

COASTAL HEALTH STRATEGY TEAM CHAPTER

I. Problem Statement

Contact (including external, ingestion, and inhalation)¹ with near shore waters of the Great Lakes can pose a risk to human health.² As the primary source of drinking water, supplier of fish for both personal and commercial benefit, and recreational outlet for millions of U.S. residents, the near shore waters of the Great Lakes should pose a *minimum* risk to human health through contact. (The Great Lakes are a natural body of water and hence the achievement of null risk is unrealistic.) To reduce human health risk, Great Lakes near shore waters should be drinkable, swimmable, and the fish harvested should be consumable at all times. The need to close beaches, issue boil water notices, publish fish consumption advisories,³ and mechanically remove stranded algae should be minimized. Lack of adequate source water protection practices and outdated drinking water distribution systems further threaten public health. These factors have led to the following trends and events in the Great Lakes:

- The estimated volume of combined sewer overflow (CSO) discharges in the U.S. is 850 billion gallons per year, with most of these CSOs located in the Great Lakes and Northeast Regions.⁴
- In 2001-2002, 23 states reported 65 waterborne disease outbreaks affecting 2536 individuals (61 hospitalized; 8 died), which represents the largest number to occur since reporting began in 1978. Five of these outbreaks were attributed to water bodies in Great Lakes states (MN, WI).⁵
- The NRDC's annual survey of water quality monitoring and public notification at U.S. beaches finds that there were 51% more beach closings and advisories in 2003 than in 2002. Across the country, pollution caused more than 18,000 days of closings and advisories at ocean and Great Lakes beaches last year – more than ever recorded in the survey's 14-year history.⁶

II. Goals and Milestones

A. Control Direct and Indirect Pollution Sources and Improve Beach/Coastal Assessment Methods

A.1. Direct sources of contamination affecting coastal health are those that originate from a single, identifiable, fixed point such as rivers, streams, sewer pipes, septic systems, a point of industrial discharge, or even an individual bather. Aging or overburdened sewage infrastructure, which can release raw sewage to source waters in urban areas through sanitary sewer overflows (SSOs) or CSOs, still exist in many Great Lakes municipalities where storm and sanitary systems remain co-mingled (see *Appendix B*). Given the potential impact on human health, overflows of untreated human and industrial waste into Great Lakes waters must be controlled through comprehensive solutions that may include structural controls such as separating storm and sanitary sewers, constructing storage capacity or controlling infiltration/inflow; non-structural controls such as land use planning and aggressive use of best management practices to allow no net increase in storm water run-off; and regulatory controls such as issuing, updating, and enforcing National Pollution Discharge Elimination System (NPDES) permits.

Long Term Goal: By 2018 or sooner where possible, eliminate inputs of untreated or inadequately treated human and industrial waste to Great Lakes Basin waters from municipal wastewater treatment systems.⁷

Interim Milestones:

- By 2007, USEPA and Great Lakes states will undertake a thorough review of their ongoing wet weather control programs to identify and correct deficiencies to ensure that programs are achieving the requirements of the Clean Water Act (CWA).
- By 2008, EPA, in cooperation with Great Lakes states, will promulgate rules governing the disbursement of grant funds towards achieving this goal.
- By 2009, or as soon as possible, all municipalities with wet weather overflows in the Great Lakes Basin will have adopted and begun to implement comprehensive storm water control programs with the objective of meeting all appropriate state and federal regulations.

- For communities with wet weather problems that have not proceeded with required planning and implementation by 2009, the States or USEPA will apply necessary enforcement actions (administrative order or judicial action) to require correction of the problems by a date certain with appropriate penalties.

A.2. Indirect sources of contamination are sources whose origination cannot be traced to a single point such as a storm drain or sewer outfall (see *Appendix B*). The effects of indirect sources of contamination are diffuse and therefore determining their origin may require intensive investigation. For example, determining a correlation between increased bacterial level density at the bathing beach and various coastal processes, predominating weather conditions, and anthropogenic and non-anthropogenic sources is often difficult.

Long Term Goal: Identify indirect pollution sources capable of adversely impacting Great Lakes coastal health, educate communities regarding their environmental impact, and remediate all potential dry weather sources to achieve a 90-95% reduction in bacterial, algal, and chemical contamination at all local beaches through identification, estimation of relative contribution (based on historical data and sanitary inspection), and remediation of these sources.

Interim Milestones:

- By 2007, coastal communities will have an education and outreach program in place for K-12, college, the general public, and coastal decision makers with assistance of the Great Lakes Sea Grant Network.
- By 2008, enforceable city ordinances will be in place which call for the placement of signs regarding the health risk associated with bather shedding, provision of adequate sanitary facilities for bathers, availability and importance of proper boater waste disposal, and prohibition of practices that attract nuisance wildlife to which fines are attached for violations.
- By 2010, the number of non-rainfall-associated incidents of poor water quality will have decreased by 90-95% (as determined locally based on historic levels in bacterial, algal, and chemical contamination) at all local beaches by remediation of 90-95% of dry weather sources identified by sanitary surveys.
- By 2020, nutrient loading will have decreased as evidenced by a decrease in nuisance algal blooms, and ambient water concentrations of nitrogen and phosphorous in coastal areas.

A.3. Beach and coastal assessment methods (microbial and physical) are the front lines of defense for determining when contaminant influxes are most likely to impact human health in the context of surface water encounters. Tools available to beach managers and authorities responsible for monitoring these water bodies should accurately reflect risk, provide timely notification to the public, and enable investigation of potential contamination sources (both direct and indirect) thus leading to remediation of these sources.

Long Term Goal: The number of beaches classified as having “good” water quality will comprise 90-95% of all Great Lakes public bathing beaches. At the local level, individual contamination events will occur no more than 5% of available days per bathing season, sources of these contamination events will be identified through standardized sanitary surveys, and remediation measures will be in place to address these events.

Interim Milestones:

- By 2005, the BEACH Act will be fully funded to continue routine compliance monitoring of coastal waters.
- By 2006, real-time testing methodologies will be evaluated and trialed at Great Lakes beaches.
- By 2006, coastal states will have complied with the BEACH Act requirements for public notification.
- By 2006, a standardized sanitary survey form will be drafted.
- By 2007, standardized sanitary surveys will be trialed at select coastal communities.
- By 2009, states will add to their existing water quality monitoring programs, a standardized tool for conducting sanitary surveys that will identify sources of contamination at the local level in those instances when bacterial indicator levels exceed published standards.
- By 2010, regional predictive models will be available using local data and forecasts of water mass movements derived from the Great Lakes Observation System.
- By 2011, real-time test methodologies will supplant existing test methods (which take in excess of 18 hours before results become available) under the BEACH Act of 2000.

B. Protect Drinking Water Quality

The Great Lakes serve as the primary source of potable drinking water for over 30 million U.S. residents, therefore, protection of drinking water quality is essential. Threats such as chemical contaminants from accidental oil and chemical discharges, infiltration of lead, pathogens and bacteria in older deteriorated drinking water distribution systems, and potential bioterrorism of critical infrastructure facilities should be prevented. Federal, State and municipal resources must focus on upgrading public and private drinking water infrastructure and ensuring that water quality monitoring and security measures are implemented.

Long Term Goal: The quality of Great Lakes Basin drinking water from coastal and tributary sources will be protected from chronic and episodic threats of chemical and biological contamination.

Interim Milestones:

- By 2007, amendments to the Safe Drinking Water Act (SDWA) will be adopted to enhance flexibility in how State Revolving Funds may be used for infrastructure system improvements.
- By 2007, amendments to the SDWA will establish ambient water quality criteria for pathogens and disinfectant by-product precursors.
- By 2007, Bioterrorism Act amendments will be adopted to require implementation of security measures that address potential resource/facility vulnerabilities identified in State Source Water Assessments.
- By 2010, all States and local municipal water supply systems will complete plans for infrastructure upgrades that address aging system deficiencies and integrate security measures for vulnerable resources/facilities.

III. Recommended Actions

Based on *assessments* that identify existing pollution sources and potential threats to water quality, multiple actions are available to *remediate* and *prevent* adverse impacts on human health in near shore waters.. The following two actions are required to achieve a minimum risk to human health within the Great Lakes:

Recommended Action A: Prevent adverse impacts to human health through control/abatement and remediation of direct and indirect pollution sources into coastal and tributary Great Lakes waters.

The following specific sub-actions, derived from Recommended Action A, are most likely to have the greatest impact on minimizing risk to human health from contact with near shore waters of the Great Lakes.

A.1. Control of Direct Pollution Sources

Summary: Federal and State statutory or regulatory requirements currently exist to address and control the adverse impacts of wet weather overflows including CSOs, SSOs, storm water, beach closings, etc. For several reasons, administration of these programs at the Federal and State levels has not resulted in the full achievement of the goals and requirements of the CWA. For example, as of February 2005, of the 147 CSO communities in the Great Lakes Basin only 77 have completed or are in the process of implementing Long Term Control Plans (LTCPs)⁸ to achieve the requirements of controlling CSOs. SSOs are prohibited under the CWA, yet many communities still have chronic SSOs. Excessive storm water is entering the sewerage systems using needed capacity to convey sewage; sewerage systems are overloaded such that communities need to bypass part of their flows around portions of their wastewater treatment plants.⁹ A major impediment to progress on reducing inputs of untreated waste to Great Lakes waters has been lack of funding for the high infrastructure costs typically involved. For example, the EPA and States estimate costs for addressing the remaining CSOs in the Great Lakes Basin at \$8.6 billion, and total costs for minimizing discharges of untreated human waste from CSOs, SSOs¹⁰ and treatment plants at \$13.75 billion.¹¹ The control of direct pollution sources should be facilitated through the following:

- EPA and the States should fully implement, enforce, and report on their wet weather control programs to identify and correct deficiencies to ensure the requirements of the CWA are achieved in a timely manner.
- Congress should support State resources by appropriating \$7.535 billion in Federal funds as part of a 55-45% Federal-local cost share to raise \$13.70 billion to fund wastewater treatment improvements. Rules governing the disbursement of funds will include but not be limited to the following:

- Grants will only be awarded to communities with approved programs addressing wet weather controls of CSOs, SSOs, storm water runoff, and wastewater treatment plant bypasses.
- Priority funding will go to communities who can demonstrate that non-structural controls, such as local land use regulations and best management practices that reduce or eliminate storm water flows into the system, are employed to the greatest extent possible.¹²
- Plans must include provisions for review and updating industrial pretreatment programs to reduce the discharge of toxics to sewage treatment systems. (See PBT section for further detail.)
- A discretionary provision for reimbursing communities that implement overflow controls as part of comprehensive programs, consistent with grant criteria, before October 1, 2008.
- A discretionary provision for rewarding those communities that fully implement and achieve their comprehensive wet weather control plan before 2012.
- Congress should appropriate \$10 million to the three USEPA Regions to review and upgrade their Great Lakes wet weather programs – including the CSO Control Policy, NPDES permit issuance and enforcement, storm water management – to insure that issues are addressed comprehensively.
 - The 1994 national CSO Control Policy, for example, established no deadline for final compliance with overflow reduction targets by all municipalities.
 - The “anti-degradation” mandate of the CWA needs Federal guidance to allow States to implement rules prohibiting new hook-ups to wastewater systems that do not control wet weather overflows.
- Congress should appropriate \$40 million to the Great Lakes States to administer the grants program, review and upgrade all of their wet weather programs (including NPDES permits and enforcement), and implement anti-degradation rules in relation to sewage system expansions.
 - The focus of this approach is on comprehensive solutions involving construction items, storm water controls, policy revision, strict monitoring and enforceable schedules.
 - Funding and permits for future sewer district expansions will be tied to having a comprehensive plan and ongoing compliance with timelines set out in NPDES permits or other enforceable documents.
 - Educate owners about regular maintenance of on-site sewage disposal systems (OSDS)¹³ to prevent health and environmental hazards associated with failures. Local regulations should require regular OSDS maintenance and inspection, by private evaluators, at the time of residential property sale.

Cost: \$13.75 billion over 10 years, plus the cost of wet weather control program review.

Benefit: Substantial reduction of the discharge of untreated sewage into the Great Lakes reducing health risks for bathers and bacteria load in drinking water supplies.

A.2. Control of Indirect Pollution Sources

Summary: Identify indirect pollution sources capable of adversely impacting Great Lakes coastal health including, but not limited to, bacterial loading from foreshore beach sand and submerged sediments, avian/animal deposition, algal blooms (can appear during dry weather, but are caused by nutrient loading during wet weather and aquatic invasive species), bather shedding, and untreated onboard boater waste. The identification of sources will be facilitated through:

- State and local public health agencies provide public education and/or incentives to reduce impacts from nutrient-loading, household and industrial products, attraction of nuisance wildlife, improper discharge of onboard boater waste, and bather shedding.
- Request that the Great Lakes Sea Grant Network make this an education/outreach priority for the region and to make it a component of a Great Lakes COSEE through NSF.
- State and local governments promulgate and enforce existing regulations which take action against boaters who discharge waste to the nearshore or open waters of the Great Lakes.
- Require regulations regarding the availability of adequate toilet and shower facilities based on projected bather density to receive U.S. EPA Beach Act grant funds.
- Assess the extent of contaminated sediments, especially in Areas of Concern, that contribute to water quality concerns. (addressed further in AOC/Sediments chapter)
- Research to clarify sources and transport of biotoxins (i.e., botulism) through foodweb.

Cost: Depends on indirect pollution sources identified at individual beaches based on annual sanitary surveys (see *Appendix C*). The costs associated with remediation range between \$20,000 - \$1,000,000 per source identified, based on the extensiveness of the impact and the need for infrastructure improvements.

Benefit: Remediating contamination sources responsible for dry weather water quality failures will reduce human health risks, increase availability/access to Great Lakes recreation, improve ecosystem health, promote sustainable practices, decrease economic loss (millions of dollars are lost each year due to beach closures), and increase commercial benefits.

A.3. Improved Beach and Coastal Assessment Methods

Summary: The USEPA should standardize, test, and implement a risk-based approach¹⁴ to manage recreational water. The approach should build upon existing water quality monitoring programs and employ the latest technology for microbial assessment and standardized sanitary survey criteria, based on a holistic watershed assessment. Federal, State, tribal and local municipalities have begun to work together to standardize the microbial assessment of recreational water and these working groups can also standardize the sanitary inspection process. Once these two tools are in place they can be tested at the local level, adopted by the Federal government, and implemented at the state and tribal level.

Cost: \$2.0 million annually to standardize, trial & implement a risk-based approach to beach/coastal assessment. \$11.65 million for USEPA to conclude and analyze data from NEEAR epidemiological studies.

Benefit: A holistic watershed approach to beach management will improve the identification of contamination sources at the local level, encourage remediation of those sources, ensure the protection of public health through a risk-based approach, decrease economic loss, and increase commercial benefits. To attract tourism and improve the economy of municipalities, investments in the development and maintenance of healthy and attractive beach recreational opportunities need to be a part of regional planning. The economic loss to a community from a swim closure day has been estimated to range from \$1,274 to \$37,030/day.¹⁵ Commercial benefits for an individual Great Lake beach projected over the swimming season would range from a low of \$100,000 to over \$3,000,000. For major municipalities, the economic value of beach recreational opportunities is estimated to exceed \$100,000,000 per beach per season. With over 800 beaches in the Great Lakes Basin, healthy beaches can be a major driver of the economy of the Great Lakes.

Recommended Action B: Protect drinking water quality.

Summary: Protection of drinking water quality by public and private water supply systems throughout the Great Lakes Basin must be improved. In addition to effective implementation and enforcement of existing SDWA and CWA requirements by EPA and the States, this action requires a combination of enhanced Federal policy requirements to include ambient water quality criteria for parasites, pathogens and disinfectant by-product precursors, full Federal funding and greater flexibility in how State Revolving Funds may be used to upgrade drinking water infrastructure systems, and implementation of water infrastructure improvement plans that integrate source water protection measures with security measures for vulnerable resources/facilities to reduce chemical contaminant and bioterrorism risks to drinking water supplies.

Specific steps include the following:

- Congress to amend the SDWA to direct EPA to establish ambient water quality criteria for parasites, pathogens and disinfectant by-product precursors for States to implement.
- Congress to fully-fund the Drinking Water State Revolving Fund (DWSRF) and Clean Water State Revolving Fund (CWSRF), and increase flexibility in how the funds may be used by the States and local municipalities for water infrastructure improvements.
- States and local public water supply systems implement and enforce infrastructure improvement plans that include security measures to address resource/facility vulnerabilities identified in source water protection assessments and critical infrastructure facilities governed under the Bioterrorism Act.

Cost: Fully fund the DWSRF at levels authorized by the SDWA (\$1 billion/year) through 2017. Fund the CWSRF at least to the level appropriated for FY 2004 (\$1.35 billion).

Benefit: Provides necessary funding for drinking water and wastewater infrastructure improvement and source water protection activities. EPA estimates that drinking water and wastewater infrastructure improvement needs will exceed \$200 billion over the next 20 years nationally.

Appendix A: Chapter Endnotes

¹ Various levels of body contact experienced by swimmers, water skiers, users of personal watercraft, scuba divers and tribal communities who live along the shore.

² Coastal Health is affected by the overall health of the natural ecosystem addressed in the Great Lakes Collaboration *Habitat/Species* strategy chapter. Coastal Health is also affected by the legacy of industrial pollution addressed in the *Persistent Bio-accumulative Toxics Reduction and Areas of Concern/Restoration Sediments* strategy chapters.

³ The Persistent Bio-accumulative Toxics team will address fish consumption advisories.

⁴ 2004 CSO/SSO Report to Congress.

⁵ Morbidity and Mortality Weekly Report, CDC. 2004.

⁶ NRDC Testing the Waters 2004.

⁷ This goal is intended to capture the intent of the US Policy Committee's 2002 Great Lakes Strategy goals, several of which are now outdated. For example:

- “By 2003, USEPA and State will assist local governments in establishing alternate funding vehicles to implement CSO/SSO abatement construction projects. Storm water permits will be in place for all phase II storm water discharges
- By 2005, 100% of all CSO permits in the Great Lakes will be consistent with the national CSO policy.
- By 2010, all sewer systems will be operated under LTCPs which will optimize performance and minimize discharges from SSOs.
- By 2010, 90% of monitored high priority Great Lakes beaches will meet bacteria standards more than 95% of the swimming season.”

See Non-point Source chapter for goals and action items related to private septic systems and to minimizing storm water runoff from urban and agricultural areas. See PBT chapter for more on preventing discharges of industrial and pharmaceutical wastes from municipal sewage treatment systems.

⁸ According to the Water Divisions in EPA Regions V and II, there are 129 Great Lakes CSO communities in Region V, 1 in Region III, and 27 in Region II. Sixty of these in Region V, 1 in Region III, and 16 in Region II have completed or are implementing LTCPs.

⁹ Not all wet weather overflows are from CSOs and SSOs. Numerous wastewater treatment plants experience excessive wastewater flows that result in the bypassing of untreated or partially treated wastewater. Such problems contribute excessive pollutants to the Great Lakes Basin and should be controlled by improvements in the sewerage collection system or treatment plant expansion.

¹⁰ Many Great Lakes communities also have SSOs. Properly designed, operated, and maintained sanitary sewer systems are meant to collect and transport all of the sewage that flows into them to a publicly owned treatment works for proper treatment. SSOs mainly occur because of unwanted water infiltration into the system during wet weather, or inadequate system operation and maintenance. Untreated sewage from these overflows can cause serious water quality problems and also back-up into basements causing property damage and threatening public health. SSOs are prohibited under the CWA other than in unique circumstances that are approved by the regulatory agency.

¹¹ It should be noted that these costs are based upon the installation of “hard” controls, i.e. construction projects, and do not reflect cost savings that could be realized through the use of “soft” controls, i.e. use of best management practices, etc, to reduce the amount of storm water entering the sewerage system.

¹² See, for example, Center for Watershed Protection, “Model Land Development Principles,” www.cwp.org, also quoted in full in the International Joint Commission's 2001-2003 *Priorities Report*.

¹³ On-site sewage disposal systems (OSDS), commonly know as septic systems, are wastewater treatment systems that use septic tanks and drainfields to dispose of sewage below the ground surface. Time and neglect will result in a failure of an OSDS that can cause serious public health and water quality problems in waterways.

¹⁴ WHO, Annapolis Protocol, USEPA National Beach Guidance and Required Performance Criteria for Grants, June 2002, EPA 823B02004.

¹⁵ Rabinovici S.J.M., R.L. Bernknopf, A.M. Wein, et al. 2004. Economic and health risk trade-offs of swim closures at a Lake Michigan beach, *Environ. Sci. Technol.* 38 (10): 2737-2745.