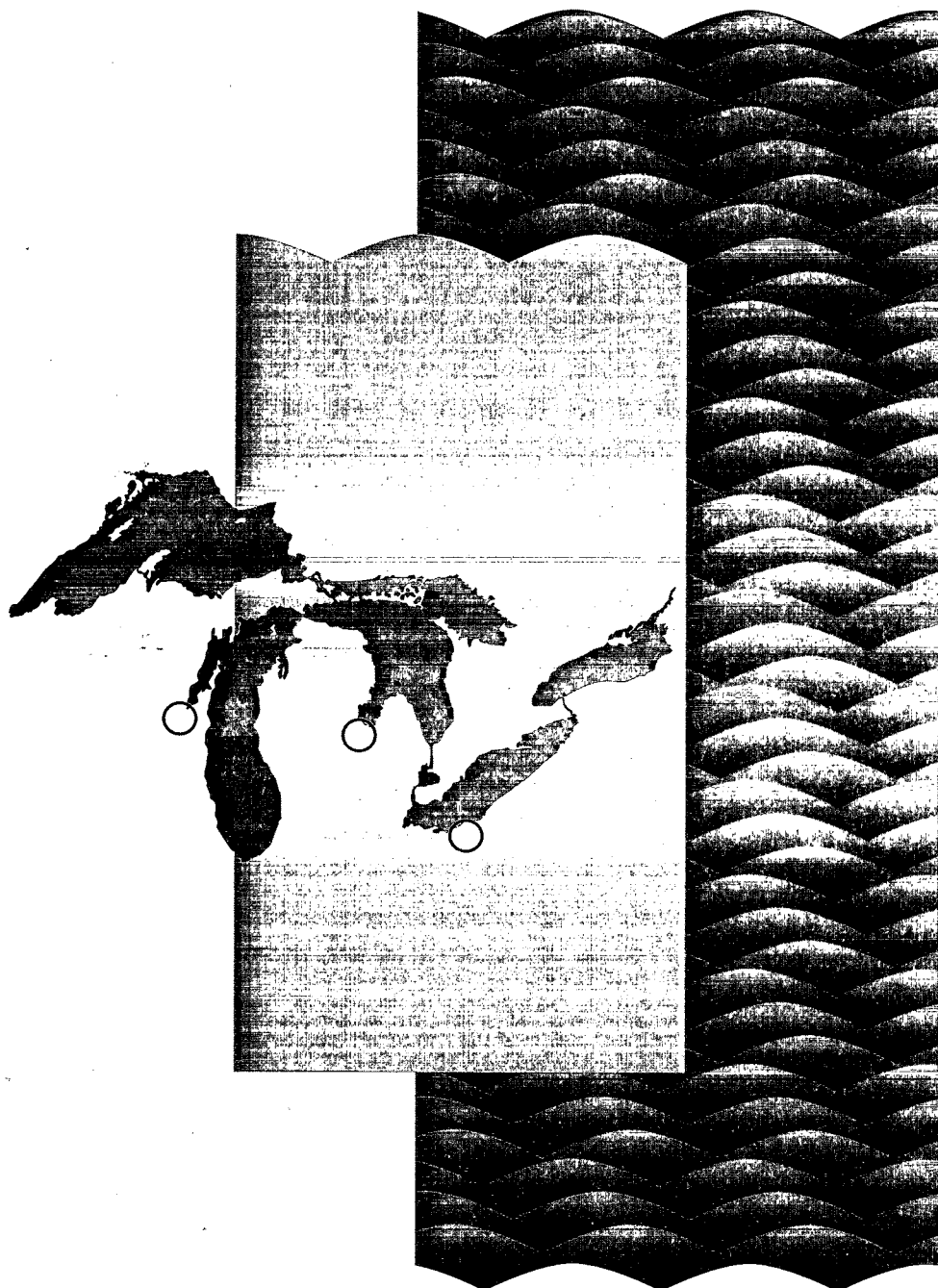
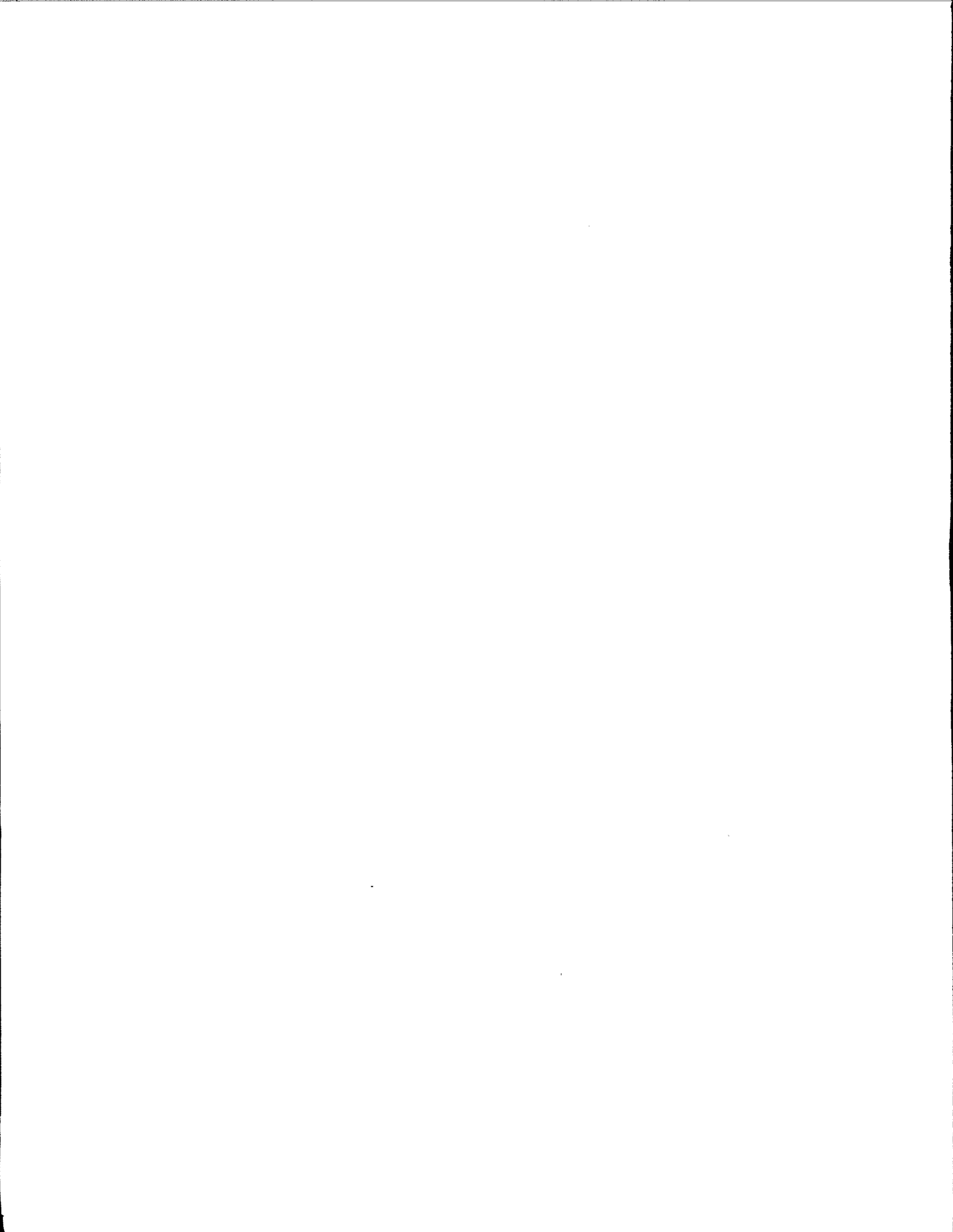




# PROTECTING THE GREAT LAKES

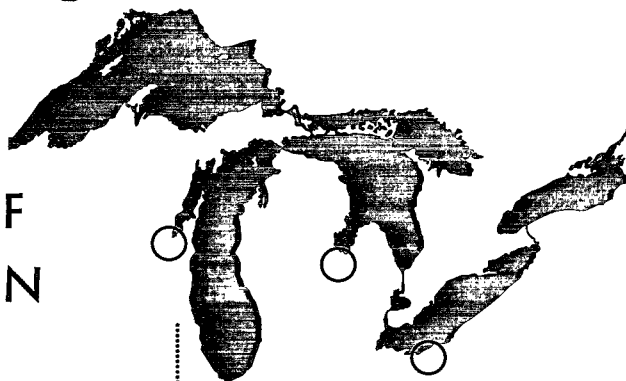
## The Costs and Benefits of Reducing Toxic Pollution in Three Communities





# PROTECTING THE GREAT LAKES

## THE COSTS AND BENEFITS OF REDUCING TOXIC POLLUTION IN THREE COMMUNITIES



### CASE STUDIES SHOW BENEFITS OUTWEIGH COSTS

EPA recently issued common-sense guidelines to reduce toxic pollution in the Great Lakes and ensure protection for the environment and people living in the area. Will this protection come at a reasonable cost? Results from a detailed evaluation of impacts for three communities in the region reveal that public health and environmental benefits will outweigh the costs of achieving those reductions.

The three communities evaluated were the Fox River near Green Bay, Wisconsin; the Saginaw River near Bay City, Michigan; and the Black River near Cleveland, Ohio. Information on the case study results is provided.

### PROTECTING PUBLIC HEALTH

The Great Lakes are a priceless treasure, containing 95% of the fresh water in the United States, and 20% of the fresh water in the world. Over 23 million people depend on the Great Lakes for drinking water. Overall, more than 40 million people live in the surrounding basin, including nearly 20 percent of the U.S. population and 50 percent of the Canadian population.

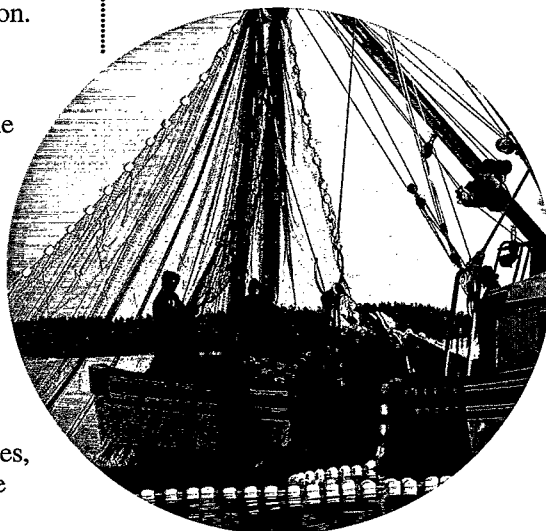
### PROTECTING THE ECONOMY

The Great Lakes are vitally important to the regional economy, and the surrounding basin is a major industrial and agricultural center. It sustains nearly 11% of the total employment and 15% of the manufacturing employment for the entire United States and Canada. With more than 94,000 square miles of navigable water, the Great Lakes support a thriving and robust recreational industry. About one million boats operate each year generating direct spending of more than \$2 billion. Surveys show that over 2.5 million anglers fished in the Great Lakes in 1991, with total expenditures of \$1.3 billion.

Fishing and boating can be very important revenue sources for local communities. For example, Saginaw Bay provides 16 public access sites, 17 state, county, and local parks and campgrounds are located along the shore.

### TOXIC POLLUTANTS — A LONG TERM HEALTH PROBLEM

Toxic pollutants can be a serious public health threat because they build up, or bioaccumulate, in the bodies of people and animals that eat fish, increasing the risk of cancer, birth defects, kidney disorders, and reproduction damages. Once in the environment they can remain there for hundreds of years.



## THE LOWER FOX RIVER AND GREEN BAY CASE STUDY SITE

The Lower Fox River and Green Bay are in northeastern Wisconsin an area, that is both heavily industrialized and highly agricultural. Dairy farming is prevalent in much of the watershed, while the river's banks hold the highest concentration of pulp and paper mills in the world.

Over 40 industries and ten municipalities discharge wastewater into the Lower Fox River drainage basin. Nineteen of these facilities are considered major dischargers (i.e., facilities that discharge more than one million gallons of wastewater per day).

Toxic pollutants, particularly PCBs, have caused widespread effects in the area. Fish consumption advisories are in effect for many species due to cancer risk. A consumption advisory is also in effect for mallard ducks. PCB-contaminated sediments are a major problem, with some levels being high enough to meet the definition of hazardous waste under Superfund.

Despite these problems, demand for recreational opportunities continues to be high. Many people engage in fishing, boating, bird-watching and hunting.



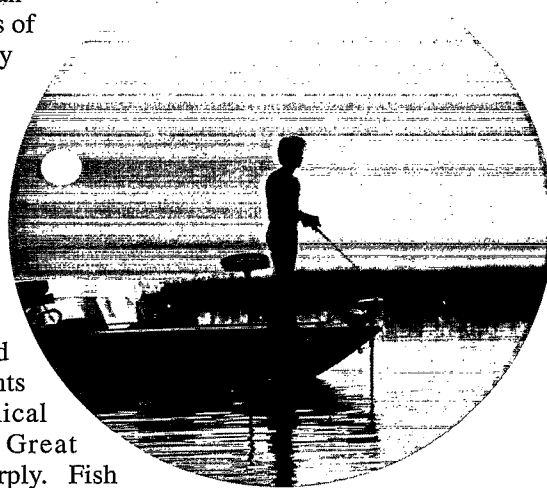
## PROTECTING THE ENVIRONMENT

The Great Lakes which form the north coast of the United States include over 4,500 miles of coastline, six national parks and lakeshores, six national forests, seven national wildlife refuges, and hundreds of State parks, forests, and sanctuaries. These unique natural resources provide renowned recreational opportunities, priceless aesthetic beauty, and diverse ecological habitat. Hundreds of species of mammals, birds, fish, reptiles, and amphibians and untold thousands of plant species are native to the basin.

### A LANDMARK CONSENSUS EFFORT

Over the past 30 years, concern has grown about the harmful effects of toxic pollutants on human health and the environment in the Great Lakes Region. Of special concern are bioaccumulative toxic pollutants. These pollutants can be a serious threat because they build up in the bodies of people and animals that eat fish, increasing the risk of cancer, birth defects, kidney disorders, and reproductive damages. Once these pollutants are in the Great Lakes they can remain there for hundreds of years. Thus, actions today will affect the quality of life for many future generations.

In the 1970s, the United States began to reduce the amount of toxic pollutants entering the Great Lakes, and scientists have observed tremendous improvements since that time. Chemical concentrations in the Great Lakes have dropped sharply. Fish have returned to some harbors from which they had disappeared. Bald eagles have gone from endangered status to nearly the highest number ever measured in Michigan. The number of double-crested cormorants, a water bird that all but vanished in the Great Lakes in the 1970s, has climbed to 12,000 nesting pairs.



While progress has been made, it is clear that more needs to be done. Throughout the Great Lakes people are still advised to limit the amount of fish they eat, and researchers still see the effects of toxic pollutants on fish and wildlife populations.

The eight States which border the Great Lakes have recognized the need to work together on common-sense, cost-effective solutions to reduce the harmful effects of toxic pollution. In the late 1980s, EPA was asked to develop a consistent approach for achieving these reductions. By working in partnership with the States as well as affected municipalities, industries and the public, EPA developed the Great Lakes Water Quality Guidance (Guidance). The Guidance was released in 1995, and States and Tribes are now focused on implementation.

## FINISHING THE JOB: FINDING ALL SOURCES OF POLLUTION

The primary purpose of the Guidance is to provide a consistent level of protection for people and wildlife who may be exposed to toxic pollutants from the Great Lakes. To accomplish this, the Guidance establishes protective levels, or water quality criteria, for toxic pollutants from all sources. Toxic pollutants enter the basin from factories and sewage plants discharging wastewater into the Great Lakes or their tributaries as well as from other diffuse sources, such as air deposition, chemically-contaminated bottom sediments, urban and agricultural runoff, hazardous waste and Superfund sites, and waste or product spills.

The Guidance provides management options for reducing toxic pollution from factories and sewage treatment plants. It also provides alternatives for taking other sources into account. This approach provides States and Tribes with flexibility in determining how to best reduce toxic pollution and improve water quality. For example, they may choose to reduce air emissions or clean up sediments rather than require end-of-pipe wastewater treatment technology. This approach encourages more cost-effective, common sense solutions, such as:

- minimizing the pollution created in the first place so that toxic effects and cleanup costs can be avoided;
- cleaning up contaminated sediments that continue to pollute the Great Lakes because of past practices; and
- using multi-media, basin-wide approaches to control various sources of toxic pollution.

The Guidance is just one of several efforts underway to reduce toxic pollution in the region. EPA, the Great Lakes States, Tribes, and other federal agencies are pursuing a program to identify, prevent and further reduce toxic discharges through implementation of the 1992 Great Lakes Five-Year Strategy.



## THE SAGINAW RIVER/SAGINAW BAY CASE STUDY SITE

The Saginaw River and Saginaw Bay are located in east central Michigan.

One hundred and fifty-five factories and municipalities discharge wastewater into the waters of the Saginaw River and Bay. Factories in the area produce food products, metal products, chemicals, rubber, and plastics. Twenty-eight facilities are considered major dischargers. The Saginaw River and Bay are important commercial shipping channels.

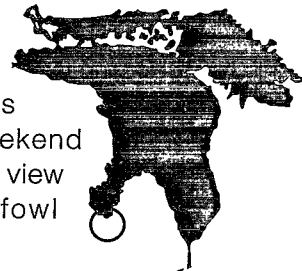
Toxic contamination from PCBs, dioxins, and heavy metals is both a historic and current problem. Sediments contaminated with these pollutants are a primary concern.

High levels of PCBs and dioxin have caused fish advisories. The Michigan Department of Health issued an advisory against eating carp and catfish in 1976. This advisory was extended to all species in 1978 (however, it was relaxed to some degree in 1986).

Sport fishing is strong in the area. The walleye fishery is growing, and several walleye tournaments are held every year. Hunting is also very popular.

Approximately 18,000 acres of coastal wetlands provide waterfowl habitat. The Bay lies in a key migration corridor for Canada geese, and tundra swans.

Birdwatching is popular, and weekend crowds gather to view arrival of waterfowl each spring.



## GENERAL DESCRIPTION OF THE BLACK RIVER CASE STUDY AREA

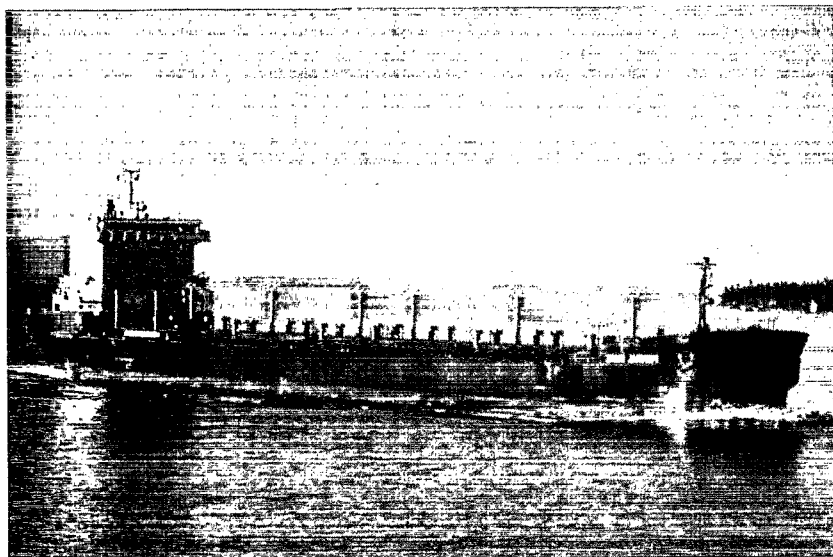
The Black River is in Lorain County Ohio, just west of Cleveland, in an area that is primarily agricultural.

Water quality has been heavily affected by sewage plants and factories. There are 32 sewage plants and facilities that discharge wastewater in the area. Five of these are considered to be major dischargers.

The lower Black River is a shipping channel with a total of 12.4 million tons of goods shipped through nearby Lorain Harbor in 1991. Other industrial uses include process waters for manufacturing and cooling, predominantly by steel mills.

Polyaromatic hydrocarbon (PAH) discharges and PAH contaminated sediments are a major concern in the Black River. PAH contamination led to the issuance of a fish consumption and primary body contact (e.g., swimming) advisory for the lower five miles of the Black River in August of 1993. The advisory is still in effect.

Recreational use of the Black River is limited by poor water quality and related concerns for human health. Currently, there is very little angling even though sport fishing is quite popular in nearby locations. The river and its branches are available for seasonal canoeing.

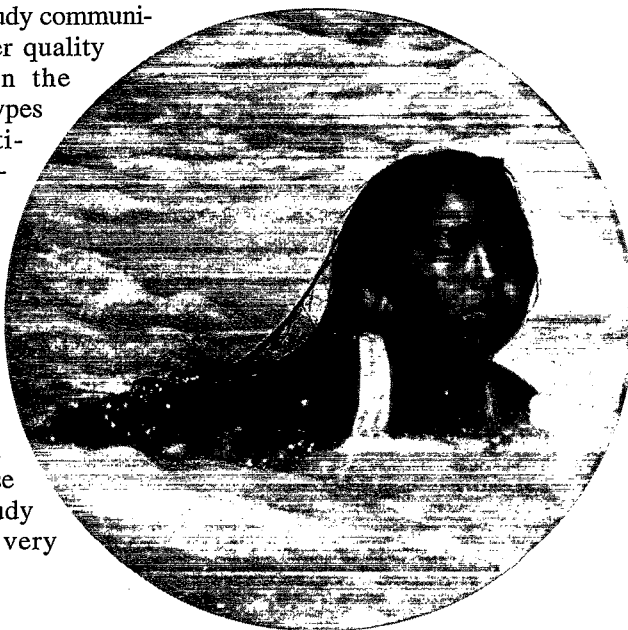


## CASE STUDY APPROACH EVALUATED COSTS AND BENEFITS

EPA undertook the three case studies to estimate the costs and the benefits of implementing the Guidance. Case studies are commonly used by the government and the private sector to estimate costs and benefits where an analysis of cumulative impact (in this case, every community in the region) is not feasible. These case study sites were selected on the basis of:

- data availability,
- geographic location,
- water quality conditions, and
- similarity to other communities in the region.

EPA evaluated the improvements that would be necessary in order for the nearly 300 affected sewage plants and factories in the case study communities to meet the water quality criteria specified in the Guidance. Several types of benefits were estimated, including public health (e.g., cancer prevention), recreation (e.g., improved fishing), and nonuse categories (e.g., wildlife preservation). The value of these benefits were determined based on survey data from those living in the case study areas or areas with very similar characteristics.



## CASE STUDIES REFLECT RANGE OF COSTS

The result of the case study analyses show yearly costs of implementing the Guidance are about \$3.6 million in the Fox River and Green Bay, \$2.6 million in the Saginaw River and Saginaw Bay, and \$2.1 million in the Black River. (For the entire Region, the costs were estimated to be between \$61 million and \$ 376 million).

## IMPROVED WATER QUALITY YIELDS PUBLIC HEALTH AND ECONOMIC BENEFITS

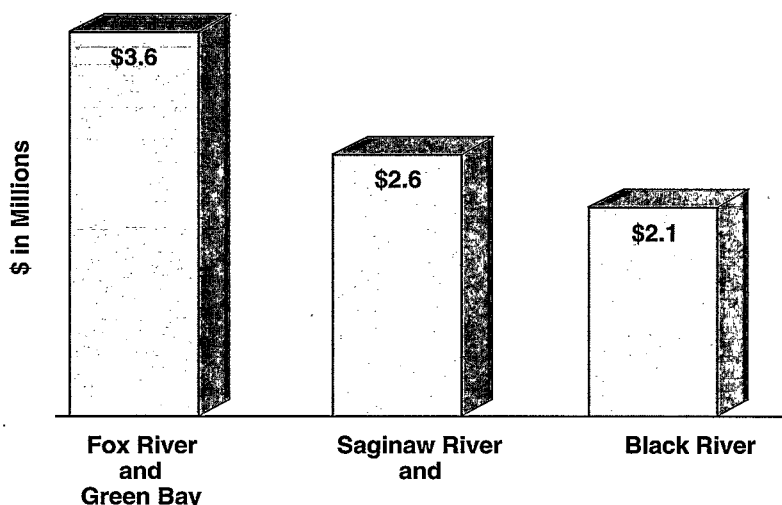
The waters in the three case study areas and throughout the region will be cleaner after the Guidance is implemented, resulting in less mercury, PCBs and toxic pesticides in the fish, wildlife and people. EPA estimates that implementation will reduce toxic pollutants from factories and sewage plants by 28% in the Fox River and Green Bay, 60% in Saginaw River and Saginaw Bay, and 37% in the Black River each year.

Pollutants expected to be reduced include metals (aluminum, mercury, lead, and arsenic), pesticides (dieldrin, DDT) and other chemicals, such as PCBs and hexachlorobenzene. (Estimates of basin-wide toxic reductions range from 5.8 million to 7.6 million pounds a year).

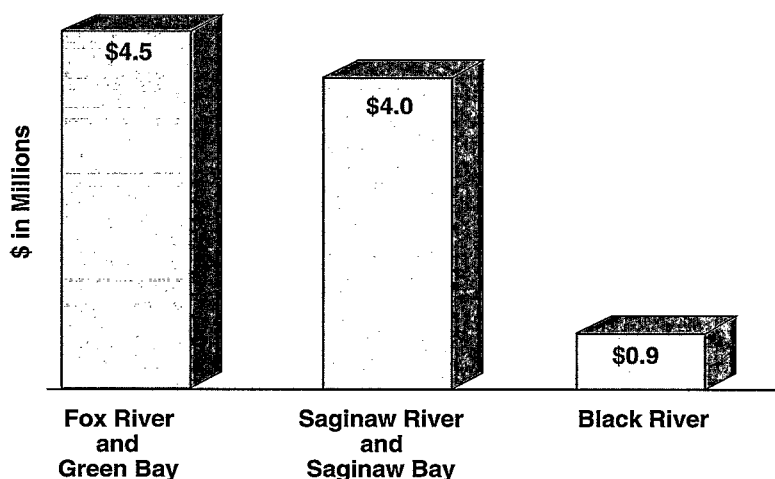
As noted previously, these projected point source pollutant reductions only address part of the problem as other sources are being addressed through other EPA or State actions.

The value associated with these pollutant reductions were then estimated based on relevant survey data. Average benefits are estimated at \$4.5 million in the Fox River and Green Bay, \$4.0 million in the Saginaw River and Saginaw Bay, and \$0.9 Million in the Black River.

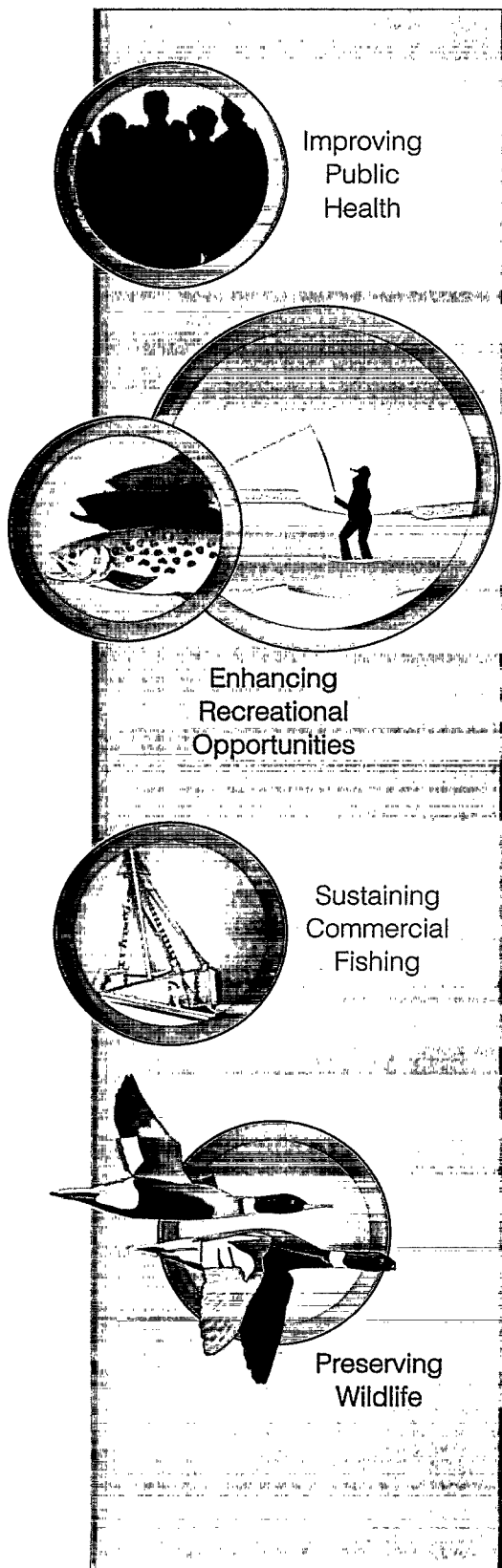
Cost of Reducing Toxic Pollution



Economic Benefits From Reducing Toxic Pollution



## THE GREAT LAKES INITIATIVE BENEFITS SOCIETY BY...



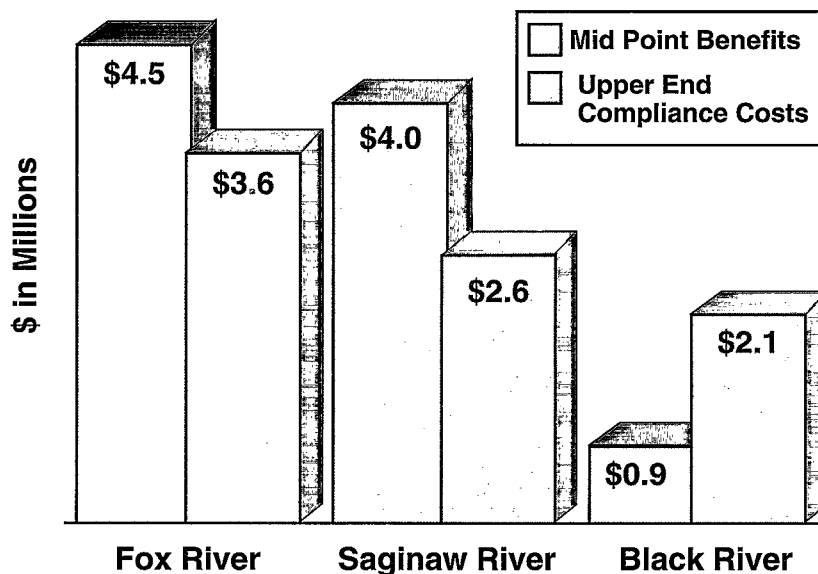
## BENEFITS AND COSTS COMPARED

The full range of benefits to be expected from reducing toxic pollution in the Great Lakes cannot be fully captured using current economic evaluation data and methodologies. Nonuse benefits, such as wildlife preservation, are particularly difficult to quantify and monetize. It is also difficult to quantify and monetize non cancer health benefits (e.g., reduced birth defects). Nevertheless, results from the case-study analysis demonstrate that the steps being taken to reduce toxic pollution to the Great Lakes will benefit communities and these benefits are commensurate with the projected costs.

Projected benefits in the case study communities are measurable and substantial, but some question whether they are affordable. An independent basin-wide analysis of the economic impact (performed by DRI McGraw-Hill in July 1993 for the Council of the Great Lakes Governors) shows implementation costs will have a negligible impact on the region's economy. It is important to note that this conclusion was based on an evaluation of the proposed Guidance; EPA reduced these costs by 80% before issuing the Guidance in final form.

Based on its analysis, EPA concluded that the costs imposed by implementing the Guidance will almost certainly be offset by the projected benefits. These benefits include improved human health, especially for the 2.5 million sports anglers and those people who because of cultural or economic reasons, eat large amounts of fish; enhanced recreation and tourism which generates \$70 billion for the region every year; and an increase in commercial fishing which generates an additional \$270 million in revenues annually.

Comparison of Costs and Benefits



## ADDITIONAL INFORMATION

The cost benefit analysis and the assumptions that were used are described in detail in the EPA publication, The Costs and Benefits of Reducing Toxic Pollution in the Great Lakes (EPA 820-K-95-002, December 1995) or from the actual regulatory impact analysis, entitled Regulatory Impact Analysis of the Final Great Lakes Water Quality Guidance (EPA 820-B-95-001, March 1995).

Copies of these reports can be obtained by calling (513)489-8910 or by writing the United States Environmental Protection Agency, National Center for Environmental Publications and Information, 11029 Kenwood Road, Cincinnati, Ohio 45242.

For more information regarding the benefits and costs of the Great Lakes Water Quality Guidance, contact:

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