

NON-POINT SOURCE (NPS) STRATEGY FOR THE GREAT LAKES

I. Problem Statement

Background

The problem of non-point source pollution is present almost everywhere in the Great Lakes Basin, in many forms and with many interactions. The complex movement of non-point source pollutants among soil, water, and air requires full and comprehensive coordination of responsive actions. This strategy details recommended actions for mitigating the stressors that contribute to non-point source pollution. Non-point source impacts vary greatly in frequency and severity among Great Lakes locations. Impact has been particularly severe in the coastal wetlands and previously healthy tributaries that buffered the Lakes from damage. Geographically, other prime impact areas may include western Lake Erie, Saginaw Bay, Green Bay, coastal Ohio (where sediment loads are high), selected Areas of Concern (AOCs), and selected tributaries or near-shore areas. This geographic variation makes geographically-responsive tools and coordination with geographically-based Strategy Teams (e.g., Habitat, Coastal Health) of this Collaboration particularly valuable. Similarly, issues such as land use and smart growth have a major impact upon the control of non-point sources.

Non-Point Pollution Stressors

Five non-point source pollution stressors – physical or chemical changes that occur within the ecosystem – significantly impact the biological components, patterns, and relationships in the natural system of the Great Lakes: **nutrients, contaminants, pathogens, sedimentation, and altered flow regimes**. These stressors enter the Great Lakes through three primary pathways: surface runoff, groundwater infiltration, and atmospheric deposition. Non-point source pollution in each of the five forms damages flora and fauna in the Lakes, threatens human health, reduces recreational opportunities, and increases the cost of treating drinking water and dredging our harbors and marinas. Actions against stressors have direct short-term costs, but often save money in the longer-term and sometimes make new sustainable growth possible.

Existing Programs and Their Effectiveness

Justifiably, billions of dollars have been spent over the last thirty-plus years to remedy major, obvious point source problems and discharges to the Great Lakes. Large projects such as the tunnel and reservoir programs of Chicago and Milwaukee and major cleanup or prevention efforts such as those at Waukegan Harbor or Reserve Mining in Minnesota have had effects, but has not secured the future or even the present security of the Lakes. The total input of stressors from non-point source pollution today considerably exceeds that from point sources. Work on point sources approaches a point of diminishing returns; funding to increase point source control beyond 90% or 95% is less effective than providing the same amount of funding to address non-point sources.

Many governmental agencies and non-governmental organizations are already at work at, or interested in, reducing non-point source pollution in the Great Lakes. They also include universities and colleges, and state Cooperative Extension Services. The combination of State, Federal, and local institutions and programs already at work or interested in reducing non-point sources have resulted in many successful projects across the Basin. However, despite these successes, pollution from non-point sources has led to a Great Lakes ecosystem that is deteriorating in health and quality.

Obstacles to Achieving the Long-Term Ecosystem Goal

There are three fundamental barriers to addressing non-point source pollution more effectively in the long-term:

- **Authority:** There is limited legal authority to require non-point sources to reduce, prevent, or stop their pollution activities. The authorities in place are spread out over a variety of jurisdictions primarily through voluntary programs and their application and implementation is inconsistent. While they have high participation rates, they can only penetrate so far into the market responsible for the non-point stressors.
- **Funding:** Funding currently available to these programs is far less than is needed to achieve maximum penetration using voluntary measures. Current funding levels will not come close to reaching the levels of implementation needed to make a difference in the Great Lakes.

- **Coordination:** These programs and the agencies implementing them often are not integrated. In the few places where there is an integrated watershed-based effort, it is usually at the sub-watershed area or smaller. To be effective for the Great Lakes, these programs and the resources they deliver need to be highly coordinated across and within all levels: regional, State, Tribal, and local.

II. Goals and Milestones

Long-Term Ecosystem Goal

The goal of the recommendations described in this strategy is for the Great Lakes States' water to meet or exceed the States' water quality standards. This goal will be met by active, on-the-ground applications of new wetlands, buffer strips, residue management programs, hydrological softer stream flows, and urban sensitive practices, all resulting in greatly improved water quality. Accomplishing this goal will require common, agreed-upon objectives, prioritized by all. Federal, State, and county agencies and local stakeholders must all agree on what is to be done, by whom, and when, and incentives must drive on-the-ground implementation and continued subsistence of all improvements on a long-term, continuing basis.

A. Wetlands

Wetland loss in the eight Great Lakes States from the 1780s to the 1980s totals 23.6 million acres, or more than two-thirds of the natural Great Lakes wetlands. Primary causes of this loss (filling or draining) have been due to agriculture, urban uses, shoreline development, recreation and resource extraction (such as peat mining). The loss of these wetlands poses special problems for hydrological processes and water quality because of the natural storage and cleansing functions of wetlands.

Long-Term Goal: Restore riparian wetlands so that rivers, streams and the lakes across the Great Lakes region function as healthy ecosystems.

Interim Milestone:

- Restore, recover and protect 500,000 acres by 2010 and 1,000,000 acres of wetlands by 2015.

B. Buffer Strips

Buffer Strips include a variety of practices including riparian buffers, filter strips, grassed waterways, windbreaks, living snow fences, contour grass strips, cross-wind trap strips, field borders and other vegetative barriers. Vegetative buffer strips slow water runoff, trap sediment; enhance infiltration within the buffer while trapping fertilizers, pesticides, pathogens, and heavy metals; and reduce blowing soil in areas with strong winds.

Long-Term Goal: Measurable reductions of at least hundreds of thousands of tons of sediment, pounds of phosphorous loading, and pounds of nitrogen loading in to the Great Lakes basin.

Interim Milestones:

- By 2010, create 600,000 new acres of buffer strips on Great Lake States within the Great Lakes basin.
- By 2015, create 1,000,000 new acres of buffer strips on Great Lake States within the Great Lakes basin.

C. Residue Management

Although conservation tillage has been heavily promoted in many areas of the Great Lakes region, many farmers still choose to use conventional tilling methods on their fields that plows crop residues into the soil. Keeping crop residues can assist in preventing erosion between planting seasons.

Long-Term Goal:

Interim Milestone:

- By 2010, achieve a 40% decrease in soil loss.

D. Livestock Manure/Nutrient Management

Animal feeding operations (AFOs) not subject to regulation (facilities with under 1000 animal units) are significant contributors to non-point source pollution in many rural areas. AFOs in the Great Lakes Basin have become more concentrated, allowing for more concentrated collection of animal waste products. If poorly controlled, these concentrations of waste products can contaminate surface and ground waters, cause odor

problems, and serve as a source of infectious disease. Increased comprehensive management of nutrients and manure on livestock farms will greatly reduce livestock agriculture's contribution to non-point source loading. **Long-Term Goal:** Increase use of comprehensive management of nutrients and manure on livestock farms to greatly reduce livestock agriculture's contribution to non-point source loading.

Interim Milestones:

- By 2008, 70% of all livestock farmers will attend education programming regarding nutrient management.
- By 2010, all acreage utilized for livestock production in a major P impaired watershed will be covered by certified CNMPs.
- By 2010, triple the number of certified Comprehensive Nutrient Management Plan Providers in the Great Lakes Basin that directly assist farmers.
- By 2015, 70% of all livestock production in the U.S. portion of the Great Lakes Basin will be covered by certified, phosphorous-based Comprehensive Nutrient Management Plans.

E. Hydrology

Alterations in the natural hydrology of surface and ground water in the Great Lakes Basin, such as in the form of floods, droughts, reduced base flow, or altered timing of natural flow regimes, has resulted in changes to the structural and functional integrity of the physical, chemical, and biological elements in these ecosystems.

Long-Term Goal:

Interim Milestones:

- By 2010, restore/manage the hydrologic regime in 10 watersheds to ensure flow delivery and habitat protection at sustainable levels, and reduce excessive sediment loadings.
- By 2015, in all watersheds classified as severely or moderately impacted based on degree of altered hydrology and ecological sensitivity using scientifically defensible indicators: 1) develop better understanding of baseline conditions (appropriate time frame, natural vs. anthropogenic influences) and relationship between stressors and ecological endpoints (e.g. water quantity as stressor, effectiveness of BMPs, cumulative impacts); 2) develop appropriate assessment criteria (numeric vs. narrative; relate to societal values); 3) develop/refine new methods (decision support systems, monitoring technology); and 4) apply this new information to all watersheds classified as severely or moderately impacted.
- By 2015, document improvements in: measurable changes in the hydrology (reduction in peak flow and volume); measurable reduction in bank erosion and sediment loading; and measurable improvement in the health of the biological community in significant portions (stream orders 1-3) of 10 urban watersheds and/or sediment loading into the areas where these watersheds discharge to the Great Lakes.

III. Recommendations

Overall Context

In general, programs need coordination at a higher level and a focus on mitigating specific problem areas, such as Areas of Concern. Although agencies offer grants to States and local groups to address these concerns, the grants are given without any overall, interagency focus or strategy. Effectively targeting and addressing problems will require not only Federal agency budget enhancements, but also *coordination* of efforts so that agencies at all levels concentrate their energies on the *same* problems. To this end, the NPS Strategy Team suggests designating or establishing an organization to coordinate efforts, roles, and initiatives among Federal, State, and local agencies and private organizations in the Great Lakes Basin.

A. Wetlands

Healthy habitats such as wetlands and riparian forests trap sediment and nutrients and serve as a buffer to protect communities from devastation caused by flooding and non-point source pollution. By restoring function to these important habitats, we restore the invaluable service they provide. The anticipated results and benefits of the following recommendations will be healthy estuaries and coastal habitats that contribute to our economic base through tourism, recreational fishing, aquaculture, and other income-producing business sectors.

Recommended Actions:

- **Fully fund agencies with partial funds from CWPPRA (USDA, NOAA, USFWS, USACE, EPA). The costs for these programs include:**
 - **Great Lakes Coastal Wetlands Conservation and Recreational Task Force: \$5M/year**
 - **Restoration Activities (CORPS, Farm Incentives, Community Grants): \$50M/year**
- **Create a Great Lakes Coastal Wetlands Conservation and Recreational Task Force (as outlined in CWPPRA) consisting of The Secretaries of Commerce, Agriculture, Interior, the Army, and the Administrator of the Environmental Protection Agency to prepare: preliminary assessments; general or site specific inventories; reconnaissance, engineering or other studies; preliminary design work; and other necessary studies to identify and evaluate the feasibility of coastal wetland restoration.**
- **Fully support the President’s Council on Environmental Quality’s Conserving America’s Wetland—Implementing the President’s Goal (April 2005).**

Lead Agencies: Task Force Members using the following programs:

- 33 USC section 2901 Estuaries and Clean Water Act of 2000,
- National Strategy to Restore Coastal and Estuary Habitat (April 2002)
- Conserving America’s Wetlands—Implementing the President’s Goal –April 2005
- Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA)
- North American Wetlands Conservation Act (NAWCA)
- Conservation Technical Assistance Program (CTA)
- USDA - Farm Bill Conservation Title programs including Wetland Reserve Program, Conservation Reserve Program (including CREP), Wildlife Habitat Incentive Program, Environmental Quality Incentives Program, and Conservation Security Program;
- NOAA—Great Lakes Restoration Program Office—Coordinate Restoration Programs.
- NOAA—Coastal Zone Programs
- USDI - North American Wetlands Conservation Act, FWS Coastal Program, Great Lakes Fish and Wildlife Restoration Act, Partners for Fish and Wildlife
- USCOE – WRDA; Restore Wetland Functions
- EPA – Great Lakes National Program Grants
- States – Land and Water Conservation Fund, State Wildlife Grants, Fish and Wildlife Fund (license revenue), Check off Funds, EPA 319, Coastal Management Zone funds.

Critical Geographies: Critical Geographies are as listed in the *National Strategy to Restore Coastal and Estuary Habitats*.

B. Buffer Strips

The anticipated results and benefits of increasing the acreage of riparian buffers will be improved water quality based on a measurable reduction of sediment load and of fertilizer, pesticide, pathogen and heavy metal contaminants, subsequently improving overall stream and riparian ecology for fish and wildlife habitat. A history of the program indicates that landowner willingness to participate exceeds program goals and that a State’s ability to increase its acreage goal is directly related to the availability of adequate State funding.

Recommended Actions:

- **Provide a total of \$1 billion to restore 1,000,000 acres of buffers over 15 years, An urban program most likely focus on education that shifts current mainstream philosophies in landscaping and would not incorporate things like soil rental rates and easements into implementation.**
- **Create of a new program to address education on and installation of buffer in urban and suburban environments, or integration onto Section 319 or Brownfield Redevelopment Programs.**

Lead Agencies: USDA: NRCS and FSA. Possibly EPA for the urban component.

Critical Geographies: Western Lake Erie, Green Bay, Saginaw Bay, Lake St. Clair, and AOCs.

C. Residue Management

The anticipated benefits of the following recommendations will be to prevent additional soil loss in the Great Lakes Basin.

Recommended Action:

Lead Agency:
Critical Geographies:

D. Livestock Manure/Nutrient Management

The anticipated results and benefits of the following recommendation will be a 70% reduction in non-point source contribution of phosphorus from livestock agriculture. This results from the fact that farms with certified CNMPs apply 20 – 30 lbs of P less per acre than farms that do not have CNMPs and minimize nutrients leaving the farm through site-specific conservation planning. The actions would provide livestock farmers with financial and technical assistance to complete certified CNMPs, reward farmers that complete and maintain CNMPs, and increase market demand for certified CNMP providers.

Recommended Actions:

- **Provide \$106,000,000 in funding to support the development and implementation of comprehensive nutrient and manure management on livestock farms. This includes \$96 million to assist the approximate 12,000 farms with more than 50 animals (estimated cost of \$8,000 per CNMP), \$5 million for educational material development grants, and \$5 million for increased technical assistance at NRCS.**

Lead Agency: United States Department of Agriculture – Natural Resources Conservation Service.

Critical Geographies: Phosphorous impaired watersheds and leading livestock producing counties.

E. Hydrology

Current Federal assistance, regulatory and grant programs, and related State programs do not focus on in-stream flows in urban areas. A new, integrated Federal initiative is needed to address flow regime issues in urban watersheds. The anticipated results and benefits of restoring the hydrology of watersheds will be reduced infrastructure costs due to elevated stream flows and excessive sediment loadings, improved shipping capacity, increased public use, and improved aquatic ecosystem health.

Recommended Action:

- **Provide \$18 million per year over 20 years to hydrologically restore 10 watersheds of various sizes. Hydrological restoration ranges from \$600,000 per year for a small rural watershed to \$3 million per year for a large urban watershed. Cost estimates include storm water slow-the-flow incentives, wetland restorations, buffer creation, stream bank and in-channel restoration, bridge and culvert modifications, appropriate dam removal and easement acquisition, and planning, coordination and monitoring.**

Lead Agencies: Four federal agencies, the Army Corps of Engineers (ACE), the U.S. Geological Survey (USGS), United States Department of Agriculture (USDA), and the U.S. EPA have resources, expertise, and experience to assist in various aspects of any new federal initiative. USDA would modify expand its focus to incorporate off-site impacts into their conservation programs. The CWA Section 319 funding for non-point source control programs would be used to address urban stream flow issues related to aquatic life impairments; however, traditional non-pollution abatement activities are the current focus.

Critical Geographies: The new program should focus on urbanized areas where runoff from development and the associated impairments directly affect natural waterways and their confluence with the Great Lakes or connecting waters. Likely candidates include smaller watersheds or sub-watersheds within the Milwaukee, Green Bay, Gary, Detroit, Cleveland, Toledo, Buffalo metropolitan areas.

Note: This recommendation will be covered by the PBT Team. The NPS Team will elevate the issue to the Executive Committee if it is not adequately addressed by the PBT Team.

Air Deposition

Recommended Action:

By 2015, reduce mercury emissions by 90%. Achieve this reduction without trading among plants within the Great Lakes Basin; rely on technology rather than trading.

Note to the Executive Committee:

The NPS team, which is charged with addressing all non-point sources, including air deposition of mercury, had made a recommendation on mercury deposition from industrial sources (e.g., coal-fired power plants, coke plants): a 90 percent reduction by 2015, with no trading among sources in the basin. But based on the assurance that the PBT team would make its own action recommendations on mercury deposition from power plants, the NPS team has agreed to remove this item from its recommendation. However, if the PBT team fails to make recommendations for action on mercury from coal-fired power plants, the NPS team reserves its right to re-insert this item back into its own recommendations. At this point, the PBT team recommendations include no action item on mercury emissions from power plants, and so this issue is still open.

Note: Team to determine which of the following appendices will be included in the report for submission to the Executive Committee.

Appendix 1

Detailed Discussion of Non-Point Source Stressors

- **Nutrients:** Lake Erie and shallow embayments of the other Great Lakes display accelerated eutrophication including serious oxygen depletion and harmful algal blooms (such as the current Wisconsin *cladophora* outbreak). These stem in part from runoff carrying rural, suburban, and urban non-point source nutrients, both dissolved and sediment-attached. Much of this runoff is wasteful because it represents unused fertilizer from farms and lawns. Eutrophication caused the recent large-scale die-offs of fish and waterfowl in Lake Erie; deadly botulism is caused by the powerful neurotoxin of the bacteria *C. botulinum*, produced in oxygen-deprived lake zones.
- **Contaminants:** The Great Lakes ecosystem exhibits many persistent bio-accumulative toxics (PBTs), including PCBs and mercury, at levels threatening human health and the environment. In response, health agencies have issued fish consumption advisories for broad areas of the Great Lakes Basin. PBTs continue to enter the Great Lakes and tributaries through atmospheric deposition, sediment resuspension, and urban and agricultural runoff. A portion of this runoff represents the costly waste of pesticides (i.e., insecticides, fungicides and herbicides) diverted from their proper function. The Great Lakes ecosystem and its beneficial uses may also be at risk due to non-point releases of new chemicals of concern. These include certain brominated flame-retardants and pharmaceuticals (e.g., hormones and antibiotics).
- **Pathogens Affecting Human Health:** Bacterial contamination in runoff from animal feeding operations, failing septic tanks, and diffuse sources in urban areas limits the recreational use of tributaries and Great Lakes shoreline swimming beaches. Among animal feeding operations, this loss by runoff again represents a waste of a useful and valuable resource that might properly be used as fertilizer. Among septic tanks, it represents an annoyance and risk to the owner and neighbors.
- **Sediments:** Sediments seriously impact aquatic habitats, choking riverine, coastal and near-coastal wetlands. Sedimentation results from storm water runoff from urban and rural developments that do not incorporate best management practices. Agricultural and forestry practices that do not employ conservation measures are adding excessive sediments as well as other pollutants to the Great Lakes and tributaries.
- **Alteration of Flow Regimes:** Both manmade and natural changes in flow regimes can cause significant harm. In the Great Lakes Basin, we see manmade changes result in excessive flows. These may be exacerbated by the loss of wetlands and the removal of natural, riparian vegetative cover, altering natural groundwater and surface water flow regimes to the detriment of aquatic species. Similar manmade flow alterations that reduce groundwater recharge and increase runoff also diminish base flows; increase flooding, bank erosion, and channel instability; and put cool water and cold water fisheries and ecosystems at risk. Flow alterations combine to increase the risks of flooding while reducing the quantity and quality of physical habitat available.

Appendix 2

Existing Federal and State Programs

- Conservation Security Program (CSP)
- Partnership and Cooperation.
- Wetlands Reserve Program (WRP)
- Environmental Equality Incentives Program (EQIP)
- Ground and Surface Water Conservation
- Klamath Basin
- Conservation Innovation Grants
- Forest Land Enhancement Program
- Grassland Reserve Program
- Conservation of Private Grazing Land Program (GPCL)
- Wildlife Habitat Incentive Program (WHIP)
- Grassroots Source Water Protection Program
- Great Lakes Basin Program for Soil Erosion and Sediment Control
- Farm and Ranch Lands Protection Program
- Delivery of Technical Assistance (Technical Service Provider)
- Aquatic Ecosystem Restoration System Program
- Confined Disposal Facilities Program
- Environmental Improvements Program
- ARS- Research Units
- Cooperative Forestry
- Forest Health Management
- Coastal Zone Management
- National Sea Grant College Program
- Hazardous Materials (Hazmat)
- Endangered Species Program
- Fish and Wildlife Management Assistance
- Partners for Fish and Wildlife
- Biological Research and Monitoring
- National Water Quality Assessment Program
- Clean Water Act (CWA)
- Clean Water State Revolving Fund
- Non-point Source Program
- Total Maximum Daily Load Programs
- Superfund

Appendix 3
Existing Authorities

- Estuary and Clean Waters Act of 2000-(P.L. 106-457)
- Water Resources Development Act of 2000-(P.L. 106-541)
- Federal Agricultural Improvement and Reform Act of 1996- (P.L. 104-127)
- Food Security Act of 1985-(P.L. 101-624)
- Highly Erodible Land Compliance, Sodbuster, Swampbuster
- Agriculture, Rural Development and Related Agencies
- Appropriations Act for Fiscal Year 1980-16 (93 Stat. 835)
- Cooperative Forest Assistance Act of 1978- (P.L. 95-313)
- Endangered Species Act of 1973-(P.L.93-87)
- Rural Development Act of 1972-(P.L. 92-419) Natural Resource Inventory
- Coastal Zone Management Act of 1972-(P.L. 92-583)
- Clean Water Act of 1972-(P.L. 91-190)
- National Environmental Policy Act (NEPA) of 1969-(P.L. 91-190)
- Soil Surveys for Resource Planning and Development Act of 1966-(P.L. 89-560)
- The Water Resources Planning Acts of 1965-(P.L. 89-90)
- Watershed Protection and Flood Prevention Act of 1954-(P.L. 83-566) Small Watershed Operations
- The Soil Conservation and Domestic Allotment Act of 1935-(P.L.74-76)

Appendix 4

Goals by Stressor

Nutrient reduction goals:

- Reduce the quantity and impact of nutrients that enter the Great Lakes tributaries and damage the quality of water.
- Reduce and prevent eutrophication among embayments, open lake areas, and tributaries.

Contaminant prevention goals:

- Eliminate persistent bioaccumulative toxic (PBT) contamination.
- Establish a secure, healthy, diverse, and sustainable biological community, free from toxics and in harmony with aquatic life.

Pathogen elimination goals:

- Eliminate the need for beach closures by 2025.
- Reduce annual closures by 20% for beaches already 80% to 90% swimmable.

Sediment reduction goal:

- Reduce sedimentation and other land base sources of pollution by improving the use of land conservation practices in sensitive watersheds.

Altered flow regime goals:

- Where practicable, protect, maintain, and restore the natural flow regime in key watersheds in the Great Lakes Basin.
- Reduce the amount of peak runoff.

Appendix 5

Categorized Objectives

1. Wetlands
 - Nutrients Objective 2: Restore, enhance, and protect at least 200,000 acres of wetland by 2010.
 - Contaminants Objective 1: Develop and restore wetlands by accelerating the Wetland Reserve Program and eliminate all backlog applications by 2010.
 2. Buffer Strips
 - Sediments Objective 1: Expand the use of conservation buffers in selected watersheds.
 - Pathogens Objective 4: Improve the use of the Conservation Reserve Enhancement Program (CREP) in all critical watersheds.
 3. Residue Management
 - Pathogens Objective 5: Support NACD's Great Lakes Buffer/No-Till Programs. Increase buffer and conservation tillage acres by 40% by 2010.
 4. AFOs
 - Nutrients Objective 1: Increase technical and financial assistance to land users to develop and apply Comprehensive Nutrient Management Programs (CNMPs) on all animal feeding operations (AFOs) and properly manage the use of fertilizer in other operations in priority watersheds by 2010.
 - Nutrients Objective 5: Provide technical and financial assistance to effectively implement the UNSAF.
 - Pathogens Objective 2: Complete and apply CNMPs for all CAFOs in the Great Lakes Basin by 2010.
 5. Hydrology
 - Flow Regimes Objective 5: Integrate consideration of flow regimes, particularly the critical 12%-15% impervious surfaces "tipping point," into non-point source watershed planning and technical assistance efforts.
 - Flow Regimes Objective 3: Manage existing dams to mirror natural flow and remove dams where practical.
 - Flow Regimes Objective 7: Develop a model plan and procedures for planning and carrying out the removal of non-regulated problem dams.
 6. Urban Practices
 - Nutrients Objective 7: Develop nutrient management techniques for homeowners and developers. Provide information about reducing the use of nutrients and pesticides.
 - Pathogens Objective 3: Establish a new program to rehabilitate aging and inoperative septic systems. Provide technical and financial assistance for upgrading.
 - Pathogens Objectives 6: Publish guidelines on the importance of proper management of on-site waste water treatment systems.
 - Flow Regimes Objective 1: Promote awareness of responses to altered flow regimes such as storm water detention, permeable pavement, and other methods.
 - Flow Regimes Objective 2: Increase porous surfaces by 25% on new construction sites.
 - Flow Regimes Objectives 6: Modify standards to require flow quantity and timing consideration in storm water permits, TMDLs, and other discharge permits.
 7. Air Deposition
 - N/A
- Programmatic
- Nutrients Objective 3: Apply the principles of Adaptive Management approaches that track and respond to environmental changes and emerging threats.
 - Nutrients Objective 4: Fully utilize existing management authorities and programs at the Federal, State, and local levels; modify, where needed, to focus on the Great Lakes Basin.
 - Nutrients Objective 9: Carry out a watershed planning process in each priority watershed to determine conservation treatment needs.
 - Sediments Objective 2: Expand the use of the USDA conservation programs to land users to install conservation systems on agricultural lands.

- Sediments Objective 3: Develop and implement a unified education and outreach strategy for rural and urban land users on the need for sediment and nutrient reduction.
- Sediments Objectives 7: Focus EPA Non-Point Source Programs and State Revolving Loan Funds toward priority watershed areas.
- Sediments Objectives 8: Designate or establish an organization to coordinate efforts, roles, and initiatives among Federal, State, and local agencies and private organizations in the Great Lakes Basin.
- Sediments Objective 9: Improve monitoring, data evaluation, and progress reporting of restoration treatments.
- Pathogens Objective 8: Implement standards for storm water permits for all Phase II storm water discharges.

Setting Priorities

- Sediments Objective 4: Identify priority areas for additional action to reduce impact of sediment from disturbed areas.

Research / Monitoring

- Contaminants Objective 2: Follow guidance and standards published for land application of sewage sludge and manure. Update standard to include emerging chemical, hormones, antibiotics, and pesticides.

Delete

- Nutrients Objective 8: Control discharges from known point sources including onshore facilities and offshore and industrial pipes.
- Sediments Objective 5: Incorporate a human dimension into the Great Lakes conservation strategy by ensuring that conservation measures reflect the local socioeconomic and cultural environment.
- Sediments Objective 6: Accelerate the TMDL process on the tributaries in the Great Lakes. Complete TMDLs for all water bodies in the Great Lake Basin by 2012.
- Pathogens Objective 1: Complete TMDLs for *E. coli* at all beaches experiencing greater than 20% annual closure.
- Pathogens Objective 7: Adopt a science-based ecosystem approach to Great Lakes conservation that recognizes and builds upon important linkages among adjacent and remote habitats associated with the Great Lakes.
- Contaminants Objective 3: Accelerate the implementation of the Clean Air Act section 112 regulations in the Great Lakes Basin.
- Contaminants Objective 4: Implement a contaminant monitoring program for PBTs and emerging toxics on a significant percentage of priority Great Lakes tributaries by 2010.
- Contaminants Objective 5: Expand the use of watershed planning as the basis for the conservation treatment in all priority watersheds.
- Contaminants Objective 6: Improve the delivery of science and technology to land users that meet their needs.
- Contaminants Objective 7: Expand and modify programs to meet tribal needs.
- Flow Regimes Objective 4: Develop a conceptual model to view the problems on a system level and identify significant data gaps and needs where practical.

Appendix 6
Chart of Detailed Action Steps

Action Step	Stressors Addressed					Action Type					
	Nutrients	Contaminants	Pathogens	Sediments	Flow Alteration	Increased Funding	Change Statute	Regulatory Changes	Coordinate Existing Programs	Modify Existing Programs	Create New Programs
A. Adjustments of Programs, Policies and Guidance.											
1. Coordinate control efforts for nutrients, contaminants, pathogens, and sediment among interested jurisdictions. These may be organized together or by stressor. Elements may include consistent standards, anti-degradation benchmarks, coordinated monitoring networks, and consistent enforcement.	N	C	P	S	F				Co	M	
2. Empower local and non-governmental “good actors” by opening funding for selected existing Federal and State programs to local drainage districts, public and private universities and established NGOs with holdings or interests in the project area, such as National Wildlife Federation, Nature Conservancy, Izaak Walton League, Ducks Unlimited, etc. Special guidance will be needed to ensure permanency, access, etc.	N	C	P	S	F	\$	CS	R	Co	M	
3. Within existing programs, particularly USDA (EQIP, nutrient management plans, etc.), create separate State priority lists for those area within the Great Lakes Basin.	N	C	P	S	F	\$		R	Co	M	
4. Within existing programs, earmark funding for planning, design and implementation of practices in the most sensitive Great Lakes Watersheds, as determined by data or support tools. (This could create problems with programs meeting schedule established in accordance with law regarding achievement of deadlines, this is a case – by – case issue)	N	C	P	S	F	\$	CS	R	Co	M	
5. Within existing programs, employ cost-effectiveness formulae that take into account all collateral benefits (reduced waste, etc).	N	C	P	S	F			R	Co	M	
6. Develop flexible alternatives to local matches within Federal and State grant/assistance programs. Some communities simply cannot afford current	N	C	P	S	F		CS	R	Co	M	

Action Step	Stressors Addressed					Action Type					
	Nutrients	Contaminants	Pathogens	Sediments	Flow Alteration	Increased Funding	Change Statute	Regulatory Changes	Coordinate Existing Programs	Modify Existing Programs	Create New Programs
requirements. This might mean a reduced rate or extended payment schedule.											
7. Apply the principles of adaptive management throughout the operation of existing Federal and State programs.	N	C	P	S	F		CS	R	Co	M	
8. Within existing EPA programs such as Section 319 of the Clean Water Act and the State Revolving Loan Fund, provide higher priorities for NPS projects that implement NPDES minimum measures.	N	C	P	S	F		CS	R	Co	M	
9. Develop concrete acreage goals with USDA's Conservation Reserve Enhancement Program (CREP), especially for forested riparian areas in the northern Great Lakes Basin.	N	C		S	F					M	
10. Identify and prioritize sites by cost and impact for the restoration of approximately one million acres of wetland within the US Great Lakes Basin: perhaps one tenth of the amount lost so far.											
11. Expand the permitting threshold for confined animal feeding operations.	N		P	S			CS	R			
12. Develop basin-wide state mandated programs for household on-site wastewater treatment (septic systems). This could begin with the development of models codes and guidance to promote regulatory consistency and the publicizing of sites and tools on optimum design.	N	C	P			\$	CS	R	Co	M	NP
13. Evaluate the results of surveys on the effectiveness of fish consumption advisories and make course corrections, particularly to improve communication with high-risk communities and populations.		C	P						Co	M	
14. The FERC should incorporate dam management regimes mirroring natural flows into its licensing and re-licensing programs, at least as a major impact-mitigative measure. It should promote similar management of non-regulated dams, at least by offering model regulatory regimes on the Internet.				S	F			R		M	
15. Interested Federal and State agencies in concert should develop at least a model plan and procedure for planning and carrying out the removal of dams.				S	F	\$			Co	M	

Action Step	Stressors Addressed					Action Type					
	Nutrients	Contaminants	Pathogens	Sediments	Flow Alteration	Increased Funding	Change Statute	Regulatory Changes	Coordinate Existing Programs	Modify Existing Programs	Create New Programs
This should balance advantages against harmful impacts viz. alien migrations, sediment release, etc.											
16. Replacement and modification of existing hardened channels and shorelines should be made at least an equal priority for Corps of Engineers and other projects. The Corps should evaluate and rate biological engineering methods and use them in its projects where appropriate and cost-effective.				S	F	\$		R		M	
17. Develop an outreach program on suburban lawn nutrients and investigate the value of existing State or local limitations on phosphorus in fertilizer.	N					\$				M	NP
18. Expand the scope of regulations for land-applied sewage and manure to include emerging chemicals, such as hormones, antibiotics, and the most current pesticides.		C				\$		R			NP
19. Develop sediment control outreach and information for non-urban areas, if justified by data or support tools.				S		\$				M	NP
20. Encourage local drainage districts or other authorities to develop drainage codes that reflect sediment reduction packages. This may begin with the development of model codes and outreach.				S				R			
21. Promote the enforcement of existing sediment regulations by the development of web-based guidance, case studies, FAQs.				S		\$					NP
22. Develop a long term sediment monitoring network plan.				S		\$				M	NP
23. Through existing outreach and educational programs (e.g., Cooperative Extension Service), promote awareness of alternatives to respond to altered flow regimes, like storm water detention, retrofitting detention basins, rain gardens, permeable pavements). This could also extend to providing technical assistance (e.g., model ordinances, legal drafting, GIS, decision support) to local governments to prevent flow regime alterations from new development.					F	\$				M	
24. Increase urban areas without destructively erosive storm water rates by 23 per		C			F						

Action Step	Stressors Addressed					Action Type					
	Nutrients	Contaminants	Pathogens	Sediments	Flow Alteration	Increased Funding	Change Statute	Regulatory Changes	Coordinate Existing Programs	Modify Existing Programs	Create New Programs
cent by 2015.											
25. Increase porous surfaces by 15 per cent nationwide. Runoff from newly impervious areas adds to runoff and sedimentation. Increasing infiltration will reduce runoff and thus sedimentation.	N	C		S	F						
26. Manage dams to mirror natural flow and remove them where appropriate.					F						
27. Increasingly address multiple causes and stressors (wetland restoration, etc).	N	C	P	S	F						
28. In all actions, anticipate the impacts of altered flows from manmade and natural sources, such as climate change, extreme precipitations, etc.					F						
B. Combining and Applying Data in Planning and Action											
1. Develop Conceptual Models to view the problems on a systems level and identify significant data gaps and needs. These may be organized together or by stressor.	N	C	P	S	F	\$					
2. Develop and promote Decision Support tools to assess levels of need, appropriate responses and prioritize them by cost and impact. Examples include the Indiana EQIP tool, the Purdue Optimization Engine and the MSU Sedimentation tool.	N	C	P	S	F	\$					
3. Establish user-friendly web-based data bases for data, jointly or by stressor.	N	C	P	S	F	\$					
4. Create unified education/outreach strategies, jointly or by stressor.	N	C	P	S	F						
5. Create web-based administrative tools to ease the complexity of the processes associated with existing programs, such as TMDLs, nutrient management plans, etc.	N	C	P	S	F						
6. Within nutrient management plans for agriculture and public or private forestry, promote the use of best management practices (BMPs) and generally accepted management practices that include considerations of natural flow regime.				S	F				Co	M	
7. Incorporate provisions for altered flow regimes into models and decision					F					M	

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support systems.											
8. Integrate consideration of flow regimes, particularly the critical 12-15% impervious “tipping point”, into all non-point source watershed planning and voluntary assistance programs.					F			R		M	
9. Make flow quantity and timing a consideration in storm water permits, TMDLs, and other discharge permits.					F		CS	R			
C. Commitment of Resources for Existing Programs											
1. Accelerate the work of established programs for each stressor. These may include TMDLs water management plans, nutrient management plans, etc.	N	C	P	S	F	\$				M	
2. Expand the Riparian Buffer Initiative in sensitive watersheds. Establish many more buffer strips to limit erosion and withhold nutrients, contaminants, pathogens and sediment from streams, especially in priority areas based on nutrient loads, slope, and critical habitat. To preserve ecosystems, native shade trees are a preferred alternative.	N	C	P	S	F	\$				M	
3. Accelerate wetland restoration to maximize capture of nutrients, contaminants, pathogens and sediment, and stabilize flows. Such programs almost always impact all stressors.	N	C	P	S	F	\$			Co	M	
4. Eliminate the current backlog in the Wetland Reserve Program for the Great Lakes.	N	C	P	S	F	\$			Co	M	
5. Provide adequate technical assistance dollars within existing programs to ensure that prudent, cost-effective technologies and methods are used, that collateral benefits are understood, and that the relation to the Great Lakes is well understood.	N	C	P	S	F	\$			Co	M	
6. Increase funding for USDA’s Conservation Reserve Enhancement Program, with funding and implementation targeted to the Great Lakes Basin.	N	C	P	S	F	\$				M	
7. Increase incentives in existing programs for the use of Best Management	N	C	P	S	F	\$			Co	M	

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Practices (BMPs) and Generally Accepted Management Practices (GAMPs)											
8. Increase funding for NPDES storm water regulation, implementation and enforcement.	N	C	P	S	F	\$				M	
9. Through existing Federal, State and local programs, provide funding sufficient to restore one million acres of wetlands: one tenth of the amount lost so far in the US Great Lakes Basin. These should be prioritized and costed using decision support tools.	N	C	P	S	F	\$			Co	M	
10. Through existing programs (GLNPO, Beach Act), provide additional funds to local governments and NGO's for pollutant tracking and real-time monitoring.	N	C	P	S		\$			Co	M	
11. Through existing programs (GLNPO, Beach Act) provide additional funds to local governments and NGO's for public education and immediate implementation of BMPs in beach areas.	N	C	P	S		\$			Co	M	
12. Provide additional funding to local governments for NPS needs through EPA programs like Section 319 of the Clean Water Act, the State Revolving Loan Fund or others. (Statute limits who can receive these funds directly)	N	C	P	S		\$			Co	M	
13. Accelerate implementation of the Clean Air Act Section 112 regulations in the Great Lakes basin		C				\$				M	
14. Complete TMDLs for <i>E. coli</i> (or another adopted indicator) at all beaches with more than a 20 per cent annual closure rate. (TMDLs are in accordance with schedule developed consistent with regulations and/or consent decrees)			P			\$				M	
15. Accelerate the TMDL development process for non-point sources. (TMDLs are in accordance with schedule developed consistent with regulations and/or consent decrees)				S		\$				M	
16. Increase year-round cover in selected watersheds by 30% by 2015. (This cover may include plants, mulch, rip-rap, etc.)											
17. Reduce the causes of altered flows and sedimentation: impervious surfaces,											

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dams, channelization, agricultural runoff, stream bank and bed erosion.											
D. Creation of New Programs and Commitment of Resources											
1. Provide actual funding to support the National Association of Conservation Districts' Great Lakes Buffer/No-Till Program.	N	C	P	S	F	\$					
2. Fund research to fill specific identified gaps identified in conceptual models	N	C	P	S	F	\$			Co	M	NP
3. Regulate the storm water runoff and facility wastewater from concentrated animal feeding operations. First, develop decision support and self-evaluation tools to assist and educate operators	N		P	S		\$	CS	R		M	NP
4. Create new Federal or State programs to fund the evaluation and upgrade of on-site wastewater treatment systems. This could begin with a "lending library" of survey and data tools, such as septic leachate detectors, groundwater flow meters, etc.	N	C	P			\$	CS	R			NP
5. Identify and model the presence and distribution of emerging contaminants of concern (hormones, antibiotics, most current pesticides). This should allow prioritization by storm water, tributaries, air deposition, and land-applied sewage sludge.		C				\$					NP
6. Reduce the mercury contamination of the Great Lakes by reducing the release of mercury into the air from coal-fired power plants within 150 miles of the Great Lakes. This should rise to a 90% reduction from 1990 levels by 2015.		C				\$					NP
7. Within the long-term sediment monitoring program, provide 100 per cent Federal funding for NPS load monitoring for selected sensitive watersheds. (Why?)				S		\$					NP
8. Place a contaminant monitoring program for PBT's and emerging toxics on a significant percentage of Great Lakes tributaries within the next decade.		C				\$					NP