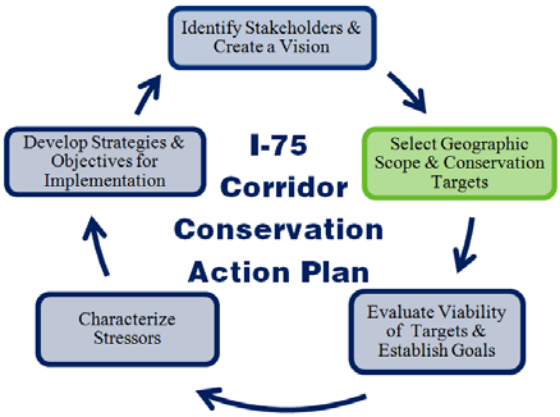
The TAC immediately moved on to the next task of determining the geographic scope and conservation targets, covered in Chapter 4.

Key components of vision

- Collaborate
- Landscape scale
- Maximize conservation and restoration

Chapter 4: Selecting the Geographic Scope and Conservation Targets

Figure 14
I-75 CAP Process



Following the steps of the CAP process (Figure 14) described in Chapter 3, selecting the geographic scope provides the boundaries for the I-75 Corridor Eco-logical study area and helps establish the scope of other study activities. Having a boundary also enables the team to identify the appropriate stakeholders for engagement. The boundary has to suit the potential conservation targets and helps support a detailed analysis of the stressors affecting the targets. Lastly, the boundary provides a location for measuring future progress. Without a defined geographic scope, the study would lack focus.

The TAC explored different project boundaries using a variety of social and ecological factors. Although the study was initiated by the reconstruction of I-75 in Monroe County, the freeway is part of a larger landscape context with environmental and social priorities extending beyond MDOT property boundaries. The freeway also plays a role in the larger picture, since 40 culverts and bridge locations allow water passage for tributaries directly discharging into Lake Erie.

Ultimately, the geographic scope must provide the best opportunities for mitigation (both on- and off-site), as well as future conservation and recreation actions. For example, MDOT recognized that wetland mitigation could not take place on their property; therefore, they needed to search a larger area for suitable mitigation sites.

Although the study was initiated by the reconstruction of I-75 in Monroe County, the freeway is part of a larger landscape context with environmental and social priorities extending beyond MDOT property boundaries.

Factors Considered in the Geographic Scope

An effective conservation plan includes analyses and recommendations that consider multiple ecological factors that transcend jurisdictional boundaries. Basic information about each factor enables scientifically-based decisions to be made when determining the geographic scope of the study. For example, defining watershed boundaries ensures that recommendations are consistent with the local stream conditions. Similarly, understanding factors such as soil and vegetation types as well as natural and human disturbances help identify geographic scope recommendations that are appropriate for the land use and cover.

The TAC first identified factors that would help define the geographic study area. They are:

- Hydrology
- Potential conservation targets
- Lake Erie coastal processes
- Soil types
- Vegetation
- Migration patterns
- Natural disturbances
- Human alterations
- Watershed boundaries

The southern border at the Ohio state line reflects an artificial jurisdictional boundary rather than an ecological boundary since many of the same ecological condition in Michigan occur in northern Ohio. Funding for the study was based on a Michigan-centered project, however, outreach extended into northern Ohio to capture their perspective on similar ecological conditions. Determining the northern, eastern, and western boundaries of the study area required more intensive consideration of factors such as the distribution of potential conservation targets, hydrology, watershed boundaries, and the extent of human alterations to the land.

The Core Team and the TAC evaluated both the geographic scope and the potential conservation targets simultaneously. A direct relationship exists between the distribution, current condition, desired future condition, and threats associated with each conservation target and the amount, type, and intensity of conservation actions.

Some conservation targets, such as coastal wetlands, were easily identified as priorities within the geographic scope due to their ecological, cultural, and economic significance. All natural resources, conservation, and regulatory agency members of the TAC noted the importance of coastal wetlands at the outset of the discussion. Other conservation targets required more debate before the group finalized them.

Some conservation targets, such as coastal wetlands, were easily identified as priorities within the geographic scope due to their ecological, cultural, and economic significance.

Geographic Scope Alternatives

The TAC considered different established ecological boundaries to represent the geographic scope of the study:

- Maumee Lakeplain sub-subsection;
- Watersheds and subwatersheds (rivers, streams, drains);
- Five-mile shoreline buffer from Lake Erie; and
- Detroit River International Wildlife Refuge.

Maumee Lakeplain sub-subsection

This is part of a statewide landscape ecosystem classification, that takes into account factors such as soil types, physiography, vegetation, and climate. A detailed description of the Maumee Lakeplain sub-section is included Chapter 2, Figure 8 (Albert, 1995).

Watersheds and subwatersheds (rivers, streams, drains)

Varying levels of hydrologic units define these boundaries in the Hydrologic Unit Classification or HUC system. For example, a HUC 10 classification generally defines a larger watershed unit, while HUC 12 boundaries delineate smaller, subwatersheds. (Chapter 2, Figure 10).

Five-mile shoreline buffer from Lake Erie

A generalized buffer from the Lake Erie shoreline ensured that the team and the TAC included important natural coastal features in the conservation action plan.

Detroit River International Wildlife Refuge (DRIWR)

Operated by the USFWS, the DRIWR includes 48 miles of coastline in its authorized boundary from north of Wyandotte, Michigan, on the Detroit River to the Michigan/Ohio border to the south. The refuge has 6,000 acres of habitat within that boundary. For example, both the Ford Marsh Management Unit and the Plum Creek Management Unit are near the I-75 Corridor in the Monroe area.

The Core Team presented three different alternatives for the geographic boundaries to the TAC for consideration and discussion. Table 6 compares each of the three scenarios and maps of the three alternatives are in the Appendix. The Alternative A subwatersheds flow into western Lake Erie and are contained within the Maumee Lakeplain sub-subsection. These subwatersheds include all of Monroe County, as well as parts of Lenawee, Washtenaw, and Wayne Counties. Alternative B shows a smaller HUC-12-based subwatershed boundary focused on tributaries draining directly into Lake Erie. It does not rely on the western boundary of the Maumee Lakeplain sub-section. Alternative C included the largest area of all three alternatives. Like Alternative A, it connects the western boundary of the entire Maumee Lakeplain sub-section with the Lake Erie shoreline including a northern boundary using the Huron River. The TAC felt this relatively large boundary would make the study unmanageable. Given the smaller area,

research capacity of the group, and available study resources, Alternative B made the most sense. Ultimately, TAC members supported Alternative B as the final geographic scope, choosing to focus more on the Lake Erie shoreline resources than island resources.

Table 6
Comparison of Geographic Scope Alternatives

Geographic Scope	Alternative A	Alternative B	Alternative C	Final Geographic Scope
Maumee Lakeplain Sub-subsection	✓		✓	
HUC 10 Watershed			✓	
HUC 12 Subwatersheds	✓	✓		✓
DRIWR	✓	✓	✓	
Five-Mile Shoreline Buffer	✓	✓	✓	
Historic lake level fluctuation-575 ft. Elevation Contour				✓

Final Geographic Scope

The Core Team and the TAC decided on Alternative B for the geographic scope; alternatives A and C were too large for the purposes of this study. Alternative B delineates the study area using HUC-12 watersheds. The Five-Mile Shoreline Buffer and the DRIWR boundaries did not determine the ultimate outcome, as it was included in all three alternatives. To further narrow the scope of the study, Alternative B was divided into primary and secondary zones.

The decision to establish primary and secondary zones involved a detailed analysis of the area influenced by changes in the water level of Lake Erie. The historic boundary for lake level fluctuations lies near the 575-foot elevation contour. When the Core Team and the TAC saw the contour line on a map, it closely follows the alignment of US-24, roughly the path of prehistoric Indian trails and the previous highway that connected Detroit to Toledo. US-24 made a logical western boundary for the preliminary zone, being the higher ground, on the edge of the area most influenced by water-level fluctuations in Lake Erie. The secondary zone extends west from US-24 and incorporates the western HUC-12 watershed boundaries of Alternative B.

The secondary zone provides a larger set of conservation opportunities for several globally rare communities such as oak openings, mesic prairie, and wet-mesic flatwoods (Chapter 2) and their associated state and federally listed threatened and endangered species (including the federally threatened Karner blue butterfly). It also opens up additional habitat opportunities for several rare and/or declining bat species (i.e., Indiana bat, northern long-eared bat). The total I-75 Corridor Eco-Logical study area is approximately 340,000 acres (Figure 15).

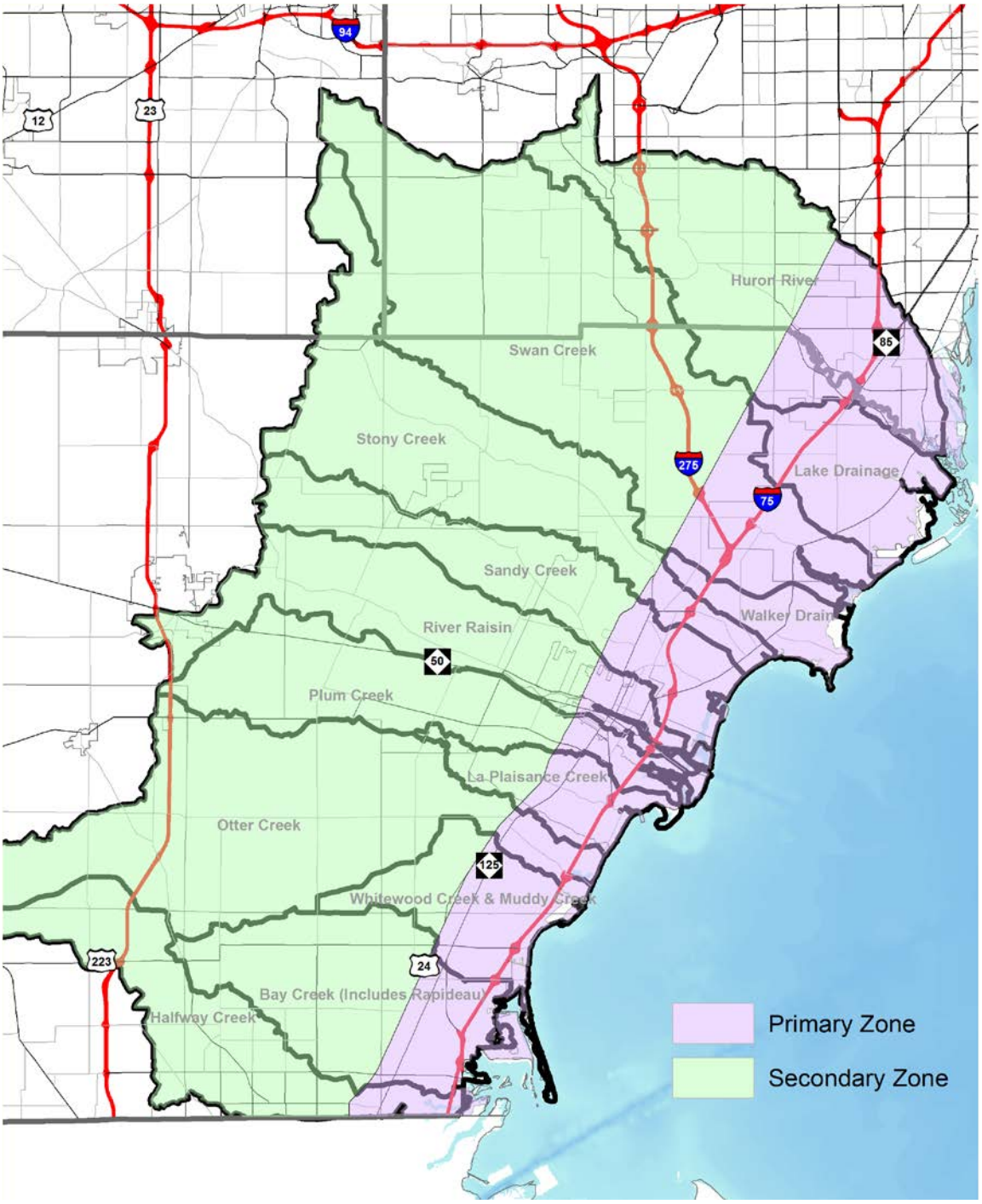
Primary Zone

- Priority study area
- Defined by the historic lake level fluctuation, 575 ft. elevation contour
- US-24 (Telegraph Road) is western boundary
- Approximately 90,000 acres

Secondary Zone

- Expanded study area
- Western boundary represented by subwatershed boundaries
- Northern boundary represented by Lower Huron River watershed boundary
- Approximately 250,000 acres

Figure 15
Final Geographic Scope for I-75 Eco-Logical Study Area



Source: SEMCOG, 2016.

Selecting the Conservation Targets

As part of selecting a geographic scope, the Core Team and the TAC identified potential conservation targets for the study. The targets are the most important biological and ecological aspects of the study area. They provide direction for the development of a conservation action plan later in the process. The geographic scope of a study area can have a large number of species, natural communities, and ecosystems. Other local priorities, such as recreation, agricultural productivity, or culturally important places or activities can also be factored into the discussion. The Core Team reviewed other related plans to ensure alignment with other conservation efforts in the region. A stakeholder input meeting was held in Fall 2014 to obtain local perspectives on both the geographic scope and the conservation targets. Initially, the TAC developed a set of 14 conservation targets, narrowing them to seven priority targets.

The final list of conservation targets focused on natural systems, not individual species.

Important individual plant and animal species were lumped in with related conservation targets as nested targets. For example, the state-threatened king rail was identified as a nested target of coastal wetlands. Exceptions to this approach were based on migration patterns and travel corridors. The group thought that migration was a strenuous event that incurs its own set of stressors and issues and, therefore, should be treated separately. Additionally, some species, such as turtles, snakes, and frogs require several different types of habitat to meet their life-cycle requirements. They are also highly vulnerable to habitat fragmentation caused by a variety of human structures such as roads, curbs, dams, and culverts.

Final List of Conservation Targets

- Coastal tributaries
- Inland wetlands
- Coastal wetlands
- Aerial migrants
- Globally rare natural communities
- Migratory fish
- Herpetofauna connectivity

Targets Eliminated, Modified, or Combined with Other Targets

- Bats
- Agricultural lands
- Green infrastructure
- Navigation/shipping channels
- Wildlife habitat
- Delisting Beneficial Use Impairments (BUI) for the River Raisin Area of Concern (AOC)
- Water Quality

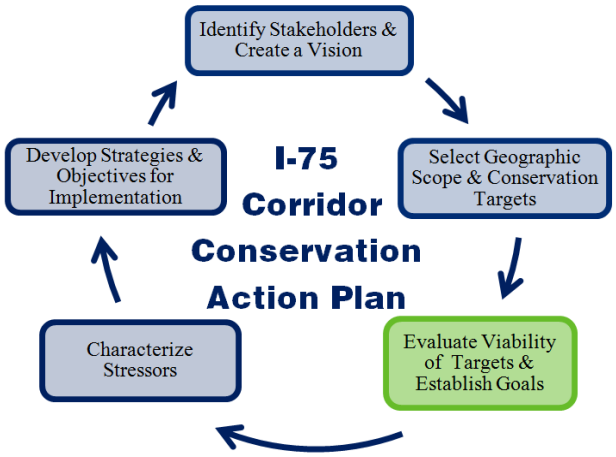
The final list of conservation targets focused on natural systems, not individual species. Although this list may be modified in the future based on new information, data, or values, the TAC agreed by consensus to focus on the seven targets listed in Table 7.

Table 7
List and Description of Conservation Targets

Conservation Targets	Description
Coastal Tributaries	Tributaries that discharge to Lake Erie exhibit important ecological attributes and serve as important connections to other conservation targets (Figure 10).
Inland Wetlands	Common types located in the secondary zone include emergent marsh, shrub swamp, floodplain forest, and hardwood swamp.
Coastal Wetlands	Includes all wetlands that are hydrologically connected to Lake Erie. Great Lakes marsh complexes have a very high level of significance in the Great Lakes region.
Globally Rare Natural Communities	These communities are primarily restricted to the glacial lakeplain: lakeplain oak openings, lakeplain wet and wet-mesic prairie, mesic sand prairie, and wet-mesic flatwoods (Figure 8).
Migratory Fish	Include white bass, white sucker, northern pike, gizzard shad, and western banded killifish; requires strong connections between Lake Erie, coastal tributaries, and their respective habitats.
Herptofauna Connectivity	The focus is on rare wetland-dependent amphibian and reptile connectivity between different wetland patches and between wetlands and uplands to meet lifecycle requirements (small mouth salamander, eastern fox snake, Blanchard's cricket frog, Blanding's turtle, etc.).
Aerial Migrants	Animal species migrating through the region require adequate stopover habitat (birds, bats, butterflies, dragonflies). The Western Lake Erie Basin is a very important stopover site for migratory birds.

Chapter 5: Evaluate Viability of Targets and Establishing Goals

Figure 16
I-75 CAP Process



Viability Assessment

The second half of the CAP process begins with assessing the viability or health of the seven selected conservation targets (Table 7, Figure 16). The Core Team engaged the TAC members in the viability assessment process because of the need for detailed knowledge about the conservation targets.

TAC members volunteered to work on a specific target and received training on how to conduct a viability assessment. Each target had a leader who recruited other subject-matter experts to help. The TAC learned about Key Ecological Attributes, or KEAs:

- Size (or abundance);
- Condition (measure of the biological composition, structure, and biotic interactions); and
- Landscape context (assessment of environment and ecological processes that maintain the biodiversity feature).

Each KEA has specific measures or indicators to track its health status. A viability rating helps determine the relative condition of an indicator compared to other indicators for that KEA. The ratings are based on both qualitative and quantitative data. The CAP process uses an algorithm and a set of rules for aggregating those values for each KEA, for the whole target, and for the overall project. See the Appendix for the detailed viability assessment tables for each of the seven conservation targets.

Viability Summaries of Conservation Targets

Coastal Tributaries

There are 13 coastal subwatersheds in the study area from the lower Huron River subwatershed in the north to the Halfway Creek subwatershed adjacent to the Ohio border (Chapter 2, Figure 10). Historically, coastal tributaries have provided habitat for native fishes, mussels, and macroinvertebrates, which are indicators of the quality of the nearshore zone and coastal wetlands along Lake Erie. At least six of these rivers/streams appear large enough to support both diverse mussel populations and fish migration

The six waterways likely to support native mussels and migratory fish are:

- Huron River
- Swan Creek
- Stony Creek
- River Raisin
- Otter Creek
- Halfway Creek

As they near Lake Erie, each of these tributaries are low gradient, slow-moving, warm water systems (Institute for Fisheries Research). During strong easterly winds, seiches can form that actually push Lake Erie water upstream, reversing the flow of water for many of these river systems.

Coastal Tributaries Viability – Fair

The overall condition of the coastal tributaries in the Study Area was categorized as *Fair*. SEMCOG and the MDEQ compiled stream data sampling and survey results from multiple data sources, including water quality sampling, biological surveys, and habitat surveys. Sources of this data included the MDEQ Five-Year Rotating Watershed Monitoring program as well as Volunteer Monitoring programs. SEMCOG also performed a GIS based land cover analysis to determine levels of impervious cover, tree canopy, and open space influencing the subwatershed and categorized as *Very Good*, *Good*, *Fair*, or *Poor*.

River Raisin empties into Lake Erie nearshore.

The viability assessment is very high level and generally representative of overall stream health. Significant variability in data collection methods, types, gaps, and analyses across multiple hydrologically independent subwatersheds also made the viability analysis challenging. Thus, the *Fair* condition assessment is reflected as a conceptual approximation for the geographic scope of the study.

KEAs for coastal tributaries included numerous indicators related to water quality, habitat, biological diversity, flow conditions, extent of riparian corridor, and adjacent land use and land cover. Water quality sampling parameters include dissolved oxygen, total suspended solids, nutrients, and bacteria. The River Raisin, Plum Creek, and Halfway Creek had multiple water quality sampling results; however, no data existed for the other subwatersheds. For example, there was only one sample location in the entire study area analyzed for total suspended solids. Similarly, biological and habitat survey data such as

macroinvertebrate scores, fish populations, mussel surveys, and habitat conditions also provide indicators of stream health. Trends in low macroinvertebrate diversity can generally indicate degraded water quality. Table 8 provides a snapshot of total phosphorus (TP) sampling results and macroinvertebrate survey results.

The EPA has recommended total phosphorus criteria in this ecoregion of approximately 76 µg/L. Thus, the sampling sites were categorized as either *poor* or *good* depending on whether the total phosphorus sample concentration exceeded this value. Macroinvertebrate scores were based on the Great Lakes and Environmental Assessment Section Procedure 51.

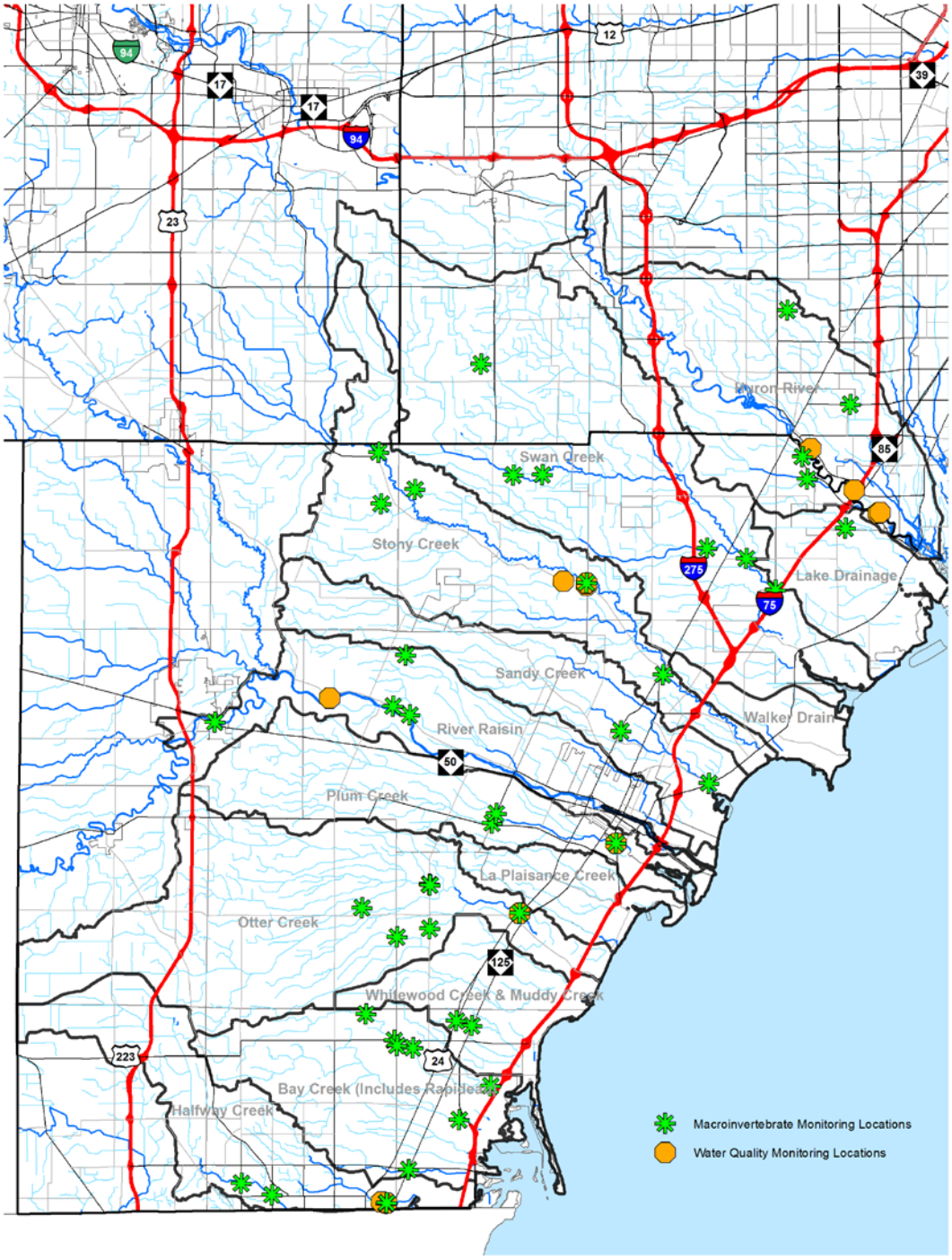
Figure 17 shows the locations for both water quality and macroinvertebrate monitoring and highlights the lack of available data with which to characterize the viability of coastal tributaries. Channelization, stormwater runoff, and associated nonpoint source pollution and lack of riparian vegetation have adversely affected all streams. Recent mussel surveys also reflect the dramatic changes that have occurred to the mussel community in this region due to nonpoint source pollution, turbidity, sedimentation, and the presence of non-native dreissenid mussels. Overall, the average stream health in the region is fair.

Table 8
Snapshot of Total Phosphorous Sampling Results

	Total Phosphorus Viability Category & Concentration (µg/L)	Macroinvertebrate Viability Category
Halfway Creek	Good (52)	Fair
Otter Creek	Good (43)	Fair
Plum Creek	Poor (154)	Fair
River Raisin	Poor (90)	Fair

(Left) Maple leaf (Quadrula quadrula) and Fragile Papershell *(Leptodea fragilis);* (Right) *State Threatened Wavyrayed lampmussel* (Lampsilis fasciola)

Figure 17
Water Quality Monitoring Locations



Coastal Wetlands

Coastal marshes are considered to be one of the most productive natural systems in the Great Lakes region. Although they are found all along the shoreline, coastal wetlands are concentrated in six distinct places within the I-75 Eco-Logical study area. These marsh complexes all connect Lake Erie to at least one river or creek system: Pt. Mouillee, Swan Creek, Pt. Aux Peaux, Mouth of the River Raisin, Otter Creek- Allen's Cove (Toledo Beach), and Erie Marsh.

Vegetation Zones in Great Lakes Marsh

- Submergent marsh,
- Emergent marsh, and
- Wet meadow.

Coastal wetlands provide habitat to aerial migrants.

Coastal Wetlands Viability – Fair

Approximately 13,695 acres or 52 percent of the wetland acreage remains from the 1800s (open water included). If open water is excluded, only 11,698 acres, or 41 percent of the original acreage remain (MTRI). Indicators with poor ratings included invasive species, shoreline hardening, and water quality index. Overall, viability of coastal wetlands in the study area is *Fair*.

Indicators to assess coastal wetlands health

- Plant and animal diversity
- Rare species
- Fish habitat
- Invertebrate quality
- Invasive species
- Size

Herpetofauna Connectivity

Similar to many areas of the Great Lakes, WLEB is home to a diverse array of reptile and amphibian species, collectively referred to as herpetofauna (turtles, frogs, toads, salamanders, snakes, and lizards). Michigan has about 49 herpetofauna species documented state-wide, with 19 (or 39 percent of herpetofauna species in the state) found within study area's primary zone. (MiHerp Atlas, 2015). Forty-six species of herpetofauna have the potential to occur in the study area based on known species ranges and habitat requirements (HRM 2015).

For nearly all wildlife, the connectivity of habitat is vital to survival and reproductive success. Animals must move across the landscape to find shelter, forage, and reproduce. Barriers such as the transportation system (i.e., roads, railroads, etc.), urban and agricultural land uses, and dams can restrict access to important habitats. For reptiles and amphibians, most species use a variety of habitats to carry out basic life functions. These habitats may include emergent marshes, forests, prairies, drains and creeks, old fields, and roadside right-of-ways. The State Threatened Eastern Fox Snake (*Elaphe vulpine glodi*) demonstrates the use of multiple habitats in the study area. This snake uses both marsh and prairie for hibernacula, cover, nesting, and foraging, but also basks and forages in upland environments. It has been found to move more than 1,300 meters (0.81 miles) to carry out these activities (Lee, 2006). Without the connectivity of various habitats, populations become fragmented and risk localized extinction over time

Enhancing hibernacula in the study area

Hibernacula are underground places where creatures can seek refuge below the frost line for hibernation and survival during the winter. Providing constructed hibernacula in habitat restoration projects helps offset loss of important habitat from urban and agricultural development. Additionally, the provision of hibernacula limits the distance animals must travel to find a safe place to hibernate during the winter. In the I-75 reconstruction, MDOT has been exploring options to construct hibernacula in wetland mitigation projects to improve herpetofauna connectivity and limit stressors to threatened snake species.

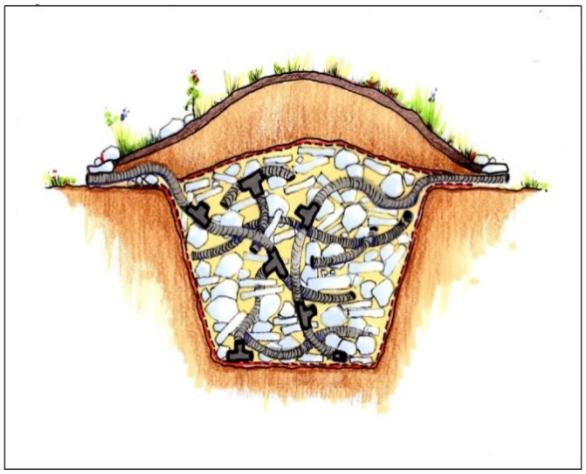


Diagram of hibernacula.

Herpetofauna Connectivity Viability – Fair

Key factors regarding herpetofauna viability include sufficient quality and quantity of wetlands, close proximity to diverse habitat types, and safe passage to those habitats. Given the high density of roads, as well as high amount of agricultural and urban land use, there appear to be few places for herpetofauna to thrive in the study area. Another important factor affecting turtles in the corridor is nest predation by mid-level predators such as raccoons. A survey of I-75 right of way found numerous nests destroyed by mid-level predators near stream crossings during the summer of 2015

Based on expert opinion, current viability of herpetofauna within the primary boundary is tentatively rated as *Fair*. Additional research and survey is needed to provide a more accurate viability rating, as well as identify other rare species, such as spotted turtle, in the corridor. Figure 18 shows approximate wetland areas that provide amphibian habitat.

(Left) Eastern fox snake *(Elaphe vulpine glodi)*, state threatened (HRM); *(Right)* Spotted turtle *(Clemmys guttata)*, state threatened (Todd Crail).

Predated snapping turtle nest adjacent to I-75 in Monroe County (HRM).

Figure 18
Wetlands Functioning for Amphibian Habitat

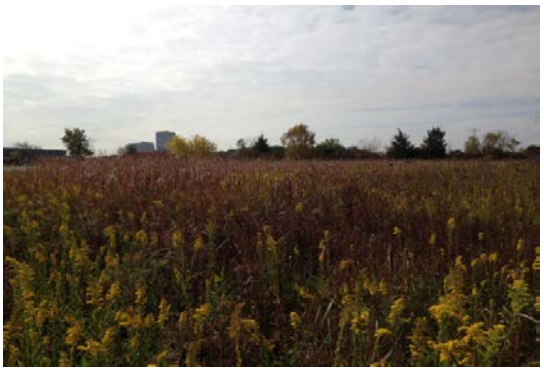
Source: MDEQ.

Inland Wetlands

Inland wetlands occur in the secondary zone of the study area defined by Telegraph Road to the east and the upper boundaries of the coastal subwatersheds to the west (Figure 19). Types of inland wetlands are:

- Forested,
- Scrub shrub, and
- Emergent.

In addition to habitat, inland wetlands improve the water quality of downstream, local waterways by absorbing and cycling nutrients and contaminants, and providing floodwater storage. These wetlands also provide important functions such as stopover habitat for migrating birds, breeding and foraging habitat for wetland birds, and critical habitat for amphibians and reptiles. Inland wetlands were primarily chosen as a conservation target given the extensive regulatory programs associated with them. Coastal wetlands are a separate target, and several of the globally rare natural communities are also wetlands



(Top Left) Emergent wetland near I-75 (MDOT); *(Top Right)* Forested wetland in I-75 study area (MDOT); *(Below)* Scrub shrub in I-75 project boundary (MDOT)

Inland Wetlands Viability – Poor

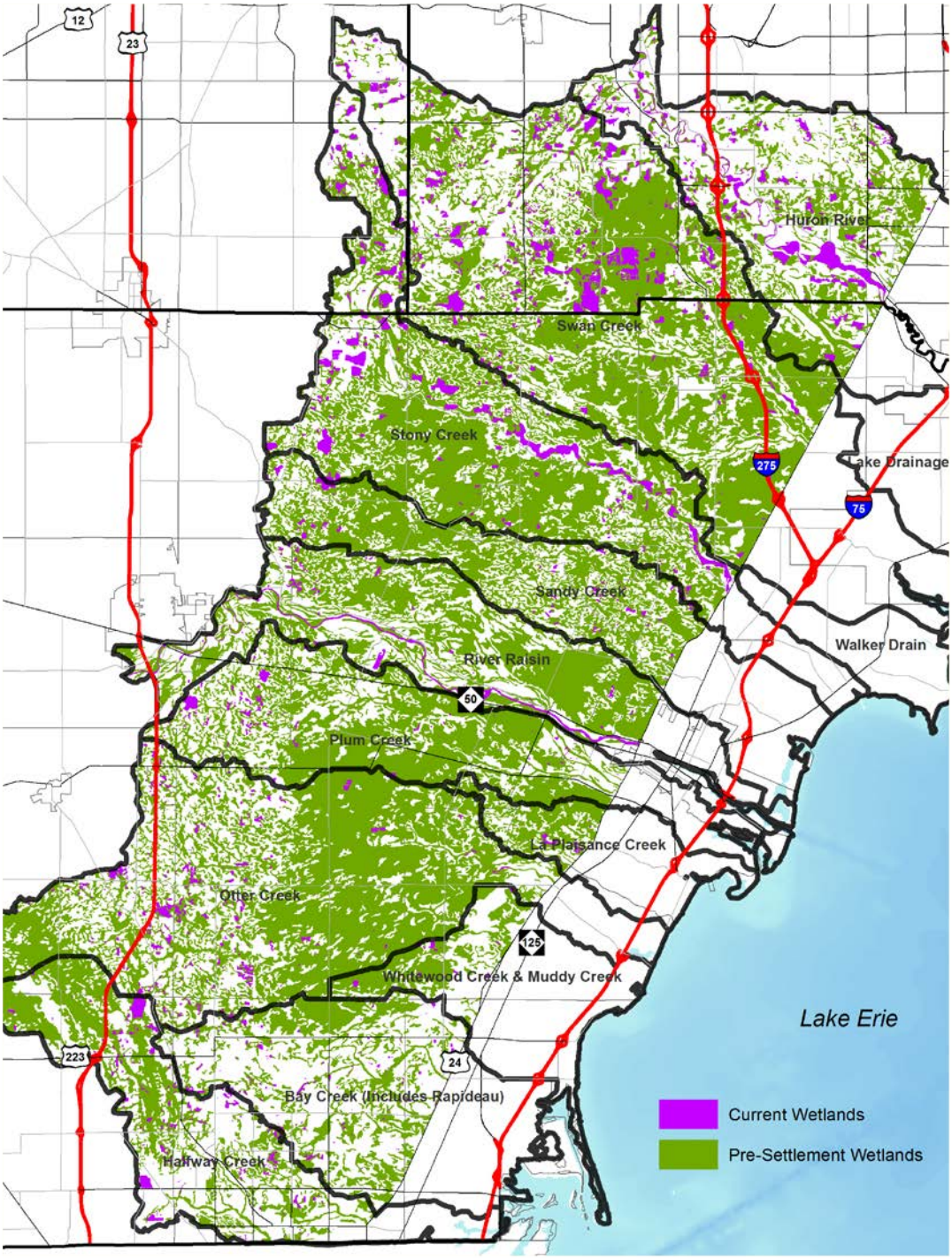
Today, only 7.4 percent of the original inland wetlands from circa 1800 remain in the secondary zone. Related to the quantity of wetland acreage lost, there is also a relatively large loss of wetland functionality.

At the request of the core team, the MDEQ Wetlands Division conducted a Landscape Level Wetland Functional Assessment (LLWFA) for the study area. This assessment measured the loss or gain of 14 different wetland functions via a GIS analysis. Based on the results, 13 functions are in poor condition, while only one function (waterfowl and waterbird habitat) appears to be in fair condition (See Appendix for Summary of Wetland Functions for the Study Area). Almost all of this functionality loss can be attributed to extensive draining of the lakeplain and conversion to agricultural land use.

MDEQ Landscape Level Wetland Functional Assessment

The Michigan Department of Environmental Quality conducts Landscape Level Wetland Functional Assessments (LLWFA) to evaluate wetland functions on a watershed or landscape scale. This level of wetland assessment is typically used to support watershed planning, zoning decisions, definition of wetland restoration and protection priorities, and for other similar purposes at the local or regional level. This landscape scale assessment can also assist in setting priorities for more detailed monitoring of wetland condition and function.

Figure 19
Historic and Current Inland Wetlands



Source: MDEQ.

Migratory Fish

Most of the 13 subwatersheds probably never provided the necessary conditions required by most migratory fish for their reproduction. However, six of these subwatersheds currently and/or historically provided the right conditions for at least one migratory fish species to spawn:

- Huron River
- Swan Creek
- Stony Creek
- River Raisin
- Otter Creek
- Halfway Creek

Historically, Lake Erie contained an abundance of migratory fish species including:

- Whitefish
- Lake sturgeon
- White sucker
- Northern pike
- Western banded killifish
- Muskellunge
- Walleye
- Smallmouth bass
- White bass
- Freshwater drum
- Gizzard shad

(Top Right) Northern Pike; *(Bottom Right)* Killifish caught during a day in the field (MDOT); *(Below)* White sucker (MDOT).

Migratory Fish Viability – Good

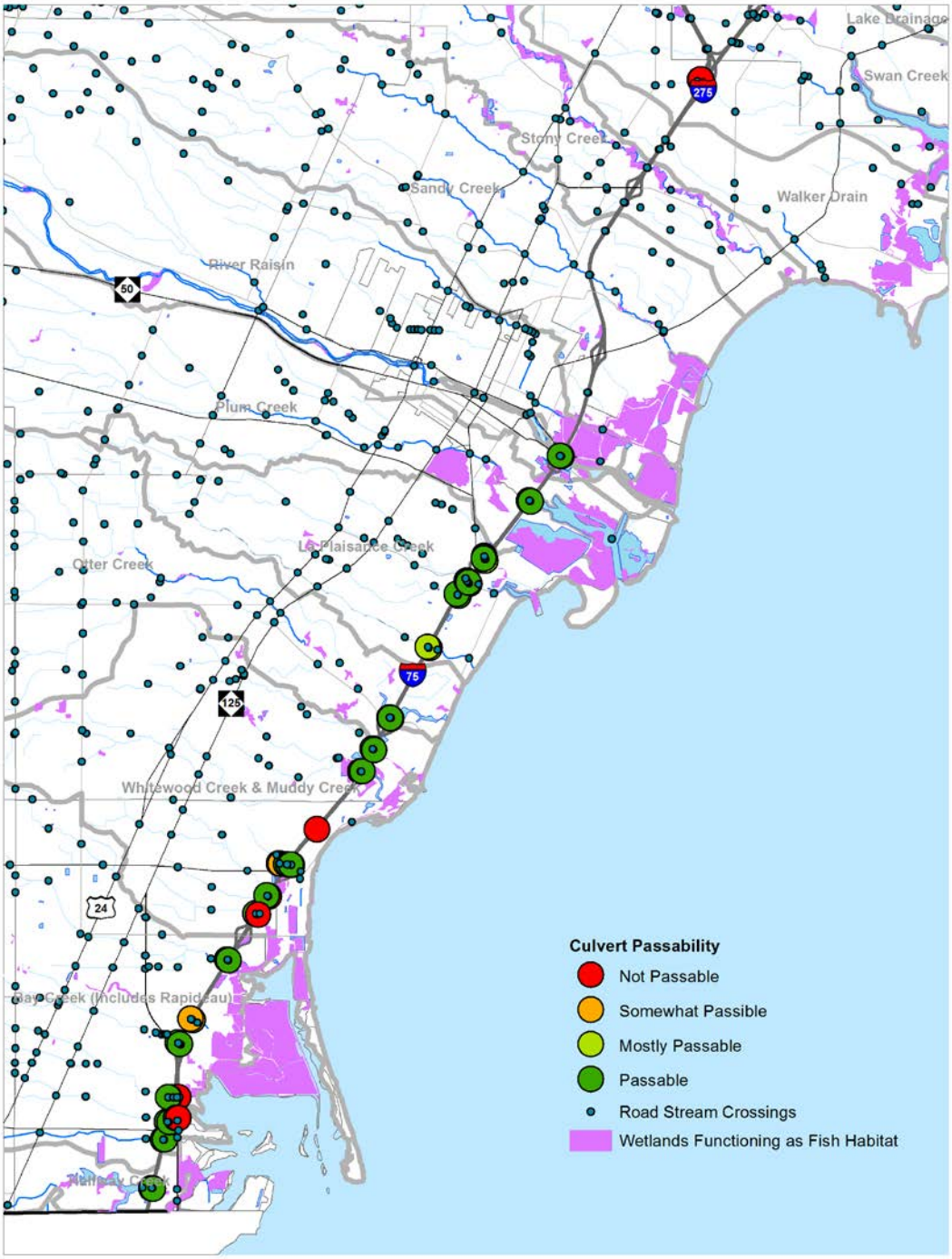
Both whitefish and lake sturgeon were pushed to near extinction throughout the Great Lakes primarily due to over fishing and degrading stream habitat. Today, both species are quite rare in the WLEB, and neither has been seen in any of the coastal tributaries of the project area for quite some time. However, many other species have been observed in both the River Raisin and Huron River, including white sucker, northern pike, muskellunge, walleye, smallmouth bass, and white bass (Braunscheidel, pers. comm.). Unfortunately, very little fish data exists on these two rivers, and not much is known about fish populations in the other four creeks. Due to lack of data, indicators of viability are focused on indirect factors such as percentage of river miles accessible to fish, and percentage of headwaters accessible to fish, both inferred from remotely sensed information rather than field data. Based on expert opinion, current viability of migratory fish is tentatively rated as *Good.*

MDOT Culvert Passability Survey

Culverts allow passage of small streams (or wetlands) through physical obstructions such as roads. They typically measure 20 feet or less in length and come in a variety of types, including box, circular, and arch culverts. A properly designed and positioned culvert will carry the natural flows of a stream, while limiting flooding and erosion, maintaining water quality, and allowing wildlife to pass. Within the I-75 corridor in Monroe County, upwards of 40 culverts carry streams and drains under the freeway before they empty into Lake Erie. During the I-75 Corridor Conservation Action Panning process, MDOT completed a culvert survey to assess migratory fish passability. This survey data helped prioritize crossings for culvert improvements to benefit migratory fish (Figure 20).

Coastal marshes provide stopover habitat for migrating birds, breeding and foraging habitat for marsh birds, spawning and nursery habitat for a number of fish species including perch and northern pike, and critical habitat for several rare animals. (Albert, 2005)

Figure 20
Road/Stream Crossings, Culvert Passability, and Wetlands Functioning for Fish Habitat



SEMCOG, 2016.

Aerial Migrants

Located along several major migratory bird flyways, the WLEB is well known as an important migratory bird stopover area, particularly among avid birders and duck hunters. The region is very important for waterfowl, landbirds (passerines and raptors), waterbirds, and shorebirds. This is particularly true for both the coastal and nearshore zones due to their rich food resources in both the spring and fall and the propensity of birds to follow significant features such as Great Lakes coastlines. (See Appendix for maps showing likelihood of migratory bird stopover in the study area.) According to Ewert et. al. (2006), "Spring passerine migration along the Erie lakeshore may be unsurpassed except by the Gulf Coast in eastern North America." It is estimated that approximately 500,000 waterfowl (Bookhout et. al. 1989), 300,000 raptors (Payne and Norwood 2010), and more than 80,000 shorebirds (Shieldcastle, 2003) migrate through the WLEB region in the fall.

(Top Left) Yellow Rail; *(Top Right)* Wilson's Phalarope; *(Bottom Left)* Henslow's Sparrow.

Spring passerine migration along the Erie lakeshore may be unsurpassed except by the Gulf Coast in eastern North America.

Aerial Migrant Viability – Fair

Overall, it is estimated that the viability of aerial migrants is rated as *Fair* based on the existing set of indicators. Unfortunately, compared to historical conditions, relatively few high quality stopover sites remain in the region; therefore, conservation of remaining stopover sites in this region is critical (Ewert et al 2006).

The primary set of aerial migrant indicators is based on predictive models and not field data. These models were developed by a group of experts representing a variety of agencies and organizations that are familiar with bird use in the WLEB and are considered to be the best gauge of migratory stopover health. Model-based indicators include:

- Percentage of area in suitable habitat (habitat models).
- Percentage of suitable habitat that is high-quality habitat.
- Percentage of priority habitat that is in conservation ownership.

Additional research is needed to provide a more accurate assessment of viability of non-bird aerial migrants such as bats, butterflies, and dragonflies.

Economic Impacts of Bird Watching along Lake Erie

In 2006, the *U.S. Fish and Wildlife Service National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* documented that 47.8 million U.S. residents observed birds around their homes and 19.8 million U.S residents traveled away from home to view birds. Financially, more than 71 million Americans spent nearly $45 billion (in retail sales) on observing, feeding, or watching wildlife in 2006 alone. The survey showed that state residents and nonresidents spent $3.2 billion on wildlife recreation in Ohio. The survey also found that 4.2 million Ohio residents and nonresidents participated in wildlife-associated recreation in 2006, and about 83 percent of them, or 3.5 million, participated in wildlife-watching activities. The Ohio survey clearly indicates that birdwatching has become a very important economic consideration for state recreation plans. In a 2011 study that focused on the economic impact of bird watching, birdwatching at six Ohio large-scale natural areas along or near Lake Erie generated more than $26 million created 283 jobs for those living and working in these coastal communities, generated $8.9 million in personal income, and contributed $1.9 million in tax revenues. (Xie, 2012)

Globally Rare Natural Communities

Four rare natural communities found in the study area have a very high affinity for the Maumee Lake Plain:

- Lakeplain Wet and Wet-Mesic Prairie,
- Lakeplain Oak Openings,
- Wet-Mesic Flatwoods, and
- Mesic Sand Prairie.

All four of these natural communities are considered to be globally rare or imperiled due to the tremendous habitat losses experienced over the past 200 years. Today, less than 200 acres of Lakeplain Prairie remain in the project boundary, representing less than .6 percent of the prairie acreage documented circa 1800 (32,600 acres).

Altogether, only approximately 1,000 acres, or less than .4 percent of the historical extent of these four globally rare natural communities combined remains in the project area. This represents a tremendous loss of genetic, plant, and animal diversity in the project area and globally. Not only are these community types rare, but they also harbor a disproportionate number of rare plants and animals, including federally listed species such as the Karner Blue Butterfly and Eastern Prairie Fringed Orchid. Known occurrences are shown in Figure 21.

Globally Rare Natural Community Current Viability – Poor

Lakeplain Wet-Mesic Prairie

Lakeplain prairie is a non-forested, wetland system only found on lake plains in the Great Lakes region. Two types of Lakeplain prairie that still occur in Michigan:

- Lakeplain wet-mesic prairie, and
- Lakeplain wet prairie,

Lakeplain Oak Openings

Lakeplain Oak Openings are another type of natural community only found on glacial lakeplain landforms. Today, only approximately 600 acres of Lakeplain Oak Openings remain in the project area, representing less than one percent of the acreage documented circa 1800 (65,700 acres).

MDOT Native Plant Survey/Plant Relocation

Sullivan's Milkweed, a rare sate threatened plant, is found in many locations along the I-75 Corridor. Prior to construction, MDOT completed a native plant survey to locate the presence of globally rare natural communities in the right-of-way. The 2015 construction on the northern portion of I-75 would have destroyed most of the plants along the roadside. However, MDOT partnered with MDNR to move many of the plants to Sterling State Park. The plants now live in the park's new 50-acre lakeplain prairie restoration site where they receive protection. MDOT will relocate other native plants from future construction project areas, along with saving seeds to place back into the roadside to ensure that rare and protected native plants species along the I-75 Corridor survive.

Wet-Mesic Flatwoods

Another type of wetland unique to the Lakeplain is wet-mesic flatwoods. Over the past 200 years, the vast majority of wet-mesic flatwoods was logged, drained, and converted to agriculture. Today, there are only four known occurrences of wet-mesic flatwoods totaling less than 200 acres, representing approximately .1 percent of the acreage documented circa 1800.

Mesic Sand Prairie

Lastly, Mesic Sand Prairie is another globally rare natural community found further inland in the western portion of the study area. Today, only approximately 60 acres of Mesic Sand Prairie remain, representing less than .2 percent of its documented extent circa 1800 (32,595 acres).

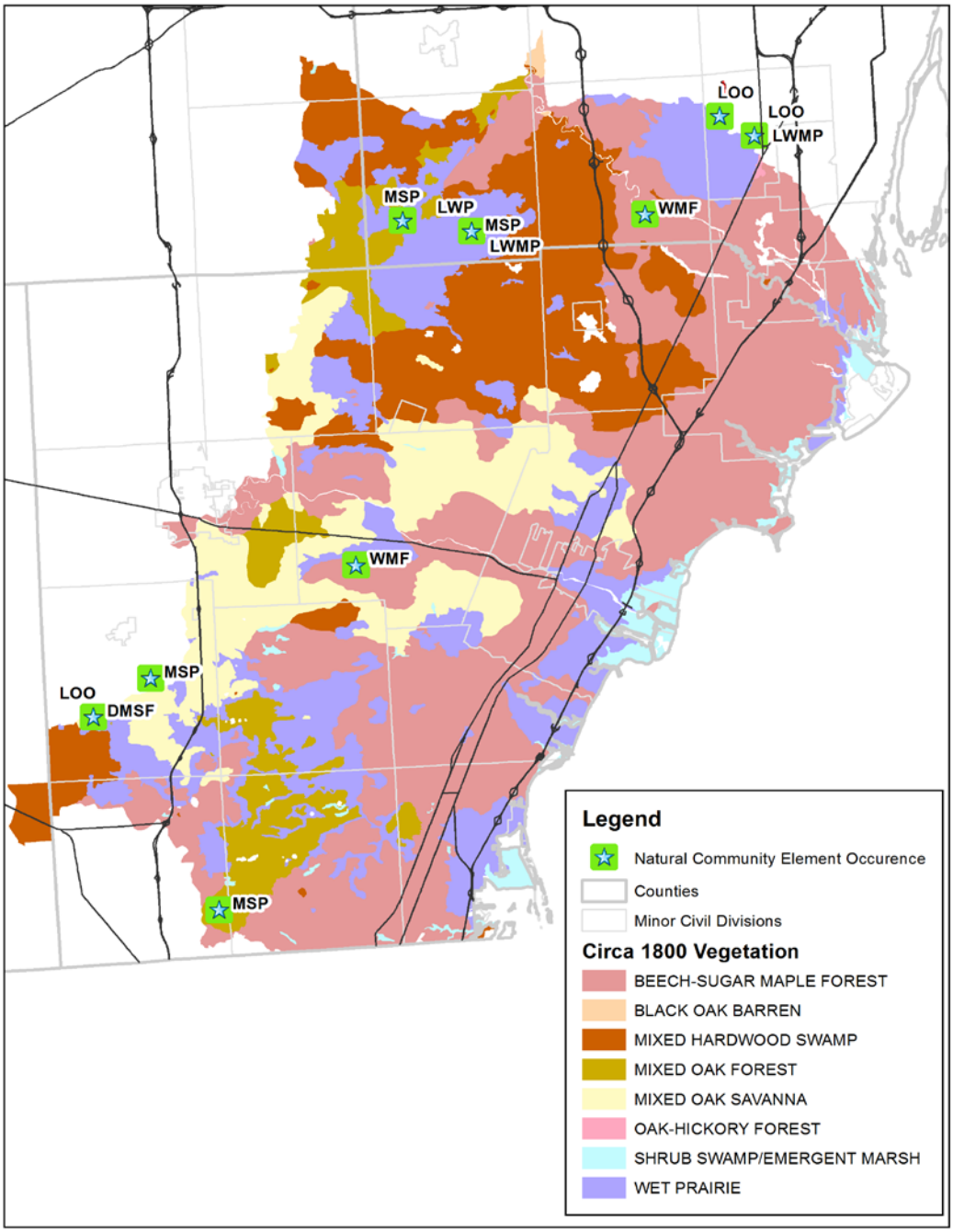
The Green Ribbon Initiative restores Globally Rare Natural Communities

The Green Ribbon Initiative (GRI) is a partnership of over 20 conservation groups working together for many years to protect the natural beauty and biological diversity of the Oak Openings Region. The Oak Openings Region contains some of the rarest plant communities in the world. Five of the six natural plant communities in the region are considered globally rare, and TNC has named it one of the world's "Last Great Places." While the GRI was originally formed in Northwest Ohio in 2000, the partnership was recently broadened to include partners from Southeast Michigan. The GRI is a shared vision of public and private organizations, landowners, and individuals working to preserve, enhance, and restore critical natural areas in the Oak Openings Region of Northwest Ohio and Southeast Michigan.

Primary activities of Green Ribbon Initiative

- Inform community about Oak Openings Region;
- Identify critical natural areas;
- Support the preservation of the critical natural areas;
- Support the restoration and enhancement of the critical natural areas;
- Build partnership coalitions; and
- Support partner organizations to ensure ongoing, sustainable efforts in the Oak Openings Region.

Figure 21
Known Occurrences of Lakeplain Wet Prairies (WLP), Lakeplain Oak Openings (LOO), Wet-Mesic Flatwoods (WMF), and Mesic Sand Prairie (MSP) within the Study Area, with circa 1800 Vegetation



Source: MNFI Biotics database, 2015.

Viability Summary

Overall, the results of the viability assessment indicate that the conservation targets are in poor to fair condition within the study area (Table 9). Given the large landscape conversions that have taken place in the Maumee Lakeplain region over the past couple of centuries, it is not surprising that almost all of the conservation targets are in fair to poor condition. One exception is the migratory fish target which appears to be in good condition.

Today, agriculture is the dominant land use, with 55 percent of the landscape or 186,300 acres in some form of agricultural use, primarily corn, wheat, and soybeans (Cropland Data Layer, 2014). The quest for agricultural production on this large, flat, clay lake plain has had a tremendous impact on terrestrial and aquatic resources, particularly on the water quality and habitats of the coastal river systems and nearshore zone of Lake Erie. Agricultural land use affects the viability of each conservation target. In addition, approximately 88.5 percent of wetlands (both forested and non-forested) and 82 percent of upland forests have been lost since the early 1800s, leaving very little habitat for native plant and animal species to persist.

Table 9
Summary of Existing Condition of Conservation Targets

Conservation Target	Condition
Migratory Fish	Good
Aerial Migrants	Fair
Coastal Tributaries	Fair
Coastal Wetlands	Fair
Herpetofauna Connectivity	Fair
Globally Rare Natural Communities	Poor
Inland Wetlands	Poor

Key Data Gaps

Insufficient data currently exists within the study area to provide an accurate assessment for most of the conservation targets. The exceptions are inland wetlands and globally rare natural communities. However, these are only exceptions due to the tremendous habitat losses experienced by these two conservation targets. It is likely that no amount of additional data would change their poor viability rating. While new data would be helpful in providing an accurate portrayal of health and distribution, both of these targets will still fall under the poor viability category due to the low amount of acreage. However**,** globally rare natural communities would benefit from more recent field surveys since most occurrences haven't been rigorously surveyed in over 25 years. The viability of each of the remaining five conservation targets is primarily based on limited expert opinion and very little empirical data.

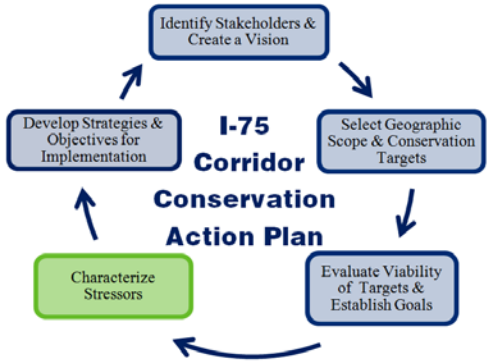
In order to provide a more accurate depiction of viability in the study area, as well as develop a solid ecological baseline to measure impacts of implemented strategies on each conservation priority, targeted field surveys are strongly recommended. Targeted field surveys would be particularly beneficial if conducted prior to implementing any of the strategies identified later in the report. Herpetofauna connectivity and migratory fish have the largest data gaps, followed closely by aerial migrants. The next biggest data gaps are for coastal wetlands, and coastal tributaries, followed by globally rare natural communities. A list of priority data gaps is identified in the Appendix.

Removal of Inland Wetlands from Conservation Targets

Given the large loss of inland wetlands in the project area due to agricultural conversion, coupled with the significance of the agriculture sector to the regional economy, the core team and TAC decided to remove inland wetlands from the list of conservation targets. This decision was made later in the conservation planning process as additional information was made available. The team realized that it just wasn't feasible to make a meaningful impact on the viability of inland wetlands. It is important to note however, that wetlands as a whole are addressed by several other conservation targets. Coastal wetlands are probably the single most important conservation target in the region, and three of the globally rare natural communities – wet-mesic flatwoods, lakeplain wet prairie, and lakeplain wet-mesic prairie – are actually wetlands found throughout the project area. In addition, both herpetofauna connectivity and aerial migrant targets are largely based on wetland protection, enhancement, and restoration.

Chapter 6: Characterizing Stressors

Figure 22
I-75 CAP Process



Step IIB. Identify and Prioritize Stressors to Conservation Targets

Following the CAP process in Table 5, Chapter 3, the TAC first identified a comprehensive list of stressors adversely affecting the conservation targets, and then prioritized them based on the degree of their impacts (Figure 22). A stressor is the degraded condition or "symptom" of the target that results from a threat. (Salafsky, et al. 2008). After identifying the list of stressors, the TAC identified factors or stressors contributing to each stress. The MNFI conservation planner then incorporated the stressors into the Miradi project management software program to rank the stressors.

After brainstorming, the TAC arrived at the following as a starting point for the stressor discussion. The level of impact of each stressor on the conservation targets was assessed and ranked according to the following criteria.

- Scope – The conservation target's percentage of area or population that is expected to be impacted by the stressor within 10 years.(Salafsky, et al. 2008)
- Severity – The level of impact to the target from the stressor within ten years. For example, an invasive species may be found across a large spatial area, but the level of impact of this species may be relatively small. (Salafsky, et al. 2008)
- Irreversibility – The degree to which the impacts from the stressor can be reversed leading to restoration of the conservation target.(Salafsky, et al. 2008)

Table 10 provides a summary of the impact of each threat on the conservation targets as generated by the Miradi software's formulas. The blank cells in the table were not rated.

Table 10
Final List and Ranking of Key Stressors

Stressors/ Targets	Migratory Fish	Inland Wetlands	Globally Rare Natural Communities	Coastal Wetlands	Aerial Migrants	Coastal Tributaries	Herpetofauna Connectivity	Average Rating by Threat
Invasive Species	Medium	High	High	Very High	Medium	Medium	High	Very High
Drainage Systems	Medium	High	High	Very High		High		Very High
Historic Agricultural Land Conversion		Very High	High	Medium	High		Low	High
Urban Development and Utilities	Low	Low	Medium	High	High		High	High
Climate Change	Medium	Medium	Medium	Medium	High	High	Medium	High
Road Stream Crossings	High	Medium		High		High	High	High
Agricultural Nonpoint Source Runoff	High	Medium	Medium	High		High	High	High
Subsidized Meso-Predators							Very High	High
Sand, Gravel and Limestone Mining		Medium		Medium				Medium
Point Source Pollution	Medium			Medium		Low		Medium
Urban Nonpoint Source Runoff	Medium	Low	Medium			Low	High	Medium
Roads and ROWs							High	Medium
Wind Energy					High			Medium
Utility Corridors		Medium						Low
Dams/Wiers	Low					Low		Low
Onsite Sewage Disposal Systems						Low		Low
Persecution and Collection							Low	Low
Shoreline Hardening							Medium	Low
Non-Compatible Water Level Management							Low	Low
Disease							Low	Low
Improperly Designed or Placed Dikes				Medium				Low
Recreational Activities					Low			Low
Cell Towers					Low			Low
Overall Threat to Conservation Target Ratings	**High**	**Very High**	**High**	**Very High**	**High**	**High**	**Very High**	**Very High**

Summary of Key Stressors

In addition to the results from Miradi, the TAC rated stressors based on input from each of the conservation target working groups. From highest to lowest, the most significant stressors were:

1. Invasive species
2. Agricultural drainage systems
3. Historic agricultural land conversion
4. Urban development and utilities
5. Poorly functioning road stream crossings
6. Agricultural non-point runoff
7. Climate change
8. Subsidized meso-predators

All but the last two have a high, or very high, impact on three or more of the conservation targets.

Similar to the *Lake Erie Biodiversity Conservation Strategy*, the Core Team tried to integrate climate change into each of the other stressors. Climate change exacerbates most of the stressors, typically through meteorological changes such as increased storm intensity, warmer temperatures, and more frequent droughts. Determining the degree that climate change can affect these stressors is beyond the scope of this study.

The Core Team also decided to drop subsidized meso-predators from the stressor list. Subsidized meso-predators only impact the herptofauna target (albeit very high), and it is also an extremely difficult stressor to mitigate particularly over a large area like the I-75 corridor. The Core Team thought the subsidized meso-predator stressor should be addressed sometime in the future, and targeted at significant turtle populations.

Given the limited time and resources remaining on the project, the core team suggested to the TAC that the eight priority stressors be condensed into four key action areas:

- Agricultural Drainage and Runoff
- Invasive Species
- Road/Stream Crossings
- Urban Development and Runoff

Agricultural land conversion, drainage systems, and agricultural non-point runoff were combined into Agricultural Drainage and Runoff. The TAC also agreed that urban runoff, which was rated overall as a medium impact, could logically combine with urban development into Urban Development and Runoff.

Agricultural Drainage and Runoff

Settlement came early to southeastern Michigan. The French, British, and then the Americans settled the majority of wild lands within the Maumee Lakeplain. Farming became profitable once the vegetation was cleared and the saturated soils were drained of excess water. Innovations such as the plow, mechanical reaper, and drain tiles helped facilitate much of the historic land conversion. Agriculture land use now makes up at least 55 percent, or more than 186,000 acres, of the I-75 study area (USDA cropland data layer, 2014).

Some of the other factors contributing to agricultural drainage and runoff challenges include conventional tillage, plowing of ditches and riparian zones, and improper manure application. Additionally, wetland loss and poor soil quality reinforce environmental stress caused by agriculture. Today, only 20 percent of the landscape remains in a natural condition. The transformation of historic natural areas to an agriculturally dominant landscape reduced the ecological benefits of natural areas and associated wildlife.

Agricultural nonpoint source runoff contributes excess sediment and nutrients to local streams, which provides a significant challenge within the WLEB (Pearsall, et. al., 2012). “Indirect effects of drainage systems include water quality and habitat impacts of sediment, phosphorus, nitrogen, and other contaminants in agricultural runoff, as well hydrological teration in the form of altered volume and timing of runoff. Alteration of low regimes in turn drives a complex of interrelated changes in stream morphology, in stream and riparian habitats, nutrient cycles, and biota.” (Blanne et al., 2009.) Today, there are approximately 1,000 miles of designated open drain in Monroe County alone (Michigan Association of Drain Commissioners, 2014).

Agricultural activity in Monroe County also produces stormwater runoff and nonpoint source pollution into the area’s coastal tributaries and nearshore environment. Managing nonpoint source runoff is challenging in both the urban and rural environments. Storm intensity can affect the level of nonpoint source pollution.

Within the WLEB, addressing the level of nutrients entering Lake Erie has been a priority between the United States and Canada. The Great Lakes Water Quality Agreement Nutrients Annex Subcommittee developed phosphorus reduction targets for the watersheds draining to Lake Erie. A total phosphorus reduction of 40 percent was identified for the WLEB.

Subsequently, Michigan’s Water Strategy has adopted this 40 percent reduction target as a priority for the Western Lake Erie Basin and has developed a Framework for Phosphorus Reduction in Western Lake Erie. Agricultural drainage and runoff affects all six conservation targets.

Agricultural runoff carrying nutrients and sediment into a drain.

Invasive Species

Invasive species includes terrestrial and aquatic plants and animal species. They disrupt the natural abundance and diversity of native species, habitat structure, nutrient cycling, soil health, and hydrology. Additionally, behaviors of wildlife are affected by the presence of invasive species, including foraging, hunting, breeding, dispersal, and nesting behaviors.

Located in the southernmost tier of counties in Michigan, it is no surprise that many non-native plants and animals call Monroe County home. For Michigan's Lower Peninsula, invasive species often enter the state in the southern tier counties along heavily used transportation corridors like I-75. According to the Early Detection and Distribution Mapping System (EDDMapS) website, there are 179 known non-native plant species in Monroe County.

The most problematic invasive species within the study area are:

- Common reed (*Phragmites* australis subsp. Australis)
- Purple loosestrife (Lythrum salicaria)
- Flowering rush (Botomus umbellatus)
- European frogbit, (Hydrocharis morsus-ranae)
- Garlic mustard, (Alliaria petiolate)
- Glossy buckthorn (Frangula alnus), and Narrow-leaved cat-tail (typha angustifolia) or the hybrid (typha x glauca)

Like Agricultural Drainage and Runoff, Invasive Species affect all six conservation targets, with significant impacts on Coastal Wetlands, Globally Rare Natural Communities, and Herpetofauna Connectivity. Very little information exists on invasive animal species. Invasive aquatic animals such as zebra mussel, Asian clam, round goby, goldfish, Chinese mystery snail, and bloody red shrimp occur in the study area [Midwest Invasive Species Information Network (MISIN) database for Monroe County]. Emerald ash borer first appeared in Southeast Michigan in 2002 and has had a devastating impact throughout Michigan by killing ash trees, once a staple of Michigan's roadsides and forested wetlands.

Midwest Invasive Species Information Network (MISIN)

The goal of this regional resource is to assist both experts and citizen scientists in detecting and identifying invasive species in support of successfully managing them. This effort is led by researchers with the Michigan State University Department of Entomology Laboratory for Applied Spatial Ecology and Technical Services in conjunction with a growing consortium of Supporting Partners.

Road/Stream Crossings

Roads are one of the primary economic drivers of any region. Roads help move goods from suppliers to retailers and consumers, and move people to jobs, businesses, parks, tourist attractions and other destinations.

The study area contains a total of 2,080 miles of highways, county roads, city roads, and private drives. This equates to 3.87 miles of road per square mile. Several of these roads are well traveled interstate or state highways, including I-75, US-23, M-24 (Telegraph Rd.), and M-100 (Dixie Highway). I-75 serves as a particularly important transportation corridor between the southern U.S. and Ontario, Canada.

Thousands of road/stream crossings (bridges and culverts) facilitate travel across streams and drains in the study area. These crossings vary widely in size, construction, age, material, condition, and length. Road stream crossings can cause ecological problems in a number of scenarios. For example, erosion of the slopes around a culvert or bridge can release sediment into a stream. This sediment transmits nutrients and degrades fish spawning, macroinvertebrate, and native mussel habitat. Culverts can bar migratory fish passage and obstruct breeding, nesting, and foraging habitat for amphibians and reptiles.

In addition, wildlife frequently use waterways for travel and may not be able to pass through certain culverts or bridges because there is no dry land for them to use. This can lead to increased roadside mortality as they seek an alternate path. Improperly sized culverts can also lead to unnatural flooding of lands upstream from the road, and severe scouring on the downstream side of the road.

Poorly functioning road stream crossings affect five of the six conservation targets– Migratory Fish, Coastal Wetlands, Coastal Tributaries, and Herpetofauna Connectivity.

(Left) Invasive species take over a drain at a road stream crossing in Monroe County; *(Right)* Road stream crossing with limited passability.

Urban Development and Runoff

Although the I-75 study area mainly supports an agricultural economy, Monroe County also contains a fair amount of urban development including residential and industrial land uses. Urban development primarily occurs east of Telegraph Road, and is particularly dense in portions of the primary study zone. The majority of urban development occurs within and adjacent to the City of Monroe, as well as along the Lake Erie shoreline. There is also significant development in Bedford Township, Michigan, a suburb of Toledo near the Michigan border with Ohio, as well as the Villages of Dundee and Luna Pier. Today, urban development comprises approximately 23 percent (75,900 acres) of the landscape (CCAP, 2010).

Urban portions of the study area are stressed by proximity to transportation corridors, legacy contamination from industry, removal of riparian vegetation, increased impervious surfaces, and an overall need to increase municipal tax base through urban development. Major utilities, such as Fermi 1 and 2, the Detroit Edison coal plant, and the former Consumers Whiting coal plant, are also located in these urban areas.

Coastal wetlands often occur near industrial land use within the primary study zone, representing a small portion of their previous size. Metal seawalls and stone or concrete rip-rap covering are common erosion

control features in western Lake Erie. Such protection measures often lead to a number of ecological challenges including habitat fragmentation, hydrologic alterations, sediment transport disruption, and loss of wildlife habitat. As Lake Erie water levels rise, existing coastal marshes and lakeplain prairies are unable to migrate inland due to urban development. Filling coastal wetlands, armoring shorelines, and increasing impervious surfaces affect how well remaining wetlands are able to provide critical services, such as flood abatement and storm protection, to local communities.

Similar to areas across the country, urban development in Monroe County results in stormwater runoff entering the coastal tributaries and low-lying areas. This runoff comes from a variety of impervious surfaces associated with urban development, such as rooftops, parking lots, driveways, roads and highly managed open spaces.

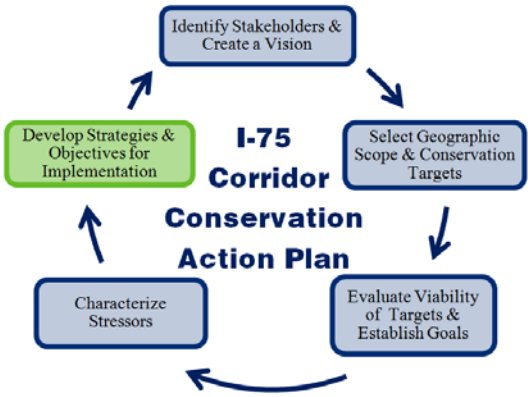
Although agriculture is a primary source of soluble reactive phosphorus in this region, urban areas also contribute a diverse array of stormwater pollutants including lawn fertilizers, sediment, oil and grease, pet waste, and metals. These pollutants degrade water quality and habitat, harm wildlife, and facilitate the establishment of invasive plant species such as common reed.

Conservation targets most affected by urban development and nonpoint source runoff include Migratory Fish, Coastal Wetlands, Coastal Tributaries, Aerial Migrants, Herpetofauna Connectivity, and Globally Rare Natural Communities.

(Left) Industry and utilities adjacent to River Raisin. *(Right)* River Raisin entering Lake Erie.

Chapter 7: Priority Conservation Strategies

Figure 23
I-75 CAP Process



This chapter explains the process for choosing priority conservation strategies to minimize the environmental stressors in the I-75 study area (Figure 23). Since the CAP depends on participation of local, state, and federal representatives, it provides fertile ground for breaking down traditional institutional barriers when discussing ideas. Each action team contained members who have experience with one of the four stressors identified in Chapter 6 including agricultural drainage and runoff, terrestrial and aquatic invasive species, road stream crossings, and urban development and runoff. The paths taken by the four action teams to develop their strategies varied with their collective areas of expertise. For a list of the action team members, see the Appendix.

The resulting strategies provide recommendations for future actions to agencies, organizations, municipalities, and stakeholders engaged in conserving priority natural resources found within the Michigan portion of the WLEB. The action teams began by completing a situation analysis.

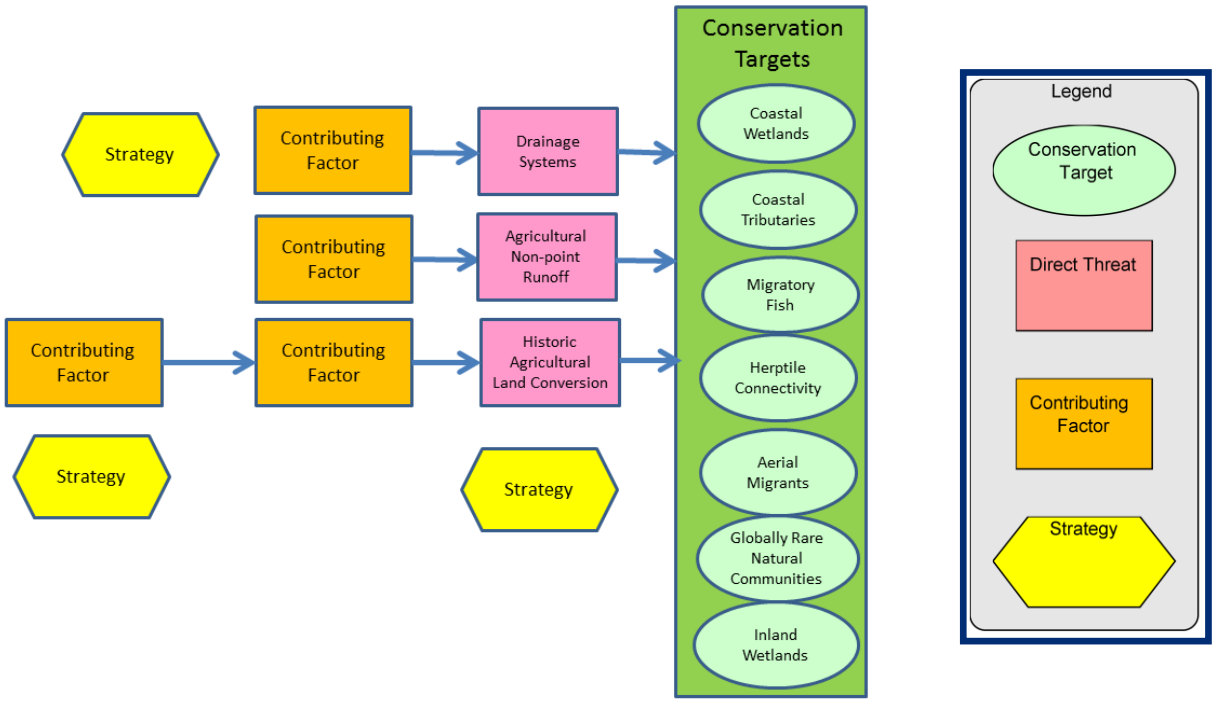
Step IIC. Completing Situation Analyses

Completing a situation analysis integrates the conservation target and its stressors into a more complete context including the biological, ecological, social, cultural, economic, political, and institutional systems that affect the conservation target (Table 5). The teams completed a situation analysis for each of the stressors. The process resulted in development of a situation diagram that shows the relationships between the conservation targets, direct stressors, indirect stressors, opportunities, and stakeholders. The chart helps document the story behind the various conservation strategies as well as their anticipated impacts on the conservation targets. An example of a situation diagram can be seen in Figure 24.

A situation analysis contains a wealth of information summarized visually. To get there, action team members spent time mapping out the situation diagrams. That information went into the Miradi software, which created final diagrams. The situation diagram begins with the conservation targets on the right side (Figure 24). The action team then develops a list of direct threats (i.e., stressors), along with the factors contributing to the stressors. Based on the stressors and contributing factors, the action team then

formulates strategies to minimize the impacts from those stressors while addressing the contributing factors.

Figure 24
Example Situation Diagram



Step IID. Develop and Prioritize Conservation Strategies

After identifying contributing factors, the action team brainstormed strategies or actions that might reduce the effect of the stressors on the conservation targets (Table 5). The core team decided to combine the analysis and discussion of Step IIC, Complete the Situation Analysis with Step IID, Develop and Prioritize Conservation Strategies since both are depicted in the final Situation Diagram.

A conservation strategy is a broad course of action intended to achieve a specific outcome that minimizes a stressor. It may enhance the viability of a conservation target or secure resources and support for enhancing the target. Once the brainstorming session ended, the action teams selected a subset of priority actions based on benefits, feasibility, and cost. For this study, the Core Team chose to take that prioritization one step further to identify a single top priority. Establishing one priority would focus the action planning process, to meet time constraints for completing the study.

Agricultural Drainage and Runoff Situation Analysis

Broad themes that helped the action team identify specific contributors to the stressors included climate change (extreme weather events), economics, national and state policies, landform and soils, culture/tradition, and lack of information.

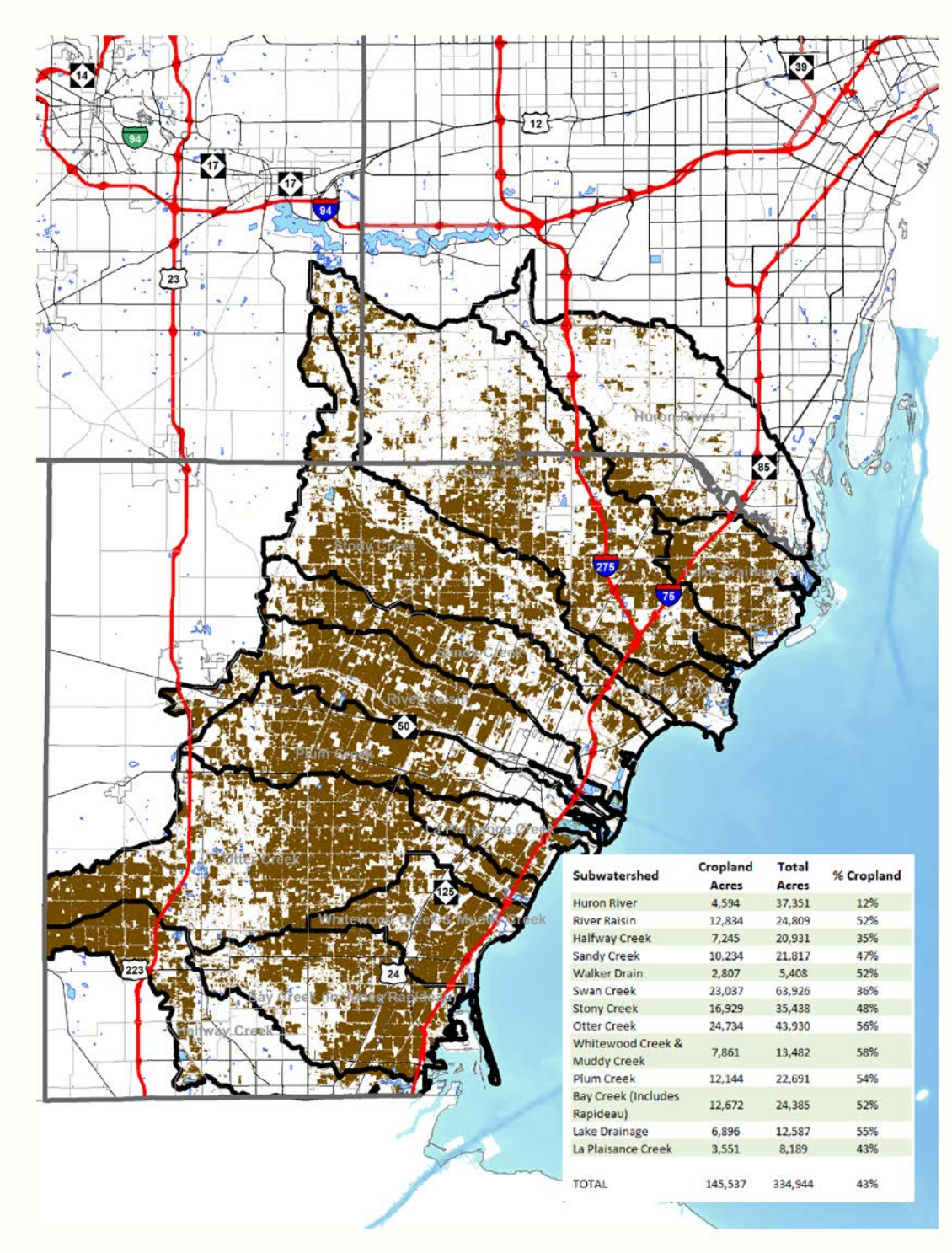
Since the three stressors identified in Chapter 6 – Historic Agricultural Land Conversion, Agriculturally Based Drainage Systems and Agricultural Nonpoint Source Runoff – are closely related, the Core Team combined them into one situation analysis. The situation diagram detailing factors contributing to agricultural drainage and runoff is shown in Figure 26. When viewed together, the three agriculturally based stressors are connected by several contributing factors. For example, agricultural economics plays a role in all three stressors. Farmers have few choices within their control to manage their profits, such as decreasing costs of materials like fertilizers (inputs), improving yields, increasing efficiency, and increasing the amount of land being farmed. However, they are also part of a dynamic market economy combined with government incentives that can affect their choices. Another example the action team discussed refers to the use of genetically modified corn to increase yields important to receive government subsidies to support ethanol production. This type of corn can create challenges with implementing the no-till style of agriculture that reduces nonpoint source impacts to local water resources.

The need to have and maintain an extensive surface and subsurface drainage system for viable farming also contributes to all three stressors. Without surface and subsurface drains, agriculture could not succeed on the flat, poorly drained landscape. Monroe County is home to more than 1,100 county drains, more than any other county in Michigan, managed by the Monroe County Drain Commissioner. The relationship between the farmers and their County Drain Commission is preeminently important to the community as is Michigan's Drain Code, which establishes the rules for maintaining and operating county drains.

Traditional farming practices can also contribute to the stressors. The agricultural extension programs and other state and federal programs promote no-till farming as a method to reduce nonpoint source pollution. Likewise, manure application can also affect water resources. An important focus for state and county agencies along with the agriculture community is to work collaboratively to achieve economically viable crop production while also minimizing impacts to water resources. Figure 25 shows USDA cropland in the I-75 study area.

By following the situation diagram from right to left, the rectangular boxes show the action team's thought process in sorting out common contributors to each stressor.

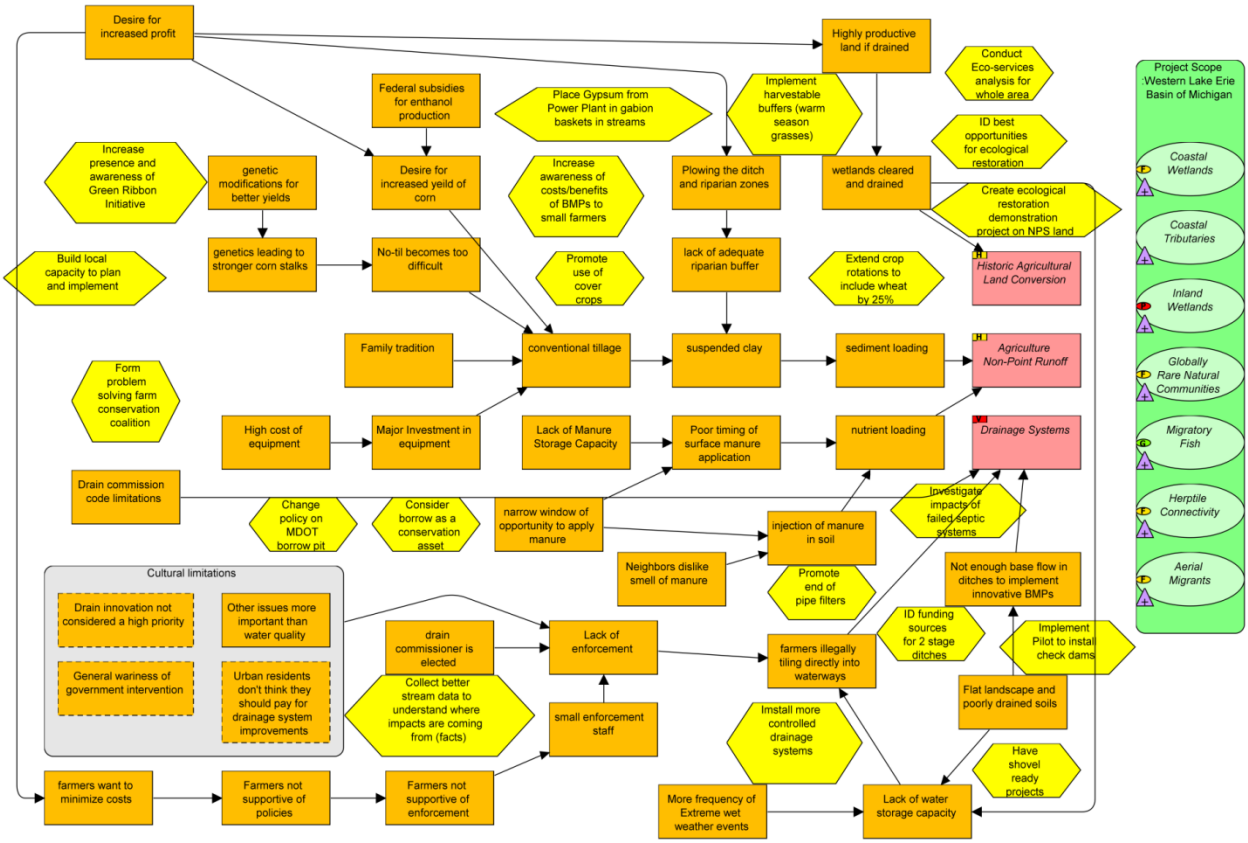
Figure 25
USDA Cropland in the I-75 Eco-Logical Study Area



Subwatershed	Cropland Acres	Total Acres	% Cropland
Huron River	4,594	37,351	12%
River Raisin	12,834	24,809	52%
Halfway Creek	7,245	20,931	35%
Sandy Creek	10,234	21,817	47%
Walker Drain	2,807	5,408	52%
Swan Creek	23,037	63,926	36%
Stony Creek	16,929	35,438	48%
Otter Creek	24,734	43,930	56%
Whitewood Creek & Muddy Creek	7,861	13,482	58%
Plum Creek	12,144	22,691	54%
Bay Creek (Includes Rapideau)	12,672	24,385	52%
Lake Drainage	6,896	12,587	55%
La Plaisance Creek	3,551	8,189	43%
TOTAL	145,537	334,944	43%

Source: SEMCOG.

Figure 26
Step IIC. Agricultural Drainage and Runoff Situation Diagram



Develop and Prioritize Conservation Strategies

Once the action team completed the list of contributing factors for the three agricultural stressors and mapped the connections between the factors, the group brainstormed strategies to minimize the impact of the agricultural stressors. The situation diagram shows strategies developed by the action team (Figure 26). A full list of 22 strategies is in the Appendix.

Of these strategies, the action team prioritized four for further discussion. The Agricultural Situation Analysis proved the most challenging and complex of the study as is demonstrated by the Situation Diagram and the large number of strategies identified by the action team. A few discussions bear more detail. For example, the action team learned that Monroe County does not have an ordinance requiring homeowners to have a functioning septic system before selling their property. The farm community and its supporters feel this may contribute to the nutrient problem of the county's drains and streams, yet little information exists to quantify that impact. Farmers feel they unfairly shoulder the blame for water quality problems given the septic systems that may be failing, especially in more heavily developed parts of the county such as Bedford Township, a bedroom community in southern Monroe County.

To go from a large list of strategies down to four required a discussion about the benefits, feasibility, and costs of the strategies. Benefits include scope, scale and duration of outcome, and ability to leverage other strategies. Feasibility is based on the level of support from key constituents, and ease of implementation. Cost refers to a onetime cost or annual cost, staff time, and number of years.

Another factor considered was leadership. Fortunately, many of the strategies listed already have champions. For example, the Michigan Agriculture Environmental Assurance Program or MAEAP promotes the use of tile drain management, which is a way to remove sediment from tile drainage before it enters the county drain. Other programs promoted by the NRCS promote the use of buffer strips between fields and drains/streams to clean runoff before it enters the water system. The State of Michigan has assembled a Western Lake Erie coalition of people who work with the farming community to coordinate their state and federal program activities. Rather than duplicate these efforts, the action team focused on what items might be within their collective reach as well as strategies that would resonate with the community.

Priority Agricultural Drainage and Runoff Strategies

- Identify best opportunities for ecological restoration in agricultural areas while focusing on marginal farm lands near important ecological conservation lands;
- Create a program that connects farmers with ecological values of the region because farmers may not be aware of importance of key ecological resources. This strategy assumes a stronger connection to ecology will provide a key incentive for farmers to participate in existing conservation programs;
- Develop a soil health initiative and use existing programs focused on mitigating problems originating on farmland. Educating on the fact that soil health is something that farmers benefit from directly and conservation priorities benefit from indirectly will help with the uptake of holistic soil health programs on farms.
- Develop and implement a smart drain assessment project that facilitates use of effective Lakeplain BMPs.

The action team settled on a modified version of one of the strategies on the final list, "**Implement demonstration Smart Drain Assessment Project that uses effective lakeplain best management practices**" as its top priority, with the addition of innovative drain assessments and financial incentives to help farmers change their practices.

A demonstration project in a drainage district with positive impacts on several conservation targets might lead to broader participation and bigger results in the future. The demonstration project would implement an innovative "smart" drain assessment. This model assesses each landowner individually based on a number of criteria specific to that parcel of land, such as cover type and management practices.

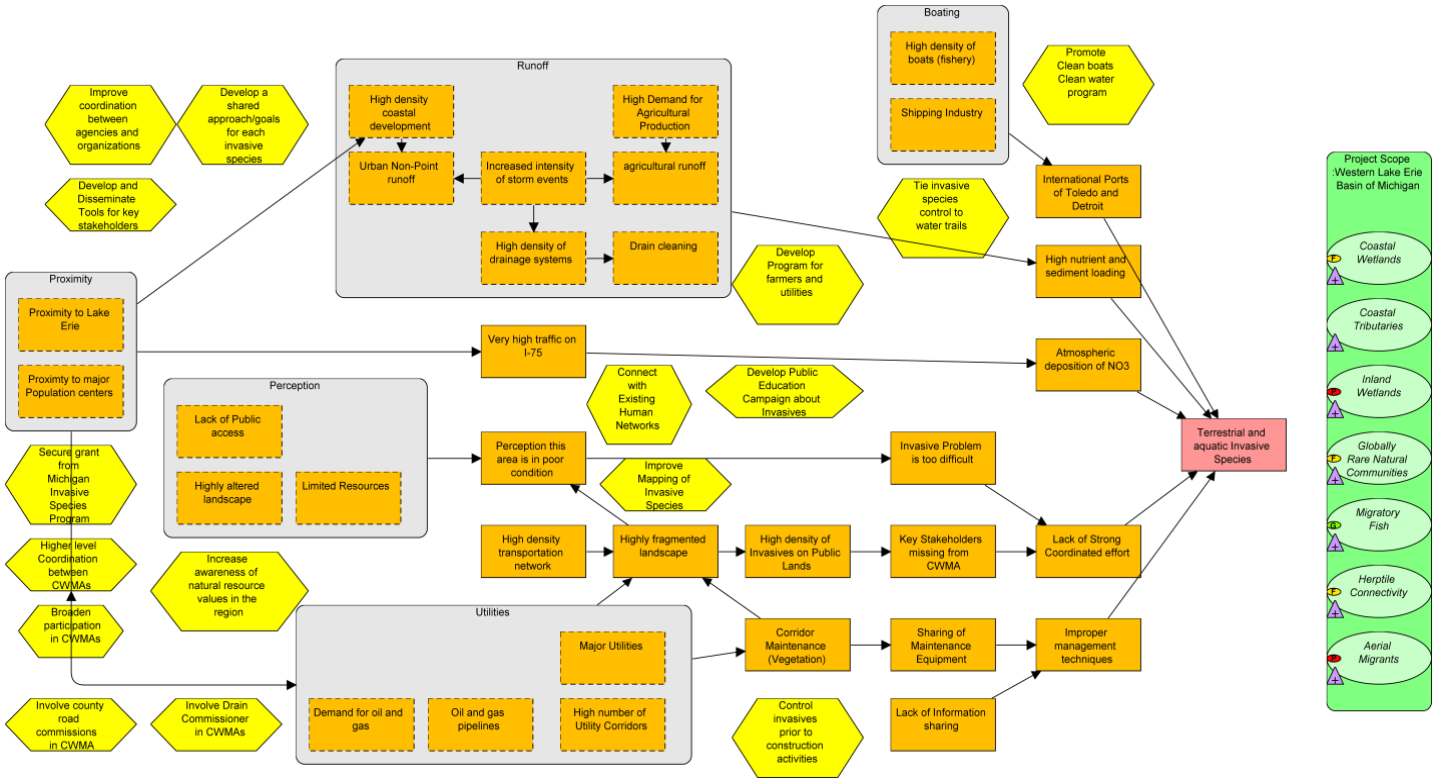
The flexibility of the Michigan Drain Code allows drain commissioners to consider a wide variety of factors when determining the benefit a parcel derives from the drain and, thus, the apportionment of the total drain project cost. In a similar pilot program in Van Buren County, Michigan, the drain commission determined assessments by combining a base allocation with a benefit allocation that considered how each quarter-acre of land on a parcel was used (land cover), how much drainage (hydric soils) it requires, and how it is managed (conservation practices). The process gives landowners the financial incentive to reduce their drain assessment by using a variety of conservation practices. Since many of these practices are promoted and financially supplemented by the NRCS, it was highly recommended that the drain commission work closely with several agricultural agencies such as the County Conservation District, Farm Bureau, and Monroe Farm Services Agency.

The group also felt that if, via monitoring data, farmers could see the relationship between their actions and ecological benefits such as an increased abundance and diversity of migratory fish and herpetofauna species, improved water quality, and healthier coastal wetlands, they would be more apt to continue implementing those practices

Terrestrial and Aquatic Invasive Species Situation Analysis

Based on the expertise of the group, the discussion focused on invasive terrestrial or land-based species. A number of aquatic invasive species, such as the zebra mussel and the round goby, are concerns for Lake Erie, but the conservation targets for this study led the group to focus on land-based species instead. Figure 27 is the situation diagram developed by this action team to better understand the various factors contributing to the proliferation of aquatic and terrestrial invasive species. Some of the influences over these factors include utility and road corridor maintenance practices where equipment may encounter invasive species and pick up debris from mowing before transferring it to another part of the road or utility corridor. Stormwater runoff from roads, agriculture, and urban areas also create ideal conditions for invasive plants to proliferate since it delivers the nutrients and sediments most invasive species thrive on, while providing another transmission method to move seeds and plant materials around the landscape. Many of these factors are documented in Figure 27 and in the final strategies list in the Appendix.

Figure 27
Step IIC. Invasive Species Situation Diagram



From the longer list, the action team reached agreement on the highest-priority strategies. Note that some of the ideas from the brainstorming session were combined for the final list.

Priority Invasive Species Strategies

- Develop comprehensive invasive species educational program; develop and disseminate targeted Best Management Practices. This would raise awareness of the negative impact of invasive species on natural resources, economics, recreation, and aesthetics. Additionally, developing BMP information for specific audiences, such as homeowners, local governments, farmers, hunters, anglers, boaters, businesses, and utilities to improve management across the landscape;
- Improve spatial data and mapping of existing invasive species populations to identify focus or priority areas. Today's spatial mapping is based on remote sensing technology and a mixture of data sources with varying quality. A coordinated effort at mapping might produce better information. Currently, all invasive species mapping focuses on phragmites or the common reed. Perhaps other species should be mapped, too. Furthermore, providing a one-stop resource on invasive species in the Maumee lakeplain might help with information sharing. Information would include spatial data, BMPs, research, grants, events, and partnerships;
- Enhance the impact and capacity of the two existing Cooperative Weed Management Areas (CWMAs). CWMAs exist now and are having success (Lakeplain and Oak Openings CWMAs) however, coordinating activities together and pooling both resources and talent could increase impact.

From these strategies, the action team selected **"Enhance the impact of the two existing cooperative weed management areas"** as the top priority. CWMAs are simple, partnership-based management structures where the partners develop coordinated plans for managing invasive species. The Detroit River-Western Lake Erie CWMA has 13 members managing or studying invasive plant species. Recently, partners have collaborated on reducing *Phragmites* (known as *Phragmite australis*) along the WLEB coast. As a branch of the GRI, a shared vision of public and private organizations working to preserve and restore critical natural areas in the Oak Openings Region of Northwest Ohio and Southeast Michigan, the Oak Openings Region CWMA partners focus on eradicating invasive species in Northwest Ohio and Southeast Michigan through early detection, rapid response, and outreach and education. The Oak Opening CWMA was officially formed in November 2014.

Just having these organizations in the study area is an asset in the fight against invasive species. These CWMAs have management experience and familiarity with the natural communities that thrive in the Maumee Lakeplain and Oak Opening landscape. Finding ways to support their activities and help them build their programs would likely help them achieve more success.

Road/Stream Crossings Situation Analysis

Currently, it is estimated that there are over 2,000 road stream crossings in Monroe County. Some of these crossings stretch over large coastal tributaries, while many others bisect small agricultural drains.. Since many of these road stream crossings were built in the early-to-mid-1900s, many need repair or replacement.

When a road/stream crossing functions poorly, erosion could occur and contribute sediment to the stream. The stream can undermine the bridge or culvert resulting in potential damage. Poorly functioning

road/stream crossings can also block migratory fish passage. Local road agencies inspect bridges every two years to monitor their condition and make sure they are safe; however, there may still be erosion problems at the crossing.

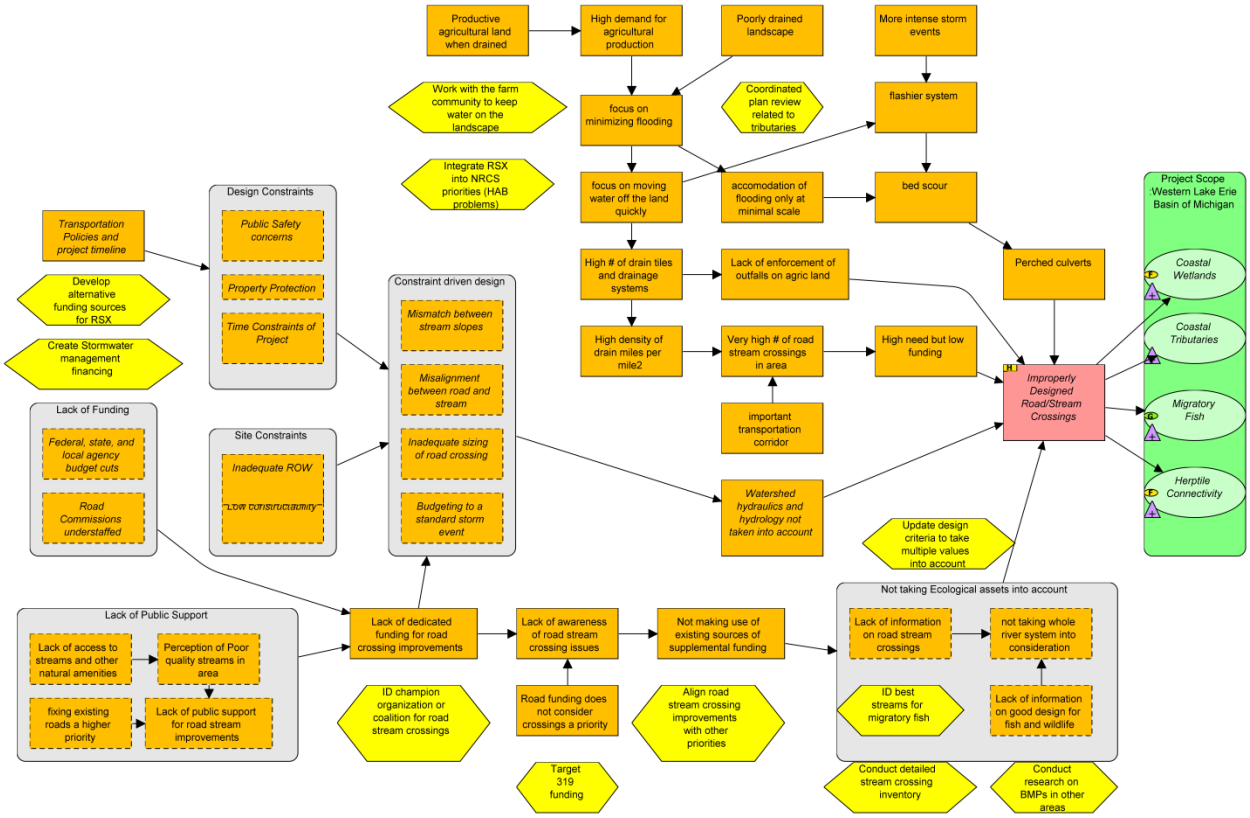
Some of the influences over these contributors included a general lack of awareness of road/stream crossing issues and their cumulative effects on the environment. Right now, no one knows how many of the 2,000 road/stream crossings are functioning poorly. These utilitarian structures would not seem so much of a threat to the I-75 conservation targets; however, if even 20 percent of road stream crossings function poorly, this equates to about 200 locations. From a financial and practical perspective, individual site constraints may hinder the ability of a designer to accommodate ecological features, especially if there is not enough property to build on. Bridge and culvert projects usually have tight timelines, making it harder for engineers to explore alternatives to accommodate ecological factors. Lastly, when compared to northern lower Michigan or other parts of the state where natural resources organizations actively seek improvements for road/stream crossings, primarily for fishing, Southeast Michigan does not have partners to assist road agencies with identifying problem areas, arriving at a solution, and helping to fund a more expansive project than might normally happen.

These are major contributors to improperly functioning road/stream crossings:

- Stream bed scour occurs when the stream carves out a hole near a bridge abutment or culvert; fish have trouble entering a culvert that is perched high with a scour hole in front of it; the scouring process occurs when natural stream processes encounter a fixed object like a bridge abutment or culvert; more intense storm events also contribute energy to the scouring process, accelerating it.
- A high number of old road/stream crossings; when designed, older crossings did not account for natural stream changes or the hydrology of the water body because their primary use was to convey water beneath a roadway while minimizing flooding. Designers did not consider impacts to water quality or to fisheries and frequently designed structures that impeded water flow because of the added cost of spanning an entire floodplain.
- When landowners illegally connect run-off to a stream or county drain, this can result in erosion at bridges and culverts since it changes the stream hydrology or water dynamics.
- Because of the low, flat topography, Monroe County has a lot of road/stream crossings, so there is a higher burden on public agencies to maintain these structures.

Figure 28 shows the situation diagram for road/stream crossings.

Figure 28
Step IIC. Situation Diagram for Poorly Functioning Road/Stream Crossings



Priority Road/Stream Crossing Strategies

- Identify a local champion because road/stream crossings are a difficult long-term challenge that requires more resources than the county road commission can provide. A local advocate would help elevate road/stream crossings as a priority and maintain momentum necessary to see future impacts;
- Identify and develop a long-term strategy to fund road crossing improvements. Monroe County has a relatively small roads budget compared to the amount of road improvements needed in the area. With over 2,000 road/stream crossings in the project area, long-term funding is required to see substantial improvements over time;
- Research, develop, and implement road/stream crossing Best Management Practices for the Lakeplain. Additionally, coordinating the planning and review process to include drain commissioner, land use planners, road commission, MDNR, watershed groups, etc., in the decision-making process will improve management. Furthermore, conduct a targeted, detailed road/stream crossing inventory throughout the project area to identify where the biggest problems occur, as well as improve collection and monitoring of water quality and stream habitat data to measure impacts over time.

Using the three criteria of benefit, feasibility, and costs, the action team settled on, **"Conduct a comprehensive needs assessment for road/stream crossings in the I-75 Eco-Logical study area,"** as the highest priority. This strategy was not on the initial list of priority conservation strategies; however, the action teams felt that a road/stream crossing needs assessment was an essential first step towards identifying solutions to manage poorly functioning road/stream crossings.

Conducting a comprehensive needs assessment for road stream/crossings in the I-75 Eco-Logical study area will provide invaluable insight on the current status and critical nature of the numerous road/stream crossings in Monroe County. While many of these crossings would benefit from improvements, conducting a needs assessment for road/stream crossings enables the road agencies to understand which crossings have the most significant impact on water quality, stream bank erosion, wildlife and migratory fish passage, and habitat connectivity. Engineers could assess this information before determining the best fix for a particular bridge or culvert without having to collect information each time they start a project.

In addition to using environmental information to prioritize crossings for improvements, understanding which crossings overlap with regional water trails and regional nonmotorized corridors can help facilitate partnerships and strategic improvements. Overall, multiple sources of data are needed to prioritize road/stream crossings for improvement. A crossing that has low fish and wildlife passability, low habitat connectivity, high erosion, and degraded water quality, becomes a higher priority when the crossing also bisects a recreational amenity such as a water trail, bike trail, or foot path. SEMCOG's *Bicycle and Pedestrian Plan for Southeast Michigan* is one resource that can determine if road/stream crossings overlap with regional, nonmotorized corridors. SEMCOG's *Southeast Michigan Traffic Safety Plan* can also prioritize crossings for traffic safety improvements.

Road/stream crossing inventory projects have been completed in northern Michigan and other parts of the state, usually by a coalition of state and federal agencies and local watershed groups. The inventory allows staff and/or volunteers to fill out a stream crossing data sheet to inventory road/stream crossings. A *Great Lakes Road/Stream Crossing Inventory Instructions* manual also provides guidance. The data can be logged into the local asset management system maintained by the road owner.

Collecting baseline environmental information before implementing a road/stream crossing improvement could also enable the road agency to quantify and take credit for any impacts the project is having on improving viability of conservation targets, such as migratory fish passage, herpetofauna connectivity, decreasing scour and erosion, and improving water quality.

Currently, the Drain Commission of Monroe County is completing an asset management inventory of drains in Monroe County. Considering the high number of road/stream crossings on county drains, completing a needs assessment for road/stream crossings in the I-75 Eco-Logical Study Area would provide implementing agencies with a wealth of information on road and drainage infrastructure in the county. Additionally, this information would help support applications to the federal Transportation Alternatives Program (TAP), which can fund road/stream crossing improvement projects.

Urban Development and Runoff Situation Analysis

Fermi and Detroit Edison properties contain some of the highest quality coastal wetlands on Lake Erie. Both the manufacturing and energy sectors were drawn to WLEB and the River Raisin for access to water for their operations. The nearby access to transportation also made Monroe an ideal location with a shallow port, multiple rail corridors, the US-24 corridor and the I-75 corridor. These all remain assets today, promoted by the region for attracting development (Figure 29).

Local governments seek new development to increase their tax base or replace tax base lost through economic recession and changes in automobile manufacturing. Monroe has vacant, legacy industrial sites they would like to redevelop.

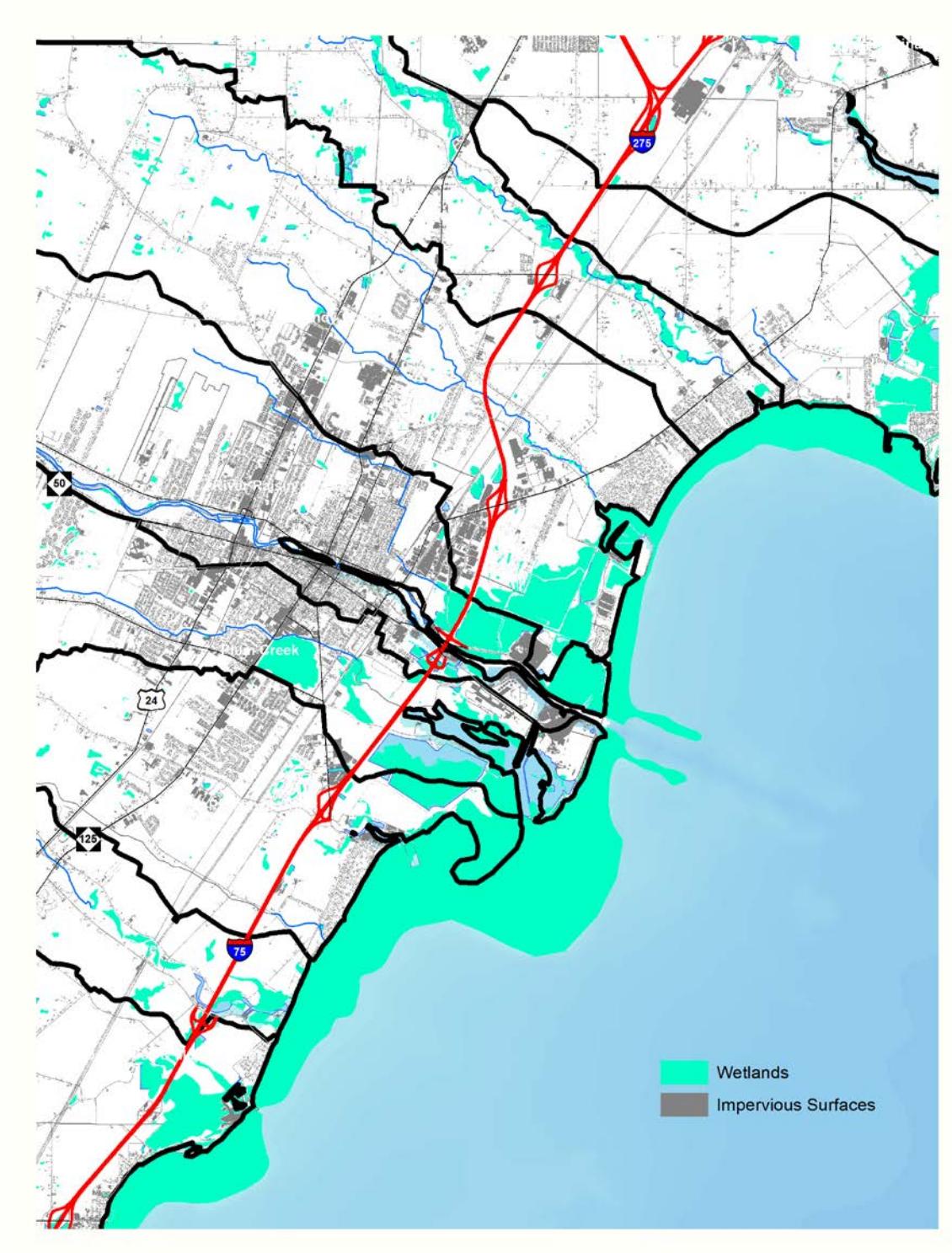
Once automobile travel became more common, recreational residential development on the Lake Erie shoreline grew. An extensive system of dikes emerged to protect existing and proposed development from lake-level changes and storm damage. As these dikes reach the end of their life, opportunities to soften the shoreline may emerge. Suburban residential development continues to grow in Bedford Township, near the Ohio border. Twenty percent of Monroe County citizens work in Toledo. Cheaper land prices and a good transportation network contribute to the suburbanization of this once rural area.

With urban development comes an increase in impervious surfaces and a decrease in vegetative buffers between rivers/streams and the new development. Also, historical ground water contamination and non-point stormwater runoff may result in greater ecological impacts with the increase in severe weather events associated with climate change. As Monroe seeks to redevelop its job base, property values may increase, raising the cost to set aside green space for stormwater management. Likewise, waterfront properties tend to keep their value since many people want private lake access.

When viewed together, urban development and non-point source runoff share the same contributing factors of close proximity to Lake Erie, Detroit, Toledo, and Canada. Being located between major metropolitan areas and near major transportation corridors made the coastal zone of Monroe County an attractive place for industrial, commercial and residential development. This desire to concentrate development and all associated impervious surfaces along and near the shoreline led to the artificial hardening of much of the Lake Erie shoreline, including draining and diking of large coastal wetland complexes, particularly at the mouth of the River Raisin. Many of the factors influencing urban development and runoff are highlighted in the situation diagram (Figure 30).

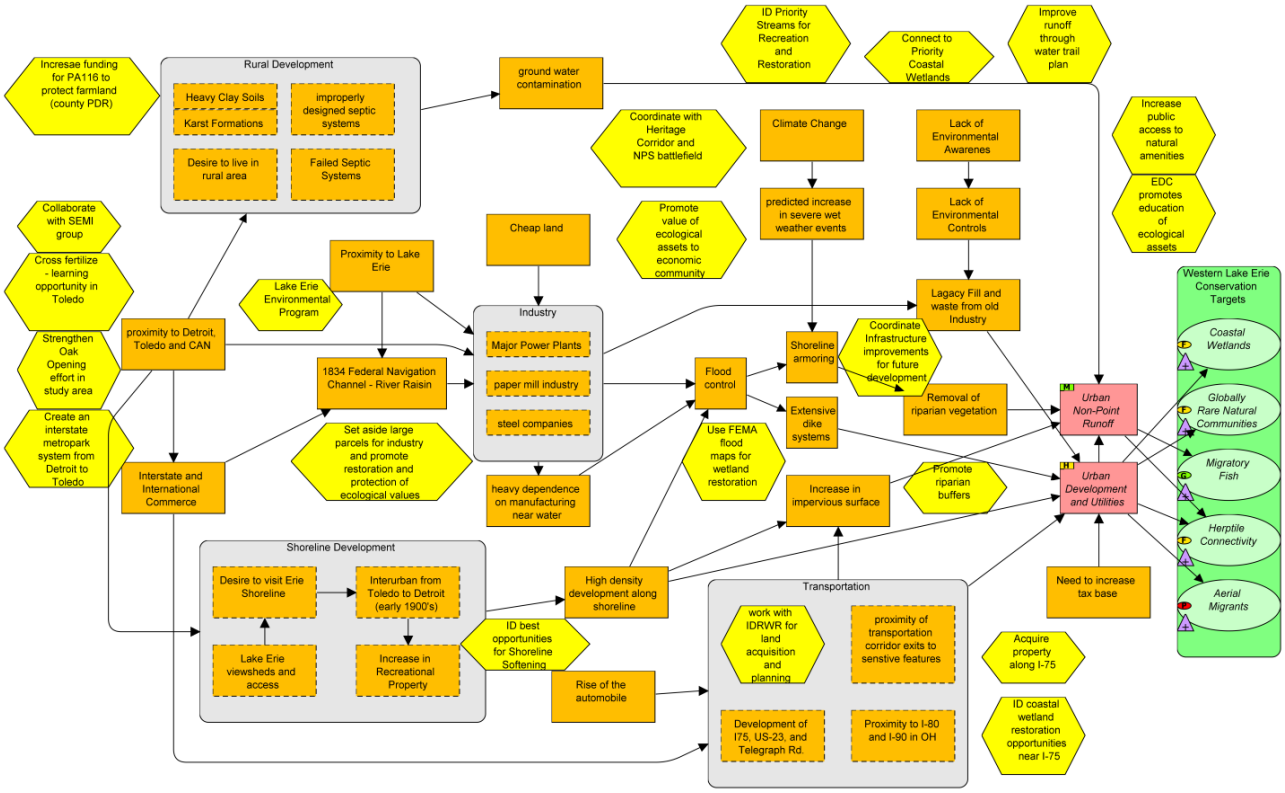
Nuclear power plants within the nearshore zone of Lake Erie.

Figure 29
Urban Development near City of Monroe



Source: SEMCOG, 2016.

Figure 30
Step IIC. Urban Development and Runoff Situation Diagram



Priority Urban Development and Runoff Strategies

- Identify the most important areas to manage runoff based on social and ecological values.
- Help Monroe County become a model for both economic development and ecological enhancement as it continues to recover from recent economic downturn. The City of Monroe has a long history of industrial development and associated waste areas, but has taken steps to improve the River Raisin and its wetlands. Attracting businesses interested in improving the region's ecological health could produce a win-win strategy.
- Develop a promotional campaign to increase awareness of ecological values of the region via the Monroe Business Development Corporation (MBDC). Currently, MBDC is interested in showcasing local and regional ecological assets to attract the right kind of businesses to the area.
- Create and implement a connected network of recreational and conservation lands. Most open space is on the west side of Monroe County; conservation of many globally imperiled natural communities found on the lakeplain may have greater success here. Monroe County could also be the connector between Detroit Metroparks and Toledo Metroparks, creating an "interstate" metropark system.
- Coordinate local land use planning with the DRIWR operated by USFWS. DRIWR has an officially designated acquisition boundary determined by Congress. Continued and improved coordination with local government planning processes and decision making would likely benefit everyone.

After much discussion, the action team settled on the following highest priority strategy combining ideas from the five top strategies to **"Create a new county initiative that takes an integrative approach to economic development and ecological enhancement."** Understanding Monroe County's interest in using the I-75 corridor reconstruction as a mechanism to perpetuate economic development, the action team felt that the urban development and runoff strategy needed to balance environmental interests with economic development priorities.

As a follow-up implementation effort from the *Green Infrastructure Vision for Southeast Michigan*, SEMCOG has been working in partnership with MSG and local Southeast Michigan communities interested in having their local codes and ordinances support green infrastructure implementation in new development and redevelopment. An update of local codes often involves reevaluating parking regulations and vegetation requirements to find opportunities to incorporate bioretention and native landscaping into development projects.

SEMCOG's *Low Impact Development Manual*, *Green Infrastructure Vision* and Guidebook provide multiple examples of how to implement green infrastructure projects in urban, economically developing, areas. Additionally, the *Partnering for Prosperity: Economic Development Strategy for Southeast Michigan* serves as a helpful reference, and a study on Access to Core Services, such as parks, could help increase access to environmental amenities in Monroe County.

Overall, developing a county initiative that takes an integrative approach to economic development and ecological enhancement will require evaluating other similar models, as well as identifying areas in Monroe County that are ready for economic and ecological enhancement. Finally, the most important factor that will determine the success of this strategy will be engaging local stakeholders and finding local support from the environmental and business community, as well as the general public.

Summary

The highest priority regional strategies (Table 2) in this *I-75 Corridor Conservation Action Plan* are:

- Implement demonstration "Smart" Drain Assessment Project that uses effective lakeplain best management practices.
- Enhance the impact and capacity of the two existing cooperative weed management areas.
- Conduct a comprehensive needs assessment for road stream crossings in the county.
- Create a new county initiative that takes an integrative approach to economic development and ecological enhancement.

Finally, circling back to the conservation targets, the Core Team assessed the potential impact of implementing these strategies by assigning a relative ranking to their effects. Impact scores ranged from zero to four, with four being the highest impact. The team considered extent, level, and duration of the positive impact of each strategy as shown in the Appendix. Selecting a single strategy for each stressor has its drawbacks. Globally rare natural communities, inland wetlands, and aerial migrants do not benefit as much from the highest-priority strategies. Multiple strategies for each stressor might help these conservation targets improve more dramatically.

Chapter 8: Implementing the Eco-Logical Plan

This chapter summarizes the action plans resulting from the CAP process. To develop the action plans, each Action Team created a Results Chain for the four highest-priority actions. The Miradi software created this visual diagram (flow chart) for each action, allowing the teams to discuss how to identify actions with the best chance of success. Once completed, the Action Teams held a stakeholder outreach meeting at Monroe County Community College on October 22, 2015, to further refine the action plans.

View the results chains and the full Action Plans in the Appendix. The TAC and Core Team also established objectives for each Action Plan area. They are summarized in this chapter. Each Action Plan covers:

- Key Actions,
- Priority Locations,
- Potential Funding, and
- Potential Leaders and Their Roles.

Stressor: Agricultural Runoff and Drainage Systems

- Priority Action: Develop and Implement a Demonstration Smart Drain Assessment Project.
- Benefits to Conservation Targets: All six conservation targets.
- Objective: Decrease nutrient loading by 40 percent by 2025, per the 2015 Lake Erie Nutrient Management Strategy.

Smart drain assessment projects can work towards achieving economically viable crop production while also minimizing impacts to water resources. During the planning process, representatives from both the agricultural community and county drain office expressed an interest in exploring alternative methods for county drain assessments. The Action Team and stakeholders identified the Farm Bureau and MDARD as potential partners in identifying financial and human resources to support development of a crediting program to reward farmers implementing water quality BMPs. The Monroe County Drain Commissioner's office could consider a financial credit to property owners based on the environmental benefit of constructed best management practices. A demonstration project of this approach could explore alternatives and processes for potential future implementation.

One of the challenges associated with this strategy involves identifying a specific drain that would make a good candidate for the pilot. Input from the Action Teams and stakeholders indicate that identifying motivated, volunteer landowners, and identifying shorter drains, not cleaned in the last 20 years might help the selection process. The right combination of landowners, programs, and physical circumstances would need to come together for success. Partnering with the Monroe Farm Services Agency could help identify interested landowners. Possible funding sources could come out of the Environmental Protection Agency (EPA), the MDEQ Office of the Great Lakes (OGL), National Oceanic and Atmospheric Administration (NOAA), MDARD, or NRCS.

Many techniques exist for managing runoff in agricultural areas such as creating riparian corridor buffers, wetland restoration, tile drain management, and other stormwater BMPs. Reducing the quantity of and improving the quality of stormwater runoff from agricultural areas will improve many coastal tributary characteristics. For example, better water quality leads to improved habitat for fish, mussels, and macroinvertebrates.

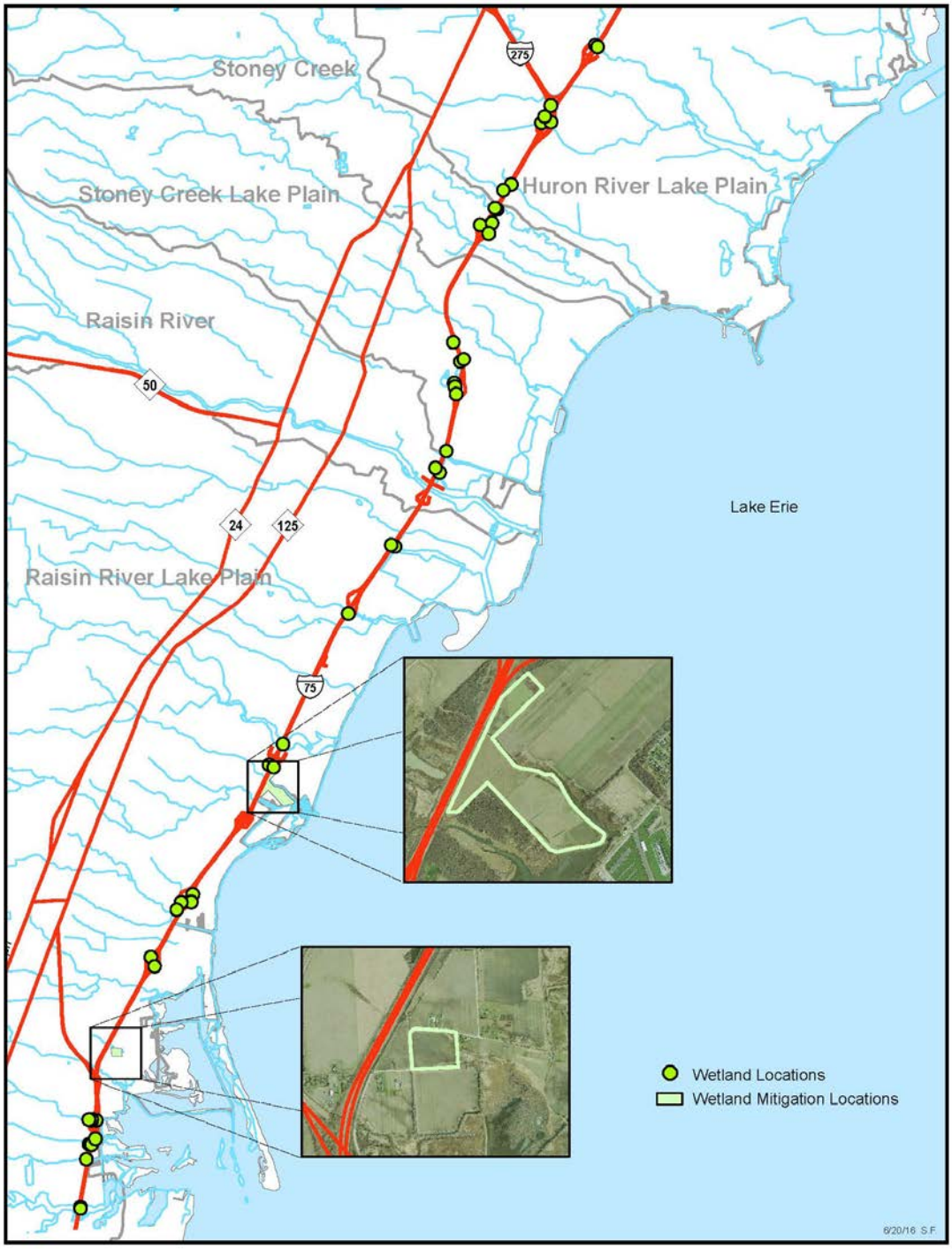
MDOT's Follow-Up Actions on Agricultural Drainage and Runoff

MDOT has little flexibility to move off the state's property to implement this type of action plan. The department's primary focus remains on improvements on the freeway right-of-way for its activities; however, MDOT remains open to partnership discussion with the farming community. For nutrient reduction, MDOT's wetland mitigation sites will restore 30-35 acres of coastal wetlands from former agricultural fields east of I-75 (Figure 31). Both sites are part of Erie State Game area. While the wetland mitigation sites primarily replace wetlands lost during construction, they will also provide an opportunity for stormwater runoff to release nutrients to wetland plants rather than directly to the natural water system. MDOT will also install wildlife habitat structures in the wetland mitigation site to create winter hibernating locations for snakes and amphibians. Wetland restoration results in a number of benefits for the conservation targets.

MDOT will also build larger grassy swales within the right-of-way to capture and hold stormwater runoff from the freeway, reducing the volume of water and sediment flowing directly into local watercourses. This will have water-quality benefits for local waters and nearby plants and animals.

Wide grassy swale helps reduce runoff and improve water quality on the 2015 construction segment.

Figure 31
Locations of Wetlands within MDOT's Right-of-Way and Location of Wetland Mitigation Sites



Stressor: Terrestrial Invasive Species

- Priority Action: Enhance the Impact and Capacity of the Two Existing CMWAs.
- Benefits to Conservation Targets: All six conservation targets.
- Objectives: By 2035, reduce high-priority invasive plants species, such as the common reed, by 30 percent; eliminate newly established invasive plant species such as frogbit within three years of initial observation.

Growing the capacity of the area's two existing CWMAs to communicate and cooperate toward mutually beneficial goals would knit together local efforts into a more regional, coordinated effort in fighting invasive plant species.

CWMAs in the study area

- Detroit River and Western Lake Erie
- Oak Opening

Early detection and rapid response to invasive species is the most effective way of eliminating them from the landscape. Education and outreach to the public, as well as monitoring and website development help bring people together in concerted action.

Potential funding sources include the State of Michigan Invasive Species Grant Program and the EPA's Great Lakes Restoration Initiative (GLRI) funding, which the Detroit River and Western Lake Erie CWMAs have successfully used in the past to work on common reed (*Phragmites*) control. Follow-up monitoring on development of a more diverse native plant community and lessons learned from invasive-species control help forward these initiatives. Priority areas for control of invasive plants include the I-75 right-of-way, the coastal zone, and existing conservation lands.

MDOT's Follow-Up Actions on Invasive Species

MDOT's right-of-way contains a number of invasive plant species, most noticeably the common reed, or Phragmites. MDOT has used herbicides to control *Phragmites* in the past and will likely do so in the future because the plant can pose a safety hazard by blocking the view of drivers. MDOT will join the local CMWA and create an invasive species management plan for the I-75 corridor. The plan will prioritize locations for invasive-species control. For example, MDNR and TNC properties near the freeway are controlling for *Phragmites*, so MDOT could focus on these areas to avoid re-infecting other treated conservation lands (Figure 33).

MDOT will continue to work with others who seek access to right-of-way for treatment purposes. For example, Sterling State Park has received several access permits to treat *Phragmites* over a two-mile area at the I-75/Telegraph Road interchange as part of their GLRI grant for invasive-species control.

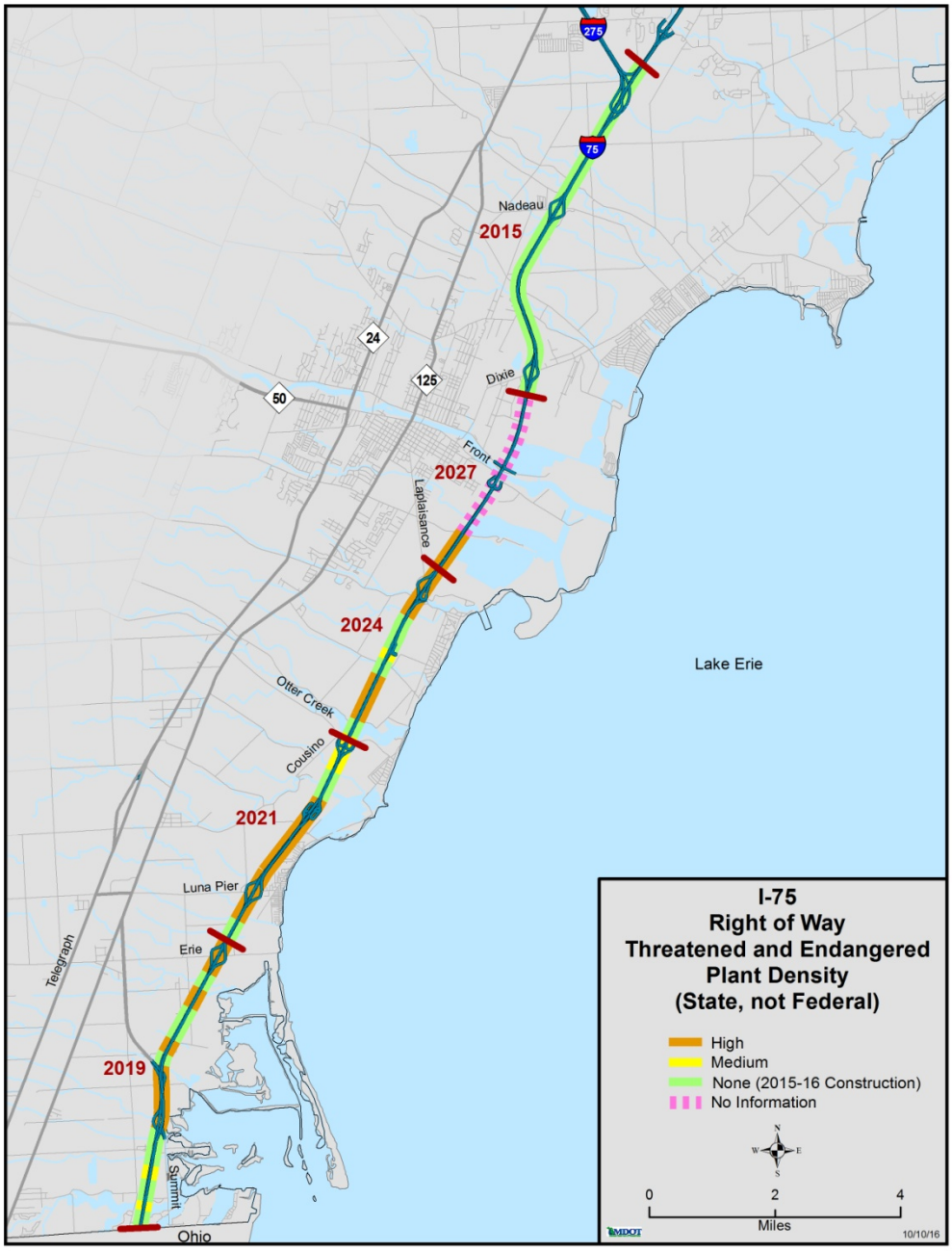
As part of managing for the spread of invasive species during the 2015-2016 construction activities, MDOT first applied herbicide the year before construction to minimize the presence of invasive plants, then required the construction contractor to keep soils with *Phragmites* on the construction site vs. transporting them to offsite locations.

Lastly, MDOT has developed a plan to manage the nearly 16,000 native, state-listed threatened plants growing within the I-75 right-of-way before and during construction. Figure 32 shows the I-75 Right of Way Threatened and Endangered Plant Density. Given the close physical proximity between native and invasive species within the highway right-of-way, any plan for managing native plants in the project corridor will have to include invasive-species control.

For the 2015 construction project, MDOT partnered with the YouthCorps program and MDNR to relocate about 1,550 Sullivant's Milkweed plants to the Sterling State Park lakeplain prairie restoration area. The group of 30 people hand-dug individual plants flagged by MDOT's botanist for the transplant. In 2015, MDOT completed a field survey of the remaining construction corridor and located three state-listed threatened species represented by 16,000 individual plants. Hand digging all of these plants will not be feasible, so MDOT has a draft mitigation plan to relocate some of the plants by hand, but also collect seeds for planting after construction, and carefully stockpiling topsoil containing the native seed bed for reapplication in the right-of-way after construction. MDOT expects to bring more protected plants to Sterling State Park and to the proposed wetland mitigation sites, but will also look for other partners interested in using native lakeplain prairie species in their conservation projects. The native stock has adapted to the harsh lakeplain prairie conditions and will likely have greater success when establishing them in former lakeplain prairie soils.

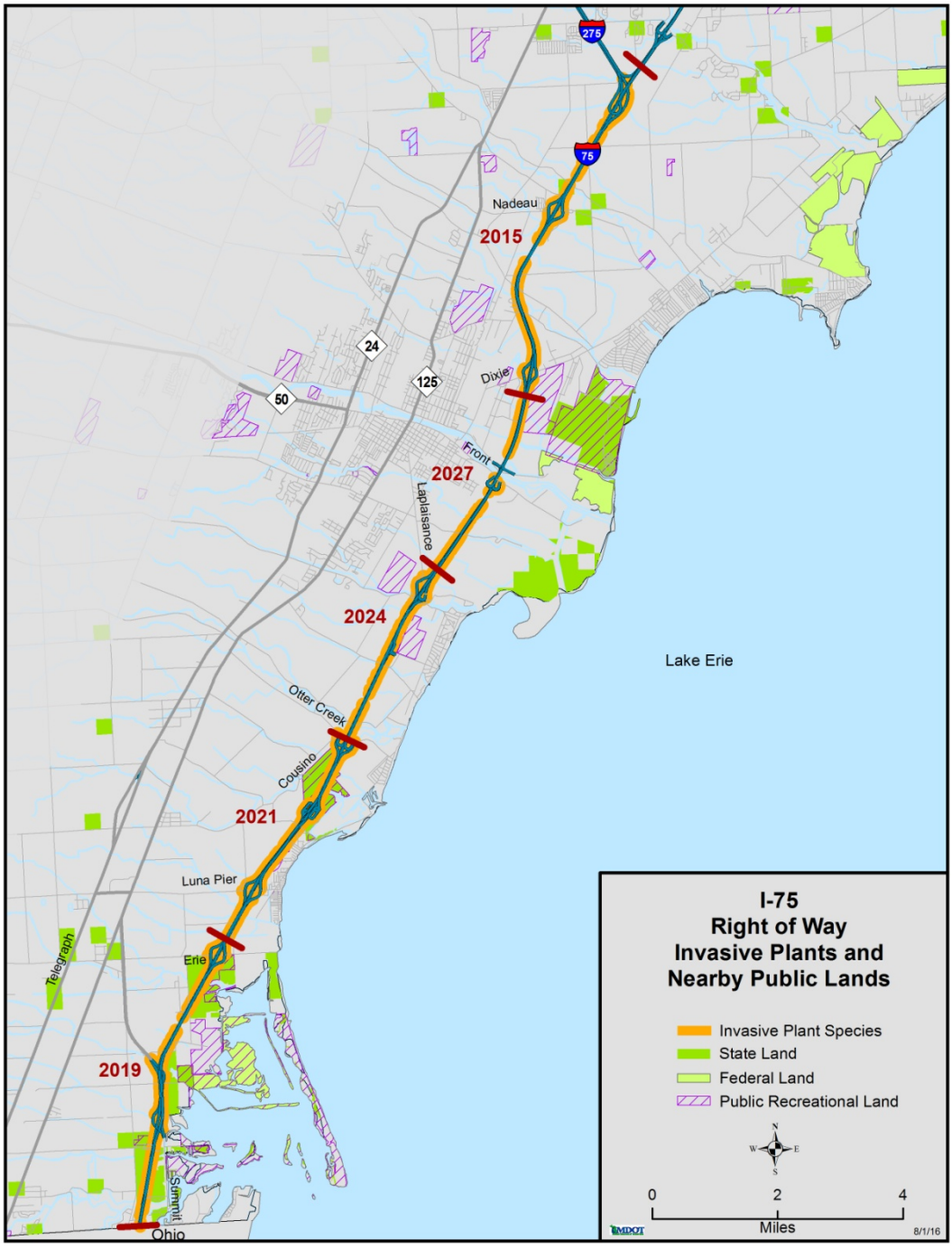
Transplanting Sullivant's Milkweed to Sterling State Park, Summer 2014.

Figure 32
I-75 Right of Way Threatened and Endangered Plant Density



Source: MDOT.

Figure 33
Invasive Plants and Nearby Public Lands along I-75 Corridor



Source: MDOT.

Stressor: Road/Stream Crossings

- Priority Action: Conduct a Comprehensive Needs Assessment of Road/Stream Crossings in the Study Area.
- Benefits to Conservation Targets: Migratory fish, coastal wetlands, coastal tributaries, and herpetofauna connectivity.
- Objective: By 2035, install BMPs at 30 percent of highest-priority road/stream crossings.

Federal law requires all bridges (defined as structures over 20 feet long) receive a thorough inspection every two years, so most road agencies have good data on the condition of their bridges, including whether or not erosion or scour problems often associated with stormwater runoff exist at the site. However, given the vast number of culverts, few road agencies have information on smaller stream crossings.

The MDNR supports a program to help road agencies inventory their road stream crossings and enter the information into the federally supported RoadSoft Asset Management database. Once road agencies have better information on the physical and ecological conditions for culverts, they can include this information in their scope of work for projects as they come up, or more importantly, they can develop partnerships with other organizations to help obtain additional funds for repair or replacement. This model has worked in the northern Lower Peninsula where watershed protection groups have partnered with road agencies to identify priority locations for seeking ecological benefits and helped obtain funding for work at those locations. Objectives for these projects may include water quality, but also improved fish passage.

For Monroe County, priority locations might include main stream stems or the first six identified tributaries connected to main stems, larger contiguous areas of streams and wetlands, public lands and conservation lands along streams, and areas with large culverts where problems might more commonly occur. Potential funding sources for road/stream crossings are the GLRI, which has had a small transportation program over the years, or the federal TAP.

Key lead agencies for implementation are the Monroe County Road Commission (MCRC) and the Monroe County Drain Commission (MCDC). Partners could include student support from Americorps, the River Raisin Watershed Council, the Western Lake Erie Stewardship Network Cluster, SEMCOG, or other natural resources organizations working in the WLEB.

MDOT's Follow-Up Actions on Road/Stream Crossings

MDOT will replace all road stream crossings within the I-75 study corridor as part of the reconstruction of the freeway with new bridges and culverts significantly larger than the 1950s structures. Modern design standards require a greater capacity for bridges and culverts to pass floodwaters. For example, the bridge over Stony Creek was originally 103 feet long while the new bridge is 169 feet long. This helps ensure that rivers and streams do not scour out holes in the streambed that threaten the stability of a bridge or culvert. The wider openings also better accommodate the natural flows of drains and creeks. The most optimal road stream crossings for migratory fish are those that mimic the conditions of a natural stream. Two key features that mimic a natural stream are natural substrate and daylight. Natural substrate can be introduced by burying the culvert ends and allowing the pipe to fill naturally. Burying the culvert ends also creates a smooth transition between the stream channel and culvert and also allows fish passage during low-water conditions. A culvert large enough to pass high-water events is also important, as the water levels and flow in the culvert will better match the stream.

(Left) Outdated culvert on I-75 before reconstruction. (Right) A large box culvert replacing a twin culvert, I-75, Summer 2015.

In addition to culvert capacity improvements, MDOT will examine alternatives to the existing twin and triple culverts within the study area. These "multiple" culverts accumulate sediment, cause scour, and generally disrupt natural flow patterns. Where possible, MDOT will replace these with a single culvert designed to better accommodate the stream.

During a survey of MDOT culverts for fish passage barriers, MDOT identified four culverts with flap gates to control flooding. These gates close and open with water pressure from the stream or drain. During Lake Erie's seiche events, when the waters of the lake blow into adjacent streams, water might try to back up through the stream, and the gates close to prevent potential flooding. Unfortunately, the gates can malfunction and require frequent maintenance. When observed in the field during the survey, the gates were mostly closed. Removing these gates would help reconnect the lake to these streams. During the design process, MDOT will coordinate with the MCDC to evaluate alternative designs, including potential removal, of these gates.

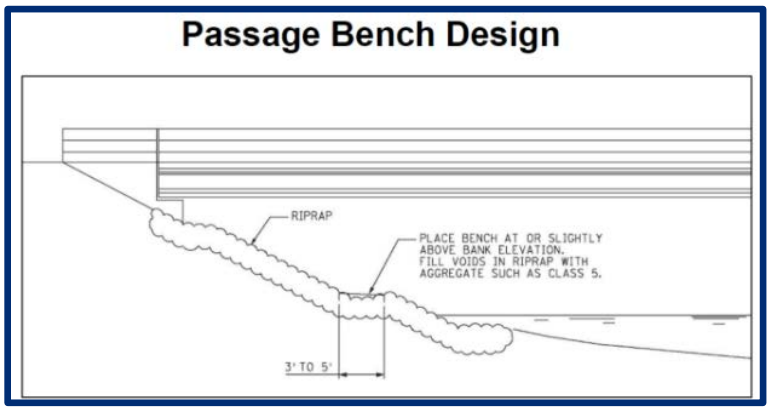
MDOT also worked with Herpetological Resource and Management (HRM) to analyze reptile and amphibian passage within the I-75 study area. The purpose of the study was to identify priority locations to improve habitat connectivity. Below are the priority crossings identified from the Ohio-Michigan border to Laplaisance Road (11.5 miles).

Priority Stream Crossings

- Rapideau Drain
- Flat Creek Drain
- Little Lake Creek
- Bay Creek (bridge)
- Whitewood Creek
- Lakeside Drain
- Columbus Drain
- Muddy Creek (bridge)
- Otter Creek (bridge)

The existing bridges in the corridor have abutments armored by steep slopes of large rip rap or sit directly in the water. Both of these scenarios limit wildlife passage. As such, design recommendations include adding a wildlife passage bench under bridges where feasible (Figure 34). These benches are typically 2-5 feet wide and comprised of "walkable" aggregate. Integrating shelves under priority bridges will not only benefit herpetofauna, but small and large mammals as well.

Figure 34
Design to Increase Wildlife Passability at Road/Stream Crossings



As stated earlier, many of the existing culverts will be increased in size. Several are recommended to be "oversized" to allow for enhanced wildlife passage. The increased size should benefit not only herpetofauna, but also various migratory fishes and small mammals.

Wildlife Shelves increase connectivity under bridges and reduce risks to wildlife.

Stressor: Urban Development and Runoff

- Priority Action: Create a New County Initiative that Takes an Integrative Approach to Economic Development and Ecological Enhancement.
- Benefits to Conservation Targets: Migratory fish, coastal wetlands, coastal tributaries, aerial migrants, herpetofauna connectivity, and globally rare natural communities
- Objectives: By 2035, 95 percent of large-scale-development projects in the primary zone incorporate design elements that improve the health of at least one conservation target; manage runoff in the six priority watersheds using stormwater BMPs to support local water quality goals. Priority watersheds are:
    - River Raisin
    - Swan Creek
    - Stony Creek
    - Plum Creek
    - Otter Creek
    - Halfway Creek

Community economic development stakeholders expressed interest in raising local awareness about the area's natural resources, as well as working with developers to enhance those resources as part of their development plans. A few priority locations include the former coal plant property at Luna Pier; the old Ford plant property in Monroe; and wetland enhancement for the River Raisin, Allen's Cove, Swan Creek, Otter Creek, and Plum Creek.

SEMCOG prepared a GIS analysis of potential opportunities to promote green development adjacent to existing conservation and park lands or sensitive natural resources in the greater Monroe urban area. Other opportunities may arise during development of the county's I-75 corridor economic development plan or in implementing *Partnering for Prosperity: Economic Development Strategy for Southeast Michigan*. Leadership for further action should come from partnerships between conservation organizations and the business community represented by the MCBDC.

Opportunities to connect people with ecological resources exist with further bike and water trail development and a look at the old rail line property right-of-way for trail possibilities. Within the secondary study zone, large forested areas occur to the west. These forests make up most of the remaining natural lands in the region; interestingly, they also appear to show high promise for mesic sand prairie and lakeplain oak openings restoration – two very rare natural community types that were very extensive components of the historic landscape. Conservation efforts in Ohio and Michigan focusing on Oak Opening preservation might make good partners for business and development interests.

Aligning economic development opportunities with collaborative approaches for stormwater management can achieve more holistic outcomes for water resources. Evaluating conceptual stormwater management locations and opportunities in conjunction with economic development planning can also achieve more cost-effective and strategic approaches. For example, most counties in southeast Michigan require that developers implement best management practices to manage stormwater on their respective developments. Some counties, including Washtenaw County offer off-site mitigation opportunities. The

idea of off-site stormwater mitigation might be a feasible alternative along the I-75 in the study area while improving the quality of stormwater runoff entering local streams.

Detroit is also developing a drainage charge program providing a financial incentive to property owners to reduce impervious surface area and manage stormwater on their property using green infrastructure. Similar policy-oriented incentives could be adopted at the local and county levels in the I-75 Eco-Logical study area to help balance economic and environmental interests, while prioritizing areas for development versus ecological enhancement.

MDOT's Follow-Up Actions on Urban Development and Runoff

MDOT and the Michigan Economic Development Corporation (MEDC) maintain and operate a Welcome Center on the east side of I-75 for people entering the state from the south. A little over a million visitors a year pass through the Welcome Center. This facility has information areas that could display educational materials on the ecology of the area or on related topics such as invasive-species control. MDOT will seek partner and stakeholder input to identify the education content for an exhibit in the Welcome Center. MDOT will also build larger grassy swales within the right-of-way to capture and hold stormwater runoff from the freeway, reducing the volume of water and sediment flowing directly into local watercourses. This will have water-quality benefits for local waters and nearby plants and animals.

Also, one of the wetland-mitigation sites for the I-75 project is near Allen's Cove, a priority area for green infrastructure. Wetland restoration in the area of the cove will improve water quality.

Other MDOT Follow-up Actions

Sometimes migratory swallows nest beneath bridges, so MDOT will require the construction contractor to install barriers prohibiting nesting to avoid harming birds and their young during construction. Also, minimizing wildlife mortality on the road should help protect predator species like Bald Eagles by reducing a food source located close to a busy freeway.

I-75 Opportunities Analysis

To ensure that conservation targets and key environmental stressors were addressed in the I-75 reconstruction, MDOT, SEMCOG, and MNFI conducted an I-75 opportunities analysis in GIS to analyze conservation and environmental mitigation opportunities that could be implemented in the I-75 reconstruction. The ultimate goal was to use multiple sources of data to prioritize specific sections and road/stream crossings along the corridor for implementation of conservation strategies.

MDOT's National Environmental Policy Act (NEPA) coordinator has already used this information to guide design and construction of the 2015 construction project and the ongoing design of the 2019 and 2021 construction segments (Figure 4). The last construction segment, scheduled for 2027 will present many challenges, including sensitive wetlands near Plum Creek and the River Raisin. This segment also passes by the City of Monroe where urban area issues such as brownfield redevelopment and the River Raisin National Battlefield site plans for future expansion may affect traffic patterns in the community.

MDOT and NEPA

NEPA is one of the most influential environmental laws affecting all federally funded programs, including transportation. NEPA requires agencies to consider the social, environmental, and economic consequences of their actions. The NEPA process helps MDOT balance environmental laws with transportation needs. There are 36 federal environmental laws, five Presidential Executive Orders, and a variety of state laws that fall under the NEPA umbrella. These are just a few:

- Public involvement
- Coast Guard permits
- Farmland protection
- Aquifer protection
- Threatened and endangered species
- Coastal zone consistency
- Air quality conformity
- Historic preservation
- Title VI and EJ
- Section 4 (f)
- Noise abatement
- Sustainable development
- Community impact assessment

Waters of the United States and I-75 Reconstruction

I-75 influences, crosses, and even hosts numerous regulated wetlands, streams, and floodplains. MDOT environmental scientists create detailed maps of existing resources to identify potential project impacts. MDOT also consults with the MDEQ, the USACE, and the MCDC to further understand these resources, determine potential impacts, and define ways to avoid, minimize, or mitigate for those impacts.

Data Layers used to assess Environmental Mitigation Opportunities

- Urban Development & Runoff
    - Impervious Landcover (SEMCOG)
    - Parking Lots (SEMCOG)
    - Commercial/Industrial/Residential Land Use
    - Floodwater Storage Wetlands (MDEQ)
    - Public Property & Conservation/Recreation Land (SEMCOG)
- Agricultural Drainage & Runoff
    - Nutrient Retention Wetland (MDEQ)
    - Sediment Retention Wetland (MDEQ)
    - Pathogen Retention Wetland (MDEQ)
    - Agricultural Land Use (SEMCOG)
    - Cropland Data (USDA)
    - Public Property & Conservation/Recreation Land (SEMCOG)
- Invasive Species
    - Phragmites (Michigan Tech)
    - Phragmites in ROW (MDOT)
    - Public Property & Conservation/Recreation Land (SEMCOG)
- Road/Stream Crossings
    - Road/Stream Crossings
    - Culverts/Fish Passability (MDOT)
    - Wetlands functioning for amphibian and fish habitat (MDEQ)
    - Non-Motorized Regional Corridor (SEMCOG)
    - Water Trails (SEMCOG)
    - Boat Launches (SEMCOG)
    - Herpetofauna (MDOT)
    - Public Property & Conservation/Recreation Land (SEMCOG)

MDOT will continue to use the landscape level information collected for the I-75 study area to inform bridge and road design for the four remaining construction segments (Figure 4). With knowledge of the larger processes at work on the landscape, MDOT can prioritize locations for specific improvements to the conservation targets. Table 11 summarizes MDOT's commitments as they relate to the conservation targets and improvement goals. MDOT will also continue to communicate with partners from the TAC, the Action Teams, and local communities who provided significant input used to create this conservation plan to obtain updated information, note changing local priorities, and consult on design details and other mitigation items.

Table 11
Conservation Targets, Future Outcomes, and MDOT Actions

Conservation Target	Viability	Future Outcomes	MDOT Actions
Coastal Tributaries	Fair	Detailed watershed plans will be completed for all sub watersheds that currently lack a plan.	As plans develop, use them to inform design of applicable stormwater BMPs, bridges, and culverts.
		Total phosphorous loading will decrease by 40% across the project.	Potential education materials at I-75 Welcome Center. Ensure this priority is a consideration in phases of the I-75 project and incorporate stormwater BMPs as applicable and feasible.
		Watershed conditions in the highest priority stream systems will meet federal water quality standards.	Incorporate stormwater BMPs as applicable and feasible.
		Natural cover along high priority streams is less than or equal to 75% of stream length within a 30 meter buffer.	Plant vegetation in ROW near riparian corridors.
Migratory Fish	Good	At least 50% of total length of each high priority tributary for migratory fish is connected to Lake Erie.	Bridges and culverts improve passage.
		Each indicator fish species is represented by at least two viable populations	Bridges and culverts improve passage.
Herpetofauna Connectivity	Fair	A minimum of 3 populations, of each herpetofauna species known to currently exist within the primary boundary, is under conservation status and considered viable.	Use fencing to redirect herpetofauna away from the freeway.
		75% of highest priority herpetofauna corridors within the primary boundary provide safe passage between important habitat patches.	Provide easier passage through culverts and bridges.
		100% of highest priority herpetofauna travel corridors within the I-75 corridor are properly constructed and functioning.	Provide easier passage through culverts and bridges.
		50% of highest priority herpetofauna habitat patches are under conservation status within the primary boundary and 75% within the I-75 corridor.	Provide easier passage through culverts and bridges.
Aerial Migrants	Fair	At least 50% of suitable habitat for migrating landbirds in the primary boundary is high quality (currently 31.6%)	Wetland restoration provides bird habitat.
		At least 50% of suitable habitat for migrating waterfowl in the primary boundary is high quality (currently 22%)	Wetland restoration provides bird habitat.
		At least 50% of suitable habitat for migrating shorebirds in the primary boundary is high quality (currently 22.6%)	Wetland restoration provides bird habitat.
		At least 40% of high quality stopover habitat for all bird groups in the primary boundary is in conservation ownership or management (26% now)	Wetland restoration provides bird habitat.
Globally Rare	Poor	1,000 acres of lake plain prairie, mesic sand	Continue plant relocation to Sterling State

Natural Communities		prairie, lake plain oak openings, and wet mesic flatwoods will be created/restored resulting in a 100% increase of current acreage.	Park Prairie.
		50% of rare natural community acreage in the project area will be in moderate quality condition (based on MNFI criteria-> B/C rank)	Continue plant relocation to Sterling State Park Prairie.
		80 % of rare natural community acreage in the project area will be under some sort of conservation status (currently 66%)	Continue plant relocation to Sterling State Park Prairie.
Coastal Wetlands	Fair	Coastal wetland area increases by 15% (900 acres) compared to existing coastal wetland area (2015)	Restoring 30-35 acres of coastal wetland.
		The average rating across coastal wetlands for each coastal wetland index (fish, amphibians/reptiles, macrophytes, marsh birds, and water quality) will reflect a good rating	Improving overall connectivity for wildlife with larger bridges and culverts.

Monitoring Progress

Goals or desired future conditions of each conservation target were determined using a multi-staged approach. The first step was identifying goals from other related plans and efforts within or near the WLEB. Next, these preliminary goals were shared with subject-matter experts, and modified as needed. Finally, these recommended goals were reviewed by the TAC and Core Team, and finalized for each of the conservation targets. All goals have a timeline of 20 years, or by 2035, unless otherwise stated (Table 1).

Over the life of the I-75 projects, MDOT will monitor progress on these goals for activities taking place within the freeway right-of-way, as well as documenting the results of partnerships with other regulatory and conservation organizations who participated in this study. MDOT monitors wetland restoration sites for 8-10 years following construction of the site, reporting the status of the restoration annually to MDEQ. The two sites proposed for Erie State Game Area (Figure 31) will receive annual monitoring. MDOT will also monitor plant relocations to assess success and report to MDNR.

The IEF/CAP Process and Lessons Learned

The Eco-Logical process promotes the integration of transportation and conservation planning while expediting transportation project delivery. This study focused on the first five steps of the Eco-Logical IEF using the CAP as a tool for completing those steps. Table 12 summarizes how the study process fulfilled the first five steps and how MDOT plans to pursue the remaining steps of the IEF in the future.

Participating in this process has already benefited MDOT in the area of transportation permits. MDOT obtained a wetland impact permit for the 2015-2016 construction project based on the conservation plan's focus and commitment to coastal wetland restoration. The MDEQ showed flexibility in approving the permit despite MDOT not having a wetland mitigation site constructed at the time. With the USACE, who also has permit oversight of the coast, MDOT gained early agreement on wetland impacts and expectations for mitigation to expedite the permit process for future segments. Lastly, the MDNR state-level protected plant permitting process is expected to proceed smoothly due to the conservation plan.

Table 12
I-75 Corridor Conservation Action Plan in Monroe County Actions Completed in First Five Steps of IEF

Step	Actions
Step 1: Build and strengthen collaborative partnerships, vision	The TAC, including regulatory agencies, SEMCOG, and MDOT established partnerships and a vision: "Develop and implement a collaboratively based landscape scale conservation plan that facilitates rebuilding the I-75 corridor while maximizing conservation and restoration outcomes in the region."
Step 2: Characterize resource status; integrate conservation, natural resource, watershed, species recovery, and state wildlife action plans	The TAC identified the seven conservation targets for Step 2 analysis. The TAC led the collection of data for these targets to evaluate their status, including a review of all other conservation plans in the study area. Public outreach provided input on specific resources.
Step 3: Create regional ecosystem framework (conservation strategy/transportation plan)	The Core Team of MDOT, SEMCOG, and MNFI integrated the conservation information from Step 2 with transportation and land use data to create the Regional Ecosystem Framework (REF) for the primary and secondary study areas or zones. .
Step 4: Assess land use and transportation effects on resource conservation objectives identified in the REF	Action Teams helped the Core Team and the TAC by identifying and prioritizing stressors for the conservation targets. They also created a situation analysis to further understand the effects of transportation and land use on the targets.
Step 5: Establish and prioritize ecological actions	All teams and the public helped prioritize actions to pursue improvements for the conservation targets, resulting in an MDOT follow up plan and a plan for local, region, and statewide stakeholders to follow.
Step 6: Develop crediting strategy	MDOT to monitor the performance of wetland mitigation sites, plant relocations, efforts to control invasive species, and measures to assist wildlife passage through both quantitative and qualitative means.
Step 7: Develop programmatic consultation, biological opinion, or permit	MDOT has developed a path forward for its natural resources permits with the MDEQ and the USACE. MDOT and MDNR have negotiated a more efficient process for the creation of transportation wetland mitigation sites on MDNR land. MDOT's proposal for the mitigation of state level threatened and endangered plant species was accepted by the MDNR, indicating that a permit will be approved once more detailed

	plans are submitted.
Step 8: Implement agreements and adaptive management; deliver conservation and transportation projects	MDOT is using the conservation plan to inform the design of the next segments in the I-75 reconstruction project. These designs and the conservation measures will be evaluated during the design, construction, and maintenance phases of the project.
Step 9: Update regional integrated plan/ecosystem framework	MDOT will coordinate with SEMCOG and other regulatory agencies to identify new information or changes to the REF that would benefit other transportation planners in the future.

On a different level, MDOT and MDNR improved their working relationship through discussions of policies and procedures related to MDOT's use of state lands for wetland mitigation. These improvements have positive implications for future cooperation between the two agencies.

The landscape approach to transportation planning and project development offers better opportunities to engage regulatory agencies, stakeholders, and the public in a dialogue about priorities. Understanding conservation and community priorities allows the transportation agency to target its attention and dollars to the most important topics and locations. Limited budgets make prioritization an essential activity. This conservation planning effort contributed greatly to MDOT's understanding of the natural and community environments affected by I-75, ultimately allowing for a more customized design suited to the facility's surroundings.

Limited budgets make prioritization an essential activity.

Despite living in a world where data seems to come at us from everywhere, locating information on the conservation targets for the WLEB proved difficult, with the exception of the Huron River and the River Raisin. Watershed organizations have adopted these rivers, collect data and implement projects within these watersheds to show measurable benefit to obtain grant funding. MDEQ makes these rivers a priority for its own monitoring. We learned that very little data exists for the small "orphan" rivers, streams, and drains discharging directly into Lake Erie, yet these water bodies certainly have a cumulative effect on Lake Erie. As part of the conservation plan process, MDEQ staff noted this lack of data and is taking steps to try to fill this gap. One stakeholder even suggested completing a watershed management plan for all of these "orphan" water bodies.

Engaging local experts proved invaluable to filling in the data gaps. Local volunteers and activists had a wealth of information and knowledge about their community that contributed greatly to our success. The study could not have progressed without their input and insights. Implementation also involves SEMCOG posting the online GIS maps produced for this study on its webpage as a future resource for transportation and local government planning in Monroe County. When identifying future transportation projects, local and state planners may use the information in considering mitigation costs during the planning process. Traditionally, transportation planners include project design and construction costs in the plan, but do not look at mitigation costs. Federal transportation funding legislation has placed more emphasis on the planning process accounting for potential mitigation costs.

SEMCOG continues to look for opportunities to integrate environmental considerations into the transportation planning process. They recently conducted a short survey of their Transportation Coordinating Council (TCC) on conservation planning and transportation planning. The TCC consists of transportation planners from SEMCOG membership and MDOT who oversee the federal and state transportation planning process. The council expressed interest in incorporating conservation planning into their process, especially for improved water quality in streams, rivers, and lakes. They identified the chief barrier to progress as the lack of overall funding for transportation, yet recognized the value of including environmental costs in the planning process.

MDOT will continue to work with the MCRC, the MCDC, the MDNR, and other partners to refine its design, but also to pursue opportunities to expand partnerships in achieving conservation goals off of the right-of-way. While its mission is transportation, MDOT will continue to communicate with the stakeholders during the design process, pointing out grant opportunities, looking for partnerships, and providing information to assist others pursuing conservation goals in the WLEB.

I-75 Reconstruction Successes to Date

- Transplanted 1,550 of Sullivant's Milkweed (Threatened)
- Strengthened partnerships with other state and federal agencies, especially MDNR
- Prioritized locations to keep wildlife off of the freeway
- Identified wetland mitigation sites
- Identified potential locations for water quality best practices
- Obtained a clearer picture of invasive species concerns and priority locations for treatments

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Appendices

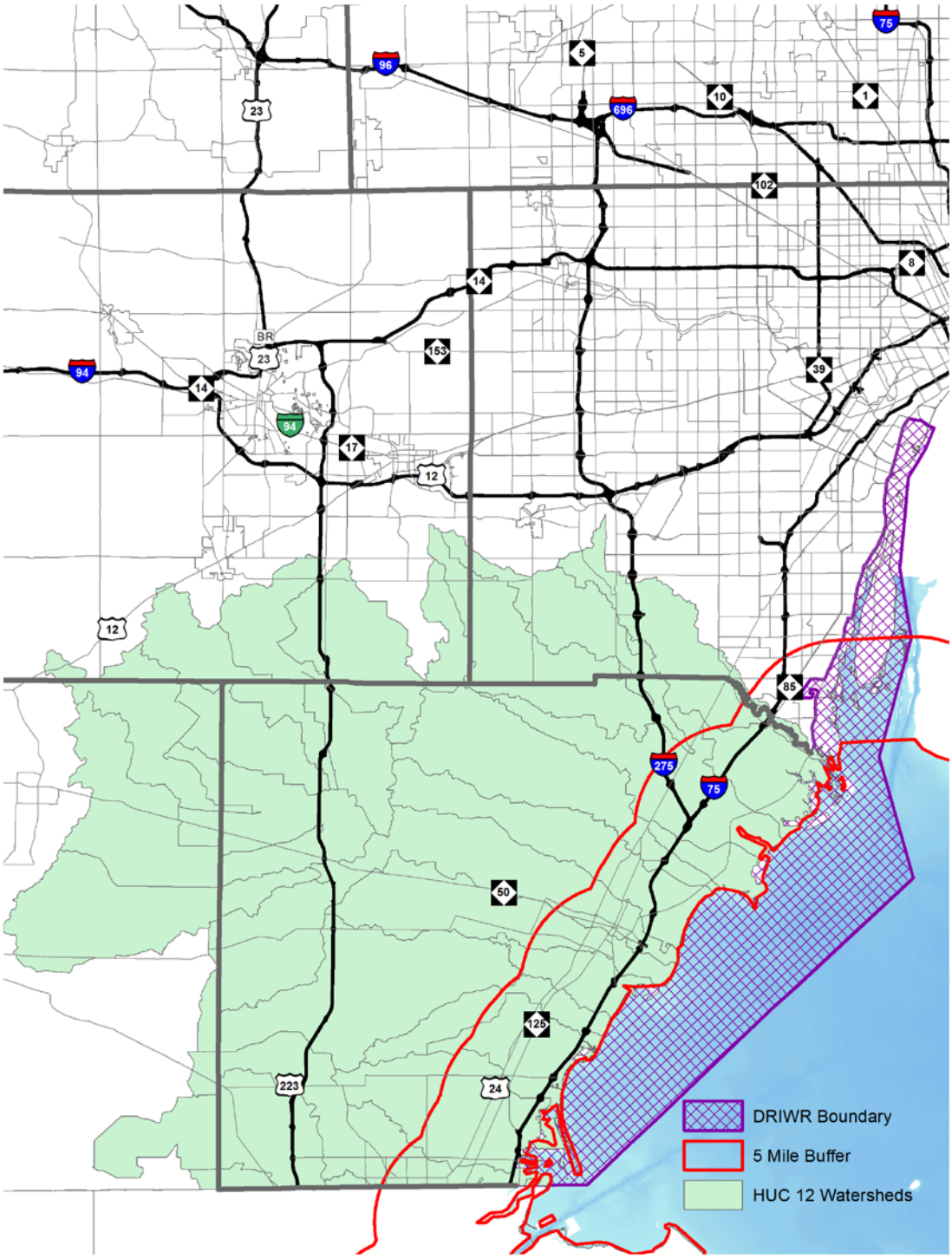
Appendix A: List of TAC Members and Agencies/Organizations

Name	Organization	Job Title
Chris May	TNC	Stewardship Director
Chris Mensing	USFWS	Fish and Wildlife Biologist
Dave Williams	FHWA	Environmental Program Manager
Jeff Braunscheidel	MDNR, Fisheries	Fisheries Biologist
Jerry Fulcher	MDEQ	Chief of the Transportation and Flood Hazard Unit
Salley Van Lieu	NRCS	Conservation Planner
Zach Cooley	MDNR, Wildlife	Wildlife Biologist
Steve Dushane	USFWS, DRIWR Refuge	DRIWR Assistant Manager
Mary Bohling	SeaGrant	Extension Educator (Southeast)
Rob Peven	Monroe County Planning Dept.	Director of Planning
Bob Morningstar	USACE, Detroit District	Regulatory Project Manager
Margaret Barondess	MDOT Environmental Services	Manager
Kelly Karll	SEMCOG	Leader, Plan Implementation
Abby Eaton	MDARD, Environmental Stew. Div.	Environmental Resources Specialist
Michael O'Malley	MDOT Environmental Services	Transportation Planning Manager
Jeff Grabarkiewicz	MDOT Environmental Services	Wildlife Biologist
Devan Rostorfer	SEMCOG	Environmental Planner

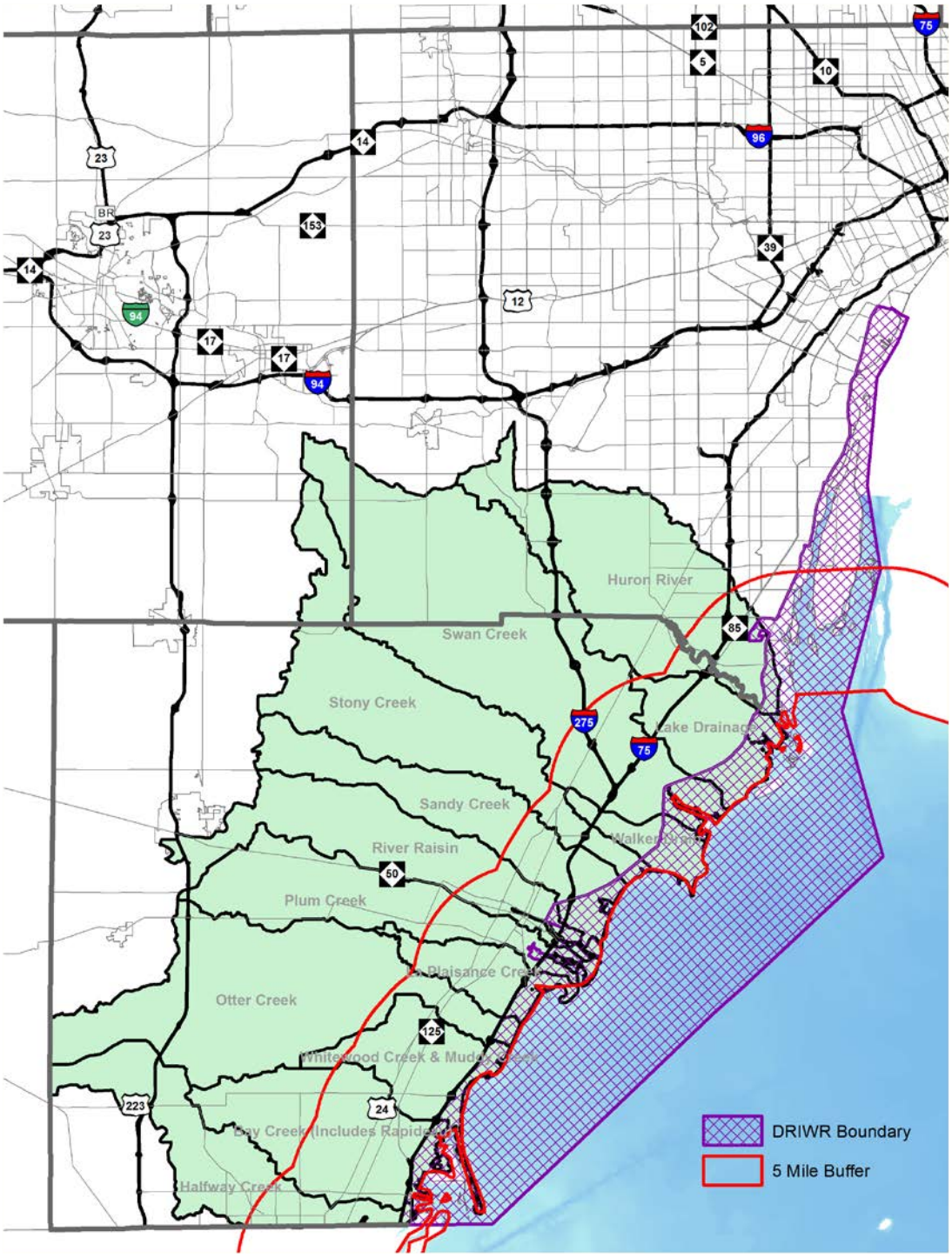
Appendix B: Subject Matter Experts by Conservation Target

Subject Matter Experts by Conservation Target	Target Leads
Coastal Tributaries	Kelly Karll (SEMCOG)
• Catherine Acerboni, SWCD	
• Elaine Brown, MDARD	
• Barb Barton, MDOT	
• Michael O'Malley, MDOT	
• David Thompson, Monroe County drain commissioner	
• Danielle Conroyd, River Raisin Institute	
• Peter Vincent, MDEQ	
Inland Wetlands (Common)	Jerry Fulcher (MDEQ)
• John Skubinna, MDEQ	
• Chad Fizzell, MDEQ	
• Jeremie Wilson, MDOT	
• Jeff Grabarkiewicz, MDOT	
• Jeremy Jones, MDEQ	
Coastal Wetlands	Chris May (TNC)
• Greg Norwood, USFWS, DRIWR	
• Don Uzarski, CMU	
• Zach Cooley, MDNR, Wildlife Division	
• Steve Dushane, USFWS, DRIWR	
Globally Rare Natural Communities	John Paskus (MNFI)
• Brad Slaughter, MNFI	
• Josh Cohen, MNFI	
Migratory Fish	Jeff Grabarkiewicz (MDOT)
• Jim Diana, U of M SeaGrant	
• Jim Boase, USFWS	
• Andrea Anai, USFWS	
• Jeff Braunschiedel, MDNR Fisheries	
Herpetofauna Connectivity	Mary Bohling (SeaGrant)
• Mary Bohling, Michigan SeaGrant Extension	
• Tom Goniea, MDNR Fisheries Division	
• Jim Harding, Michigan State University	
• Yu Man Lee, MNFI	
• David Mifsud, Herpetological Resource Management	
• Lori Sargent, MDNR Wildlife Division	
• Megan Stapleton, Herpetological Resource Management	
Aerial Migrants	Zach Cooley (MDNR)
• Joe Robison, MDNR Wildlife Division	
• Dave Luukkonen, MDNR Wildlife Division	

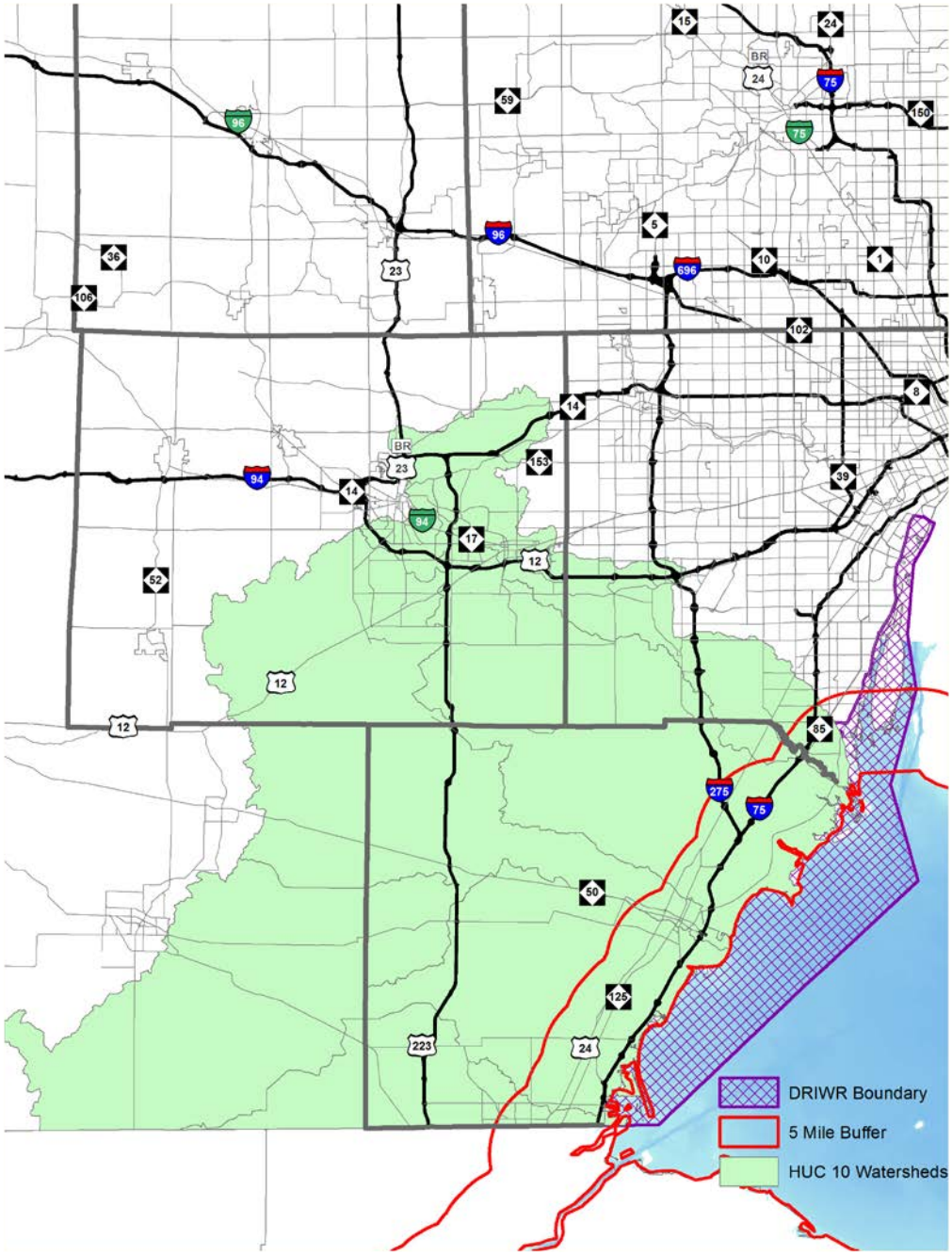
Appendix C: Geographic Scope Alternative A



Appendix C: Geographic Scope Alternative B



Appendix C: Geographic Scope Alternative C



Appendix D: Viability Assessments – Coastal Tributaries

Type	Key Ecological Attribute	Indicators	Poor	Fair	Good	Very Good	*Avg.*	Source for Standards
Condition	Water Quality [ID: 580,540]	Embeddedness	0-5	6-10	11-15	16-20	15.25	WB-SWAS-051 Qualitative Biological and Habitat Survey Protocols for Wadeable Streams
		Total Phosphorus			≤ 70 ug/l		84.75	USEPA Ambient Water Quality Criteria Recommendations; Rivers and Streams in Nutrient Ecoregion VI
		Total Nitrogen			≤ 1.55 mg/l		0.91	USEPA Ambient Water Quality Criteria Recommendations; Rivers and Streams in Nutrient Ecoregion VI
		Ecoli TBC	> 130 CFU per 100 ml (30 day geometric mean)		< 130 per 100 ml (30 day geometric mean)		294.5	Rule 62 MI WQS Part 4 of Act 451
Condition	Water Quantity	Flow Status - Flashiness	0-2	3-5	6-8	9-10	6	WB-SWAS-051 Qualitative Biological and Habitat Survey Protocols for Wadeable Streams
		Bank Stability	0-5	6-10	11-15	16-20	7	WB-SWAS-051 Qualitative Biological and Habitat Survey Protocols for Wadeable Streams
		Vegetative Protection	0-5	6-10	11-15	16-20	6.175	WB-SWAS-051 Qualitative Biological and Habitat Survey Protocols for Wadeable Streams
Condition	Biological Communities	Macroinvertebrate Scores	< -5	-4 to +4	> 5		-1.4	MDEQ SWQD June 1996 Staff Report: Update of GLEAS P51 Metric Scoring & Interpretation
		Habitat Riffle/Run	< 56	56 - 104	105 - 154	> 154	136.94	WB-SWAS-051 Qualitative Biological and Habitat Survey Protocols for Wadeable Streams
		Habitat Glide/Pool	< 56	57 - 104	106 - 154	> 154	90.08	WB-SWAS-051 Qualitative Biological and Habitat Survey Protocols for Wadeable Streams
Landscape Context	Land Cover	% Impervious Cover	> 25%	10 - 25%	<10%	<5%	8%	Center for Watershed Protection Impervious Cover Model
		% Tree Canopy		<20%		> 40%	21%	American Forests
	Riparian Corridor	% Impervious Cover	> 25%	10 - 25%	<10%	<5%	4%	Center for Watershed Protection Impervious Cover Model
		Riparian Vegetation Zone Width	0-5	6-10	11-15	16-20	3	WB-SWAS-051 Qualitative Biological and Habitat Survey Protocols for Wadeable Streams

Appendix D: Viability Assessments – Coastal Wetlands

Type	KEA	Indicator	Poor	Fair	Good	Very Good	Current Measure	Status Method	Status	Rating Source
Condition	Abundance and diversity of amphibians								**Fair**	
		Amphibian community-based coastal wetland Index of Biotic Integrity	0 - 25	>25 - 50	>50 - 75	>75 - 100	>25 - 50		Fair	Expert Knowledge
Condition	Abundance and diversity of birds								**Fair**	
		Marsh Bird IBI	0 - 20	>20 - 40	>40 - 60	>60	>20 - 40		Fair	Expert Knowledge
		Waterfowl								
Condition	Condition of nested targets								**Poor?**	
		EO ranks of nested natural community targets	<30% A or B ranked	30-50% A or B ranked	>50-70% A or B ranked	>70% A or B ranked	All GLM EOs are older than 1984.		Poor	
		EO ranks of nested species targets	<30% A or B ranked	30-50% A or B ranked	>50-70% A or B ranked	>70% A or B ranked	25%; many EOs are historic		Poor	
Condition	Fish habitat quality								**Fair**	
		Wetland Fish Index (WFI) of wetland quality	<2.5	2.5 - 3.25	>3.25 - 3.75	>3.75	2.5 - 3.25		Fair	
Condition	Macroinvertebrate quality								Not Specified	
		invertebrate IBI	extremely degraded	degraded or moderately degraded	moderately impacted or mildly impacted	reference condition			Not Specified	Onsite Research

Appendix D: Viability Assessments – Coastal Wetlands, continued

Type	KEA	Indicator	Poor	Fair	Good	Very Good	Current Measure	Status Method	Status	Rating Source
Condition	community integrity								**Fair**	
		% coverage of phragmites	>50	50 - 20	<20 - 5	<5	20-30		Fair	Expert Knowledge
		invasive species index	>30	20-30	<20 - 5	<5			Fair	
Condition	Species composition / dominance								**Fair**	
		Wetland macrophyte index	<=2	3	4	5	3		Fair	
Size	Size / extent of characteristic communities / ecosystems								**Good**	
		Wetland area	<25% of circa 1800 acres	>25-50% of circa 1800 acres	>50-75% of circa 1800 acres	>75% of circa 1800 acres	**5**,850 Acres (51%)	Intensive Assessment	Good	Rough Guess
Landscape Context	Water quality								**Poor**	
		Water Quality Index (WQI) for wetland quality	-3 to -1	> -1 to 0	>0 to 1	>1 to 3			Poor	
Landscape Context	Connectivity among communities and ecosystems								**Poor**	
		Percent natural land cover within 500m of mapped wetlands	<20	20 - 40	>40 - 70	>80	<20		Poor?	Expert Knowledge
		Artificial Shoreline Hardening Index	>40	30-40	15-29	<15	30-40		Fair	Rough Guess

Appendix D: Viability Assessments – Inland Wetlands

Target	Type	KEA	Indicator	Poor	Fair	Good	Very Good	Current Measure	Status	Source
Inland Wetlands	Size	Historical Wetland Conversion	% of Circa 1800 Wetland Acreage Lost	>75%	50-75%	25-50%	<25%		92%	NWI 2005 and MIRIS Wetland Inventory data. NRSC Soil Survey and Monroe Co. 1800 Land Cover data; *Statewide average citation*
Inland Wetlands	Condition	Landscape Level Wetland Function Assessment (LLWFA)	% of wetland functions lost compared to Circa 1800 wetland	100% lost - median % lost		median % lost - lowest % lost	lowest % lost			*Sprawl Avoidance and Resource Management Initiative (SARMI): Wetland Inventory and Analysis.* October 23, 2012. City of Sault Ste. Marie and Michigan DEQ Methodology Report.
		Flood Storage								
		Streamflow Maintenance								
		Nutrient Transformation								
		Sediment Retention								
		Shoreline Stabilization								
		Stream Shading								
		Groundwater Influence								
		Fish Habitat								
		Waterfowl Habitat								
		Shorebird Habitat								
		Amphibian Habitat								
		Pathogen Retention								
Inland Wetlands	Landscape Context	Average Natural Buffer Width	Average thickness of width of the buffer surrounding the wetland that contains low intensity land use	<25 feet	50-75 feet	75-150 feet	>150 feet		NA	Michigan Rapid Assessment Method for Evaluating Functional Quality of Wetlands (MiRAM)
	Landscape Context	Land Use within 1000 feet	Average % of area within 1000 feet of wetland that has high or moderate intensity land use	>75%	50-75%	25-50%	<25%		NA	MiRAM

Appendix D: Viability Assessments – Migratory Fish

Type	KEA	Indicator	Poor	Fair	Good	Very Good	Current Measure	Status Method	Status	Source
Landscape Context	Access to Spawning Areas									
		Percent of Accessible Headwater Stream Habitat (stream order 1)	<25%	25-50%	>50-75%	>75%	50%	Rough Guess	Fair	Expert Knowledge
		Percent of Accessible Creek Habitat (stream order 2-3)	<25%	25-50%	>50-75%	>75%	50%	Rough Guess	Fair	Expert Knowledge
		Percent of Accessible Small River Habitat (stream order 4-5)	<25%	25-50%	>50-75%	>75%	80%	Rough Guess	Very Good	Expert Knowledge
		Percent of Accessible Large River Habitat (stream order >6)	<25%	25-50%	>50-75%	>75%	100%	Intensive Assessment	Very Good	Expert Knowledge
		Percent of Accessible Tributary Wetland Habitat	<25%	25-50%	>50-75%	>75%	30%	Rough Guess	Fair	Expert Knowledge
Size	Population size & dynamics									
		Status of Smallmouth Bass across tributaries	Occupies < 25% of historic range	Occupies 25-50% of historic range	Occupies 50-75% of historic range	Occupies >75% of historic range	NA			
		Status of White Sucker across tributaries	Occupies < 25% of historic range	Occupies 25-50% of historic range	Occupies 50-75% of historic range	Occupies >75% of historic range	NA			
		Status of Northern Pike across tributaries	Occupies < 25% of historic range	Occupies 25-50% of historic range	Occupies 50-75% of historic range	Occupies >75% of historic range	NA			
		Status of Banded Killifish across tributaries	Occupies < 25% of historic range	Occupies 25-50% of historic range	Occupies 50-75% of historic range	Occupies >75% of historic range	NA			
		Status of Gizzard Shad across tributaries	Occupies < 25% of historic range	Occupies 25-50% of historic range	Occupies 50-75% of historic range	Occupies >75% of historic range	NA			
Condition	Fish Community Composition	Percent Similarity Index	TBD	TBD	TBD	TBD	TBD			

Appendix D: Viability Assessments – Aerial Migrants

KEA Type	KEA	Indicator	Poor	Fair	Good	Very Good	Current Measure	Status Method	Status	Source	Actual Numbers
Landscape Context	Anthropogenic disturbance								Poor		
									Not Specified		
		Average distance of suitable shorebird habitat from disturbance factor (m)	<100	100 - < 200	>200	>250			Not Specified	External Research	
		Average distance of suitable waterfowl habitat from disturbance factor (m)	<100	100 - < 200	>200	>250			Not Specified	External Research	
Landscape Context	Habitat availability								Good		
		percentage of project area that is suitable habitat for landbirds	<10	>10-30	>30 - 50	>50	40.0%	Intensive Assessment	Good	External Research	
		percentage of 2 km shoreline area that is suitable for shorebirds	<10	>10-30	>30 - 50	>50	40.0%	Intensive Assessment	Good	External Research	
		percentage of 2 km shoreline area that is suitable habitat for waterfowl	<30	>30 - 50	>50 - 80	>80	46.0%	Intensive Assessment	Fair	External Research	
Landscape Context	Management Status								Poor		
		percentage of high priority habitat across all bird groups, that is in conservation management	<50	>50 - 80	>80 and <100	100	7.8%	Intensive Assessment	Poor	External Research	3,080/ 39,732
Condition	Habitat Condition								Poor		
		percentage of suitable habitat for landbirds that is high quaility (4-5)	<25	>25-50	>50-75	>75	14.7%	Intensive Assessment	Poor	External Research	7,048/ 47,915
		percentage of suitable habitat for shorebirds that is high quality (4-5)	<25	>25-50	>50-75	>75	46.0%	Intensive Assessment	Fair	External Research	29,742/ 64,286
		percentage of suitable habitat for waterfowl that is high quality (4-5)	<25	>25-50	>50-75	>75	3.2%	Intensive Assessment	Poor	External Research	2,342/ 72,996

Appendix D: Viability Assessments – Globally Rare Natural Communities

Type	KEA	Indicator	Poor	Fair	Good	Very Good	Source of Rating	Current Measure	Status	Source of Status	References
Size	Habitat Area	% of existing Lakeplain Prairie and Mesic Sand Prairie acreage compared to historic acreage	< 10% of historic acreage	10-20% of historic acreage	20-40% of historic acreage	>40% of historic acreage	Rough Guess	382 acres	Poor	Intensive Assessment	MNFI database + circa 1800 veg maps
Condition	Overall Viability	% occurrences of Lakeplain Prairie and Mesic Sand Prairie with > B/C viability rank visited within last 20 years	<25%	25-50%	50-75%	>75%	Rough Guess	0 (database will show 1/5; the one with a B rank is > 20 years old)	Poor	Intensive Assessment	MNFI database
Size	Habitat Area	% of existing Oak Openings acreage compared to historic acreage	< 10% of historic acreage	10-20% of historic acreage	20-40% of historic acreage	>40% of historic acreage	Rough Guess	742 acres	Poor	Intensive Assessment	MNFI database + circa 1800 veg maps
Condition	Overall Viability	% occurrences of Oak Openings with > B/C viability rank visited within last 20 years	<25%	25-50%	50-75%	>75%	Rough Guess	0 (database will show 2/3 - all 3 EOs are >20 year old records)	Poor	Intensive Assessment	MNFI database
Size	Habitat Area	% of existing Wet-Mesic Flatwoods acreage compared to historic acreage	< 10% of historic acreage	10-20% of historic acreage	20-40% of historic acreage	>40% of historic acreage	Rough Guess	242 acres	Poor	Intensive Assessment	MNFI database + circa 1800 veg maps
Condition	Overall Viability	% occurrences of Wet-Mesic Flatwoods with > B/C viability rank visited within last 20 years	<25%	25-50%	50-75%	>75%	Rough Guess	0 (database will show 1/3; the one that has a B/C rank is >20 years old)	Poor	Intensive Assessment	MNFI database

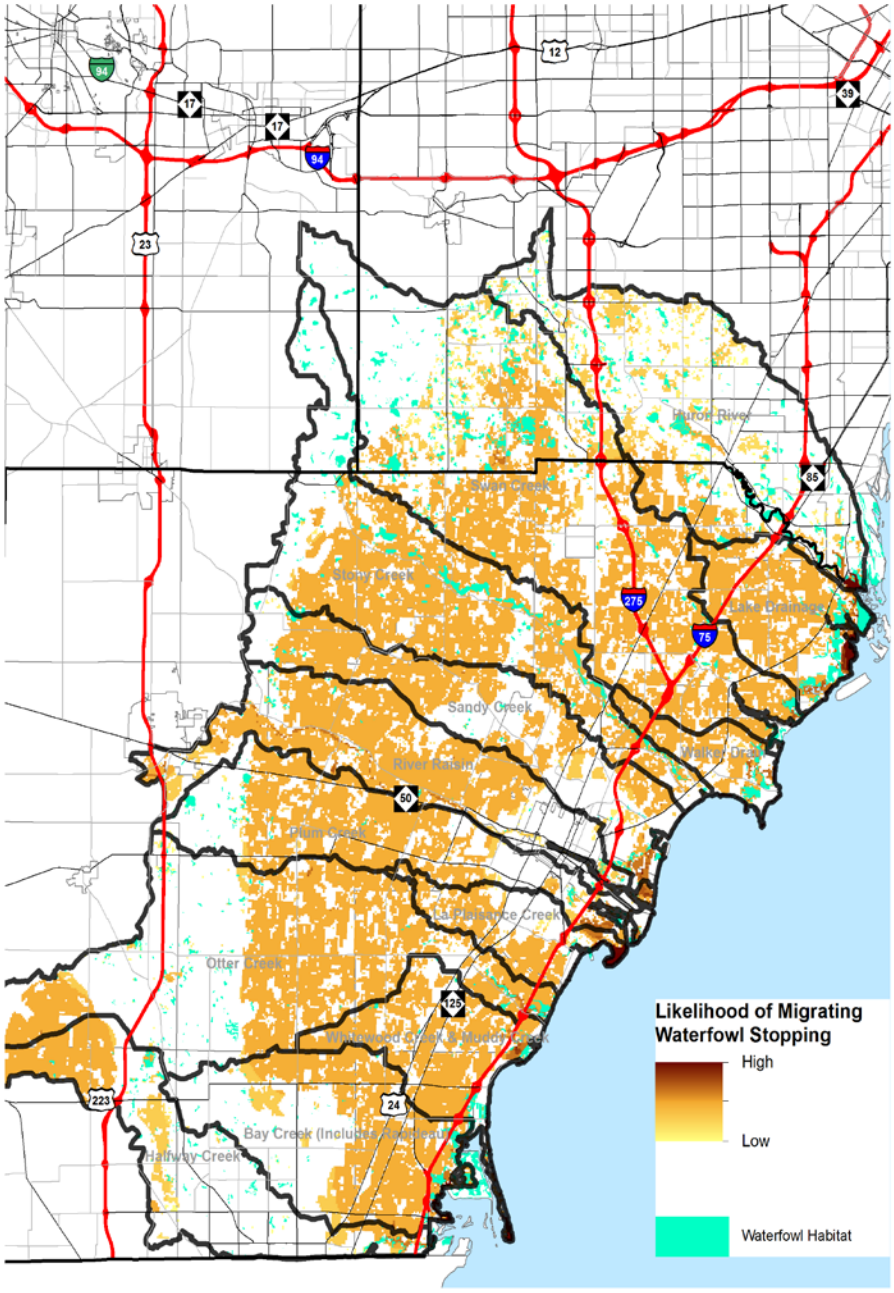
Appendix D: Viability Assessments – Herpetofauna

Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good
Size, Condition and Landscape Context	Great Lakes Wetland Complex (marshes, uplands, wet-mesic flatwoods, vernal pools, etc)	Eastern Fox Snake Distribution, Density & Demography	Species absent across much of landscape in low densities and restricted to only highest quality areas with skewed demography	Species present but in lower numbers with potential sex and/or age bias towards older adults or absent where historically present	All age classes present in ratios needed for healthy population localized in highest quality areas in protected refugia.	All age classes present in ratios needed for a healthy population in sustainable distributions throughout the primary boundary of the project
Size, Condition and Landscape Context	Great Lakes Wetland Complex (marshes, uplands, wet-mesic flatwoods, vernal pools, etc)	Amount of off-road corridor turtle nesting habitat	< # acres of diverse off-road corridor turtle nesting habitat available at # sites distributed throughout the primary boundary	> # acres of diverse off-road corridor turtle nesting habitat available at # sites distributed throughout the primary boundary	> # acres of diverse off-road corridor turtle nesting habitat available at # sites distributed throughout the primary boundary	> # acres of diverse off-road corridor turtle nesting habitat available at # sites distributed throughout the primary boundary
Size, Condition and Landscape Context	Great Lakes Wetland Complex (marshes, uplands, wet-mesic flatwoods, vernal pools, etc)	High turtle nesting diversity	< 3 native species successfully nesting in off-road corridor turtle nesting areas distributed throughout most of the primary boundary of the project	3 to 5 native species successfully nesting in off-road corridor turtle nesting areas distributed throughout most of the primary boundary of the project	5 to 7 native species successfully nesting in off-road corridor turtle nesting areas distributed throughout most of the primary boundary of the project	> 7 native species successfully nesting in off-road corridor turtle nesting areas distributed throughout most of the primary boundary of the project
Condition	Salinity/Population	High amphibian species diversity	< 2 species of frogs calling in most of the primary boundary of the project	2 to 3 species of frogs calling in most of the primary boundary of the project	4 to 6 species of frogs calling in most of the primary boundary of the project	> 6 species of frogs calling in most of the primary boundary of the project
Condition	Salinity/Population	High amphibian species diversity	Salamander egg masses present in < 25% of the suitable habitat in the primary boundary	Salamander egg masses present in 25-50% of the suitable habitat in the primary boundary	Salamander egg masses present in 51-75% of the suitable habitat in the primary boundary	Salamander egg masses present in >75% of the suitable habitat in the primary boundary
Condition	Road Mortality	# individuals killed	# of individuals killed would have severe impacts on population viability with high likelihood of species extirpation	# of individuals killed would have moderate impacts that could lead to species extirpation in the primary boundary	# of individuals killed would have minimal impacts on population viability with no long term effects	# of individuals killed would not negatively impact species and would allow for species expansion within the primary boundary
Landscape	Herp Passage East-West across I-75	wildlife corridors between wetland complex components (wetlands, uplands, wet-mesic flatwoods, vernal pools)	< 50% wildlife corridors identified as needed for the project are constructed and functioning as designed	50-74% wildlife corridors identified as needed for the project are constructed and functioning as designed	75-99% wildlife corridors identified as needed for the project are constructed and functioning as designed	All wildlife corridors identified as needed for the project are constructed and functioning as designed
Landscape	Forested Vernal Pools	vernal pool condition within 1000 ft. of the highway	< 50% vernal pools intact	50-74% vernal pools intact	75-99% vernal pools intact	All vernal pools are intact

Appendix E: Results from Functional Wetland Assessment

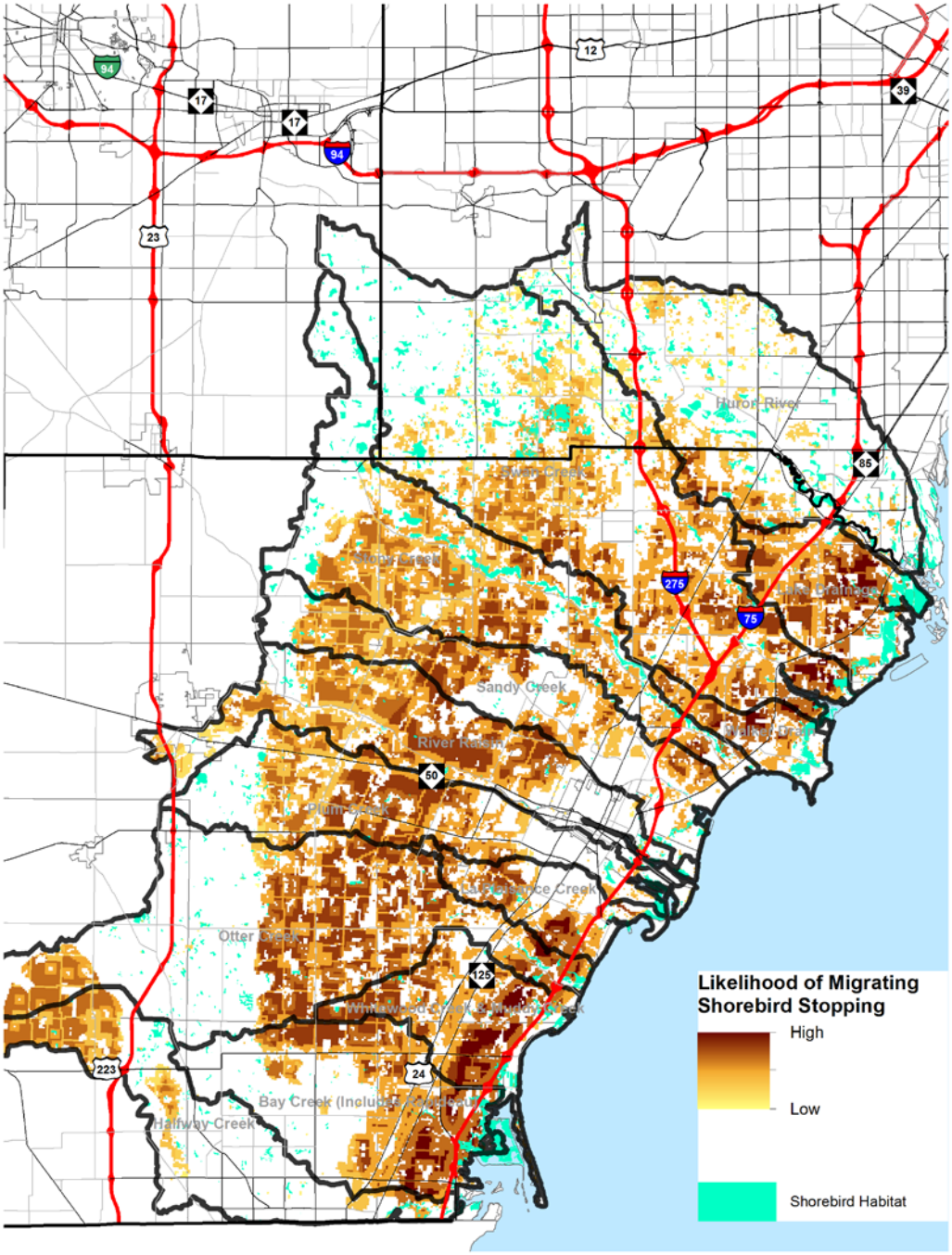
Function	Pre-European Settlement Functional Acres	2005 Functional Acres	Predicted % of Original Capacity Left	Predicted % Change in Functional Capacity
Flood Water Storage	232,764	17,586	8	-92.
Streamflow Maintenance	292,566	17,606	6	-94
Nutrient Transformation	217,142	24,410	11	-89
Sediment and Other Particulate Retention	140,140	18,772	13	-87
Shoreline Stabilization	226,194	15,439	7	-93
Fish Habitat	332,153	21,388	6	-94
Stream Shading	60,008	1,564	3	-98
Waterfowl and Waterbird Habitat	47,184	15,531	33	-67
Shorebird Habitat	182,484	13,377	7	-93
Interior Forest Bird Habitat	152,773	11,670	8	-92
Amphibian Habitat	193,157	14,750	8	-92
Carbon Sequestration	27,339	6,330	23	-77
Ground Water Influence	8,691	1,640	19	-81
Conservation of Rare & Imperiled Wetlands & Species	0.00	25,589	100	100

Appendix F: Likelihood of Stopover Habitat for Migratory Waterfowl and Wetlands Functioning for Waterfowl Habitat



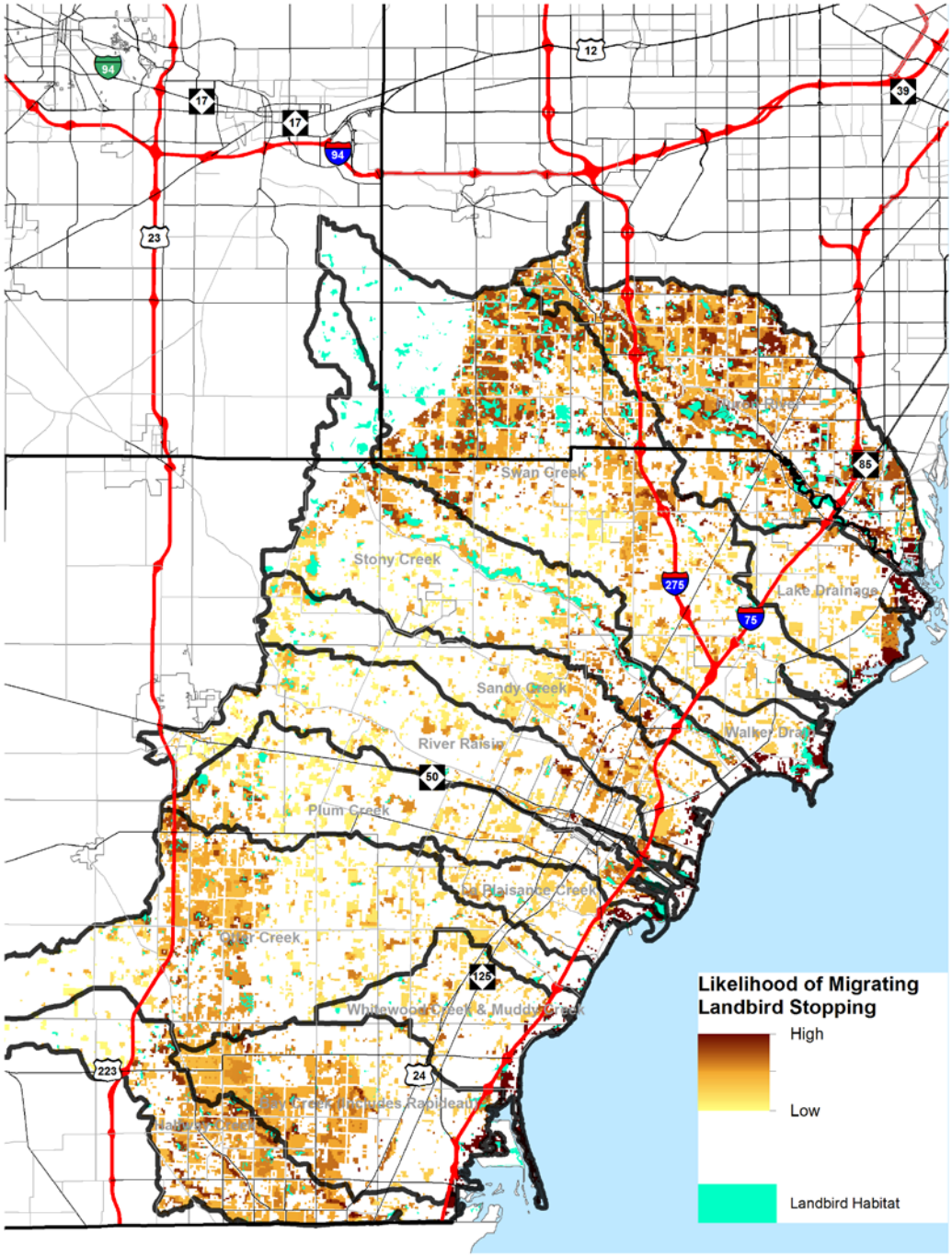
Source: The Nature Conservancy, MDEQ.

Appendix F: Likelihood of Stopover Habitat for Migratory Shorebirds and Wetlands Functioning for Shorebird Habitat



Source: The Nature Coservancy, MDEQ.

Appendix F: Likelihood of Stopover Habitat for Migratory Landbirds and Wetlands Functioning for Landbird Habitat



Source: The Nature Conservancy, MDEQ.

Appendix G: Priority Data Gaps

Conservation Targets	Data Gap Description	Recent Data Improvement Activities
Herpetofauna Connectivity	Very few surveys have been completed for herpetofauna species within the study area. Old and recent observation data was provided from the Herp Atlas; however the results are limited and based on random observations rather than a comprehensive survey. The biggest data priorities are: basic information on current herpetofauna diversity and abundance within the primary zone; locations of highest priority herpetofauna habitats in primary zone; and locations of highest priority herpetofauna road stream crossings in the primary zone.	The southernmost section of I-75 corridor right of way surveyed by Mifsud, LCC in 2015.
Migratory Fish	Very little historic and current data exists on fish species within the tributaries, particularly the smaller streams and creeks. The biggest data priorities are: fish species diversity and abundance for each coastal tributary; location of highest priority barriers for targeted migratory fish species; and the location of highest priority streams for targeted migratory fish species.	
Aerial Migrants	All information regarding stopover habitat provided in this report is based on recent GIS modeling. Some information on bird migration is available but difficult to obtain. No information on other aerial migrant types (bats, dragonflies) was found. Priority data gap is: 1) random sampling of stopover habitat usage by waterfowl, land birds, and shorebirds within the primary boundary to test the efficacy of each GIS spatial model.	
Coastal Tributaries	The majority of streams lack any recent water quality or habitat data. Priority data gaps are: 1) comprehensive water quality and habitat sampling of all interstitial (orphan) streams in the project area; and 2) identification of streams with the highest probability for water quality and habitat improvement. Additional research is needed to determine nutrification sources in each of the streams with poor water quality.	DEQ recently collected water quality and habitat data for Lapointe Drain.
Globally Rare Natural Communities	All occurrences of the four globally rare natural communities that occur in the study area are greater than 25 years old. Priority data gaps are: 1) updated information on the size and viability of existing natural community occurrences, and 2) new locations of globally rare natural communities - primarily on private lands.	

Appendix H: Action Team Members

First	Last	Affiliation
Agriculture Action Team		
Catherine	Acerboni	Monroe Conservation District
Tim	Csurgo	Monroe County Drain Commission
Abby	Eaton	MDARD
Kelly	Karll	SEMCOG
Tim	Kwiatkowski	MCD - MEAP technician
Nathan	McNett	Monroe Conservation District
Devan	Rostorfer	SEMCOG
Christina	Salenbien	Farm Service Agency (Monroe)
Michelle	Selzer	MDEQ, Office of the Great Lakes
Ryan	Simmons	Monroe County Planning Department
Dan	Stefanski	Former Monroe Co. Drain Commissioner
Marilyn	Thelen	MSUE
David	Thompson	Monroe County Drain Commission
Steve	Woods	The Nature Conservancy, Ohio
Dan	Zay	NRCS
Road/Stream Crossings Action Team		
Scott	Assenmacher	Monroe Co. Road Commission
Jeff	Braunschiedel	MDNR Fisheries
Jerry	Fulcher	MDEQ
Jeff	Grabarkiewicz	MDOT
Kelly	Karll	SEMCOG
Hedi	Kaufman	River Raisin Watershed Council
Patrick	Lewis	City of Monroe
Dave	Mifsud	Consultant
Mike	O'Malley	MDOT
Joe	Robison	MDNR, Wildlife Division
Ryan	Simmons	Monroe County Planning Department
John	Skubinna	MDEQ
Devan	Rostorfer	SEMCOG

Appendix H: Action Team Members, continued

First	Last	Affiliation
Invasive Species Action Team		
Bob	Batt	MDOT
Lisa	Brush	The Stewardship Network
Zach	Cooley	DNR Wildlife
Chris	May	The Nature Conservancy
Dick	Mitka	USFWS, DRIWR
Mike	O'Malley	MDOT
Bill	Parkus	SEMCOG
Rob	Pevin	Monroe County Planning Department
Devan	Rostorfer	SEMCOG
Dave	Schuen	MDOT
Ryan	Simmons	Monroe County Planning Department
Steve	Woods	The Nature Conservancy, Ohio
Urban Development and Runoff Action Team		
Margaret	Barondess	MDOT
Eric	Elgin	Southeast MI Land Conservancy
Kelly	Karll	SEMCOG
Devan	Rostorfer	SEMCOG
Carly	Kratz	River Raisin Watershed Council
Tim	Lake	Monroe Co. Business Development Corp.
Dick	Micka	USFWS, DRIWR
Michael	O'Malley	MDOT
Rob	Pevin	Monroe County Planning
Ryan	Simmons	Monroe County Planning Department
Dan	Swallow	City of Monroe, Economic Development
Peter	Vincent	MDEQ
Bill	Walters	City of Monroe Public Services

Appendix I: Final List of Agricultural Strategies

1	ID best opportunities for ecological restoration in agricultural areas (marginal farm lands near high conservation value lands).
2	Create a program that connects farmers with ecological values of the region.
3	Develop a Soil Health Initiative (rather than focusing on the problem).
4	Build local capacity to plan and implement BMP's specifically designed for the Lake Plain and monitor results.
5	Conduct eco-services analysis for whole project area.
6	Create ecological restoration demonstration project on Nation Park Service land.
7	Extend crop rotations to include wheat (25%).
8	Implement harvestable buffers (warm season grasses).
9	Place gypsum from power plant in gabion baskets in streams.
10	Increase awareness of costs/benefits of BMPs to small farmers.
11	Promote use of cover crops.
12	Investigate impacts of failed septic systems.
13	Implement pilot to install check dams.
14	Have shovel ready projects prepared for restoration.
15	Increase installation of controlled drainage systems.
16	ID funding sources for installing 2 stage ditches.
17	Promote end of pipe filters.
18	Improve collection and monitoring of stream data (sources of problems).
19	Consider borrow as a conservation asset.
20	Change policy on MDOT borrow pit.
21	Form problem solving farm conservation coalition.
22	Increase presence and awareness of the Blue Ribbon Initiative (OH).

Appendix J: Final List of Invasive Species Strategies

1	Promote clean boats clean water program (DEQ).
2	Tie invasive species control to water trails.
3	Develop specific program for farmers and utilities.
4	Develop public education campaign about invasives.
5	Connect with existing human networks.
6	Improve mapping of invasive species.
7	Control invasives prior to construction activities.
8	Involve drain commissioners in Cooperative Weed Management Areas (CWMAs).
9	Increase awareness of natural resource values in the region.
10	Involve county road commissions in CWMAs.
11	Broader participation in CWMAs.
12	Secure grant from MI Invasive Species Program.
13	Higher level coordination between CWMAs.
14	Improve coordination between agencies and organizations.
15	Develop and disseminate tools for key stakeholders.
16	Develop a shared approach/goals for each invasive species.

Appendix K: Final List of Road/Stream Crossing Strategies

1	Coordinated plan review for new road/stream crossings would bring other perspectives into the process.
2	Update design criteria to take multiple values into account.
3	Identify best streams for migratory fish.
4	Conduct detailed stream crossing inventory using standardized protocol.
5	Conduct research on Road/Stream Crossing Best Management Practices.
6	Align road/stream crossing improvements with other priorities such as water trails, fish and wildlife passage priorities, and green infrastructure goals.
7	Target 319 funding, which is a non-point source pollution grant program, for improvements to road/stream crossings.
8	ID champion organization or coalition pursuing road/stream crossing inventory and improvements.
9	Integrate road/stream crossings into NRCS priorities (e.g., Harmful Algal Bloom problems).
10	Work with the farm community to keep water on the landscape.
11	Develop alternative funding sources for road/stream crossings.
12	Create stormwater management financing.

Appendix L: Final List of Urban Development and Runoff Strategies

1	Economic Development Corporation promotes education on ecological assets
2	Increase public access to natural amenities
3	Improve runoff through water trail plan
4	Connect people to priority coastal wetlands
5	Promote restoration of riparian buffers (vegetated space between a stream and more developed areas)
6	Acquire property adjacent to I-75 ROW
7	Identify coastal wetland restoration opportunities near I-75
8	Coordinate with the International Detroit River Wildlife Refuge regarding land acquisition and planning
9	Identify best opportunities for shoreline softening
10	Set aside large parcels for industry and promote restoration and protection of ecological values
11	Partner with the Lake Erie Environmental Education center in Monroe on public education opportunities.
12	Coordinate with Heritage Corridor and National Park Service River Raisin Battlefield Park in Monroe
13	Promote value of ecological assets to the economic community
14	Identify priority streams for recreation and restoration
15	Increase funding for PA116 to protect vulnerable farmland
16	Collaborate with SEMIWILD, which preserves natural areas in Southeast Michigan
17	Cross fertilize - learning opportunity in Toledo
18	Strengthen Oak Openings effort in study area
19	Create an interstate metropark system from Detroit to Toledo
20	Use FEMA flood maps to identify wetland restoration opportunities

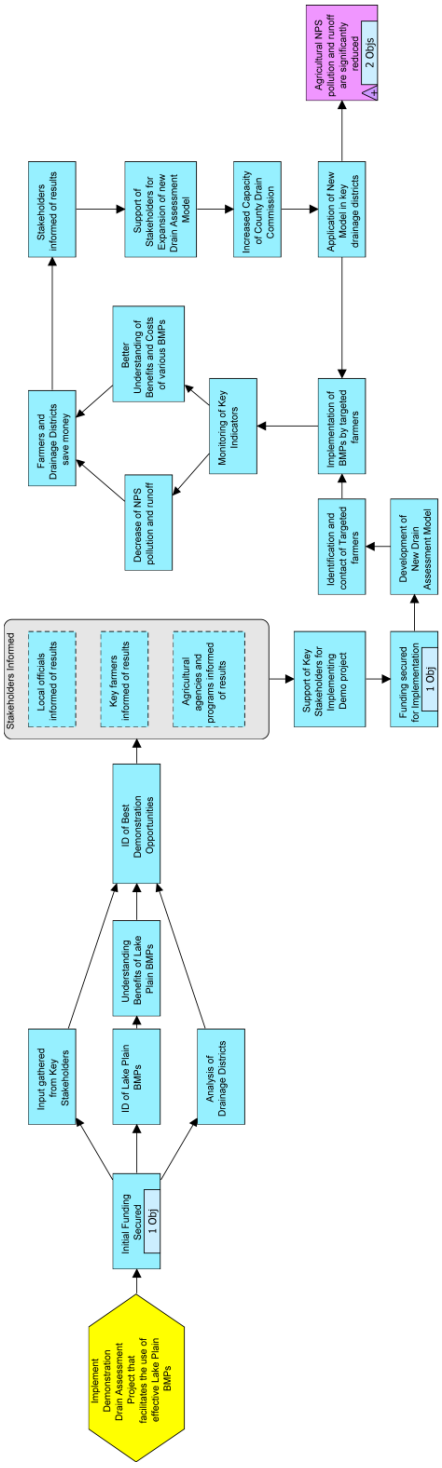
Appendix M: Extent, Level, and Duration of Positive Impacts of Conservation Strategies on Conservation Targets

Top Strategies (regional scale)	Coastal Wetlands	Coastal Tributaries	Globally Rare Natural Communities	Inland Wetlands	Herpetofauna Connectivity	Aerial Migrants	Migratory Fish	TOTAL
Implement Demonstration "Smart" Drain Assessment Project	3	2	0	1	2	1	3	13
Enhance existing CWMAs	3	2	2	1	3	2	1	14
Create County initiative that promotes the integration of new economic development with ecological enhancement	3	3	2	1	3	2	1	15
Conduct a comprehensive needs assessment for RSXs	3	3	0	1	3	0	4	14
TOTAL	12	11	4	4	11	5	9	

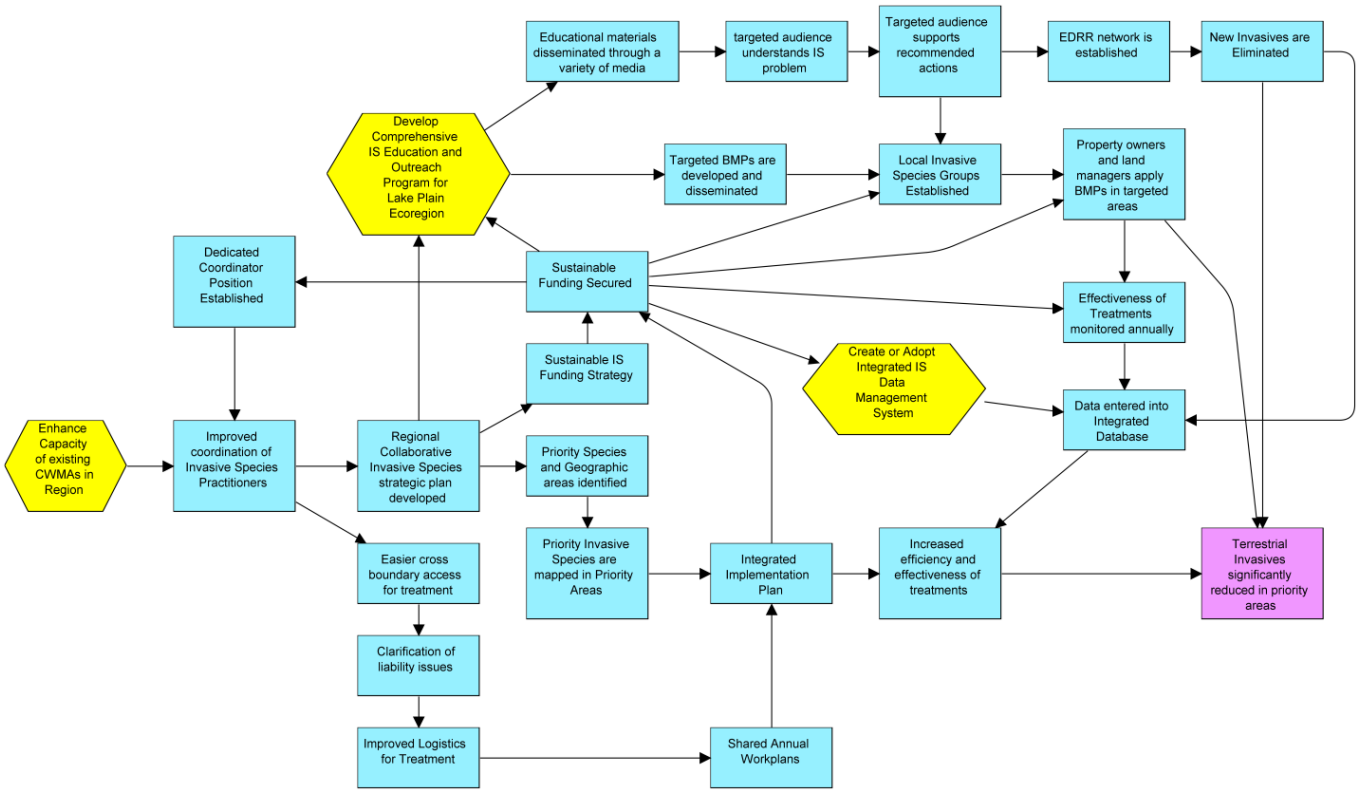
Appendix M: Extent, Level, and Duration of Positive Impacts of Conservation Strategies

Top Strategies (regional scale)	Coastal Wetlands	Coastal Tributaries	Globally Rare Natural Communities	Inland Wetlands	Herpetofauna Connectivity	Aerial Migrants	Migratory Fish	TOTAL
Agriculture								
Implement Demonstration "Smart" Drain Assessment Project	3	3	0	1	2	1	3	13
ID best opportunities for ecological restoration in agricultural areas	2	2	3	2	2	3	1	15
Develop Soil Health Initiative	1	2	1	1	1	1	1	8
Invasive Species								
Enhance existing CWMAs	3	2	2	1	3	2	1	14
Urban Development and Runoff								
Create County initiative that promotes the integration of new economic development with ecological enhancement	3	3	2	1	3	2	1	15
Coordinate land use planning with IDRWR (USFWS)	2	2	2	0	2	2	1	11
Create a vision of a connected network of recreation and conservation lands (west side)	0	1	3	1	2	2	0	9
Road Stream Crossings								
Conduct a comprehensive needs assessment for RSXs	3	3	0	1	3	0	4	14
TOTAL	17	18	13	8	18	13	12	
PREVIOUS TOTAL	12	11	4	4	11	5	9	
DIFFERENTIAL	5	7	9	4	7	8	3	

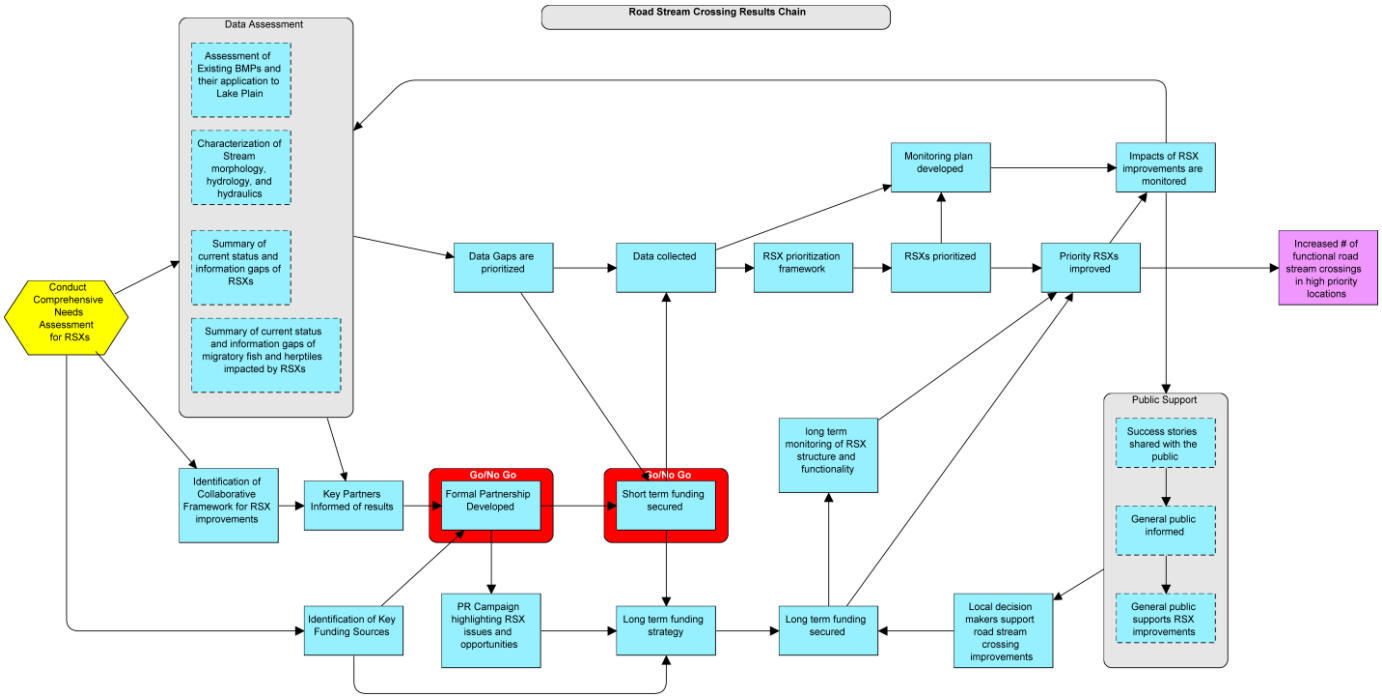
Appendix N: Results Chains



Appendix N: Results Chains



Appendix N: Results Chains



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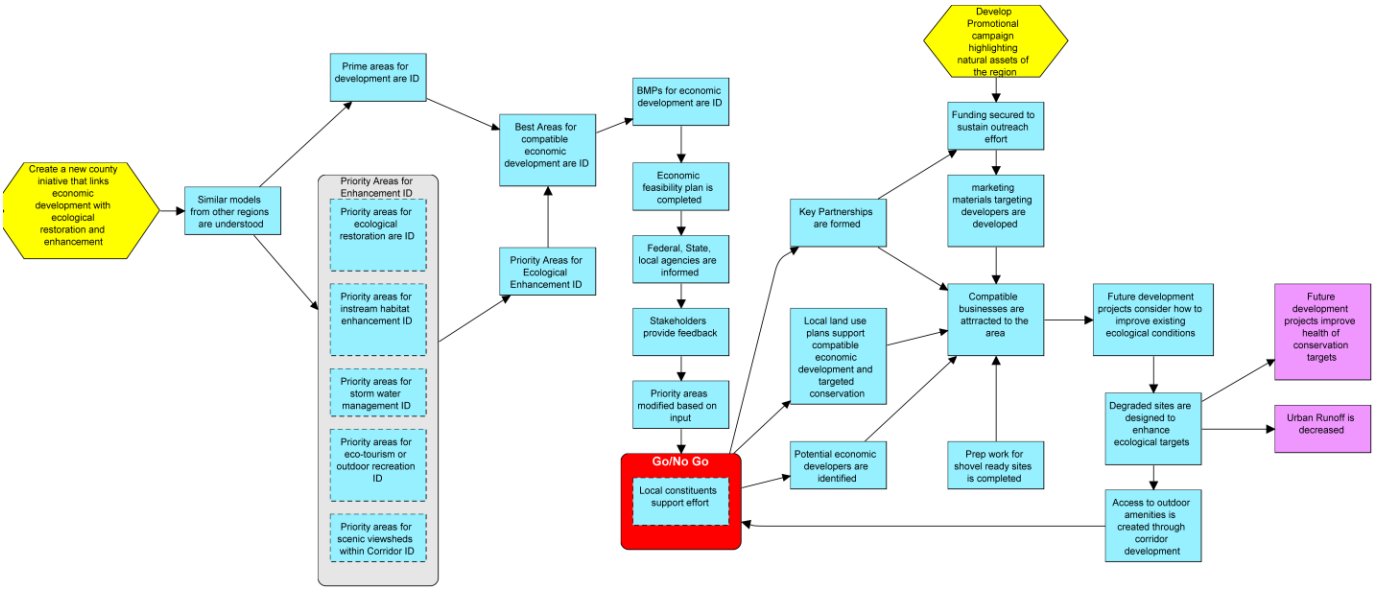

Appendix O: Conservation Action Plans – Agricultural Drainage and Runoff

Key Issues

- Federal farm programs preserve privacy of the land owner, so need to be innovative in identifying candidate drains with both physical features as a screening criteria and outreach to the farmers for volunteers.
- Rental land vs. farmer owned and farmed land might present challenges
- Drain assessment requests come from farmers and are not initiated by the Drain Commissioner
- Farmers need to "own" this idea and the process used to implement it; and evaluate its value as a community. This has to be a true partnership between the Drain Commission and the farm community.

Assumptions

- Agricultural BMPs will have a positive impact on water quality in Monroe County
- Financial incentives based on drain assessments are critical for increasing voluntary installments of BMPs in Monroe County
- The drain commission office will have the capacity to roll up the demonstration project to the larger project area
- Sufficient resources will be available to monitor water quality changes

Key Actions

- secure funding for analysis by 2017
- The Farm Bureau evaluates support for idea with the farming community
- Contact MDARD to get more information on the Van Bureau County crediting effort. Develop more detail on the crediting concept with the farm champions and Drain Commission.
- Use information and tools from the Van Bureau County example
    - Explore the idea of including input from an agricultural economist
    - Develop best way to measure success of the pilot
    - Determine candidate drains
- Drain Commission identifies which drains have been cleaned out within the last 20 years. These drains would not be good candidates for the pilot because they do not need maintenance.
    - Digitize the county's records on drain clean-out, next summer (SeaGrant student)
    - Use recently compiled asset management data and GIS to look at these factors:
    - Length of the drain – County Drain staff believe a 1-2 mile long drain would be the best candidate because there are fewer owners
    - Soils
    - Aerial photos showing locations of existing filter strips
- Conduct outreach to the farm community
    - Once candidate drains are identified, outreach to the farmers would occur through the Farm Bureau to solicit volunteers interested in participating in the pilot credit project.
- Once volunteer farmers identify themselves, the Drain Commission implements new credit program

- secure funding to implement demonstration project by 2018
- develop new smart drain assessment model
- monitor and communicate results to key stakeholders
- hire staff (Drain Commission), and apply model to broader region

Priority Locations

- Create a decision-making process:
    - Drains that are ripe for clean-out because they are ready for the assessment process and nearby landowners are motivated to have the drain cleaned out to prevent flooding on their property.
    - Short drains (1-2 miles) long because it might be easier to demonstrate the success or lack of success of the pilot project with fewer owners
    - Drains with motivated farmers who are already participating in best practices for water quality because they will be motivated to receive a credit on their assessment for their improvements
    - Farms with more tiled fields might be more motivated since they have a lot of infrastructure investment and are more motivated to preserve the drain in good working order.

Potential Funding Sources

- EPA
- MDEQ, Office of the Great Lakes
- NOAA

Potential Leads and Roles

- The Monroe County Drain Commission - manage agricultural drains including clean-outs on behalf of the farmers. Help identify candidate drains for a pilot project.
- Farmers - Farmers need to voluntarily participate in the pilot development and implementation.
- Monroe Farm Services Agency - implements the NRCS/CRP program encouraging use of filter strips near drains. Help identify candidate drains for a pilot project.
- Soil Conservation Service - help identify candidate drains for a pilot project; NCRS may have information on one-time payouts to farmers for best practices.
- The Farm Bureau – use upcoming winter meeting to share information with farmers about a pilot drain assessment credit for implementing water quality best practices.

Opportunities

- In regards to conducting a drainage district analysis, it was noted that the University of Michigan is in the process of developing a model for Monroe County to investigate nutrient loading sources.
- The Stewardship Network (TSN) is conducting a hot-spot analysis along the South Branch of the River Raisin.
- Ohio Environmental Council has a grant to assess the contribution of drainage districts to Lake Erie nutrient loading.
- The MEAP certification program
- Growing interest at the federal and state levels to increase pollinator habitat

Timeline

- Secure initial funding by 2017
- Secure funding for implementation by 2018
- Complete implementation of smart assessment in demonstration drainage district by 2020
- Hire additional drain commission staff in 2022

Objectives

- Decrease nutrient loading by 40% by 2025 - based on the recent Lake Erie Nutrient Management Strategy (2015).

Indicators

- Total phosphorus
- Dissolved reactive phosphorus
- Total nitrogen
- Total suspended solids
- Base flow (flashiness)

Appendix O: Conservation Action Plans – Invasive Species

Key Issues

- Numerous invasive species are well established in this portion of the Lake Erie Basin
- Competition between different invasive species groups has increased
- There are a large number of factors contributing to invasive species in this region, increasing the complexity of invasive species control
- Controlling invasive species in this landscape will require a long-term commitment

Assumptions

- Collaboration will be more efficient and effective
- CWMAs are willing to collaborate and work across state boundaries
- Long term funding will be available to support a large scale effort
- Existing control methods are effective at controlling most difficult species

Key Actions

- Expand on existing partnerships
- develop regional collaborative invasive species strategic plan,
- identify and map priority species and areas,
- develop integrated implementation plan,
- Create and maintain invasive species online resource,
- secure sustainable funding,
- hire dedicated coordinator,
- *develop comprehensive invasive species education and outreach program (Strategy),*
- determine what BMPs exist, and what BMPs need to be developed,
- establish local invasive species groups throughout region,
- establish early detection and rapid response network,
- apply BMPs,
- *create or adopt integrated invasive species data management system (Strategy),*
- develop and implement monitoring plan for actions and results

Potential funding sources

- State of Michigan Invasive Species Program
- EPA (GLRI)

Opportunities

- Three CWMAs are well established in the greater region
- Lake Erie CWMA – recently secured a grant to establish an early detection rapid response (EDRR) program
- Midwest Invasive Species Information Network (MISIN) database
- The Stewardship Network is planning to provide BMP information to homeowners
- MDNR is planning to provide BMP information to hunters and fisherpersons
- Conservation Districts are planning to provide BMP information to farmers and homeowners

- SEMCOG SHRP2 website could be a clearinghouse on invasive species; providing links or information on BMPs, Mapping, and Identification
- Phragmites Collaborative – List of BMP's, contractors for hire, and current research.
- Eastern Michigan University – research on phragmites and aerial photos analysis

Priority Areas
- I-75 Corridor
- Coastal zone
- Existing conservation lands

Potential Strategy Leads and Roles
- Detroit River and Western Lake Erie CWMA (MI)
- Oak Openings CWMA (OH and MI)
- Western Lake Erie CWMA (OH)

Proposed Timeline
- Not defined yet

Objectives (by 2035)
- Reduce spatial extent of high priority species such as common reed by 30%
- Eliminate newly established invasive plant species such as frogbit within 3 years of initial observation

Indicators
- Aerial extent of common reed
- Observations of new invasive plant species
- Acres of land actively managed for invasive species control

Appendix O: Conservation Action Plans – Road/Stream Crossings

Issues

- Lack of political support for road funding at state and federal levels
- Lack of awareness of impact road stream crossings have on conservation priorities
- Over 2,000 road stream crossings in the project area
- Lack of existing road stream crossing inventory

Assumptions

- RSX improvements will have a significant positive impact on several conservation priorities
- There are significant differences in RSX conditions across the project area
- Residents and key decision-makers can be convinced to financially support RSX improvements
- Targeted RSX improvements is both politically and financially feasible

Key Actions

- assess existing road/stream crossing, stream, and conservation target data,
- inform key partners of results
- develop formal road stream crossing partnership
- create PR campaign highlighting issues and opportunities
- secure short-term funding for analysis,
- collect data (fill data gaps)
- develop and implement road stream crossing prioritization framework,
- develop long-term funding strategy
- install BMPs at priority RSXs
- development and implementation of monitoring plan,
- share results with public and local/state decision makers
- secure long-term funding

Priority Areas

- Develop decision making process for prioritization (potential criteria below)
    - Mainstems and first tributaries connected to mainstems
    - Largest contiguous areas of stream/wetland on either side of 1-75
    - Public lands along streams - Erie Township, Erie SGA, Pt. Moulliee SGA, and Sterling SP
    - Herpetofauna need larger culverts that span part of the floodplain, or overflow culverts with barrier fences to direct species to culverts
    - Include all culverts down to 18 inches in diameter

Potential funding sources

- Transportation Alternatives Program (TAP)
- NOAA (GLRI)
- Sustain our Great Lakes
- EPA (GLRI)

- Americorps (hire students for inventory work)

Opportunities
- MDOT is implementing RSX BMPs as part of the I-75 rebuild

Potential Leads and Roles
- SEMCOG = role of facilitator
- Monroe County Road Commission = lead on implementation
- Monroe County Drain Commission
- River Raisin Watershed Group
- Huron Pines - consultation

Proposed Timeline:
- Undetermined

Objectives: (by 2035)
- Will be determined based on results from data assessment and data collection
- Install BMP's at 30% of highest priority RSX's (draft)

Indicators:
- % of RSXs in high priority subwatersheds that rate high for fish passibility
- % of RSXs in high priority subwatersheds that rate high for herpetofauna passibility
- Average summer base flow of larger streams is sufficient to support fish migration

Appendix O: Conservation Action Plans – Urban Development and Runoff

Key Issues

- Roads are an obstacle to recreational access– lots of west-east dead end roads
- Leadership turnover at the local level
- Lack of funding
- Legacy costs of brownfields, particularly in the city of Monroe
- Number of WWTP's and CSO's in the region

Assumptions

- Sufficient conservation funding exists for restoration and protection activities in the region
- Economic developers will be attracted to the region and willing to integrate the long-term health of the conservation targets into their site design

Key Actions

- identify priority areas for ecological enhancement,
- identify best areas for compatible economic development,
- identify areas of overlap between ecological enhancement and economic development
- coordinate implementation of this strategy with Monroe County's Economic Development Plan and SEMCOG's Economic Development Strategy,
- gain support from local constituents,
- *develop promotional campaign highlighting ecological assets of the region (strategy)*,
- improve understanding of private-public partnership opportunities,
- develop marketing materials targeting compatible businesses,
- attract compatible businesses, and
- enhance priority degraded sites

Priority Areas

- DTE Whiting coal plant (Luna Pier)
- Old Ford Plant (opportunity for compatible redevelopment; shipping container warehouse)
- Mouth of River Raisin (nexus for many priorities)
- New La-Z Boy headquarters (restoration of lakeplain prairie and oak openings)
- Inter-Urban Rail line (provide recreational access to coastal wetlands and a connection between Detroit and Toledo)
- Quarry and Landfill adjacent to Pt. Mouillee
- Wetland enhancement (Allen's Cove marsh, Swan Creek, Otter Creek, and Plum Creek)
- Golf courses (green certification)

Opportunities

- MDOT welcome center on I-75 provides a great opportunity to showcase regional ecological assets and the work being done to restore, protect, and enhance these assets

- Monroe County is working on an economic development plan for I-75 corridor
- SEMCOG is working on an economic development strategy
- NPS River Raisin Battlefield development
- Decommissioning of DTE Whiting coal plant (Luna Pier)
    - Possible redevelopment options include: ecotourism, green energy production, agricultural processing plant, logistics and warehousing, outdoor recreation

Potential Funding Sources
- Monroe County Business Development Corporation
- Michigan Economic Development Corporation

Potential Leads
- Monroe County Business Development Corporation
- Monroe County Planning Department
- City of Monroe

Timeline:
- Undetermined

Objectives: (by 2035)
- Urban runoff in priority subwatersheds is reduced by 50%
- 95% of large scale development projects in the primary boundary incorporate design elements that improve the health of at least one conservation target

Indicators:
- How do we effectively measure urban runoff?
- % of large scale development projects in the primary boundary that incorporate design elements to improve the health of at least one conservation target
- # of combined sewer overflows (CSOs) per year