STATE of the STRAIT

State Of The Strait
Monitoring For Sound Management






A Binational Conference on the Detroit River Ecosystem

Convened December 2004 by Great Lakes Institute for Environmental Research, University of Windsor, The Greater Detroit American Heritage River Initiative of Metropolitan Affairs Coalition, The Detroit River Canadian Cleanup, The Detroit River International Wildlife Refuge, The Detroit Water and Sewerage Department, and other organizations.

Cover photos: photos left and center (upper and lower): Recreational fishing in the Huron-Erie Corridor (lower center photo by Kurt Byers, Michigan Sea Grant Extension, courtesy of United States Environmental Protection Agency, Great Lakes National Program Office; other photos courtesy of OMNR); upper right: Scientist sampling water, benthic invertebrates and sediment in Lake Erie (photo courtesy of Environment Canada and University of Windsor); lower right: Longear sunfish (*Lepomis megalotis*) (photo courtesy of Nicolas Lapointe)

STATE OF THE STRAIT

MONITORING FOR SOUND MANAGEMENT

2004 Conference Proceedings

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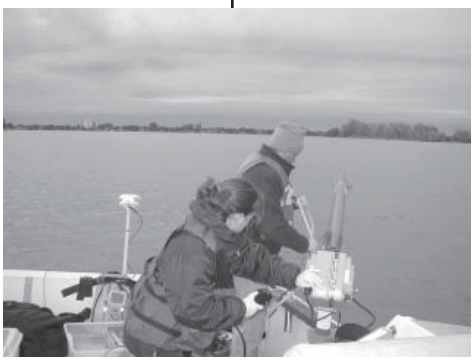
4. Session Summaries

4.1. Traditional Monitoring

Cities and counties that utilize the Detroit River as a discharge location have monitoring requirements as part of their discharge permits. This is true for wastewater treatment plant (WWTP) facilities, for combined sewer overflow (CSO) facilities, and for stormwater discharges. The State of the Strait session on traditional monitoring profiled four studies covering several aspects of the monitoring required as part of regulatory reporting and scientific analyses, such as modeling.

The Detroit Water and Sewerage Department (DWSD) was required to develop a long term CSO control plan in 1996 that would result in the elimination or adequate treatment of CSO discharges (Salim et al., Section 6.1). Under a demonstrative approach, the DWSD has established four CSO pilot facilities—three on the Detroit River and one on the Rouge River. The DWSD study area extends from Windmill Pointe in Grosse Pointe Park, chosen to represent conditions upstream of the influence of DWSD CSO discharges, to the confluence with the Rouge River.



Monitoring the Detroit River.

The DWSD CSO monitoring objectives focused on four issues: 1) the presence and extent of dissolved oxygen (DO) levels; 2) the extent of aesthetic and other use impairments; 3) the ecological impacts of untreated and treated CSO discharges; and 4) the extent of CSO discharge plumes.

Dissolved oxygen depression was evaluated with four continuous water quality monitors installed along the Detroit River shoreline from 2000 to 2004. Results show that the DO levels drop after a CSO discharge, but not below the water quality standard of 7.0 mg/L as set by the State.

The aesthetic and other use impairments survey results showed that the Detroit River was found to be clear and colorless, and generally had no odor during the surveys performed during dry weather or following major rain events. However, bacteria concentrations higher than total body contact standards were found during some of the surveys within two days after major rain events.

Potential ecological impacts of Detroit CSO discharges were evaluated through benthic macroinvertebrate surveys that included the collection of samples at eight locations along the Detroit River shoreline and seven locations further offshore. A direct impact from CSO discharges was not consistently observed at the near shore stations. However, there was an observable decrease in the number and quality of organisms from the head of the Detroit River (Windmill Pointe) to the near shore stations in the urban area downtown.

The extent of the DWSD CSO discharge plume was evaluated during both wet weather and dry weather through fluorescent dye tracers. The plume tracking surveys indicated that the CSO discharges remained within 152 m (500 feet) of the shoreline and impacted

20% or less of the total Detroit River channel. This is significant since there is a City of Detroit water intake on the opposite shoreline about 1,067 m (3,500 feet) downstream of a major CSO outfall.

Across the river, the City of Windsor does extensive monitoring in support of their two WWTPs that discharge into the Detroit River (Drca, Section 6.2). The City has been monitoring conventional pollutants and heavy metal concentrations discharged from the treatment facilities since 1970. The presentation described the monitoring being conducted in the City's eight programs:

1. Pollution control plant constituent monitoring
2. Industrial waste control
3. Watershed monitoring
4. License clearance program
5. Emergency response
6. Laboratory analysis
7. Flow monitoring
8. Municipal landfill monitoring

Wayne County Department of Environment presented a discussion of the water quality of the Rouge River, a major tributary to the Detroit River (Hughes et al., Section 6.3). The Rouge Project was started in 1992 and includes continuous monitoring of DO, temperature, stream flow and rainfall. Data have been collected at 15-minute intervals at stations throughout the watershed. The presentation covered trends from ten years of recorded data. The number of samples ranged from 23,402 to more than 146,800, allowing strong trend analyses.

Trend analyses demonstrated that DO concentrations are improving during both wet and dry weather conditions. Eight of the nine long term (ten years) locations show a statistically significant improving trend for mean DO, with the average annual improvement ranging from 0.09 to 0.53 mg/L per year. The water quality at seven of the nine locations met state standards more than 95% of the time.

The *E. coli* trend analysis showed improvement downstream of most watershed management projects. The analysis also identified locations where *E. coli* is still a problem during wet weather conditions. This will assist in planning future watershed management activities.

Considerable volumes of data have been collected to demonstrate efficient wastewater and CSO treatment and the impacts of watershed management activities. However, comprehensive ecosystem status and health cannot be determined with monitoring data especially given current budget constraints. Therefore, computer models become necessary tools to help analyze the interactions between water quality parameters or between the media (water–air–sediments). The data required to properly calibrate and verify a computer model are extensive.

A management model for the Detroit River was developed and partially calibrated during 1999 to 2002 (Drouillard, Section 6.4). Management models have the potential to identify scientifically defensible linkages among key systems or processes. However, the data requirements of such models are extensive and require the coordinated refinement of existing sampling strategies of existing monitoring programs.

The Detroit River Modeling and Management Framework (DRMMF) was developed to include hydraulic, sediment, and food web bioaccumulation models that evaluate linkages between water quality, sediment quality and sport fish consumption. Future coordination of monitoring programs to satisfy DRMMF data needs will be required to ensure that:

A coordinated effort will be required to inform all parties of current monitoring programs.

- Managers, monitoring agencies, and modelers are made fully aware of the types of data being collected
- Modelers have an opportunity to influence sampling designs to optimize model requirements and minimize duplication of efforts
- Reviews of existing monitoring data are conducted in a timely manner to identify data gaps
- Data are collected with appropriate quality assurance/quality control

In summary, traditional monitoring programs have been around for decades. Although they are used primarily to demonstrate treatment efficiencies, the data are valuable as inputs into models and can potentially help us assess overall ecosystem health. A coordinated effort is required to inform all interested parties of the monitoring programs currently in operation. The 2004 State of the Strait Conference was just an initial step in the information process.

Traditional monitoring is both required (regulations) and necessary (analyses). Unfortunately, both regulations and analyses are very site specific. Therefore, few of the many U.S. and Canadian communities that collect data to meet their regulatory requirements make these data available to others via some type of clearinghouse. Similarly, the data collected from studies conducted throughout the Detroit River watersheds are often unavailable.

One or more organizations should step forward and accept the responsibility of region wide data management and dissemination.

Many organizations within the Detroit River watershed would be interested in the variety of monitoring information being collected. One or more of the many organizations should step forward and accept the role of region wide data management and dissemination. This would provide a single source of information on water quality monitoring for everyone.

4.2. Biomonitoring

Biological monitoring, or biomonitoring, is the use of biological information to assess the status of the environment as it may be affected by anthropogenic activity. Biomonitoring is a proven assessment tool that is receiving increased use in monitoring programs of all types.

The Biomonitoring Session of the State of the Strait Conference profiled four biological monitoring programs with relatively long-term data sets. Fishery assessments have occurred in the Detroit River since 1956 (Johnson et al. 2004, Section 6.5). Both the Ontario Ministry of Natural Resources and Michigan Department of Natural Resources have used electrofishing surveys, trap netting and seining surveys, and creel surveys to perform fish community assessments. Community assessments have relied heavily on electrofishing surveys (1989, 2003, 2004), with more limited trap netting and seining surveys occurring in the lower Detroit River in the early 1980s (Grosse Ile, Grassy Island, Belle Isle) and mid-1990s (Humbug Marsh). Across all surveys, 50 species of fish, including four species of special concern, have been captured. Emerald and spottail shiners were numerically abundant in all surveys (each species representing >11% of the total catch each year), while in recent years yellow perch (22% in 2003) replaced alewife (39% in 1989) as the single most numerically abundant species across surveys. Angler creel programs have been run by Ontario Ministry of Natural Resources (1959–1960; 1974–1080; 1992; 2002) and Michigan Department of Natural Resources (1983–1985; 2000–2004) at varying seasonal and spatial intensity. Overall angler effort was highest during the 1980s (~150,000 rod hours per year), but declined to about 70,000 hours per year after 1990. Walleye are by far the most sought-after species by anglers in the Detroit River (78–93% of targeted effort between 2000 and 2003). In 2003, catch rates (i.e., catch per unit effort) for walleye in the Detroit River (0.85 fish per hour) were higher than those reported for western Lake Erie (0.55 fish per hour), the St. Clair River (0.41 fish per hour), or Lake St. Clair (0.32 fish per hour).

Detroit River fish habitat associations survey (Photo courtesy of Nicolas Lapointe).

Priority must be given to standardizing methods employed across years and between jurisdictions to ensure that resource managers have sound information to support decision-making. Due to the importance of the fishery of the Detroit River and western Lake Erie, the intensity of fishing effort, and the economic value of both sport and commercial fishing, greater priority should be given to fishery monitoring in the corridor.

Further, agencies should consider making monitoring explicit in their budget process.

Hawk migration monitoring by Southeastern Michigan Raptor Research and Holiday Beach Migration Observatory provides insight into environmental health on a continental scale. Under the direction of Southeastern Michigan Raptor Research, hawk watch monitoring has been underway since 1983 (Cypher, Section 6.6).

The count season of Southeastern Michigan Raptor Research begins on September 1 and concludes on November 30 each year. A professional counter, along with volunteers, staffs the count site every day during daylight hours. All data are entered into the Hawk Migration Association of North America's Raptors Online database at www.hawkcount.

org. In addition, the data are posted on the website of Southeastern Michigan Raptor Research at www.smrr.net.

Since 1983, more than three million birds representing 23 species have been recorded. This 12-year database shows significant increases in peregrine falcons, osprey, bald eagles, and turkey vultures. In addition, the database shows a general upward trend in red-shouldered hawks, although recruitment is very poor for this species. More research needs to be performed to identify why recruitment of this species has been poor. Other needed improvements include expansion of banding programs, more funding for paid staff, and expanded public outreach.

Aerial canvasback surveys have been performed on Lake St. Clair, the Detroit River, and western Lake Erie since 1974 (Robison, Section 6.7). Michigan Department of Natural Resources has worked with U.S. Fish and Wildlife Service and the Canadian Wildlife Service to estimate numbers of canvasbacks on major staging areas prior to arrival of most birds on the wintering grounds.

Canvasback surveys are conducted using one observer (plus a pilot) from a fixed-wing aircraft, flying 160–200 km/h at 45–60 m altitude. Observers record all canvasbacks roosting, feeding, or flushing from water bodies. Surveys are usually conducted between November 3 and 10. Based on these and other surveys, the Upper Mississippi River (mostly pools 7–9), Lake St. Clair, Detroit River, and Long Point, Ontario remain the major staging areas for canvasbacks in early November. For the second consecutive year, most of the canvasbacks on Lake St. Clair were seen on the Canadian side. Both the Michigan side of Lake St. Clair and Long Point, Ontario had near record or record low counts of canvasbacks. The May Breeding Population Survey indicated 558,000 canvasbacks in 2003, 15% above the 2002 estimate and one percent below the long-term (1955–2002) average. Canvasback surveys provide critical life-cycle information from staging and wintering areas, and must be continued to support continental management of canvasback populations.

The bald eagle is an endangered species and a key indicator of aquatic ecosystem health. Bald eagle monitoring is performed by Bird Studies Canada, in cooperation with U.S. Fish and Wildlife Service and Ontario Ministry of Natural Resources. Long-term monitoring has shown that bald eagles were almost extirpated by the 1980s (Laing and Badzinski, Section 6.8). Both the number of nests and nesting successes have increased dramatically during the last two decades, particularly on the Canadian side. While this reproductive success is encouraging, there still remains concern for the viability and long-term stability of the population in this region.

Bird Studies Canada is now partnering with the Ontario Ministry of Natural Resources and Canadian Wildlife Service on a new program called Destination Eagle to determine where juvenile eagles are becoming exposed to certain heavy metals. Satellite telemetry is being used to track eagle movements in support of better management. Such bald eagle monitoring must be continued to track this endangered species and to support both wildlife and contaminant programs. Canadian and U.S. efforts could be better coordinated through collaboration on bald eagle indicator reporting and outreach activities.

This Biomonitoring Session provided excellent examples of long-term monitoring programs that could help further comprehensive, ecosystem-based management. The

data from these programs should be made more accessible. Findings from these programs should be communicated more widely, including translation and interpretation for policy-makers. Priority must be given to ensuring the continuity and consistency of these programs. The efforts of nonprofit organizations (e.g., Southeastern Michigan Raptor Research) to build the capacity for long-term monitoring should be encouraged. For example, Steinman and Ogdahl (2004) have documented the value and benefit of the Muskegon Research Fund—a creative mechanism to secure funding for monitoring to raise community awareness and accelerate necessary cleanup. However, governments must undertake some programs, and long-term support for monitoring should be explicitly identified as a need in the governmental budget process.

Findings from these biomonitoring programs should be communicated more widely, including translation for policy-makers.

4.3. Volunteer Monitoring

Volunteer monitoring, or "citizen science," allows members of the public to become involved with efforts to improve the natural environment around them. It can range from counting birds, to taking and analysing water quality samples, to identifying amphibians by their calls. It provides a variety of benefits to those who take part by allowing people to participate in assessing the success of restoration efforts, and helps focus energy and desire on improving the environment. It can also provide valuable experience for young people and allow retired individuals to continue to put their professional skills to work. The most effective use of volunteer monitoring also provides benefits to environmental and natural resource managers. Frequently, cutbacks limit the amount of professional monitoring that can be undertaken by governments. However, if steps are taken to ensure quality control, volunteer monitoring can aid in assessing the effectiveness of restoration efforts. In some programs, quality control may be difficult to verify, but because so many individuals take part, the data are valuable and reliable.

The volunteer monitoring programs highlighted at the 2004 State of the Strait Conference covered the spectrum of volunteer monitoring opportunities associated with the Detroit River. The Christmas Bird Count and Project Feederwatch programs were outlined by a representative of Parks Canada. The Christmas Bird Count is the oldest volunteer monitoring effort in the world. It takes place on both sides of the Detroit River and throughout North America. The Friends of the Rouge presented details of their volunteer frog and toad survey, which for several years has used volunteers to gather amphibian population data from local sites. The Stream Team spoke about their history of working with high school students to teach science with real-world applications, while raising student awareness of environmental issues. Finally, Bird Studies Canada discussed their Marsh Monitoring Program, which recruits and trains volunteers to gather bird and amphibian population data in order to monitor the ecological integrity of Great Lakes wetlands, including those in the Detroit River. In addition, all conference registrants were provided with an outline of volunteer monitoring opportunities in the Detroit River watershed. This was intended to inform members of the public about the many opportunities to put their enthusiasm for the Detroit River into action, while providing professionals with information that they can make available to their colleagues or contacts.

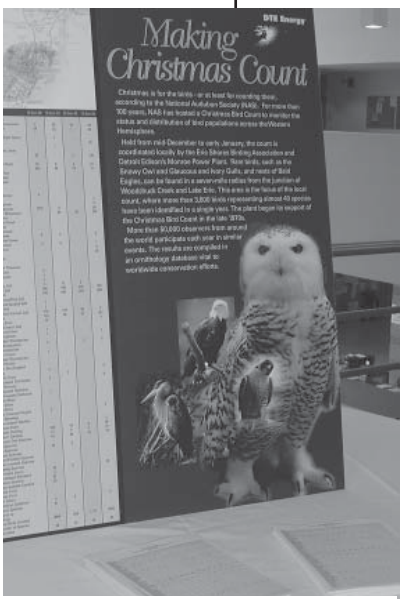
The Christmas Bird Count began more than one hundred years ago. Each year, approximately 50,000 volunteers in North America and abroad count more than 63

million birds during a 24-hour period. The project is coordinated by the Audubon Society, and implemented locally by organizations such as Point Pelee National Park and the Ojibway Nature Centre. Another major bird count effort is Project Feederwatch, which is much younger than the Christmas Bird Count, but still includes approximately 15,000 participants who count and identify the birds that visit feeders at their homes, nature centres, schools, and institutions. The volunteers' data are collected by Cornell University, Bird Studies Canada, the National Audubon Society, and the Canadian Nature Federation, who use this information to detect long-term trends in bird population health (Rupert, Section 6.9).

Volunteer monitoring, or "citizen science," allows members of the public to become involved with efforts to improve the natural environment around them.

As the name implies, the focus of the Friends of the Rouge (FOTR) is the Rouge River, a tributary of the Detroit River. Both the Detroit and Rouge Rivers have been designated "Areas of Concern" (AOC) by the International Joint Commission, and this provides the Detroit River with the dubious distinction of being the only AOC with another AOC as its tributary. The FOTR has coordinated watershed-based amphibian monitoring programs since 1998. Volunteers are provided with training, and then they monitor local wetland areas for frogs and toads by sound. These efforts have allowed FOTR to collect species diversity data, which can then be provided to local environmental management officials. This effort also creates an interested and educated populace that can encourage their government representatives to take steps to protect and restore this watershed (Petrella, Section 6.10).

For ten years the Stream Team has brought together more than 50 school and community organizations to undertake environmental monitoring and ecological restoration in the Detroit River's downriver watershed. Their efforts have included extensive scientific testing (the results of which have been accepted as scientifically sound) and have been successful in bringing several serious environmental concerns to the attention of management officials. The Stream Team recently worked out an agreement with the Michigan Department of Environmental Quality to use Stream Team-collected data on an ongoing basis as part of the State's downriver management strategy. The Stream Team has also harnessed their volunteer force to implement biological control of purple loosestrife, stream bank stabilization, tree plantings, and litter clean-ups (Szczechowski and Nasarzewski, Section 6.11).



Monroe Christmas Bird Count poster at the 2004 SOS conference (Photo courtesy of A. J. Kirkpatrick).

The focus of the Marsh Monitoring program is to conduct surveys of wetlands in Areas of Concern within the Great Lakes region, including Detroit River wetlands. Volunteers receive extensive training, and then monitor the annual abundance of marsh-dependent bird and amphibian species in designated areas. This Bird Studies Canada-coordinated program has been in place since 1995. It supports government efforts to assess ecological integrity in the Great Lakes basin and detect any trends early. The program also seeks to compare AOC with non-AOC marshes and investigate species-habitat associations. The results are used and distributed by government agencies, primarily Environment Canada and the U.S. Environmental Protection Agency, as part of AOC Remedial Action Plan implementation efforts (Crewe and Timmermans, Section 6.12).

The volunteer monitoring programs presented at the conference are only

a few of many "citizen science" opportunities available to members of the public who are interested in improving the health of the Detroit River and its watershed. However, several actions are required in order to more fully and effectively utilize this resource. First, government and agency representatives must begin to consider how they can make fuller use of public monitoring efforts. For example, lay people can easily learn methods of benthic sampling that can lead to a more comprehensive understanding of the health of the Detroit River's benthic community. Secondly, organizations that undertake volunteer monitoring must ensure that their results are as accurate and as scientifically defensible as possible. In some cases, this may mean retaining an expert to design the sampling program and to develop quality control measures. In other cases, it may mean that government agencies and volunteer monitoring coordinators should work more closely together to ensure that each are meeting the needs of the other. Finally, information about volunteer monitoring opportunities must be made more readily available to the public. This began at the conference, where a list of volunteer opportunities was distributed. However, this list is incomplete, and there are no plans to maintain it on an ongoing basis. There should be a central location, or perhaps one location on each side of the border, where members of the public who are interested in Detroit River volunteer opportunities can access information. This information should be shared among all organizations working on the Detroit River so that volunteers can be steered to a centralized location with complete, accurate volunteer information. With a little effort, the public's energy and desire to contribute can be harnessed to the greatest extent possible to support the effort to restore the Detroit River and its watershed to their natural states.

Stream Team monitoring benthic invertebrates (Szczechowski and Nasarzewski, Section 6.11).