D'ARCY JENISH

THE ST. LAWRENCE SEAWAY

Fifty Years and Counting

PENUMBRA PRESS, *publishers*
Box 940 | Manotick, ON | Canada
K4M 1A8 | www.penumbrapress.ca

Printed & bound in Canada

Library and Archives Canada Cataloguing-in-Publication Data

JENISH, D'ARCY, 1952–
The St. Lawrence Seaway:
Fifty Years and Counting / D'Arcy Jenish;
Includes index.
1. St. Lawrence Seaway — History
2. Transportation — Canada — History

ISBN 978-1-897323-75-5

Little did I think, when I joined the St. Lawrence Seaway Authority in 1983, that I would be president of the organization as it celebrated its fiftieth birthday!

I was hired at a time when the Seaway was changing direction. The organization moved from looking at expansion to recognizing that it had to maintain what it had—a change prompted by the tough economic conditions of the early 1980s. As a mechanical engineer, my background was in maintenance. My first responsibility was to implement "value for money" by getting the most out of every dollar spent to maintain the system. This initiative was particularly timely as, over the next thirty months, the Seaway lived through its two major infrastructure failures at the Valleyfield Bridge in the MLO section and at Lock 7 on the Welland Canal.

These "significant emotional events" for the Seaway caused us to say "never again." They provided the impetus for a mid-life refit through the Welland Canal Rehabilitation Program and the establishment of a comprehensive Infrastructure Management System, which has served us well as we deal with an aging system.

Over the last twenty-plus years, we have met our commitment to avoid major failures and are routinely running the overall system at greater than 99-per-cent availability. However, the search continues for adequate funding to maintain this enviable record.

I had the opportunity to "practise what I preached" from a maintenance standpoint with a transfer to the Welland Canal in the late 1980s as director of engineering and maintenance, followed by spells as assistant vice-president for the Niagara Region and as vice-president of engineering for the overall Authority.

Richard Corfe, St. Lawrence Seaway Management Corporation president.

And then came commercialization!

In later years, I have often spoken about our journey from a model Crown corporation to a fully mature "not for profit" corporation. As a Crown we had an "internal focus" to ensure that we had followed best practices and procedures in every aspect of the operation, and that we had good environmental-management systems in place.

As we were commercialized, we moved to an approach of "inside, looking out," focusing on the direct and immediate needs of our customers—the real reason for commercialization. Then as the corporation found its legs, showed its worth, and started playing a larger role in marine transport in

general, we gradually moved to an "outside, looking in" approach. Here we considered not only our direct customer needs, but the needs of all stakeholders, and developed a "sustainability" approach based on the integration of corporate social responsibility into our ongoing activities.

This approach had us recognize that we operate on a shared resource—the St. Lawrence River and Great Lakes—and that, while marine transportation is essential to the economic activity and competitiveness of many of our industries, we need to forge common agendas with other stakeholders to ensure our success and ongoing sustainability.

As we look to the future, the Seaway is in great shape. Our system-wide marketing and Hwy H_2O branding are raising the profile of the Great Lakes and St. Lawrence Seaway, while our market-development initiatives are producing new business and diversifying the cargo mix. Opportunities abound with the recently issued *Great Lakes St Lawrence Seaway Study* and the Canadian government's Gateway and Trade Corridor strategy.

The corporation is on a mission to ensure a sustainable future for the system by increasing its utilization to full capacity, which will maximize the benefits flowing to both countries. At the same time, initiatives are under way to minimize the impacts that system use can have on others and to manage costs to ensure the right mix of return to all stakeholders, including the people of Canada and the US through their respective governments.

In this context, with a sound infrastructure to build on—and the necessary funding to keep it so—we are applying modern technology to get the maximum benefit from the system.

Over the history of the Seaway, innovation and the application of new technology have ensured that the established infrastructure met the transportation needs of the day.

This continues as we celebrate our fiftieth anniversary. The early traffic-management systems have evolved and the evolution continues. Five years ago, the seaway became the first waterway in the world to introduce an automatic identification system, or AIS, and subsequent improvements have ensured that the system remains state of the art. As we look to the future, we are in the process of modifying our complete operating process with the implementation of "hands-free" vessel transits.

The infrastructure of the St. Lawrence Seaway, which was built in the 1950s, coupled with the Welland Canal, which has been in operation since 1932, is the foundation on which the success of the Seaway enterprise has been built. But it could not have succeeded without its employees.

Generation after generation, the Seaway has been well served by its workers—from those who built the system to those who operate and maintain it, and all who are in the background supporting the different activities.

This book is dedicated to them, past and present, as we collectively move into an exciting future.

— RICHARD CORFE

1 | The Seaway Today

"Once you have experienced life aboard a Great Lakes vessel, you can appreciate the work that is done, the competence of the crew, and the challenges they face."

WAYNE SMITH
Senior vice-president, commercial,
Algoma Central Corporation

A westbound ship in the St-Lambert Lock and the city of Montreal in the background. This lock is the gateway to the Great Lakes St. Lawrence Seaway. AIR PHOTO MAX

Captain Werner Draenger is well rested and casually dressed in a white short-sleeve shirt, navy-blue short pants, and Birkenstock sandals when he climbs the staircase from the master's quarters to the bridge of the MV *Algomarine*. He stands for a moment at his post above the bow of the vessel and scans the grey-green waters of the St. Lawrence River some forty feet below him. It is mid-afternoon, a Saturday in July, and the 730-foot *Algomarine* has been tied up at Pier 99, at the Port of Montreal in the city's east end, for the past eight hours. It has unloaded 24,000 tonnes of golf-ball-sized chunks of limestone, which now stand on the pier's asphalt pad in two, tidy pyramids, each about fifty feet high. The captain, an old pro who recently turned sixty-five, is about to give orders to depart.

Over the next eighteen to twenty hours, he will guide the vessel through the channels, the canals, and the seven locks that make up the Montreal-Lake Ontario section of the Great Lakes St. Lawrence Seaway. At 3:20 p.m. Captain Draenger runs through a pre-departure checklist. He asks the first mate, Joe Ames, if the crew of twenty-four is all aboard. Then he instructs Chief Engineer Seth Gordon, who is seated in his engine control room some 700 feet away at the stern of the ship, to turn on the bow thruster. It is an 800-horsepower engine built into the hull directly below the bridge and it drives a propeller two metres in diameter.

The bow of the vessel moves off the concrete wall of the pier and the journey has begun. The *Algomarine* is destined for

Putting a ship into the concrete chamber is a delicate task, one that requires tremendous skill and a deft touch on the part of the captain and a team that includes the wheelman, the mates, and the engineers.

With just two and a half feet to spare on either side, it takes a highly skilled team to drive the 730-foot Algomarine into a lock. PATRICK JENISH

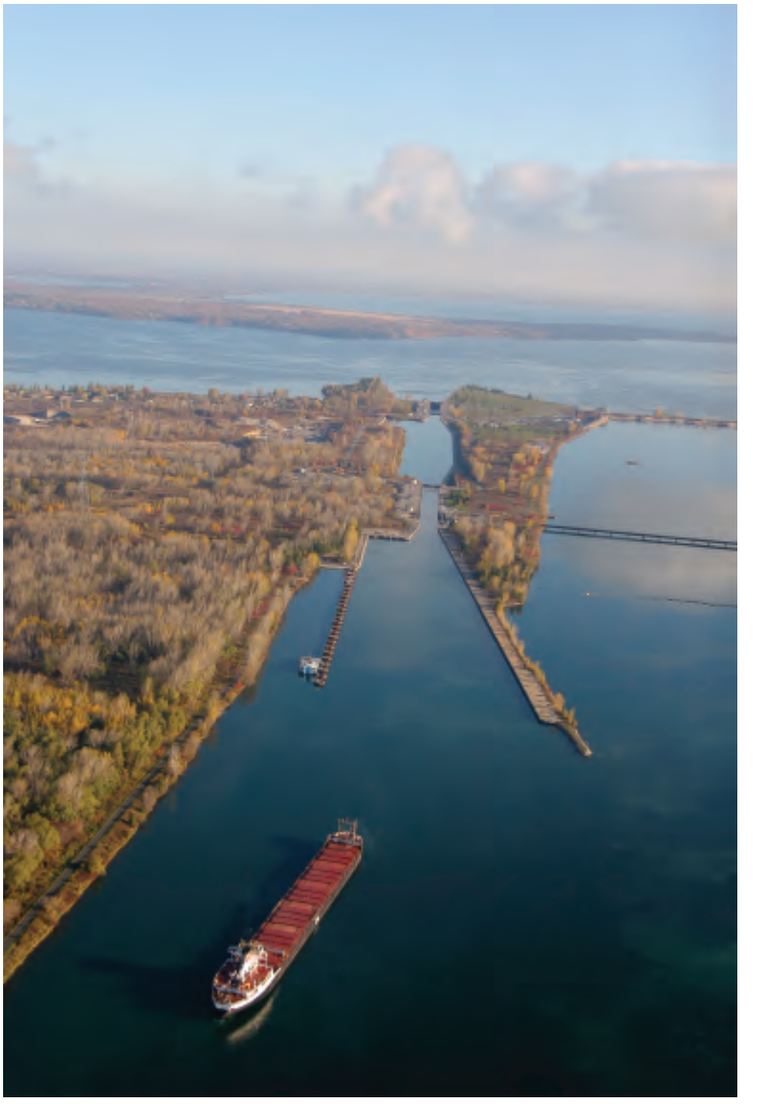
Thunder Bay to take on a load of oats. Its six enormous cargo holds, which can move the same volume of goods as 870 transport trucks or three 100-car unit trains, are empty, but its ballast tanks are filled with water to provide stability. Minutes after leaving the pier, the *Algomarine* is out in the St. Lawrence.

The skies are grey, the winds light, and the river busy. There are tour boats, sailboats, power boats, fishing boats, kayaks, and Sea-Doos on the water as the big laker—which is longer than two football fields and half as wide—makes its way upstream. It passes La Ronde, the busy amusement park on the eastern tip of Île Ste-Hélène, where Expo 67 was held. It passes beneath one of the two arches of the Jacques Cartier Bridge, enters the shipping channel, and heads toward the St-Lambert Lock and the first step in its ascent to Lake Ontario.

The lock is on the south shore of the St. Lawrence, directly opposite downtown Montreal. Putting a ship into the concrete chamber is a delicate task, one that requires tremendous skill and a deft touch on the part of the captain and a team that includes the wheelman, the mates, and the engineers. The lock is eighty feet wide. The vessel is seventy-five, leaving two and a half feet of breathing room on either side, precious little space for error.

The captain issues orders in a calm, reassuring voice. He communicates non-stop with his team: the wheelman who stands directly behind him; the engineers ensconced in their control room; and the mates, the first at the bow, the second at the stern, each with a hand-held two-way radio to keep the captain apprised of the vessel's position as the bow rubs against the approach wall, slides toward the gate, and enters the lock.

The *Algomarine* comes to rest in the lock at 5:40 p.m. and is tied up twelve minutes later. At 6:00 p.m., water begins to rush into the chamber and lifts the ship eighteen feet in eight minutes. The gate opens, the captain gives the horn a short blast that serves as a command to "Let go all lines," and the vessel resumes its journey in the South Shore Canal, which is 22½ kilometres long and hugs the V-shaped shore of a section of the river known as the Laprairie Basin.



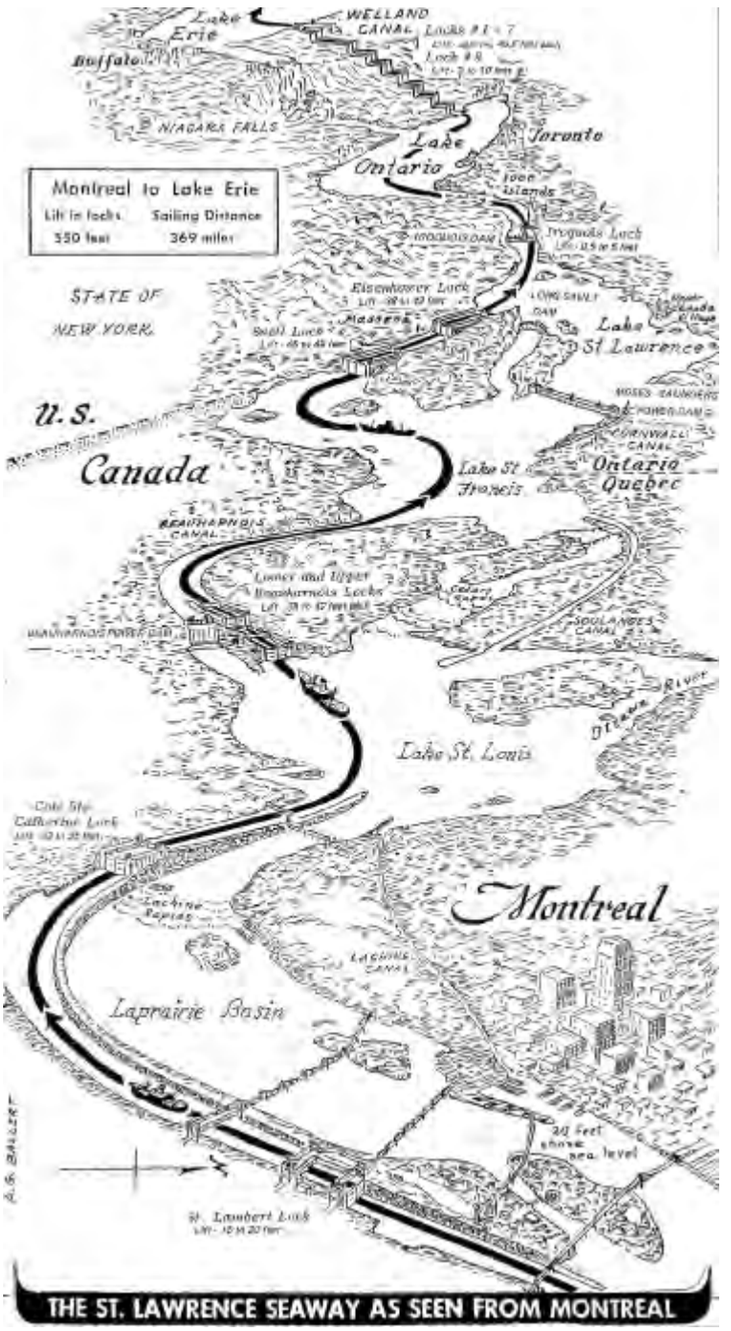
The next stop is the Côte-Ste-Catherine Lock, sixteen kilometres upstream, which takes its name from the adjacent suburban community. This lock lifts the ship thirty feet. Up ahead, the river widens and becomes Lac St-Louis. The *Algomarine* reaches the lake as the sun is setting. The fireworks and the midway of a summer fair illuminate the sky over the Kahnawake Mohawk Territory on the South Shore. Across the water on the West Island, the lights of Dorval, Pointe-Claire, and Beaconsfield have begun to sparkle.

Around midnight, having traversed Lac St-Louis, the ship arrives at the first of the two Beauharnois locks, which are adjacent to a hydroelectric dam and generating station of the same name. Each lifts the *Algomarine* forty-two feet, up to the Beauharnois Canal. The canal, initially dug in the 1930s and then deepened in the 1950s during the construction of the seaway, is twenty-one kilometres long and delivers most of the water from Lac St-François, another widening of the river, to the turbines of the Beauharnois power plant.

LEFT: **A downbound ship in the South Shore Canal travels toward the Côte-Ste-Catherine Lock and Montreal.** AIR PHOTO MAX

RIGHT: **The upper and lower Beauharnois locks each provide a lift or descent of forty-two feet and are adjacent to a hydroelectric dam of the same name.** AIR PHOTO MAX

Captain Draenger keeps his right hand on the stick that controls the throttle. His eyes restlessly scan the dials, screens, and gauges of the console in front of him.



An artistic rendering of the Great Lakes St. Lawrence Seaway. Albert G. Ballert, former director of research with the Great Lakes Commission in Ann Arbor, Michigan, created this image in the late 1960s. ALBERT BALLERT

By sunrise, the vessel has reached the west end of Lac St-François. It has sailed past the small, lakeside communities of St-Zotique in Quebec and Lancaster and Summerstown in Ontario. Cornwall lies ahead. The *Algomarine* enters the river's narrow shipping channel, which is marked by buoys and other navigational aids. It cruises by several small islands and two large ones—St. Regis Island and Cornwall Island—and arrives at the Snell Lock. This is the first of two on the US side of the seaway and the fifth of the seven steps in the ship's ascent to the upper St. Lawrence and Lake Ontario. The Snell raises the vessel forty-seven feet. The Eisenhower Lock, six and a half kilometres upstream, lifts it another forty-two.

The last lock, the Iroquois, named for the adjacent Ontario riverside town, is 40 kilometres farther west. It raises the *Algomarine* a mere 2 feet. When it clears the Iroquois Lock, the *Algomarine* is 175 kilometres west of Montreal and 224 feet above the city. The waters of the big river are largely free of islands and the shipping channels straightforward as the vessel sails past Prescott and Brockville on the Ontario side and Ogdensburg and Morristown on the New York shore.

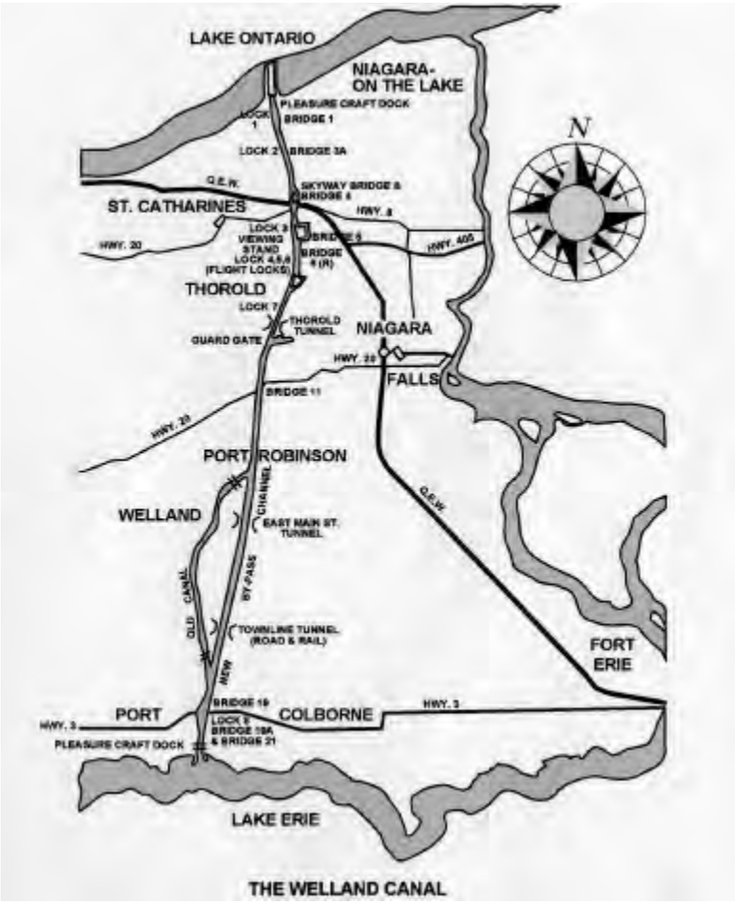
By early Sunday afternoon, it has begun to weave through the famous archipelago known as the Thousand Islands. Cottagers and homeowners on both sides of the St. Lawrence are enjoying a warm, sunny summer afternoon, and powerboats race up and down the river. By dinnertime, the *Algomarine* has cleared Cape Vincent and Tibbets Point. It has left the river behind and is now sailing on a fixed course toward the western end of Lake Ontario.

§ Sunrise is two hours away on Monday morning when Captain Draenger steers the *Algomarine* past the quiet, lakeside town of Port Weller into the narrow, still-dark waters of the Welland Canal and toward the hunched black mass of the Niagara escarpment, which forms the horizon and stands between lakes Ontario and Erie. It is 4:00 a.m. and Captain Draenger has been up for an hour, standing at the bridge. He will spend the next twelve hours guiding the vessel through the locks, reaches, and channels of the forty-three-kilometre canal. Water from Lake Erie, drawn by gravity into and out of the canal's eight locks, will lift the *Algomarine* 100 metres — 326 feet, the height of a thirty-two-storey building — and the climb begins under the hard, orange glare of the lights at Lock 1.

Captain Draenger keeps his right hand on the stick that controls the throttle. His eyes restlessly scan the dials, screens, and gauges of the console in front of him. The *Algomarine* is moving two kilometres per hour: Dead Slow, according to the scale on the throttle. Over the next few minutes, Captain Draenger reduces the speed. Then he orders the engineer to reverse the engine, which brings the ship to a complete stop just a metre or two short of the upper gates of the lock. It is 4:21 a.m. and the third mate, who is up in the bridge, enters the time in the log.

LEFT: **The Lake Erie entrance to the Welland Canal at Port Colborne, Ont. The ship channel is to the right. The other is a feeder channel that supplies water from the lake to the rest of the canal.** AIR PHOTO MAX

RIGHT: **The twin flight locks form the heart of the Welland Canal. They can handle upbound traffic, as in this photo, and downbound simultaneously. They lift and lower ships in three giants steps, each of them forty-two feet.** AIR PHOTO MAX



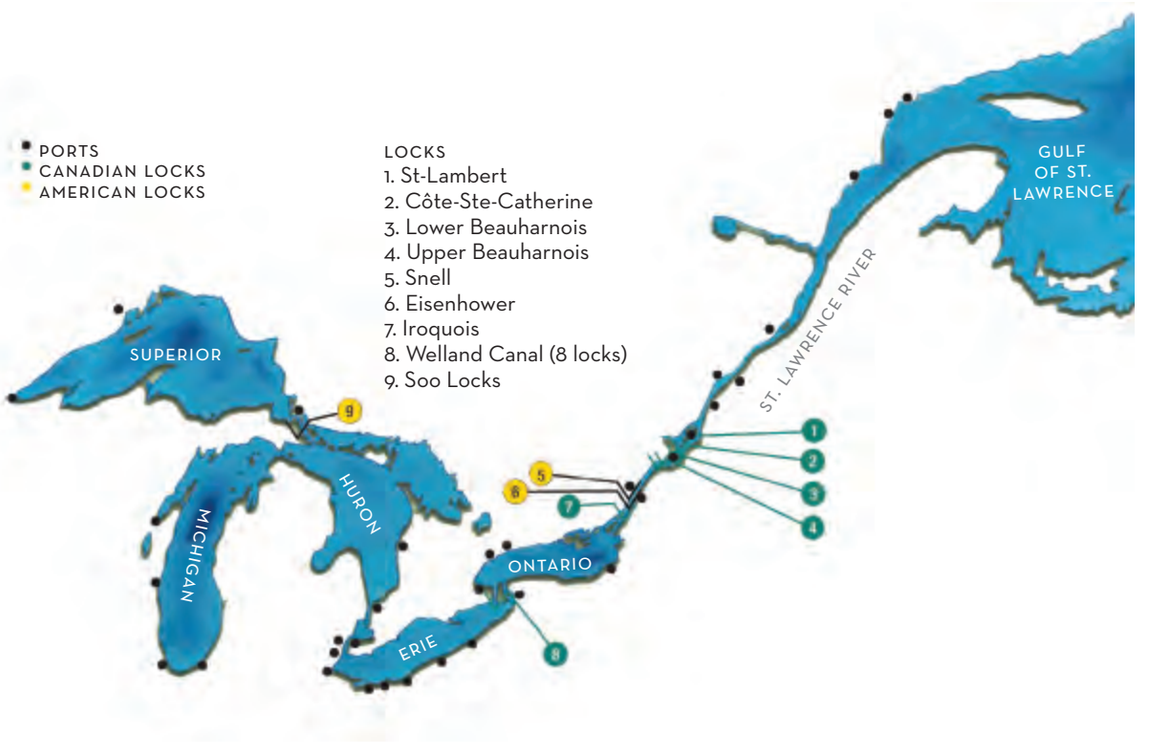
The Welland Canal, depicted in this map, runs from north to south and cuts through the Niagara Peninsula. It is 43.4 kilometres long and its eight locks lift or lower vessels 326.5 feet. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

Down on the deck, the first and second mates feed braided-steel mooring cables from winches to the lockmen, who secure the ship by slipping the cables over stubby iron posts known as bollards, which are embedded in the concrete surface. The lock operator opens four huge intake valves. Each is seven feet wide and fourteen high, big enough to drive a car through. Then his voice comes across the communications system, announcing to captain and crew: "*Algomarine*, you're on your way up." The sound of water is clearly audible as it tumbles and cascades into the chamber. In the space of ten minutes, 23 million gallons of water—the daily consumption of a city of nearly 130,000—has rushed into the chamber and lifted the *Algomarine* forty-six feet. It is 4:41 a.m. The third mate enters the time in the log. The upper gates begin to open and the lock operator speaks again to the captain: "*Algomarine* all clear for transit. Have a safe trip."

The *Algomarine* is the only vessel plying the waters of the canal on this summer morning. It quickly passes through locks 2 and 3 before arriving at the twin flight locks—numbers 4, 5, and 6—which start at the foot of the escarpment and rise one after another in three giant steps nearly to the summit of this formidable natural barrier. These locks are twinned. Each has two chambers, side by side, thereby allowing ships to ascend and descend simultaneously. From Lock 6, the *Algomarine* navigates a short reach of several hundred metres to arrive at Lock 7 and a final forty-seven-foot rise to the height of land.

Then it sails south, past the city of Welland, past fertile farmland, under hydro towers, over two tunnels that allow trains, trucks, and automobiles unfettered passage, on to the small city of Port Colborne, through the canal's eighth lock, and out to Lake Erie. By then it is nearly 4:00 p.m. Captain Draenger retires to his quarters, directly below the bridge, for a well-deserved rest. First Mate Ames takes charge and the vessel continues its westward journey.

§ With that, the *Algomarine* has completed its passage through the heart of the Great Lakes St. Lawrence Seaway—the system of canals, channels, and locks that completed its fiftieth year of operation in 2008. The seaway makes commercial navigation possible from tidewater in the Gulf of St. Lawrence to Thunder Bay, Ontario, and Duluth, Minnesota, at the western end of Lake Superior. This

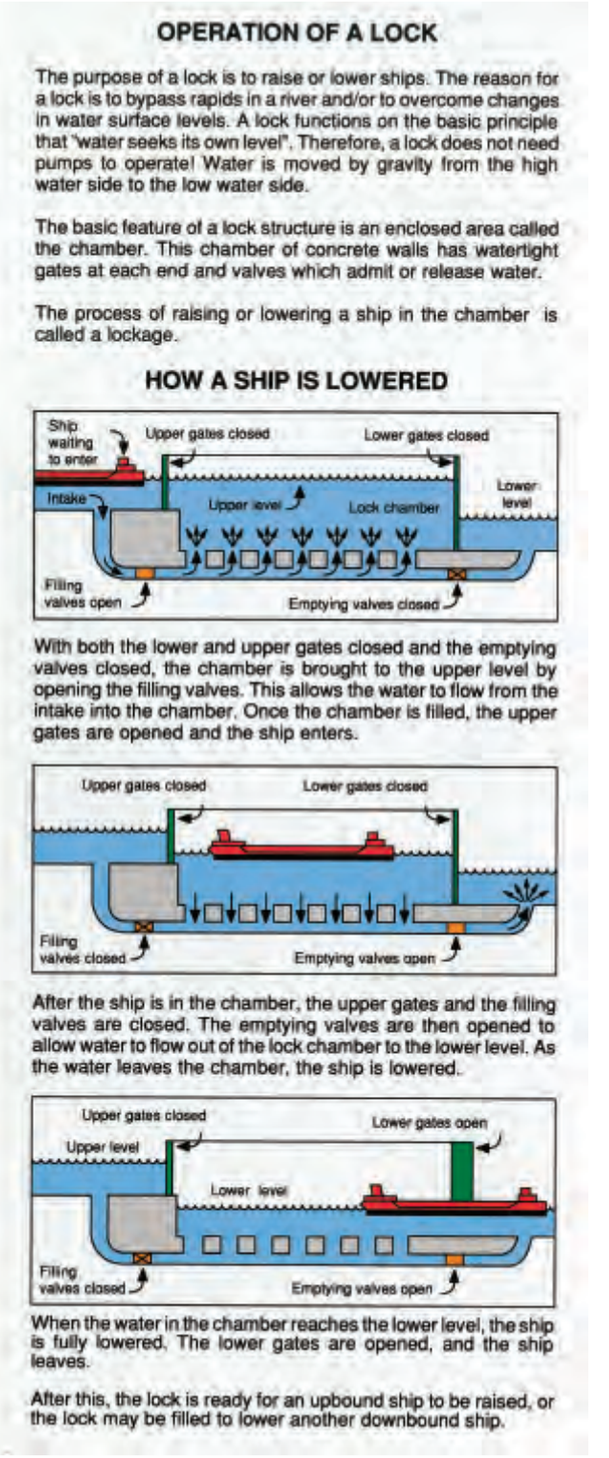


The locks and major ports of the Great Lakes St. Lawrence Seaway system. The seaway makes navigation possible from the Gulf of St. Lawrence to the western tip of Lake Superior, some 3,700 kilometres. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

great waterway reaches 3,700 kilometres inland, halfway across the continent. Eight American states and two Canadian provinces border the seaway, and one-third of North America's population lives in those jurisdictions.

The seaway is, without doubt, one of the world's most important inland marine highways. It is also an engineering marvel. The current Welland Canal is actually the fourth waterway built since the early nineteenth century to connect lakes Ontario and Erie. It was constructed over a period of nearly twenty years and opened in 1932. The Montreal-Lake Ontario section, built between 1954 and 1959, ranks as one of the most remarkable engineering and construction feats in Canadian history. In 2000, the American Public Works Association included the seaway on its list of the ten most important publicly funded projects of the twentieth century, along with the Golden Gate Bridge, the Hoover Dam, and the Panama Canal.

It is also an economic powerhouse. The seaway supports 75,000 jobs directly and indirectly in Canada and 150,000 in the United States. Commerce on the system generates more than $4.3 billion in personal income annually; $3.4 billion in transportation-related business revenue; and $1.3 billion in taxes for provincial, state, and municipal governments. Apart from the commercial benefits, marine transport has a bright future because it is safer and greener than competing forms of transportation. There is one shipping accident for every 13.7 rail and 74.7 trucking mishaps. And for each spill that occurs on the water, there are 10 involving trains and 37.5 involving trucks. Ships emit one-tenth as much greenhouse gas as trucks and half that of trains. The shipping industry produces less noise and less waste. Furthermore, it could also reduce traffic congestion if some of the cargo moving by truck and train were transferred to ships.



A postcard produced by the Saint Lawrence Seaway Development Corp., the US Seaway organization, explains how a lock operates. SAINT LAWRENCE SEAWAY DEVELOPMENT CORP.

Every day, during a navigation season that begins in late March and runs till late December, an average of twelve to thirteen ships transit the Great Lakes St. Lawrence Seaway. In a typical season of nearly 285 days, some 3,600 vessels travel its waters. In the half century since the seaway opened in the spring of 1959, more than 260,000 vessels have used the waterway. They have moved 2.3 billion tonnes of cargo worth some $350 billion, and those goods have moved to and from ports in Canada, the US, and more than fifty other countries.

In recent years, the seaway has handled about 40 million tonnes of cargo annually, mostly bulk commodities. Grain and iron ore have always been the staples of the marine industry in the Great Lakes basin and now account for 50 to 60 per cent of yearly traffic. Grain moves from Canada's Prairie provinces through Thunder Bay, or from the American Midwest through US ports on the upper lakes. It is shipped to the lower St. Lawrence for trans-shipment to deep-sea ships or loaded directly onto ocean-going vessels destined for ports in Europe, the Mediterranean, North Africa, and elsewhere. Iron ore — extracted from vast deposits in western Labrador and eastern Quebec — is loaded at Sept-Îles, Port-Cartier, and Pointe-Noire and moved west, up the system to Hamilton, Nanticoke, Ashtabula, Toledo, and other steelmaking centres.

The shipping companies of Canada and the US move many other commodities — coal, road salt, sugar, aggregates, cement clinker, and petroleum products to cite a few — but they are not enough to keep the seaway operating at capacity. At its peak in the 1960s and 1970s, the system routinely handled between 50 and 60 million tonnes annually. In the best years, cargo volumes hit 70 million tonnes. But during the decade leading up to its fiftieth anniversary, the seaway was working at about 60 per cent of its potential.

For nearly forty years, a Crown corporation known as the St. Lawrence Seaway Authority, or the Authority, ran the system. That changed in the late 1990s. The federal government was

'We expect grain, iron ore, and coal will remain stable commodities. In the future, we think the opportunities will be in the movement of general cargo.' *Richard Corfe* · Seaway president and CEO

wrestling with a deficit-induced fiscal crisis and privatized or commercialized as much of the country's transportation infrastructure as possible. As part of that process, Ottawa retained ownership of the Seaway's assets but turned over day-to-day management and operation to a user group that formed the St. Lawrence Seaway Management Corporation (SLSMC). This organization has worked to reduce costs, improve the efficiency of the system, and has aggressively marketed it as "Highway H_2O" — the green and sustainable highway of the future.

"We are trying to maximize the use of the system," says Richard Corfe, SLSMC president and chief executive officer. "We expect grain, iron ore, and coal will remain stable commodities. In the future, we think the opportunities will be in the movement of general cargo. We want to become a significant player in the shipment of containers.

"As China, India, and other developing countries become producers for the world, we expect a lot more of that product to land on the east coast of North America because a lot of the west-coast ports are at or near capacity. More and more containerized goods are going to come to ports like Halifax in big vessels. We see trans-shipment in smaller seaway-sized ships to all the ports along Highway H_2O — Montreal, Toronto, Hamilton, Cleveland, Detroit, Chicago, and others — because the roads and railways are congested and it's only going to get worse. That's the concept we're working on. We could move from 60-per-cent to full capacity just with containers."

The first Highway H_2O campaign began in the spring of 2003. The SLSMC started with public-awareness billboards on Ontario's 400-series highways. They informed motorists that one seaway-sized vessel can haul as much cargo as 870 trucks and made the point that marine transport is one way of reducing congestion on the roads.

From there, the SLSMC invited its American counterpart, the Saint Lawrence Seaway Development Corporation, to participate in the initiative. The two organizations then enlisted port authorities on the St. Lawrence and the Great Lakes to join a broader Highway H_2O campaign aimed at selling the waterway to potential users. Within six months, they had signed up eighteen of approximately forty-five ports, including all of the big ones. They have since added another

The Seaway corporations and their partners market the waterway as Highway H_2O — the green alternative to rail and road. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

twenty-five stakeholders, including most of the large shipping companies on both sides of the border as well as some of the municipalities on the system.

Highway H_2O has become the seaway's brand and the cornerstone of a range of marketing and promotional efforts, which include participation in trade shows and annual trade missions abroad. In recent years, the two seaway organizations have led excursions to China, Europe, and Brazil. They have also retained agents to represent them in Europe and China. Their job is to visit shippers and shipping companies, and to sell them on using the waterway.

"We believe we're on the map as a system, now more than ever," says Corfe. "When we talk to decision-makers in Ottawa or Washington, the Highway H_2O is a brand they recognize."

'We believe we're on the map as a system, now more than ever. When we talk to decision-makers in Ottawa or Washington, the Highway H_2O is a brand they recognize.' *Richard Corfe*

§ In the early years, the seaway usually opened in early to mid-April. The two sections were normally closed for the winter by mid-December, providing the shipping companies and their customers with a season of eight to eight and a half months, or 235 to 255 days. But milder weather, perhaps due to global warming, and the introduction of technology to reduce the buildup of ice in and around locks have extended commercial navigation by two weeks or more at either end.

The system is now open nine and a half months each year, or 285 days, and had its earliest opening in 2007. The Montreal-Lake Ontario section began operating on March 21, the Welland Canal twenty-four hours prior on the morning of March 20. The skies over the Niagara Peninsula that day were clear. The temperature was a few degrees above freezing. But a sharp wind from the northwest created a wintry chill when some 200 people gathered next to Lock 3 at 10:00 a.m. for the Top Hat Ceremony, which is held annually to celebrate the first ship's passage.

The distinction in 2007 belonged to the *CSL Tadoussac*, a 740-foot vessel bound for Picton, Ontario, to take on a load of cement clinker. At Lock 3, Captain Dan McCormack came ashore with Chief Engineer Ron Sequeira for the ceremony, which took place in a large portable tent erected on a concrete pad between the canal and the St. Catharines Museum. The six-piece St. Catharines Collegiate Jazz Combo provided the music. Several newspapers and television stations covered the event. Political leaders and shipping executives spoke about the importance of the seaway and the vital role that marine transport plays in the economy of the Great Lakes basin.

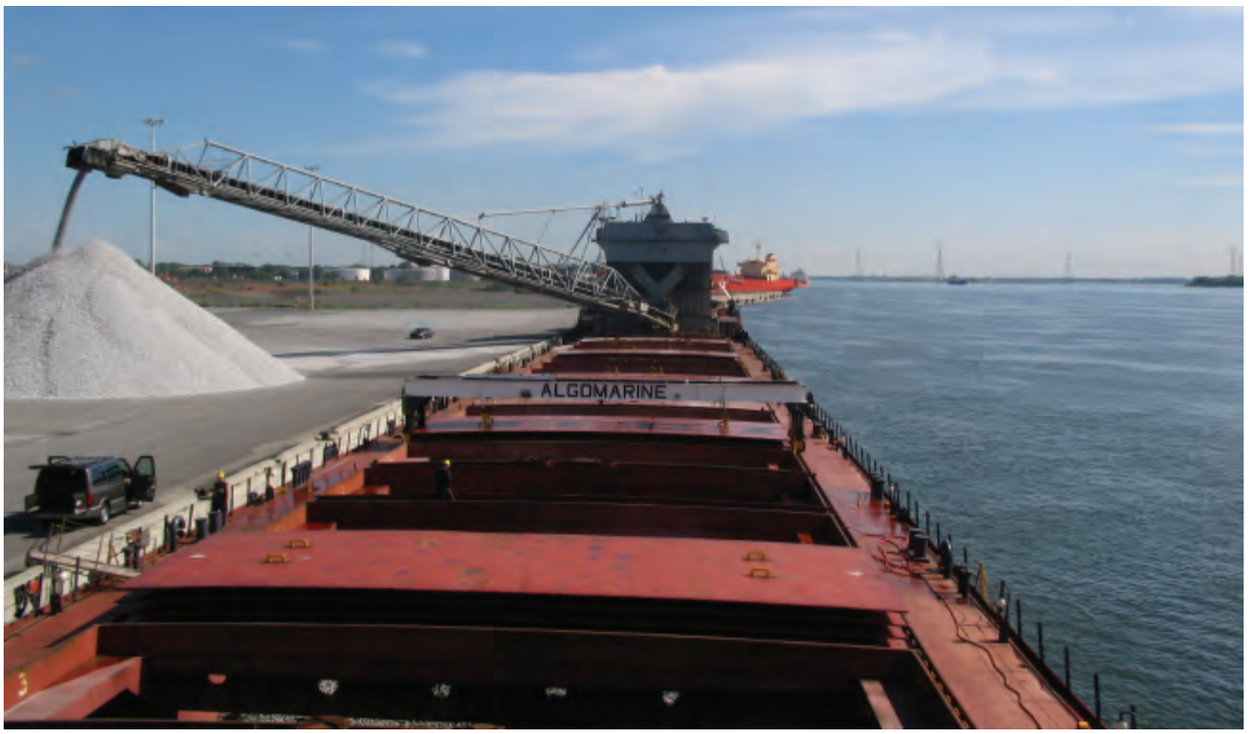
CSL's Assiniboine was one of four of the company's vessels to receive a new forebody over the past decade. Each is now a seawaymax ship: 740 feet long and 78 feet wide.
WWW.BOATNERD.COM

"The earliest opening in history speaks to the demand for Great Lakes shipping," said Peter Partington, chairman of the Niagara region. "This industry has played a major role in our history and will play a major role in our future. It is woven into the social and economic fabric of this area."

Donna Cansfield, then Ontario's minister of transportation, assured the audience that the shipping industry and the waterway had her government's full support. "The Great Lakes St. Lawrence Seaway is an underutilized asset," Cansfield said. "We need marine to reduce congestion, to protect our environment, and to enhance safety on our roads. We see this industry as an integral part of the transportation system in our province. It's going back on the agenda. We're listening and we're going to make a difference."

Tom Brodeur, vice-president of marketing and customer service with Montreal-based Canada Steamship Lines, spoke of the advantages of the longer shipping season and CSL's faith in the future of the system. "We're seaway traders," he said. "We have been the most pro-active company on the lakes in rebuilding our fleet."

CSL spent $225 million between 1999 and 2007 on upgrades for six of its ships, Brodeur told the audience. The work was done under two programs. The first involved four vessels built during the 1970s: the *CSL Assiniboine*, *CSL Niagara*, *CSL Rt. Honorable Paul J. Martin*, and the *CSL Laurentian*. In each case, the engine room and the accommodation block in the stern were in good shape and were retained. The rest of the hull was cut off and replaced with a new forebody that added ten feet to the length of each vessel and three feet to the width, which increased the carrying capacity of each by some 3,000 tonnes. Under the second program, the company kept the stern and bow of two other ships, the *CSL Tadoussac* and the *Atlantic Huron*, but replaced the midsections.



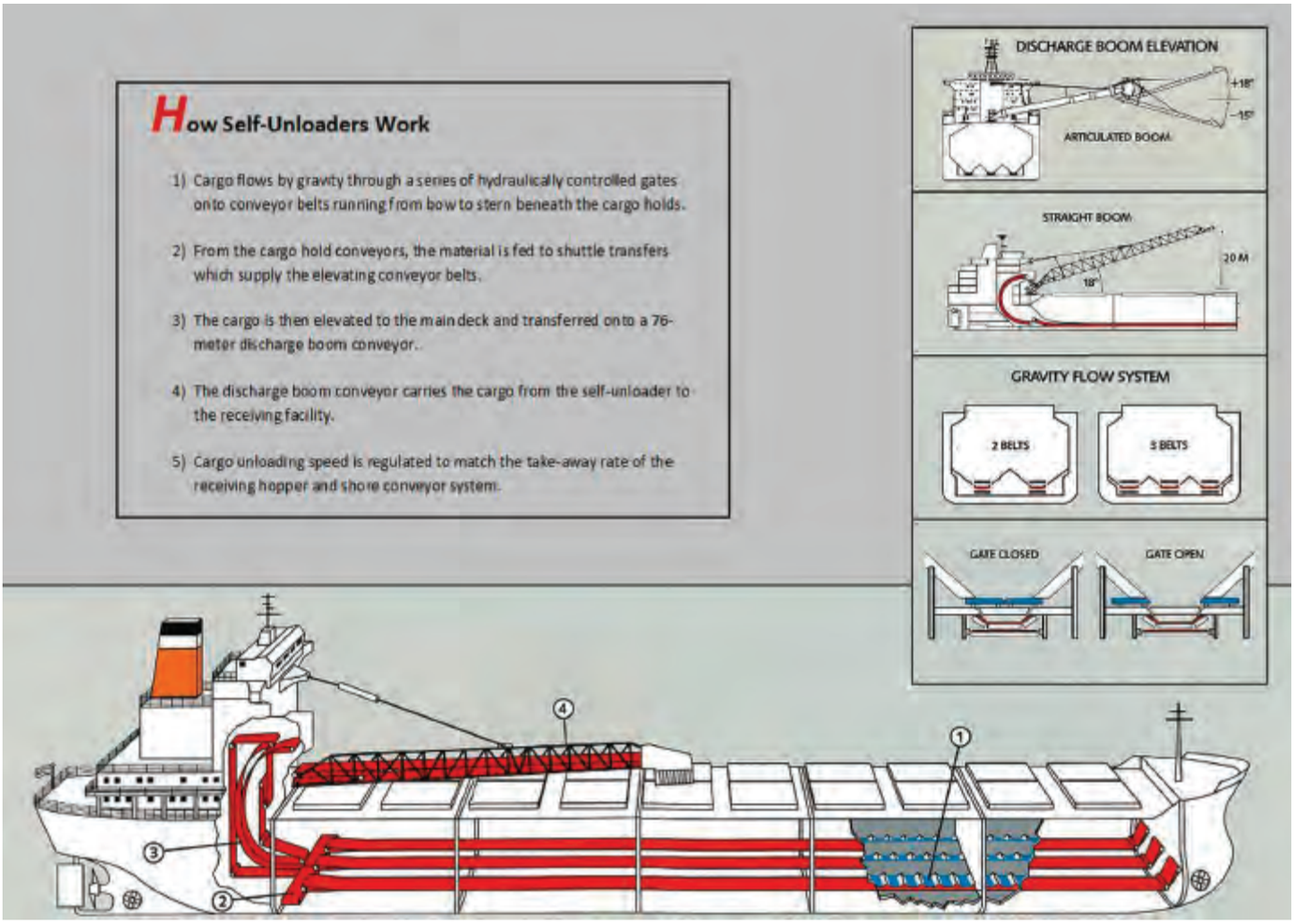
The Algomarine discharges aggregate onto a pier in the Port of Montreal. Self-unloaders can also deposit cargo in hoppers or into the holds of other ships. PATRICK JENISH

"We believe in this business," Brodeur said. "If we didn't, we wouldn't be building these ships."

Finally, the CSL executive pointed out, the extension of the season has been a major benefit for shipping companies. In the case of Canada Steamship, which runs fifteen vessels on the seaway, the extra 20 days means about 300 shipping days for the entire fleet. "That's like having an extra ship for free," he points out.

By 11:00 a.m., the speeches were finished. Captain McCormack, a stocky man of medium height with a salt-and-pepper beard, came forward to receive the black top hat with the frayed edges, which is taken out of storage once a year for this ceremony. A clergyman said a short prayer for the safety of all the captains, engineers, and crew working on the ships and then handed the microphone to Corfe: "On behalf of Minister Cansfield, assembled dignitaries, and Highway H_2O partners," he said, "I now declare the 2007 season open."

§ Two different types of ship—bulkers and self-unloaders—dominate domestic marine transport on the Great Lakes and the St. Lawrence Seaway. These vessels are used to haul bulk commodities and many are close to the maximum length (740 feet) and width (78 feet) allowable under seaway regulations. The principal difference is that bulkers do not have their own onboard equipment for unloading cargo. They rely on shore-based cranes with clamshell buckets to scoop up the material they have transported and dump it on a pier or into hopper cars.



A schematic diagram depicting the elaborate system of conveyor belts that run from bow to stern and from ship floor to deck. Self-unloaders can discharge up to 6,000 tonnes of bulk cargo per hour. CANADA STEAMSHIP LINES

Self-unloaders were developed on the Great Lakes and have been around in one form or another for nearly three-quarters of a century. But the C-loop systems in use today were conceived and refined in the 1970s. Cargo is stored in up to six separate holds and each has a series of sliding doors at the bottom. During unloading, these doors are opened one hold at a time, according to a plan drawn up by the first mate. The cargo drops onto a conveyor belt, which is approximately 6 feet wide and extends some 600 feet along the floor of the vessel.

This belt carries the cargo toward the stern to a pair of belts known as a C-loop, so called because they form a very large C. They squeeze the cargo, like the meat in a sandwich, in order to raise it 70 to 80 feet to the level of the deck. The third component of this system is the boom. On most vessels it is about 250 feet long. It can be raised 45 degrees and rotated close to 180 degrees. There is a conveyor belt within the boom and it runs from the base to the tip and discharges the cargo from the ship.

Self-unloaders have two big advantages: speed and flexibility. They can discharge cargo at a rate of about 6,000 tonnes an hour and do not require any shore-based equipment. They can dump a commodity onto a pier, into a hopper, or straight onto an ocean-going ship.

Bulkers require crews of nineteen or twenty, while self-unloaders require up to twenty-eight

'The first time I sailed on the lakes, I couldn't believe the beauty of the seaway system.... I was hooked and decided to stay.' *Seth Gordon* · chief engineer

people in order to maintain and operate all the unloading equipment and related machinery. There are currently about 5,000 men and women directly employed in the Canadian Great Lakes shipping industry and they fall into a number of categories and skill levels. The captains are the senior officers on a ship, but they rely heavily on their first, second, and third mates, who assist with navigation and handle deck duties. The chief engineer, who is responsible for the engine that propels the ship and the power plant that provides heat and electricity, is the number-two officer and is assisted by a team comprising second, third, and fourth engineers.

The rest of a crew consists of mechanical assistants, or oilers; electricians; cooks; deckhands; wheelmen; and tunnelmen, who work deep in the belly of the self-unloaders. They spend their watches in a narrow, tunnel-like corridor at the base of the vast cargo holds, and they maintain in good working order the conveyor belts of the C-loop (all 2,000 feet of them) and the hundreds of metal rollers that they run on.

Newfoundlanders account for at least a third of this workforce, most of them born "with the sea in their blood," as they say, and drawn inland for work as opportunities dwindled in the Atlantic cod fishery. The balance come from elsewhere in Atlantic Canada, from Quebec, Ontario, or from other countries—and a good number of them are as attached to the seafaring life as the Newfoundlanders.

Cindy Simpson, a second cook, followed her father into the industry. He quit a prized position at a General Motors plant in St. Catharines to go sailing, as Simpson puts it, and she never considered doing anything else. "Once it's in your blood," she says, "you can't get used to a shore job."

Seth Gordon, a chief engineer, grew up in a seaside village in Ghana on the west coast of Africa. "I could see the ships going by on the horizon and was fascinated," he recalls. Gordon sailed on ocean-going vessels before coming to Canada at age twenty-nine and has worked on the Great Lakes St. Lawrence Seaway for three decades.

"The first time I sailed on the lakes, I couldn't believe the beauty of the seaway system," he says. "When you're going through the canals, you see people working in their gardens or lying by the swimming pool. I was hooked and decided to stay."

Captain Werner Draenger grew up in West Germany and went to sea in 1959 at age eighteen. His first ship was a tramp steamer, a steam-driven vessel that tramped from port to port in search of cargo. He was gone a year and a half and found his calling. Captain Draenger has been sailing ever since. He came to Canada in 1965 and in 1982 obtained his master's certificate. He could have retired during the 2007 season but thought he might continue for another year or maybe two. "Why should I quit?" he asks rhetorically. "I like my job."

Despite the rewards, Canadian shipping companies that sail on the seaway have difficulty recruiting young people to replace those who are retiring. They also have aging workforces due to a major transition that occurred within their industry in the 1980s and 1990s. Grain and iron-ore shipments declined sharply, and so did the number of shipping firms. In 1980, there were approximately fifteen sizable Canadian-based companies operating on the Great Lakes. By the end of the century, only about five remained. Some long-established names went bankrupt. Others were absorbed by larger, healthier rivals.

Everyone was laying off workers. For nearly a decade (1985 through 1995), nobody was hiring, and the average age of the workforce on Great Lakes vessels rose sharply. Many of the workers are approaching retirement and the companies are recruiting again. Positions are available at all levels and shipping companies are quick to hire, especially when a young person has a university degree or college diploma from one of the schools that offer a program in either marine technology or nautical science.

Aaron Coffin, a Newfoundlander in his early twenties, graduated from Memorial University's nautical-science program in the summer of 2007 and e-mailed a letter, along with his resumé, to several companies. One of them, Algoma Central, replied immediately. "I said that I had my third-mate's licence, and they said we want you on a ship," Coffin recalls. "I didn't even have time to go home to visit my parents."

§ Each winter, between Christmas and New Year's, a time that most Canadians reserve for home and family, the last ships are making their way through the Welland Canal or down the St. Lawrence toward the sea, and another navigation season is coming to a close. In the first days of January, sometimes amid bitter and biting cold, small crews of Seaway employees in both sections begin the arduous task of draining the locks and preparing them for winter maintenance.

Winter maintenance on the seaway's fifteen locks begins in early January and continues until mid-March. The offseason work is part of a rigorous infrastructure-management system that has made the seaway one of the world's safest and most reliable waterways. AIR PHOTO MAX

The work is very different in the two parts of the seaway. In St. Catharines, technical co-ordinator Lou Spagnol and his team must drain a stretch of the waterway that is approximately fourteen kilometres long, from Lock 1 at Port Weller to Lock 7 at the summit of the Niagara escarpment. They begin by partially opening the intake and discharge valves at Lock 1 to create a slow, smooth flow of water. They open the valves at Lock 2 and then work their way up the canal until the water is flowing from top to bottom through the locks and the reaches between them. The water drops at a rate of three inches per hour, and the whole process takes seventy-two to eighty hours. Winter maintenance begins once the chambers and the reaches between them are empty.

The locks of the Montreal-Lake Ontario section are all located within the river, so the work is much different. Temporary walls must be erected outside the upper and lower gates to isolate the lock. This is done with metal beams called stoplogs. They are four to six feet high, about four feet wide, some eighty-four feet long, and weigh up to 63,000 pounds. Cranes are used to lift the stoplogs and then to lower them into slots in the approach walls, one after another until a barrier has been erected. Each wall takes ten to fifteen logs and can be forty to eighty feet high.

Once these barriers have been created above and below the locks, the work of draining the water begins. The water will flow out under force of gravity until it reaches the level of the water on the downstream side. The rest must be pumped out, a process that can take forty-eight to seventy-two hours.

The de-watering of parts of the two sections has occurred annually since the waterway opened in 1959. But in 1996 the Seaway adopted a rigorous infrastructure-management system to improve the reliability of both the Welland Canal and the Montreal-Lake Ontario section. This approach is based on an index of Seaway assets, about 1,100 all told, that includes infrastructure, equipment, and buildings.

Engineering staff inspect assets, including locks, walls, gates, and intake and discharge valves, on a regular basis and do a condition assessment of every single item once a year. Each is assigned a rating on a scale of one to six. One indicates that the piece no longer fully performs its function; six indicates it is "as new." Some of the inspections are visual, while others require measurement or testing, and some must be done by divers. Assessments are based on the inspection results and operating experience, and can also involve detailed engineering analysis.

This approach allows the Seaway to track over time the condition of its assets. Engineers decide when repairs are necessary or a piece of equipment needs to be replaced and the work is scheduled as part of the winter maintenance program. "Our infrastructure-management system has produced tangible results," says Corfe. "The St. Lawrence Seaway is one of the safest and most reliable waterways in the world, with no lengthy outages and a 99.75-per-cent availability over the last number of years."

2 | Promise Fulfilled, 1959–1969

The Queen and US President Dwight Eisenhower leave the Royal Yacht Britannia during the official opening of the St. Lawrence Seaway on June 26, 1959.

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SHORTLY after 11:00 a.m. on June 26, 1959, an American government aircraft landed at a military airstrip in the Montreal suburb of St-Hubert, taxied to a red carpet laid on the tarmac, and stopped as smoothly as a cab pulling up at a curb. A few minutes later, US President Dwight D. Eisenhower emerged with his wife, Mamie, at his side. The president and the first lady smiled, waved, and walked up the carpet to meet Her Majesty, Queen Elizabeth II and her husband, Prince Philip; John Diefenbaker, Canada's prime minister, and his wife, Olive; and other members of the welcoming party. After inspecting a military guard of honour, the Queen, the president, and the rest of the dignitaries rode in gleaming, black Cadillacs a few kilometres west to St-Lambert, on the south shore of the St. Lawrence River, opposite Montreal, for the official opening of the St. Lawrence Seaway.

A crowd estimated at 20,000 was on hand, along with 5,000 invited guests: the entire federal cabinet; members of Parliament and the Senate; US senators and congressmen; mayors of seaway cities and towns as far away as Chicago and Milwaukee; and shipping executives from England, Holland, Germany, Greece, and several other countries. The temperature stood at 80 degrees Fahrenheit and the air was heavy with humidity, but the ceremony was short and, according to the *Globe and Mail*, "austere in its simplicity."

Construction of the seaway was 'one of the most ambitious and effective man-made alterations to the face of the earth ever completed,' according to Lionel Chevrier, its first president. ST.LAWRENCE SEAWAY MANAGEMENT CORP.

A Royal Marine band played the *Star Spangled Banner*. A US navy band played *God Save the Queen*. Then Her Majesty delivered her remarks. "This distinguished company has come together," the Queen said, "from the two great countries that border this waterway to mark the completion of a combined operation that ranks as one of the outstanding engineering accomplishments of modern times. We can say in truth that this occasion deserves a place in history."

The president spoke of the seaway in equally glowing terms. "Its completion," Eisenhower said, "is a tribute to those far-sighted and persevering people who across the years pushed forward despite decades of disappointment and setbacks. It is, above all, a magnificent symbol to the entire world of the achievements possible to democratic nations peacefully working together for the common good."

A group of schoolgirls sang *O Canada* and the official party left the dais and boarded the Royal Yacht *Britannia*, docked nearby in the channel leading to the St-Lambert Lock, the first of seven on the newly constructed St. Lawrence section of the seaway. At 12:03 p.m., the vessel entered the lock and, at that, the seaway was declared open. Church bells rang throughout Montreal. Nearby ships and pleasure craft blasted their horns. Fireworks exploded overhead. Throngs of onlookers cheered, and the Queen, the president, the prime minister, and their spouses waved from the deck of the *Britannia*.

The opening was a fitting celebration for a massive engineering and construction project that cost $475 million, had been completed in less than five years, and was destined to become a vital commercial artery serving two nations, dozens of communities, and much of the world's shipping industry. "It was," according to Lionel Chevrier, first president of the St. Lawrence Seaway Authority, "one of the most ambitious and effective man-made alterations to the face of the earth ever completed."

Channels had been dug through dry land and dredged through river bottoms. Locks had been erected. Hydroelectric dams and powerhouses had been built. Billions of tons of earth had been moved. Farms, villages, cemeteries, highways, and railways had been relocated, and an army of men and women 21,000 strong had been employed. The first contract on this mammoth undertaking was awarded in October 1954; the work was completed in the winter of 1958–59; and the St. Lawrence section of the seaway opened for business on April 25, 1959, a Saturday.

The first westbound vessel was the *Simcoe*, a thirty-six-year-old, coal-burning, Canadian canaller. It left Montreal empty and thirty hours later reached Kingston, where it took on a load

The first westbound vessel was the Simcoe, a thirty-six-year-old, coal-burning, Canadian canaller. It left Montreal empty and thirty hours later reached Kingston, where it took on a load of grain.

Lionel Chevrier, in dark coat at left, inspects one of the new canals with Vincent Massey, then governor general. Chevrier, the longtime MP from Cornwall, was one of the seaway's staunchest advocates. COURTESY OF BERNARD CHEVRIER

of grain. The Montreal-bound *Humberdoc*, another Canadian canaller with a cargo of grain, completed the inaugural eastbound transit. It cleared the seven locks between Iroquois, Ontario, and St-Lambert, a distance of 175 kilometres, in sixteen hours.

The *Britannia* was the 1,875th vessel to enter the system of locks, channels, and canals that make up the St. Lawrence segment of the seaway. By season's end, on Dec. 3, 1959, nearly 8,150 vessels had travelled up and down this portion of the waterway, some 3,000 fewer than had passed through the old network of locks and canals in 1958. But the tonnage handled had more than doubled. It reached 18.68 million tonnes because the navigation channels in the St. Lawrence had been deepened to 27 feet from 14. Ships measuring 730 feet in length, with drafts of 25 feet, could now travel up and down the river, whereas the old system could only handle 250-foot vessels—the canallers—with drafts of less than 14 feet.

On the Welland Canal—the western section of the seaway—the story was the same: fewer ships, but bulk and general cargo combined had increased 30 per cent to 24.98 million tonnes. That was just a start. Over the next two decades, the numbers achieved in 1959 would come to seem small. Annual traffic on the seaway, and the volumes of cargo handled, would increase sharply as world demand for grain, steel, and other goods grew, as bottlenecks in the system were cleared, as the shipping season was extended, and as operating efficiencies were achieved.

The American Society of Civil Engineers in 1960 recognized the scale and complexity of building the seaway and the hydroelectric projects. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

Nevertheless, in that inaugural year, the seaway had more than proved its worth. It allowed ocean-going vessels to travel 3,680 kilometres inland—halfway across the country, in other words—and it lifted them the equivalent of sixty storeys: from sea level at the mouth of the St. Lawrence to an elevation of 182 metres on the broad, cold waters of Lake Superior. It allowed grain companies to load wheat or barley at Thunder Bay or Duluth and ship it to Rotterdam. It permitted textile manufacturers to put their goods aboard ships in Liverpool and deliver them to customers in Chicago.

But equally important, the opening of the seaway was the culmination of a centuries-old dream of transforming a great river and the inland seas above it into a waterway navigable for ocean-going ships. In the late 1600s, French-speaking settlers on Île de Montréal made the first attempts to improve marine transport by digging a canal to bypass the Lachine Rapids. But having circumvented one major obstacle, they encountered five other sets of rapids in the Soulange and Long Sault sections of the St. Lawrence, above Montreal. Farther west and approximately a century later, Loyalist settlers in the fertile peninsula that separated Lake Ontario from Lake Erie encountered their own formidable barrier to navigation: the Niagara escarpment, the 326-foot drop between the two bodies of water.

Far-sighted businessmen, backed by their governments and the best engineers of the day, spent most of the nineteenth century building or upgrading locks and canals to create a navigable waterway from the lower St. Lawrence to the upper lakes. The first Welland Canal, which was 44½ kilometres long and capable of handling sailing vessels with drafts of almost eight feet, opened in late November 1829. By mid-century, the Welland had been rebuilt and the canals of the upper St. Lawrence expanded to create a continuous

channel no less than nine feet deep from Montreal to Lake Erie. By 1904, a third Welland Canal had been built, while further improvements on the St. Lawrence had created a fourteen-foot channel.

The Welland was rebuilt a fourth time between 1913 and 1932 to accommodate ships up to 736½ feet in length and with drafts of up to 25 feet. But there were no further large-scale works on the St. Lawrence. The result was a fractured marine highway. Lakers hauling grain or other goods down from the upper lakes would travel as far as Toronto, Kingston, or Prescott, where their cargoes were unloaded, stored in terminals, and sent downriver aboard canallers. Likewise, ocean-going vessels stopped at Montreal or elsewhere on the lower St. Lawrence and sent their goods upriver in canallers.

The system was inefficient, and untenable in the long term, and in 1920 the governments of Canada and the US commissioned the first studies to examine the feasibility of expanding the waterway of the upper St. Lawrence and, at the same time, harnessing the river's immense hydroelectric potential. More than three decades would elapse before the work began. The Great Depression stalled the project, as did the Second World War. But political opposition was also a serious impediment.

As Chevrier wrote in *The St. Lawrence Seaway*, his book about the building of the system:

> Few projects have been so bitterly opposed or inspired so many opinions, arguments, legal battles, treaties and inter-governmental memoranda. Few projects have been so desperately needed while being delayed for so long. The Seaway is a story of men fighting for self-interest against nations fighting for national interest.

Two things tipped the scales in favour of national interest. First, in the postwar era, Ontario and New York desperately needed hydroelectricity from the St. Lawrence to run their rapidly expanding economies, and politicians in both jurisdictions pushed their national governments for an agreement that would allow them to build dams and generating stations on the river. Second, the American steel industry was depleting the biggest iron-ore deposits in the United States, found in the Mesabi Range, west of Duluth, Minnesota. Thus, when major new reserves were discovered in the interior of Labrador and nearby in eastern Quebec, Big Steel added its voice to those clamouring for the seaway.

'Few projects have been so bitterly opposed or inspired so many opinions, arguments, legal battles, treaties and inter-governmental memoranda.'
Lionel Chevrier · Seaway president, 1954–1957

In October 1949, a consortium of ten American steel producers and mining companies formed the Iron Ore Company of Canada to exploit mineral reserves that exceeded 400 million tonnes and were located some 580 kilometres north of Sept-Îles, Quebec. By June 1954, IOC had shipped its first rail cars south to Sept-Îles loaded with ore, and production quickly rose to 10 million tons annually. But the company could only transport the ore in large vessels to terminals in Contrecoeur, about 40 kilometres below Montreal. From there, the ore was loaded onto

A downbound CSL vessel passes the site of Expo 67 in the new South Shore Canal. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

canallers for the journey to Buffalo, Cleveland, Detroit, and other Great Lakes ports.

The companies behind IOC fully expected that Canada and the US would reach an agreement to build the seaway, which would allow their ships to travel non-stop up the St. Lawrence. Years of political wrangling, most of it in Washington, finally ended with Eisenhower's election in the fall of 1952. The new president favoured the seaway, and in January 1953 Congress began drafting an act that would allow US participation. Eisenhower signed the legislation in May 1954, but the most stubborn opponents applied for an injunction to stop the project.

The US Supreme Court rejected the application in early June and that caused a spontaneous outburst of public joy in the small St. Lawrence River community of Cornwall, where people had talked about the creation of a seaway for most of the twentieth century. The city quickly organized a parade. Mayor Aaron Horovitz and Reeve Elzear Emard rode in the lead vehicle. Two units of the Cornwall fire department participated. Every available band was pressed into action, and so were the reservists of the Stormont-Dundas-Glengarry Highlanders, who rolled through the streets on Bren gun carriers. When the parade ended, jubilant local residents joined what the next day's *Cornwall Standard-Freeholder* called the "largest spontaneous street celebration since the end of World War Two."

Less than five months later, work began on the seaway. The completion of the mammoth project transformed shipping on the St. Lawrence and the Great Lakes, and those who were there to witness the change have vivid memories. "We were used to seeing smaller ships—the canallers," recalls retired Cornwall

The scale of the newly-constructed seaway — as well as the sight of vehicles passing under large vessels — startled longtime residents of communities along the St. Lawrence.
ST. LAWRENCE SEAWAY MANAGEMENT CORP.

clergyman Bill McNairn, who grew up on the river and was in his late teens when the seaway opened. "We'd go out in a little sixteen-foot fishing boat when the big ships started coming through just to watch them. You'd realize how massive they were. You felt like you were next to the *Titanic*."

Even seasoned mariners were startled by the change. "Everything that could float came up here in 1959," recalls former pilot Robert "Louie" Stevenson. "A US navy task force went up as far as Chicago, just to show the colours. There must have been sixty ships. They had landing craft, three submarines, destroyers. The flagship was the cruiser *Macon*. It barely got through the locks."

There was a big influx of ocean vessels — "salties," as they are known in the trade — and they sailed alongside ships from dozens of fleets that had been working these waters for many years. According to *Greenwood's Guide to Great Lakes Shipping*, there were about eighty American companies on the lakes in the early 1960s and forty-three Canadian firms, and they represented diverse interests.

Imperial Oil, Shell Canada, and Texaco Canada had their own fleets of tankers. Coal companies, paper producers, and firms in the sand, gravel, and aggregates business owned ships. The Canadian Pacific Railway ran two package freighters and competed against the likes of Northwest Steamships of Toronto and the Owen Sound Transportation Company. Montreal-based Canada Steamship Lines was the biggest Canadian company, with forty-four

'We had upwards of fifty ships a day lined up at anchor at Port Weller and Port Colborne.... It was a real bottleneck. Sometimes they were there for days.'
John Kroon · Seaway employee, 1956–1995

A cluster of vessels at the Lake Ontario entrance to the Welland Canal. Congestion was a major problem in the early years of the seaway. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

ships, while US Steel was the reigning heavyweight of Great Lakes shipping, with fifty-six on the water.

The salties complicated things for the freshwater companies and the seaway itself. The supply of pilots—local captains who sailed foreign vessels through unfamiliar inland waters—was frequently exhausted, which disrupted traffic. At times, the language barrier hampered communications between ship and shore. Many of the ocean-going captains from abroad anchored their ships overnight to avoid navigating unfamiliar inland waters, and that also interrupted the flow of vessels. And there was serious congestion at both ends of the Welland Canal almost from day one. "We had upwards of fifty ships a day lined up at anchor at Port Weller and Port Colborne," says John Kroon, who worked on the seaway from 1956 to 1995. "It really became a bottleneck. Sometimes they were there for days."

Part of the problem was the canal's traffic-control system. It was rudimentary. A single dispatcher working from the fourth floor of a building near the guard gate, south of Lock 7, called the ships into the canal either from Lake Ontario or Erie, but did not manage the flow of traffic. Lockmasters admitted and released vessels as they saw fit and their cardinal rule was "never leave a lock empty." Captains maintained radio contact with each other and they kept the dispatcher apprised of their progress through the waterway. "The Welland Canal had hardly changed its operating

procedures from the time it opened in 1932," recalls Henry Koski, a former Seaway employee who was at one time responsible for navigation on the system.

Congestion on the Welland Canal remained a major logistical challenge throughout the seaway's first decade, and the problem became acute in 1964. "This spring there has been an enormous increase in Seaway tonnage," the *Financial Post* reported in late June that year. "Traffic through the Welland Canal and other Seaway locks has been more than 50 per cent heavier this year than last. This, together with fog on several spring mornings, has caused long line-ups of vessels on numerous occasions at both ends of the canal."

Every delay cost shippers money, and they were demanding action. Some proposed that passage through the canal be determined on a priority basis. Others suggested that freshwater vessels take precedence over those that had come up from the Atlantic. The St. Lawrence Seaway Authority—the organization that ran the system—rejected those ideas. Instead, in the summer of 1964, the Seaway hired the consulting firm Kates, Peat, Marwick & Company to solve the congestion problem.

By the following spring, the Seaway had begun to make changes based on the consultants' recommendations. Five channels were widened. Hydraulic modifications allowed the authority to fill and empty the locks more quickly. Measures were taken to open and close the gates faster. Navigational signal boards with red, amber, and green lights were erected above and below each lock to make for smoother entries and exits. The maximum allowable drafts—bumped from 25 feet in 1959 to 25 feet, 6 inches in 1963—were increased yet again to 25 feet, 9 inches in 1967, which permitted shippers to move increased tonnages with each voyage.

TOP: **A dispatcher at the Welland Canal keeps track of the ships awaiting entry in November 1969. With the end of navigation approaching, there was a crush of downbound ships at the Lake Erie end of the canal.** ST. LAWRENCE SEAWAY MANAGEMENT CORP.

BOTTOM: **A consulting firm hired in the mid-1960s helped the Seaway Authority develop the first traffic-control system, which included the use of closed-circuit cameras, a new technology** ST. LAWRENCE SEAWAY MANAGEMENT CORP.

The consultants also recommended changes at the St-Lambert and Côte-Ste-Catherine locks near Montreal that allowed

The seaway was built for commercial shipping, but pleasure craft also use the system. These boats are in the St-Lambert Lock, travelling up the St. Lawrence.

ST. LAWRENCE SEAWAY MANAGEMENT CORP.

the Seaway to add nearly a month to the shipping season in the eastern section. By increasing and modifying the flow of water, lock operators were able to erode and flush out early winter ice and advance the spring break-up. As a result, the season was extended from 222 days in 1959 to 250 days in 1968.

Perhaps most importantly, the consultants laid the groundwork for an effective traffic-control system. A dedicated centre was set up in a building below the escarpment that primarily served as a maintenance and repair shop. Three-member teams, consisting of a supervisor and two assistants, worked around the clock and managed the movement of vessels through the entire canal. Three closed-circuit-television cameras—then a relatively new technology used mainly for prison and industrial security—were installed at each lock so that the controllers could see the ships as well as communicate via radio with the captains.

They kept track of the movement of vessels on an animated display board that was nine metres long. It was a scale model of the canal and the escarpment, complete with movable wooden ships that the controllers pushed along with sticks as real vessels made their way through the system. The animated board was later replaced by a mechanized one that used worm gears, or long, threaded shafts. They moved models horizontally when ships were navigating a channel, and vertically when they were ascending or descending via the locks. "The traffic-control system changed completely," recalls Pierre Camu, the Seaway's president at the time. "It went from a nineteenth- to a twentieth-century approach. It was applied to the Montreal-St. Lawrence section as well."

All of these changes improved transit times and eased the congestion. Nevertheless, Seaway officials believed that major upgrades were required if the Welland were to function smoothly and accommodate the growth in

An aerial view of the Welland Canal as it passed through the city of Welland. Narrow and full of turns, as well as bridges, ship captains viewed it as a treacherous section of the waterway. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

demand anticipated in coming decades. To that end, they developed a plan to complete the twinning of the seven locks that raise vessels from Lake Ontario to the summit of the escarpment, a project estimated to cost as much as $450 million.

Locks 4, 5, and 6 rise like three giant steps up the face of the escarpment and had long been twinned to allow simultaneous upbound and downbound traffic. The Seaway envisioned the creation of a parallel channel and the construction of four locks to correspond with Locks 1, 2, 3, and 7. The federal government announced in August 1963 that the project would proceed, and Seaway officials went to work selecting a route and conducting preliminary studies.

By the fall of 1965, they had decided that the new waterway would be built about one kilometre east of the existing canal. It would run from Lake Ontario south for fourteen kilometres and would connect with the older system below Lock 7. Two immovable obstacles lay in the path of this new public work: the Queen Elizabeth Way and the Lakeview Cemetery in Thorold, the site of some 8,000 graves. Seaway planners envisioned digging a tunnel so the expressway could pass under the canal, but the cemetery would have to be relocated. The most contentious part of the project involved the expropriation of land from private owners. Letters went out to them before the end of 1965, and by May 1966 the Seaway had acquired 1,971 acres of land from 335 titleholders at a price of $4 million.

By then, Seaway engineers were at work on two even more ambitious schemes, dubbed Project X and Project Z, which when completed would have replaced the existing Welland Canal with an entirely new one. Project Z was a new set of locks that would lift ships from Lake Ontario to the summit of the escarpment in four giant steps of about eighty feet each. Furthermore, each lock would have been a thousand feet long. The engineers

produced a conceptual design for this undertaking, but never got any further because Project X consumed the organization's time, energy, and money.

In 1966, the Seaway began work on this mammoth undertaking, which came to be known as the Welland Canal Bypass. This new channel would replace an existing 14½-kilometre stretch of the canal that was regarded as downright treacherous. It was only 180 feet wide in most places, a little too narrow for the ships now plying these waters. It had four big curves in it, as well as several smaller ones. It passed through the city of Welland and there were six bridges — four of them spanning the canal within a space of about two kilometres.

'You worked like a dog. On some of those old ships, you had to come right around to the side of the wheel and pull down with two hands. I hated that bridge.' *Charles Tully* · retired pilot

One of these structures — Bridge 15 — became known internationally among the captains of the ocean vessels. It was a swing bridge for trains on the New York Central Railroad main line between Buffalo and Detroit. It rested on a concrete pier that was located right in the middle of the canal. "Bridge 15 was known all over the world," recalls the retired pilot Stevenson. "When you got on a ship at Port Weller, at the Lake Ontario end of the canal, the foreign captains would always ask, 'Where is this bridge?' Some of them didn't even want to breathe when you went through there. That's how narrow it was."

To make matters worse, there was a slight turn just south of the structure, which added to the difficulty of navigation, says Charles Tully, another retired pilot. "You always liked to keep the ship in the centre of the canal," he adds. "So you came through this bend and all of a sudden you were steering right at Bridge 15. Then you had to get your vessel over to the right and lined up so you could get through. You worked like a dog. On some of those old ships, you had to come right around to the side of the wheel and pull down with two hands. I hated that bridge."

As a precaution, the Seaway installed creosote-soaked pilings the size of telephone poles around the pier. They also put in sensors and a bell that would ring if a ship touched the bridge — something that happened too often for comfort.

Another well-known occurrence on this stretch of the canal was the end-on-end passing. Two ships would approach from opposite directions and each would be in the centre of the canal, but travelling very slowly. When they were about one boat length apart, both pilots would steer their vessels to the right, leaving a strip of water less than two metres wide between them — usually just enough to push them apart.

"There used to be a lot of scrapings," says Tully. "The ships rubbed each other. If there was only superficial damage you just carried on. Today, you'd call them incidents and you would have to report them."

"Sometimes the paint caught fire," Stevenson adds. "You'd be surprised how much flame there was. But I take my hat off to those captains. They did a wonderful job. Otherwise, there would have been serious accidents."

While the seaway was experiencing growing pains, the shipping industry was going through a remarkable transformation. "The change was

'As soon as the seaway opened, there was a huge amount of obsolescence. The ships were just too old or too small. They weren't making any money.'
Jack Leitch · Upper Lakes Shipping

Before the seaway was a decade old, the postal services of Canada and the United States had issued stamps to celebrate its remarkable success. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

dramatic," recalls Jack Leitch, the longtime president of Toronto-based Upper Lakes Shipping. "As soon as the seaway opened, there was a huge amount of obsolescence. The ships were just too old or too small. They weren't making any money. We needed to expand our fleet for two reasons. To get rid of the canallers and to meet the steady increase in demand to move coal and iron ore."

Upper Lakes owned twenty-nine vessels at the time, fifteen of them canallers capable of hauling about 2,000 to 3,000 tons of freight. Within five years, all of those small ships were out of service—the second phase of a fleet-modernization program that actually began in the early 1950s in anticipation of the seaway. In 1952, Upper Lakes awarded a contract to a shipyard in Midland, Ontario, to build two 644-foot ore, coal, and grain carriers. They were named the *Gordon C. Leitch*, after the company founder, and the *James Norris*, in honour of the Chicago grain tycoon who held a 65-per-cent interest.

Six years later, Upper Lakes built a 681-foot vessel at the Port Weller Dry Docks, which it had purchased in 1956. The ship, designed for use in the seaway, was required to fulfil a long-term contract to supply coal and iron ore to the Dominion Foundries and Steel Company (Dofasco) in Hamilton. It was named the *Frank A. Sherman* to recognize the chairman of Dofasco.

Once the seaway was opened, Upper Lakes had to move quickly to replace the carrying capacity lost by decommissioning the canallers. All told, the company built, or bought and re-conditioned, thirteen ships in the space of ten years. It acquired four oil tankers, extended the hulls at Port Weller, sometimes by as much as 200 feet, and converted them to bulk carriers. Upper Lakes purchased four older vessels that ranged in length from 550 to 600 feet and could be put into service immediately. The firm also built four self-unloaders—the *Cape Breton Miner*, *Ontario Power*, *Canadian Century*, and *Canadian Progress*—that were used largely to supply coal to Ontario Hydro generating stations.

All of the other big Canadian shippers launched renewal programs and, for some, it presented a complex challenge, as Edgar Collard wrote in *Passage to the Sea: The Story*

Pierre Camu, president of the Seaway Authority from 1965 to 1973, right, meets with David Oberlin, administrator of the Saint Lawrence Seaway Development Corporation, at Massena, New York. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

of Canada Steamship Lines. "The startling prospect was that most of CSL's fleet would have to be rebuilt. Too many of its ships were too small. Nonetheless, all of CSL's canallers would have to be kept in repair and good sailing order until the very day the Seaway opened. CSL would have to prepare for the new order while imprisoned in the old."

Like Upper Lakes, CSL started building for the seaway before construction of the new system had begun. In November 1953, the company launched the *T.R. McLagan*, a 714-foot ship with a 70-foot beam. The ship could transit the Welland Canal, but CSL executives were gambling that the locks on a new seaway would be big enough to accommodate the *T.R. McLagan*.

The real boom occurred in the 1960s. One ship after another sailed out of the company's shipyards in Lauzon, Quebec, and the Ontario communities of Midland, Collingwood, Kingston, and Port Arthur: the *Murray Bay* in 1960; the *English River*, the *Fort Chambly*, the *French River*, and the *Whitefish Bay* in 1963; the *Saguenay* in 1964; the *Rimouski* and the *Stephen B. Roman* in 1965. By the end of the decade, CSL had completed another seven vessels.

The shipbuilding bonanza ultimately changed the competitive balance among the companies. Algoma Central Marine, now based in St. Catharines, had been a small operator compared to firms such as Scott Misener Steamships, N.M Patterson & Sons, and Hall Corporation of Canada. "We just sort of took off," says Peter Cresswell, a former president of Algoma. "One of the reasons we were able to grow was that we got into self-unloaders, whereas some of the others didn't. They're more expensive to build, but more profitable. You didn't need shoreside facilities. You got rid of your cargo very quickly. It could take a bulker twenty-four hours to unload a cargo of iron ore and as much as two days for grain. Self-unloaders could do it in eight to ten hours."

Algoma launched its building program in anticipation of the seaway with the *E.B. Barber*, a 564-foot bulk freighter that was constructed in 1953 and converted to a self-unloader in the early 1960s. The company launched the *Sir*

Denys Lowson in 1964, the *Roy A. Jodrey* in 1965, the *Algorail* and the *Algocen* in 1968, and the *Agawa Canyon* in 1970. The fleet expansion continued until the early 1980s, by which time Algoma had built fourteen vessels.

By the end of the 1960s, the shipowners were building vessels 730 feet long, the maximum allowable length to fit seaway locks. There were thirty-eight of these ships in service, five of them launched in 1968 alone, and all had been built in Canadian shipyards. The seaway also served as a catalyst in the conversion from steam-driven to diesel-powered vessels. Jack Kinnear, a former executive with the shipping company Carryore, which eventually merged with Algoma, notes that most of the pre-seaway vessels on the lakes were driven by oil-fired steam turbines. "They couldn't go below Quebec City because you very quickly encountered saltwater," says Kinnear. "The older ships needed fresh water for their boilers."

The seaway also led to improvements at the major ports of the Great Lakes. Most had to be expanded to accommodate the new fleet of vessels, as well as the larger ocean-going ships travelling inland. Access channels were deepened. Dredging was undertaken at wharfs, piers, and anchorage areas. Cargo terminal sheds, grain elevators, conveyor systems, and pipelines were modified or rebuilt to accommodate the demands of increased traffic.

When the seaway opened, it was large enough to handle 90 per cent of the world's sailing vessels; by the end of the first decade, the fleets of thirty nations were using the system. They came from Japan, Thailand, Taiwan, Greece, England, and Russia, among other places, demonstrating that international shippers had recognized the seaway as an indispensable commercial artery reaching into the heartland of North America.

Furthermore, the system functioned so well during those first ten years that it silenced forever the skeptics and naysayers who had opposed and obstructed it for so long. During the construction phase, Seaway planners predicted that the volume of goods shipped on the Montreal-Lake Ontario section would reach 50 million tonnes annually by 1969 and 60 million tonnes on the Welland Canal portion.

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The high-water mark for the decade was achieved in 1966, when volume on the Montreal-Lake Ontario section exceeded 44.67 million tonnes while 53.77 million tonnes went through the Welland Canal. Two years later, the numbers were similar: 43.5 million through Montreal-Lake Ontario and 52.68 million through the Welland. The waterway likely would have hit or exceeded the projected volumes in 1968 but fell short largely due to a three-week strike by Seaway employees. In any event, the entire system was handling more than three times as much cargo as the old fragmented waterway had in its final year of operation.

As such, there was much to celebrate when the seaway completed its tenth year of operation. Camu summed up the challenges and the achievements in a speech in January 1969 to the annual conference of the Dominion Marine Association and the Lake Carriers' Association. "The Seaway had to be accepted as an economical, efficient, fast and safe artery of commerce by the business community—the

On June 27, 1969, in Montreal, Pierre Trudeau and Richard Nixon unveiled a plaque commemorating 'the spirit of friendship and co-operation' that led to the building of the seaway. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

importers, exporters, bulk shippers, hydro and steel companies," Camu told his audience. "In ten years, we have improved the image of the Seaway to the point that those who, in 1959, tended to consider the waterway as a superfluous achievement, by 1965 had come to the conclusion that it was useful and by 1969 that it was a necessity."

That summer, public ceremonies were held to commemorate the tenth anniversary at Morrisburg, Ontario, at Sault Ste. Marie, at Massena, New York, and several other seaway communities. The most noteworthy event took place June 27, 1969, at the exhibition Man and His World in Montreal, the site of Expo 67 two years earlier. It featured Prime Minister Pierre Trudeau and US President Richard Nixon, who was making his first visit to Canada since being elected in 1968, along with many other political dignitaries. The two leaders unveiled a plaque that read: "The spirit of friendship and co-operation between Canada and the United States is commemorated by this tablet which was dedicated on the tenth anniversary of the St. Lawrence Seaway."

Trudeau spoke first, then Nixon. "We are happy to welcome you here, Mr. President," the prime minister said, speaking in French, "to salute the work that our two peoples have made together, to see the economic progress that has flown out of it, but above all to demonstrate that this waterway … can serve, not as a barrier between our peoples, but as a gateway of welcome, of progress and of access."

The president expressed similar sentiments, and then added: "If I have one thought today to leave this great audience, it is this: I believe that the spirit that built this Seaway is the spirit that the world needs today to bring the people of the world together."

3 | Growth and Optimism, 1969–1979

Captain Arthur Perry stood on the bridge of the SS *Georgian Bay* late on the afternoon of December 15, 1972, and guided the 630-foot ship south from Lake Ontario into the inky waters of the Welland Canal. The sun had already set and a heavy snow was falling. This was the *Georgian Bay*'s final run of the season: a 43-kilometre trip through the canal to its winter berth at Port Colborne on Lake Erie. This was Captain Perry's final journey: he was retiring after a career spent on the lakes. And this was a historic passage for the St. Lawrence Seaway Authority, for the shipping companies that used the Welland Canal, and for the residents who lived alongside it. It was the final transit of a narrow, 14½-kilometre stretch of the canal that passed through the city of Welland and had become a major impediment to vessels, vehicles, and trains alike. At the height of the shipping season, as many as fifty lakers and ocean-going freighters sometimes stood idle at either end of the canal due to the bottleneck in the middle. And for every transit (7,000 during the 1972 season), cars idled and motorists fumed at six bridges that had to be raised or swung open to allow passage.

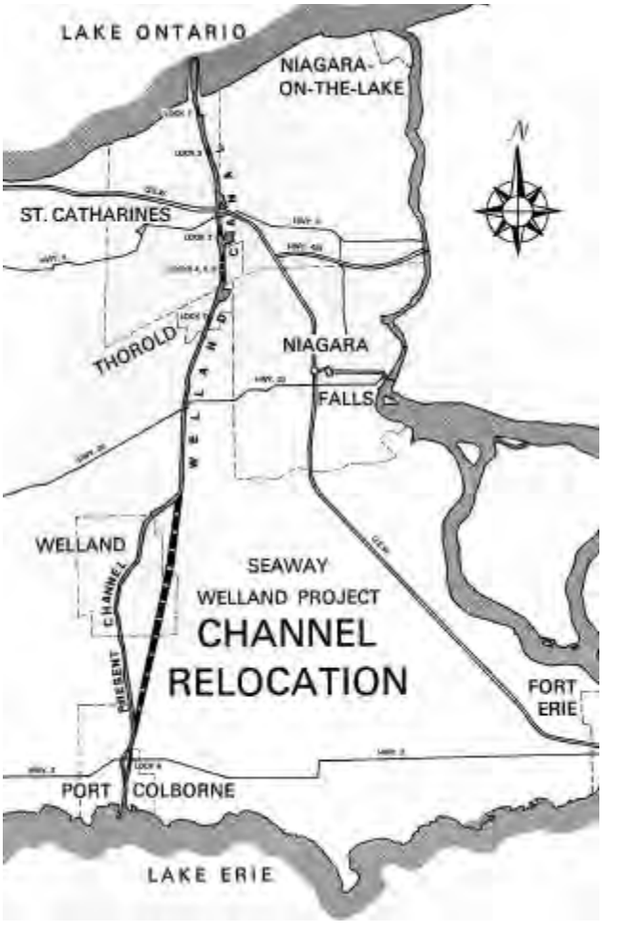
Many of Welland's 45,000 residents had come to detest the delays, and thousands came out that wintry night to see the last ship through. They built fires along the route; they parked their cars and flashed the headlights when the *Georgian Bay* passed; homeowners turned their lights on and off; kids hurled snowballs at the iron flanks of the big laker. At 8:00 p.m., the ship's horn sounded as it approached Bridge 13 at Main Street in downtown Welland, where for forty years the worst traffic congestion had occurred. People were lined up ten deep here and they cheered in response to the blast. The arms of Number 13 were raised for this final passage, and as they slowly descended, people in the crowd began to sing a local version of an old British ditty: *Welland bridge is coming down, coming down, coming down. Welland bridge is coming down.*

A laker passes through downtown Welland, interrupting the flow of traffic on Main Street, a one-way thoroughfare, and creating a long line of idling vehicles on the east side of the bridge. THIES BOGNER

When they finished, they turned their attention to the city's jubilant mayor, Alan Pietz, who stood before a microphone on a stage and declared, "It's the end of one era, and the beginning of another."

The new one began on March 28, 1973. That day, the MV *Senneville*, a bulk-cargo carrier loaded with barley and destined for Port-

ABOVE: **An aerial view of the Welland Canal looking north from Port Colborne, with the passage through the city of Welland on the left and an excavation for the path of the new channel on the right.** TIM ROOT



RIGHT: **A map depicting the Welland Canal and the route of the relocated channel, which is represented by the bold, dotted line.** ST. LAWRENCE SEAWAY MANAGEMENT CORP.

Cartier, Quebec, entered the Welland Canal at Port Colborne and made the first commercial passage through a new channel that bypassed the city. It had cost $188 million and taken five years to construct. It was wider, deeper, and straighter than its predecessor, and its inauguration was cause for celebration, though on a smaller scale than the canal closing of the previous December. Hundreds of children were given time off school to witness this historic voyage and the city staged a fireworks display.

"You've spoiled us," the *Senneville's* captain, W.T. Elliott, told officials with the Seaway Authority that day, a sentiment echoed by many a mariner over the years.

"It was a big improvement," recalls former pilot Charles Tully, who was beginning his career on the lakes at the time. "There were no bridges to worry about. There was lots of room to meet other ships. From our point of view, it made a big, big difference."

The Welland Bypass, as it was known, was the biggest capital project undertaken in the seaway's first two decades of operation. It greatly improved the speed and safety of navigation. It allowed the shipping industry to meet the rising demand that came with growth in the Canadian economy. Moreover, it was "a

'We did not want any movable bridges on the new channel.... We wanted uninterrupted crossings, so we built tunnels for everything.'
Bill O'Neil · Seaway president, 1980–1989

marvel of engineering expertise," in the words of the Seaway's 1973 annual report, and it had been completed "within severely restricted time schedules and without any interruptions in road, rail or marine traffic."

The new bypass was 13.3 kilometres long. It was 350 feet wide and 30 feet deep. Planning for this colossal undertaking began in the mid-1960s, when shipping executives and civic leaders complained that the delays and disruptions had become intolerable. In May 1966, shortly after receiving government approval, the Seaway Authority began acquiring the 6,500 acres of land required for the new channel and started construction fourteen months later. By the time the bypass was complete, more than 4,000 people had worked on it.

They had moved 65 million tons of earth, clay, rock, and silt. They had relocated rail lines belonging to three companies: the Canadian National, the Penn Central, and Toronto, Hamilton & Buffalo. They had laid 160 kilometres of new track and had built a station, a control centre, freight depots, and marshalling yards. They had dug a tunnel under the bypass for trains and motor vehicles, a tunnel that was 1,080 feet long, 116½ feet wide and 35 feet high — spacious enough for three rail lines and a two-lane highway. They dug a four-lane roadway under Main Street in Welland and relocated 80 kilometres of arterial roads.

The Welland River had to be re-routed under the bypass. This meant building a siphon containing four tubes, each one 94 feet wide and 638 feet long, big enough to handle peak flows of 12,000 cubic feet of water per second. Finally, hydro, gas, telephone, and sewer lines were moved and realigned to accommodate the new infrastructure.

The Main Street tunnel, top, under construction in the summer of 1971. All rail and road traffic would go under the new channel to ensure safer, more efficient navigation. Below, siphon culverts were constructed to handle the flow of the Welland River. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

"We did not want any movable bridges on the new channel," recalls former Seaway president Bill O'Neil, who was in charge of construction of the bypass. "We wanted uninterrupted crossings, so we built tunnels for everything."

On August 25, 1974, a vessel owned by a subsidiary of Bethlehem Steel, the Steelton, collided with the Port Robinson bridge while transiting the Welland Canal. It was the worst accident in more than forty years and closed the waterway until September 8. THIES BOGNER

The opening of the bypass occurred at a time when the shipping companies were hard pressed to keep pace with a booming economy. In 1969, the final year of the seaway's first decade of operation, 48.56 million tonnes of cargo moved through the Welland Canal. By 1973, that figure had increased to 60.96 million tonnes, a new record and the fourth-straight annual increase. Likewise, a fresh high—52.28 million tonnes—was established on the Montreal-Lake Ontario section of the seaway.

Cargo volumes fell sharply in 1974 on both sections due to labour disputes and the worst accident on the Welland Canal in its forty-two years of operation. The canal was closed for fifteen days—from August 25 until September 8—after the *Steelton*, a 620-foot laker owned by a subsidiary of Buffalo-based Bethlehem Steel, completely destroyed a vertical-lift bridge at Port Robinson. The collision occurred at 4:20 a.m., according to a report in the *Toronto Star*, shaking nearby houses and waking most of the town. One of the bridge's 300-ton counterweights wound up deeply embedded in the road below, while the other ended in the silt and muck at the bottom of the canal.

After the setbacks of 1974, the amount of cargo moving on the seaway climbed annually for four consecutive seasons. By the end of the second decade, the two sections combined were moving more than 74.3 million tonnes annually, nearly two and a half times the volumes attained back in 1959. But the numbers told only part of the story.

'You walked into the Seafarers' union hall on King Street and the board was full of jobs. We all got work on the ships.... I was green as grass when I started.'
Bruce Duffett · ordinary seaman

"The seaway has proved to be one of the most remarkably profitable investments Canada has ever sponsored," declared Ralph Misener, chairman of St. Catharines-based Scott Misener Steamships, in a speech to the Palliser Wheat Growers' Association at Regina in January 1974. "It has consolidated Canada's position as a nation with a virile inland merchant marine. It has lured extra cargoes that previously reached the eastern seaboard via US railroads, and it has generated astounding and continuing dividends by stimulating development and economic progress."

Times were good for the Seaway, for the shipping companies, and for the men and women they employed. "In July 1976," recalls Bruce Duffett, an ordinary seaman whose career on the lakes spanned three decades, "I drove up to Toronto from Newfoundland with five other guys. You walked into the Seafarers' union hall on King Street and the board was full of jobs. We all got work on the ships. We almost picked our positions. I was green as grass when I started."

Mechanical assistant Jacques Dumont, a Quebecer from Cap Chat on the Gaspé Peninsula, has similar memories. "You could get on a ship at Lock 1 in the Welland Canal, and if you didn't like the captain, you could get off at Lock 3 and catch on with another ship. I took a job as an oiler in Montreal just to get a ride to the union office in Thorold [Ontario]. I got fired in Cardinal, took a bus to Thorold, and got another job just like that."

Dozens of commodities and products were moving on the seaway in those days: stone, salt, and sulphur; chemicals, fuel oil, and cement, to name a few. But grain and iron ore were the big ones. Most years, they accounted for about 70 per cent, by volume, of the goods hauled, and

The Iron Ore Company of Canada terminal at Sept-Îles, Quebec. Iron ore and grain accounted for 70 per cent of seaway traffic in the 1970s. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

demand for these commodities pushed seaway tonnages to unprecedented levels.

Canada had been exporting wheat and other cereal grains grown in the three Prairie provinces for decades. But the business changed dramatically in the 1960s and 1970s, when the Soviet Union began buying and the seaway was a major beneficiary. Throughout the 1950s, Russia had exported small volumes of grain annually, mainly to earn foreign currency, but crop failures in the early 1960s reversed that trend.

The communist government of Nikita Khrushchev announced in 1962 that the prices of meat, butter, and other staples would be increasing. The result was widespread unrest and, in the town of Novocherkassk, strikes and demonstrations.

Although the uprising was short-lived and brutally suppressed, it had a lasting impact.

A big delegation arrived in Ottawa in late August, set up camp at the Château Laurier, and began negotiating with the Canadian government.

Seaway president Paul Normandeau, far right, meets a delegation of Soviet shipping officials who were touring Canada in December 1974, when the USSR was making record grain purchases. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

The following year, the Soviet authorities approved large-scale grain imports for the first time. In the summer of 1963, representatives of Exportkhleb, the state agency that normally handled foreign sales, went looking for cereal grains to buy. A big delegation arrived in Ottawa in late August, set up camp at the Château Laurier, and began negotiating with the Canadian government.

The talks were private, but after two weeks behind closed doors the secrecy began to break down. On September, 14, 1963, the *Globe and Mail* ran a front-page story under the headline "Huge Wheat Sale Near; $500,000,000 Deal With Soviets." Two days later, Mitchell Sharp, Canada's minister of foreign trade, and S.A. Borisov, first deputy minister of the Soviet ministry of foreign trade, signed an agreement that would see Canada ship 228 million bushels of wheat to Russia and its Eastern European satellites—the largest grain deal in Canadian history.

"This announcement was a watershed in the history of the postwar grain trade, in the history of the Soviet Union itself," author Dan Morgan wrote in his 1979 book *Merchants of Grain*. "The grain crop had failed, but this time Russians were not being asked to tighten their belts. Khrushchev was doing what other rich countries like Japan were doing: covering the deficit with imports."

Immediately after signing the deal, the Soviets began sending fleets of freighters to

Canada's Atlantic and Pacific ports, and Foreign Trade Minister Sharp told journalists that the bulk of the grain would be shipped through the St. Lawrence. The impact was apparent in the volumes of grain that moved through Thunder Bay at the western end of Lake Superior and on to the Seaway: 6.5 million tonnes in 1962, 8.8 million in 1963, 11.6 million in 1964, 10.9 million in 1965, and 12.9 million in 1966. The Russians kept buying year after year because, as Morgan wrote, "Soviet agriculture … was still a dismal failure by Western standards. The collective and state farms were inefficient for all kinds of reasons—poor transportation, inadequate incentives, investments in the wrong places, the rural blahs.... Harvest failures, when they occurred, were usually colossal."

By the end of the 1960s, the Soviet authorities were attempting to build up their livestock herds in order to put more meat and poultry on Russian tables. That meant huge amounts of grain were being used for animal feed in a society rife with shortages. To make matters worse, the regime announced shortly before Christmas in 1970 that food prices were going up. It was all too much for Polish workers in the cities of Gdansk and Szczecin. They walked off their jobs in protest.

Shortly after, the Soviets again began scouring the globe for new sources of grain. Eighteen months later, in July 1972, they made a purchase that still ranks as one of the largest in the history of the trade. This time, they were able to buy from private American companies because the US government had lifted restrictions on exports to the Soviet Union. The magnitude of the Russian acquisitions is evident from a Central Intelligence Agency memo sent to Carroll Brunthaver, assistant secretary of US agriculture, on August 31, 1972:

> Total grain contracts with all countries for delivery in fiscal year 1973 now total 24.2 million tonnes worth almost $1.5 billion, three times the quantity imported in FY 1972 and more than twice the amounts bought after the disastrous harvests of 1963 and 1965. A recent contract for one million ton of soybeans to be used for livestock feed and vegetable oil, brings total purchases to about $1.6 billion. These imports of grain will largely be from the United States—17.5 million tonnes—with the remainder from Canada, France, Australia and Sweden.

This enormous purchase and others throughout the 1970s tested the capabilities of Canada's grain-handling system. They also ensured that the seaway operated at or near capacity annually, from the start of navigation in the spring till close in early winter. Farmers in hundreds of locales across the prairies hauled their grain to country elevators. The railways collected it and transported it to Thunder Bay, one of the busiest ports in the country at the time.

By the end of the 1960s, the Soviet authorities were attempting to build up their livestock herds in order to put more meat and poultry on Russian tables.

There were twenty-one terminal elevators at the lakehead, according to *Greenwood's Guide to Great Lakes Shipping*. The smallest could hold 1.75 million bushels, the largest 9 million. More than 1,700 men worked at the port, and at times the rail yards would be

The pressure to move grain meant that the Seaway extended the navigation season and opened early. In this photo, the S.S. Canadian Hunter, owned by Upper Lakes Shipping, is traveling down the St. Lawrence with a load of grain on March 26, 1974—the earliest opening to that point.
ST. LAWRENCE SEAWAY MANAGEMENT CORP./THE OTTAWA CITIZEN

clogged with as many as 8,000 boxcars waiting to be unloaded. "We worked full out," recalls Gene Onchulenko, a Thunder Bay resident who was employed on the waterfront in those days. "There were a lot more ships. We were loading grain constantly. I recall a weekend when we cleared ten ships."

Grain destined for Russia went to US-owned terminals at Baie-Comeau and Port-Cartier, the two deepwater ports near the mouth of the St. Lawrence that were capable of handling the Soviet Union's big freighters. Some of them were old, cleaned-out tankers capable of carrying three times as much cargo as a laker. American grain moved on the seaway to those terminals as well, though only a portion of it because most was exported via Houston or New Orleans.

"I can remember the lineups," says Tom Brodeur, vice-president of sales and marketing at CSL, who was working on the lakes at the time. "You think you've got a problem today if you go down and wait a day at Baie-Comeau to unload. The average back then was about five days. There was tremendous congestion at all the St. Lawrence elevators."

Bob Charman, a retired vice-president of sales at CSL, recalls the almost-frantic push to transport grain. "The Russians were pressuring the Wheat Board and the board put a tremendous amount of pressure on us to move cargo, sometimes when it was almost impossible," Charman says. "In December, the weather was awful. You were running in fog

and ice, wind, sleet, and snow. It was hard on our crews. We took a lot of risks."

And when a ship had unloaded its grain on the St. Lawrence, there was always iron ore waiting at Baie-Comeau, Port-Cartier, or farther downriver at Sept-Îles. On the upbound journey, the cargo holds were almost always fully loaded with ore for the steel plants of Hamilton or Sault Ste. Marie on the Canadian side and Cleveland, Detroit, or other centres on the US side. For a good part of the decade, the mills could scarcely produce fast enough to meet demand.

World steel production surged from 650 million tonnes in 1971 to 705 million the following year and to 780 million in 1973. It jumped again in 1974 to 795 million before tumbling to 723 million in 1975. But output recovered a year later and rose annually through the end of the decade. By 1979, global production had soared to 827 million tonnes. The Canadian and US industries followed similar trajectories, and at the start of that remarkable decade, senior executives were stuck for words to describe the blaze of activity.

"I have never seen anything like it," Peter Gordon, president of the Hamilton-based Steel Company of Canada, told the *Financial Post* in June 1973. "And the story is the same in every major producing country—the US, Western Europe and Japan."

"Our planning has been advanced several years due to the unexpected boom in demand," said Frank Sherman, president of Dominion Foundries and Steel of Hamilton. "Our production rate right now is at the level originally forecast for 1976–77."

The *Financial Post* reported in the fall of 1973 that every major Canadian mill was operating at capacity and there were enough major industrial and commercial projects planned to keep demand strong for years to come. Electrical utilities forecast their needs at 1.2 million tonnes between 1974 and 1980 for power-generating projects that were already started or being designed. The oil-and-gas industry required some 635,000 tonnes for additional refining capacity, for petrochemical plants and oilsands projects. New bridges, subways, and highways would consume 200,000 tonnes.

First Canadian Place, a seventy-two-storey office tower at the corner of King and Bay streets in downtown Toronto and the new headquarters of the Bank of Montreal, was under construction and would take 42,000 tonnes of structural steel. It was just one of more than fifty commercial or industrial building projects that would need roughly 816,000 tonnes of steel.

A self-unloader discharges coal at the Stelco docks in Hamilton Harbour in November 1973. World steel production soared during the 1970s and Canadian mills sometimes had difficulty getting enough ore to meet their needs. HAMILTON PORT AUTHORITY

Ships docked at Dofasco's Pier 21 unload bulk materials for the steel industry. HAMILTON PORT AUTHORITY

The steel companies were among those consuming the product because they were expanding to meet demand. In June 1975, Algoma Steel of Sault Ste. Marie ran full-page advertisements in the business press under the heading "Canada gets another 5,000 tons of molten iron every day." The company was announcing the completion of a new blast furnace — No. 7 — a $50-million expansion.

"To make more steel, Algoma needs more iron," the company stated. "No. 7 Blast Furnace does that. No. 7 stands more than 30 storeys high and has a 35-foot-diameter hearth, which makes it the largest blast furnace in Canada. When in full operation, No. 7 will supply our basic oxygen steelmaking plants with enough molten iron to increase our raw steelmaking output to 4,000,000 tons per year."

At the same time, Stelco was just beginning to develop a completely new, fully integrated steelmaking complex — the first in North America in decades. The company had acquired 6,600 acres of land. The project would cost $500 million, and it would completely transform the tiny farming community of Nanticoke on the shore of Lake Erie, sixty kilometres southwest of Hamilton. "The steelmaking expansion on the new property will carry Stelco well into the 21st century," the *Financial Post*'s W.L. Dack wrote, "and will provide well over 12 million tons annual capacity."

Stelco's Nanticoke-related capital outlays were growing when demand took a dive. A recession hit in 1975, brought on by escalating oil prices and runaway inflation. World output fell by 9 per cent that year, US production fell 20 per cent, and the Canadian industry produced 4 per cent less. It was, according to Canadian business journalist Peter Foster, "the industry's most traumatic reversal in its post-war history."

When the recession ended, North American steelmakers confronted another perplexing challenge. Cheap imports from Japan, Europe, and emerging economies such as Brazil, South Korea, and South Africa began flooding into their markets and quickly put a dent in domestic production. The industry wrestled with the import problem for two years until a recovery began, and for Canada's steelmakers, the decade ended much as it had begun.

Their order books were full. The plants were operating at or near capacity, and the companies were reporting healthy increases in production. Stelco and Algoma boosted output by 12 per cent each in 1978 and Dofasco by 6 per cent. In late 1979, the *Financial Post* declared: "The big three steelmakers can see few clouds on their horizons. They have orders on their books, most of their customers are on allocation and they haven't been able to meet all the export demand from the US."

The movement of grain and iron ore — downbound vessels stuffed with grain, upbound ones bulging with ore — had propelled the Seaway and the Great Lakes shipping industry to their best decade ever. For years Ontario's steel mills and power plants had burned American coal, hauled north in 100-car unit trains from mines in Pennsylvania, Kentucky, and Virginia; transferred to lakers in Toledo, Sandusky, Ashtabula, and other Ohio ports; and moved from there to Hamilton, Toronto, and Sault Ste. Marie. Western Canadian coal entered the picture in the mid-1970s and quickly became the fastest-growing cargo on the lakes.

In order to diversify their supply bases, Ontario Hydro and the steel companies began buying lignite in Saskatchewan and bituminous in Alberta and BC. Stelco took delivery of 270,000 tonnes in 1975, which came through existing facilities in Thunder Bay, and Ontario Hydro bought 180,000 tonnes. That was just the start. A new coal terminal that occupied 236 acres was under construction on McKellar Island at the mouth of the Kaministiquia River, which drains into Lake Superior near Thunder Bay. It was completed in the fall of 1978. In its first full year of operation, the new terminal handled 365,000 tonnes of coal. By 1980, that figure had reached 2.4 million tonnes.

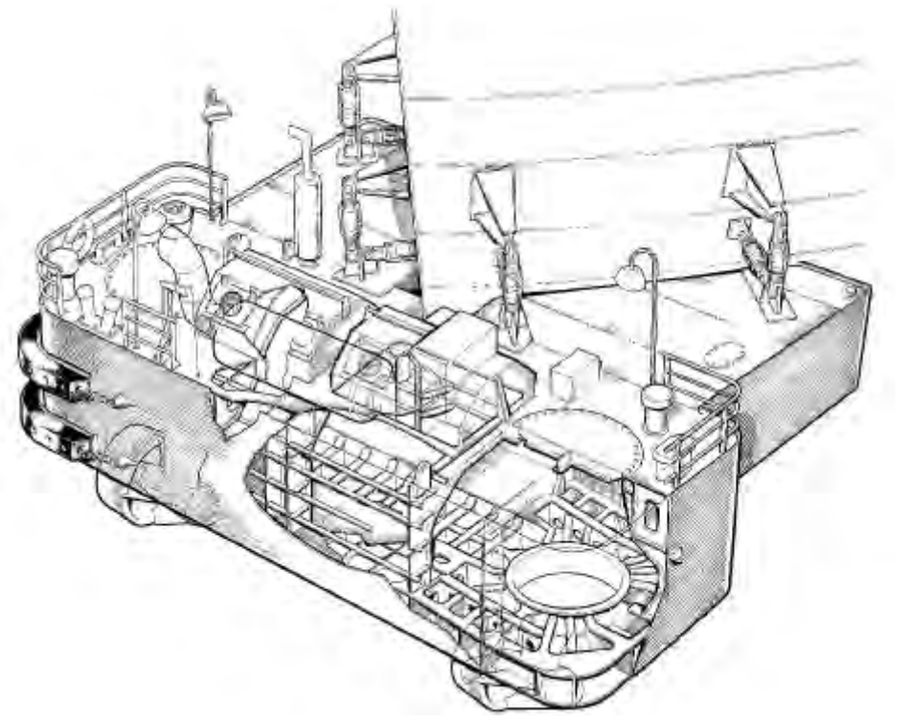
The seaway had to function as efficiently as possible to handle the volumes, and the Seaway Authority introduced a number of measures to ensure this happened, especially during cold weather. Director of operations A.M. Luce outlined some of these in February 1974 at the annual joint conference of the Dominion Marine Association and the Lake Carriers' Association.

The movement of grain and iron ore — downbound vessels stuffed with grain, upbound ones bulging with ore — had propelled the Seaway and the Great Lakes shipping industry to their best decade ever.

Specially insulated gates had been installed at the Côte-Ste-Catherine and Upper Beauharnois locks to minimize ice buildup. The Seaway was experimenting with epoxy coating on lock walls to prevent ice formation. Culverts were in place at St-Lambert and Côte-Ste-Catherine to flush ice out of the locks, and they were being added at Upper Beauharnois that winter. "It is our intention," Luce told the gathering, "to continue to study the problems associated with various canal reaches and structures. We will continue to upgrade the facilities at our locks in order to improve our capability to operate in cold weather."

Two years later, Seaway president Paul Normandeau addressed a joint conference of the same organizations and outlined an even more ambitious scheme to boost the system's capacity — the creation of shunters that would be affixed to the stern or bow of vessels transiting the Welland Canal to guide them in and out of the locks. "Specially designed marine shunters," Normandeau said, "used in

'No other improvement, short of building another canal, seems to offer the significant boost in capacity that will enable us to keep on using our facilities for many more years.'
Paul Normandeau · Seaway president, 1973–1980



With traffic increasing annually on the seaway, congestion in the Welland Canal remained a major challenge. The Seaway Authority responded by designing and producing several prototypes of a device known as a shunter, which would guide vessels into and out of the locks of the canal. The above drawing is a close-up of a shunter, with cutaways to show some of the interior workings. PHIL JENKINS

combination with a precise guidance system, offer what we believe to be the most direct and least expensive method of gaining a significant increase in the capacity of our waterway, an increase that may prove to be sufficient to meet the traffic growth expected during the next 20 years."

The shunters were barge-like platforms. They were fifty-two feet wide by eighteen deep and one side was distinguished by a V-shaped notch to receive the bow of a vessel. A single 3,600-horsepower Japanese engine drove two thrusters, or propellers, that were six feet across and located at the corners. They could move a ship left or right, as well as forward and backward. They would eliminate the need for captain and crew to guide a ship into a lock by making contact with the approach wall. The shunters would also provide enough stability that the crew would not be required to tie up before a lock was filled or emptied.

Normandeau projected that the Seaway would need a fleet of thirty shunters, at a cost of $50 to $65 million, a figure that was later

adjusted to $100 million. The Seaway's engineering studies anticipated that these vessels could cut the time a ship spent transiting a lock by 20 per cent. "No other improvement, short of building another canal, seems to offer the significant boost in capacity that will enable us to keep on using our facilities for many more years," he said.

The shunter program was in the early stages when Normandeau addressed the shippers' conference, and over the next five years Seaway engineers tested the platforms on the water. The Seaway acquired two old ships for its trials, the 8,600-tonne *Marinsal* and the 36,400-tonne *Menihek Lake*. Shunters were welded to the bow and stern of both vessels because, at that time, engineers had not determined the best way to secure the platforms to the various types of vessels they would encounter.

The shunters were meant to be unmanned. Umbilical cables would run from the platform to a portable console in the bridge and a pilot would control the movement of the ship from there. The field trials involved taking the ships through the Welland Canal and the shunter got the job done, according to a report that appeared in *Fairplay International Shipping Weekly* on May 17, 1979. "Manoeuvrability has been found to be outstanding," the trade journal reported. "Positioning can be accurately maintained under any conditions of current and wind through careful adjustment of the thruster controls."

The shunters were in an embryonic stage of development and the Seaway continued to refine the concept for several years. Meanwhile, private industry was pushing the Seaway Authority hard to extend the shipping season by keeping the waterway open longer each year. In 1974, the Authority announced

The Seaway purchased two old vessels to test the shunters on the water. This photograph shows a particularly successful test of the Marinsal on the Welland Canal, circa 1979.
PHIL JENKINS

that the Welland Canal would close December 30. But Stelco and a number of other companies pressed for an extension, and the Seaway kept the canal open until January 17, 1975—ten days longer than the previous record, established three years earlier.

The US authorities went even further. For the first time in history, they kept the locks at

Sault Ste. Marie open all winter—largely to accommodate US Steel and the manager of its marine division, William H. Ransome, an ardent advocate of year-round navigation. In mid-February, nine of the company's forty vessels were still moving coal, iron-ore pellets, and limestone from Twin Harbors, Minnesota, to their mills in Chicago. By mid-March, the number had dwindled to five. "But those ships," John Dalrymple wrote in *Canadian Shipping and Marine Engineering*, "were still churning through the Soo locks and down through the Straits of Mackinac despite warnings from the insurance underwriters."

Scientists were attempting to determine average ice conditions on the Great Lakes and examining various methods of reducing the buildup of ice in canals and locks.

At the same time, the Canadian and US governments, as well as those of Ontario, Quebec, and six states, had all contributed to a multimillion-dollar study aimed at producing a longer shipping season. Scientists were attempting to determine average ice conditions on the Great Lakes and examining various methods of reducing the buildup of ice in canals and locks. Researchers looked at installing bubbler systems on the floors of locks to carry warmer air up, and keep the water at the surface above the freezing point. They also considered putting in heating pipes along lock walls. The other challenge was to keep the shipping lanes open on lakes and rivers. Researchers studied the feasibility of increasing the flow velocities of rivers and diverting warm-water effluent from factories and power plants.

Ice-breaking technology seemed to be the most promising alternative. For several winters, starting in 1974–75, the Canadian Coast Guard conducted tests with icebreakers, as well as air-cushion technology developed in Calgary for use in the Arctic. The latter proved to be more effective, according to Bill O'Neil, commissioner of the coast guard at the time. Air-cushion vehicles could be attached to the front of an icebreaker or they could be self-propelled, working as a hovercraft does. Flexible rubber skirts were hung like a shower curtain around the edge of a barge to create a cushion of air, which raised the vessel off the surface of the water and allowed it to ride on a sheet of ice. The weight of the vessel created waves under the ice and the movement of the waves caused the solid, frozen surface to crack and buckle.

In February and March 1976, the coast guard tested the capabilities of the new technology, as well as conventional icebreakers on the St. Lawrence above and below Montreal. "These developments open exciting possibilities in the field of icebreaking technologies," O'Neil later reported in *Canadian Shipping and Marine Engineering*, "enhancing our overall objective of extending the navigation season of the Great Lakes/St. Lawrence system."

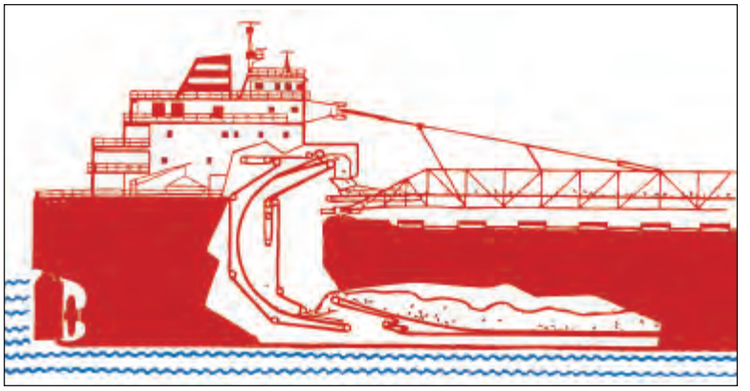
The extension of the season remained a subject of study and debate for the rest of the decade. Several experts presented papers outlining the pros and cons at the Dominion Marine and Lake Carriers' 1978 joint conference. Year-round navigation on all or part of the system would allow for more economical use of the capital invested in shipping. Ports could be used continuously. Manufacturers would be able to get by with smaller stockpiles of raw material and seasonal jobs would become full-time employment.

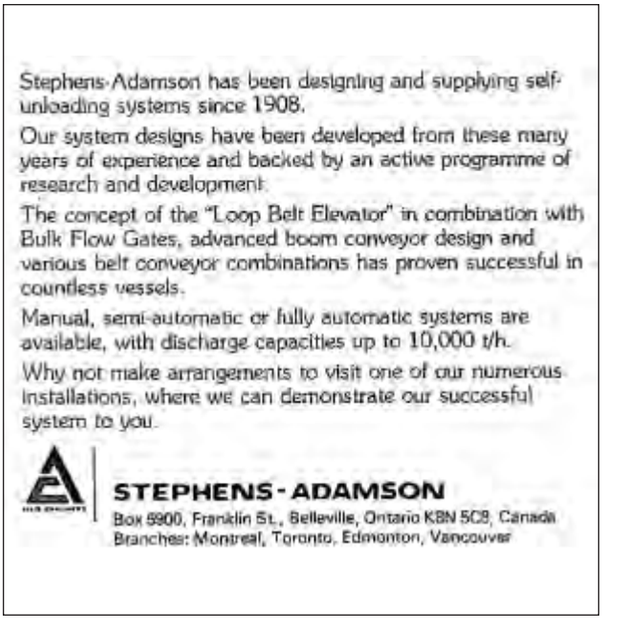
The 730-foot CSL Saguenay, bound for Hamilton from Sandusky, Ohio, with a cargo of coal, leaves Lock 7 on Jan. 4, 1974. The Saguenay was the last vessel to transit the Welland Canal that year. THE ST. LAWRENCE SEAWAY MANAGEMENT CORP.

But there would be many drawbacks. Working conditions on the ships, in the ports, and at the locks and canals would be much more arduous. Insurance costs would go up. Air-bubbling systems, ice booms, and navigational aids would have to be modified and improved. The coast guard would have to conduct non-stop aerial reconnaissance of ice conditions and would have to break ice to keep the shipping lanes open.

The US Army Corps of Engineers undertook a study of winter navigation and concluded there would be substantial benefits to the United States. Before making the capital investments required to extend the season, the Seaway Authority retained LBA Consulting Partners of Ottawa to assess the economic impact. In October 1978, the consultants submitted their findings. They concluded that Canada and the US would have to invest $30 million to extend the season to nine and a half months and $440 million, excluding the cost of icebreakers, to push it to eleven months.

Throughout the 1970s, the shipping companies did their part to boost the volume of cargo moving on the seaway. They continued the fleet-renewal programs that were started in the years after the system opened. Most of the new vessels were built to the maximum specifications allowable on the waterway.





ABOVE, RIGHT: **Details from a Stephens-Adamson advertisement for the C-loop self-unloading system.**

Improvements in the design of hulls and holds increased tonnages; but the most significant innovation of the decade was the development of the C-loop self-unloading system.

Improvements in the design of hulls and holds increased tonnages; but the most significant innovation of the decade was the development of the C-loop self-unloading system.

Self-unloading technology had been in use on the Great Lakes since the mid-1920s, and over the years shipping companies had invested in several improved systems. By the 1960s, two types of technology were commonplace: one that used bucket elevators and another that relied on a series of incline belts to raise cargo from the floor of the holds to the discharge boom on deck and ashore.

According to Ed DeRoche, a senior vice-president with CSL International in Boston, a Canada Steamship engineer named Bill Johnston came up with the idea for the C-loop in the late 1960s. It used two wide belts that functioned like the bread in a sandwich and held material in place while it was being elevated. "We were doing a lot of things at CSL to increase the discharge rate," says DeRoche. "The season was only nine months long and we wanted to move more tonnes. One way to do that was to improve the unloaders."

To develop the C-loop, CSL partnered with the Stephens-Adamson division of Allis-Chalmers Canada. DeRoche joined CSL in early 1972 and recalls seeing a working model at the Stephens-Adamson yard in Belleville, Ontario. By the mid-1970s, the new system had been installed on four CSL vessels: the *J.W. McGriffin*, the *H.M. Griffith*, the *Louis R. Desmarais,* and the *Jean Parisien*. Before long, competitors began adopting the technology.

There were many advantages to the C-loop. "Once you put material between the two belts, it stayed there," says DeRoche. "Unloading was a lot cleaner because there was less spillage.

The equipment was easier to maintain and it was much quicker than anything else available. You could discharge at a rate of 6,000 tonnes an hour. That was unheard of."

§ The 1970s were buoyant years, awash in optimism. Given the temperament of the times, a celebratory spirit prevailed as the decade drew to a close. The Seaway commemorated the twentieth anniversary with ceremonies on September 7, 1979, in both the eastern and western sections. A crowd of 600 joined Canadian and American government representatives for a tribute at the Eisenhower Lock on the St. Lawrence in the morning, and about 200 people participated in a similar event on the Welland Canal in the afternoon.

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"With the seaway entering its third decade," said Peter M. Towe, Canada's ambassador to the US, "we can look forward to continuing co-operation with our American counterparts. It can be said that dreams which unite countries such as ours are much stronger than those that divide them. The St. Lawrence Seaway is a shining example of US-Canadian relations."

Luther H. Hodges, the US undersecretary of state, spoke with equal eloquence. "The seaway serves as a model to other countries in the world," Hodges said. "I see the seaway as a ribbon that ties our two nations together. As we will see in the next twenty years, the seaway will play a more and more vital role in world affairs."

4 | Trying Times, 1980–1992

The annual Top Hat Ceremony, which predates the seaway, celebrates the first vessel through the Welland Canal in the spring. This event was held on the deck of an upbound self-unloader, which was tied up at Lock 3. THIES BOGNER

It was cool and damp the morning of March, 24, 1980, thanks to an overnight storm that had brought rain and wet snow to much of southern Ontario. In the Niagara Peninsula, temperatures hovered around freezing, chilling several hundred hardy souls—Seaway employees, retirees, shipping buffs, and local politicians—who gathered shortly before 10:30 at Lock 3 of the Welland Canal for the Top Hat Ceremony, the annual salute to the first ship of the season through the waterway.

The *H.M. Griffith*—sailing under the flag of Canada Steamship Lines—had been accorded the honour. It was the earliest opening in the seaway's twenty-one years, but there were weather-related hitches. The *Griffith* was stalled at Lock 2. Ice was the problem. Lock operators worked with pike poles to dislodge the ship, and Seaway officials nervously eyed their watches. Finally, at 11:20 a.m., they moved the event to the vessel. At noon, Captain Jim Playford, master of the *Griffith*, came ashore and Malcolm Campbell, western regional vice-president, presented the symbolic hat. "I hope you don't think we operate the Welland Canal like this all season," Campbell told the crowd. "We're normally much more efficient."

Canal staff quickly made good on that boast. By sunset, the *Griffith* was chugging across Lake Erie, destined for Cleveland to take on a load of coal, and five other vessels had transited as well. The eastern section of the seaway also began operating that day, and with the customary rush and excitement, another shipping season was under way.

Within the Seaway Authority, though, it was anything but business as usual. The organization was in the midst of a major transition. Paul Normandeau had resigned in January 1980 after serving seven years as president. The country was then in the midst of a federal election campaign that ended in early February, when Pierre Trudeau and the Liberals won a majority. Jean-Luc Pépin became the minister of transportation, and on July 4, 1980, he announced that Bill O'Neil would be the next president of the Seaway Authority.

The appointment was a homecoming, of sorts, for the fifty-three-year-old civil engineer who had grown up in Ottawa, studied at the University of Toronto, and earlier in his career had spent sixteen years as a senior manager with the Seaway. "It was great to be back," O'Neil recalled in an interview years later. "I felt right at home. I knew the system. There was no learning curve for me."

O'Neil had joined the newly formed St. Lawrence Seaway Authority in 1955, leaving a position with the canal-services division of the

The presentation of the top hat to Captain Ted Courtemanche of MV Meaford, a vessel owned by Upper Lakes Shipping, March 29, 1974. The three men on the right are Allan Luce, then the Seaway Authority's director of operations; Tom Quigg, vice-president; and Malcolm Campbell, western regional director.
ST. LAWRENCE SEAWAY MANAGEMENT CORP.

Department of Transportation in Ottawa to join an engineering group in Montreal. He worked briefly on the preliminary surveys of the South Shore Canal. Shortly afterward, he moved to St. Catharines to supervise the dredging of the Welland Canal and other improvements required to ensure the old waterway would be compatible with the new one.

O'Neil was in charge of design and construction of the Welland Canal Bypass when he resigned in 1971. His staff conducted the feasibility studies, set up the engineering teams, and awarded the contracts to the outside companies that performed most of the work. O'Neil left the organization to become commissioner of the Canadian Coast Guard in Ottawa. He returned to familiar surroundings nine years later, but faced much different challenges than his predecessor.

The country was in a recession, the worst, some observers said, since the Great Depression of the 1930s. The economy had been crippled by high inflation, high unemployment, record-high interest rates, rising oil prices, and mounting government deficits. Consumer spending sagged. Auto sales slumped. The North American steel industry was awash in unused capacity and red ink. Demand for iron ore—one of the seaway's two cornerstone commodities—fell precipitously. American grain shipments also

Canadian grain exports increased — one of the few bright spots in a year that saw overall cargo volumes decline by 10 per cent on both sections of the seaway.

In 1984, the Seaway held a ceremony to celebrate twenty-five years of operation. In this photo, then-president Bill O'Neil watches while Lionel Chevrier lights the candles.
COURTESY OF BERNARD CHEVRIER

declined due to international political developments. The Soviet Union had invaded Afghanistan early in 1980, and Washington responded by imposing an embargo on grain shipments to the Communist bloc.

Canadian grain exports increased — one of the few bright spots in a year that saw overall cargo volumes decline by 10 per cent on both sections of the seaway. Over the next two seasons, the shipping industry continued to feel the bite of the recession. The Dominion Marine Association reported that 12 per cent of the Canadian fleet was tied up in 1981, and the following year 20 per cent of the vessels were idle. Conditions were even worse on the American side, where one-fifth of the US ships were laid up in 1981 and 41 per cent in 1982.

The two fleets, along with foreign ocean-going vessels, moved 50.6 million tonnes through the Montreal-Lake Ontario section in 1981 and 58.9 million tonnes through the Welland Canal, roughly the same as the previous year. But in 1982, the cargo volume in the eastern division fell by 15 per cent and by 17 per cent in the western region. Seaway revenues from operations slumped by almost $10 million to $52 million. According to the 1982 annual report, the Seaway Authority was forced to make "some significant cuts in the operation and maintenance budget in order to maintain a reasonable cash flow." One of the victims of the austerity measures was the shunter program, which was shelved indefinitely.

These were trying times, but Seaway officials remained optimistic about the future. "This year will be down," O'Neil conceded in a *Globe and Mail* interview in June 1982, "but next year we may have a substantial increase. It's a sawtooth performance — always upwards — and we have to stay one step ahead of demand."

O'Neil's hopeful outlook was based on two reports on the waterway's long-term prospects. In 1981, the provincially sponsored Ontario Great Lakes Task Force concluded that traffic would grow to the point where the seaway would begin experiencing congestion in 1985, and that it would run out of capacity soon afterward.

The second traffic forecast was prepared by Acres Consulting Services of Toronto and Data Resources of Lexington, Massachusetts. The Seaway Authority and the Saint Lawrence Seaway Development Corporation commissioned this report in early 1980, and the two firms released their findings in February 1982. They concluded that "flows on both the

Welland and the Montreal-Lake Ontario sections will increase but at a lower rate than in the previous historical period."

The consultants predicted that traffic on the Montreal-Lake Ontario section would grow to 60 million tonnes by 1985 and to 80 million by the year 2000. They were more optimistic about the prospects for the Welland Canal. Cargo volumes there would surge to almost 70 million tonnes by 1985 and to 90 million by the turn of the century. In fact, both east and west experienced a modest recovery in traffic in 1983 and again in 1984; but the entire system suffered two unexpected setbacks, both of which shook the image of the seaway as a safe, reliable waterway.

The first occurred at 7:30 a.m. on November 21, 1984. The movable span of a vertical-lift bridge near Valleyfield, Quebec, was being raised to allow a ship through. It was nearly 215 feet long, weighed 1,400 tons, and was merely one section of a combined highway and railway crossing of the 3,300-foot-wide Beauharnois Canal. The lift bridge was built during the construction of the seaway and had been in operation for twenty-five years. On thousands of occasions, the span had been raised without incident to a height of 114½ feet and then lowered. This time, it jammed one-quarter of the way up.

"The co-ordinator of the Beauharnois Canal called and a bunch of us went out there," recalls Pat Dalzell, then a regional contracts engineer stationed at the Seaway maintenance centre in Brossard. "We didn't know what had happened. My first reaction was that we were in big trouble. Winter was coming and we had to get the ocean-going ships out."

In fact, stalled vessels soon began to accumulate on the waters of Lac St-François to the west of the Beauharnois Canal and Lac St-Louis to the east. By November 26, the Canadian Press reported that thirty-two downbound ships and twenty-eight inbound were at anchor between Montreal and Prescott. Another twenty-two ocean-going vessels were elsewhere in the system, above Prescott.

The Seaway Authority had to bring a self-propelled barge, equipped with a 250-foot boom, up from Montreal to remove the damaged shaft and sheave. This photo depicts the barge and the platform of the bridge where it stopped, one-quarter of the way up. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

All the while, a frantic effort was under way to fix the bridge. Dalzell and his colleagues quickly figured out what had gone wrong. The lifting mechanism included four sheaves, or large pulleys, two of them on each tower of the bridge. The sheaves were 15 feet in diameter and 46 inches wide at the hub. Sixteen steel ropes, measuring 2⅛ inches in diameter, were draped over each sheave. The ropes were secured to the span and to the counterweights, one per tower, each a 750-ton block of solid concrete encased in a steel box.

'I had to sleep on a drafting table in a trailer at the site for a couple of nights, and the crane operator slept on the floor beside me. We were hoping the wind would die down just before sunrise so we could lower the sheave.' *Pat Dalzell* · Seaway engineer

This photo depicts the 250-foot boom raised to a vertical position and ready to remove the damaged equipment. The weather played havoc with the repair effort. Several days of high winds and choppy water made it impossible to lift the thirty-ton sheave. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

When a ship was transiting the canal, the sheaves rotated about two and a half times on a steel shaft that was approximately two feet in diameter and nine feet long. The counterweights on either side descended as the span rose. Once the vessel was through, the process was reversed. The span descended, the counterweights rose, and the sheaves rotated two and a half times. After a quarter century of use, and thousands of high-stress turns, the forged steel shaft in one of the sheaves cracked and broke, and the sheave itself collapsed onto the tower.

The Seaway had to rely on outside contractors to repair the bridge because it did not have the staff or equipment. Their first challenge, says Dalzell, was to construct temporary towers that would support the span and the counterweights. Once that was done, the contractors turned their attention to removing the broken sheave. The Seaway sent up a self-propelled floating crane from Montreal known as the Hercules. It measured 75 feet by 200 and was normally used to lift lock gates in rare cases when they were accidentally damaged by ships. A 200-tonne crane fitted with a 250-foot boom was placed on the deck of the Hercules and manoeuvred into position.

Then the weather played havoc with the repair effort. As Dalzell recalls, several days of high winds and choppy water made it impossible to lift the thirty-ton sheave from the tower and lower it to the deck of the Hercules. "Any kind of wind exaggerated the movement at the end of the boom," says Dalzell. "I had to sleep on a drafting table in a trailer at the site for a couple of nights, and the crane operator slept on the floor beside me. We were hoping the wind would die down just before sunrise so we could lower the sheave."

The sheave containing the broken shaft in its hub was taken to a Dominion Bridge machine shop in Lachine, and the next big challenge was to remove the shaft. John Vazalinskas, then the general maintenance engineer for the Seaway's eastern region, supervised that effort. "No matter what we tried wouldn't get it out," he says.

Initially they tried a combination of liquid nitrogen and blow torches, expecting that the cold of the nitrogen would cause the shaft to contract while the heat of the flames would expand the hub of the sheave. That didn't work, so the sheave was placed on a 1,000-ton press, this time to push the shaft out of the hub. Instead, they bent the press.

Finally, Vazalinskas and the Dominion Bridge team decided to bore it out. The sheave was clamped onto a rotating table of a vertical boring mill, a device similar to a lathe, which began to shave away the shaft from the centre outward toward its circumference. "We were boring it twenty-four hours a day for a couple of days," recalls Vazalinskas. "I was wide awake most of the time and fretting like an expectant father."

The bridge was finally back in operation on December 9 — nineteen days after the breakdown. By then there were 165 vessels waiting to get through, 104 downbound and 61 upbound. Thanks to good weather — and an extraordinary effort by Seaway personnel, pilots, and the crews of the ships — the backlog was cleared up by December 15.

The seaway remained open that season till January 2, 1985, and the Valleyfield Bridge, as well as a second, similar structure on the Beauharnois Canal, was left in the raised position until the system shut down for the winter. Seaway engineers had discovered cracks in several other shafts, and the organization could not risk a second failure. The spans of all eastern-region vertical-lift bridges were finally lowered after the last ship had cleared the system, and the defective parts were replaced over the winter.

A crane lowers a sheave, fifteen feet in diameter, from the tower of the Valleyfield Bridge. These giant pulleys rotate on a steel shaft and support the sixteen steel cables used to raise and lower the platform of the bridge. Cracks in the shaft prevented the sheave from rotating while the platform was being raised to allow a ship to pass. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

It had been a pressure-packed autumn for the Seaway employees charged with putting the Valleyfield Bridge back into operation, but their efforts were recognized. "Several of us got letters from Don Mazankowski, the federal transport minister of the day," recalls Vazalinskas. "He thanked us personally for our contribution to the Canadian economy."

The Seaway's legal department was still dealing with the repercussions of the Valleyfield Bridge failure — namely dozens of lawsuits and claims totalling more than $200 million — when a second, equally

More than a dozen other freighters were waiting to get through the canal when the accident occurred, and they were forced to drop anchor or tie up. Shipping companies stood to lose $5,000 to $10,000 each day a vessel was idle.

By the end of October, workers had removed approximately 2,000 cubic yards of concrete rubble weighing 5,000 tons. In this image, workers are erecting scaffolding necessary for pouring concrete. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

devastating mishap occurred on October 14, 1985, Thanksgiving Day. At 10:25 a.m., an American-owned grain carrier, the *Furia*, was moored in Lock 7 of the Welland Canal. A 564-foot vessel loaded with 16,775 tons of wheat, the *Furia* was about to commence a descent of the flight locks toward Lake Ontario. The water in the lock had been lowered. The gate opened. The ship moved off the wall. It began to advance and then stopped so abruptly, according to the captain, that it was as though they had run aground. Crew members and lock workers quickly discovered that part of the west wall had collapsed.

Seaway officials arrived within minutes. "We could see chunks of concrete resting against the hull," recalls retired construction engineer Robert Poe. "We didn't know how extensive the damage was or what had caused it."

Those questions would be answered later. The first priority was to get the ship out of the lock. The lockmaster closed the downbound gate. At 6:15 p.m., he began filling the chamber, slowly. Fortunately, the *Furia* lurched free of the concrete rubble that had come to rest along its port side, extending 250 feet from the bow almost to mid-ship. The water lifted the big bulker 38 feet, the lockmaster and his team breathed a sigh of relief, and the captain backed the ship out of the lock and tied it up against the approach wall. By then it was 9:25 p.m. and darkness had fallen.

More than a dozen other freighters were waiting to get through the canal when the accident occurred, and they were forced to drop anchor or tie up. Shipping companies stood to lose $5,000 to $10,000 each day a vessel was idle. Their customers were affected as well. "Oh, Lord," said John Hanieski, chairman of the Detroit-Wayne County Port Authority, upon learning that the canal was shut down temporarily. "That's a major, major problem, especially now because you've got people laying in inventory in anticipation of the seaway being closed in the winter."

Seaway officials could not offer any reassurances. "I have no idea how long this is going to take because we have to see what is going on," said Malcolm Campbell, who was then vice-president of the western region. "We have never had a problem like this before."

On the morning after the blowout, Seaway engineers began to assess the damage. Poe and several colleagues boarded a twelve-foot aluminum outboard motorboat. The water was lowered to the top of the fault line, and they got their first close up glimpse of the fracture. It ran for roughly a third of the length of the

The repairs were nearly complete when this photo was taken. The Welland Canal reopened on November 7, after being closed for almost twenty-four days.

ST. LAWRENCE SEAWAY MANAGEMENT CORP.

lock, and in places had caused nearly half of the eighty-one-foot-high wall to collapse.

Meanwhile, senior executives obtained proposals from outside contractors capable of repairing the wall and spent the day reviewing them. They awarded contracts on October 16 to Pitts Engineering and Canron. "That was the start of twenty-one days of non-stop work," recalls Poe. "We worked twelve-hour shifts, seven days a week. One group worked the day shift. The other worked nights."

The contractors used front-end loaders and backhoes to remove the fill — a mix of clay and silt — piled years earlier against the exterior surface of the damaged wall. This was done in order to relieve the pressure and prevent a further collapse. While the fill was being excavated, struts were installed between the east and west walls to stabilize the structure. Two barges were floated into the chamber on the morning of October 18. Over the next five days, workers installed fourteen of these braces, a row of six near the top of the lock and a second row thirty-nine feet below them.

Having secured the wall, the contractors brought in hoe rams aboard the barges. These machines, similar to a backhoe, had long, flexible arms equipped with jackhammer-like devices to chip away damaged concrete at the face of the fracture. Eight days later, on October 26, the lock had been drained and the full extent of the damage finally became visible. Massive slabs of broken and irregular concrete lay on the floor of the chamber and, behind them, a gaping cavity — four storeys high in places and up to twelve feet deep. All told, 2,000 cubic yards of concrete rubble, weighing an estimated 5,000 tons, had to be removed by truck.

In November 1986, Transport Minister John Crosbie announced the seven-year, $175-million Welland Canal rehabilitation program. Among other things, it involved re-facing the lock walls. Workers had to strip away as much as thirty inches of concrete using jackhammers, hoe rams, or, in this case, controlled explosions. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

Once that had been done, the contractors inserted wooden forms into the cavity. They anchored them to the back wall and began pouring concrete in lifts, or batches, that were no more than eight and a half feet high. The first was poured on the morning of October 30, the last at 9 p.m. on November 4. That same evening, crews began removing the struts and cleaning up.

Lock 7 was back in operation at 5:43 a.m. on November 7. The *Furia* was the first ship through, having been delayed twenty-three days, nineteen hours, and eighteen minutes. Another 130 other vessels were waiting.

While the repairs were being carried out, engineers from Acres International were attempting to determine the cause of the failure. The Seaway commissioned a second investigation several years later—this one conducted by University of Waterloo engineers Roger Green and Leo Rothenburg—due to lawsuits arising from the incident. There were variations in their findings, but both teams concluded that several problems had caused internal cracks in the wall.

First, the age of the lock was a factor. It had been in operation for more than fifty years. It had handled some 380,000 transits. Each time the chamber was emptied and refilled, the stress loads on the concrete walls rose and fell. When the water was lowered, the weight of the clay fill caused the wall to bend ever so slightly. When the chamber was full, the water supported the wall and offset the pressure from the other side. As the years passed,

drains embedded in the fill became plugged and the clay became saturated. That pushed the loads on the wall beyond the design capability and caused cracks deep inside and invisible to the eye.

The second source of trouble was a culvert known as the penstock, which ran through the west wall of Lock 7 as well as through the walls of the three flight locks immediately below it. The penstock was 6,300 feet long, 8 feet, 6 inches in diameter, and delivered water to a Seaway-owned hydroelectric generating station near Lock 3. It was lined with steel for most of its length, but not the section in Lock 7. The pressure of the water flowing through the penstock caused cracks. Water migrated into these fissures and pushed them deeper into the cement until the integrity of the wall was gravely compromised.

In late November 1986, a full year after the failure of Lock 7, federal Transport Minister John Crosbie announced that the government would fund a seven-year, $175-million Welland Canal rehabilitation program. The Seaway had obtained reports from three consulting firms and, based on their findings, prepared a plan to ensure the viability of the waterway well into the twenty-first century.

There were three main elements: the re-enforcement and stabilization of the lock walls, restoration of damage to the walls, and repairs to the approach walls above and below the locks. All the work had to be done during the three months between late December and late March, when the canal was closed for the season. Construction crews of up to 700 strong worked in the cold of winter and under tight time constraints. There were so many projects involved that the rehabilitation of the canal took the full seven years. Indeed, the Seaway Authority spent $29 million during the final winter, 1992–93, more than in any previous season.

The work on the locks was arguably the most crucial part of the entire rehabilitation undertaking and usually began by re-enforcing the walls. Contractors drilled horizontal and vertical holes, some of them to a depth of eighty feet, and installed high-strength steel rods, which were 1 ⅜ inches thick. Large bolts were fastened to the upper ends and jacks were used to stretch them, thereby compressing and strengthening the concrete.

As the years passed, drains embedded in the fill became plugged and the clay became saturated. That pushed the loads on the wall beyond the design capability and caused cracks deep inside and invisible to the eye.

After that, the fill from the exterior of the lock walls — largely clay or silty clay — was removed. New drainage systems consisting of eight-inch-diameter pipes were installed, as well as fresh fill of small, porous rock. The biggest job involved repairs to faces of lock walls, and this work had to be well planned and completed in phases. Construction crews could only work on one side of the wall while re-facing, and they couldn't blast both sides at once.

Workers used explosives, hoe rams, and jackhammers to strip away as much as thirty inches of concrete. Pouring concrete in the winter created unusual challenges. Aggregates had to be warmed with steam or dry heat before they could be used. Likewise, water was heated to 40 C and added to mixers containing aggregate before the cement was introduced. The concrete was poured into

All the work had to be done during the winter months and pouring concrete in cold weather proved to be a challenge. Water and aggregates had to be heated to ensure that the cement adhered. THIES BOGNER

insulated forms, to a maximum depth of five inches at a time. As well, existing surfaces had to be heated to at least 5 C to ensure the new concrete adhered to the old.

The failure of Lock 7 led to multiple lawsuits against the Seaway and claims of millions of dollars of damages. But that wasn't the only problem the organization faced. Purely by coincidence, the volume of goods moved on the seaway in 1985 fell 20 per cent — "the most precipitous year-to-year decline the waterway has experienced since it opened in 1959," according to the annual report.

"This situation was particularly disturbing because it was so unexpected," the report continued. "A sharp drop in the two major components of Seaway cargo — grain and iron ore — accounts for almost all of the overall loss in tonnage."

Iron-ore shipments had never recovered fully from the devastating recession of 1981. In fact, the US steel industry spent most of the 1980s restructuring and downsizing. As well, the US embargo on grain shipments to the Soviet Union remained in effect and led to a permanent decrease in the movement of American wheat and other commodities down the St. Lawrence. In 1985, though, the Canadian grain moving on the Seaway also plunged, and the decrease was due to fundamental changes in the flow of goods — something O'Neil acknowledged in a January 1986 interview with the *Financial Post*.

'The Seaway's misfortune is not a blip on the screen. It's a structural shift.' *Don Rothwell* · president, Great Lakes Waterways Development Association

"The whole Great Lakes system is in a bind," O'Neil said. Don Rothwell, president of a user group known as the Great Lakes Waterways Development Association, was equally blunt: "The Seaway's misfortune is not a blip on the screen. It's a structural shift."

The Canadian Wheat Board had begun to divert exports from the seaway to the port of Vancouver, as well as to a brand-new terminal at Prince Rupert that had been built by a consortium of companies. In the crop year that ended July 31, 1983, Great Lakes carriers moved 57 per cent of Prairie grain exports while 41 per cent went through West Coast ports. During the 1984–85 crop year, only 47 per cent of grain exports moved on the seaway. The majority went west. In 1988–89, another tough year, only 38 per cent of Canada's grain exports went through the eastern waterway, while 61 per cent was shipped out of the West Coast. Three years later, in 1991–92, the seaway's share of export movements had fallen to 27 per cent.

Grain loaded in Vancouver or Prince Rupert could be shipped through the Panama Canal and reach markets in Europe or North Africa almost as quickly as grain shipped east to Thunder Bay and out the St. Lawrence. Besides, it had become cheaper to move grain through the West Coast ports, as CSL president and chief executive officer Paul Martin pointed out in a speech to the Rotary Club of St. Catharines in the spring of 1986.

"To put it bluntly," Martin said. "The St. Lawrence Seaway and the Welland Canal are no longer competitive. According to the Canadian Wheat Board, it now costs considerably more per tonne to ship western grain to Europe via the Atlantic than it does the Pacific. And a similar comparison exists for the shipment of US grain, Seaway versus the Mississippi."

The rehabilitation of the flight locks was done in the winter of 1992, the final year of the project. The locks were built in panels or monoliths and the re-facing of the walls followed the original structure. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

Federal legislation, in the form of the Western Grain Transportation Act, which was passed in November 1983, also encouraged Prairie farmers to ship their grain to Pacific ports. "The WGTA created the condition whereby a [Prairie] producer, irrespective of his location, would find his out-of-pocket transportation costs minimized and farm gate returns improved if his grain moved over the [West Coast] route," according to a 1992 report prepared by Transmode Consultants for Transport Canada. "It would appear, therefore,

that the WGTA has created a distortion of the true economics of the [West Coast] and Seaway routes and has artificially altered their respective competitive positions."

To make matters worse, global production and consumption of cereal grains were changing. Many European countries—which had for years imported wheat—became self-sufficient or were even exporting, due in large part to the lavish agricultural subsidies of the European Union. At the same time, new markets for Canadian grain were opening in the Asia-Pacific region.

Almost everyone involved in maritime transport on the Great Lakes suffered: the carriers, the ports, and the shipyards alike.

Between 1978 and 1982, a little more than 23 per cent of exports went to Eastern and Western Europe. In 1990, only 6 per cent were destined for Europe. By comparison, the amount going to Asia rose to 43 per cent, up from 32 per cent in the 1978–82 period. There was no quick fix for the decline in shipments of either grain or iron ore. As a result, the Seaway's balance sheet took a beating. Revenues in 1985 were $13 million below projections, while expenses were nearly $16 million higher than anticipated, owing largely to unforeseen costs related to the Lock 7 failure. That led to a $25.2-million loss, the largest in nearly a decade.

The total volume of goods moved in 1986 remained virtually unchanged from 1985, but senior management had adjusted to the changes that were taking place. The revenue forecast was cut in response to the drop in cargo. Expenses were also slashed, in part by reducing the operational and maintenance workforce. These measures allowed the Seaway to hold its operating losses for 1986 at $4.4 million.

Almost everyone involved in maritime transport on the Great Lakes suffered: the carriers, the ports, and the shipyards alike. At the Port of Thunder Bay, about 1,000 employees at the terminal elevators, fully half the workforce, were laid off for most of 1985. By the end of the decade, the number of elevators in operation had been reduced to fourteen from twenty-one and job losses became permanent.

The same fate befell many of those who worked on the ships. In 1980, membership in the Great Lakes locals of the SIU stood at 8,000. By the spring of 1986, there were only 5,000 members and most weren't working full time. "The union has grabbed the life-ring of job-sharing," Carey French wrote in April 1986 in the *Globe and Mail*. "Starting this season, an SIU wheelsman aboard a laker must spend one month in every four ashore."

Ontario's three shipyards, located at Port Weller, Collingwood, and Thunder Bay, were facing even more dismal prospects. They were all finishing up contracts, but none had new orders on the books. Many of the shipping companies were also in distress. Norman Hall, president of the Ottawa-based Dominion Marine Association, told a newspaper interviewer that 13 older lakers with outdated propulsion systems had been taken out of service in 1984 and 1985. A survey of Great Lakes shippers conducted in early July 1986 revealed that 41 of 133 freighters were laid-up temporarily.

The slowdown led to a major downsizing of the Great Lakes shipping industry. In 1980, there were eighty-nine fleets—thirty-one of

This image depicts the work on the downbound locks. Following the system failures of the 1980s, the Seaway adopted a comprehensive approach to infrastructure management, which involves annual inspections of every physical asset. As a result, the waterway has not experienced a major failure for more than 20 years. THIES BOGNER

them Canadian—operating on the lakes, according to *Greenwood's Guide*. Ten years later, there were only twenty-four Canadian fleets and sixty-eight all told. The casualties included some old, established family firms, and one of the first to fold was Halco of Montreal.

The firm was founded in 1930 by Frank Augsbury of Ogdensburg, New York. By the early 1980s, Augsbury's descendants still controlled Halco, which operated a fleet of seventeen vessels, including bulkers, tankers, and self-unloaders. According to CSL vice-president Tom Brodeur, who began his career at Halco, the company had relied too heavily on hauling American grain to the lower St. Lawrence and bringing iron ore back up.

In 1983, the Royal Bank of Canada, Halco's main lender, took control of the fleet under a financial-restructuring plan and by 1986 had put the company out of business. "It was depressing working there," recalls Brodeur. "It was difficult getting business because customers doubted whether we'd be around to service them. Nobody wanted to give us credits. Nobody wanted to give us contracts."

Other companies wound up in trouble for the same reason: they were overly reliant on grain and iron ore. Or they had too many

The carriers that survived the crunch of the mid-1980s tended to be those that had invested heavily in self-unloaders, says Peter Cresswell, who was president of Algoma Central at the time.

The Welland Canal rehabilitation included the rebuilding of some of the approach walls, a process depicted here.
THIES BOGNER

bulkers, which had to be loaded and unloaded with shore-based equipment. The carriers that survived the crunch of the mid-1980s tended to be those that had invested heavily in self-unloaders, says Peter Cresswell, who was president of Algoma Central at the time.

Algoma had built a fleet of self-unloaders starting in the late 1960s and emerged from the 1980s as one of the strongest shippers on the lakes. Cresswell points out that self-unloaders were about $10 million more expensive to build than bulkers. They required larger crews and were costlier to operate. But used properly, they were more profitable in the long run.

"They're just more efficient vessels," he says. "They can be loaded and unloaded so much faster than a bulker. They're much better on short hauls because you're using the self-unloading equipment more often. That's what kept us going after the grain and iron ore fell off. We were able to haul sand, limestone, aggregates, bentonite, and other commodities."

The crisis of the mid-1980s also led to a fundamental change in thinking within the Seaway and among its partners in the Great Lakes shipping industry. They concluded that they all had to take a more active role in marketing the system and pursuing business, and that led to a series of trade missions. The first of these efforts took place in January and February 1985 and a second occurred in March 1987.

"Some of the best features offered by our great waterway remain a mystery to those who

decide how goods are shipped," O'Neil told a shipping magazine prior to the 1987 trip. "It is our expectation that this mission will succeed in providing information to change this."

The delegation included representatives of the Seaway Authority and its American counterpart, the Saint Lawrence Seaway Development Corporation, as well as port officials, shipping companies, and marine-services firms. They made stops in Oslo, Copenhagen, Dusseldorf, Antwerp, and London. In October 1987, a marketing conference was held in Chicago and a third trade mission was organized in March 1989. Thirty-two representatives participated in the two-week junket and made stops in London, Antwerp, Madrid, Tunis, and Casablanca.

At the close of the decade, the Seaway Authority went through another major transition. In late 1989, O'Neil resigned to become secretary-general of the International Maritime Organization in London, England. On January 10, 1990, Transport Minister Benoît Bouchard announced that Glendon Stewart had been appointed president and chief executive officer of the Seaway.

The 54-year-old native of Victoria, BC, was a civil engineer who began his career with the transport department's marine-services division in 1960. Stewart served from 1968 to 1975 as Pierre Camu's executive assistant, when Camu was administrator of the division and was responsible for overseeing the Seaway, the coast guard, and the National Harbours Board. From 1975 until his appointment to the Seaway, Stewart held several positions with the coast guard, including deputy commissioner in Ottawa.

Stewart took over at a time when a major transformation was occurring in world politics. The Cold War was ending. The Soviet Union was crumbling. Its Eastern European satellites — Poland, Czechoslovakia, Hungary, and Romania, among others — were declaring independence. Freedom, democracy, and capitalism were replacing the dictatorships and controlled economies of the Communist era.

All of this was bound to have a profound effect on Canadian grain sales to the former Communist-bloc countries and, ultimately, the Seaway, as Stewart noted in a speech in April 1990 at the semi-annual meeting of the Great Lakes Commission. "These European countries will become more efficient and therefore more productive, and their reliance on the Western economy will not be as noticeable as it has been in the past," he said. "It is our view that the development of the entrepreneurial spirit cannot occur overnight and it will take some time for these countries to adjust from state dominance."

The Cold War was ending. The Soviet Union was crumbling. Its Eastern European satellites — Poland, Czechoslovakia, Hungary, and Romania, among others — were declaring independence.

Stewart anticipated that grain sales to the former Communist countries would begin to decline by the mid- to late 1990s. Meantime, he had a clear mandate from the government. "I came in and the minister said we want you to turn this organization around," Stewart recalled. "There was more likelihood that we were going to become profitable by reducing costs than by getting new revenues."

Nevertheless, under his leadership, the Seaway administration worked on both the revenue and expense side of the balance sheet. Prior to the opening of the system in

1990, the Seaway Authority introduced an incentive toll program in order to attract new business. The pilot project applied to cargoes that had not moved through a Seaway lock during the previous three seasons and to goods that accounted for less than 5 per cent of the average traffic to a particular destination during the same period.

Toll reductions of 25 per cent were available from the start of navigation to the end of June. The discount rose to 50 per cent for the traditionally slow months of July, August, and September, and dropped to 25 per cent for the balance of the season. Carriers earned rebates of $306,000 in 1990 on 745,000 tonnes of new cargo. The following year, they saved nearly $681,000 on 2.1 million tonnes.

The Seaway also offered volume discounts, which proved even more successful. Shipping companies were eligible for rebates of 20 per cent for commodities that exceeded the five-year average moved from a specific port within the system, or from overseas by country of origin. In 1991, some 5.1 million tonnes of cargo were deemed eligible and carriers earned rebates of $1.1 million.

Stewart also introduced an austerity program that dramatically transformed the organization. Over a four-year period, he and his senior management team cut the payroll by $13 million, reducing it to about $45 million annually. They computerized as many operations as they could, eliminated duplication, and reduced overlap. "We met declining revenues by reducing costs," he says.

The world had changed and so did the organization that ran the seaway. But even though it had been adversely affected, the waterway remained a vital part of Canada's transportation infrastructure. A report prepared for the federal Department of Transport in late 1992 concluded that the Seaway's contribution to the Canadian economy amounted to $2.1 billion annually. It generated jobs for 17,500 people, including 9,000 who were directly employed in the marine-services sector.

A second report, this one issued by the parliamentary standing committee on transport, concluded by stating: "The future economic well-being of the Great Lakes/St. Lawrence Seaway is very important to the social and economic prosperity of the Central Canadian region. It is critical not only for Thunder Bay and the other Ontario-Quebec ports along the system but also for Ontario and Quebec-based agriculture, manufacturing and mining industries. Moreover, it is vital as well for the long-term interests of the land-locked western farmer."

5 | A New Beginning, 1992–2002

Glendon Stewart saw signs of trouble everywhere he turned during his first two years as president of the St. Lawrence Seaway Authority. The Canadian economy was in a recession. World commodity markets were changing in ways that adversely affected the Seaway. The European Community, once a net importer of grain, had become an exporter. Russia, reeling after the disintegration of its former empire, could no longer pay for its purchases of Canadian wheat. On top of this, federal transportation policies favoured the railways and the West Coast ports at the expense of the Great Lakes St. Lawrence Seaway system. The volume of cargo moving on the waterway had fallen by 50 per cent from its peak in the late 1970s. Shipments of grain, iron ore, and coal were all down. The Seaway was losing money and only managed to avoid a government bailout by drawing on the reserves built up during the good years.

Stewart concluded that the Seaway had to adapt or risk being marginalized permanently. The corporate culture had begun to change under Bill O'Neil, but in many essential ways the Seaway Authority in 1992 was the same organization it had been in 1959, the year it began to operate the inland waterway that made commercial shipping possible from the Gulf of St. Lawrence to the western tip of Lake Superior. Head office was still located in Ottawa. There were still regional offices in St-Lambert, Quebec, and the Ontario cities of Cornwall and St. Catharines. There were still close to 1,000 employees on the payroll. Finally and most importantly, the Seaway Authority remained a Crown corporation.

The federal government owned the Seaway infrastructure, which included locks, canals, and navigational channels, as well as bridges, buildings, and even a small hydroelectric generating station. The St. Lawrence Seaway Authority Act, passed by Parliament in the mid-1950s, established the organization's mandate. The prime minister appointed the president of the Seaway. Each year, the president prepared a corporate plan and submitted it to the federal transport minister for approval. In 1977, as part of a financial restructuring, the government decided the Seaway would have to be self-sustaining. But perennial losses, starting in 1983, jeopardized the Seaway Authority's status as a quasi-independent organization operating at arm's length from its political masters.

Glendon Stewart became president of the Seaway Authority during the most difficult period in the first fifty years of the waterway and guided the organization through a complete transformation. ST. LAWRENCE SEAWAY MANAGEMENT CORP.

Something had to be done and Stewart launched a sweeping, multi-year overhaul. When the initiative was complete, the Seaway Authority was much smaller and leaner, its culture had been transformed, and the financial losses had been turned into profits. Furthermore, it was fit for commercialization. That is, it was ready to be converted from a Crown corporation to an autonomous profit-making enterprise that would be run by users of the system.

'We had to become results oriented and we had to champion financial self-sufficiency. Our goal was low-cost excellence.'
Glendon Stewart · Seaway president, 1990–1997

"We had to become a lean organization with an entrepreneurial spirit," Stewart recalled years later in an interview. "We had to work as a team. We had to become results oriented and we had to champion financial self-sufficiency. Our goal was low-cost excellence."

Stewart and his management team had to cast their net as widely as possible to bring about such fundamental change. They conducted both internal and external reviews. In November 1990, the Canadian and US Seaway organizations convened the first Seaway Summit. They brought together some seventy individuals from both sides of the border, including shipowners, port authorities, terminal operators, pilotage officials, and union leaders. The objective was to look for ways to cut costs, improve operations, and make the system a more attractive transportation alternative to end users.

Such a large gathering proved unwieldy and unproductive. Subsequent meetings involved less than half as many representatives, and eventually a working group of six was formed to bring forward recommendations. But by the end of 1994, it was clear that the summit would not produce the desired results. "There were too many vested interests," Stewart says. "It was very difficult to draw everyone together and to have them move in the same direction without conflicts or divulging commercially sensitive information."

The internal reviews and changes ultimately proved more fruitful. Organizational change began in earnest in the spring of 1991, when the Seaway retained consultants Coopers and Lybrand to help senior management identify ways of reducing overlap and administrative costs. The consultants recommended investments in new technology and a restructuring of the two regional operating divisions that would allow the Seaway Authority to trim about 100 positions from the payroll over a three- to five-year period.

They also suggested reorganizing lock crews, cutting the personnel to three per lock from four. At the time, an operator situated in a tower was responsible for opening and closing the gates as well as filling and emptying the chamber. A lockmaster and two line handlers worked on the wall, mainly tying up ships. The consultants recommended moving the controls to a kiosk on the wall. The operator would continue to control the gates and the flow of water, but would also help secure the vessels. That way, one line-handler position per team could be eliminated. All told, fifty-two jobs were eliminated by 1993, leading to savings of $3 to $4 million per year.

Coopers and Lybrand had provided the outlines for a new direction. Stewart and the management team then turned to the staff for proposals that would allow them to develop a

Tying up a ship within a lock chamber is four-step process. Here, a line handler starts by tossing a nylon rope to the deckhands aboard a ship. The deckhands will attach the rope to a braided-steel tie-up line. The line handler activates a small motor, which reels in rope and cable. Finally, the line handler drops the loop of the cable around a bollard and the deckhands reel in the cable to secure the vessel. RON SAMSON

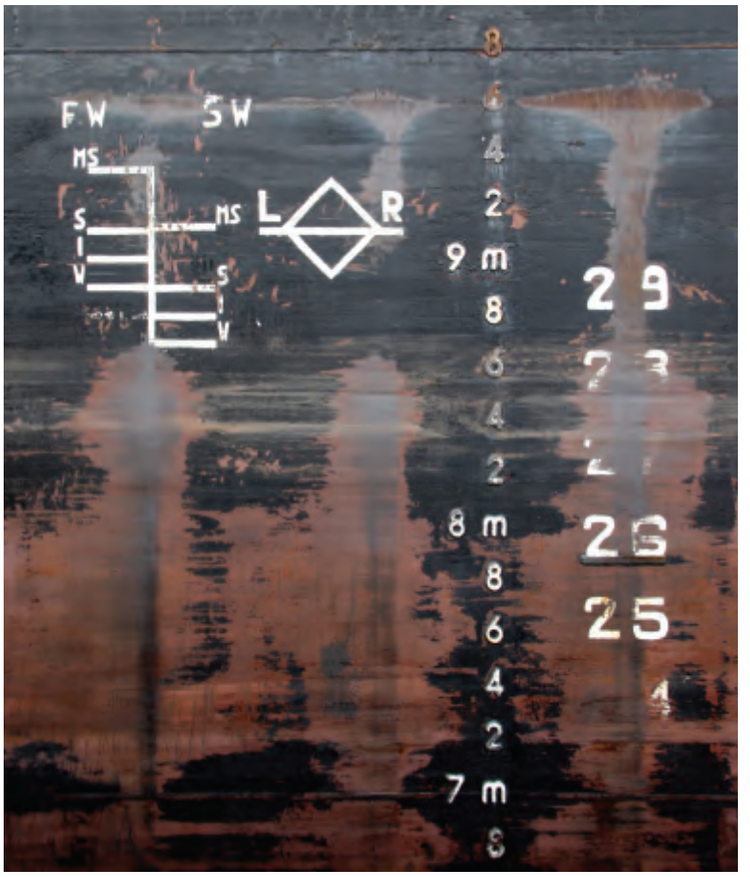
ten-year strategic plan for the organization. They asked for ideas from employees at all levels of the organization. "We had to come up with some numbers," recalls Stewart. "Otherwise, we would have ended up with bold statements that didn't convey the necessity of what we were doing."

All of that internal thinking and discussion culminated in a two-day meeting called Vision 2002, held at the Ramada Inn in Trenton, Ontario, in October 1992. Fifty-five senior managers from all parts of the organization participated, and for most it was a novel experience. "This was new to the Seaway," recalls human-resources manager Jean-Guy Lauzon, who attended the sessions. "It was the first time I'm aware of that there was a strategic vision. We used to have a planning department, but it worked in isolation. This project involved the whole organization."

In his opening remarks, Stewart laid out in no uncertain terms the challenges the organization faced. Traffic had fallen from 42.1 million tonnes in 1988 to slightly less than 32 million tonnes in 1992. Revenues were holding steady at around $70 million per year, but costs were rising and the Seaway was losing money—$11 million in 1992, up from $1.8 million the previous year. "Depending on the scenario we adopt," he told the gathering, "we could be broke in as little as two years."

The survival plan he proposed involved a combination of higher revenues and lower expenses. The Seaway could boost revenues through marketing initiatives, attracting new types of cargo and increasing tolls. It could cut costs by reducing staff, disposing of surplus buildings and property, and by transferring responsibility for bridges and tunnels to government agencies.

Along with such specific measures, Stewart insisted that a broader shift in attitudes and



ABOVE: **Every commercial vessel sailing on the seaway has a variety of markings on its hull. Plimsoll markings, on the left in this photo, denote the maximum depth to which a ship can be loaded in different weather conditions. The columns of numbers on the right are draught marks, in metric and imperial scales. They indicate the ship's depth, or draught, below the water line.** RON SAMSON

FACING PAGE: **Navigating a seaway-max vessel into a lock is a delicate task. Such ships are up to 740 feet long and 78 feet wide, while the locks are only 80 feet in width.**

TOP: **The captain of the Canadian Transport has steered the bow of the vessel against the approach wall, which he uses to guide the ship.**
MIDDLE: **The captain runs the vessel along the approach wall, but he keeps the stern of the vessel off the wall and lined up with the entrance to the lock.**
BOTTOM: **Having reached the end of the approach wall, the bow of the Canadian Transport is accurately aligned with the entrance to the lock and advances into the chamber.**
RON SAMSON

approaches was needed. "We must decide where we are going in to be in 2002 and decide how we are going to get there," he said, "then develop a culture and management style consistent with this vision."

On the first day of the Vision 2002 conference, the employees were split into four different groups. They were asked to think about what the Seaway should look like in ten years' time. They were to contemplate how the organization should adapt to changing market conditions, what the organizational hierarchy would look like, and how many people would be employed. They were also to address financial viability and the condition of the infrastructure, as well as tolls and revenues. The ideas were supposed to be as specific as possible and they were all recorded. A second exercise involved envisioning the size and state of the Seaway Authority in the first three years as it tried to meet the restructuring targets in 2002.

The conference produced numerous ideas. They were later used to formulate a vision statement—"Working with our partners, we are leaders in fulfilling our customer's transportation needs"—and to develop four strategic objectives: improving the Seaway's market share, maintaining the infrastructure in a safe and reliable condition for the users,

operating the Seaway profitably, and optimizing the potential of all employees.

Guided by the vision statement and the accompanying specific objectives, the Seaway achieved a remarkable turnaround in its financial fortunes in just two years. The carrying capacity of the system was enhanced by allowing larger, more heavily loaded ships to pass through the locks and canals. The maximum allowable draught was bumped up to 26 feet, 3 inches from 26 feet. Vessels with 78-foot beams were permitted, up from the previous ceiling of 76 feet. Finally, the limit on the length was increased to 740 feet from 730.

The Seaway began to dispose of surplus assets. In 1992, it realized $2.3 million from the sale of twenty-nine properties. The following year, twenty-two properties were sold, bringing in $1.6 million. By May 1995, the organization had made $7 million through the sale of lands it wasn't using, while rentals of property and buildings had exceeded $8 million.

Early in 1993, the organization launched a voluntary-separation-incentive program to reduce the workforce, primarily through early retirement. "It was geared to people in operations and maintenance, but it was applicable to everyone," recalls Lauzon. "People applied to leave. We never forced

The new business, as well as increased shipments of other commodities, allowed the Seaway to cut its 1993 loss to $6.1 million, down from $11 million in 1992.

anybody to go. We offered packages and a lot of people in operations and maintenance opted to take them."

In April 1994, Stewart told MPs on the Seaway subcommittee of the standing committee on transport that the Seaway Authority had reduced its workforce by 230 person-years, or 25 per cent, over a four-year period through cuts in administration, engineering, operations, and maintenance. The streamlining had been achieved by introducing new technology, by combining groups, and by eliminating overlap and duplication.

At the locks, for example, operations and maintenance personnel were merged in order to assist one another when necessary. Operators worked on maintenance when there were no ships, while maintenance workers focused on lock operations when ships were transiting. Through such measures, the Seaway had slashed its operating budget by $12 million and was well on the way to achieving its objective of a workforce of 600 by the year 2002.

At the same time, the organization was aggressively pursuing its goal of improved market share and the incentive toll program proved to be one of its most powerful tools. This initiative provided discounts for new business and volume rebates for shipping companies whose tonnages in a given year exceeded historical averages. "This has resulted in more than $26 million in new revenue from 1990 to 1994 and approximately $6 million in rebates to customers from 1990 to 1994," Stewart told the House standing committee on transport in 1995.

The Seaway Authority also continued to market the system by embarking on trade missions and meeting with end users to sell the benefits of the waterway. Those efforts began to pay dividends by 1993, when the Montreal-Lake Ontario section handled 300,000 tonnes of Appalachian coal destined for New Brunswick Power. Shipping companies were also busy searching for new cargoes, with sometimes-surprising results.

Coal from the Powder River basin in Montana moved on the seaway for the first time in 1993, thanks to an innovative arrangement between Venture Fuels and Montreal-based Canada Steamship Lines. Venture normally shipped Powder River coal to European users via the Mississippi system. But when the river overflowed its banks that summer, Venture began delivering coal by rail to ports on Lake Superior, where it was transferred to CSL self-unloaders. The ships moved the commodity to Sept-Îles and loaded it directly onto CSL Panamax vessels for the journey to Europe. The coal reached the customers in a timely fashion and at a competitive price.

The new business, as well as increased shipments of other commodities, allowed the Seaway to cut its 1993 loss to $6.1 million, down from $11 million in 1992. Further improvements were achieved the following year. Cargo movements on the Montreal-Lake Ontario section reached 38.4 million tonnes, up 20 per cent. Traffic on the Welland Canal increased by nearly 25 per cent to 39.7 million tonnes. Toll revenues hit $76 million, 28 per cent above 1993. A total of fifty-nine vessels used the system for the first time and forty-six vessels returned to the seaway after absences of up to six years. Another reduction in personnel, equivalent to eighty-three person-years, saved $4.5 million in payroll costs. The net result was a profit of $15.5 million, the first since 1983.

On May 10, 1996, Algoma Central's MV Algosoo transited the Welland Canal en route to Lorain, Ohio, with a load of iron ore. The vessel was carrying the two billionth tonne of cargo to move on the waterway since 1959 and the Seaway held a ceremony on deck to commemorate the occasion. THIES BOGNER

That was the start of a sustained turnaround. The Seaway earned a profit of $238,000 in 1995 on revenues of $80 million. The following year, nearly 50 million tonnes of cargo passed through the system and revenues reached $88.6 million, the highest in the history of the Authority. A total of 3,953 vessels used the waterway, the best traffic count since 1988. Furthermore, May 10, 1996, marked a momentous milestone. Algoma Central's MV *Algosoo* transited the Welland Canal on a trip from Pointe-Noire, Quebec, to Lorain, Ohio, with a load of iron ore. The *Algosoo* was carrying the two billionth tonne of cargo to move on the seaway since 1959.

Meanwhile, organizational change continued. In 1994, the Seaway Authority adopted a quality-management process to ensure that employees at all levels focused on the needs of customers. Quality councils were introduced, client needs were identified, and associated performance measures were established. Programs were initiated to train personnel in the new approach.

The overall change was summed up in the 1995 annual report: "Customer satisfaction has become the driving force behind all aspects of Seaway business. The future of the Seaway as a major transportation route is dependent on satisfying customer needs for cost effective, reliable and speedy service."

The Seaway Authority in 1994 also conducted a survey of users that revealed two major areas of concern. The first was transit times. The second was the system for reporting the location of vessels so that shipping companies could more accurately determine the arrival times of their vessels at locks and ports. The Seaway promptly addressed both.

In order to improve transit times, the Seaway Authority made two commitments:

that 95 per cent of all vessels would get through each section of the waterway within four hours of the average, and that 90 per cent would complete a passage within two hours of that standard. On the basis of 3,000 ships per season, that meant only 150, or 5 per cent, would be allowed to exceed the average transit time by more than four hours.

The changes of the early 1990s were part of a broader effort to prepare the Seaway for commercialization, an initiative driven by a cash-strapped federal government.

The Seaway also developed a delay code in order to identify the causes of problems and to assign responsibility. The code included five categories: delays caused by vessel breakdowns, accidents, or breach of regulations; those attributable to wind, ice, visibility, or other environmental occurrences; those owing to breakdowns of structures or operational equipment; those originating with partners such as railways or hydro companies; and those arising due to traffic management.

The system went into effect at the start of the 1996 navigation season. The results of that first year indicated that 92 per cent of ships on the Montreal-Lake Ontario section and more than 95 per cent of those on the Welland Canal completed their transits within four hours of the average.

The Seaway dealt with the vessel-location issue by acquiring a new computer-based graphic display system that was updated every ten minutes in the Welland Canal and every fifteen on the Montreal-Lake Ontario section. It depicted for Seaway employees the exact position of all ships within the system and kept them abreast of weather conditions and projected use of the locks. Shippers and receivers had access to the information through an interactive voice-response system, and the Seaway had already begun investigating ways to make everything available on the Internet.

The changes of the early 1990s were part of a broader effort to prepare the Seaway for commercialization, an initiative driven by a cash-strapped federal government. Jean Chrétien's Liberals took office in late 1993, just as the country was headed for a serious fiscal crisis after twenty-five years of budget deficits. Rising debt-service charges were eroding Ottawa's ability to deliver effective services and undermining its ability to respond to new challenges and needs. The government had to reduce its financial obligations where possible, and that meant examining and questioning almost everything it did.

Within Chrétien's cabinet, Transport Minister Doug Young proved to be one of the most energetic and effective reformers. He shook his department from top to bottom and engineered a major overhaul of the air, rail, and marine sectors. He cut subsidies and got the federal government out of the business of owning and operating airports, air-traffic-control systems, ports, and other facilities. Under Young's direction, the Department of Transport almost ceased to be an active participant in the business of moving goods and people, and assumed the more limited role of establishing rules and regulations. Under the circumstances, the Seaway could hardly expect to go untouched.

In November 1994, the Seaway Authority prepared a report for the minister, *A Blueprint To Commercialize the St. Lawrence Seaway*; and in March 1995, Stewart presented the

DEALING WITH INVASIVE SPECIES

The Great Lakes St. Lawrence Seaway Study summarizes the problem succinctly and unequivocally: "The introduction of non-indigenous species into the Great Lakes basin and St. Lawrence River, particularly through ballast water from trans-oceanic ships, is one of the most pervasive and challenging environmental problems facing these waters."

More than 185 invasive species have found their way into the St. Lawrence and the Great Lakes over the past two centuries, and they have come from a variety of sources: aquaculture, live fish markets, sport fishing, the pet trade, bait fish, and garden plants, as well as ballast water from ocean-going vessels.

The earliest-recorded example of an aquatic invader was the sea lamprey, which reached the Great Lakes via the Erie Canal in the 1820s. Since 1990, scientists have documented about twelve new species—none as notorious as the zebra mussel, a fingernail-sized mollusk from the Caspian Sea. It arrived in North America aboard a transatlantic freighter and was possibly flushed into Lake St. Clair along with ballast water in the late 1980s. Since then, it has spread to all of the Great Lakes as well as rivers and numerous other lakes in Ontario, Quebec, and several states.

The arrival of the zebra mussel coincided with efforts in both Canada and the United States to stop the introduction of invasive species. In 1989, Transport Canada introduced voluntary ballast-water-exchange guidelines for ships entering the Great Lakes—the first such attempt to control the problem—but did not adopt mandatory regulations until June 2006.

Four years later, the US Coast Guard issued the first regulations, which applied to vessels entering the Great Lakes from the Atlantic and carrying ballast water (BOB vessels). The U.S. rules required vessels to exchange their ballast water at least 200 miles offshore. Those unable to take on ocean water for safety reasons were required to retain their ballast in sealed tanks or to have it treated on discharge. US Coast Guard officers or marine specialists from the Saint Lawrence Seaway Development Corporation at Massena, New York, inspected the salinity of the ballast either at the St-Lambert or the US locks.

The zebra mussel, a fingernail-sized intruder, arrived in the late 1980s and quickly spread to other lakes and rivers in the Great Lakes drainage basin. ENVIRONMENTAL PROTECTION AGENCY

Meanwhile, the shipping industry was also dealing with the issue. In 1991, the International Maritime Organization (IMO) endorsed ballast-water exchange and issued a set of preliminary guidelines. The IMO issued updated guidelines in 1997 and, by 2004, representatives of seventy-four member countries had adopted the International Convention for the Control and Management of Ship's Ballast Water and Sediment. The convention would »

become effective twelve months after thirty member states, representing 35 per cent of the world's merchant-shipping tonnage, had ratified it.

The Shipping Federation of Canada (SFC) in September 2000 adopted a code of best practices for ballast-water management on ocean-going vessels entering the system. And four months later, in January 2001, the Lake Carriers' Association and Canadian Shipowners Association published voluntary management practices aimed at reducing the transfer of aquatic nuisance species through domestic shipping.

The two Seaway corporations issued mandatory regulations in 2002 based on the SFC's code, which applied to vessels entering from beyond the exclusive economic zone. They also adopted the Lake Carriers-Canadian Shipowners voluntary practices for ships entering the seaway.

None of these measures was sufficient to satisfy critics of the shipping industry. In early 2003, former Liberal MP Herb Gray, Canadian co-chair of the International Joint Commission, told the Commons fisheries committee that the federal government should appoint a lead department to handle the issue rather than allowing it to bounce between Environment, Fisheries, and Transport.

Johanne Gélinas, former federal commissioner of the environment and sustainable development, was even more pointed in her criticism when she appeared before the same committee. "There is no consensus on priorities," she told the committee, "no clear understanding of who will do what and no capability to gauge the progress on the government's commitments. There has been no practical action by the federal government to prevent alien invaders from harming Canada's ecosystems."

That was about to change. Henceforth, BOB vessels entering the seaway from the Atlantic and destined for a Canadian port were required to exchange their ballast at least 200 miles from shore and in seas at least 2,000 feet deep. NOBOB vessels had to conduct a saltwater flush of their tanks and ballast systems to kill organisms that might be living in the residual water and sediment.

That created a discrepancy between the Canadian and US regulations, and a major loophole, according to scientific observers, since the US rules applied only to vessels with ballast on board. They noted that about 75 per cent of ocean vessels arrive in North America carrying freight, in which case they do not have ballast and therefore are not subject to inspections.

Prior to the start of the 2008 navigation season, the US Seaway corporation agreed to harmonize its approach with Canadian practices. As a result, a joint regulation was issued that will result in all ocean vessels being subjected to a consistent and rigorous inspection process in Montreal.

"Controlling the introduction of new invasive species is the number-one environmental priority of governments and the marine industries," said Collister Johnson Jr., administrator of the Saint Lawrence Seaway Development Corporation. "The Seaway corporations are working tirelessly to effect tangible progress as quickly as possible."

Richard Corfe, president and CEO of the SLSMC, added: "This agreement demonstrates the resolve of the Seaway corporations, the Canadian and US governments, and that of the marine industry to effectively manage ballast water, and apply industry-leading best practices to each and every ocean vessel entering our system." ■

recommendations to the parliamentary standing committee on transport. He and his executive team examined nine options—everything from maintaining the status quo to closing the system—and they were guided by three principles: providing better service to users, reducing the overall cost to the government as well as those using the waterway, and increasing the competitiveness of the Seaway.

Stewart told the MPs that there were three realistic options. The first involved leaving the Seaway Authority in charge of the waterway, but extending its jurisdiction to Thunder Bay, and making it responsible for overseeing the coast guard as well as the Great Lakes Pilotage Authority. This was Stewart's preferred scenario. He argued that it would allow the three organizations to combine sites and facilities, saving 10 to 20 per cent of their annual operating expenses, or $15 to $30 million.

The second option was a public-private partnership. The government would continue to own the system and pay for major capital expenditures. But a private, not-for-profit company or consortium would operate the seaway and use toll revenue to cover the cost of operations and basic maintenance. Alternatively, Ottawa could sell the seaway outright, which would mean turning over the infrastructure and the associated capital costs to a private firm.

Stewart was one of a number of witnesses to appear that spring before the committee, which held hearings in order to advise the minister on the shape and direction of a new national marine policy. The MPs submitted their report in May 1995 and Young was expected to unveil a blueprint for the future of the seaway, the coast guard, and the nation's ports by September.

That summer, he consulted directly with the industry. During those talks, the Montreal-based engineering and consulting firm SNC-Lavalin emerged as a potential buyer of the seaway. Stewart met with SNC president Bernard Lamarre and his brother Jacques, then vice-president, at Le Métro Restaurant Parisien in downtown Ottawa in mid-December 1994. The brothers asked detailed questions about the Seaway's expenses, revenues, and management structure. Stewart again met Bernard Lamarre at the same restaurant in early May 1995, and this time the businessman expressed interest in the Jacques Cartier and Champlain bridges, which link Montreal to the south shore of the St. Lawrence and were managed by the Seaway.

The MPs submitted their report in May 1995 and Young was expected to unveil a blueprint for the future of the seaway, the coast guard, and the nation's ports by September.

SNC's interest caught the attention of Norman Hall, then president of the Canadian Shipowner's Association. It worried him and he convinced the CSA board to prepare a takeover proposal of its own. "The industry first got interested in the Seaway because Young said he wanted to sell it," Hall later recalled in an interview with the magazine *Canadian Sailings*, "and second because we got wind of the fact that SNC-Lavalin was very interested in taking over the waterway." Hall went to the board with a warning: "You know what is going to happen if those fellows take it. They don't even use the Seaway. They will want to make money on all the engineering

and infrastructure costs that an ageing Seaway automatically imposes. God knows what the tolls will be."

He also had in mind a plan that bore a strong resemblance to Stewart's. "We should be looking at a new Seaway corporation taking over all marine aid matters on the Great Lakes," Hall told the board. "Would it not make sense for the Seaway to be in charge of ice-breaking on the lakes, to be in charge of navigation aids, do everything, replace the Coast Guard altogether? The corporation could go to tender and see if it could get people to do it cheaper?"

By mid-July 1996, representatives of the users group had signed a letter of intent to create a not-for-profit company that would take control of the waterway, possibly as early as January 1, 1997.

As it happened, SNC quickly determined that the tolls required to cover operating expenses and capital expenditures would be prohibitive and withdrew from consideration. But by showing interest, the company had had a profound effect on the future of the seaway. The CSA initiated the creation of a user group to prepare a bid. Its members included four shippers (Algoma Central, Upper Lakes Shipping, Canada Steamship Lines, and Fednav International), three grain companies (James Richardson & Sons, Louis Dreyfus, and Cargill), and the steel companies Stelco and Dofasco.

The user group negotiated with the government for about a year. During that time, a cabinet shuffle interrupted the talks. Young moved on to another portfolio and BC's David Anderson took over the transport file. By mid-July 1996, though, Anderson and Robert Swenor, a senior vice-president at Dofasco, had signed a letter of intent to create a not-for-profit company that would take control of the waterway, possibly as early as January 1, 1997.

The two sides had agreed on a public-private partnership along the lines of Stewart's presentation to the transport committee. The government would retain ownership of the locks, canals, and related facilities. It would also be responsible for major overhauls and upgrades. The users would operate the waterway and take care of routine maintenance.

Several key issues remained to be resolved. The government and the users had to strike a formula for sharing any operating surpluses. The new organization needed a board of directors as well as a management team. Decisions had to be made about the location of the head office and the closure of other facilities. There was also opposition to the arrangement, mainly south of the border.

"Various US Great Lakes port and shipping interests have expressed strong reservations over the prospect of a users group running the waterway, and also eventually increasing tolls," *Canadian Sailings* reported. "US Seaway officials have objected to a public asset under private industry."

The Saint Lawrence Seaway Development Corporation had its own agenda. It was pushing for the creation of a bi-national agency to run the system, and officials from the transportation departments of both countries discussed the proposal that summer. Those talks did not come to fruition and the idea was set aside for the time being

The transition from the old organization to the new was delayed by almost two years, not by external opposition but by domestic politics. The Canada Marine Act had to be

amended to allow the minister to disband the Seaway Authority and enter into an agreement with the user group. In September 1996, Anderson introduced a bill incorporating those changes, along with others that would allow the privatization of ports and a reorganization of the coast guard.

It passed third reading in the House of Commons, but died on the Senate order paper in early April 1997 when Prime Minister Chrétien prorogued Parliament and called a general election for June 2. That meant the bill had to be reintroduced, which didn't happen until a new session of Parliament opened in the fall.

Meanwhile, a changing of the guard took place at the Seaway. Stewart's term as president expired on August 7, 1997, and he retired. He had led the organization through a remarkable transformation and had earned the respect of the industry. "Management at its best," declared the headline over a *Canadian Sailings* story about the outgoing president.

"Mr. Stewart can feel comfortable with his tenure at the Seaway," the magazine's Ottawa correspondent, Wilbrod Leclerc, wrote. "Tonnage and revenues have increased. Costs have decreased. Personnel has been cut back. Management has improved. It has all the makings of a successful downsizing. The Seaway is now operating under business principles.

"There is every indication," he continued, "that the Seaway has reached the stage where its operations can be taken over successfully by private industry. The users group which is waiting in the wings will be able to move in with a higher degree of confidence."

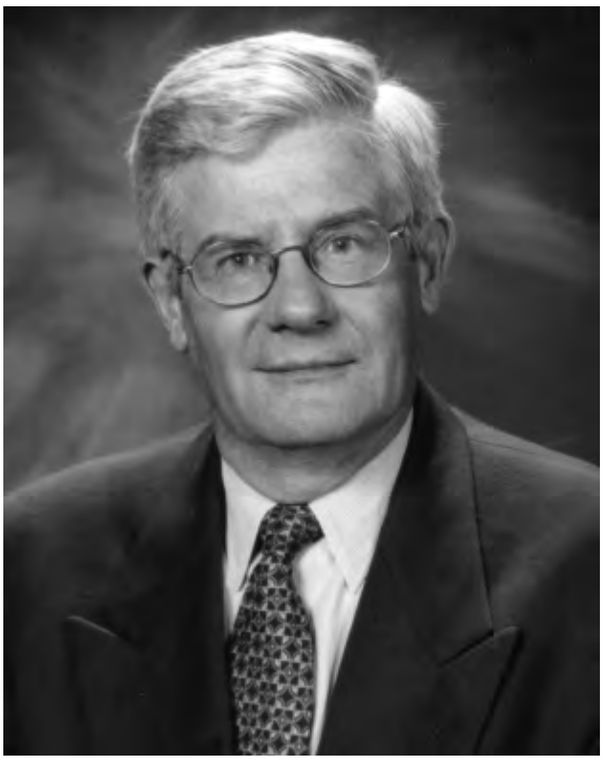
David Collenette became the transport minister in the newly elected Liberal government, and he announced Michel Fournier as interim president and chief executive. Fournier was a notary public from Saint-Jean-sur-Richelieu, Quebec, who specialized in commercial and corporate law. The government had appointed him to the Seaway Authority in 1995 and he served as one of the two vice-presidents working directly under Stewart.

'There is every indication that the Seaway has reached the stage where its operations can be taken over successfully by private industry.'
Wilbrod Leclerc · Canadian Sailings magazine

Collenette reintroduced the bill amending the Canada Marine Act that fall, and the Commons passed it before Christmas recess. The Senate finally approved it in early June 1998, clearing the last hurdle for transferring control of the seaway to the users.

That handoff happened on October 1, 1998, and a ceremony marking the occasion was held aboard the MV *Canadian Olympic* while it was transiting the Welland Canal. The St. Lawrence Seaway Authority became the St. Lawrence Seaway Management Corporation. The head office moved from Ottawa to Cornwall. The newly constituted board of directors had nine members, drawn from the iron and steel industries, the grain trade, ocean and domestic shipping companies, and one each from the federal, Ontario, and Quebec governments. The ninth member was the new president, Guy Véronneau.

Then 61, Véronneau had years of experience as a senior executive and was a prominent figure in Canada's dwindling shipbuilding industry. He began his career in the late 1950s in data processing, a field that evolved into



Former shipbuilding executive Guy Véronneau became the first president of the newly formed St. Lawrence Seaway Management Corp. A reluctant recruit, he signed on for three years but enjoyed it enough to stay five.

ST. LAWRENCE SEAWAY MANAGEMENT CORP.

information technology. He started with a brewing company, moved to a newspaper, and then became director of systems and data processing with Marine Industrie Ltée., a Sorel, Quebec, manufacturer that built ships, rail cars, and hydroelectric equipment.

In the late 1970s, MIL put Véronneau in charge of a project to build cargo ships for the Polish government and in 1980 made him vice-president of the shipbuilding division. But he left in 1986 for a position as vice-president of marketing with Bombardier's public-transit division. Three years later, he returned to MIL, which had by then merged with Davie Shipbuilding of Quebec City. Véronneau ran the Davie shipyard until it was sold in 1996. At that point, he retired, moved to the Eastern Townships, and was still there when a recruitment firm called in June 1998 about the Seaway job.

"I said, 'Are you crazy?'" Véronneau later recalled. "It had been a very difficult seven years at the shipyard and I needed time to recover. I had no intention of going back to work."

But the newly appointed Seaway board wanted Véronneau. The headhunters persisted and by the end of August he had accepted. The board was looking for a minimum two-year commitment. He agreed to stay for three, but ended up being there for nearly five. "I enjoyed it immensely," he says. "It was a very professional organization. We were taking the first steps in a completely different relationship with the world."

Véronneau's arrival coincided with another slump in the volume of goods moving on the seaway. A total of 50.5 million tonnes went through the system in 1998, then the amount shipped declined in each of the next four seasons, settling at 41.4 million in 2002, Véronneau's final year as president.

Nevertheless, his tenure was filled with projects and initiatives, and he pushed even further the cultural transformation launched by Stewart. He began in February 1999 by holding a management retreat at a hotel on the American side of the Thousand Islands. It led to a comprehensive strategic planning exercise and a restatement of the mission, vision, values, and goals of the organization.

Equally important, some fifty action plans flowed from the exercise and four teams were

established to review how work was performed at the Seaway. They looked at project management and capital spending, preventive and corrective maintenance, lock-crew operations, and procurement. The recommendations in their report pointed to the potential for creating a new organizational structure, and a consulting firm was retained to assist with the implementation.

The result was a complete overhaul. It was finished by March 2000 and produced a clearer, more effective delineation of regional and head-office responsibilities. The operational and regional vice-presidents in St-Lambert and St. Catharines were given two major responsibilities: ensuring that ships moved efficiently on their sections of the waterway and that the infrastructure was maintained. Support departments such as human resources, finance, and information technology were centralized at head office in Cornwall and a new position, vice-president of strategic and business development, was created.

"We expect the new structure to produce better planning, co-ordination and communication among engineering, maintenance and operation," Véronneau wrote in the 1999–2000 annual report, "and to improve services to clients while reducing costs."

With the passage of time, Véronneau's role in reshaping the organization came to be appreciated by many who worked with him. "We wanted somebody to change the culture and Guy did it," board chairman Swenor later said. "He garnered the respect of everyone."

Albert Jacquez, then the administrator of the Saint Lawrence Seaway Development Corporation, added: "Coming from the private sector, Guy brought a different spirit and culture to our waterway. He welcomed and embraced change. He was performance and results oriented in all aspects of the business."

Véronneau believed it was imperative to improve the organization's working relationship with SLSDC executives. He therefore insisted that the Seaway begin participating in trade missions involving American Seaway officials and shipping executives. The change in relations between the Canadians and their American counterparts led to two important technology initiatives that have enhanced the performance of the seaway. In March 2000, the Seaway organizations launched a joint project, led by the Americans, to acquire and test an automatic identification system, or AIS, with the objective of improving traffic control. It took a full three years to complete the trials, to install the various components, and to ensure they were fully functional; but by opening day of the 2003 season, AIS was up and running.

With the passage of time, Véronneau's role in reshaping the organization came to be appreciated by many who worked with him.

AIS relied on transponders and global-positioning systems to relay information from ship to ship or between ships and the traffic-control centres, located in St-Lambert and St. Catharines on the Canadian side, and the Eisenhower lock on the American side. As a vessel made its way through locks and canals, an onboard AIS transponder sent its exact location to the centres and other ships. The position appeared on computer screens at the traffic centres, as well as on transiting vessels, and it changed as the ship advanced. The system could also estimate time of arrival at a lock and supply captains with accurate

An automatic identification system underwent three years of testing and development starting in 2000. The new technology went into operation in the spring of 2003 and provided seamless and integrated traffic control between the centres at the St-Lambert Lock, the Eisenhower Lock, and the Welland Canal. THIES BOGNER

information about wind speed and direction, water depth, ice conditions, and the direction of the vessel's next change of course.

"AIS was killing two birds with one stone," says Véronneau. "It improved the safety and security of the system. It also made the seaway more efficient, and we had identified efficiency as a way of growing the business."

The second major technological advance was the creation of a fully interactive, multifunctional, and bi-national website. The Canadian Seaway led this project, and when fully operational in 2002, it offered shippers unparalleled service. It provided shipowners, operators, and agents with access to vessel-location information in real time, supplied by AIS, as well as online access to their accounts. It allowed seaway users with empty vessels to find cargoes, while those who needed to move cargo could locate ships. It also included a calculator that could produce customized estimates of the cost of shipping from point to point. Finally, they could complete and file pre-clearance and transit-declaration forms online. The site quickly began to attract some 70,000 hits per month and became the single most comprehensive source of information about commercial navigation on the seaway.

Véronneau also initiated two other technological changes that could only be started, not completed, while he was president. He asked his senior staff to begin looking at waterways around the world for a system that would allow for hands-free mooring of ships when they were transiting a

The Seaway employees in this photo are in the St. Catharines control centre. The Seaway was the first commercial waterway in the world to adopt such sophisticated technology. THIES BOGNER

lock. In other words, he wanted technology that would eliminate the age-old practice in which the mates passed steel cables to lockhands who secured the vessel by attaching the cables to steel posts known as bollards. Finally, Véronneau pushed for a program to replace with hydraulics the motors and steel cables used to open and close canal gates as well as intake and discharge valves.

Meanwhile, in order to achieve cost reductions, Véronneau concluded that the Seaway would have to work with other stakeholders in the system. In 1999, he and Swenor began meeting with shippers, shipping companies, port authorities, and others to discuss system-wide strategic planning and co-ordination. Their discussions led to the formation of a group called the Waterway Strategic Issues Forum.

Chaired by Véronneau, the forum included representatives from Cargill, Stelco, Québec Cartier Mining, Algoma Central, Fednav, the ports of Duluth, Thunder Bay, and Montreal, as well as the Saint Lawrence Seaway Development Corporation. They decided to pursue four objectives—to improve the management of the waterway and reduce costs, to increase tonnages on the system, to improve its long-term competitiveness, and to secure adequate government support—and they formed committees to pursue each of these goals.

The forum was a long-term initiative that outlived Véronneau's tenure as president and CEO of the Seaway. In the 2001–02 annual report, he announced his intent to resign at the end of the next fiscal year, March 31, 2003, and that he had already begun looking for a successor. Véronneau chaired a three-member

'As we serve today's customers, we have to look to the future. We have to promote the advantages of marine transportation, especially the environmental benefits of reducing pollution and congestion.' *Richard Corfe*

Richard Corfe was the first Seaway employee in more than three decades to become president of the organization. Corfe has led the push to increase and diversify the cargo carried on the system. THIES BOGNER

search committee. They interviewed internal and external candidates before settling on Richard Corfe, the 54-year-old vice-president of the Seaway's Maisonneuve region, formerly known as the Montreal-Lake Ontario section. He was the first Seaway employee in more than three decades chosen to lead the organization.

"The successful candidate had to be able to do the job," recalls Véronneau, "but I told the board it would be an advantage if the new president came from inside. It would be good for morale, and after all the changes of the previous decade, we needed to continue in the same direction."

Corfe, a mechanical engineer, was born and raised in England and earned his degree from City University in London. He began his career in the rubber-and-tire industry before joining the Seaway in 1983 as chief of maintenance services. Over the next two decades, he worked in the eastern and western sections, and handled jobs that touched on operations, traffic control, ship inspection, customer liaison, safety and the environment, and the negotiation of collective agreements.

He inherited an organization that was lean, efficient, and financially sound, despite the decline in traffic volumes that had occurred since 1998. The Seaway had just completed a five-year business cycle. It had met its revenue targets while keeping manageable costs nearly 5 per cent below budget. And the organization had spent $123 million on its asset-renewal program.

As the Seaway embarked on a new five-year business cycle, Corfe intended to match those achievements and more, as he explained in the June 2003 issue of *Maritime Magazine*:

> As we serve today's customers, we have to look to the future. We have to promote the advantages of marine transportation, especially the environmental benefits of reducing pollution and congestion. We have to grow our business by providing new delivery methods and attracting new cargoes. And we have to work with all partners to ensure that enlightened decisions are taken for the future of transportation across the country.

The Alouette Spirit is one of the integrated tug and barge units operated by McKeil Marine. Such vessels — relative newcomers to Great Lakes shipping — are smaller than bulkers and self-unloaders, but they're more versatile and can sail in shallower waters than the big lakers. THIES BOGNER

In the spring of 1955, Evans McKeil joined the rush of workers — thousands of labourers, tradesmen, and engineers — who converged on Cornwall from every corner of the Canada to commence construction of the St. Lawrence Seaway. McKeil arrived as a labourer. He started on a dredging platform, blasting and carving a shipping channel from the bedrock of the river bottom, but quickly spotted an opportunity. Boats were in short supply to ferry workers from camps, hotels, and boarding houses to worksites on the river. McKeil and his father, William, built a 40-foot vessel — the *Micmac* — and for the next three seasons McKeil the younger ran a shuttle day and night from the start of navigation in the spring through to freeze up in late fall. The enterprise lasted until the winter of 1958–59, when the work was largely complete and the contracts ended. But the seaway had provided the foundation for an enduring business.

The young entrepreneur settled in Hamilton, formed McKeil Marine, and began acquiring tugs. Over the next four decades, the small, family-owned firm served the Great Lakes shipping and marine construction industries. In the early 1990s, Evans McKeil sold the company to his son Blair, who soon moved in a bold new direction. He entered the shipping business — moving freight up and down the seaway, from the Gulf of St. Lawrence to Lake Superior — on integrated tug and barge units, so called because the bow of the tug is secured to a V-shaped indent in the stern of the barge.

In the space of fifteen years, McKeil Marine became the largest operator of tugs and

barges on the Canadian side of the seaway and was slated to take delivery of up to five newly constructed barges between 2008 and 2013. The vessels are generally 75 feet wide, 350 to 450 feet long, and carry 10,000 to 14,000 tonnes of cargo, about half as much as the bulkers and self-unloaders that dominate Great Lakes shipping.

Fednav launched its fleet-renewal program in 1994 when it ordered six 34,000-tonne bulk carriers at a cost of $100 million from the Jiangnan Shipyard in Shanghai, China.

But what they lack in size, they more than make up in versatility. Some barges are enclosed. Some have retractable roofs. Others simply have walls. They are also shallow-draft vessels, which allows them to navigate in ports that are off limits to bulkers and self-unloaders. Over the course of a typical season, the company's vessels transport jet fuel from Montreal to Hamilton, steel byproducts from Hamilton to Cleveland, timber from Anticosti Island in the Gulf of St. Lawrence to Cacouna, salt from Windsor to Becancour, and coke from Hamilton to Belledune, New Brunswick.

In July 2005, McKeil Marine began shipping aluminum ingots from the port of Pointe-Noire, near Sept-Îles, to Trois-Rivières and on into the seaway. This was new cargo for the waterway, and by the end of the 2007 shipping season, the company had moved more than 300,000 tonnes of ingots, all produced by Aluminerie Alouette, the largest aluminum smelter in North America.

"Our company has gone through rejuvenation. We've brought new business onto the seaway," McKeil points out. "We've made long-term investments."

In this, McKeil Marine was not alone. After nearly two decades of retreat, in which cargo volumes declined, fleets were reduced, and several old, familiar names (Halco, Misener, Parrish & Heimbecker) exited the industry altogether, the big, long-established companies were investing again. Most of the money—well over $1 billion—was being spent on the renewal of bulkers and self-unloaders. But some of those funds were being used to acquire new types of ships that may well represent the future of Great Lakes shipping.

Montreal-based Fednav International, the largest ocean-shipping user of the seaway, has led the industry in the construction of new vessels. Fednav operates a fleet of up to 100 ships, 22 of them owned and the balance leased. Typically, 50 to 60 of these vessels are capable of navigating the St. Lawrence Seaway. President and chief executive officer Laurence Pathy says that finished and semi-finished steel from Europe, Asia, and South America are the major inbound products, while grain destined for North Africa as well as Central and South America is the principal export.

Fednav launched its fleet-renewal program in 1994, when it ordered six 34,000-tonne bulk carriers at a cost of $100 million from the Jiangnan Shipyard in Shanghai, China. The company took delivery of the last of those vessels in the latter half of 1997 and then announced that it had ordered four more bulkers, each weighing 35,750 tonnes, from Oshima Shipbuilding in Oshima, Japan.

Shortly after the turn of the century, Fednav ordered seven new vessels at a cost of some $200 million from shipyards in China and Japan, and they were scheduled to come into service between 2008 and 2011. Pathy says the

Montreal-based Fednav International, the largest ocean-going user of the seaway, has built several generations of ships in order to trade on the St. Lawrence and the Great Lakes. The Federal Rhine, seen here navigating the Thousand Islands, is one of four Fednav vessels constructed at Jiangnan Shipyard in Shanghai, China, in the latter half of the 1990s. RON SAMSON

company has a long-term replacement program that will see it ordering more new vessels and retiring older ones. "We started using the seaway as soon as it opened and we have built several generations of ships for the seaway," Pathy adds. "We are committed to the future of the Great Lakes as one of the bases of our business."

On the domestic front, Canada Steamship Lines spent $225 million between 1999 and 2007 upgrading its fleet of eleven self-unloaders. The forebodies of four ships and the mid-sections of two others were replaced with newly constructed hulls. All six are now 740 feet long and 78 feet wide, the maximum allowed under seaway regulations. At the same time, CSL has been acquiring bulkers. In 2003, the company acquired the *Birchglen* and the *Spruceglen* from Fednav, and it later acquired four additional Fednav vessels: the *Lake Michigan*, the *Lake Superior*, the *Lake Erie*, and the *Lake Ontario*, which were slated to join the CSL fleet in 2008 and 2009.

The Fednav ships were all built in the early 1980s; but despite their age, they enhanced CSL's reach and capabilities. They are ocean-going vessels, meaning that CSL can run them from the St. Lawrence out to the Atlantic and they can sail year round. These vessels, acquired at a cost of about $50 million, were expected to remain in service for ten to fifteen years. "The next step is to build new ships," said Tom Brodeur, vice-president of marketing and customer service. "That's our plan. Certain of our assets are getting very old and will have to be replaced."

Seaway Marine Transport was contemplating an equally ambitious program to renew its fleet of twenty-one self-unloaders and thirteen bulkers, jointly owned by Algoma Central and Upper Lakes Group. Most of those ships were built between the late 1960s and the end of the 1970s and were due to be

Bulkers and self-unloaders have been the backbone of the Great Lakes and St. Lawrence shipping industry for the past half-century.

Starting in the late 1990s, the large domestic shipping companies that use the seaway invested well over $1 billion in fleet renewal. The Algobay, seen here, is one of the vessels in the Seaway Marine Transport fleet that was being rebuilt.
ST. LAWRENCE SEAWAY MANAGEMENT CORP.

replaced. In 2007, Seaway Marine hired two outside companies to design the hulls and superstructures for a new generation of vessels that could be converted from bulkers to self-unloaders or vice versa.

"They have invested $1 million into developing this model," says Graeme Cook, vice-president of business development with Upper Lakes. "There will be a level of standardization that we never saw in the last generation of ships."

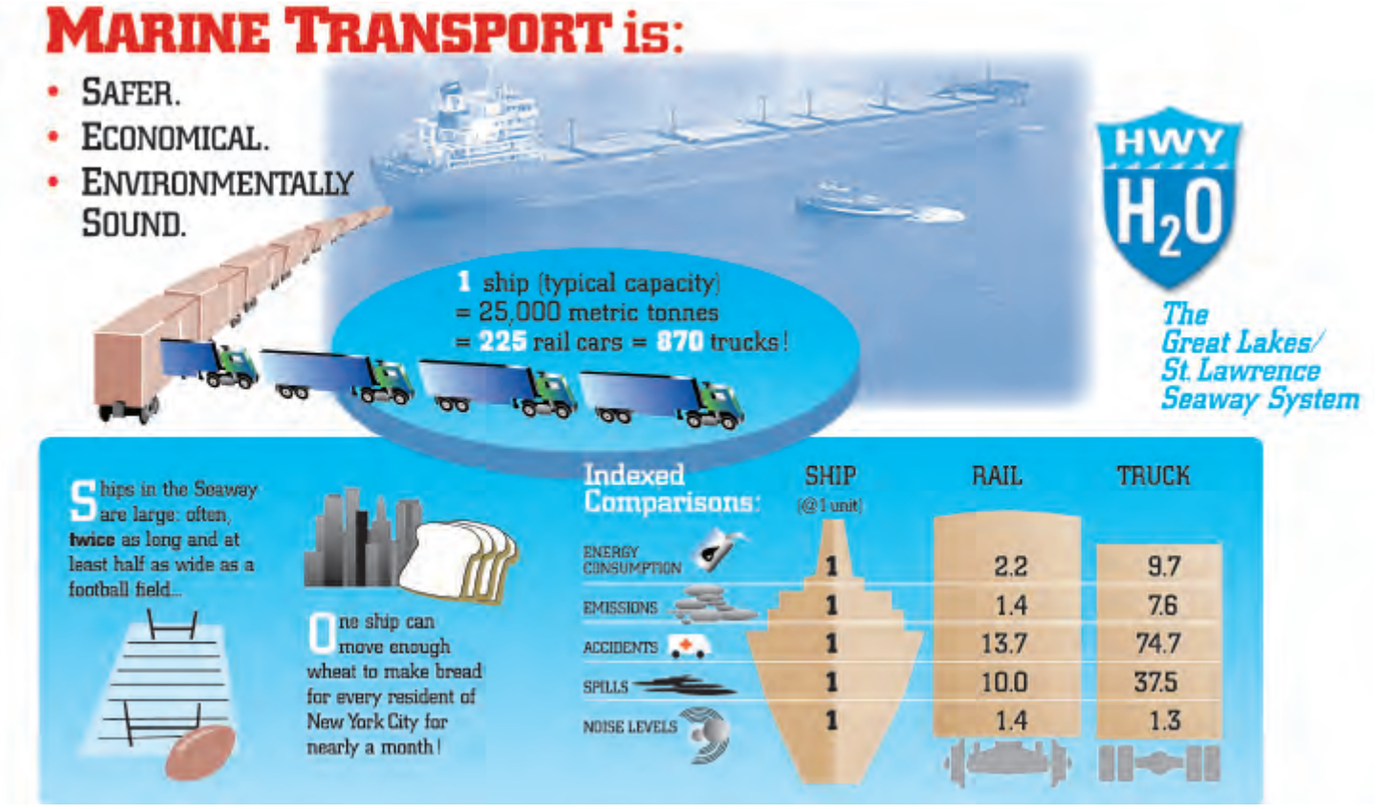
New ships were just one component of the program. In early 2008, Algoma announced the $38-million acquisition of three Seaway-size, ocean-going bulkers from Viken Shipping AS, a company based in Bergen, Norway. The vessels, then under lease to Fednav, were slated to join the Seaway Marine fleet by 2012. They were built in the late 1980s and were expected to sail under the company's flag for at least twenty years.

Two other vessels in the Seaway Marine fleet, the MV *Algobay* and MV *Algoport*, were being rebuilt. In November 2007, Algoma and Upper Lakes reached an agreement to spend approximately $125 million constructing new self-unloading forebodies, which were to be attached to refurbished aft-ends. Chengxi Shipyard Company, located in Jiangyin, China, won the contract for the work and expected to complete one vessel in December 2009 and the other by September 2010.

Greg Wight, Algoma's president and CEO, says the rebuilt ships, along with those acquired from Viken, will help maintain the capacity and flexibility of the Seaway Marine fleet while others are under construction. "They will bridge the gap until we build new ones," Wight says. "They are definitely the first step in a major fleet-renewal project we will be undertaking in the next five to ten years."

§ Bulkers and self-unloaders have been the backbone of the Great Lakes and St. Lawrence shipping industry for the past half century. Since the opening of the seaway in 1959, they have moved nearly 2½ billion tonnes of cargo and they will likely move the same volume of goods or more in the next fifty years, according to the *Great Lakes St. Lawrence Seaway Study*, a joint Canadian-US examination of the future of marine transport on these waters. Seven agencies, including Transport Canada, the US Department of Transport, and the two Seaway organizations, contributed to the study, which was published in the fall of 2007.

The study examined four things—the economic importance of the Great Lakes and the St. Lawrence Seaway, the environmental impacts and issues, the costs of maintaining the infrastructure, and the opportunities and challenges that lie ahead. The authors



concluded that the seaway has been and will remain a vital transportation corridor serving the Great Lakes and St. Lawrence basins. During the 1990s and the first years of the new century, the system was operating at about 60-per-cent capacity and handling in the neighbourhood of 40 to 45 million tonnes annually, saving roughly $1.2 billion in transportation costs each year.

"This volume of traffic simply could not be transferred to an already overloaded land-based transportation network without severe economic impacts on the industries served," the study concludes. "Marine transportation continues to be a viable and essential complement to the existing road and rail transportation networks in the region."

The authors predicted that the volume of traditional bulk traffic moving through the two sections of the seaway would increase by about 20 per cent over the next twenty years, providing additional economic benefits and requiring today's fleet of domestic vessels not only to be renewed but also increased.

This poster was created as part of the Hwy H_2O marketing campaign and explains some of the economic and environmental advantages of using marine transport. Ships are quieter, safer, and more efficient than trains or trucks.
ST. LAWRENCE SEAWAY MANAGEMENT CORP.

This is good news for the environment because marine transportation has two big advantages. It is the most cost-efficient mode of transport and, as the study concludes, the least harmful for the environment. "The transportation sector as a whole contributes 27 per cent of total greenhouse gas emissions," the authors wrote. "But less than three per cent of all GHG emissions come from shipping."

They go on to point out that: "Because each vessel can carry a very large amount of cargo, shipping remains more fuel efficient than rail or truck. It consumes less energy and creates fewer emissions."

Despite these advantages, commercial navigation does adversely affect the environment in several ways, according to the study. Ships burn lower-grade fuel than trains or

Maintaining aging infrastructure, like this lift bridge at the St-Lambert Lock, is a major challenge. But the Seaway's comprehensive infrastructure-management program and its ongoing asset-renewal initiative have made the waterway one of the most reliable in the world. RON SAMSON

trucks and they release high concentrations of sulphur oxide, nitrogen oxide, and particulate matter. The regular passage of large vessels close to shore, especially on the St. Lawrence, has an impact on shorelines, wetlands, and islands, as well as the species that live in the water. Dredging, too, can damage or destroy wildlife habitat and alter water levels.

But the study notes that the Canadian and US Seaway corporations have adopted a number of policies and practices to minimize environmental damage: speed limits have been lowered in narrow channels to reduce erosion and improve safety; draft advisories are in effect to alert masters and officers of changes in water levels, which helps avoid groundings or other disturbances; fuel-quality standards have been adopted to reduce emissions; port authorities control anchoring, waste management, and other practices that can affect water quality.

In short, the authors conclude that,"Over the past 20 years, the industries that use the GLSLS and the agencies responsible for the seaway have taken up the role of environmental stewardship."

§ Maintaining the infrastructure—a joint responsibility of the Seaway and the federal government under the 1998 commercialization agreement—is a second major challenge. The infrastructure on the Montreal-Lake Ontario section includes five locks, six lift bridges, two bascule bridges, and one swing bridge. Basic operating costs average about $31 million annually. The tab for the Welland Canal runs between $38 and $41 million, but there is considerably more hardware: 11 locks, three lift bridges, and eight bascule bridges.

Capital expenditures totalled $170 million under an asset-renewal plan that ran from 2003 to 2008. Transport Canada contributed nearly $108 million while the SLSMC covered the balance—just over $62 million. The largest single project involved the conversion of the original mechanical operating equipment on the Welland Canal to hydraulic operation, a project started in 2005 and expected to be complete by 2010. The balance of the funds was spent on such things as dredging, repairs to lock walls and bridges, the replacement of

other mechanical equipment, and upgrades to electrical systems, says Mike Whittington, the Seaway's corporate engineering manager for civil structures.

Meanwhile, Ottawa had agreed to participate in the next five-year asset-renewal plan—2008 to 2013—this one valued at $270 million. The Seaway planned to complete the hydraulic conversion at the Welland Canal at a cost of some $30 million. It also expected to finish the re-facing of the locks begun in the late 1980s after the collapse of the west wall at Lock 7 in October 1985. That work was supposed to be done under the seven-year Welland Canal rehabilitation program, but federal funding proved inadequate and was exhausted before the job was complete.

The largest single project, which was slated to take ten years and cost $58 million, involved replacement of tie-up walls at the Niagara entrance to the canal. They consisted of timber piles with concrete caps, which were forty years old and deteriorating, and were to be replaced by steel piles and new concrete caps.

Beyond 2013, the Seaway faces an even bigger maintenance challenge—re-facing the walls in four of the five locks on the Montreal-Lake Ontario section. That project is expected to take sixteen years and cost as much as $350 million. A phenomenon known as alkali aggregate reaction has caused the concrete in the walls to expand and crack, resulting in misalignment of machinery such as gates and valves, and a gradual narrowing of the lock chambers.

The swelling first became apparent in the mid- to late 1990s, Corfe says. Maintenance crews began having difficulty installing stoplogs in their slots above and below the locks in order to work on the structures in the winter. "We wondered what was happening," he recalls. "We had to shave the logs down to make them fit."

Seaway engineers eventually determined that alkali in the cement mortar was reacting with components of the aggregate. The swelling occurs slowly, at a rate of about one inch every five years. "Theoretically, we have eighty feet between the walls," Corfe says. "In fact, we're down to seventy-nine feet, six inches, or seven inches at certain points."

Beyond 2013, the Seaway faces an even bigger maintenance challenge — re-facing the walls in four of the five locks on the Montreal-Lake Ontario section.

The solution will likely involve drilling from the surface to the base of the lock walls, which are twenty to twenty-five feet thick at the top and sixty to seventy-five feet thick at the bottom, and installing anchors to secure them. Then as much as a three feet of concrete will have to be stripped away with hoe rams, jackhammers, and explosives. Finally, the walls will be re-faced using concrete with appropriate aggregates.

Apart from the joint Seaway-Transport Canada asset-renewal plans, the corporation itself has been investing in updated technology. In 2007, the Seaway began testing a hands-free mooring system on the Welland Canal—a concept that Guy Véronneau pushed while he was president. One of the objectives was to reduce the amount of time it takes for a ship to transit a lock. A second was to make better use of lock personnel by moving them to maintenance jobs and relieving them of the menial work of handling the tie-up lines. The Seaway acquired the hands-free technology from a company called Cavotec MoorMaster,

Grain, iron ore, and other bulk commodities remain the cornerstone of commercial shipping on the seaway. But in recent years, partly due to aggressive marketing by the Seaway corporations and their partners, the waterway has attracted other types of cargo. This photo depicts an upbound, ocean-going vessel that is carrying windmill arms.
RON SAMSON

based in Christchurch, New Zealand, and tested it at Lock 8 of the Welland Canal in the summer of 2007 because it raises and lowers ships only three feet. "We ironed out a lot of the bugs and identified issues that needed to be resolved," Whittington says.

In 2008, the Seaway tested the technology at Lock 7, where the change in elevation is 47½ feet. The hands-free system replaces the traditional tie-up lines with two vacuum mooring pads, which are rectangular-shaped steel boxes. Each measures about four feet by eight feet and is covered, like the head of a drum, by a rubber seal. A pump draws the air out of the box, creating a vacuum and ensuring that the pad adheres to the side of a vessel. The pad is attached to a flotation tank that moves up and down on a set of rails embedded in a slot in the wall of the lock.

If the tests at a full-height lock proved successful, the Seaway hoped to install the hands-free system in the other six locks of the Welland Canal. But that would depend on funding. This initiative, more a strategic project than asset renewal, was aimed at improving efficiency. The total cost of the project was estimated at $50 million and in the spring of 2008 the Seaway was discussing funding options with Transport Canada to cover some or all of the cost. While this was initially seen as a cost-reduction initiative, in later years it has evolved into one that will reduce barriers to entry to the system for a wide range of vessels and provide increased flexibility and ease of use of the system. The corporation sees it as a cornerstone of its strategic initiative to expand the business on the seaway.

§ With reliable, well-maintained infrastructure and a stable market for bulk commodities driving fleet renewal, two pieces of the seaway's future are in place. But two major challenges remain: diversifying and increasing the type of goods moving on the system. The Seaway has been working with both existing and new vessel operators to attract more general cargo and containers—an approach supported by the *Great Lakes St. Lawrence Seaway Study*. The introduction of tug and barge operations, as well as small multipurpose vessels, is seen as a first step toward enhancing the mix of goods moving on the system. And

There is a significant opportunity to begin moving containers from deepwater ports to the consumer markets on the Great Lakes via the seaway.

these new types of ships may well represent a significant component of the future of Great Lakes shipping.

McKeil Marine has been a leader in developing the tug and barge business, but other companies have also invested in this mode of transport. Upper Lakes has acquired systems similar to those in use on the Mississippi River. Cook says the company chartered two tugs and eight barges in 2005 in order to haul grain—some of it destined for ethanol plants—from Prescott, Ontario, to Quebec terminals in Sorel, Trois Rivières, and Sillery. A single unit is 200 feet long by 35 feet wide and can hold about 1,500 tonnes of grain. One tug pushes two of these at a time, side by side, an approach used on the Mississippi, where single tugs often push trains of up to eight barges at once.

Upper Lakes moves grain-filled barges downriver and leaves them at a terminal to be unloaded. The tug then returns upriver with two empty units to take on fresh cargo at Prescott. A two-way trip from Prescott to Sorel takes three days, and by using the American drop-barge system, the tugs are moving most of the time. "The Mississippi system is one of the most efficient modes of marine transport in the world," Cook says. "We decided to copy what they're doing. There was no point reinventing the wheel."

As the Seaway adapts to the times, significant potential exists to add general cargo, according to the study. This scenario is based on anticipated growth: first, in the economy of the Great Lakes region; second, in the flow of containers from Asia to North America. The study predicts that the gross domestic product of the states and provinces bordering the Great Lakes will more than double, increasing

The Canadian and American Seaway corporations and their Highway H_2O partners have worked to attract container traffic to the St. Lawrence and the Great Lakes. They have also lobbied governments to invest in the cranes and other infrastructure necessary to handle containers.

TRANSPORT CANADA

from $6 trillion in 2005 to $14 trillion by 2050. That will mean significant growth in population and congestion for land-based transportation systems.

World container traffic is expected to increase by 6.3 per cent annually to 2020, according to the study. By then, nearly 100 million twenty-foot equivalent units (TEUs) will be arriving in North America each year. But the already-congested West Coast ports of Los Angeles, Seattle, and Vancouver have limited room for expansion because they are located in major urban areas. About one-third of the growth in container traffic will have to be diverted from the West Coast to the East, according to the study. Half of that volume will go through the Panama Canal. The Suez Canal is emerging as an alternative to handle the rest.

Goods would be shipped across the Indian Ocean, the length of the Red Sea to the Suez Canal, across the Mediterranean and the North Atlantic to ports such as Halifax and Norfolk, Virginia.

"These pressures and trends may open up opportunities for the GLSLS system," the study concludes. "As the system is operating at about half its potential capacity, it can be used to relieve at least some of the traffic being added to increasingly congested roads and railways of the region."

'We expect a lot more of that cargo to land on the East Coast of North America. We foresee a trans-shipment of containers from the big ocean-going vessels to smaller, seaway-size ships.' *Richard Corfe*

There is a significant opportunity to begin moving containers from deepwater ports to the consumer markets on the Great Lakes via the seaway. Short-sea shipping—the movement of goods, mostly in containers, on inland or coastal waterways as part of an integrated network that includes trains and trucks—is another way of increasing and diversifying cargo. European governments view short-sea shipping as a way to reduce highway congestion by circumventing urban areas and traffic bottlenecks, and they have been aggressively promoting it since the early 1990s.

Over the past decade, Transport Canada and the US Department of Transportation have examined the potential of using the waterways to ease the congestion on roads and railways. On July 16, 2003, Canada and the US signed the Memorandum of Co-operation on Short Sea Shipping, and Mexico later signed on as well. This accord encouraged the three countries to exchange information about research or technological breakthroughs that would advance the concept.

"We want to become a significant player in the movement of containers," Corfe says. "With China, India, and other Asian countries becoming producers for the world, a lot of West Coast ports are operating at or near capacity. We expect a lot more of that cargo to land on the East Coast of North America. We foresee a trans-shipment of containers from the big ocean-going vessels to smaller, seaway-size ships. They will bring these goods in by water to all the ports along Highway H_2O—Montreal, Toronto, Hamilton, Cleveland, Detroit, Chicago—because the roads and railways are already congested and it's only going to get worse."

Despite the risks involved, two companies were preparing to launch short-sea-shipping services in the spring of 2008 with European-style ro-ro, lo-lo vessels, short for roll on, roll off, load on, load off. Burlington, Ontario-based Great Lakes Feeder Lines planned to start the seaway's first regular container service with a weekly run between Halifax, Montreal, and Toronto. Company president and CEO Aldert van Nieuwkoop, a longtime European shipping executive and former marketing director of the Seaway, said Great Lakes would be using a twenty-year-old German-built vessel named the *Dutch Runner*.

It is 260 feet long, 51 feet wide, and can carry about 3,000 tonnes of cargo. "It's not a very big ship," says van Nieuwkoop, whose company has the financial backing of a freight-forwarding firm in Erie, Pennsylvania. "But we're serving an emerging market and want to fill the ship. We're pioneering. We need more of this type of vessel plying these waters if ports are going to invest in infrastructure."

A typical short-sea shipping vessel with ro-ro, lo-lo capabilities — that's short for roll on, roll off, load on, load off. Trucks can use the ramp at the stern to drive onto the cargo deck, while the two big cranes are used to lift cargo.
UPPER LAKES SHIPPING

Upper Lakes introduced a second vessel to the seaway system, an American vessel named the *John Henry*, which is 300 feet long, 55 wide, and capable of carrying 3,000 tonnes of cargo. It has both stern and bow ramps and two heavy-lift cranes, each powerful enough to raise or lower 450 tonnes of cargo. Cook said Upper Lakes was putting the vessel into service to test the market. Initially, the company planned to use a tug to push it, which would eliminate the expense of hiring a dedicated crew, but that would change as the business grew.

"One problem with a lot of the new generation of ships is that the infrastructure in the ports doesn't exist," Cook pointed out. "We're facing a chicken-and-egg situation. Is someone going to invest in infrastructure first, or vice versa? Will we have to prove the concept?"

The industry has lobbied both the federal and provincial governments to invest and it has had some success, but both physical and regulatory barriers remain. User fees for ice breaking, dredging, pilotage, and seaway tolls all conspire to reduce the competitiveness of the marine highway. As well, outdated government policies, such as the 25-per-cent duty on vessels built abroad, make investments in new services on the system a courageous act. Collaboration between the industry and governments has led to a memorandum of understanding on the development of the Ontario-Quebec Continental Gateway and Trade Corridor.

As the Seaway approached its fiftieth anniversary, the corporation was busy supporting these industry-wide activities, marketing the overall system through the Highway H_2O brand and investing in technology to ensure its ability to maximize the benefits of the system in the future.

THE QUESTION OF TOLLS

The seaway will be debt-free by 2008. Lionel Chevrier, the first president of the St. Lawrence Seaway Authority, made that bold prediction in his 1959 book about the construction of the waterway and the decades-long debate that preceded it. Chevrier reflected the belief, widely held at the time, that the tariff of tolls would generate revenues sufficient to cover annual operating and maintenance costs, as well as debt and interest charges. "The seaway is a self-sustaining public utility," Chevrier wrote, "and it must, by international agreement, pay for itself in fifty years by collecting money from the people who use it."

The American government had insisted, as a condition for participating in the project, that the seaway operate on a user-pay basis. But establishing a tariff of tolls was a complicated business, as Chevrier pointed out. "Both the Canadian authority and the US corporation established toll committees, which worked for years trying to reach fair rates," he wrote.

Committee members faced a great many unknowns. They did not know how much of the seaway traffic would consist of grain, iron ore, and other bulk commodities, how much would be semi-bulk such as pulpwood and salt, or how much would be general cargo. They also had to devise tolls that would not discriminate against commodities, which move in the largest ships, and general merchandise, which was handled by much smaller vessels.

When the system opened in the spring of 1959, users of the Montreal-Lake Ontario section were charged four cents per gross registered ton for their vessels, forty cents per ton of bulk cargo, and ninety cents per ton of general cargo. Those that transited the Welland Canal paid two cents per gross registered ton, two cents per ton of bulk, and five cents per ton of general cargo.

The federal government suspended the tolls on the Welland Canal in 1962 and five years later imposed a small lockage fee, which remained in effect until 1977. Tolls stayed in place on the international, or Montreal-Lake Ontario, section, though they were frozen at their original 1959 levels through the 1960s and into the 1970s. Canadian officials collected them and retained 71 per cent, while the balance—29 per cent—went to the Saint Lawrence Seaway Development Corporation.

Toll revenues rose dramatically between 1959 and 1979, which reflected the growth in cargo moving on the seaway. Most years, the Canadian side earned enough money to cover operating and maintenance expenses. But it soon became apparent that the tolls would never generate the income required to pay down the construction-related debt, held largely by the Canadian government. To make matters worse, the Seaway Authority was unable to cover the annual interest charges in full, and each year's unpaid interest was then added to the debt.

The Seaway's debt in 1959, almost all of it incurred through construction of the Montreal-Lake Ontario section, stood at $283 million. By the end of the 1974 season, the Seaway's fifteenth, it had soared to $786.6 million. This situation was untenable in the long run. It made realistic financial planning impossible. It undermined the morale of the organization and it damaged public perceptions of the seaway. "This bleak financial record gives a false impression of the waterway and obscures its true value to Canada," the Seaway Authority declared in the 1975 annual report.

One year later, the debt had risen to $817 million, and the Seaway Authority predicted it could hit $1 billion by 1981 unless something was done. The organization was falling further behind annually because, since 1973, toll revenues were no longer sufficient to meet operating and maintenance costs. These yearly deficits, along with the unpaid interest, were now being added to the debt.

In 1976, management submitted a debt-restructuring plan to the government, which included an increase in tolls — the first since 1959 — something the shipping industry vehemently opposed. An editorial that appeared in the November 1975 issue of *Canadian Shipping and Marine Engineering* declared that: "For years, *Canadian Shipping* has called for the removal of Seaway tolls, believing them to be punitive and discriminatory. After all, why should the seaway be treated differently from, say, the Trans-Canada Highway? Both are vital economic arteries, yet one imposes tolls and the other doesn't."

"Consider, too," the editorial continued, "that when the seaway was built, the government of the day charged users with the responsibility of repaying the debt, which is akin to asking the airlines to pay for Montreal's lavish Mirabel airport."

Despite such opposition, the government approved a package of measures that took effect April 1, 1977. Ottawa converted $625 million in loans to equity to be held by the federal government. The Seaway was to pay 1 per cent annually to the treasury as a return on that equity. Another $216 million in unpaid interest became an interest-free loan that was eventually forgiven. Tolls were raised on both sections of the waterway to a level that would cover annual operating costs, including depreciation, as well as the yearly 1-per-cent return to the government.

The toll increases were phased in over a three-year period beginning in 1978. At the same time, the seaway was handling record volumes of cargo. By the end of the 1979 season, the Seaway Authority reported its best-ever revenues and a financial surplus of $1.4 million, the first in the history of the seaway. "After all the years of red ink," incoming president Bill O'Neil wrote in that year's annual report, "the financial results of last year are a source of great satisfaction."

Under the financial restructuring, the Seaway was to be a self-supporting Crown corporation. But meeting this objective proved to be a major challenge over most of the next two decades. Cargo volumes declined sharply during the recession of the early 1980s and never returned to the levels attained in the late 1970s. Aging infrastructure meant higher maintenance costs. The Seaway Authority began cutting expenses and repeatedly had to draw on cash reserves built up during the good years to avoid handouts from the government.

Given the circumstances, toll increases were inevitable. They went up in 1982 and again in 1983, but were frozen in 1984. The Seaway Authority and its US counterpart agreed to extend the freeze on the Montreal-Lake Ontario section through to the end of the 1988 season. By then the Welland Canal had become a major source of the Seaway's annual operating deficits. As a result, lockage fees were reintroduced on the Welland in 1982, and tolls on that section rose 15 per cent in 1985 and 8 per cent in both 1987 and 1988.

By the end of the 1980s, the Seaway Authority was still cutting costs but had begun to focus on attracting new business in order to increase revenues. In 1990, incentive tolls were introduced for shippers using the seaway for the first time and »

rebates offered to shipping companies based on volume of goods moved. At the same time, a new tariff of tolls was approved that provided for increases averaging 5.75 per cent annually in 1991, 1992 and 1993.

Meanwhile, the US eliminated tolls on its portion of the seaway in 1985, but they were, in effect, replaced by the Harbor Maintenance Tax, which shipping companies pay every time they enter an American port. The Canadian government continued to collect tolls until 1995 for ships transiting the two US locks. These revenues were remitted to US Seaway corporation, which refunded them.

Since the commercialization of the waterway in 1998, the St. Lawrence Seaway Management Corporation has been permitted under its agreements with Transport Canada to increase tolls by 2 per cent annually. These agreements, each five years in length, also allowed the corporation to raise tolls by less than 2 per cent, provided certain financial goals were attained. Seaway president Richard Corfe notes that, in the first decade after commercialization, tolls rose by 20 per cent, whereas the consumer price index was up by 25 per cent over that period.

In 2008, the Seaway and Transport Canada reached a third five-year agreement, covering the period 2008 to 2013. Tolls are frozen for the first three years and the freeze can be extended to the final two years if the Seaway meets its targets for attracting new business.

"We have been able to provide a more predictable environment for the users over the past ten years," says Corfe. "The revenue has covered operating costs every year. It has allowed us to contribute to the cost of asset renewal. For users, it's been very stable. Better than ever before." ■

The Highway H_2O initiative began modestly in the spring of 2003 with billboards posted on Ontario's 400-series of expressways to promote the environmental advantages of marine transport. It has since become the cornerstone of all promotional efforts. The objective of the campaign is to promote marine as an integral part of the road and rail networks, while boosting traffic on the system from about 40 million tonnes per year to its potential of 60 to 70 million annually.

And the marketing efforts have grown in scope and sophistication. The corporation, together with its US partner, gradually enlisted the support of forty-four other stakeholders. Port authorities from all the major cities on the lakes—Chicago, Cleveland, and Detroit on the US side; Toronto, Montreal, and Hamilton on the Canadian side—became Highway H_2O partners, and so did the major shipping companies.

The messaging has also evolved. Promotional materials now stress that marine is the most fuel-efficient mode of transportation, that it produces fewer greenhouse gases, that there are far fewer accidents, and that it is quieter than road or rail. As well, the waters of the St. Lawrence and the Great Lakes are a natural highway, and using those waters can reduce the need to build new roads and rail lines.

§ This was the state of affairs as the St. Lawrence Seaway completed its first half century of operation and embarked on its second. The seaway was, without doubt, one of the continent's great public works, and it ranked among the world's most important

A map showing Highway H_2O port partners.
ST. LAWRENCE SEAWAY MANAGEMENT CORP.

waterways. Its completion in the spring of 1959 was the realization of a dream, centuries old, of opening the industrial heartland of Canada and the United States to ocean-going navigation.

The seaway transformed shipping on the St. Lawrence and the Great Lakes. It led to the creation of a new generation of larger, more efficient vessels designed specifically to fit as snugly as possible into its fifteen locks. The seaway is the vital artery that makes possible the seamless, cost-effective movement of bulk commodities from the western tip of Lake Superior to the Gulf of St. Lawrence. It has made an indispensable, though often overlooked, contribution to the economy of the Great Lakes basin.

It has the potential to make an even bigger impact in the future. As it celebrates its fiftieth anniversary, the St. Lawrence Seaway is operating at about 60 per cent of capacity. Forty to 45 million tonnes of cargo move on its waters annually. By diversifying the cargo carried on the system, an additional 25 million tonnes of goods could be moving by water rather than rail or road. The seaway, or Highway H_2O, as proponents call it, can reduce gridlock on the expressways and congestion on the railways. It can make a vital contribution to a safer, greener, more sustainable system of transportation. It is a grand opportunity—one still waiting to be fully recognized by policy-makers in the political capitals of two countries, two provinces, and eight states.

The St. Lawrence Seaway: Fifty Years and Counting was designed and typeset by Dennis Choquette in the winter of 2009. It was printed, Smyth-sewn, and bound by Tri-Graphic, Ottawa. The body type is Neutra, 12/15; display type is Cartier. The paper is HannoArt, 100 lb.