

**Summary Report**

**Great Lakes Coastal Infrastructure  
Scoping Workshop**

October 10-11, 2007 Duluth, Minnesota

*convened by the*

**Great Lakes Commission**

*with support from*

**NOAA Coastal Services Center**



**NOAA Coastal Services Center**  
LINKING PEOPLE, INFORMATION, AND TECHNOLOGY

## I. Workshop background

In October, 2007, the Great Lakes Commission hosted a Great Lakes Coastal Infrastructure Scoping Workshop to focus attention on the physical condition of coastal and navigation protection structures on Great Lakes coastlines such as piers, breakwaters, bulkheads, seawalls and jetties, and discuss appropriate strategies for their ongoing maintenance. This workshop was an outcome of an earlier effort between the Great Lakes Commission and NOAA Coastal Services Center where a regional needs assessment was conducted and identified significant concern among the Great Lakes St. Lawrence ports and navigation community over the condition and reliability of the Great Lakes St. Lawrence maritime transportation infrastructure. Dredging needs were of particular concern, as was maintenance of locks, piers and breakwalls.<sup>a</sup>

At approximately the same time the U.S. Army Corps of Engineers was calling attention to the aging and serious deterioration of a significant number of structures located in more than 130 coastal communities along the Great Lakes. In some cases, these structures were actually failing. The piers, breakwaters and other coastal infrastructure at issue are part of a network of federal navigation projects in the Great Lakes. Over half of these coastal structures were built before World War I and over 80 percent are older than their typical 50-year design life span.<sup>b</sup> The oldest structures were built with timber crib core sections which deteriorate more rapidly when exposed to air during periods of low lake levels. The fact that Great Lakes water levels have remained significantly below average for almost a decade has contributed to the urgency of the issue.

Additionally, most long term climate models indicate a potential for ongoing low, or even lower water levels in the Great Lakes, combined with patterns of increased storm volatility. Thus one specific objective of the workshop was to identify potential impacts of climate change on coastal protection infrastructure, and more broadly, on coastal hazard resilience in the Great Lakes.

## II. Participants

Workshop participants included coastal engineers and coastal zone managers, state and local government personnel, U.S. Army Corps of Engineers personnel, commercial port interests and representatives of the recreational boating community. See *Appendix A*.

## III. Objectives

**The overall objective** of the workshop was to assess the physical status of aging coastal protection structures in the Great Lakes, identify factors influencing that status, with special focus on climate change, and begin a discussion on strategic approaches to future maintenance of the structures, given changes in protected harbors between the time the structures were built and today; and fiscal realities at the federal, regional and local levels.

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<sup>a</sup> Great Lakes Commission, 2006, *Great Lakes Regional Needs Assessment/Ports and Navigation: Final Draft Interim Report*.

<sup>b</sup> U.S. Army Corps of Engineers, 2007, *Great Lakes Coastal Infrastructure: Critical Protection at Risk*.

**Day One, Sessions One and Two: Scoping.** Presenters from the U.S. Army Corps of Engineers (USACE) reviewed the existing inventory of federally owned coastal protection structures in authorized U.S. Great Lakes harbors. They also reviewed efforts currently underway to conduct inspections of all federal structures for physical condition and assess risk of failure. Data gaps were identified, particularly in the area of value protected by coastal structures not necessarily related to navigation. Further presentations outlined data assembled to date by NOAA and the Corps on potential climate change scenarios for the Great Lakes, with emphasis on climatic trends and patterns most likely to impact coastal structures.

**Day Two, Session Three: Looking ahead.** A number of stakeholder perspectives were offered, including those from the Great Lakes states, coastal municipalities, commercial port authorities and the recreational boating community. A facilitated discussion followed to identify specific needs, potential actions and next steps to address needs.

#### IV. Presentations <sup>c</sup>

[Opening, introductions, objectives](#) : Dave Knight, Great Lakes Commission and Linda Sorn, USACE Chicago District.

- Reviewed events leading to the workshop, namely the GLC/NOAA CSC needs assessment conducted as part of their joint project agreement.
- Identified workshop participants and presenters.
- Laid out goals and objectives for the workshop.

#### **Session 1: Climate change models and projected impacts for the Great Lakes basin**

[NOAA Coastal Services Center workshop](#) on climate change: Gene Clark, Wisconsin Sea Grant Institute.

- Summarized proceedings of an April, 2007 workshop sponsored by NOAA that presented current climate change models, and outlined NOAA's priorities in assessing related impacts. Among findings: Global warming is real, but regional predictions are more difficult; most models predict lower Great Lakes water levels but there is no solid consensus yet; and yearly fluctuations in weather will always trump mean changes in climate.

[Relevant data from the International Lake Ontario-St. Lawrence River study and the upcoming International Upper Great Lakes study](#) : Tony Eberhardt: USACE Institute for Water Resources.

- Presented findings from the LOSL study that have relevance to the future of coastal protection infrastructure in the Great Lakes, including climate change scenarios, hydroclimatic assessments and their project impacts on water levels in the Great Lakes.
- Reported on outcomes of the study in the form of guidance on management options and policy development.

[Potential climate change impact on Great Lakes commercial navigation](#) : Dale Bergeron, Minnesota Sea Grant

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<sup>c</sup> PowerPoint slides for the following presentations can be accessed at [www.glc.org/coast/infrastructure.html](http://www.glc.org/coast/infrastructure.html).

- Reviewed potential impacts of climate change on Great Lakes commercial navigation, including less winter ice cover and potentially longer navigation season, less frequent but fiercer storms, and ongoing shifts in water levels.
- Emphasized the need for adaptive management strategies.

[Current and proposed climate research in the Great Lakes basin](#) : Nick Schroeck, Sea Grant Fellow, Great Lakes Commission

- Continued discussion on adaptation strategies citing Great Lakes climate change research initiatives by three entities: the EPA's Great Lakes Environmental Research Laboratory (overall system adaptation and resiliency), Michigan Sea Grant (vulnerability in three sectors: fisheries, transportation and tourism) and the Great Lakes Commission (impacts on navigation, transportation and coastal community infrastructure.)

## **Session 2: Great Lakes Coastal protection infrastructure: inventory, conditions, maintenance status and related policy**

[Overview of the USACE Breakwater Initiative](#) : Linda Sorn, USACE Chicago District

- Identified universe of: federally authorized harbors (117); miles of navigation channels to maintain (610); miles of breakwaters (104) and number of confined disposal facilities (20).
- Characterized general age and condition of federal structures, 80 percent of which are over 50 years old and 45 percent of which have never had a rehabilitation.
- Outlined USACE budget constraints of recent years which have created a backlog in both navigation dredging and harbor structure maintenance; and noted that recreational (no cargo traffic) harbors remain completely unbudgetable.
- Reviewed alternatives to ongoing federal funding of harbor maintenance, including locally contributed funds.

[USACE structure inspection program](#) : Dave Foster, USACE Detroit District

- Provided more detailed overview of the types of coastal protection structure design and construction prevalent on the Great Lakes, including timber core, stone, cement and sheet pile.
- Reported on formation of regional inspection teams (Great Lakes Navigation System Breakwater Assessment Initiative) to develop a consistent, standardized methodology for assessment of coastal protection structures, and subsequent prioritization for budget allocation.

[Non-federal coastal protection structures](#) : Gene Clark, Wisconsin Sea Grant Institute

- Identified types of non-federal coastal protection infrastructure in the Great Lakes, including structures that protect power generating facilities, municipal water treatment plants and intakes, public beaches, parks and walkways, state and private marinas, private development and private residential property, noting that there is no single, comprehensive source or data bank of these structures currently available.
- Identified some of the physical problems emerging with these structures including accelerated metal corrosion in sheet piles and dock supports.

- Noted that maintenance strategies developed for federal structures could likely be applied to non-federal structures as well.

### **Session 3: Stakeholders' perspectives**

The States : Larry Kieck, Wisconsin Department of Transportation

- Provided an overview of the state-funded Wisconsin Harbor Assistance Program, including the history of the program (est. 1979), its parameters (limited to commercial ports) and types, amounts and examples of recent grants.

Coastal municipalities: Allen Hansen, City of Petoskey, Michigan

- Presented the case study of Petoskey on Lake Michigan where, in March, 2006, a heavy winter storm destroyed a 50-foot section of the timber-crib type breakwall protecting the Petoskey harbor.
- Summarized efforts since the incident to obtain federal funding for repairs, which required Congressional intervention.

Commercial ports : Eric Hirsimaki, Cleveland Cuyahoga County Port Authority

- Presented the case study of the Port of Cleveland's 27,000-foot long breakwall, first sections of which were built in 1871.
- Noted role of the structure in maintaining viability of commercial shipping in Cleveland, and summarize recent repair and maintenance efforts.

## **V. Discussion**

Following presentations on Day Two, the participants engaged in a facilitated discussion organized around questions relating to specific issues. Following are the questions/issues raised, and summaries of the resultant discussions.

**Issue: What types of information can help us better understand the problems facing coastal protection and navigation infrastructure – what do we need to tell the story?**

### **Discussion:**

Participants commented about the importance of having federal agencies, and the Corps of Engineers in particular, formally acknowledge that climate change is occurring. This would then ideally lead to a commensurate federal acknowledgement of the need for a revised policy on the maintenance and rebuilding of federally authorized coastal structures where necessary.

USACE personnel explained that they currently look at the return on their investment in coastal structure maintenance in terms of commercial benefits. Economic analysis on existing projects is much less than the analysis for a new project. To make an informed decision, the Corps has to view harbors as multi-purpose, but it does not have the authority to do that type of analysis right now. The view was expressed that the Corps needs to look beyond cargo tonnage requirements as criteria for harbor maintenance prioritization, and consider other benefits.

It was noted that as a follow up to a recently released recreational boating economic impact study (coordinated by the Great Lakes Commission), Michigan State University has developed an online tool to calculate economic benefits of individual marinas. The website, <http://www.marinaeconomics.com/>, allows users to determine the economic impact of any existing or proposed marina operation by the number of boats/slips and other quantifiable factors. This tool could be a useful resource in assembling a more robust picture of the value in a given harbor protected by coastal structures.

**Issue: Is there a need for a transportation efficiency analysis?**

**Discussion:**

When the Petoskey (Mich.) breakwater structure failed, it was noted that Sen. Levin required the community do this type of analysis and put a value on the structure. Like roads and sewers, it was pointed out, people have to be educated about infrastructure projects.

USACE participants said that they don't have a firm analysis protocol in place at the moment, and have not done much work in identifying other variables that could be in the equation, such as probability analysis for loss of life and potential property damage. The questions thus emerge as to whether the Corps should start to consider a plan to go in that direction, or whether local communities should take more responsibility.

The model now is that federal projects are viewed as having a single purpose: commercial navigation. The view was expressed that we have harbors/channels that are dredged, but large ships don't need breakwaters as much as they used to. But if we view the projects as multi-purpose – it will be much higher (human health/property). Projects are stuck in the navigation box – we're not looking at the multi-purpose point of view.

What the Corps needs to communicate is more accurate information on when the structures will fail. What they can't necessarily express with current resources is the cost of impacts of failures; they need the ports/communities to provide those values. Communities have to tell USACE what will happen to property, municipalities, etc., but the Corps can't be the advocate for additional resources. That argument has to be made to Congress by the communities.

Breakwaters will be highly susceptible to higher waves when the lakes rise again. The states and cities may have to chip in for maintenance, but the Corps needs to provide a reasonable expectation about anticipations of failure – and a cost of repair and replacement. We are looking at system-wide impacts.

For commercial navigation purposes, the Great Lakes should be managed as a system and not on a port by port basis. We need to change allocations from a port by port basis to a system wide fund.

Coastal communities need to think in a different direction, and move beyond communicating their needs only to the Corps. The municipalities have to get together, develop their criteria and tell legislators what they want the Corps to do on their behalf – and look at other ways to fund projects. The Corps is carrying out the charge of the Congress, so municipalities have to get together and promote their needs to their Congressional delegations.

**Issue: How are the health and human safety factors considered?**

**Discussion:**

There are statistics on fatalities and accidents, but it might not relate specifically to Great Lakes access. The data might be compiled with a little bit of work.

The GLC economic benefits study started with total state registrations, then calculated the percentage of boaters likely to be using the Great Lakes based on based on the number of contiguous coastal counties. That same methodology may be helpful in converting statewide boating safety/casualty data into Great Lakes-specific data.

**Issue: What are the economic value factors to be considered? If sole cargo tonnage is not an appropriate metric, what else should be included?**

**Discussion:**

Nothing means more to elected officials than jobs. To translate this into an employment issue is important. Property damage and human health are most important – and the Corps only tracks tonnage. Other economic benefits (job numbers) are important.

Public access must be considered. The Park Service has a methodology to calculate per-person values of visitors.

Also you could add deferred value; from a commercial perspective there could be a huge increase in the value of deep water port access in the face of climate change. There is a deferred value to deep water access. And tourism access could overlap – you have access/tourism – museums, stadiums, etc.

**Issue: Is there an environmental component to the value of coastal structures?**

**Discussion:**

There are many state parks protected by our structures and millions of visitors each year. Each project needs to be evaluated. Ludington has a piper preserve in the federal channel. We have endangered species protected by coastal structures.

There are values to wetlands, embayments and other natural areas protected by these structures. And there are protected containment and superfund sites.

## **VI. Analysis**

There is evidence, drawn from information presented by the Corps of Engineers, of data gaps in the areas of 1) the existing condition of federally owned coastal protection structures in the Great Lakes; 2) accurate assessments of risk of failure on a methodologically consistent, structure-by-structure basis; and 3) the true value of non-navigation assets and properties protected by federal structures. The first two gaps are being addressed by an inspection program currently being carried out by the Corps which, at last report, was visiting approximately ten projects (piers or breakwaters) a year. The Corps, however, does not currently have the resources to address the third need, a comprehensive analysis of the full and true value of all community assets that have some degree of reliance on federally-owned coastal protection structures.

There is also evidence, derived from the climate models presented at the workshop, that projected climate change trends in the Great Lakes – particularly those resulting in ongoing low or

lower water levels and increased storm volatility – will likely pose greater threats to the physical condition of Great Lakes coastal protection infrastructure, much of which has already aged beyond its design life-span and has not been maintained adequately due to lack of funds. Structures with timber crib designs face the greatest potential threat.

Compounding the accelerating deterioration of much of the federal Great Lakes coastal protection infrastructure is the Corps of Engineers' budget constraints in recent years. The operation and maintenance (O&M) budget for the Corps' Great Lakes navigation business line has been consistently underfunded for the past decade, creating significant backlogs for dredging and repair of such structures as piers and breakwaters. Maintenance of shallow-draft, recreational harbors remains completely unbudgetable under longstanding administration policy.

**Critical questions** that emerge from the above include:

Is there, and should there be, ongoing federal interest in maintaining federally authorized coastal protection infrastructure, including structures that were built generations ago to support commercial navigation in ports and harbors that no longer are served by commercial navigation, and yet have significant waterfront assets that rely on resilient coastal protection structures?

In cases where a federal interest in coastal protection structures is either deemed inappropriate, or unfundable due to budget constraints, what alternative public and/or private monetary resources exist?

What is the state, regional or local governmental interest in public coastal infrastructure that plays an important role in economic development and/or health and human safety, but for one of the above reasons has little prospect for ongoing federal support?

## **VI. Recommended actions**

- Establish a working partnership including, but not necessarily limited to, the Corps of Engineers, Great Lakes Coastal Zone Managers, Great Lakes Sea Grant Network and the states via the Great Lakes Commission, to continue evaluation and assessment of coastal hazard resilience in the Great Lakes, and facilitate appropriate action(s).
- Work with Great Lakes coastal communities to identify the full range of values – economic, environmental and human health and safety - placed at risk by deteriorating coastal protection/navigation infrastructure.
- Develop an outreach initiative to better inform and educate local municipalities, states, commercial and recreational navigation interests on 1) the existing condition of Great Lakes coastal protection/navigation structures; 2) potential impact on Great Lakes coastal hazard resilience of climate change; and 3) the likelihood, on a project by project basis, of continued federal interest in ownership and maintenance of federal projects.
- Continue scoping work on non-federal coastal protection infrastructure.