

A scenic view of a rocky coastline. In the foreground, a small, dark, pebbly pier extends into the water. Two people are standing on the pier, looking towards the water. The water is a deep blue, and the sky is a pale, hazy blue. In the distance, a large white and yellow ship is visible on the horizon. The right side of the image is dominated by a steep, rocky cliff covered in lush green trees and bushes. The overall scene is peaceful and natural.

The Great Lakes:

**A waterways
management
challenge**

A scenic view of a rocky shoreline. In the foreground, a person wearing a red cap and a dark jacket is standing on a large, dark rock, fishing. To the left, a red life jacket is resting on another rock. The background shows a calm body of water under a clear blue sky, with several tall, thin evergreen trees on the left side.

At the heart of our lives

One way or another, the Great Lakes are at the heart of the lives of over 33 million North Americans, both at work and at play. Millions more are supported by the industries, agriculture, and natural resources of the continent's "Fourth Seacoast." Recreational boating, fishing, lake cruises, beaches, parkland and the pleasure of a water view enhance our lifestyles and our health.

Much of what we take for granted would not be possible without the Lakes. Our climate, the abundance of fresh water for personal, agricultural and industrial uses, our busy—and cost effective—trade with the rest of the world all derive from Great Lakes waters. We have the know-how, and the obligation to use them wisely.

The value of the Great Lakes to the U.S. and Canada is immense. Most importantly, they provide drinking water for the millions of residents of the cities and towns that embrace the Great Lakes shorelines. The Lakes also support a wealth of recreational opportunities and an efficient and environmentally friendly marine transportation system for industries and businesses. Combined with the St. Lawrence Seaway, and a gateway to the Mississippi River System, the Lakes are the Midcontinent's trade link to markets around the world. This marine trade system annually handles more than 200 million net tons (180 million metric tons) of cargo.

The Great Lakes: A valued resource



As a recreational asset, the Great Lakes are unmatched. These waters are home to millions of Canadian- and U.S.-registered boats, perhaps the largest pleasure fleet in the world. Estimates of the annual economic impact of the Great Lakes sport fishery alone range from \$4 billion to \$7 billion.

Clearly, a large number of interests and people converge at the Great Lakes. Industries here account for more than a third of the combined Canadian and U.S. gross national product. The area generates more than 50 percent of America's and two-thirds of Canada's manufacturing output.

Growing populations, thriving trade, increasing recreational use, and environmental considerations have all intensified the pressures on the Lakes. Although they have demonstrated an amazing resilience, regular reminders of the Great Lakes' ecological fragility still occur. Management of the Great Lakes has thus become an increasingly complex function.

Recognizing this, a diverse group of interests convened in March 1999 to create the Great Lakes Waterways Management Forum. To date, the Forum consists of 26 members from various U.S. and Canadian agencies and organizations, representing both governments and the private sector. The Forum was established to help ensure that the Great Lakes remain economically viable, safe for all users, and environmentally sound. Its primary purpose is to identify and develop operational solutions that maintain or improve the value of the Great Lakes for everyone.

This publication was produced to define the unique challenge of waterway management in the Great Lakes, identify the people and organizations involved in this task and inform Great Lakes area residents about the waterways management issues that affect their lives.

Greater understanding is the first step towards ensuring responsible use and management of our waters, a goal toward which we can all work.

Great Lakes/ Seaway shipping

The Great Lakes and St. Lawrence River have been major North American trade arteries since long before the U.S. or Canada achieved nationhood, when the first cargoes were floated by Native North Americans. Today, this integrated navigation system serves miners, farmers, factory workers and commercial interests from the western prairies to the eastern seaboard.

In its entirety, the Great Lakes/Seaway System stretches over 2,000 miles (3,700 kilometers) from the Gulf of St. Lawrence on the Atlantic coast to the tip of Lake Superior at Duluth, MN/Superior, WI.

Virtually every commodity imaginable moves on the system. The annual commerce exceeds 200 million net tons (180 million metric tons), and there's still ample room for growth. Some commodities are dominant:

- Iron ore for the steel industry
- Coal for power generation and steel production
- Limestone for the construction and steel industries
- Grain for overseas markets
- General cargo, such as iron and steel products and heavy machinery
- Cement and salt for the construction industry and municipalities

The primary shipping vessels fall into two main groups: the resident Great Lakes bulk carriers, or "lakers," and ocean ships, or "salties." U.S. and Canadian lakers move cargo among Great Lakes ports, with both nations' laws reserving domestic commerce to their own flag carriers. Salties flying the flags of other nations connect the Lakes with all parts of the world. The Great Lakes are also linked to the U.S. inland river navigation system, via barge transport through Chicago and the Illinois Waterway to the Mississippi River.

The Great Lakes/Seaway System is a big system with big statistics. Commercial vessels trading in its waters include 65 large U.S. lakers, 90 Canadian lakers, nearly 550 St. Lawrence Seaway saltwater arrivals per year, and about 50,000 barges connecting with the rivers. To realize the magnitude of this commerce, consider the impact of some typical cargoes:

- One 1000-foot-long U.S.-flag Great Lakes vessel carries enough iron ore to take 4,800 tractor trailers off the road.
- A similar "super laker" carries enough coal to power Greater Detroit for one day.
- A Seaway-size vessel moves enough wheat to make bread for every resident of New York City for nearly a month.

For every ton of cargo, there are scores—often hundreds—of human faces behind the scenes. On board, there are the mariners themselves, while shoreside there are lock operators and longshoremen, vessel agents and freight forwarders, ship chandlers and shipyard workers, stevedores and terminal operators, Coast Guard personnel and port officials, railroad workers and truck drivers—a wide web of service providers. In the steel industry alone, more than 400,000 direct and indirect jobs depend on Great Lakes trade.

Opened to navigation in 1959, the St. Lawrence Seaway portion of the system has moved more than 2.3 billion metric tons of cargo in more than 45 years, with an estimated value of \$285 billion Canadian (\$197 billion U.S.). Almost 24% of this cargo travels to and from overseas ports, especially Europe, the Middle East, and Africa.

From Great Lakes/Seaway ports, a multi-modal transportation network fans out across the continent. More than 40 provincial and interstate highways and nearly 30 rail lines link the 15 major ports of the system and 50 regional ports with consumers, products and industries all over North America.

Recognizing the potential of the St. Lawrence Seaway, a marketing initiative was launched to brand the Seaway/Great Lakes as "Hwy H₂O." Highlighting the advantages of marine transportation, this effort is sponsored by a coalition of stakeholders including many of the ports around the Great Lakes and the St. Lawrence River. The goal is to raise awareness of the Seaway/Great Lakes as a cost effective transportation corridor, with an existing infrastructure that can readily accommodate increased tonnage.



**An efficient,
environmentally-
friendly asset to the
regional economy**

The environmental

and safety benefits of water transportation

Great Lakes/Seaway shipping is an environmentally-friendly transportation system. Transportation being the leading energy use sector in North America, both its efficiency and its environmental impacts have become the focus of scrutiny and regulation.

Studies of the Great Lakes/Seaway System have shown that marine transport uses less fuel, has fewer emissions and is safer than either rail or truck for equivalent cargoes and distances. Their large cargo capacity relative to engine size and their operating characteristics make Great Lakes and Seaway vessels models of fuel efficiency. A laker, for instance, uses about one gallon of fuel per one ton of iron ore per round trip or 4.2 litres of fuel per metric ton per round trip.

As well as cost savings, this fuel efficiency translates into fewer emissions. Less air pollution comes from Great Lakes/Seaway shipping than from other sources in the region, with the added advantage of very low noise levels and few safety risks. Unique among the world's navigation systems, the ships and ports of the Great Lakes/Seaway System have an unparalleled safety record while keeping transportation costs competitive for the industrial and agricultural heart of North America.

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The waters of the Great Lakes

The Great Lakes states are home to 4.3 million recreational boats, or about one-third of all registered recreational vessels in the United States. Additionally, an estimated 1.2 million recreational boats are registered in the Canadian Province of Ontario. All told, a large number of these boats are used on Great Lakes waters.

Surprisingly, despite a relatively short boating season compared to the rest of the country, Great Lakes boaters manage to log a lot of hours on the water and contribute significantly to the regional economy. A recreational boating economic benefits study, conducted by the Great Lakes Commission for the Army Corps of Engineers concluded that the direct and secondary economic impacts of recreational boating in the Great Lakes states annually



Enjoyed by millions of recreational boaters, passenger vessels, anglers and tourists

amounts to over \$19 billion U.S. in sales, \$6.4 billion U.S. in personal income and 246,117 jobs.

Every weekend, power-boaters and sailors weigh anchor and head out for relaxation and family fun. Some may cruise only a day, while others opt for one- to two-week trips, exploring the furthest reaches of the Lakes.

For more adventurous and competitive boaters, nearly 1,000 regattas and sanctioned sailboat races are held annually on all the Great Lakes. Perhaps the most famous is the Chicago to Mackinac Island Sailing Race, an event that has been held annually for the past 107 years.

Despite the number of residents boating on the Great Lakes, the sport remains remarkably safe. The U.S. Coast Guard, state and local Marine Patrols, the Canadian Coast Guard and various volunteer

organizations patrol the waters, enforcing boating safety, responding to marine pollution alerts, and carrying out search and rescue operations.

Helping attract non-resident recreational boaters to the region are several protected and picturesque waterways leading into the Lakes. The St. Lawrence Seaway System and the famous Erie (New York State Barge) Canal provide routes from the East Coast and Hudson River, while the Illinois Waterway System links the Great Lakes with the Mississippi River. On the Canadian side, the Rideau Canal system connects the Ottawa River with the Lakes; the Trent-Severn Canal connects Lake Ontario with Lake Huron.

The region is well supplied with large and small marinas, pump-

annual events in many Great Lakes port communities.

Tourists are also drawn to the Great Lakes and the St. Lawrence Seaway by the spectacular Thousand Islands, Niagara Falls, and the ample number of parks and recreational areas in the region. National, state and provincial parks and historic sites around the Lakes accommodate more than 250 million visitors annually on both sides of the border. Tourism in the Great Lakes is a burgeoning industry that pumps billions of dollars into the region and generates tens of thousands of jobs.

Currently enjoying resurgence in the Great Lakes/Seaway System is overnight passenger cruising. Passenger service was a major industry in the Lakes through the first half of the century, but



out facilities and a host of other recreational boating services. In addition to the millions of privately owned recreational boats on Great Lakes waters, there are also about 300 commercial excursion vessels, dinner boats and ferries operating in the Lakes and their connecting channels.

While commercial fishing has greatly diminished in the Great Lakes over the past few decades, sport fishing thrives. One-third of American anglers live or enjoy their sport in the Great Lakes region, and nearly five million Americans and Canadians specifically fish the Great Lakes. Over 84 commercial fishing vessels are registered and inspected by Transport Canada Marine Safety.

On any given weekend, thousands of U.S. and Canadian charter fishing boats cast off with eager anglers. Great Lakes fishing has even emerged as a competitive sport; serious fishing tournaments are

cruise liners had all but disappeared by the 1970s.

Led by the cruise ship *C. Columbus*, which was the first such vessel to operate in the Lakes in over two decades when it arrived in 1997, a new generation of ocean cruise ships is now rediscovering the Great Lakes as an excellent cruise destination. Now, multiple passenger lines visit the Lakes, joining Canadian and American inter-lake cruise operations enjoying the advantages of being close to home and convenient transportation.

Also expanding on the Lakes are the Highway H₂O initiatives of cross-lake ferries on Lake Michigan and Lake Ontario. On both sides of the border, there is an increase in the total number of passengers enjoying the majestic beauty of the Lakes from dinner cruise vessels to sightseeing and excursion vessels.

Government provided services

in the Great Lakes/ Seaway System promote safety for recreation and commerce

A multitude of services ensure the safety of those who enjoy the Lakes, support Great Lakes marine transportation, and protect this vital natural resource. The Great Lakes are open for business and so are the many agencies that provide these services.

Though aimed at the needs of recreational boating, commercial shipping, and a variety of economic and environmental interests, marine-related services on the Great Lakes indirectly affect the lives of nearly all U.S. and Canadian citizens who live in the region.

The provision of services on the Great Lakes involves an extensive network of federal, state, provincial and municipal agencies and organizations on both sides of the border. In recent years, the U.S. and Canada have made considerable progress in opening communication, and in coordinating equipment and responsibilities to eliminate duplication and to provide services more efficiently.

Marine safety

Numerous agencies in the Great Lakes area look after a wide variety of tasks related to marine safety. Vessel inspection is carried out to enforce construction standards and compliance with safety regulations. There are agencies that oversee the competence of seafarers and issue licenses and certificates.

U.S. and Canadian agencies share responsibility for constructing and maintaining numerous navigation structures (such as breakwaters, piers, and jetties) and aids to navigation (from buoys, lights and channel markers to sophisticated electronic positioning systems used by large commercial vessels and recreational boaters) throughout the Lakes. They also operate marine communication and vessel traffic systems that coordinate the movement of commercial vessels in the waterway. U.S. and Canadian agencies also work together to provide complete nautical chart coverage of the Great Lakes as well as a sophisticated network of water level monitoring gauges throughout the Lakes.

The two countries share the job of investigating commercial



marine accidents, and maintain search and rescue capabilities covering all the Great Lakes. To prevent accidents and promote safe boating, they produce informational and educational materials, and enforce federal, state, provincial and local boating laws, such as the prohibition against boating while intoxicated.

Following enactment of the United States Maritime Transportation Security Act in 2002 (MTSA), the Canadian Marine Transportation Security Regulations (MTSR), and the IMO International Ship and Port Facility Security Code (ISPS), new security regulations were put in place to protect the region and its citizens from a waterborne terrorist attack.

Waterborne commerce

Both the U.S. and Canadian governments support the maintenance of a strong Merchant Marine on the Great Lakes and have structured a service network to carry out that commitment. Maritime trade in the Lakes is assisted, for instance, by icebreaking activities designed to maximize the shipping season and optimize operational conditions. For the same reason, both governments provide dredging services to ensure proper channel and harbor depths for commercial shipping throughout the Great Lakes/Seaway System.

Binational Great Lakes policy

Many policies related to U.S.- and Canadian-provided services on the Great Lakes involve the work of three unique binational bodies, the International Joint Commission, the Great Lakes Commission, and the Council of Great Lakes Governors.

The International Joint Commission (IJC) is an independent body formed by the two countries as part of the Boundary Waters Treaty of 1909. Since each country is affected by the other's actions in lake and river systems along their common border, the IJC regulates projects affecting such waters, and helps protect the environment in and around the Great Lakes.

The Great Lakes Commission (GLC) is an eight-state agency founded in state and federal law that represents the collective views of the Great Lakes states. An Associate Membership program also provides for Canadian provincial involvement and a binational focus. The Commission addresses a variety of issues involving environmental protection, resource management, transportation and economic development, and provides services ranging from policy development and regional advocacy, to communications, coordination and research.

The Council of Great Lakes Governors (CGLG) is a non-partisan partnership of the governors of the eight Great Lakes states. In recent years, the premiers of Ontario and Quebec have joined the CGLG as associate members. The CGLG's mission is to encourage and facilitate environmentally responsible economic growth. Toward that end, the CGLG has spearheaded regional efforts to develop priorities to protect and restore the Great Lakes and update the water management system.



Increasing demands

on the Great Lakes make environmental stewardship all the more important

co-operate closely on this common mission.

Contingency plans for large-scale and local marine pollution incidents are in place, and annual joint emergency response exercises ensure that the available technology and skills will be used to the best effect. These annual preparedness exercises are part of the terms of the Great Lakes Water Quality Agreement between the U.S. and Canada. Ongoing prevention activities help reduce the risk from vessel spills and other cargo discharges, including residue from loading and unloading operations.

The response to marine pollution incidents includes issuing alerts, reporting, investigation and the co-ordination of clean-up efforts. In addition, the two countries enforce marine environmental protection laws, monitor water quality, and monitor and protect wildlife and fish species in the Lakes.

The basin ecosystem has undergone fundamental changes since the time of the first large-scale settlements. Forests were cut, over-fishing occurred, farming began and industry geared up, relying



The Great Lakes-St. Lawrence River System is not just a commercial artery for an important region of North America. It is the largest reservoir of fresh surface water on earth. It is the largest reservoir of fresh surface water on earth. The amount of water in the Great Lakes is estimated to be 6 quadrillion gallons (22.8 quadrillion liters). The St. Lawrence River has an average annual flow rate of 240,000 cubic feet per second or 6,800 cubic meters per second. These waters are also the foundation of a diverse and unique basin-wide ecosystem. Management and protection of the Great Lakes and St. Lawrence River is a high priority for the federal, provincial and state and local governments in the region.

Environmental protection

Environmental protection services on the Great Lakes work to reduce the threat of pollution and ensure an environmentally sound waterway system. All levels of government and the marine industry

on abundant natural resources and the wealth of human capital. Initially, these human activities had a large detrimental impact on natural systems in the Great Lakes area.

Much progress has been made in rectifying past abuse through pollution abatement and resource conservation measures. Still, much work remains to be done to deal with contaminated sediments, restore aquatic ecosystems, and alter animal and plant populations and urban development patterns that add to local environmental problems.

The shore areas of the Great Lakes/St. Lawrence System are where development meets the water and current land use activities are responding to improved water quality and industrial restructuring. Water has always had an appeal for home buyers, but use of the waterfront by recreational boaters, park visitors and commercial interests is growing rapidly.

Many older industrial uses are being discontinued or are shifting inland for various reasons, including more reasonably priced land for new buildings. The confluence of these trends has raised awareness of related environmental issues and the need to preserve a place for continued water transportation activities. In this context, public opinion, government policy and navigation interests have serious concerns about inter-basin transfer or bulk exports of Great Lakes or St. Lawrence water. Recent work by the Great Lakes states and provinces through the CGLG to implement the Great Lakes Charter Annex will facilitate increased protection of Great Lakes water resources through a new regional management regime for future uses.

Looking to the future

The search for solutions to environmental problems in the Great Lakes basin is ongoing. In recent years, we have begun to make progress in two areas of long-standing concern: dredging and invasive species.

road construction, strip mine restoration or temporary cover for landfills. These alternatives don't cost much, and are environmentally responsible.

We are also dealing with the problem of invasive species. From the early 1800s, at least 160 non-indigenous aquatic species have established themselves in the Great Lakes basin. They come from the ballast water that ocean-going ships carry for stability, and from accidental releases made by aquaculture, the bait and aquarium trades and horticultural activities.

Such invaders can cause economic and environmental harm. The effects of plants like the purple loosestrife and water creatures like the parasitic sea lamprey and the prolific zebra mussel are familiar to most people around the Lakes.

To reduce the risk of introducing or spreading nuisance species, one focus of U.S. and Canadian policy is on ballast water management. Before ocean ships enter the Seaway, they are inspected to make sure they have flushed their ballast tanks in the ocean and



Dredging is necessary in many parts of the Great Lakes/St. Lawrence Seaway, so that large vessels can pass through safely and efficiently. Dredging is also needed for waterfront construction and utilities, and to remedy environmental problems. But dredging leaves its own environmental impact, and some of the dredged material carries pollution from the days when environmental protection had less priority.

Contaminated material has to be placed in confined disposal sites. But government and private sector organizations are exploring ways to decrease the need for future dredging, and to use dredged sediment more productively, such as using dredged material beneficially to restore aquatic ecosystems.

There would be less need for dredging, for instance, if we can reduce agricultural erosion along the rivers that feed Great Lakes harbors. And we can use non-polluted dredged material to replenish beaches, restore habitats, boost agricultural soils, or for landscaping,

refilled with clean water. The domestic commercial navigation industry has altered ballasting operations in some places and conducted experiments with ballast water filtration and treatment systems that someday may be installed on ocean-going vessels.

The other focus is on the hydrologic connections between the Great Lakes and other fresh water basins. An immediate concern is preventing migration of Asian carp into the Great Lakes from the Mississippi River basin. In 2002, the U.S. Army Corps of Engineers, in consultation with an interagency team, completed construction of an invasive species barrier demonstration project in the Chicago Sanitary and Ship Canal. The barrier consists of a low voltage pulsating DC current sent through cables in the bottom of the canal. Measures to insure the safety of navigation traffic are coordinated with the U.S. Coast Guard and representatives of the navigation industry. A permanent barrier is currently under construction. 1

Waterway Statistics

St. Lawrence Seaway Commerce Five-year average annual tonnage 1999-2003

(Millions of metric tons)

Grain	10.88
Iron ore	10.14
Coal	4.38
Other bulk	13.60
General cargo	3.81
Total	42.80

Source: St. Lawrence Seaway Management Corp.

Great Lakes dry bulk waterborne commerce

Five-year average annual tonnage 1999-2003
(Millions of net tons)

Iron ore	61.36
Coal	41.80
Limestone	36.16
Salt	7.32
Cement	5.48
Potash	.61
Grain	13.74
Total	166.46

Source: Lake Carriers' Association

Coast Guard activity on the Great Lakes

People saved or assisted

U.S. Coast Guard	8,223
Canadian Coast Guard	3,857

Value of property saved

U.S. Coast Guard	\$11,272,333
Canadian Coast Guard	n/a

Marine inspections conducted on commercial vessels

U.S. Coast Guard	2,013
Transport Canada Marine Safety	1,922

Number of pollution and marine casualties investigated

U.S. Coast Guard	439
Transport Canada Marine Safety	155

Number of buoys maintained

U.S. Coast Guard	1,783
Canadian Coast Guard	3,155

Statistical profiles of the Great Lakes

Commercial fish harvest U.S. & Canada

(in millions of pounds)

Erie	23.1
Ontario	1.0
Huron	10.5
Michigan	11.4
Superior	1.5

US Army Corps of Engineers activity on the Great Lakes

(Includes Buffalo, Detroit and Chicago Districts)

Total Number of Federal Harbors Maintained

(Commercial and Recreational) 136

Total Miles of Federal Channels Maintained

by Dredging 751 miles

Total Miles of Federal Navigation Structures Maintained

(includes breakwaters, piers, jetties, etc.) 145 miles

Source: Canadian Coast Guard, Transport Canada Marine Safety and U.S. Coast Guard statistics for the 2004 season.

Waterway System



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