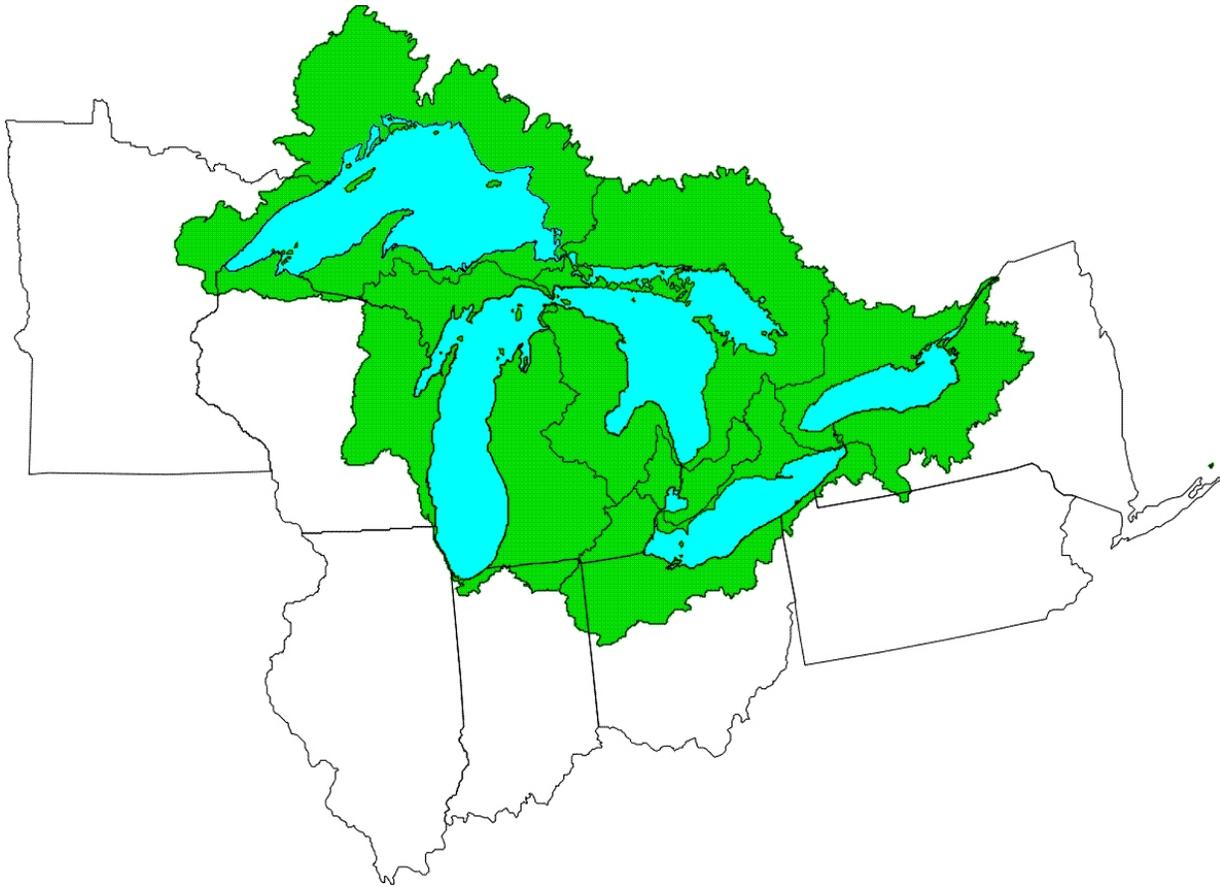


John Glenn Great Lakes Basin Program Strategic Plan

**In response to Public Law 106-53, Water Resources Development Act of 1999,
Section 455(a), John Glenn Great Lakes Basin Program,**

Main Report – Final



September 2006



**US Army Corps
of Engineers®**

Executive Summary

In 1999, Congress authorized the John Glenn Great Lakes Basin Program Strategic Plan (part a) which was one of three main study efforts under the Program. The overall objective of this report is to summarize what existing programs and authorities are available to the U.S. Army Corps of Engineers (Corps) in order to execute its Great Lakes missions, to better define and understand Great Lakes water resources issues, and to develop this *Great Lakes Strategic Plan* to address current and emerging needs in the Great Lakes basin. Existing Corps Great Lakes mission areas include support of commercial navigation, environmental restoration and protection, and flood damage reduction and shoreline erosion prevention.

Parallel to the production of the John Glenn Great Lakes Basin Program *Strategic Plan*, the eight Great Lakes Governors identified a list of critical issues (“Issue Areas”) facing the Great Lakes that would be paramount to address in order to achieve a holistic restoration and preservation of the Great Lakes. The Great Lakes Governor’s Issue Areas list was then refined by the Great Lakes Regional Collaboration (GLRC). The refined Issue Areas are: Aquatic Invasive Species, Habitat/Species (Restoration and Protection), Coastal Health Areas of Concern and Contaminated Sediments, Nonpoint source Pollution, Toxic Pollutants, Indicators and Information, and Sustainable Development.

Then, in December 2005, the GLRC – whose members are representatives from Federal agencies, the Council of Great Lakes Governors, Great Lakes Mayors, Great Lakes Tribes, and Members of the Great Lakes States Congressional Delegation - released a draft final strategy (entitled the *Great Lakes Regional Collaboration Strategy*) to restore and protect the Great Lakes ecosystem. The Strategy is focused on addressing the Great Lakes governors’ refined list of eight primary issue areas.

The *Great Lakes Regional Collaboration Strategy* also recommends measures to address the priorities in order to achieve a healthy and sustainable Great Lakes system. Since the Strategy’s release, the Governor’s priorities have been adopted by the Great Lakes mayors, the Great Lakes Commission and other Great Lakes leaders. The Corps’ Great Lakes programs and authorities that directly address the identified Issue Areas are: Aquatic Invasive Species, Habitat/Ecosystem Restoration, Coastal Health, Areas of Concern/Contaminated Sediments and Nonpoint Source Pollution.

Although the John Glenn Great Lakes Basin Program *Strategic Plan* primarily focuses on the congressionally appointed authorities and Corps programs, the study also identifies (in coordination with the GLRC) additional unaddressed needs that are critical to the restoration and protection of the Great Lakes, and blends the 11 recommended actions of both the Collaboration and the Corps to remedy these needs. Lastly, the *Strategic Plan* suggests how Corps authorities and programs may need to change to keep pace with the evolving needs and priorities of a unified Great Lakes restoration and protection plan.

Today, we understand that the health, economic prosperity and quality of life of future generations will depend on our individual and collaborative efforts to manage this complex ecosystem in a scientifically sound, well-focused manner. As resources diminish, the only way to accomplish this task is through a unified, carefully-planned collaborative approach.

ABSTRACT

AUTHOR: USACE – Detroit District

TITLE: John Glenn Great Lakes Basin Program – Strategic Plan

FORMAT: USACE Feasibility Report

DATE: September 2006 PAGES: 55 CLASSIFICATION: Unclassified

The U.S. Army Corps of Engineers (Corps) and the Council of Great Lakes Governors (CoGLG) are forming a working partnership in order to develop and execute a comprehensive, overarching restoration and protection plan for the Great Lakes. The Great Lakes Regional Collaboration (GLRC - of which the CoGLG is a partner in) and the Corps have recently completed individual strategic plans for the restoration and protection of the Great Lakes. However, the plans have somewhat different focuses. The Corps' plan identifies where the Corps could and/or should be involved in the various areas of need within the basin. The GLRC strategic plan is intent on creating eight strategies to match each of the Governor's Great Lakes Issue Areas and suggest which agencies or entities should be involved in the remedy of each.

In the process of finalizing the *John Glenn Great Lakes Basin Strategic Plan*, the Corps reviewed the GLRC's Strategy and identified areas where the two entities have common interests, and where the Corps could provide restoration and or protection assistance through authority, program, or area of expertise (such as planning assistance). In response to this, the *John Glenn Strategic Plan* has adopted five of the GLRC's Issue Areas and also expands on the GLRC's Strategy to include additional unaddressed needs such as *balancing economic and environmental needs, planning and flood protection on a watershed basis, water level and diversion management, waterfront revitalization, and basinwide project management*. The resultant eleven alternatives and recommendations in the *John Glenn Strategic Plan* form the basis of a thorough and inclusive Great Lakes restoration and protection plan that strives to balance environmental, commercial and recreational interests.

John Glenn Great Lakes Basin Program – Strategic Plan

Table of Contents

i	EXECUTIVE SUMMARY	
ii	ABSTRACT	
1.	STUDY AUTHORITY	1
2.	STUDY PURPOSE AND SCOPE.....	2
3.	LOCATION OF STUDY AND CONGRESSIONAL DISTRICTS	4
4.	PRIOR STUDIES, REPORTS AND EXISTING WATER PROJECTS	8
	A. Corps of Engineers Great Lakes Programs and Projects.....	11
	1. Great Lakes Fishery and Ecosystem Restoration	12
	2. Great Lakes St Lawrence Seaway Navigation System	12
	3. Great Lakes Remedial Action Plans and Sediment Remediation	12
	4. Great Lakes Sediment Transport Models.....	13
	5. International Water Studies-Surveillance of Northern Boundary Waters.....	13
	6. Soo Lock Replacement Project	13
	B. Corps of Engineers Great Lakes Nationwide Programs	14
	1. Environmental Restoration	14
	2. Flood Damage Reduction and Shoreline Erosion Prevention	16
	3. Navigation	17
	4. Sediment Transport Anaylsis and Management Planning	18
	5. Planning Assistance and Technical Support Programs	19
	6. Water Level Control.....	19
	C. Corps of Engineers Water Resources Program Funding	20
	D. Other Federal and State Agencies	25

5. STRATEGIC PLANNING.....	25
A . General	25
B. Synopsis of Corps Programs Related to the Council of Great Lakes Governors Issue Areas	25
C. Existing Conditions	26
1. Regional Status.....	26
2. Great Lakes Basin Challenges.....	29
3. Strategic Plans for the Great Lakes	41
D. Future Without Project Conditions	43
E. Planning Objectives	46
F. Planning Constraints (Limiting Factors to Corps of Engineers Authorities and Needed New or Modified Authorities)	47
G. Problems and Opportunities	49
H. Measures to Address Identified Problems and Opportunities	49
I. Strategic Plan	52
J. Environmental Compliance	53
K. Summary.....	54
6. CONCLUSION AND RECOMMENDATIONS.....	55

List of Tables

Table 5.1 Corps of Engineers water resources programs for the Great Lakes basin.

John Glenn Great Lakes Basin Program – Strategic Plan

List of Figures

Figure 5.1. FY 2001 Budget of the Corps Great Lakes Basin Districts.	11
Figure 5.2. Corps of Engineers FY 2000 Great Lakes Basin Spending by Program Activity	20
Figure 5.3. Corps of Engineers Great Lakes Basin Navigation Program Activities in FY 2000.	21
Figure 5.4. Corps of Engineers CAP Spending (FY 1992 – FY 2002).....	22
Figure 5.5. Number of Projects Considered for Construction Under CAPs in the Great Lakes Basin (FY 1992 – FY 2002).....	22
Figure 5.6. Number of Projects Constructed Under CAPs in the Great Lakes Basin (FY 1992 – FY 2002).	23
Figure 5.7. CAP Program Spending in the Great Lakes Basin (FY 1992 – FY 2002), by Authority.	24

John Glenn Great Lakes Basin Program – Strategic Plan

List of Boxes

Box 5.1	15
Box 5.2	17
Box 5.3	18
Box 5.4	18
Box 5.5	19
Box 5.6	19

John Glenn Great Lakes Basin Program – Strategic Plan

APPENDICIES

- Appendix A. Strategic Plans for the Great Lakes
- Appendix B. Corps of Engineers Program Authorities
- Appendix C. Great Lakes Regional Collaboration
- Appendix D. Current Trends
- Appendix E. Corps Program Matrices
- Appendix F. Identified Problems
- Appendix G. Other Federal & State Agencies
- Appendix H. Bibliography and Research Resources

List of Acronyms

ANS	aquatic nuisance species
AOC	Area of Concern
APCR	aquatic plant control research
ARCS	Assessment and Remediation of Contaminated Sediments
BIA	Bureau of Indiana Affairs
BMP	Best Management Practice
BTS	Binational Toxics Strategy
CAP	Continuing Authorities Program
CCS	Challenge Costshare
CDF	confined disposal facility
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CG	Construction General
Coop Program	Cooperative Water Program
CSC	Coastal Services Center
CSD	Commission on Sustainable Development
CSO	combined sewer overflow
CWA	Clean Water Act
CWP	Clean Water Partnership
CZARA	Coastal Zone Act Reauthorization Amendments
CZM	Coastal Zone Management Program
CZMA	Coastal Zone Management Act of 1972
D9	Ninth Coast Guard District
DDT	dichlorodiphenyltrichloroethane
DNR	Department of Natural Resources
DOER	Dredging Operations and Environmental Research
DOI	Department of the Interior
DOTS	Dredging Operations Technical Support
EPA	Environmental Protection Agency
EWP	Emergency Watershed Protection Program
FCA	Flood Control Act
FEMA	Federal Emergency Management Agency
FMA	Flood Mitigation Assistance
FUSRAP	Formerly Utilized Sites Remedial Action Program
FWS	Fish and Wildlife Service
FY	fiscal year
GAO	U.S. General Accounting Office
GDP	gross domestic product
GI	General Investigations
GIS	geographic information systems
GLC	Great Lakes Commission
GLERL	Great Lakes Environmental Research Laboratory
GLNPO	Great Lakes National Program Office
GLPF	Great Lakes Protection Fund

GLWQA	Great Lakes Water Quality Agreement
H.Doc.	House Document
H.Ex.Doc.	House Executive Document
HMGP	Hazard Mitigation Grant Program
HR	House Resolution
IJC	International Joint Commission
IL-DNR	Illinois Department of Natural Resources
ISLRBC	International St. Lawrence River Board of Control
IWS	International Water Studies
LaMPs	Lakewide Management Plans
LCR	Landscape Characterization and Restoration Program
LERRD	lands, easements, rights-of-way, relocations, and disposal
LWD	low-water datum
MI-DEQ	Michigan Department of Environmental Quality
MOU	Memorandum of Understanding
MPCA	Minnesota Pollution Control Agency
NACD	National Association of Conservation Districts
NAISA	National Aquatic Invasive Species Act
NANPCA	Nonindigenous Aquatic Nuisance Prevention and Control Act
NAWQA	National Water Quality Assessment Program
NFIP	National Flood Insurance Program
NFWF	National Fish and Wildlife Foundation
NGO	non-governmental organization
NISA	National Invasive Species Act
NMFS	National Marine Fisheries Service
NOBOB	no-ballast-on-board
NPL	National Priorities List
NPS	nonpoint source
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRCS	Natural Resources Conservation Service
NYSDEC	New York State Department of Environmental Conservation
O&M	Operation and Maintenance
OMB	U.S. Office of Management and Budget
OMOE	Ontario Ministry of Environment and Energy
PBDE	polybrominated diphenyl ester
PCB	polychlorinated biphenyl
PDF	Declaration of Partnership
PFOS	perfluorooctanyl sulfonate
PL	public law
POS	Plan of Study
PRP	potentially responsible party
RAP	Remedial Action Plan
RC&D	Resource Conservation and Development Program
R&D	research and development
RHA	River and Harbor Act

S.Doc.	Senate Document
SDWA	Safe Drinking Water Act
SFO	Support For Others
SLSDC	Saint Lawrence Seaway Development Corporation
SOLEC	State of the Lakes Ecosystem Conference
SR	Senate Resolution
SRF	State Revolving Fund
SSO	sanitary sewer overflows
TCDD	tetrachlorodibenzo-p-dioxin
TCDF	tetrachlorodibenzofuran
TFM	3-trifluoromethyl-4-nitrophenol
TMDL	total maximum daily load
TNC	The Nature Conservancy
UCS	Union of Concerned Scientists
UN	United Nations
US	United States
USC	U.S. Code
USDA	U.S. Department of Agriculture
U.S. EPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WAWTAP	Wind and Water Technical Assistance Program
WIN	Water Infrastructure Network
WOTS	Water Operations Technical Support
WRDA	Water Resources Development Act
WY	Water Year

1. Study Authority

In 1999, the United States (U.S.) Congress established a program to protect, manage and sustainably use water and related natural resources of the Great Lakes basin. The program, authorized under Section 455 of the Water Resources Development Act (WRDA) of 1999, was titled the John Glenn Great Lakes Basin Program, recognizing the contributions of former Ohio Senator John Glenn, a strong advocate for the Great Lakes during his 24 years of public service in Congress. The language that pertains to this Strategic Plan (part A of the program) is as follows:

SEC. 455. JOHN GLENN GREAT LAKES BASIN PROGRAM

(a) STRATEGIC PLAN.—

(1) STUDY.—The Secretary shall conduct a comprehensive study of the Great Lakes region to ensure the future use, management, and protection of water resources and related resources of the Great Lakes basin.

(2) REPORT.—

(A) IN GENERAL.—As expeditiously as possible, but not later than 3 years after the date of enactment of this Act, and every 2 years thereafter, the Secretary shall submit to the Committee on Transportation and Infrastructure of the House of Representatives and the Committee on Environment and Public Works of the Senate a report outlining a strategic plan for Corps of Engineers programs and proposed Corps of Engineers projects in the Great Lakes basin.

(B) CONTENTS.—The plan shall include—

(i) details of projects in the Great Lakes region relating to—

(I) navigation improvements, maintenance, and operations for commercial and recreational vessels;

(II) environmental restoration activities;

(III) water level maintenance activities;

(IV) technical and planning assistance to States and remedial action planning committees;

(V) sediment transport analysis, sediment management planning, and activities to support prevention of excess sediment loadings;

(VI) flood damage reduction and shoreline erosion prevention; and

(VII) all other relevant activities of the Corps of Engineers; and

(ii) an analysis of factors limiting use of programs and authorities of the Corps of Engineers in existence on the date of enactment of this Act in the Great Lakes basin, including the need for new or modified authorities.

Under this program, Congress directed the U.S. Army Corps of Engineers to better define and understand Great Lakes water resources issues and to develop a *Great Lakes Strategic Plan* to address current and emerging regional needs. Among the more salient issues are the following seven major challenges identified by Congress in Section 455(a) of the Act:

1. Maritime Transportation
2. Navigation Infrastructure for Recreational Vessels
3. Environmental Restoration
4. Water Level Control
5. Technical and Planning Assistance to States and Remedial Action Planning Committees
6. Sediment Transport Analysis and Management Planning for Prevention of Excess Sediment Loadings
7. Flood Damage Reduction and Shoreline Erosion Prevention

This study focused primarily on the last five of these seven challenges. Maritime transportation and navigation infrastructure for recreational vessels – equally significant considerations – are addressed in detail in complementary projects authorized under the John Glenn Great Lakes Basin Program (primarily Part c, Great Lakes Recreational Boating).

2. Study Purpose and Scope

The Great Lakes-St. Lawrence system holds six quadrillion gallons of fresh water; one-fifth of the world's fresh surface water (only the polar ice caps and Lake Baikal in Siberia contain more) and 95 percent of the U.S. supply. This vast freshwater basin is not only impressive because of its sheer size and natural beauty; it also holds the key to the economic prosperity, environmental health, and quality of life of tens of millions of basin residents.

A significant fraction of the U.S. gross domestic product (GDP) – over \$150 billion in goods – is generated annually in the Great Lakes region. The region owes this global significance largely to the Great Lakes freshwater system. The region's vast and easy-to-access water supply, along with trading possibilities of a waterborne transportation system, has fostered its development and prosperity. Today, the lakes continue to serve as commercial waterways; supply water for agricultural, municipal, and industrial use; and provide numerous opportunities for outdoor recreation and tourism.

The Great Lakes-St. Lawrence system is rich and diverse, providing fish and wildlife habitat, shaping weather and climate, and supplying drinking water to some 40 million residents in the U.S. and Canada. Its chemical and biological integrity is essential to the environmental health and quality of life not only for today's residents but also for future generations. Yet, a legacy of misuse and abuse has revealed how vulnerable the Great Lakes ecosystem is – some three decades ago the state of the Great Lakes was so dire that portions were declared “dead or dying.” Since then, policies were put into action and the Great Lakes have come a long way toward recovery. Today, we understand that the health, economic prosperity and quality of life of future generations will depend on our individual and collective efforts to manage this complex ecosystem in a scientifically sound, well-focused manner.

Parallel to the production of the John Glenn Great Lakes Basin Program *Strategic Plan*, the Great Lakes Governors identified a list of critical issues (“Issue Areas”) facing the Great

Lakes that would be paramount to address in order to achieve restoration and preservation of the Great Lakes. On October 1, 2003, the Great Lakes Governors released a list of priorities (“Issue Areas”) for the protection and restoration of the Great Lakes. The Governor’s list of Issue Areas was refined by the Great Lakes Regional Collaboration, and is shown below:

1. Aquatic Invasive Species
2. Habitat/Species (Restoration and Protection)
3. Coastal Health
4. Areas of Concern and Contaminated Sediments
5. Nonpoint source Pollution
6. Toxic Pollutants
7. Indicators and Information
8. Sustainable Development

Although the John Glenn Great Lakes Basin Program *Strategic Plan* primarily focuses on the Congressionally appointed authorities and Corps programs, this study also investigates the unaddressed needs that are critical to the restoration and protection of the Great Lakes, and recommends actions (in coordination with the Great Lakes Regional Collaboration) to remedy these needs. Lastly, the study suggests how Corps authorities and programs may need to change to keep pace with the evolving needs and priorities of a holistic Great Lakes restoration and protection plan.

3. Location of Study and Congressional Districts

The area encompassed by this study focused on the Great Lakes basin, comprised of the five Great Lakes, their connecting channels, and associated drainage area. Additionally, the St. Lawrence River, as a vital component of the Great lakes-St. Lawrence navigation system is addressed as well. Jurisdictions within this area include: the following U.S. states Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and the Canadian provinces of Québec and Ontario.

The report area lies within the jurisdiction of the following Congressional Districts:

a. For the U.S. Senate:

- Illinois: Senator Richard J. Durbin (D)
Senator Barack Obama (D)
- Indiana: Senator Richard G. Lugar (R)
Senator Evan Bayh (D)
- Michigan: Senator Carl Levin (D)
Senator Debbie Stabenow (D)
- Minnesota: Senator Norm Coleman (R)
Senator Mark Dayton (D)
- New York: Senator Hillary Rodham Clinton (D)
Senator Charles Schumer (D)
- Ohio: Senator Mike DeWine (R)
Senator George V. Voinovich (R)
- Pennsylvania: Senator Arlen Specter (R)
Senator Rick Santorum (R)
- Wisconsin: Senator Herb Kohl (D)
Senator Russell D. Feingold (D)

b. For the U.S. House of Representatives:

Great Lakes U.S. Congressional Districts within Basin

State	District No.	Lake Basin	In-Basin Area, sq. mi.	Percent of District In-Basin	Name
IL	01	Lake Michigan	1.5	1.5	Bobby L. Rush (D)
IL	02	Lake Michigan	21.0	11.2	Jesse Jackson, Jr. (D)
IL	05	Lake Michigan	2.5	4.4	Rahm Emanuel (D)
IL	07	Lake Michigan	6.7	11.6	Danny K. Davis (D)
IL	08	Lake Michigan	22.4	3.4	Melissa L. Bean (D)
IL	09	Lake Michigan	8.7	11.3	Janice D. Schakowsky (D)
IL	10	Lake Michigan	37.0	14.6	Mark Steven Kirk (R)
IN	01	Lake Michigan	351.3	15.9	Peter J. Visclosky (D)
IN	02	Lake Michigan	455.0	12.3	Chris Chocola (R)
IN	03	Lake Erie	842.1	25.6	Mark Souder (R)
IN	03	Lake Michigan	1444.7	43.9	Mark Souder (R)
IN	06	Lake Erie	415.1	7.5	Mike Pence (R)
MI	01	Lake Huron	8868.7	34.6	Bart Stupak (D)
MI	01	Lake Michigan	9030.6	35.2	Bart Stupak (D)
MI	01	Lake Superior	7683.0	30.0	Bart Stupak (D)
MI	02	Lake Michigan	5474.0	100	Peter Hoekstra (R)
MI	03	Lake Michigan	1900.2	100	Vernon J. Ehlers (R)
MI	04	Lake Huron	3126.0	40.9	Dave Camp (R)
MI	04	Lake Michigan	4519.5	59.1	Dave Camp (R)
MI	05	Lake Huron	1772.5	100	Dale E. Kildee (D)
MI	06	Lake Michigan	3402.4	99.7	Fred Upton (R)
MI	07	Lake Erie	1684.7	38.7	John Schwarz (R)
MI	07	Lake Michigan	2670.5	61.3	John Schwarz (R)
MI	08	Lake Erie	372.1	16.2	Mike Rogers (R)

MI	08	Lake Huron	499.1	21.8	Mike Rogers (R)
MI	08	Lake Michigan	1422.4	62.0	Mike Rogers (R)
MI	09	Lake Erie	323.7	100	Joe Knollenberg (R)
MI	10	Lake Erie	1668.3	46.7	Candice S. Miller (R)
MI	10	Lake Huron	1902.5	53.3	Candice S. Miller (R)
MI	11	Lake Erie	404.4	97.2	Thaddeus G. McCotter (R)
MI	11	Lake Huron	11.5	2.8	Thaddeus G. McCotter (R)
MI	12	Lake Erie	160.8	100	Sander M. Levin (D)
MI	13	Lake Erie	107.2	100	Carolyn Cheeks Kilpatrick (D)
MI	14	Lake Erie	121.7	100	John Conyers, Jr. (D)
MI	15	Lake Erie	973.6	100	John D. Dingell (D)
MN	08	Lake Superior	6203.4	20.8	James L. Oberstar (DFL)
NY	22	Lake Ontario	66.7	2.0	Maurice D. Hinchey (D)
NY	23	Lake Ontario	3910.5	28.3	John M. McHugh (R)
NY	23	St. Lawrence R.	1873.5	13.6	John M. McHugh (R)
NY	24	Lake Ontario	2115.0	33.3	Sherwood L. Boehlert (R)
NY	24	St. Lawrence R.	90.6	1.4	Sherwood L. Boehlert (R)
NY	25	Lake Ontario	1603.7	96.7	James T. Walsh (R)
NY	26	Lake Erie	192.0	7.0	Thomas M. Reynolds (R)
NY	26	Lake Ontario	2539.5	92.5	Thomas M. Reynolds (R)
NY	27	Lake Erie	1063.1	57.3	Brian Higgins (D)
NY	27	Lake Ontario	22.6	1.2	Brian Higgins (D)
NY	28	Lake Erie	9.7	1.8	Louise M. Slaughter (D)
NY	28	Lake Ontario	535.2	98.2	Louise M. Slaughter (D)
NY	29	Lake Erie	337.3	5.9	John R. Kuhl, Jr. (R)
NY	29	Lake Ontario	2473.6	43.0	John R. Kuhl, Jr. (R)
OH	05	Lake Erie	5902.1	95.8	Paul E. Gillmor (R)
OH	08	Lake Erie	36.8	1.8	John A. Boehner (R)
OH	09	Lake Erie	1128.5	100	Marcy Kaptur (D)
OH	10	Lake Erie	196.7	100	Dennis J. Kucinich (D)

OH	11	Lake Erie	135.8	100	Stephanie Tubbs Jones (D)
OH	13	Lake Erie	409.0	76.0	Sherrod Brown (D)
OH	14	Lake Erie	1537.4	84.5	Steven C. LaTourette (R)
OH	16	Lake Erie	206.8	11.9	Ralph Regula (R)
OH	17	Lake Erie	307.4	29.7	Timothy J. Ryan (D)
PA	03	Lake Erie	524.0	13.1	Phil English (R)
PA	05	Lake Ontario	96.1	0.9	John E. Peterson (R)
WI	02	Lake Michigan	177.5	4.9	Tammy Baldwin (D)
WI	04	Lake Michigan	111.4	100	Gwen Moore (D)
WI	05	Lake Michigan	578.4	44.4	Jim Sensenbrenner, Jr. (R)
WI	06	Lake Michigan	4168.6	69.3	Thomas E. Petri (R)
WI	07	Lake Michigan	489.8	2.5	David Obey (D)
WI	07	Lake Superior	2928.4	15.1	David Obey (D)
WI	08	Lake Michigan	8383.0	82.9	Mark Green (R)
WI	08	Lake Superior	106.3	1.1	Mark Green (R)

4. Prior Studies, Reports and Existing Water Projects

The Corps is authorized to conduct a number of specific Great Lakes programs as well as numerous local projects in the basin under general or site-specific authorities (see Table 5.1). The overview presented in **Sections A – D** (after Table 5.1) recognizes the water resources challenges identified in Section 455(a) of WRDA 1999: i) environmental restoration; ii) flood damage reduction and shoreline erosion prevention; iii) navigation; iv) sediment transport analysis and management planning; v) planning assistance and technical support programs; and vi) water level monitoring and management. **Section A** describes specific Great Lakes programs of the Corps. **Section B** continuing authorities, research programs, and other specific Corps authorities used nationwide by the Corps and also for the Great Lakes. The Continuing Authorities Program (CAP) is a group of nine legislative authorities that enable the Corps to plan, design, and construct projects of limited scope and complexity without additional and specific congressional authorization. Appendix C provides additional information on Corps of Engineers program authorities, requirements, and accomplishments. **Section C** provides a comprehensive summary of recent Corps activities in the Great Lakes. **Section D** describes the activities of other federal and state agencies (See Appendix G a detailed discussion).

Table 5.1. Corps of Engineers water resources programs for the Great Lakes basin.

Program Name	Purpose	Program expenditures (1992–2001)^a
Great Lakes Programs		
Great Lakes Fishery & Ecosystem Restoration	Plan, design, and construct projects to restore Great Lakes fisheries and beneficial uses.	\$66,000
Great Lakes Navigational System	A reconnaissance study of potential capital improvements to optimize the Great Lakes navigation system infrastructure, including locks, dams, harbors, ports, channels, and other related features.	\$579,000
Great Lakes RAPs & Sediment Remediation	Plan, design and construct demonstrations of promising technologies for contaminated sediment remediation.	\$3,667,100
International Water Studies/Surveillance of Northern Boundary Waters	Supports of IJC in a wide variety of technical and scientific studies and technical support roles, including support to the IJC Boards of control, working committees and study boards.	\$44,025,000 ^c
Great Lakes Sediment Transport Models	Develop computer models of sediment loading and transport to Great Lakes tributaries to support state and local conservation and pollution prevention activities.	\$1,493,270
Soo Replacement Lock	Construct a second lock adjacent to the Poe lock at the Soo Lock complex in Sault Sainte Marie, Michigan.	\$4,252,024
Continuing Authorities		
Aquatic Ecosystem Restoration	Plan, design and construct projects to restore and enhance aquatic ecosystems.	\$9,210,400
Aquatic Plan Control	Control of Eurasian watermilfoil and other obnoxious aquatic plant growths.	\$0
Beneficial Use of Dredged Material	Plan, design and construct projects to protect, restore, and enhance aquatic habitat using sediments dredged from federal navigation projects.	\$465,400
Emergency Streambank and Shoreline Protection	Plan, design, and construct projects to protect public facilities and services from streambank and shoreline erosion.	\$11,509,400
Environmental Improvements	Plan, design, and construct projects to restore and enhance aquatic ecosystems at sites impacted by Corps projects	\$15,421,200
Riverine Ecosystem Restoration & Flood Hazard Mitigation	Coordinate local flood damage reduction or riverine and wetland restoration studies with projects that conserve, restore, and manage hydrologic and hydraulic regimes and restore the natural functions and values of floodplains.	\$0

Water Management (Table 5.1 continued)		
Shore Damage Mitigation	Provide mitigation for damages that are caused by federal navigation structures built by the Corps of Engineers.	^b
Shore Protection	Plan, design, and construct projects to restore and protect shores against waves and currents.	\$1,195,000
Small Flood Control Projects	Plan, design, and construct projects to reduce flood damages.	\$13,060,000
Small Navigation Projects	Plan, design, and construct projects to improve navigation.	\$8,715,800
Snagging and Clearing	Plan, design, and construct projects for emergency removal of debris threatening to aggravate flood damages.	\$4,000
Other Construction Authorities		
Environmental Dredging	Plan, design, and construct projects to remove contaminated sediments from areas outside federal navigation channels.	\$716,100
Environmental Infrastructure	Environmental infrastructure projects provide technical solutions to the alleviation of water quality problems. Examples are water supply and storage facilities, wastewater routing and treatment, mitigation of combined sewer overflows, and acid mine drainage.	\$16,412,027
Planning and Technical Support Programs		
Flood Plain Management Services	Provide flood plain information and technical assistance.	\$5,245,200
Planning Assistance to States	Assist planning for use, development, and conservation of water resources.	\$3,891,200
Tribal Partnership Program	Assist planning for use, development, and conservation of water resources.	\$0
Lake Michigan Diversion Accounting	The objective of the program is, in cooperation with the State of Illinois, to make flow measurements, gauge records, make hydraulic and hydrologic computations, including periodic field investigations and measuring device calibrations, necessary to compute the amount of water diverted from Lake Michigan by the State of Illinois and its municipalities, political subdivisions, agencies, and instrumentalities,	\$7,277,200
Ecosystem Restoration Projects		
Chicago Sanitary & Ship Canal Dispersal Barrier	A feasibility study to investigate and identify environmentally sound methods to prevent or reduce the dispersal of non-indigenous aquatic species between the Great Lakes and Mississippi River drainage basins.	\$2,481,100
Research Programs		
Aquatic Nuisance Control Research	The program is producing information on the growth and ecological requirements of problem aquatic plants as well as new biological, chemical, and ecological technologies for their management.	^b
Dredging Operations Environmental Research	DOER supports the Navigation O&M Program. Research is designed to balance operational and environmental initiatives and to meet complex economic, engineering, and environmental challenges of dredging and disposal in support of the navigation mission.	^b

Continuing Authorities <i>(Table 5.1 continued)</i>		
Dredging Operations Technical Support	DOTS provides engineering and environmental engineering support to the O&M mission of the Corps. DOTS provides an envelope structure for dredging-related research programs such as DOER and a platform for technology transfer from such programs to the O&M mission of the Corps.	b
National Shoreline Erosion Control Development and Demonstration Program	This program provides a vehicle by which shore protection devices, designs, and methods can be constructed, monitored, and evaluated. It is geared toward innovative solutions advancing the state-of-the-art in coastal shoreline protection.	b
Regional Sediment Management Demo Program	RSM has the objective to increase collaboration and to improve decision-making regarding issues of planning, development, damage reduction, and resource management in coastal regions. RSM is further intended to provide improved information on environmental, economic, and social consequences of proposed actions and a better understanding of potential tradeoffs.	b
Water Operations Technical Support	WOTS activities include new technologies to solve water quality and related environmental problems resulting from ANS, shoreline erosion, and other impacts related to water resources projects and operations.	b

^aUnless otherwise noted, the funding figures in this column represent federal fiscal year expenditures.

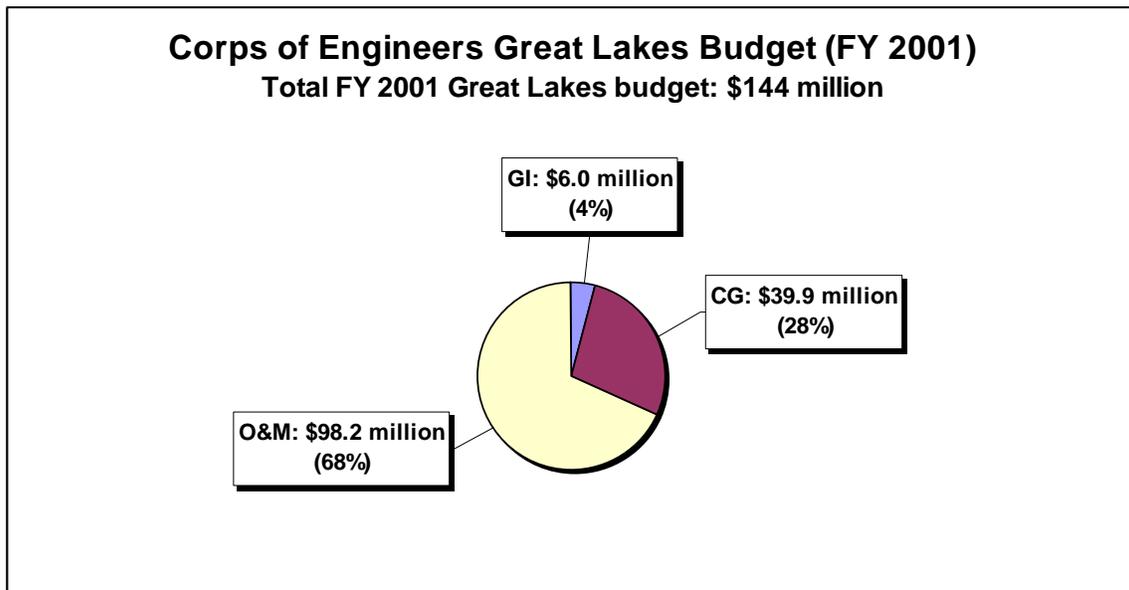
^bNot known for this program.

^cFederal fiscal year expenditures FY 1994 – FY 2002.

The funding mechanism for programs of the Corps of Engineers is quite different from that of most programs of other federal agencies. Unlike most other federal agencies, the Corps of Engineers is not a granting agency offering financial support through grants or loans for specified purposes. Instead, potential non-Federal “partnership” sponsors can request support from the Corps in the form of technical and planning assistance or the construction of specific projects. The Corps then initiates a federally-funded reconnaissance report to determine if a feasibility study, assistance and/or project construction is warranted. The Corps of Engineers conducts feasibility study, Preconstruction Engineering and Design (PED) and project construction work under a cost-sharing agreement, as long as a local sponsor can meet the program-specific cost share and LERRD (lands, easements, rights-of-way, relocations, and disposal) requirements.

The annual Energy and Water Appropriations bill determines the Corps of Engineers national budget. The Corps budget is provided under three major funding categories (see Figure 5.1): General Investigations (GI), which includes planning studies of water resources projects and planning support programs; Construction General (CG), which is for design and construction of new Civil Works projects, including those constructed under continuing authorities as well as specifically authorized projects; and, Operation and Maintenance (O&M), which is for projects that are the continuing responsibility of the Corps.

Figure 5.1. FY 2001 budget of the Corps of Engineers Great Lakes basin districts (Buffalo, Chicago and Detroit)



A. Corps of Engineers Great Lakes Programs and Projects

At the present, the Corps has four Great Lakes-specific programs, one major regional study, and one project of basinwide and national significance:

- Great Lakes Fishery and Ecosystem Restoration (Section 506, WRDA 2000)
- Great Lakes-St. Lawrence Seaway System Review (Section 456, WRDA 1999)
- Great Lakes Remedial Action Plans (Section 401, WRDA 1990)
- Great Lakes Tributary Model (sediment transport) (Section 516(e), WRDA 1996)
- International Water Studies-Surveillance of Northern Boundary Waters (U.S. obligations under the provisions of the Boundary Waters Treaty of 1909 and other international agreements)
- Soo Lock Replacement Project (specifically authorized project at Sault Ste. Marie, Michigan) (Section 1149, WRDA 1086)

1. Great Lakes Fishery and Ecosystem Restoration

The Section 506 provisions of WRDA 2000 authorized \$100 million for Corps projects to restore the fishery, ecosystem, and beneficial uses of the Great Lakes. The provision also authorized \$300,000 for the Corps to develop a plan in cooperation with the signatories of the Joint Strategic Plan for Management of the Great Lakes Fisheries (see Appendix B-1) for its activities in support of Great Lakes fisheries management. In FY 2002, the Corps received initial funding for this program at \$66,000. The balance of the planning funding was received in subsequent years and a Support Plan was prepared, approved by the ASA, and forwarded to OMB on April 13, 2006. OMB has determined that the program is not consistent with the policies and program of the President, so funding for site specific projects cannot be included in Corps' budget requests.

2. Great Lakes St. Lawrence Seaway Navigation System

This is a supplemental reconnaissance study of the current and future status of commercial navigation on the Great Lakes and St. Lawrence Seaway, including the infrastructure (locks, channels, harbors, ports and other navigation related features) upon which it relies. This study extrapolates the current status of the system out 50 years, assuming the system is maintained as it exists today, with no major improvements.

The Corps is conducting the study in partnership with Transport Canada, as well as the U.S. Fish and Wildlife Service, Environment Canada, U.S. Department of Transportation and both the U.S. and Canadian Seaway authorities. The study started as a reconnaissance level review of the recommendations made in the 1985 Great Lakes Connecting Channels and Harbors report. The Corps received funding in the amount of \$1.3M for the initial reconnaissance study between FY2001 and FY2002. The Corps has received \$670,000 in FY2003 and \$1.4M in FY2004 for the more detailed supplemental study effort, which is currently scheduled to be complete in 2007.

3. Great Lakes Remedial Action Plans and Sediment Remediation

Through this program, the Corps may support remedial action planning in the 26 Great Lakes Areas of Concern (AOCs) on the U.S. side of the Great Lakes basin. States, local governments, and non-governmental entities are eligible partners to apply for this type of support, which may be used to implement Remedial Action Plans (RAPs) and to conduct pilot and full scale sediment remediation projects. RAP support may include a variety of services, including physical and environmental monitoring, remedial planning and design, construction management, development of geographic information systems (GIS), computer modeling and analysis, cost estimating, public outreach support, and project construction. The program is cost-shared at 35 percent.

All funding to date for the RAP program has been through congressional add-ons, which have resulted from the advocacy by the Great Lakes Task Force in the U.S. Congress, the Great Lakes Commission, and other regional interests. The appropriations of recent fiscal years provided base level funding for the program: \$600,000 in FY 2001, \$2 million in FY 2002, and \$1.5 million in FY 2003. The current level of funding is not adequate to shift program targets from remediation planning to remedial actions.

4. Great Lakes Sediment Transport Models

The Corps is directed to develop sediment transport models for tributaries to the Great Lakes that discharge to federal navigation channels or AOCs. These models are being developed to assist state and local resource agencies across the basin in evaluating alternatives for soil conservation and nonpoint source pollution prevention in the tributary watersheds. The ultimate goal is to support state and local measures that will reduce the loading of sediments and pollutants to navigation channels and AOCs, and thereby reduce the costs for navigation maintenance and sediment remediation.

Congress has provided \$500,000 for the Great Lakes Tributary Models authority in each of FYs 1998, 1999, and 2001; \$1.25 million in FY 2002; and, \$2.5 million in FY 2003. This funding was used toward model development for 12 Great Lakes tributaries. The value of this program is expected to grow as model development becomes more integrated with watershed planning, total maximum daily load (TMDL) evaluations, RAPs, and LaMPs.

5. International Water Studies-Surveillance of Northern Boundary Waters

The Corps supports the International Joint Commission (IJC) in a wide variety of technical and scientific studies and technical support roles. For instance, the Corps provides the regular monthly Lake Superior outflow recommendations for the IJC International Lake Superior Board of Control. The outflow recommendations are based upon a review of the hydrologic factors influencing future conditions of Lakes Superior, Michigan-Huron, St. Clair and Erie.

To this end, the Corps collects data on hydropower operations, water levels, flow releases, and water supplies to the basin in coordination with U.S. and Canadian partners. The Corps also supports other IJC boards including the International Niagara Board of Control and the International St. Lawrence River Board of Control (ISLRBC). Beyond its support to Great Lakes water management activities of the IJC, the Corps also provides an extensive variety of water management products for the entire Great Lakes system, including water levels, meteorological data and geographic information systems. The Corps also routinely forecasts water supply and water levels in the basin and conducts hydraulic flow measurements in the Great Lakes connecting channels and the St. Lawrence River.

Between FY 1993 and FY 2002, the International Water Studies (IWS) and Northern Boundary Water Surveillance programs have received sufficient funding to keep the Corps of Engineers Great Lakes water monitoring and management activities operational. However, the inflation-adjusted funding level for the Surveillance of Northern Boundary Waters program has declined by about ten percent since 1996. Between 1994 and 2002, the mean value of annual appropriations for this program was at \$4.8 million. Appropriations for IWS have ranged between \$288,000 (FY 1999) and \$625,700 (FY 1995).

6. Soo Lock Replacement Project

In 2002, dry-bulk movement on the Great Lakes exceeded 160 million tons, half of which went through the Soo Locks on the St. Mary's River at Sault Ste. Marie, Michigan, from and to ports on Lake Superior. The Soo Locks complex consists of four locks, of which two are currently being used: the McArthur Lock (80 feet wide, 800 feet in length, and 31 feet deep) and the Poe Lock (110 feet wide, 1,200 feet in length, and 32 feet deep). The purpose of this project

is to build a new Poe-sized lock in the current location of the technologically obsolete Davis and Sabin locks at the Soo Lock complex. With a depth of only 23 feet, both locks are too shallow for most commercial vessels. U.S. Great Lakes vessels that are restricted by size to the use of a single lock (the Poe Lock) represent almost 70 percent of the fleet's carrying capacity.

Most interests agree that building the replacement lock is an important investment in the safety and reliability of waterborne transportation on the Great Lakes. The major obstacle to progress remains the substantial nonfederal cost share to be paid by the Great Lakes states. When the lock was authorized by WRDA 1986, the cost-sharing formula required a nonfederal sponsor to assume 35 percent of the project cost, or about \$70 to \$80 million. While there has not been a ruling yet on the exact portion to be carried by nonfederal project partners, WRDA 1999 included a provision that reduces the states' share of the project to 23.8 percent, or approximately \$50 - \$55 million, and allows it to be paid over 50 years, interest-free. The Great Lakes Commission has since agreed to become the nonfederal project sponsor responsible for coordinating the payment of the states' cost share.

By the end of FY 2002, total federal expenditures for preconstruction planning and design amounted to \$5.6 million dollars. For FY 2002, the Congress appropriated \$3 million toward construction. However, the project has not proceeded to the construction phase and the starting date has not been set.

B. Corps of Engineers Great Lakes Nationwide Programs

1. Environmental Restoration (Project Modifications for the Improvement of the Environment)

(see Box 5.2 and Appendix B, Sec. B-1)

WRDA 1990 established environmental protection as one of the three primary missions of the Corps Civil Works branch, along with navigation and flood damage reduction. By now, the Corps has a considerable and growing number of authorities for water resources programs with environmental goals. Section 404 of the Clean Water Act (CWA), as amended in 1977, gave the Corps of Engineers the authority to regulate discharges of dredged or fill materials into lakes, rivers and wetlands. Specifically, the Corps is authorized to require that any wetland habitat loss through fill materials shall be compensated either by restoring, enhancing, or preserving existing wetlands, or by creating new wetlands.

The Corps' "green engineering" programs span a broad range of activities from aquatic habitat restoration to employing natural materials in project construction where possible. As discussed in the previous section, two of these programs—Great Lakes Fishery and Ecosystem Restoration and Great Lakes Remedial Action Plans — are specific to the basin (see Section A above). The environmental restoration mission also includes five CAPs: Aquatic Ecosystem Restoration; Aquatic Plant Control; Beneficial Use of Dredged Material; Environmental Improvements (Restoration of Environmental Quality); and Riverine Ecosystem Restoration and Flood Hazard Mitigation.

CAPs are Corps-wide programs that can be used to implement projects within specified funding limits without the need for additional, specific authorization by Congress. Two research

and development (R&D) programs, Dredging Operations Technical Support (DOTS) and Water Operations Technical Support (WOTS), address environmental challenges of water resources development operations, such as dredging or hydropower. The Corps also has an Aquatic Nuisance Plant Control research program. The Chicago Sanitary and Ship Canal Dispersal Barrier (Section 1202, National Invasive Species Act of 1996) is a specifically authorized local project with basin-wide significance: it aims to prevent invasive species from moving between the Mississippi River and Great Lakes basins.

Box 5.1. Corps of Engineers Environmental Restoration Programs

Great Lakes Programs (see Section A)

- Great Lakes Fishery and Ecosystem Restoration (Section 506, WRDA 2000)
- Great Lakes Remedial Action Plans (Section 401, WRDA 1990)

Continuing Authorities Program

- Aquatic Ecosystem Restoration (Section 206, WRDA 1996)
- Beneficial Uses of Dredged Material (Section 204, WRDA 1992)
- Project Modifications for the Improvement of the Environment (Section 1135(b), WRDA 1986)

Other Construction Authorities

- Environmental Dredging (Section 312 WRDA 1996)

Local Projects:

- Chicago Sanitary and Ship Canal Dispersal Barrier (Section 1202 NISA 1996)

Research programs:

- Aquatic Plant Control Research
- Dredging Operations and Environmental Research
- Dredging Operations Technical Support
- Water Operations Technical Support

Environmental restoration may well be the Corps mission with the largest number of general program authorities. These programs span a broad range of activities, including aquatic habitat restoration and mitigation of environmental damages related to Corps projects. Five of nine CAPs serve environmental purposes (see Box 5.2). In addition, the Corps has general authorities for Environmental Infrastructure and Environmental Dredging projects and two Great Lakes programs: Great Lakes Fishery and Ecosystem Restoration, and Great Lakes Remedial

Action Plans and Sediment Remediation. All of these programs are relatively new (authorized under WRDA 1990 or later legislation) and their share of the Corps budget is relatively small. In FY 2000, environmental restoration activities accounted for \$2.8 million, which was approximately two percent of the total Corps budget for the Great Lakes (see Figure 5.5).

2. Flood Damage Reduction and Shoreline Erosion Prevention (see Box 5.3 and Appendix B, Sec B-2)

The Corps of Engineers has constructed dams, levees, and other water control structures to reduce flood damages in the Great Lakes basin. The majority of these projects (over 35) are operated and maintained by state and local governments, although the Corps is responsible for four federally owned flood damage reduction projects, all of which were specifically authorized by Congress. These are: Chicago River North Branch, Chicago, IL; Saginaw River Flood Damage Reduction Project, Saginaw County, MI (both authorized by River and Harbor Acts); Mt. Morris Lake, Waushara County, NY; and the flood damage reduction project (through channel dredging) at Sebewaing River, Sebewaing, MI. The Corps is in charge of O&M for the federally owned flood control projects, which involves controlling releases at dams, monitoring of water levels and flows, monitoring water quality, maintenance and repair of dams, and the operation of visitor centers.

Shore protection projects include structural and non-structural measures to protect shorelines against erosion and reduce storm damage to public lands and facilities. A number of these projects provide for beach erosion control and beach nourishment. Although there is a shore protection CAP (Section 103, RHA 1962), and a shoreline damages mitigation CAP (Section 111, RHA 1968) all current shore protection and beach nourishment projects in the region are specifically authorized. Of these, the Chicago Shoreline project is the costliest with \$132 million spent to date. Specifically authorized shore protection projects were authorized by miscellaneous acts of legislation, including WRDA as well as a number of House bills, including resolutions of the Committee on Transportation and Infrastructure and the Committee on Public Works. In addition, the Corps has a research authority focusing on shoreline erosion control.

Six of the nine CAPs are programs to address problems related to flooding and shoreline or streambank erosion: Section 14 - Emergency Streambank and Shoreline Protection; Section 204 – Ecosystem Restoration in Connection with Dredging (to replenish eroded shoreline habitat); Section 111 – Mitigation of Shore Erosion Damage due to Federal Navigation; Section 103 - Storm Damage Reduction/Beach Erosion Control; Section 205- Small Flood Control Projects, and Section 208 - Snagging and Clearing for Flood Control.

Box 5.2. Corps of Engineers programs for flood damage reduction and shoreline erosion prevention.

CAPs:

- Emergency Streambank and Shoreline Protection
(Section 14, FCA 1946, as amended)
- Beneficial Use of Dredged Material
(Section 204, WRDA 1992)
- Shore Damage Mitigation
(Section 111, RHA 1968)
- Shore Protection
(Section 103, RHA 1962)
- Small Flood Control Projects
(Section 205, FCA 1948)
- Snagging and Clearing
(Section 208, FCA 1954)

Research programs:

- National Shoreline Erosion Control Development and Demonstration Program (Section 227, WRDA 1996)

3. Navigation (see Box 5.4 and Appendix B, Sec B-3)

Navigation support is the Corps of Engineers' oldest mission and the one that receives the most funding (see Section C below). In the Great Lakes, the Corps of Engineers is responsible for the federally operated Great Lakes and Connecting Channels navigation system. The Corps-supported system includes both deep-draft/commercial (≥ 14 ft) and shallow-draft/recreational (≤ 14 ft) facilities. Altogether, the Great Lakes navigation system comprises a total of 68 commercial harbors, 71 recreational harbors, 734 miles of navigation channel, 150 miles of breakwater, 25 lock chambers, 3 visitor centers, and 44 confined disposal facilities (CDFs) for contaminated dredged material.

The Corps' navigation activities fall roughly into two categories:

1) construction of new projects and modifications to existing projects and, 2) O&M activities (such as repair and replacement work). Typical O&M activities are maintenance dredging of harbors and navigation channels, repairs to structures, lock operations, and the construction and operation of CDF's. Twenty-seven CDF's were constructed under the authority of Section 123, River and Harbor Act (RHA) of 1970. All others were constructed under the O&M authority of specific navigation projects. O&M is by far the largest of the three Civil Works activity sectors: in FY 2001, 68 percent of the total Civil Works budget for the Great Lakes basin (\$98 million of \$144 million) was used for O&M activities (see Figure 5.1).

The navigation support mission of the Corps of Engineers stems from the Commerce clause of the U.S. Constitution (Article I, Section 8). Generally, specific authorization of federal navigation projects (including O&M provisions) is provided on a project-by-project basis. The

Small Navigation Projects CAP (Section 107, RHA 1960) enables the Corps to build or modify navigation projects or make modifications without specific authorization by Congress, if the Federal cost is less than \$4,000,000. Typical navigation projects include the deepening and widening of harbors and navigation channels, construction or extension of breakwaters, or construction of piers and wharves. Further discussion of Corps support for maritime transportation is not included in this report (see Study Purpose and Scope). These activities are being addressed comprehensively in a project authorized under Section 456 of WRDA 1999.

Box 5.3. Corps of Engineers navigation program:

- Great Lakes Navigation System (reconnaissance study)
(Section 456, WRDA 1999)
- Small Navigation Projects (CAP)
(Section 107, RHA 1960)
- Soo Lock Replacement Project (specifically authorized project)
(Section 1149, WRDA 1986)

4. Sediment Transport Analysis and Management Planning (see Box 5.4 and Appendix B, Sec. B-4)

From a Corps perspective, sediment loadings to the Great Lakes are a major financial burden. For example, maintenance dredging to remove sediments from federal navigation channels in the Great Lakes costs over \$20 million annually. The costs for managing dredged material can be even more substantial when toxic chemicals contaminate the dredged material. In addition, sediment remediation to achieve environmental restoration in Great Lakes AOCs is being hindered by new sediment depositions containing residues of pesticides, nutrients, and other nonpoint source (NPS) pollutants.

Whether for navigation or environmental restoration, it has been recognized that dredging is a reactive solution to problems posed by sediment accumulation. Hence, the Corps has developed an R&D program—the Regional Sediment Management Demo Program (RSM)—focusing on sediment management planning issues to reduce costs for navigation maintenance and sediment remediation through proactive measures. The regional Great Lakes Sediment Transport Models program (see Section A above) ties into efforts for soil conservation and erosion control to reduce sediment loadings and NPS pollution originating in tributary watersheds. Output from sediment models is also planned for use in scheduling Operations and Maintenance dredging activities and for surveying for shoals.

Box 5.4. Corps of Engineers programs for sediment transport analysis and management planning.

- Great Lakes Sediment Transport Models (Great Lakes program)
(Section 516(e), WRDA 1996)
- Regional Sediment Management Demonstration Program
(research program)

5. Planning Assistance and Technical Support Programs (see Box 5.5 and Appendix B, Sec B-5)

The Corps provides specialized engineering support to other federal, state, and local agencies on a cost-reimbursable basis under the authority of the Economy Act of 1932 and the Intergovernmental Cooperation Act of 1968 (Support For Others - SFO). In addition to specialized engineering services, the Corp's Civil Works units also provide planning assistance and technical support to eligible recipients, which include the states and remedial action planning committees, local and tribal governments, as well as NGOs and nonprofit groups. The Great Lakes Remedial Action Plans and Sediment Remediation program provides RAP support in Great Lakes AOCs (Section A). In addition, the Corps has three nationwide program authorities to provide planning assistance and technical support services. Planning Assistance to States (Section 22, WRDA 1974) and the Tribal Partnership Program (Section 203, WRDA 2000) are very broad authorities for the Corps to provide a wide range of planning assistance and technical support to eligible partners for the development, utilization, and conservation of water and related land resources. Also, the Floodplain Management Services authority (Section 206, FCA 1960) specifically addresses flood mitigation through land-use planning for floodplains.

Box 5.5. Corps of Engineers Planning Assistance and Technical Support Programs

- Floodplain Management Services
(Section 206, FCA 1960, as amended)
- Planning Assistance to States
(Section 22, WRDA 1974, as amended)
- Tribal Partnership Program
(Section 203, WRDA 2000)

6. Water Level Control (see Box 5.6 and Appendix B, Sec B-6)

The Corps' water level control activities focus on hydrologic studies and technical assistance in support of the IJC (see Section A.2 above). Lake Michigan Diversion Accounting (Section 1142, WRDA 1986) is an additional water management program with regional significance. The objective of the program is to fund activities that are necessary to compute the amount of water diverted from Lake Michigan by the State of Illinois and its political subdivisions and municipalities.

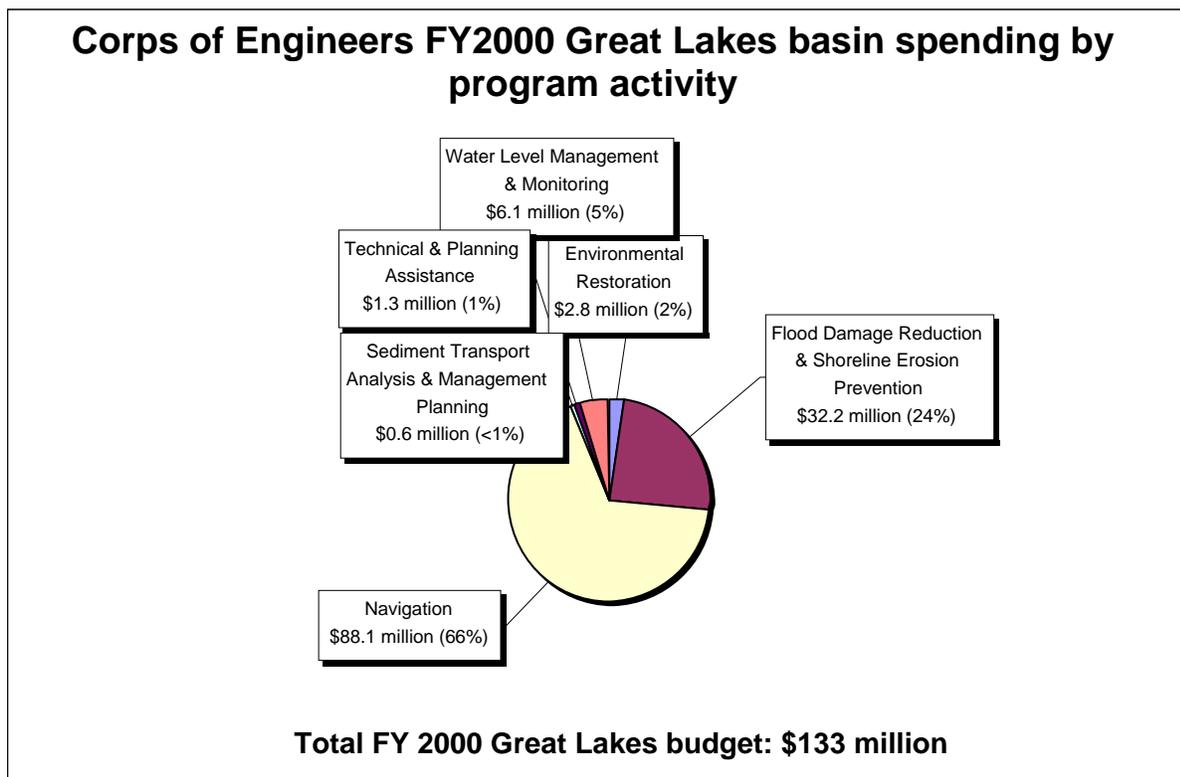
Box 5.6. Corps of Engineers Water Level Management and Monitoring Programs.

- International Water Studies
- Lake Michigan Diversion Accounting
(Section 1142, WRDA 1986)
- Surveillance of Northern Boundary Waters

C. Corps of Engineers Water Resources Program Funding

Navigation programs are the largest operation of the Corps in the Great Lakes. In FY 2000, the Corps invested two thirds (\$88 million) of its Great Lakes budget (approximately \$133 million) (see Figure 5.2). As shown in Figure 5.3, commercial and recreational navigation O&M accounts for more than 90 percent of the navigation budget. From 1992 to 2002, the Small Navigation Projects CAP (Section 107, RHA of 1960) supported three new navigation projects at a total of \$8.7 million (see Figure 5.4). All three were for recreational boating purposes, even though the administration traditionally opposes federal spending on such projects. Congressional district representatives brokered the necessary Section 107 funds through federal budget add-ons.

Figure 5.2. Corps of Engineers FY 2000 Great Lakes Basin Spending by Program Activity.



Water level management and monitoring activities of the Corps include making outflow recommendations for Lake Superior and monitoring river and lake levels, as well as other hydrologic factors, to assist federal and local efforts in water diversion accounting or flood mitigation. Between 1994 and 2002, the funding for these activities was between \$5.2 and \$6.0 million per year. However, when inflation-adjusted, the funding level for Surveillance of Northern Boundary Waters has been slightly declining since 1997, by about 10 percent. Most recently, the FY 2002 figure reflects approximately five percent of the Corps' Great Lakes budget.

Figure 5.3 Corps of Engineers Great Lakes Basin Navigation Program Activities in 2000.

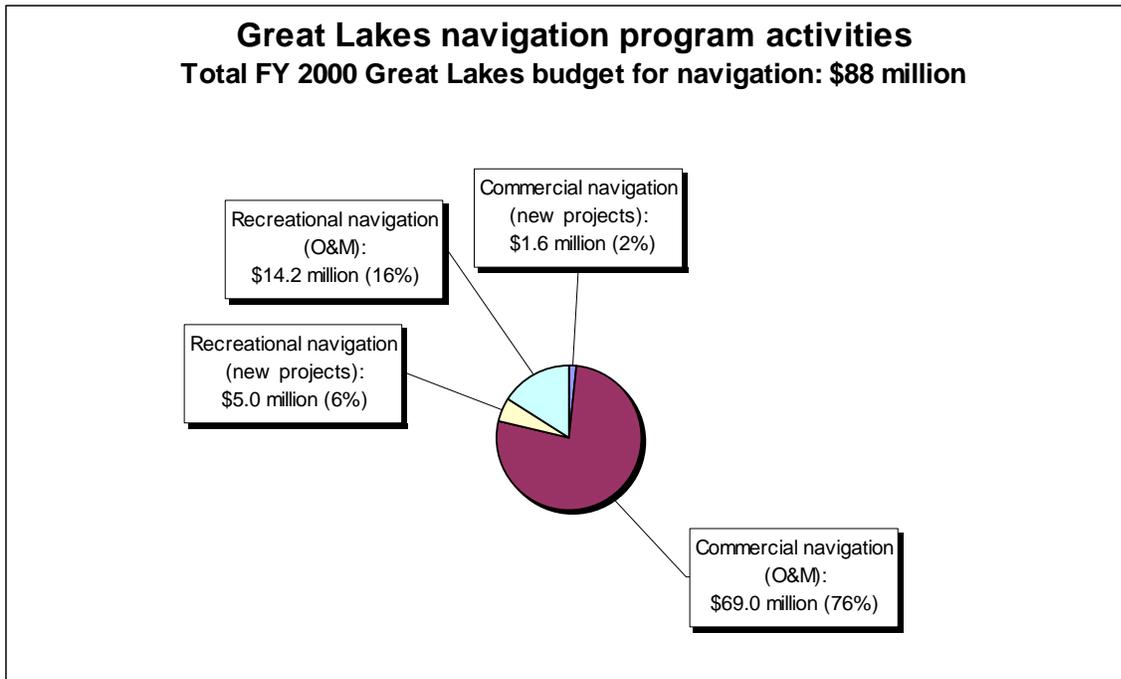


Figure 5.4. Corps of Engineers CAP Spending (FY 1992 – FY 2002)

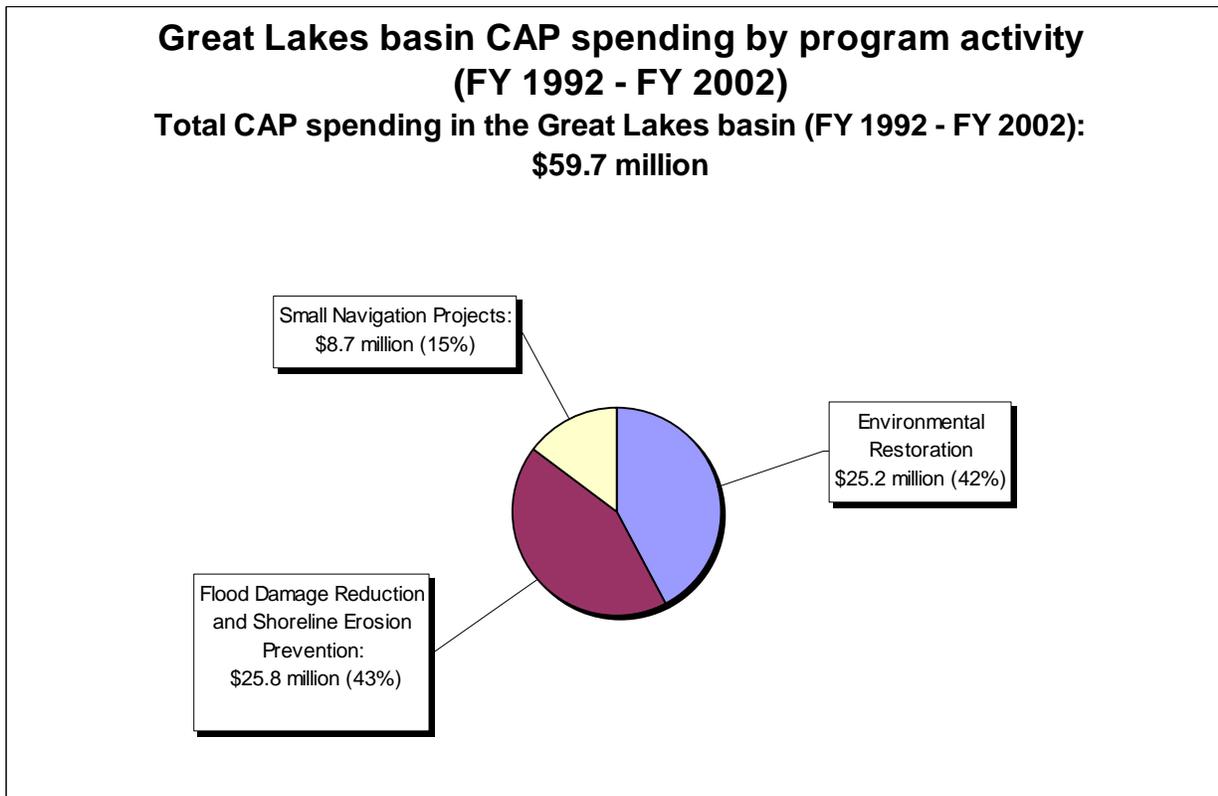
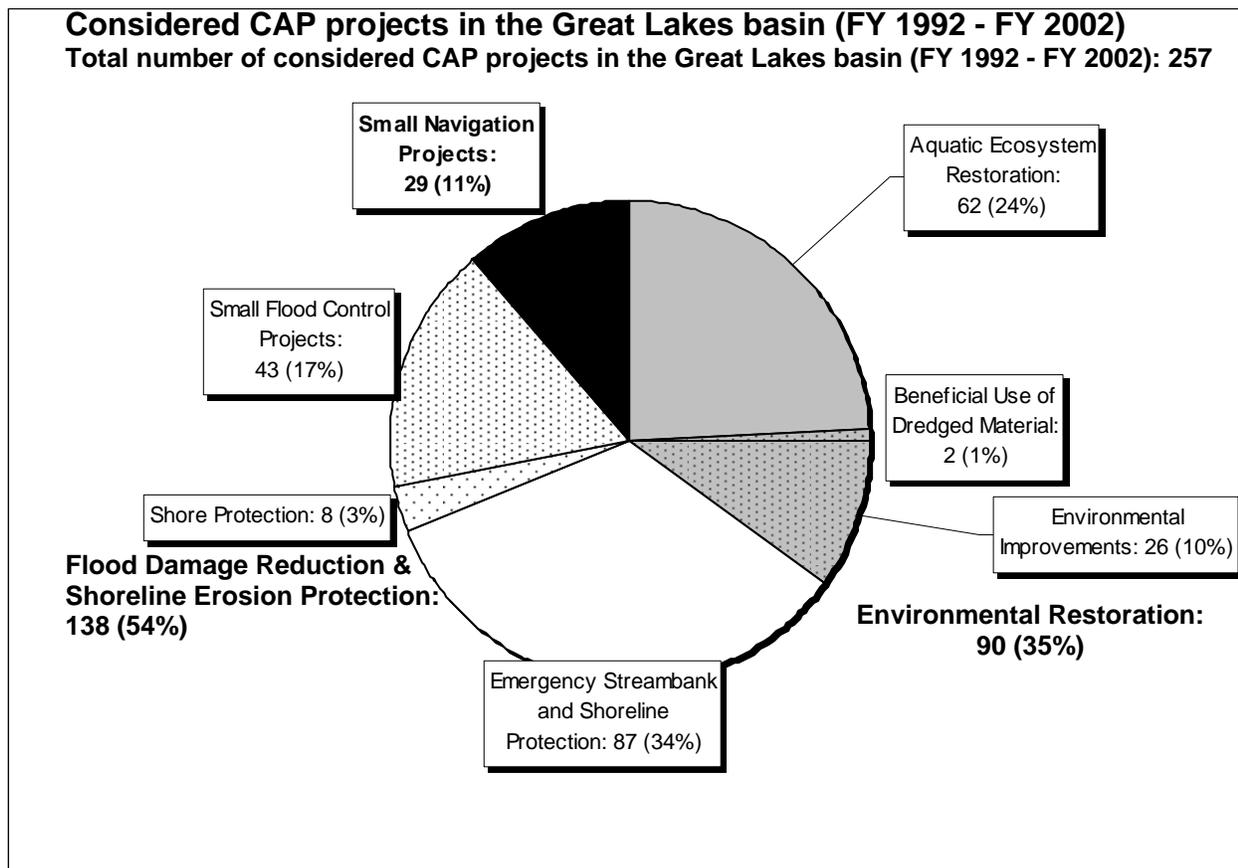


Figure 5.5. Number of Projects Considered for Construction under CAP in the Great Lakes Basin (FY 1992 – FY 2002).



Flood Damage Reduction and Shoreline Erosion Control projects accounted for 24 percent (\$32 million) of the Corps' FY 2000 budget in the Great Lakes basin (see Figure 5.2). About 10 percent of these funds (\$3.3 million) were used for O&M of federally owned projects. The remainder was invested in the study and construction of new projects. Notable is the proportionally high use of CAP funding for flood damage reduction and shoreline erosion control. Between 1992 and 2002, flood control and shoreline or streambank protection projects accounted for: (a) \$25.8 million (43 percent) of the total CAP expenditures of \$59.7 million in the Great Lakes basin (see Figure 5.7); and, (b) 27 of 34 CAP-funded projects (79 percent) (see Figure 5.6)

Figure 5.6 Number of Projects Constructed under CAP in the Great Lakes Basin (FY 1992 – FY 2002).

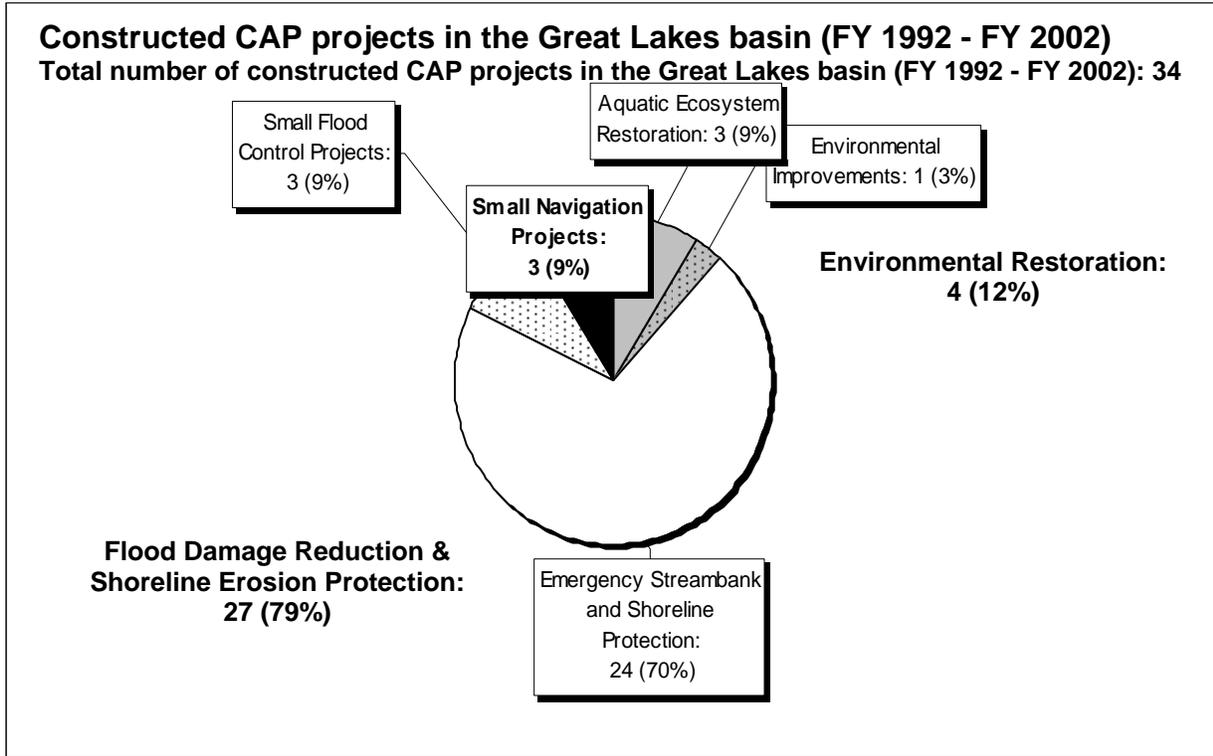
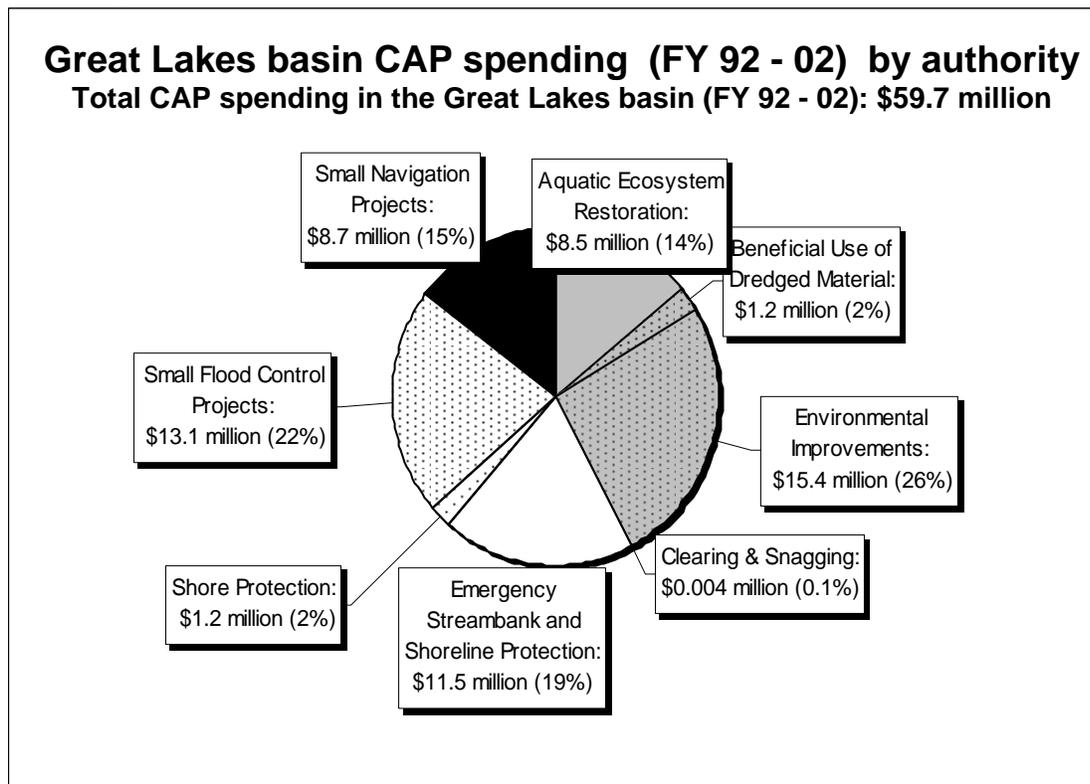


Figure 5.7 CAP Spending in the Great Lakes Basin (FY 1992 - 2002), by Authority.



From 1992 to 2002, the Corps has provided planning and technical assistance to 159 projects in the Great Lakes using the Planning Assistance to States and Flood Plain Management Services programs, at a total cost of \$9.1 million. With \$3.9 million, Planning Assistance to States supported a variety of water resources projects in the Great Lakes states, including ecosystem restoration and habitat creation. The Flood Plain Management Services program received \$5.3 million to provide planning guidance on floods and flood plain issues to state, tribal, and local governments. The Tribal Partnership Program (Section 203, WRDA 2000) received funding in 2005 of nearly \$600,000 for tribes in the Great Lakes region.

Also since 1992, the Corps has invested \$1.5 million to develop models for sediment transport analyses and management planning on 12 Great Lakes tributaries (Section 516(e), WRDA 1996). The program is adequately funded. Congress has provided \$500,000 for the Great Lakes Tributary Models in each of FY 1998, 1999 and 2001; \$1.25 million in FY 2002; and \$2.5 million for FY 2003. The value of this program is expected to grow as model development becomes more integrated with watershed planning, TMDL evaluations, RAPs, and LaMPs.

The Corps has a number of research programs with the capability to support Great Lakes restoration and management efforts. The Regional Sediment Management Demo Program was funded at \$95,000 in FY 2001 and 2002. These funds support a pilot project on the eastern shore of Lake Michigan. Project outcomes are expected to help integrating sediment management activities across the basin; for example, by guiding joint strategies for dredging (where to dispose of the dredged material) and beach nourishment (where to get the sand). Sediment management issues are inherently tied to shoreline and soil erosion control. Under the National Shoreline

Erosion Control Development and Demonstration Program, two Great Lakes sites were selected to implement and evaluate new shoreline erosion control techniques. Additional research and development programs aim to reduce and mitigate impacts of navigation and flood control projects (Water Operations Technical Support - WOTS), advance dredged material management (Dredging Operations Technical Support - DOTS), and support the control of Eurasian milfoil and other invasive aquatic nuisance plants.

In addition to its Great Lakes programs, the Corps is charged with several local projects of basin-wide importance. These include the Soo Lock Replacement Project, sea lamprey control at the Soo Locks (Section 1135, WRDA 1986), the Chicago Sanitary and Ship Canal Dispersal Barrier (Section 1202, NISA 1996), and the pilot projects of the Regional Sediment Management Demonstration and National Shoreline Erosion Control Development and Demonstration programs. In addition, the Corps constructs and manages numerous water resources projects in the basin that are locally planned and local in scope. In one way or another, these localized efforts contribute to Great Lakes restoration and management. However, with the exception of the commercial navigation system, most of these projects are not tied into a larger strategic framework for the Great Lakes basin.

D. Other Federal and State Agencies

The GAO report identified 148 federal and 51 state programs supporting Great Lakes restoration activities, including the programs of the Corps of Engineers. See Appendix G for a detailed discussion.

5. Strategic Planning

A. General

Plan formulation is the process of combining various management measures into comprehensive water and related land resources alternatives plans of action that meet the goals defined in the study authorization. The study objective is to formulate alternative plans that respond to national, regional, state and local objectives and resolve identified problems, meet commercial navigation needs and facilitate opportunities.

B. Synopsis of Corps Programs Related to the Council of Great Lakes Governors Issue Areas

In preceding sections, an overview was provided of Corps of Engineers programs with relevance to the Great Lakes, strategies and programs of other agencies and organizations. In this section, this information is synthesized to provide a synopsis of how Corps of Engineers programs and the strategic goals, objectives, and key actions of other partners relate to the water resources priorities that have been identified by Great Lakes stakeholders, especially the Great Lakes Regional Collaboration (GLRC) in coordination with the Council of Great Lakes Governors. See Appendix C for more discussion.

On October 1, 2003, the Council released nine priorities (producing eight “Issue Areas”) for the protection and restoration of the Great Lakes. They are:

- 1) ensure the sustainable use of water resources while confirming that the states retain authority over water use and diversions;
- 2) promote programs to protect human health against adverse effects of pollution;
- 3) control NPS pollution;
- 4) reduce the introduction of persistent bioaccumulative toxics into the Great Lakes ecosystem;
- 5) stop the introduction and spread of ANS;
- 6) enhance fish and wildlife by restoring and protecting coastal wetlands and other habitats;
- 7) restore the environmental health of AOCs;
- 8) standardize and enhance the methods by which information is collected, recorded and shared within the region; and
- 9) adopt sustainable use practices that protect environmental resources and may enhance the recreational and commercial value of the Great Lakes.

In December 2005, the GLRC – whose members are representatives from Federal agencies, the offices of the Great Lakes Governors, Great Lakes Mayors, Great Lakes Tribes, and Members of the Great Lakes States Congressional Delegation - released a draft final strategy to restore and protect the Great Lakes ecosystem. Entitled the *Great Lakes Regional Collaboration Strategy*, the report is a wide-ranging, cooperative effort to design and implement a strategy for the restoration, protection and sustainable use of the Great Lakes. The strategy encompasses the Great Lakes governors identified priorities (*Issue Areas*) for Great Lakes restoration and protection, and recommends steps and measures do address the priorities to achieve a healthy and sustainable Great Lakes system. These priorities form the organizing principle for this action plan. Since the Strategy's release, the Governor's priorities have been adopted by the Great Lakes mayors, the Great Lakes Commission and other Great Lakes leaders.

C. Existing Conditions

1. **Regional Status**

- **Commercial navigation** activity on the Great Lakes is inherently tied to the overall economic well-being of the United States and Canada. As economic growth slowed in the post-2000 period, commercial shipping on the Great Lakes-St. Lawrence Seaway system experienced a commensurate decrease, dipping to a combined 187 million metric tons in 2002, compared to close to 200 million tons in previous years. The recent drop in lake levels is further impacting the shipping industry by decreasing navigable channel depths and, thus, the carrying capacity of cargo vessels. Nevertheless, maritime transportation remains a vital element of the regional economy. According to an economic impact study for the year 2000, prepared by Martin Associates for the U.S. Saint Lawrence Seaway Corporation, more than 150,000 jobs in

the region are directly attributed of the U.S. Great Lakes-St. Lawrence Seaway system. Maritime transportation also continues to compare favorably to road and rail in terms of fuel economy, toxic emissions, and safety.

- At the State of the Lakes Ecosystem Conference 2002 (SOLEC 2002), only one out of 34 assessed **Great Lakes ecosystem** health indicators—drinking water—received the rating “good.” On the other hand, twenty-four (or 70 percent) of all the indicators were labeled “mixed,” “mixed-improving”, “mixed-deteriorating,” or “poor.” Among the indicators pointing to a worsening of the condition of the Great Lakes ecosystem are the declining number and diversity of wildlife; invasion and spread of alien nuisance species; as well as the continuing overall increase in the consumption of energy, land, and water in the basin. In its *Eleventh Biennial Report on Great Lakes Water Quality*, the International Joint Commission (IJC) finds that, while there are many ongoing programs and activities in Canada and the United States, progress to restore and maintain the physical, chemical and biological integrity of the Great Lakes is proceeding at a slow pace.
- In 1994, the release of the *Ecosystem Charter for the Great Lakes-St. Lawrence Basin* and convening of the initial SOLEC demonstrated an accelerated movement toward an **ecosystem approach** toward resources management for the Great Lakes basin. On a lake-by-lake basis, Lakewide Management Plans (LaMPs) have been developed for four of the Great Lakes and there are also a number of initiatives around the basin that apply the ecosystem approach to local watershed management. The need for ecosystem-based management has been widely recognized in the region, and interest in a comprehensive restoration plan, as well as a refined list of indicators to measure restoration progress in Great Lakes restoration, is growing.
- According to estimates by the National Oceanic and Atmospheric Administration (NOAA), the population of coastal counties in the Great Lakes basin will continue to grow over the next 10 -15 years, further increasing pressure on coastal resources. The Coastal Zone Management Program (CZM), authorized in the federal Coastal Zone Management Act (CZMA) of 1972, will play a key role in addressing the numerous challenges presented by this trend, such as urban sprawl and cottage development, the restoration of brownfields, nonpoint source pollution, and related water quality considerations. CZM is a voluntary federal-state partnership that provides financial and technical incentives to develop state **coastal management** programs consistent with CZMA goals to preserve and protect coastal resources while allowing compatible economic growth. With the recent federal approval of coastal programs in Ohio (1997), Minnesota (1999), and Indiana (2002), all Great Lakes states but Illinois participate in the program.
- **Global warming** and associate climate change are projected to have major impacts in the Great Lakes-St. Lawrence basin. Under most global warming scenarios, average water levels are expected to drop significantly over time.

Some models predict that lake levels could drop by as much as 8 feet from their historic mean. The frequency and severity of weather hazards—torrential rainstorms, river flooding, and droughts—are expected to increase as a result of the higher temperatures. There may be lower frequencies of flooding induced by high lake levels, but the reduction of resulting damages may be offset by increased storms. Losses to lakefront infrastructure and property from shoreline erosion could be increased or decreased, depending upon changes in water levels, storm frequencies, and landside development.

Measurements taken over the past 160 years indicate that lake levels fluctuate periodically in what appears as a recurring, climate-driven cycle. Over the last century, lake levels varied by as much as four to seven feet between periods of extreme high and extreme low levels. Currently, Great Lakes water levels are at a 30 year-low. This is attributed to the warmer-than-average weather, lower precipitation and, in particular, the reduced snowfall of recent consecutive years. The low water levels are not necessarily due to global warming. Nevertheless, they may offer a glimpse at what global warming entail for water resources-related activities in the basin. If global warming takes place, it will have implications for Corps operations in the Great Lakes basin. For example, there will be a greater demand for the maintenance dredging of federal navigation channels. Also, the operations of the Lake Superior and Lake Ontario outflow controls will likely be affected. There may be considerations to delay water flow between and out of the Great Lakes by means of engineered flow reduction measures. These could include structural engineering in the form of dams and underwater weirs (“speed bumps”). They may also include “green engineering” solutions such as wetland creation.

- Great Lakes basin jurisdictions are facing a **drinking water supply and wastewater infrastructure** crisis. Over the next two decades, communities of all sizes in the Great Lakes region will need to make significant upgrades to their drinking water and wastewater treatment systems. These needs may not be met, however, according to a recent report by the U.S. EPA in cooperation with the Water Infrastructure Network (WIN). The report highlights the increasing gap between projected water infrastructure needs and the federal government's financial commitment to safe and clean water.
- About 4 million cubic yards of sediment are annually dredged from federal navigation projects in the Great Lakes; approximately half of these are contaminated with toxic chemicals and need to be placed in confined disposal facilities (CDF's)(see Miller, 1997). Many of these CDF's will be approaching capacity within the next decade. Alternative strategies for management of contaminated sediments are often infeasible due to lack of suitable clean-up technologies or prohibitive costs. Beneficial uses of these spoils—such as for landscaping or construction--are feasible but not permitted under current Corps authorities. Advances in sediment remediation technologies and the development of regional guidelines for the safe reuse of partially contaminated sediments could open new possibilities, such as increased beneficial use of dredged material in upland applications. Soil

erosion prevention provides a proactive **sediment management** alternative to reduce the need for dredging.

- The Great Lakes offer outstanding **water-based recreation** opportunities, including ice fishing, skiing, snowmobiling, fishing, boating, and swimming. The eight Great Lakes states have approximately 3.7 million registered recreational boats, or about a third of the nation's total. Michigan and Minnesota lead the nation in the number of boat registrations, and six Great Lakes states rank in the nation's top ten. The commercial and sport fishing industry of the Great Lakes is collectively valued at more than \$4 billion annually.
- Improving **program performance** is one of the top priorities in the administration's FY 2004 budget proposal for the Corps of Engineers' Civil Works missions. In a recent program assessment examining flood reduction, emergency management, and wetlands restoration activities of the Corps, the U.S. Office of Management and Budget (OMB) found the lack of acceptable performance data as a major shortcoming. The Corps to identify suitable performance measures as a first step toward filling the gap. To guide program improvement efforts, the administration also proposes five principles to guide future Corps authorization and funding legislation, which include 1) improved cost-benefit analyses, 2) prioritization of projects with high economic and environmental return to society, 3) establishment of project priorities across and within watersheds in each of the three main missions (flood and storm damage reduction, commercial navigation, aquatic ecosystem restoration), 4) legislation to deauthorize low priority projects, and 5) a nonfederal cost share that reflects the extent to which a water resources project economically benefits commercial interests, property owners, or other identifiable parties.
- The U.S. Government Accounting Office (GAO) recently released a report on the effectiveness of government programs to protect and restore the Great Lakes. In its report, the GAO identifies 148 federal and 51 state programs that currently operate to protect or restore the environment in the Great Lakes basin in some fashion but without an **overarching, coordinated strategy**. The GAO report concludes that this lack of coordination impedes current restoration efforts and that an overall strategy – comparable to those of other large restoration projects such as the Everglades or Chesapeake Bay – is needed to better achieve restoration goals in the Great Lakes.

2. **Great Lakes Basin Challenges**

- **Navigation Infrastructure**

- Soo Replacement Lock*

- Total annual shipping on the Great Lakes exceeds 180 million tons, over half of which goes through the Soo Locks on the St. Mary's River at Sault Ste. Marie, MI, from and to ports on Lake Superior. The Soo Locks complex consists

of four locks, two of which are currently being used: the McArthur Lock (80 feet wide, 800 feet in length and 31 feet deep) and the Poe Lock (110 feet wide, 1,200 feet in length, and 32 feet deep). The Sabin and Davis locks are not presently being used due to size and depth limitations. Twenty-nine lake carriers – representing two-thirds of the U.S. Great Lakes fleet’s carrying capacity – are restricted to the larger Poe Lock because their dimensions exceed those of the McArthur Lock. If the Poe Lock should fail, shipping from and to ports on Lake Superior would cease.

The Water Resources Development Act of 1986 (WRDA 86) authorized the construction of a second large lock at Sault Ste. Marie, Michigan. However, project funding was not appropriated until Fiscal Year 1995. Since, the project had not been worked on since the authorization in 1986 a Limited Reevaluation Report was initiated to determine the current federal interest in the project. The LRR calls for the construction of a “Poe-sized “ lock at the current location of the Davis and Sabin Locks. The current cost of the lock is \$341.7 million and the benefit to cost ratio is 0.73. The LRR was transmitted for approval to the ASA (CW) in February 2005 after much work to determine the project benefits and cost. The LRR has been revised based on comments from the office of the ASA (CW) and is being transmitted back for approval.

The non-Federal sponsor for the project is the Great Lakes Commission (GLC). Non-Federal cost sharing is to be provided by the eight Great Lake States, based on a formula developed by them and the GLC. WRDA 96 allows for the non-federal share to be paid back over a 50-year period with the Canadian share being funded as part of the federal responsibility. WRDA 99 makes the non-federal share interest free. The current non-Federal share is \$81.3 million. The States of Illinois, Michigan, Pennsylvania, and Wisconsin have appropriated funds toward their share of the non-Federal funding.

With funding provided through Congressional Adds the Corps is continuing the design efforts on channel excavation, guide walls and the lock chamber. At the end of FY 2006 approximately \$ 13.1 million of federal funds will have been expended on the Limited Reevaluation Report (LRR) and design efforts. The LRR was transmitted to the Assistant Secretary of the Army (Civil Works) on September 30, 2005. The Departments of Homeland Security and Transportation both strongly support this effort.

Deepening of the Upper St. Marys River

Over half of the shipping on the Great Lakes moves through the upper St. Mary’s River. Water levels in this critical channel fluctuate dramatically and can create a major bottleneck in the Great Lakes navigation system. Deepening of the channel through this segment of the river, particularly in periods of low water, will provide an extra margin of safety. WRDA 1990 authorized \$13 million for deepening the Upper St. Mary’s River to 29 feet. This project met resistance on environmental and economic grounds. It was then recognized that a more limited version of the project – deepening the channel from 25.5 to 26.5 feet – would be

beneficial. WRDA 1999 authorized the scaled back project to be carried out at full federal cost, and the Upper St. Marys was deepened in early 2000.

- **Toxic Contaminants**

When the devastating ecological effects and health risks of polychlorinated biphenyls (PCBs), DDT (dichlorodiphenyltrichloroethane), and other toxic chemicals became apparent in the late 1960s and early 1970s, a new policy was spelled out in the Clean Water Act (CWA) of 1974 to phase out the production and use of these substances. The ban of these substances was followed by significant reductions in contaminant levels in water, fish, and wildlife of the Great Lakes during the late 1970s and early 1980s. However, progress in further reducing toxic contaminant levels has been mixed over the past 10 - 15 years and levels of certain regulated chemicals remain above health thresholds.

In the 1987 protocol to the Canada-United States Great Lakes Water Quality Agreement (GLWQA), the two nations committed to “virtually eliminate” a set of persistent toxic substances comprised of intentionally produced chemicals (PCBs, DDT, dieldrin, toxaphene, mirex), production byproducts (hexachlorobenzene, TCDD [tetrachlorodibenzo-p-dioxin], TCDF [tetrachlorodibenzofuran], benzo(a)pyrene), and heavy metals (lead, mercury). Four additional toxic substances (chlordane, cadmium, arsenic, octachlorostyrene) were subsequently added to this list. The 1997 Canada-U.S. Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes (or the Binational Toxics Strategy, BTS) identified 13 of the chemicals listed above as “level 1” substances plus an additional 14 as “level 2” substances for action. Level 1 substances are those that have been identified as pollutants of concern in previous binational agreements, whereas Level 2 substances are those being considered by either country, but which have not been sufficiently considered by both nations as to set joint challenge goals for their reduction at this time.

In addition, a number of problematic but entirely unregulated chemicals have recently been detected in waters, sediments, and organisms of the Great Lakes. These include estrogenic compounds, pharmaceuticals, and the now ubiquitous perfluorooctanyl sulfonate (PFOS) as well as polybrominated diphenyl esters (PBDEs). PFOS is a carcinogenic substance that was used by 3M in the production of Scotchgard™. Phase-out of PFOS began in 2001, when researchers detected the occurrence of the substance in water, soil, and wildlife tissue in such remote regions as Antarctica or Siberia. PFOS concentrations are currently on the rise in Lake Ontario, as are those of PBDEs. The latter were used as flame-retardants in polyurethane foams and are probably the most troubling “emerging” group of toxic contaminants. PBDEs are unregulated and their concentrations are currently increasing in herring gulls and lake trout around the Great Lakes with a doubling time of about four years.

The mixed progress in achieving the goal of virtual elimination demonstrates both the need to further reduce emissions and other non-point sources as well as the need to remove toxic contaminants that were deposited into the sediments decades ago. The Great Lakes ecosystem is still widely impaired by

this legacy. The IJC designated 43 Areas of Concern (AOCs) – 31 of which are wholly or partly in the U.S. – as places where human use of the aquatic resource is severely impaired. Only two of these places, Collingwood Harbor and Severn Sound in Ontario, have been sufficiently remediated to be delisted as AOCs.

In 40 of the remaining 41 AOCs (including all U.S. sites), the impairment is due largely or in part to contaminated sediments. RAP Committees have been established for each site, but progress beyond the planning stage has been slow compared to the actual cleanup needed. The cumulative amount of contaminated sediment removed from AOCs has tripled from approximately 1.1 million cubic yards in 1993 to more than 3 million cubic yards in 1998, but much remains to be done. A major part of the sediments that remain to be dredged will have to be deposited in CDF's.

The U.S. federal Great Lakes Legacy Act of 2002 authorizes, over a five-year period, a \$54 million-per-year clean-up program to be managed by the U.S. EPA Great Lakes National Program Office (GLNPO). Funds appropriated under the Act are to assist in the clean up of orphaned contaminated sites within AOCs. The Great Lakes Legacy Act has been welcomed by many and stimulated some optimism that some significant progress toward restoring contaminated sites can be achieved if the political momentum can be maintained. Given the magnitude of the unmet need, however, even full appropriation under this act would constitute a “down payment” in addressing the problem as apposed to providing for comprehensive clean up.

- **Invasive Species**

More than 160 non-indigenous aquatic species have been documented in the waters of Great Lakes-St. Lawrence system, of which at least a dozen appear to have entered during the past decade. A number of these species have caused dramatic ecosystem impacts and associated economic costs. A suspected primary pathway for introductions is via ballast water from ocean-going vessels.

Sea Lamprey

Among the most destructive species to invade the Great Lakes is the *sea lamprey*, which virtually destroyed the upper Great Lakes fishery before control measures were taken. Control measures to keep the sea lamprey in check cost nearly \$9 million annually and keep the lamprey population in the Great Lakes basin at about 10 percent of its peak.

The Great Lakes Fishery Commission and its partners maintain a regular schedule of chemical treatment with the lampricide TFM (3-trifluoromethyl-4-nitrophenol) applied in approximately 250 Great Lakes tributaries. Treatment intervals for each river range from 3-10 years. Research continues into reducing lampricide concentrations and developing alternative, non-chemical control measures. A second method that has proved efficient is construction of physical sea lamprey barriers in Great Lakes tributaries.

In 1991, the release of sterile males was added as a third method of sea lamprey control. The sterile-male-technique is being used exclusively in the St. Marys River. On average, 40,000 sterilized sea lampreys are released annually into the river. The Sterile Male Release Program is part of an integrated non-chemical strategy and used in combination with a Trapping Program, which is a cooperative effort of the Great Lakes Fishery Commission, Great Lakes Power Ltd. (Sault Ste. Marie, ON), and the Corps of Engineers. The Trapping Program has the dual benefit of removing spawning adults from the river and supplying males for the Sterile Release Program.

Zebra Mussel

The Zebra mussel, indigenous to Russia, was first found in Lake St. Clair in the mid-1980s, likely transported in the ballast water of an oceangoing vessel. It has since spread to waters throughout the Great Lakes and to other watersheds across the eastern and central parts of the continent. By 2002, zebra mussel populations had been found in lakes and rivers of 21 U.S. states and 2 Canadian provinces. Zebra mussels have caused massive changes to the Great Lakes ecosystem, including the elimination of native mussels, the triggering of toxic algal blooms, and the decline of the benthic amphipod *Diporeia*, which is the primary food source for many young fish and forage fish species in the Great Lakes. Zebra mussels also have serious economic impacts by clogging water intake and discharge pipes. Large water users such as power plants or municipal water treatment facilities are spending an average of \$350,000 to \$400,000 per facility just to clear zebra mussels from intake pipes. The quagga mussel, a near relative of the zebra mussel, is able to survive in deeper waters and different sediment types, effectively expanding the zebra mussel problem to additional areas of the lakes.

Once zebra mussels have invaded a water body, there is no effective method for eliminating or reducing the infestation. They continue to spread to new water bodies via ballast water of commercial vessels, as “hitchhikers” on recreational boats, and in the bait buckets of anglers. Currently, the most effective control methods to curb the spread to inland waters and freshwater systems outside the Great Lakes basin are the precautions taken by recreational boaters and anglers, such as the cleaning and draining of equipment before transporting it from one water body to another.

Other recent invaders and potential threats

Several more recent invaders causing serious concerns have also likely been introduced via ballast water. The spiny water flea and the fishhook flea, two microscopic crustaceans confirmed in 1984 and 1999, respectively, are gradually replacing their native counterparts. Since their long spines make them harder for fish to capture and digest, these invaders are destabilizing the food chain at its base. Round gobies were first found in the St. Clair River in 1990. Their population has since expanded explosively in the Great Lakes and is displacing native species. Alas, Eurasian ruffe, introduced to Lake Superior in 1986, are expanding their range rapidly. The decline of value in fisheries in the Great Lakes

due to ruffe infestation has been estimated at \$119 million annually. Other concerns are the potential to introduce fish disease-causing pathogens and the potential to import microorganisms causing human diseases such as dinoflagellates, which are the cause of “red” and “brown” algal tides and associated shellfish poisonings, or cholera and other pathogenic bacteria.

An imminent threat is the invasion of three Asian carp species (silver, black, and bighead). Silver carp have infested large areas of the Mississippi river watershed. Despite their recent introduction, they have already out-competed fish species in the Mississippi River, and now comprise a large percentage of the total fish population. An electrical barrier in the Chicago Sanitary and Ship Canal, originally constructed to keep the round goby out of the Mississippi watershed, is currently the only structure that can prevent movement of these invaders into Lake Michigan and the other Great Lakes. In its present design and operation, the barrier is not considered to be a reliable deterrent. Bighead carp have been identified in Lake Erie in recent years, though the low numbers could indicate that the species may not yet be established.

The Great Lakes-St. Lawrence basin is also in danger of compromising its ecological health and biodiversity due to the impact of invasive plants. Reed canary grass, purple loosestrife, and hybrid cattails are among the most notorious aquatic nuisance plant species.

Policy Developments

The arrival of the zebra mussel in the Great Lakes led to the passage of the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA) of 1990, which was subsequently amended under the National Invasive Species Act (NISA) of 1996. NISA focuses primarily on the prevention of unintentional introductions of invasive species via the ballast water of ships, into the Great Lakes and other freshwater systems in the United States. Among its provisions, NISA directs the Coast Guard to ensure that ships headed for the Great Lakes exchange their freshwater ballast with saltwater to flush out and eliminate freshwater organisms. NISA is presently up for reauthorization through the proposed National Aquatic Invasive Species Act (NAISA)

Despite implementation of control measures and a high level of compliance, at least four additional species have been established in recent years, all of which were presumably introduced with ballast water. Unresolved questions remain concerning the effectiveness of exchanging brackish or fresh water ballast from regions such as the Baltic and Black Seas. These regions have been identified as source regions for many recent Great Lakes invaders. Many of these organisms can either survive saline water or from resting stages—eggs, spores, and cysts—that remain in residual sediments settling at the bottom of ballast water tanks. The latter is particularly troublesome: more than 90 percent of all oceangoing vessels entering the Great Lakes do not contain declarable ballast water on board. These NOBOB (no-ballast-on-board) vessels escape scrutiny under existing U.S. and Canadian federal, state, and provincial laws. Yet the unpumpable water and sediment residuals in the ballast tanks of these ships may

contain life organisms and their resting stages, accumulated over previous ballasting operations. Various ballast water treatment technologies are being tested to reduce these problems. The four ballast water options that have been given priority consideration are 1) filtering; 2) nonoxidizing biocides; 3) heat; and 4) retrofitting or redesign of ballast water systems to allow safe and effective exchange. Currently, all of these options have limitations that compromise effectiveness (e.g., high costs, high power requirements, large size, or infeasible treatment rates).

According to the GAO, the current aquatic nuisance species (ANS) prevention and control programs lack a clear, long-term desired outcome and quantifiable measures of performance. The Union of Concerned Scientists (UCS) advocates for new and effective provisions that apply to all invasive ANS and all major pathways of introduction. At the 2003 annual conference of the International Association of Great Lakes and St. Lawrence Mayors, a resolution was adopted that calls on the governments of the U.S. and Canada to make a formal request for the IJC to comprehensively study and address the problem of invasive species in the Great Lakes. The mayors also called on the U.S. Congress to promptly enact NAISA in 2003. Activities in NAISA to be undertaken that are expected to particularly benefit the Great Lakes region include i) a nationwide mandatory ballast water management program; ii) increased funding and research for the Chicago Sanitary and Ship Canal Dispersal Barrier; iii) screening of planned importations of non-indigenous species; iv) public outreach programs; v) funding and assistance for rapid response plans, and vi) funding to conduct ecological surveys for the early detection of invasive species and analysis of invasion rates and patterns.

- **Wetlands and Wildlife Habitat**

NOAA has identified some 883 distinct coastal wetland ecosystems covering approximately 393 square miles in the U.S. portion of the Great Lakes basin. These wetlands are home to numerous wildlife species and ecological communities that are globally rare or imperiled in the coastal zone of the Great Lakes.

One of the challenges in assessing trends for Great Lakes coastal wetlands is the difficulty in evaluating actual wetland acreage given fluctuating water levels. The loss of coastal wetlands on lakes Erie and Ontario is estimated at 80 percent. In total, it is estimated that more than two-thirds of all Great Lakes wetlands have disappeared within the past two centuries.

While the impact of these losses has not been assessed at the basinwide level in detail, effects have been documented. For example, the resultant habitat destruction has led to the decline of numerous reptiles, amphibians, fish, and bird species. The loss of wetlands systems also poses special problems for hydrological processes and water quality due to the natural storage and cleansing functions of these systems.

In addition to losses, human-induced stressors that degrade the remaining habitat and interfere with beneficial wetland functions are impacting both

unprotected and protected wetlands. Human-induced stressors include drainage, dredging, filling, shoreline armoring and modification, changes in water level regime, fragmentation, and diking.

Although the rate of wetlands loss has slowed compared to previous decades, significant losses continue to occur. Recent policy developments also suggest a continued loss of inland wetlands in the basin may occur. A Supreme Court ruling in early 2003 concerning an Illinois landfill removed federal authority and protection from certain isolated wetlands that had previously been included in the category of “navigable waters.” In the Illinois case, the Army Corps of Engineers argued that an isolated pond could be considered part of the nation’s navigable waterways because migrating waterfowl used it. The claim was denied.

- **Great Lakes Water Withdrawals**

If current trends in water consumption are projected into the future, most experts agree that a global water crisis is imminent and that water of sufficient quality and quantity to meet human demands will become a scarce and fought over resource. The United Nations (UN) Commission on Sustainable Development (CSD) found that, by the mid-1990s, about half the world’s rivers were seriously depleted and polluted, and some 80 countries—including the U.S.—with 40 per cent of the earth’s population were suffering from water shortages. *Global Water Outlook to 2025: Averting an Impending Crisis*, a report published by the International Food Policy Research Institute and the International Water Management Institute, projects that daily global water use for households, industry, and agriculture will increase by at least 50 percent by 2025. By that time, according to estimates by the CSD, more than two-thirds of the world’s people could be living in water-stressed countries.

There are differing opinions on how serious a threat these trends pose for major water diversions from the Great Lakes to other regions. In its report *Protection of the Waters of the Great Lakes*, the IJC concluded that there is little reason to believe that the call for major diversions from the basin would return in the foreseeable future; barring significant climate change, engineering, economic, and social feasibility; and an abandonment of national ethics. Organizations such as the National Wildlife Federation or the Lake Michigan Federation, on the other hand, foresee that water industries and water-needy regions will increasingly seek to sell and export bulk water from the Great Lakes to satisfy consumption demands outside the basin.

Over the next twenty years, the region will most likely see a slight increase in water consumption and demand. The IJC report *Protection of the Waters of the Great Lakes* predicts an increase in irrigation within the basin. On the other hand, the IJC expects that there will be a trend to slower growth in water withdrawals in the region. The report attributes this slowdown to conservation and environmental measures, shifts in resources from the industrial to the service sector, and a decline in population growth, mainly on the U.S. side of the basin.

The IJC concludes in its trend assessment that existing water use data are out of date and do not provide a reliable basis from which to predict future demands.

Recent Calls for Major Water Withdrawals

In recent years, two proposals to divert large quantities of water from the Great Lakes basin focused attention on legal loopholes and the lack of clear, consistent rules for water withdrawals from the basin. The first was an effort to export Lake Superior water to Asia, the second is an attempt to pump and bottle water from a central Michigan aquifer.

In April 1998, the Ontario Ministry of Energy granted the NOVA Group a permit to transport bulk water by tanker ships to Asia. The province's argument for allowing the withdrawal was that it would not have an environmental impact on the lakes and would amount to less than the 19 million liters (5 million gallons) per day that require an agreement under the Great Lakes Charter. However, the permit was rescinded due to international and public pressure.

In August 2001, the Michigan Department of Environmental Quality granted the Perrier Group permission to pump and bottle 105 million gallons of water per year from central Michigan aquifers. The proposal was objected by then-Attorney General Jennifer Granholm, who argued that the federal statute from WRDA 1986 would apply requiring the consent of Great Lakes governors, since the bottling and transporting of Michigan spring water would constitute diversion and export from the Great Lakes and their tributaries for use outside the Great Lakes basin.

The plan also met with considerable resistance from parts of the local communities: a group of Mecosta County residents formed a nonprofit organization called Michigan Citizens for Water Conservation (MCWC). Based on concerns that the pumping would have adverse effects on the hydrology of adjacent streams and wetlands and dependent ecosystems, MCWC filed a lawsuit to contest the proposed groundwater withdrawal by Perrier. The case went to court in May 2003. In the court trial, MCWC made a motion for a temporary injunction pending the Court's final decision. The court trial resulted in a request to the company to provide more scientific information as evidence for their claim that the planned withdrawal would have no significant impacts on the regional hydrology and ecology. The court trial has ended in September of 2003. The injunction was postponed to a later date and the final decision of the judge is still pending.

Policy Developments

In 1985, the eight Great Lakes governors and the premiers of Ontario and Québec signed the Great Lakes Charter, a good-faith agreement to establish principles for the management of Great Lakes water resources. In the charter, the signatories agreed to prevent water diversions from the basin if they would have significant adverse impacts on lake levels, in-basin uses, and the ecosystem. In response to Annex 2001, WRDA 1986 prohibited Great Lakes water diversions unless all Great Lakes state governors approve a proposed diversion of water

outside of the basin. However, neither the Great Lakes Charter nor WRDA 1986 address consumptive uses within the basin.

The foundered attempt to export Lake Superior water to Asia prompted the Great Lakes Governors to fund a study through the Great Lakes Protection Fund that would examine potential legal problems that the Great Lakes face along with solution options. When the report was delivered to the Governors in the spring of 1999, they formed the Water Management Working Group to address the issues raised in the legal team's report. Later in the year, the provinces of Quebec and Ontario joined this working group. The working group is composed of at least one technical representative from each of the ten jurisdictions and one representative from each governor's and premier's immediate office.

Also in late 1999, the Great Lakes governors issued a set of principles for a stronger water resources management framework in the region. The statement led to the drafting of the Great Lakes Charter Annex 2001 by the working group. Signed by the Great Lakes governors and premiers on June 18, 2001, Annex 2001 is an amendment to the Great Lakes Charter that is intended to prevent future threats by asserting local control over Great Lakes water management and setting forth consensus-based and protective standards for water withdrawals. On December 13, 2005, the Great Lakes Governors and Premiers signed agreements implementing Annex 2001.

As illustrated by the proposed water bottling operation in Michigan, current water laws and withdrawal standards of the states and provinces are considered "leaky" and controversial, particularly as far as the protection of groundwater resources. These and other issues are being addressed by an advisory committee that was formed to ensure broad-based public participation in the implementation of Annex 2001. The committee is made up of over twenty members representing environmental, agricultural, municipal, and industrial concerns. The working group also works closely with a resource group and a number of observers that include representatives from federal agencies, the IJC, and other governmental and related organizations.

- **Nutrient Pollution**

(excerpted from an analysis by the Northeast-Midwest Institute, The Great Lakes at the Millennium: Priorities for Fiscal 2001)

In the 1960s, nutrient pollution (primarily phosphorus, but also nitrate) led to severe degradation of the lower Great Lakes and many embayments of the upper Great Lakes. Massive algal blooms were a frequent occurrence. Decomposition of the algae resulted in anoxia (lack of oxygen), bad odors, and taste problems in drinking water. Fish died in large numbers and parts of the lakes were nearly devoid of aquatic life.

Since then, intergovernmental partnerships have invested more than \$10 billion to address the problems of nutrient pollution and eutrophication in

the Great Lakes. Reductions in annual phosphorus loadings have been achieved in all five Great Lakes, with current loads well below the targets of the 1978 GLWQA. Problems remain in some areas, particularly within the Lake Erie basin.

The remaining problems are mainly a result of nonpoint source (NPS) pollution from urban and agricultural runoff. An important part of the strategy to curb nutrient pollution from nonpoint sources is soil conservation and erosion control in tributary watersheds. Since soils used for agricultural production also contain both fertilizer and pesticides, these strategies help to address several types of nonpoint source pollution.

- **Commitment to Great Lakes Restoration Goals**

Institutional arrangements for Great Lakes governance are elaborate and complex, originally more so than in any other freshwater system in the world. Literally hundreds of entities are charged with management of some aspect of the Great Lakes system. These include municipalities, agencies of the eight Great Lakes states and two Canadian Great Lakes provinces, dozens of tribes, U.S. and Canadian federal agencies, and several international commissions. While this extensive network is appropriately viewed as strength, the large number of players can lead to a host of management processes that run parallel or even at cross purposes to each other. In a recent GAO report, the lack of coordination among the many institutions was identified as a hindrance in achieving restoration goals.

GLWQA

Many coordination mechanisms are in place that have met with some success in advancing Great Lakes restoration efforts. Principal among them is the GLWQA, which was signed first by the two federal governments in 1972, with amendments in 1978 and 1987. The GLWQA expresses the commitment of both countries to restore and maintain the chemical, physical, and biological integrity of the Great Lakes basin ecosystem and includes objectives and guidelines to achieve these goals. For example, it establishes criteria that guide water quality-related programs between U.S. and Canadian federal, state and provincial governments.

The IJC was designated to monitor and assess progress pursuant to the goals of the GLWQA, in particular the adequacy of actions by the two federal governments, the province of Ontario, and the eight Great Lakes states. In 1981, the IJC began reporting on the progress toward GLWQA goals every two years. The most recent, the *11th Biennial Report* was released in 2002. Recently, the U.S. Policy Committee for the Great Lakes has released *Great Lakes Strategy 2002* (see Appendix A, page A-3), which is intended to coordinate and streamline U.S. governmental program efforts toward fulfillment of the GLWQA. The U.S. Policy Committee is a multi-agency body that was formed under the leadership of GLNPO. Environment Canada has developed the *Great Lakes Action Plan (2001-2006)* to accelerate the restoration of beneficial uses in Canada's 13 AOCs.

Beginnings of the GLWQA: Focus on Chemical Pollution

The initial agreement, signed on April 15, 1972, by Prime Minister Pierre Trudeau and President Richard Nixon, committed the two federal governments to control chemical pollution in the Great Lakes. The focus was on pointsource pollution control by cleaning up wastewater from industries and communities. The major issue at that time was over-enrichment of the lakes with phosphorus. In the new 1978 agreement, the countries specifically committed themselves to rid the Great Lakes of persistent toxic substances, such as PCB, DDT, or dioxins. In 1987, a protocol amending the 1978 GLWQA was signed. The 1987 protocol introduced new annexes focusing on nonpoint contaminant sources (Annex 13), contaminated sediment (Annex 14), airborne toxic substances (Annex 15), contaminated groundwater (Annex 16), and associated research and development (Annex 17).

Annex 14 to GLWQA helped federal, state, and provincial agencies focus attention on contaminated sediments. In response, Congress authorized EPA's Assessment and Remediation of Contaminated Sediments Program (ARCS) under the Water Quality Act of 1987 and the Corps' Great Lakes RAPs & Sediment Remediation Program under WRDA 1990. The most recent initiative advancing Annex 14 goals was the Great Lakes Legacy Act of 2002. The legislation authorizes a \$54 million-per-year clean-up program, over a five-year period, through the U.S. EPA Great Lakes National Program Office (GLNPO). Legacy Act funds are to help accelerate clean up of orphaned contaminated sites.

Expanding the Focus of GLWQA: Addressing Physical and Biological Integrity

The 1987 protocol first emphasized the importance of human and aquatic ecosystem health and introduced provisions to develop and implement LaMPs and RAPs. In addition, SOLEC 1994 established aquatic habitat as an environmental issue that had been largely overlooked by GLWQA. The Great Lakes Fish and Wildlife Restoration Act of 1998 reflected growing concerns about the state of the Great Lakes fisheries. The Great Lakes Panel on Aquatic Species, convened by the Great Lakes Commission in 1991, was a major force in influencing the development of, and support for NISA, which passed in 1996. Panel membership is drawn from U.S. and Canadian federal agencies, the Great Lakes states and provinces, regional agencies, user groups, local communities, tribal authorities, commercial interests, and the university/research community.

Beyond GLWQA

In the past decade, the notion of a large-scale, coordinated Great Lakes Restoration Plan took shape. The key players agree that large-scale restoration planning, and the development of associated restoration priorities, can only succeed if it emphasizes the mutual dependence of environmental, economic, and quality of life objectives for the Great Lakes basin. This thinking is guided by the sustainability concept, which implies that today's society must be able to meet its needs without compromising the ability of future generations to meet their own needs. Two landmark documents have played a key role in advancing this concept in the region. The first is the *Ecosystem Charter for the Great Lakes-St. Lawrence Basin*, released in 1993. More than 160 agencies, organizations, and businesses throughout the region have since signed the charter, which calls for a clean environment, strong economy, and high quality of life for basin residents. It presents a vision statement, principles, goals, objectives and strategic actions. The second document is the *Great Lakes Program to Ensure Environmental and Economic Prosperity*, which summarizes the U.S. federal legislative and appropriations priorities of the Great Lakes

Commission membership. First released in 2000 and updated annually, it provides a blueprint for restoration goals. On October 1, 2003, the Council of Great Lakes Governors released nine priorities for the protection and restoration of the Great Lakes.

Also, in the summer of 2003, the National Sea Grant Program has launched two new cooperative restoration-planning initiatives, one with the Great Lakes Commission and another with the Northeast-Midwest Institute. The Great Lakes Commission-Sea Grant initiative is expected to provide a scientific basis for a comprehensive Great Lakes restoration plan. The ambitious two-year initiative will research ecosystem problems and needs; assess existing restoration initiatives; conduct focus groups that build on the development of state and provincial priorities; and convene a restoration-planning forum to assemble outcomes. Presently, the Great Lakes Commission and Sea Grant are planning and conducting state-specific stakeholder workshops in the Great Lakes states, in which restoration priorities are being developed.

The second initiative, the Northeast-Midwest Institute-Sea Grant cooperation, will explore approaches that other regions have used to launch major ecosystem restoration initiatives. It will compare and contrast other initiatives in order to develop a series of lessons relevant to the Great Lakes. It will also review the legislative history of key regional, national and international efforts to develop a useful reference for legislators.

Both initiatives are in support of the work of the Council of Great Lakes Governors, which is developing a series of restoration planning priorities at the request of the Great Lakes Congressional Task Force. This work is expected to lay the foundation for a Great Lakes Restoration Plan, to be developed under the auspices of the Great Lakes governors.

Great Lakes United, an international coalition of nongovernmental organizations (NGOs) and tribal organizations across the basin, has developed the *Great Lakes Greenbook*, an action agenda intended to guide restoration efforts from a citizen point of view (see Appendix A). The agenda summarizes recommendations for restoration actions, legislative initiatives, and funding requirements pertaining to i) toxic cleanup; ii) clean production; iii) green energy; iv) sustaining and restoring water quantities and flows; v) protecting and restoring species; and vi) water and air quality standards.

The Nature Conservancy (TNC) is working on a Great Lakes Ecoregional Plan. The TNC initiative is a systematic approach that identifies all native species, natural communities, and aquatic systems of the Great Lakes basin and then determines how many of these and where these elements for biodiversity need to be protected to preserve the ecological character of the basin in the long term. In a first and second iteration, completed in 1999 and 2000, major portions of the ecoregional plan were completed with the selection of sites for target species and natural communities, including aquatic habitats. Current efforts are directed to fill in gaps, such as the absence of sites on the Canadian portion of the lakes.

3. Strategic Plans for the Great Lakes

In the present study, a total of 37 strategies, strategic plans, and guiding principles for Great Lakes management were reviewed (see Appendix A). The principles of the ecosystem approach, spelled out in the *Ecosystem Charter for the Great Lakes-St. Lawrence Basin*, reappear as a common thread throughout the majority of these documents. Almost all of the current strategies outline integrated management approaches for the Great Lakes and envision a healthy ecosystem and a sustainable economy in the basin. The particular goals vary depending on the

mission and role of each organization and, in the case of multilateral strategies, the purpose of an alliance.

In December 2005, the Great Lakes Regional Collaboration (GLRC) – whose members are representatives from Federal agencies, the offices of the Great Lakes Governors, Great Lakes Mayors, Great Lakes Tribes, and Members of the Great Lakes States Congressional Delegation - released a draft final strategy to restore and protect the Great Lakes ecosystem. Entitled the *Great Lakes Regional Collaboration Strategy*, the report is a wide-ranging, cooperative effort to design and implement a strategy for the restoration, protection and sustainable use of the Great Lakes. The strategy encompasses the Great Lakes governors identified nine priorities (issue areas) for Great Lakes restoration and protection, and recommends steps and measures do address the priorities to achieve a healthy and sustainable Great Lakes system. These priorities form the organizing principle for this action plan. Since the Strategy's release, the Governor's priorities have been adopted by the Great Lakes mayors, the Great Lakes Commission and other Great Lakes leaders.

Several joint strategies address specific aspects of Great Lakes management. A *Joint Strategic Plan for Management of Great Lakes Fisheries*, developed by the Great Lakes Fishery Commission, aims at interjurisdictional coordination of fishery management. The interjurisdictional management of fisheries is also a main objective of *Conserving America's Fisheries*, the strategy for the fishery program of the U.S. Fish and Wildlife Service. The *Binational Toxics Strategy* of the U.S. and Canadian federal governments and the *Joint Commitment to Achieve Shared Water Goals* aim at fulfilling specific objectives of GLWQA. Another offspring from GLWQA, *LaMPs* address critical pollution issues at a lakewide basis. In the case of the *LaMPs* for Lake Superior and Lake Erie, the lakewide strategies have evolved beyond addressing critical pollutants to include issues such as sustainable development and habitat restoration. The *National Strategy to Restore Coastal and Estuarine Habitat* aims at coastal wetlands and habitat restoration. So does the *Great Lakes Ecoregional Plan* of The Nature Conservancy, which aims at developing appropriate partnerships for the restoration and protection of each of its 271 designated conservation sites.

A *Great Lakes Action Plan for the Prevention and Control of Nonindigenous ANS* spells out a number of principles drawn from existing laws, policies, and programs to guide ANS prevention and control plans in each of the Great Lakes states and provinces. ANS is an identified priority in the majority of the reviewed documents, including the *Saint Lawrence Development Corporation Fiscal Year 2003/2004 Strategic Plan* and the U.S. Coast Guard's *Ninth District FY2001 Strategic Plan*.

Several agencies and organizations have also developed strategic plans for the Great Lakes or have national strategies guiding their activities in the Great Lakes region. *Sustaining America's Coastal Communities and Resources* outlines strategic goals for the NOAA-led state-federal CZM. These include the entire spectrum of water resources challenges, ranging from the development and revitalization of ports and waterfronts and the reduction of hazard threats to the restoration of coastal habitats and water quality enhancement. CZM program development aligns with NOAA's goal to protect, restore, and manage the use of Great Lakes resources with management plans using ecosystem best management practices (*New Priorities for the 21st Century*). With its Great Lakes Environmental Research Laboratory (GLERL), NOAA also aims

to provide leadership in research, monitoring, technology development, and communication and information transfer (GLERL *Strategic Plan 2000*). The U.S. Geological Survey (USGS) also generates scientific information and disseminates it to decisionmakers in the region. *Strategic Vision for the U.S. Geological Survey in the Great Lakes-St. Lawrence Region, 2001-2010* identifies mapping, water quality, water quantity, landscape and coastal assessments, geologic mapping, and biological resources research and assessments as the USGS science areas that are relevant to the Great Lakes region.

The strategic objectives of the Great Lakes Committee of the National Association of Conservation Districts (NACD) and the Natural Resource Conservation Service (NRCS) may help integrate rural development and agricultural land-use practices into Great Lakes restoration efforts. *The Strategic Direction of the NACD Great Lakes Committee* provides strategic guidance on how to address identified priority issues such as nonpoint water quality issues; erosion and sediment control; strengthening the district role in resource issues; implementing water quality plans; and providing a coordinating and information mechanism for conservation districts in the basin. The *NRCS Strategic Plan* specifies watershed-level, integrative approaches as a strategic direction to address water resources-related issues such as agricultural NPS, protection of rivers and streams from excess nutrient loadings, or wetland conservation.

New York's *25 Year Plan for the Great Lakes*, which has not been updated since 1991 and is hence somewhat outdated, is nevertheless an example of how the individual Great Lakes states could comprehensively strategize water resources management within the framework of an overarching, coordinated restoration plan for the Great Lakes basin. The *Strategic Plan for Water Resource Management* by the Northeastern Illinois Planning Committee is a similar effort to address the issues of water quality, flooding, and water supply in an integrated fashion but does not provide the larger, basinwide perspective.

D. Future Without Project Conditions

At the present, there is **no** unified management strategy to integrate economic and ecological objectives for the Great Lakes basin. Such a strategy will be necessary to build a broad, non-partisan coalition to restore the Great Lakes basin for ecological and economic sustainability. The principles of ecosystem management—spelled out in the Ecosystem Charter for the Great Lakes-St. Lawrence Basin—offer guidance for the development of such an integrated strategy.

Great Lakes restoration progress is stalling, even though hundreds of federal, state, and provincial programs spanning dozens of agencies are available to support restoration efforts. Several new initiatives aim to turn the tide by developing a Great Lakes restoration plan or strategy that would coordinate existing federal and state efforts and generate the necessary funding to put the plan into action. Due to the range of ecosystems and the large number of stakeholders within the basin, the task of coordinating a comprehensive restoration effort is daunting and requires strong commitments and active support from all parties involved in the restoration effort.

The Great Lakes Legacy Act authorizes a total of \$270 million toward the cleanup of Great Lakes AOCs. If funded, the Legacy Act would only allow for the cleanup of a

small fraction of the 31 U.S. and binational AOCs; total costs for the full restoration of beneficial uses at all U.S. AOCs are estimated at more than \$7.4 billion. Additional barriers to restoring beneficial uses are the lack of accountability and responsibility and missing restoration targets, priorities, and monitoring for recovery.

Invasive species are a growing and potentially devastating threat to the economy and environment of the Great Lakes region. Costs to date are documented in the hundreds of millions of dollars and are likely to increase over a 10-year period if measures to address the problem are not taken. Presently, strategies and methods for prevention and control are lagging behind the initial occurrence and the progressing spread of invaders.

Mandates and program authorities for coastal habitat restoration are very fragmented both across and within different agencies. Habitat restoration and management planning is part of the different LaMPs and other initiatives at the watershed or local level, but strategic, coordinated restoration planning on a basinwide scale is still in the beginning. In addition, many habitat areas have been identified as needing restoration (for example, in LaMPs) but have yet to undergo any formal restoration or management planning.

The development of ecosystem objectives is recognized as an important part of habitat restoration management and planning. The individual LaMP processes, for example, involve the expansion of broad, vision-type goals to specific, sub-basin ecosystem objectives. FWS, TNC, and other partners address the need to establish ecosystem objectives for their restoration programs but these efforts are limited by the lack of data and information about the current state of the Great Lakes ecosystem.

Virtually all who work in Great Lakes resources management and restoration would benefit from a binational GIS database that contains an inventory of all coastal wetlands and other coastal habitat types in the Great Lakes basin. The Great Lakes Coastal Wetlands Consortium, a binational group of scientific and policy experts coordinated by the Great Lakes Commission are developing such a database. When completed, the database will support a long-term program for coastal wetlands monitoring.

Habitat loss continues as a progressive, cumulative loss of small wetlands rather than the losses of large parcels. Millions of acres of coastal wetlands and other habitat resources are threatened by low-density development and other unsustainable land uses, hydraulic alterations, and shoreline hardening. The Corps of Engineers *Great Lakes Habitat Initiative* provides an opportunity to integrate Federal, State and non-federal programs that can be targeted to site-specific needs to support wetland and aquatic habitat restoration.

Communities and shore property owners are intensifying coastal investments, mostly in the form of public facilities, lakeside condominiums, and year-round homes. However, the natural erosion processes and the risks of erosion to structures are often poorly understood and inadequately considered when making coastal investments. Particularly private shoreline property owners experience a high rate of failure in their efforts to abate shoreline erosion along the Great Lakes.

One of the greatest stressors to the Great Lakes is not in the water but on the land in the form of urban sprawl, the rapid low-density development that comes at the expense of wetlands, green spaces, and a sustainable service infrastructure. Urban sprawl has become the dominant pattern of development in the Great Lakes basin, but interest is growing in revitalizing urban centers through higher-density, mixed-use community planning and redevelopment of underutilized or brownfields locations. The success of ecosystem management—including efforts of flood protection, antipollution, and habitat restoration—will hinge on the success of turning the unsustainable trend of urban sprawl around to more responsible land-use practices.

Many coastal cities in the Great Lakes have plans to or are already revitalizing their deteriorated ports and urban waterfronts for the unique opportunities of community enhancement and development that these amenities provide. Major barriers to revitalization of urban waterfronts include limited funds and the large scale and complexity of these efforts, especially in cases where there is no effective network effort to consolidate resources and responsibilities and to connect remediation and redevelopment efforts. One of the major obstacles to investment is the stigmatization of vacant or idle properties by perceived or real contamination problems. Lenders, investors, and developers still fear that involvement with these sites may make them liable for cleaning up contamination they did not create.

Cleanup of contaminated urban waterfront areas continues to be a major challenge, particularly since remediation and redevelopment do not clearly fall within the responsibility of any particular agency. Contaminated waterfront sites, especially those where the contamination extends to both the land and the water, may fall under the jurisdiction of up to several dozen governmental agencies, often with overlapping and competing responsibilities. At present, there is no single agency providing oversight of the overall remediation process, which slows the process of waterfront remediation and revitalization.

Many urban centers in the Great Lakes basin, especially former manufacturing centers, are plagued by abandoned commercial property, under-utilized infrastructure, a reduced tax base, and the social problems associated with decay. As a result, skilled workers are leaving the urban centers of the region behind for places that offer better job opportunities and a higher quality of life, either at the ever-expanding fringe of metropolitan areas or outside the basin. The revitalization of urban centers is expensive and complex, but more planners and decisionmakers are becoming aware that redeveloping within population centers, with existing infrastructure, is less expensive in the long run and a good investment in the economic and ecological sustainability as well as the quality of life in the basin.

The Great Lakes basin is home to thousands of inactive, abandoned hazardous waste sites. Cleaning them up is often the responsibility of each individual state. But the process often takes years and is hampered by a lack of funds, technical knowledge, and political will.

Unsustainable farming and development continue to wash hundreds of million of tons of topsoil sediments into the Great Lakes each year. The suspended sediments carry pollutants and fill in shipping channels and harbors. The continued sediment loadings

increase the costs for dredging and sediment remediation, but integrated strategies for sediment management and control that tackle the issue at the roots (i.e., in the upper watersheds) are just in the beginning stages.

In the 2001 Annex to the Great Lakes Charter, the Great Lakes states and provinces agreed to work toward a common decisionmaking standard by June 2004 to evaluate water withdrawals from the Great Lakes-St. Lawrence basin, including surface and ground waters. While the agreement might shield the basin from major diversions, scientists and environmental groups are concerned that it exempts certain small uses diverting less than one million gallons per day. The cumulative effects of groundwater withdrawals, spurred by urban sprawl, could have a major impact on the Great Lakes hydrologic balance.

Low lake levels come with erosion hazards to property and infrastructure and shoaling hazards to commercial and recreational vessels; extremely high lake levels can threaten properties and public infrastructure by flooding and shore damage. While lessons have been learned from the past, it appears that current policies fail to put a halt to hazard-prone lakeshore land-use and development practices.

An effective water resources management decision support system to guide sound policy decisions will depend on our ability to accurately calculate the Great Lakes hydrologic balance. Our current understanding of the Great Lakes water balance is limited by our inability to assess the impacts of cumulative minor withdrawals (e.g. groundwater withdrawals) on the water balance. Major unknowns are the surface water-groundwater connection within the basin and across watersheds and projected water demands and uses.

Limited funds remain the main barrier to the implementation of Great Lakes restoration programs and projects. Other barriers that need to be overcome include the lack of local technical expertise, poor coordination, and a lack of leadership.

E. Planning Objectives

The following planning objectives have been formulated based upon the Great Lakes water policy. The objectives listed below contribute to accommodating the Corps Great Lakes activities and programs:

1. Contribute to integrative and sustainable management of the Great Lakes economy and ecosystem;
2. Contribute to coordinated planning and strategizing for development of a consensus-based Great Lakes Restoration Program;
3. Contribute to timely RAP implementation, coordination of authorities and beneficial use targets for delisting Great Lakes Areas of Concern;

4. Contribute to prevention and control methods to reduce the introductions of Aquatic Invasive Species;
5. Contribute to ecosystem management practices, including coordination, monitoring, planning and prioritization, that protect and restore Great Lakes coastal habitat;
6. Contribute to the development of a binational GIS-based coastal wetlands inventory that becomes integrated into Corps program management;
7. Contribute to sustainable watershed management practices, including education on the human impacts on shoreline erosion processes and natural approaches to attenuate it, to mitigate water-related hazards;
8. Contribute expertise and resources to coordination of environmental management programs among federal agencies for remediating urban waterfronts and brownfields;
9. Contribute to integrated watershed planning, soil conservation, education and other best management practices; and,
10. Contribute to interagency research, monitoring, water use accounting information systems, and data coordination to achieve balanced Great Lakes water management.

F. Planning Constraints (Limiting Factors to Corps of Engineers Authorities and Needed New or Modified Authorities)

There exist several limiting factors to the Corps executing its mission, several of which are discussed below. However, the greatest limiting factor is a lack of funding; without appropriations, the authorities are immaterial. Also, to continue to effectively execute its mission on the coming decades, Corps authorities will either have to evolve (change or add to existing authorities) or new authorities need to be created to allow the Corps mission to adapt to the anticipated changing needs within the basin. Some areas where a new or changed existing authority would be beneficial to the Corps executing its mission follows the “Limiting Factors” section.

Limiting Factors

- **Unfunded Authorities** - Several Corps programs have the potential to meet water resources needs in the Great Lakes basin but sometimes are never funded or have received funding for initial studies but not for the design and construction of the projects. For example, the Aquatic Plant Control Program has been used in other parts of the country for more than forty years but never applied in the Great Lakes basin.
- **Underfunded Authorities** - More often than not, federal programs receive funding well below the levels required to achieve authorized program objectives. Not surprisingly, stakeholders identified a critical lack of funding as the major impediment to meeting water resources needs in the Great Lakes basin. This result echoes those of the GAO report: *Great Lakes - an Overall Strategy and Indicators for Measuring Progress are*

Needed to Better Achieve Restoration Goals, which cites a lack of funding as the chief barrier to restoration progress in the Great Lakes. Five underfunded authorities were identified: Aquatic Ecosystem Restoration, Environmental Improvements, Great Lakes RAPs and Sediment Remediation, Emergency Streambank and Shoreline Protection, and Flood Plain Management Services.

- **Program Limitations** - Program Managers in the Corps Great Lakes district offices (Buffalo, Chicago, and Detroit) identified potential program limitations and barriers. These factors emerged from a systematic comparison of those that are recognized by Corps Program Managers with the most critical shortcomings in current Great Lakes management and restoration efforts, as identified in the by the broader stakeholder community. These factors include:
 1. Implementation limitations;
 2. Lack of matching funds by non-Corps partners;
 3. Lack of nonfederal sponsors;
 4. Limits to in-kind contributions; and,
 5. Statutory limitations.

Needed New or Modified Authorities

Needed Authority - Remediate and Redevelop Waterfront Brownfields

With a new authority, the Corps could build on existing program authorities, resources, and expertise for urban waterfront and brownfield remediation but provides for a more comprehensive waterfront approach that addresses revitalization needs of waterfront communities in the water and on the land. Such a new authority would allow the Corps to coordinate and maximize the application of this and existing program authorities and resources to restore degraded urban waterfronts.

Needed Authority - Superfund Site Cleanup

The Corps has existing technical capacities and expertise very capably support other governmental agencies in the cleanup of Superfund sites in the Great Lakes basin. The Corps needs an authority to allow for the planning and execution of this work.

G. Problems and Opportunities

Below is a brief discussion of the problems and opportunities regarding Corp programs. See Appendix F for a detailed discussion. Four problems emerged from an analysis of *Funding Inadequacies* for Corps programs in the Great Lakes basin. The analysis reviewed four elements:

- i) De-authorized projects;
- ii) Unfunded authorities;
- iii) Under funded authorities,
- iv) Program limitation.

Opportunities

This element of the analysis provides an assessment of opportunities for the Corps to improve Great Lakes water resources in the foreseeable future. The assessment is based on the trend scenario analyses presented in Appendix D as well as the findings from preceding sections.

The Corps of Engineers has an opportunity to contribute to the Great Lakes basin strategy though the following:

Balance economic and Great Lakes ecosystem restoration needs;

Create a basin wide strategy to coordinate programs with other federal, state and tribal agencies;

Improve Corps performance regarding RAP implementation;

To improve the prevention of evasive species;

To prevent further loss of coastal wetland and ecosystem functions;

To restore wetland and coastal habitat; and

Improve outreach with regards to educating state and locals officials on Great Lakes hydrology, shoreline erosion, and coastal wetlands

H. Measures to Address Identified Planning Problems and Opportunities

The Corps of Engineers and a broad coalition of partnering organizations representing all levels of government, industry, and society could embrace and advance an ecosystem management strategy for the Great Lakes basin. All the following measures provide an opportunity to partner in the advancement of restoring and protecting the Great Lakes basin. Appendix C contains more detailed discussions of the measures.

1) Aquatic Invasive Species (AIS)

Investigate, support and identify environmentally sound methods to prevent or reduce invasive species in the Great Lakes basin. Examples of effective programs include the Sea Lamprey Barriers under the Continuing Authorities Program Section 1135 (Project Modifications for Improvement of the Environment) and the Carp Barrier, which may see support for permanent operation in the pending Water Resources Development Act of 2006. Also, the Aquatic Plant Control (Section 104, RHA 1958) and Aquatic Plant Control Research authorities could be used to investigate and address Great Lakes invasive species issues such as the Eurasian watermilfoil.

2) Great Lakes Habitat/Ecosystem Restoration

Based on an ecosystem approach, develop a basinwide program management strategy for the application of environmental authorities—specifically, Aquatic Ecosystem Restoration (Section 206, WRDA 1996), Beneficial Use of Dredged Material (Section 204, WRDA 1992), and Environmental Improvements (Section 1135, WRDA 1986)—to coastal habitat restoration. Develop priorities and evaluation criteria for this coastal habitat restoration strategy in consultation with other agencies and organizations leading regional planning efforts, specifically membership should include NOAA, The Nature Conservancy, and LaMP committees. The Corps’ Great Lakes Habitat Initiative allows the unique capability for Federal, non-Federal, State and local partnerships for wetland and aquatic habitat restoration. Any such effort should coordinate program and project development with these and other partners and implement projects pursuant to regional restoration priorities.

In coordination with other agencies and organizations, the Corps could inventory wetlands and other coastal habitat by applying existing technical resources and expertise. Increase investment in a coordinated database of coastal wetlands in the Great Lakes basin and actively support this effort; for example, by contributing data from existing studies and frequently updating completed field investigations. Use the completed inventory in conjunction with Section 404 permitting and for environmental impact assessment studies; for example, to conduct predictive modeling of navigation improvements on coastal wetlands and other habitats in connection with the Great Lakes Navigation Study (Section 456, WRDA 1999).

Develop policies to prevent loopholes in Section 404 permitting that allow the gradual destruction of wetlands through cumulative “minimal effects.” Enhance field investigations for Section 404 permitting and inspect and report all violations. Develop strategic goals for how to advance coastal wetlands restoration priorities by making use of the following ecosystem restoration and planning authorities: Aquatic Ecosystem Restoration (Section 206, WRDA 1996), Beneficial Use of Dredged Material (Section 204, WRDA 1992), Environmental Improvements (Section 1135, WRDA 1986), and Great Lakes Fishery and Ecosystem Restoration (Section 506, WRDA 2000), Great Lakes RAPs and Sediment Remediation (Section 401, WRDA 1990), and Planning Assistance to States (Section 22, WRDA 1974).

3) Coastal Health and Environmental Infrastructure

Improve separation of combined sewers and upgrade water treatment facilities to eliminate accidental sewage discharge and threaten coastal health. Increase funding and the geographic area under the environmental assistance programs, specifically Section 219, Section 569 (northeast Minnesota), Section 154 (northern Wisconsin) and Section 594 (Ohio).

4) Soil Erosion, Contaminated Sediments and Areas of concern (AOC’s)

Educate stakeholders on the importance of integrated watershed management. As part of a strengthened outreach effort, educate local planners on sediment problems, and of the economic and ecological benefits of topsoil erosion prevention. Put more programmatic focus on sediment loading reduction versus dredging, for example, by extending the Regional Sediment Management Demo Program to integrate topsoil erosion prevention with other aspects of sediment management. Invest resources in gathering and coordinating baseline data for the application of Great Lakes Sediment Transport Models (Section 516(e), WRDA 1996). Develop

and maintain strong program partnerships with U.S. EPA, NRCS, and relevant state agencies to address sediment control.

Develop strategic objectives, and supporting action items, for the application of Great Lakes RAPs and Sediment Remediation (Section 401, WRDA 1990) and Environmental Dredging (Section 312, WRDA 1990) to restore beneficial uses in AOCs. Coordinate the use of these programs with other federal, state, and provincial agencies; RAP committees; and other local partners. Ensure the timely implementation of projects in accordance with basinwide priorities and restoration targets.

5) Non-Point Source and Brownfield Remediation

Coordinate efforts among federal, state and local agencies to identify and map known areas of non-point pollution sources with adequate funding.

With a new authority, establish a strategic approach that builds on existing program authorities, resources, and expertise for urban waterfront and brownfield remediation but provides for a more comprehensive waterfront approach that addresses revitalization needs of waterfront communities in the water and on the land. Coordinate and maximize the application of existing program authorities and resources to restore brownfields.

6) Balancing Economic and Environmental Needs

Develop a Great Lakes basin strategy that is rooted in the principles of ecosystem management and keyed into a coalition-based, coordinated Great Lakes management strategy. The Corps strategy for the Great Lakes basin would integrate commercial navigation and other societal needs with ecological restoration objectives.

7) Program Funding

A legacy of Corps programs is that they have the potential to meet water resources needs in the Great Lakes basin but sometimes are never funded or have received funding for feasibility studies but not for the implementation of the projects. For example, the Aquatic Plant Control Program has been used in other parts of the country for more than forty years but never applied in the Great Lakes basin.

More often than not, federal programs receive funding well below the levels required to achieve authorized program objectives. Not surprisingly, stakeholders identified a critical lack of funding as the major impediment to meeting water resources needs in the Great Lakes basin. This result echoes those of the GAO report: *Great Lakes - an Overall Strategy and Indicators for Measuring Progress are Needed to Better Achieve Restoration Goals*, which cites a lack of funding as the chief barrier to restoration progress in the Great Lakes. Five underfunded authorities were identified: Aquatic Ecosystem Restoration, Environmental Improvements, Great Lakes RAPs and Sediment Remediation, Emergency Streambank and Shoreline Protection, and Flood Plain Management Services.

8) Watershed Management Planning and Flood Protection

Project planning should be encouraged toward a balanced watershed approach (as opposed to a single project/single function approach) to implementation. Projects would likely be more

efficient in both funding and development if projects were designed and constructed complementary to other projects within the same basin. If the watershed were managed correctly, a few well placed water control (such as retention or flood damage reduction) management measures could have a much greater positive impact on the basin than several non-coordinated individual projects.

9) Waterfront Revitalization

Collaborate more extensively with states and local authorities to develop a strategic approach for how to tie waterfront remediation into revitalization programs. Coordinate and maximize the application of existing program authorities and resources to restore degraded urban waterfronts. Develop strategic objectives for using Planning Assistance to States (Section 22, WRDA 1974) to remediate coastal areas and Great Lakes RAPs and Sediment Remediation (Section 401, WRDA 1990) and Environmental Dredging (Section 312, WRDA 1990) to dredge and cap contaminated sediments.

10) Monitoring and Management of Great Lakes Water Levels and Diversions

Report (in a timely manner) Great Lake) water diversion data. Strategically explore opportunities for program development in water supply accounting. Strengthen resource investment and participation in multiagency research, data coordination, and information systems.

11) Program and Project Management and Planning

The Corps would focus on enhancing efficiency and effectiveness of Great Lakes project development, execution and completion. A streamlined process would likely result in financial savings, better project-effort continuity (less fiscal years), a greater percentage of implemented projects and more satisfied project partners.

I. Strategic Plan

The John Glenn Strategic Plan authorization directed the Corps to prepare a report outlining a strategic plan for Corps of Engineers programs and proposed Corps of Engineers projects in the Great Lakes basin. If no action were taken, it is expected that the Corps' and other Federal agencies' efforts on the Great Lakes will continue through existing Great Lakes specific and other national programs. States, Tribes and other Great Lakes Collaborative stakeholders will continue efforts for a larger, more coordinated program. Congressional action to the level desired by the Regional Collaboration (\$20 Billion total cost) is unlikely due to other national priorities and the lack of a comprehensive plan for Great Lakes Restoration.

In assessing the current state of the Corps' Great Lakes programs, the following elements have been identified as essential elements of a strategic plan for Corps's participation in Great Lakes restoration and other initiatives.

1) Increased Funding for Existing Corps Programs

As identified in this plan, there are a number of existing Corps programs that would serve to meet the needs of the Great Lakes region, as well as programs for other Federal agencies. These

include national programs as well as Great Lakes specific programs. These programs have generally not been funded to their full capability level. Providing full funding for these programs would have significant impact on the restoration of the Great Lakes. Key programs and estimated annual funding levels would include Great Lakes Fishery and Ecosystem Restoration (\$2M now, expanding to \$5M in future years), Great Lakes RAP and Sediment Remediation (\$4M per year), Great Lakes Tributary Modeling (\$2M per year), Chicago Sanitary and Ship Canal Barrier (\$3M one time cost), Environmental Improvements (\$2M per year for sea lamprey projects), Surveillance of Northern Boundary Waters (\$3-4M per year).

2) Development of Great Lakes Collaboration Implementation Plans

There is an opportunity for the Corps' to take further action to assist the Regional Collaboration in taking its next steps within existing authority. The Collaboration has developed a Strategy for Protection and Restoration of the Great Lakes. This strategy follows eight of the priority issues identified by the Great Lakes Governors, including descriptions of the needs associated with each issue, as well as numerous recommendations of near term actions. However, no implementation plan was developed for any of the issue areas. The Great Lakes Habitat Initiative is working on developing an implementation plan for the Habitat/Species issue area. The John Glenn Strategic Plan authority could be utilized to develop additional implementation plans for the other issue areas. These plans would focus on near term strategies, and the plans would be updated utilizing the existing authority as identified priorities are met. It is estimated that it would require \$7-10 M over 5 years to complete the initial implementation plans for each issue area.

3) Feasibility Study for Great Lakes Restoration

A detailed feasibility study for the Great Lakes similar to those prepared for the Everglades and for Coastal Louisiana would be very beneficial to the efforts to fund further Great Lakes Restoration efforts. This study would most likely focus on fishery and ecosystem restoration, but would address all the measures identified in the previous section to some extent. The study area would be the Great Lakes Basin (extending over parts of 8 states) including: Lakes Superior, Michigan, Huron, Erie, Ontario and St. Clair, the Detroit, St. Clair, St. Marys and Chicago Rivers, and the St. Lawrence River to the 45th parallel. It is estimated that the study would require \$3M Federal (\$6M total) over a five year period.

J. Environmental Compliance

Because the *John Glenn Great Lakes Basin Program Strategic Plan* is informational in nature, and does not recommend the construction of a project or structure, certain exemptions apply that would exclude this work from normally-required NEPA analysis. Pertaining to a July 24, 2006 *Memorandum for Record* from the Environmental Branch Chief at the Detroit District, the following was cited regarding this study:

Under ER 200-2-2, certain actions are excluded from NEPA documentation. ER-2-200 par 9 (c) states - " Planning and technical studies which do not contain recommendations for

authorization or funding for construction, but may recommend further study... (are exempted from NEPA)" Since this is solely a study, no NEPA documentation or ROD/FONSI is required.

K. Summary

The Corps of Engineers, in the development of this Strategic Plan, drew input from Great Lakes stakeholders, the Council of Great Lakes Governors, and an analysis of Corps programs and Authorities in the Great Lakes basin. Through developing this plan, the Corps pooled this input to formulate priorities that are essential to the development of a comprehensive long-term, collaborative strategic plan for the Great Lakes Basin. These priorities are:

- 1) to fully fund existing Corps programs;
- 2) to utilize the John Glenn Strategic Plan authority to assist in developing near term implementation strategies to assist the Great Lakes Regional Collaboration in moving forward with Great Lakes Restoration;
- 3) the completion of a Comprehensive Great Lakes Restoration Study to identify long term plans for Great Lakes Restoration.

With these priorities met, the Corps could effectively work toward the development of a collaborative, comprehensive, balanced and overarching restoration plan that would provide long-term benefit to the environmental, commercial and recreational interests in the Great Lakes basin.

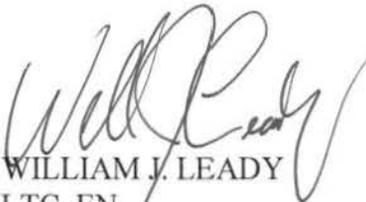
6. Conclusions and Recommendations

The Detroit District, U.S. Army Corps of Engineers recognizes and supports the need for an overarching restoration and protection strategy for the Great Lakes that involves both public and private interests, balances economic and environmental objectives, and is supported unilaterally. With the combined resources and efforts of the Corps and its Federal partners, as well as the stakeholders within the Great Lakes Basin as represented by the Great Lakes Regional Collaboration, working toward one common goal, we stand to have the best chance at succeeding at this large task. There have been significant strides made in the cleanup and restoration of the Great Lakes during the past three decades, but new challenges arise almost monthly, such as the Asian Carp moving toward Lake Michigan at a steady and determined rate.

The Corps has the capability and the authority to play a large role in the Great Lakes. Three elements are recommended as the foundation for a Corps' strategic plan for the Great Lakes:

- 1) Full funding for existing Corps programs.
- 2) Utilization of the John Glenn Strategic Plan authority to assist in developing near term implementation strategies to assist the Great Lakes Regional Collaboration in moving forward with Great Lakes Restoration.
- 3) Completion of a Comprehensive Great Lakes Restoration Study to identify long term plans for Great Lakes Restoration.

The recommendations contained herein reflect the information available at this time. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding.


WILLIAM J. LEADY
LTC, EN
Commanding

Date 20 OCT 2006