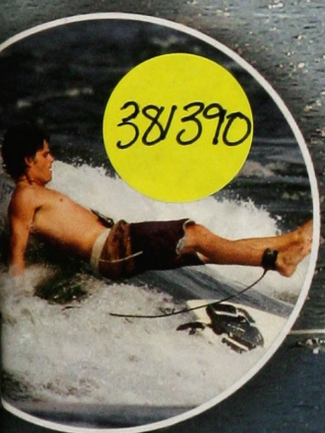
St. Lawrence Plan
For Sustainable Development

ACTION river

Discovering the St. Lawrence



GAMES ≈ ISSUES ≈ WILDLIFE
FLORA ≈ TREASURES ≈ CHALLENGES

Environment Canada Environnement Canada

Canada

A HEALTHY ST. LAWRENCE: THE YOUTH OF TODAY WILL BENEFIT TOMORROW!

As the chairpersons of the *Canada–Quebec Agreement on the St. Lawrence*, we would like, first and foremost, to congratulate you young people for caring about the future of the St. Lawrence. You are likely more aware of the situation than we were at your age. The Youth Statement on Water and the St. Lawrence River is an obvious indication of this. Many of you are already directly involved in projects; this is very encouraging.

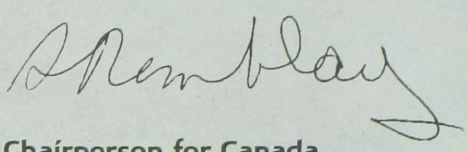
As you may know, the governments of Canada and Quebec have been working together for almost 20 years to improve the state of the St. Lawrence River. Since 1988, our work has yielded positive results. Here are a few examples. Factories, cities and farms are releasing significantly fewer pollutants into the St. Lawrence River, natural habitats have been preserved and animal species have been protected. Commercial navigation is more respectful of the ecosystem, and people are more aware of environmental issues and more engaged. Finally, swimming is now possible in many places.

According to a survey published in 2003, the St. Lawrence is in better shape today than it was during the last half of the twentieth century. This is very good news, but we still have a long way to go. The objective is the sustainable development of this huge river system for the benefit of present users and future generations alike. To this end, our two governments are counting on the involvement of citizens, especially you young people, who are environmentally conscious about protecting the St. Lawrence ecosystem while promoting its economic development.

As you can see, we have been working on this broad socio-environmental plan for a long time and we share your environmental concerns. We have taken note of your questions about the health of the St. Lawrence. Since there is strength in numbers, the more participants we have, the more successful we will be. We therefore strongly encourage you to contribute to this cause, as many of you already did at the Youth Summit on Water and the St. Lawrence River. We need your ideas, suggestions, enthusiasm and action. Interested? Please contact your regional ZIP committee.

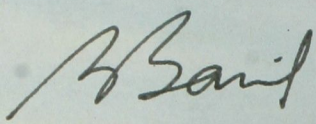
You are part of the new generation and you can make a difference by adopting a responsible attitude towards the environment. Through your action, you are influencing those around you to protect the rich heritage that is the St. Lawrence. By getting involved in safeguarding the river, you are leaving yourselves a priceless legacy.

Albin Tremblay



Chairperson for Canada
Canada–Quebec Agreement on the St. Lawrence
Regional Director General
Environment Canada

Pierre Baril



Chairperson for Quebec
Canada–Quebec Agreement on the St. Lawrence
Assistant Deputy Minister, Policies
Ministère du Développement durable,
de l'Environnement et des Parcs

River ACTION

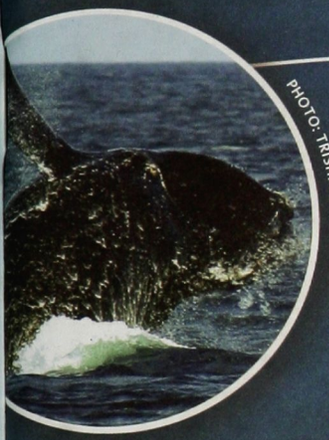


PHOTO: TRISHA CHENEY

PHOTO: JEAU AUDET, PARKS CANADA

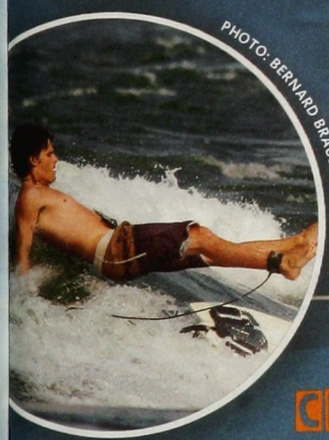


PHOTO: BERNARD BRAULT

CREDITS:

Production of River Action magazine was made possible with funding from the St. Lawrence Plan for Sustainable Development.

The Plan is a collaborative initiative of the governments of Canada and Quebec. It is aimed at the protection, conservation and enhancement of the St. Lawrence ecosystem, from the perspective of sustainable development.

Production:	The Biosphère, Environment Canada
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Coordination:	Thérèse Baribeau, Ann Dacres and Marie-France Vézina
Print:	Komunikintramedia
Acknowledgments:	We thank René Brunet, Danielle Coulombe, Ophélie Delaunay, Françoise Lapointe, Diane Lebrun, Julie Reine, Michelle Sincennes, and all the photographers who contributed to this publication.

OVERVIEW OF THE St. Lawrence

Words in boldface and underlined: see Glossary on page 54

Great Lakes–
ECOSYSTEM

The Great Lakes and the St. Lawrence together form an ecosystem that is unique in the world in terms of its size and ecological diversity.

The watershed of the Great Lakes and the St. Lawrence extends over 1 610 000 square kilometres and is home to thousands of plant and animal species.

PHOTO: NORMAN LÉVESQUE

PHOTO: FRANÇOIS LUSSIER©PARKS CANADA

The Great Lakes–St. Lawrence ECOSYSTEM PLAYS A SPECIAL ROLE IN OUR LIVES. THINK ABOUT IT...

Did you know?

Exceptional Diversity

The Great Lakes and the St. Lawrence are teeming with life. Starfish, pike, cattail and marine algae are equally at home in this ecosystem due to the wide-ranging diversity of conditions over the length of its course.

In fact, a multitude of factors—water temperature and salinity, the presence of tides and the type of sediments, to name just a few—affect the distribution of flora and fauna.

This ecological richness benefits everyone, including sport and commercial fishers, nature lovers and the tourism industry.

It is a source of **drinking water**, food (fish and seafood) and hydroelectricity.

It provides a place for recreational boaters, swimmers and outdoor enthusiasts to do what they love.

It provides an income for those who work in fields such as **marine transport**, fisheries and tourism.

It has inspired many artists: filmmakers, painters, photographers and writers.

How about you? What role do the Great Lakes and the St. Lawrence play in your daily life?

GAME

HOW MANY SPECIES OF PLANTS AND ANIMALS CAN BE FOUND IN THE GREAT LAKES AND THE ST. LAWRENCE?

Approximately 1.75 million plant and animal species have been identified on the planet. Scientists believe that there are millions more yet to discover. Some believe that the Earth shelters 100 million living species!

WHAT ABOUT THE GREAT LAKES AND THE ST. LAWRENCE?

To find out how many species of plants and animals live in the Great Lakes and the St. Lawrence, solve the following equations:

Great Lakes: 660 + 2870 – 30 = _____

St. Lawrence: (2100 X 12) + 1000 + (4300 - 3500) = _____

PHOTO: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, GREAT LAKES NATIONAL PROGRAM OFFICE

Connections between the **GREAT LAKES** and the **ST. LAWRENCE**

The Great Lakes and the St. Lawrence are closely connected. The five lakes follow a step-like configuration; Lake Superior has the highest altitude (183 m above sea level) and Lake Ontario, the lowest (74 m above sea level). Naturally, the water follows the slope and flows from the Great Lakes to the St. Lawrence and into the Atlantic Ocean, carrying along with it living organisms but also many pollutants.

Physical Characteristics

LENGTH OF THE GREAT LAKES AND THE ST. LAWRENCE: 3 260 km

LAKES	LENGTH (km)	WIDTH (km)	MAXIMUM DEPTH (m)	VOLUME (cubic km)
SUPERIOR	563	257	406	12 100
MICHIGAN	494	190	282	4 920
HURON	332	245	229	3 540
ERIE	388	92	64	484
ONTARIO	311	85	244	1 640

The Great Lakes–St. Lawrence ECOSYSTEM AND OTHER RIVERS OF THE WORLD

LENGTH (km)		
1st	Nile	6 670
2nd	Amazon	6 570
17th	Great Lakes–St. Lawrence	3 260
AVERAGE ANNUAL FLOW (m^3/s)		
1st	Amazon	175 000
2nd	Zaire	39 200
15th	St. Lawrence	12 600*

* 12 600 m^3/s—that's enough to fill five and one-half Olympic-sized swimming pools in one second!

river ACTION

HOW THE GREAT LAKES AND THE ST. LAWRENCE WERE FORMED

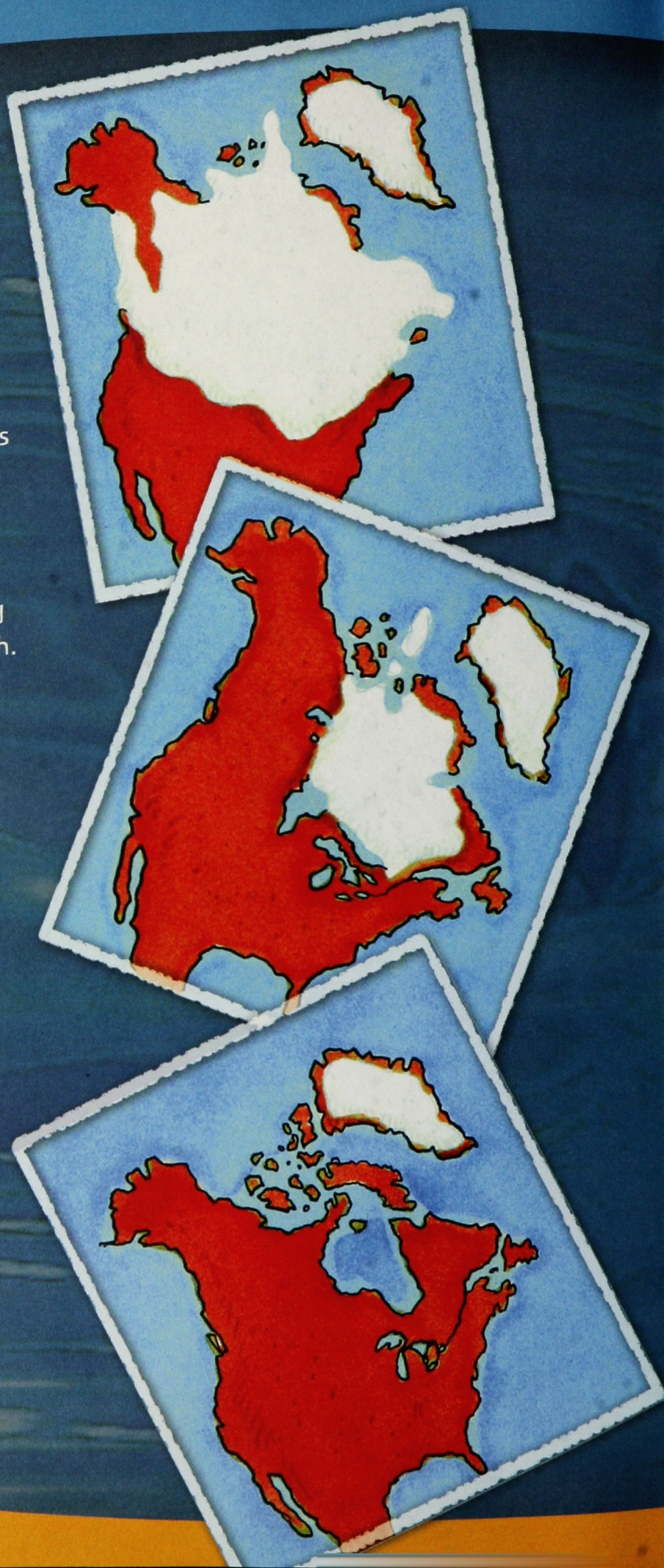
The Great Lakes and the St. Lawrence were formed during the last ice age, 20 000 years ago, at a time when the glaciation was at its peak. Almost all of Canada lay beneath enormous ice sheets of 1 to 3 km thick.

THE FORMATION OF THE GREAT LAKES

Like bulldozers, as the glaciers retreated they carved out giant basins in the earth. Then, as the climate warmed, the ice began to melt and fill these basins. The Great Lakes were born.

THE FORMATION OF THE ST. LAWRENCE

Melting ice sheets 11 000 years ago caused the level of the Atlantic Ocean to rise. Salt water flooded the land, forming the Champlain Sea (between Ottawa and Quebec City) and the Goldthwait Sea (downstream from Quebec City). Over time, the continent gradually rebounded as it escaped the weight of the ice. The result: the salt water no longer extended beyond Quebec City, and the Champlain Sea became a lake, known as Lake Lampsilis. The level of Lake Lampsilis dropped 5000 years ago, and the lake slowly became a river, the St. Lawrence.



ILLUSTRATIONS: JACQUES GOLDSTYN

GAME

COMPLETE THE FOLLOWING SENTENCE:

The Great Lakes contain _____ % of the planet's supply of fresh surface water, only 1% of which is **renewable**.

To find the answer, find all of the pairs of numbers that add up to 60 and mark them with an X. The number that remains is the answer.

22 38 56 20 50 37 18 10 21 4 30 5 32 40 47 28 13 55 30 39 23

Managing WATER LEVELS

Water levels in rivers and lakes can vary a great deal depending on weather conditions.

Riverfront property owners know this only too well! Since 1963, dams have been used to regulate water levels in Lake Ontario and the St. Lawrence, upstream of Lake Saint-Pierre. The largest of these, the Moses Saunders dam, spans the river between Cornwall, Ontario, and Massena, New York.

The organization that manages water levels both upstream and down of Lake Ontario is the International Joint Commission or IJC; it is composed of Canadian, American and First Nations representatives.

THE IJC HAS A DIFFICULT JOB: reconciling the (often divergent) needs of boaters, hydroelectricity producers and riverside residents.

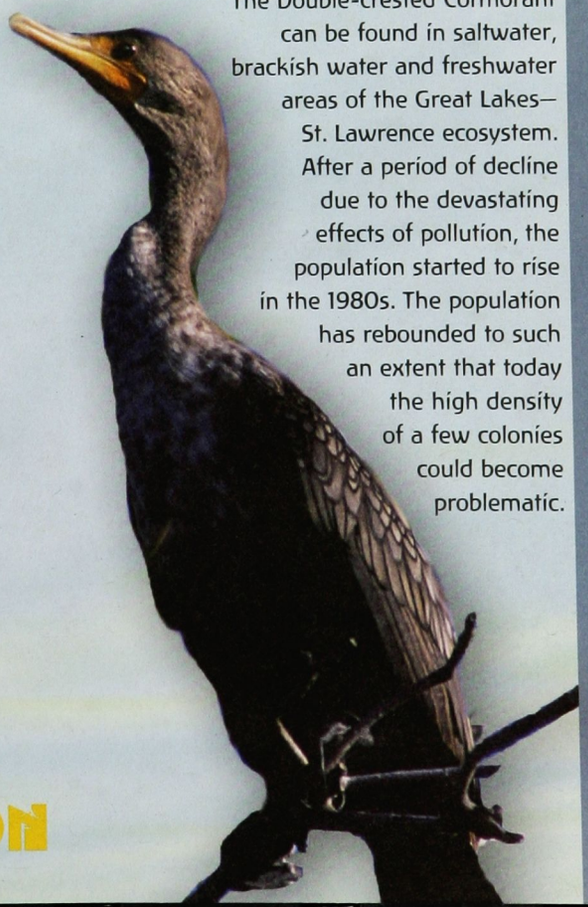


PHOTO: JOHN MOSESSO JR.

DOUBLE-CRESTED CORMORANT

The Double-crested Cormorant can be found in saltwater, brackish water and freshwater areas of the Great Lakes–St. Lawrence ecosystem. After a period of decline due to the devastating effects of pollution, the population started to rise in the 1980s. The population has rebounded to such an extent that today the high density of a few colonies could become problematic.

GAME

HOW DID THE ST. LAWRENCE GET ITS NAME?

On August 10, 1535, Jacques Cartier named a **cove** located near today's Havre-Saint-Pierre "Bay Saint Laurens," because it was the feast day of Saint Lawrence. A few years later, translators thought that the name "St. Lawrence" applied to the entire **gulf**. Then, in 1613, the cartographer Samuel de Champlain extended the name to include the entire river system. Long before Cartier, though, some Amerindians knew the river as *Magtogoek*.

To find out the meaning of this word, use the secret code below:

A	B	C	D	E	F	G	H	I	J	K	L	M
▮	|	❐	✌	✎	▯	✛	✲	✳	❄	❤	🡆	⊶

N	O	P	Q	R	S	T	U	V	W	X	Y	Z
➤	➢	➶	♠	✲	❦	⊶	✲	▲	✔	✖	●	○

⊶ ✳ ✎ ➶ ▮ ⊶ ✳

⊶ ✳ ▮ ⊶ ✔ ▮ 🡆 ❤ ❦

ILLUSTRATION: AMERINDIAN PORTAGING A CANOE, 1849, CORNELIUS KRIEGHOFF (06-193) MCCORD MUSEUM, MONTRÉAL.

TREASURES TO CHERISH

FOOD FOR THOUGHT!

You might say that the St. Lawrence is both young *and* old...

It is young because it was formed during the last ice age.

It is old because it is situated on Logan's Line, an ancient fault line approximately 450 million years old.

DID YOU KNOW

that the Great Lakes are so vast they can be seen from the moon? They cover almost half of the land area of Quebec!

THE MAP TURTLE

This animal's name refers to the pale yellow designs adorning its shell that resemble the lines on a map. These turtles are generally active at night, spending the better part of the day lying on rocks and sleeping in the sun. They are very shy and dive into the water at the first sign of danger. They can be found in the lakes and rivers of the United States and the southern regions of Quebec and Ontario.

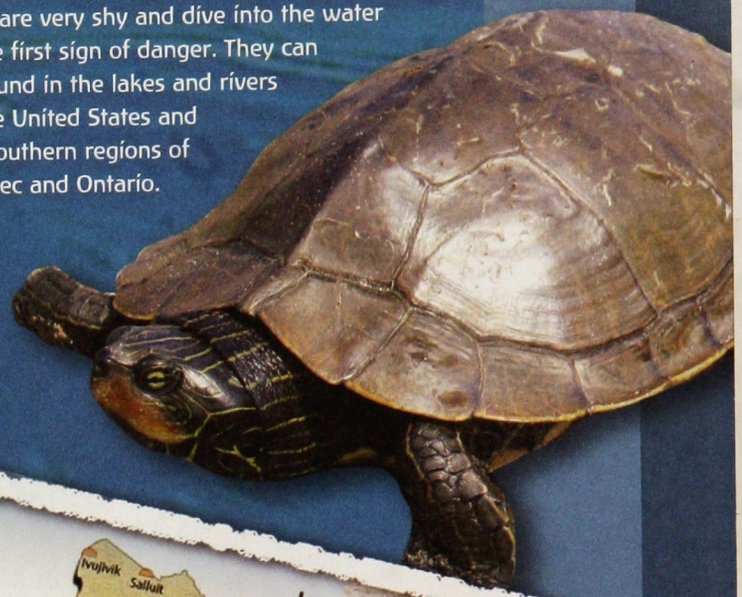


PHOTO: © RYAN M. BOLTON

A LITTLE BIT OF HISTORY...

The Amerindians were the first to benefit from the abundant resources of the Great Lakes and the St. Lawrence: water, game, fish and marine mammals.

These waters were also vital transportation corridors facilitating the trade in furs, corn flour, dried fruit and medicine.

Today, First Nations people continue to have a strong presence all along the St. Lawrence.

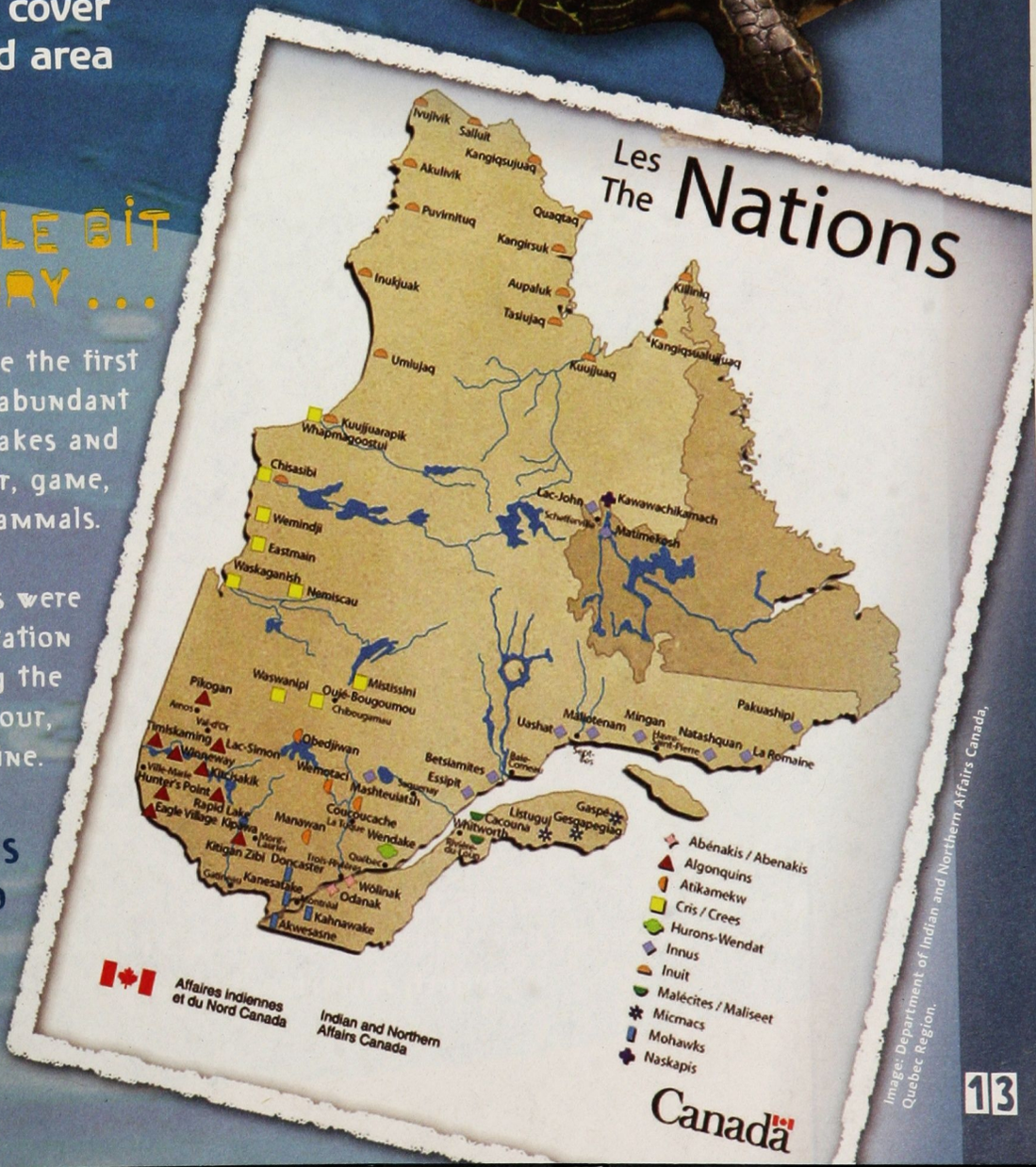


Image: Department of Indian and Northern Affairs Canada, Quebec Region.

HERE ARE SOME EXAMPLES OF GOODS THAT HAVE JOURNEYED DOWN THE ST. LAWRENCE BEFORE ENTERING OUR HOMES:

computers, CDs, video games, sneakers, jeans, hockey sticks, cosmetics...

Montréal is the largest container port in Canada.

More than one million containers are handled here each year!

DISTRIBUTION OF THE PLANET'S WATER RESERVES:

97.5% in oceans and seas (salt water)

2.5% in lakes, rivers, and streams, ice and groundwater (fresh water). Glaciers and ice caps account for more than two-thirds of this fresh water.

Did you know?

OF ALL THE GOODS THAT TRANSIT THROUGH THE ST. LAWRENCE AND GREAT LAKES WATERWAYS, GRAIN AND IRON ORE DOMINATE.

COMMERCIAL SHIPPING

The St. Lawrence connects the Great Lakes to the Atlantic Ocean in a near-perfect straight line. This waterway is 3700 km long and leads to the heart of North America, home to approximately 100 million people.

GAME

CAN YOU IDENTIFY THESE THREE VESSELS BY STUDYING THEIR SILHOUETTES AND READING THE CLUES?

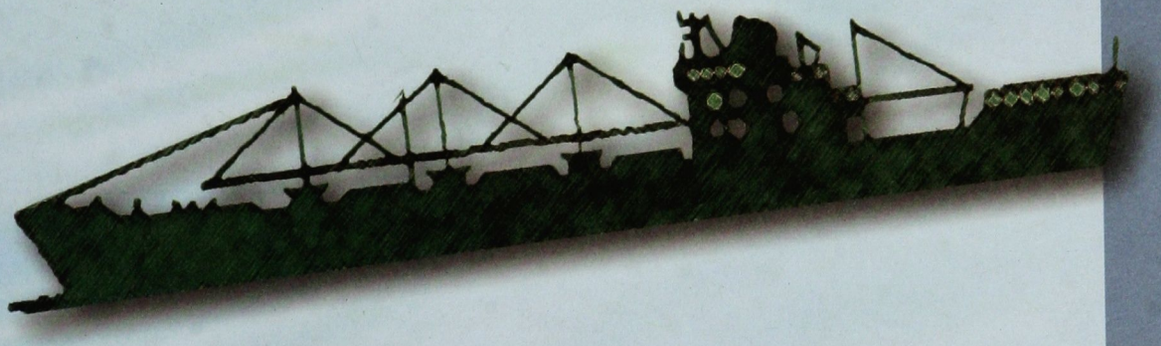
OIL TANKER
Slanted bow
bridge at the centre of the deck

OCEAN-GOING FREIGHTER
Slanted bow
cargo boom on the deck

LAKER
straight bow
flat deck
pilothouse in front

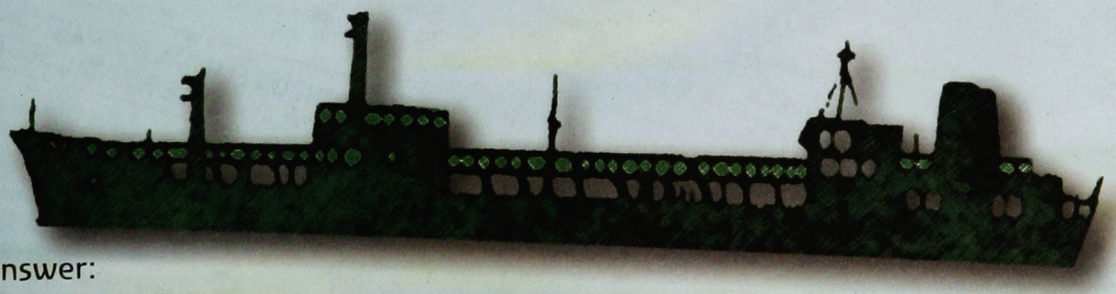
A) Answer:

_____



B) Answer:

_____



C) Answer:

_____

OVERVIEW OF FLUVIAL

PHOTO: ALEX A. MARTIN

Words in boldface and underlined: see Glossary on page 54

THE SECTION

In the fluvial section, calm waters are interspersed with areas of turbulent water. The river widens in places to form large, shallow lakes called fluvial lakes (Lake Saint-François, Lake Saint-Louis and Lake Saint-Pierre); elsewhere, it flows into narrow passages to form rapids.

Physical Characteristics

LENGTH:	400 km	MAXIMUM DEPTH:	12 m
WIDTH:	14 km	PRESENCE OF TIDES:	no
		SALINITY:	fresh water

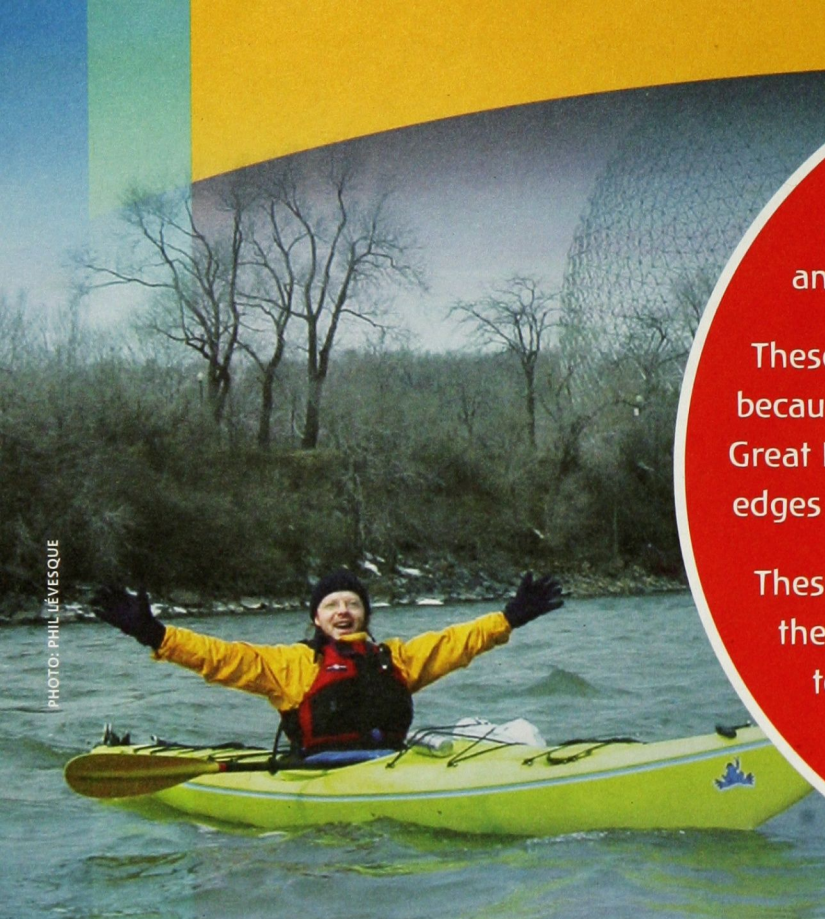


PHOTO: PHIL LÉVESQUE

In the fluvial section, the river is made up of a dozen water masses that come from the Great Lakes and the **tributaries**.

These water masses flow alongside one another because the strong **flow** of the main water mass, the Great Lakes water mass, pushes the others to the edges of the river.

These different water masses are distinguished by their distinct characteristics in terms of colour, temperature, etc. Once they reach the estuary, though, the water masses are mixed together by the **tide**.

Main uses

There are very few beaches on Lake Saint-Pierre because the water contains too much bacteria to allow swimming in many areas.

WHAT ARE THE RISKS OF SWIMMING IN WATER OF POOR QUALITY?

The risks include gastroenteritis as well as skin, eye and ear infections. However, there are areas where the water is clean enough for swimming, specifically at Lake Saint-François, Cap-Saint-Jacques and the Lake of Two Mountains, in Oka.

For more information on the water quality in the Montréal area, visit the Web site of *the Réseau de suivi du milieu aquatique* at: www.rsma.qc.ca (in French only).

PHOTO: FRANÇOISE LAPOINTE, ENVIRONMENT CANADA

Many riverside communities draw their drinking water from the river proper. The freshwater portion of the St. Lawrence supplies **drinking water** to more than three million Quebec residents! Every day, we draw more than two billion litres of water from the river. Before it is fit to drink, bacteria and impurities must first be removed at a filtration plant.

PHOTO: MRNF

Main Uses

The majority of freshwater commercial fishers ply the waters of Lake Saint-Pierre. They catch mainly Brown Bullhead, Yellow Perch, eel and Lake Sturgeon.

Northern Pike, perch, Walleye and bass are favoured by anglers. Would you eat fish from the St. Lawrence River? Before doing so, consult the freshwater sportfish guide, the *Guide de consommation du poisson de pêche sportive en eau douce*. It indicates how often certain fish can be eaten based on the species and size. Species like Walleye that eat other fish are more contaminated than those that eat insects, due to the process of **biomagnification**.

TRY YOUR HAND AT THESE FRESHWATER FISH RIDDLES

GAME

1- I can be a fish or a musical instrument, depending on the length of the vowel. Who am I?

_____

2- The first syllable of my name encloses, divides, supports or protects; the second is something we all need to see.
Who am I?

_____

PHOTOS: ENVIRONMENT CANADA

Guide de consummation du poisson de pêche sportive en eau douce:
www.mddep.gouv.qc.ca/eau/guide/index.htm (available in French only).

In 2001, **UNESCO** named Lake Saint-Pierre a "World Biosphere Reserve" owing to its unique characteristics. This vast **wetland** has significant ecological value since it is home to a wide variety of plants and animals.

On Grande Île, for example, there are more than 1000 Great Blue Heron nests. That's the largest heronry in Quebec—and probably the world!

BIOSPHERE RESERVE

A biosphere reserve is a pilot area that attempts to strike a balance between development and **biodiversity** conservation, where people, businesses and governments are committed to living in harmony with nature. Designated by UNESCO, these areas are of great ecological importance and allow for the development of economic activities that are sustainable, respectful of the environment and promote biodiversity. Twelve of the 500 UNESCO World Biosphere Reserves are located in Canada.

Lake Saint-Pierre provides both feeding and breeding grounds for numerous species of animals; it's a first-rate pantry and nursery! As well as controlling floods, its marshes oxygenate and purify the water. They are the river's lungs and kidneys.

TREASURES TO CHERISH

PHOTO: MICHEL LEBLOND@LEQUEBECENIMAGES, CCDMD

THE GREAT BLUE HERON

Great Blue Herons are the largest wading birds in Canada. Perched high on legs that can measure up to 60 cm long, they scan the marshes in search of food. Patient, they can remain motionless for several minutes waiting for a fish to cross their paths. When a fish finally appears, with a quick thrust of its long neck, the Great Blue Heron plunges its beak into the water to seize its prey. Herons live in pairs and both parents take turns looking after the chicks.

PHOTO: CAROLINE SAVAGE, ENVIRONMENT CANADA

THE PICKERELWEED

The Pickerelweed is a hardy perennial. It is easily recognized by its heart-shaped leaves and purple flowers that grow together in a spike at the end of a long stem. It grows in the water and can be found in large numbers in marshes and wetlands. This plant can serve as a hiding place for fish like pike, which slides its body between the plant's stems and submerged leaves.

GAME

REORGANIZE THESE LETTERS TO FIND THE NAMES OF TWO EXOTIC INVASIVE SPECIES

PHOTO: ENVIRONMENT CANADA

These **shellfish** attach themselves in large numbers to all types of hard surfaces. These intruders "steal" food from native fishes, clog water intake pipes, slow boats, etc.

ARBEZ SUSLEM

PHOTO: CAROLINE SAVAGE ENVIRONMENT CANADA

This grass grows in patches so dense that it crowds out nesting ducks and prevents native plants from growing.

MONMOC EDER

Environmental Pressures

It is in this section of the St. Lawrence that water and **sediment** are most polluted by bacteria and chemicals.

Over the past 200 years, it is estimated that approximately 163 **exotic species**, mostly plants, have invaded the Great Lakes.

Of this number, at least 85 species have reached the St. Lawrence through the **St. Lawrence Seaway**.

Many exotic species have invaded the river, thereby threatening **indigenous species**. Because they come from other countries, these invaders have few enemies and they are able to multiply at a tremendous rate. These exotic species are often introduced accidentally through **marine transport** activities.

TREASURES TO CHERISH

PHOTO: JEAN RODRIGUE, ENVIRONMENT CANADA

THE CANADA GOOSE

During the spring and fall **migration**, geese travel in groups by the hundreds and thousands. In flight, they assume long, ragged V-formations that allow them to conserve their strength. Geese can cover 1000 km in just one day in this way. Canada Geese are loyal, staying with the same mates throughout their lives and returning to the same nesting sites every year.

THE ARROWHEAD

This plant has large arrow-shaped leaves and grows in very shallow water, creating dense strips of vegetation. Its flower is composed of three white petals. Arrowheads are a favourite food of beavers and muskrats, who consume the entire plant. Humans can also eat the roots of the arrowhead as they would potatoes.

PHOTO: CAROLINE SAVAGE, ENVIRONMENT CANADA

GAME

IDENTIFY THIS PLACE

The St. Lawrence River has the largest rapids in eastern North America.

To find out the name of these rapids, cross out the letters that appear more than once in the grid. Then put the remaining letters in the right order.

PHOTO: JET BOATING - SAUTE-MOUTONS

L	K	E	K	B	P
Y	V	O	D	V	O
A	B	N	G	J	I
J	P	Y	V	S	K
C	B	G	S	D	H

Answer: _____

Environmental Pressures

The creation of Notre-Dame and Sainte-Hélène islands for Expo 67 adversely affected the ability of American Shad, Striped Bass and Atlantic Sturgeon to reproduce.

The development of the **St. Lawrence Seaway** and the construction of dams led to the degradation of the **habitats** of many species of fish.

The banks of the St. Lawrence are densely populated and highly industrialized.
The fluvial section is located in the most densely populated area of Quebec; 45% of Quebec's population lives in the Montréal region.

The large agricultural zones on both shores of the river are major sources of pollution.

Large sections of the **shoreline** have been **denaturalized** by the construction of roads, ports and houses.

Vast areas have also been **eroded** by waves caused by the passage of ships. These waves are called "wake waves."

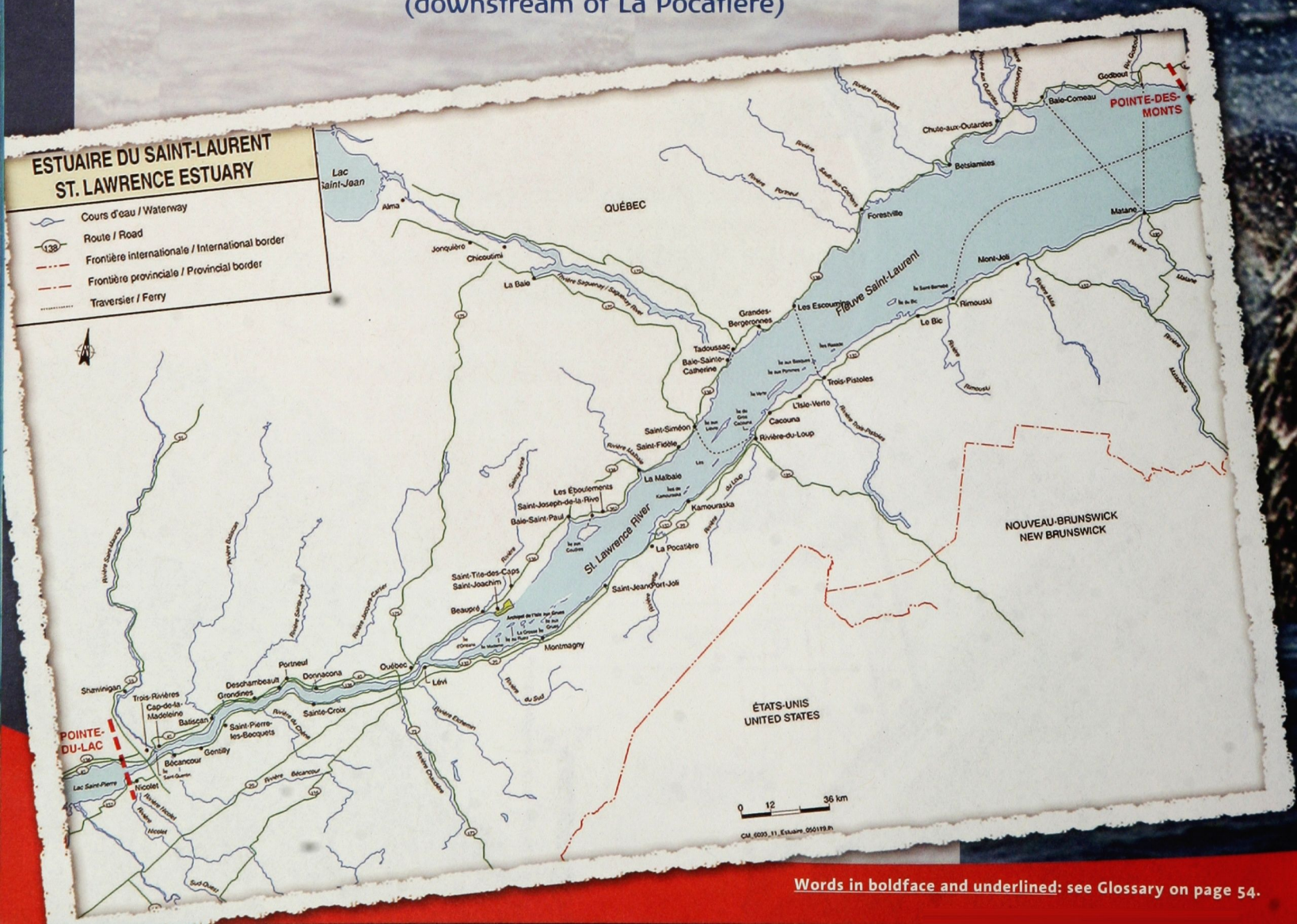
To prevent these waves from eating away at the banks, ship speed is regulated and low protective retaining walls made of stone or concrete are erected; better still, the banks are restored by revegetating them.

PHOTO: BÉRANGER THOMINET, ENVIRONMENT CANADA

Overview of the

Physical Characteristics

LENGTH:	550 km
MAXIMUM WIDTH:	60 km (**downstream** from Baie-Comeau)
PRESENCE OF **TIDES**:	yes
SALINITY:	fresh water (**upstream** of Île d'Orléans), brackish water (between Île d'Orléans and La Pocatière), and salt water (downstream of La Pocatière)



Words in boldface and underlined: see Glossary on page 54.

ESTUARY

PHOTO: TRISHA CHENEY

It's in the estuary that the tide begins to make its presence known. Every day, the water level rises and falls. The tide wave begins in the Atlantic Ocean and travels from the gulf to Lake Saint-Pierre. Between Batiscan and the gulf, the rising tide is strong enough to reverse the river's direction of flow.

Environmental Pressures

Water quality in the **estuary** is generally good and it improves significantly **downstream** of Île d'Orléans. Nonetheless, it can be more polluted near certain localities.

Some human activities have disturbed the natural environment. For example, the construction of the Dufferin-Montmorency Highway over the Beauport **flats** destroyed a prime **habitat** for plants and birds. In the 1980s, construction of **aboiteaux** near Kamouraska dried up some 30-odd km of the vast salt marshes bordering the river. The land was converted to rich farmland.

Upstream of Quebec City, farmland stretches along both sides of the river. The population density is low to moderate. Downstream, the differences between the two shores become apparent. The southern shore is more populous and there are many small towns and villages. The northern shore is more sparsely populated, restricted to a narrow coastal strip of land hemmed in by mountains and forests.

GAME

DECIPHER THE SECRET CODE:

The name "Quebec" comes from the Algonquin word *Kebec*.

To find out what this word means, decipher the code by replacing each letter with the one that precedes it in the alphabet.

X I F S F U I F S J W F S O B S S P X T

Main Uses

There is intensive ship traffic in the estuary. All commercial vessels travelling between Les Escoumins and Montréal must take on a trained local pilot, because this is an especially hazardous stretch of the St. Lawrence.

This precautionary measure ensures vessel safety and protects the environment from potential accidents. In winter, icebreakers keep the ship **channel** open.

Swimming is a popular activity in some areas, particularly Saint-Siméon, Baie-Comeau, Sainte-Luce-sur-Mer and Tadoussac.

PHOTO: SUZANNE GAGNON. SOURCE: AACT.

COMPLETE THE FOLLOWING SENTENCE:

About _____ million Quebecers get their drinking water from the St. Lawrence.

To get the answer, find all the pairs of numbers with a product of 500 and mark them with an X. The leftover number is the answer.

25 10 500 20 50 3 5 100 2 1 250

RIDDLE

Every year, about fifteen Beluga Whales are found dead on the banks of the St. Lawrence. Scientists examine them to determine their cause of death.

The carcasses contain several cancer- and infection-causing chemicals, including the insecticide mirex. The thing is, this product has never been used in the areas surrounding the St. Lawrence.

GAMES

SO HOW DID THE BELUGAS BECOME CONTAMINATED BY MIREX?

To solve this mystery, read the following clues and use your head!

1 – Mirex was used around Lake Ontario until the mid-1970s.

2 – Belugas eat many species of fish (Capelin, Herring, eel, Sand Lance, salmon), marine worms, shellfish and octopus.

3 – Eels are **migratory** fish.

ANSWER:

_____

There is an underwater valley at the bottom of the St. Lawrence that stretches from Tadoussac to the Atlantic Ocean. It's called the Laurentian Channel. Near Tadoussac, the riverbed falls away, dropping from 25 to 340 metres in depth.

This underwater "wall" causes an upwelling of icy-cold, nutrient-rich sea water.

These nutrients act as a fertilizer and, where there is sunlight, they spur the growth of microscopic algae. These plants feed multitudes of fish, seabirds and cetaceans.

Main Uses

Every year, about 300 000 people go on whale-watching cruises.

We are spoiled—the St. Lawrence is one of the best places in the world to see cetaceans!

TREASURES TO CHERISH

THE GREATER SNOW GOOSE

This **migratory** bird travels more than 4000 km every year. The Greater Snow Goose, or white goose, spends the winter in the coastal marshes from New Jersey to South Carolina. By March or April, it's time to leave. The geese gather in groups to travel back to their breeding grounds on Baffin Island and Bylot Island, north of the Arctic Circle. They travel 2000 km and make only one real stop: the shores of the St. Lawrence.

At Cap Tourmente, near Quebec City, more than 80 000 geese gather to rest during their spring and fall migrations.

PHOTO: JOSÉE LEFEBVRE, GON

PHOTO: JOCELYNE PAGÉ. SOURCE : AACT

CROSSWORD

Fill in the squares using the clues below.
All the words relate to the whales of the St. Lawrence.

ACROSS

1 The ..... Whale has long black and white pectoral fins.

3 This village on Quebec's North Shore is the starting point for many whale-watching excursions.

5 The other name for the Killer Whale is .....

8 The cetacean seen most often during whale-watching cruises on the St. Lawrence is the ..... Whale.

9 A small white whale that often travels in pods.

10 Many whales do not have teeth. Their ..... filters the seawater and allows them to feed.

DOWN

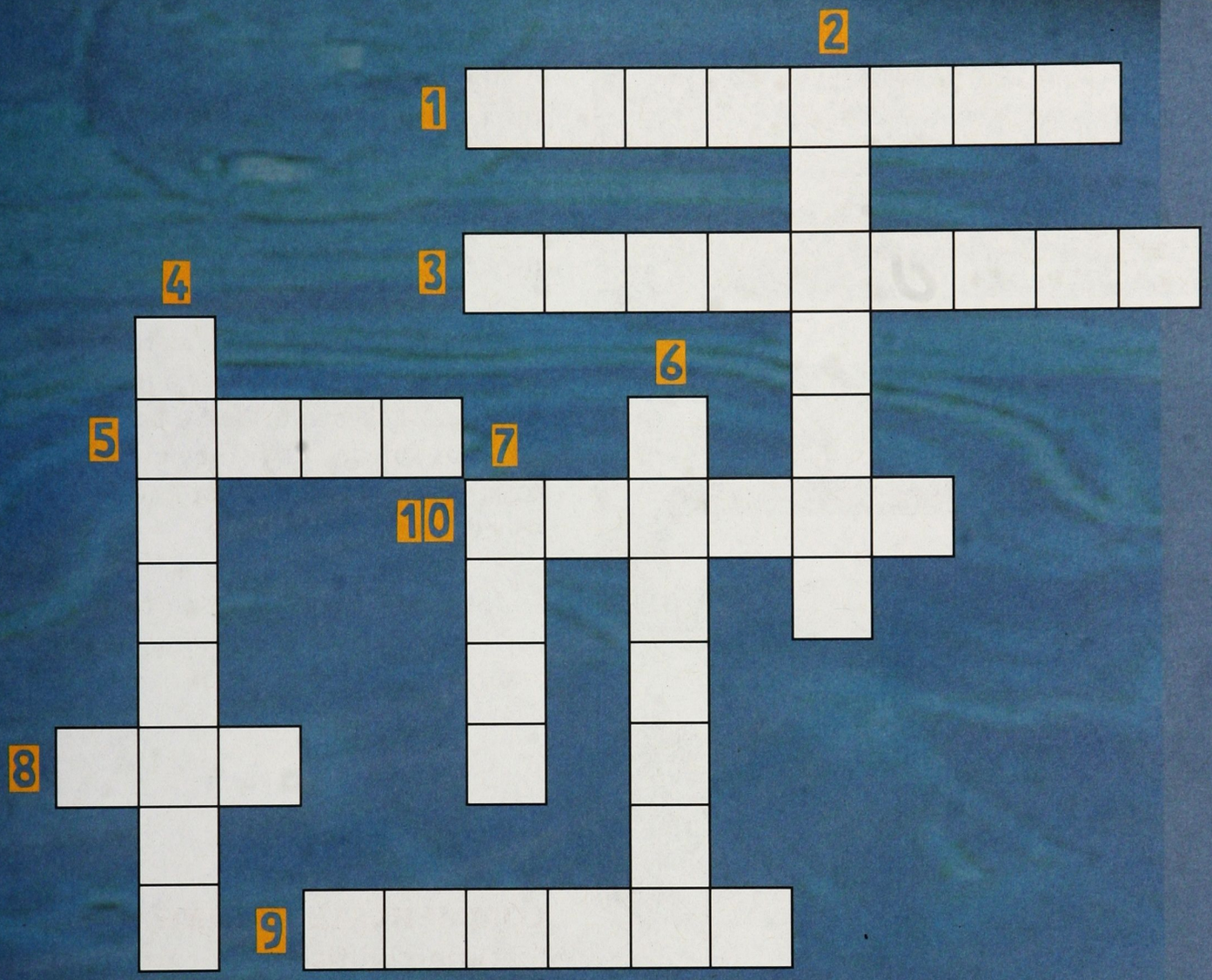
2 Whales have a thick layer of ..... that protects them from the cold.

4 The Harbour ..... is the smallest cetacean that lives in the St. Lawrence. It measures between 1.5 and 2 m in length.

6 When whales expel hot, moist air, we say they are.....

7 The largest animal that has ever lived on Earth is the ..... Whale.

GAME



PHOTOS : JEAN AUDET, PARKS CANADA

GAME

PICTURE RIDDLE

This edible plant grows in salt marshes. Its leaves can be eaten raw, in a salad or as a side vegetable. What is its name? To find out, solve this riddle.

THE FIRST SYLLABLE OF MY NAME IS SOMETHING YOU DRINK FROM.

THE SECOND SYLLABLE OF MY NAME SOUNDS LIKE A SMALL, HARD AND CONTAGIOUS SKIN BUMP.

Answer:

PHOTO: O. PENARD, FONDS APNO

NOMADIC OR SEDENTARY?

At the beginning of the 17th century, the majority of Amerindians in Quebec lived a nomadic lifestyle. Because their survival depended on fishing, hunting and gathering, they had to move with the seasons.

The Iroquois people were more sedentary. They lived in villages along the Great Lakes and the St. Lawrence as far as Quebec City. They grew corn, beans and squash but also fished and hunted.

As they exhausted the resources in a particular area, they would migrate to another area to start again.

Main Uses

COMMERCIAL FISHING

Commercial fisheries target species like eel, smelt, shrimp, Snow Crab as well as groundfish like cod, halibut, and plaice (or flounder).

SPORT FISHING

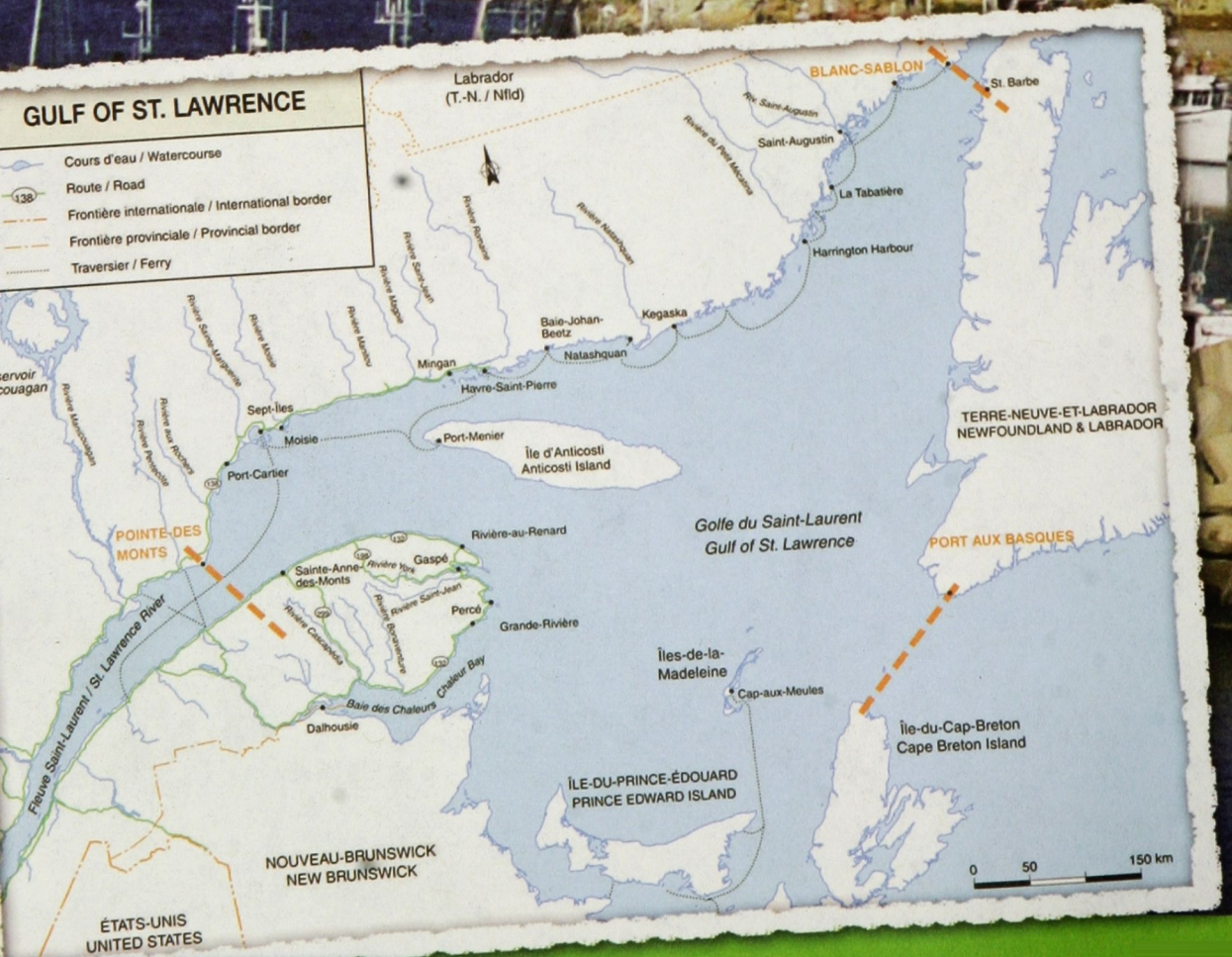
This popular pastime is also practised in winter, when the town of Sainte-Anne-de-la-Pérade welcomes ice fishers seeking "tommycod" (Atlantic Tomcod).

PHOTO: YVON RICHARD, MDDEP

WEIR FISHING

This ingenious fishing technique was invented by First Nations people. It involves building walls of interlaced branches and attaching them to posts. Swimming alongside these walls, the fish have no option but to swim directly into the enclosure at the end. Fishers only have to wait for low tide to recover the fish caught in the trap. In modern weirs, nets replace the interlaced branches.

OVERVIEW OF THE GULF



Beyond Pointe-des-Monts, the St. Lawrence becomes so wide that the opposite shore can't be seen. This is the Gulf of St. Lawrence, an extension of the Atlantic Ocean.

Here, boaters must pay careful attention to the moods of the **gulf** because of strong drift currents. Several factors affect the formation of drift currents, including the wind, the underwater relief, the configuration of the coastline, and the **climate**. Sound knowledge of currents is extremely useful when rescuing a ship in distress or protecting the **shoreline** from a toxic spill.

Physical Characteristics

LENGTH:	650 km (from Pointe-des-Monts to the Cabot Strait)
WIDTH:	800 km (from Shediac to the Strait of Belle Isle)
PRESENCE OF **TIDES**:	yes
SALINITY:	salt water (3.2% at the surface)
TIDES:	strong (4 to 6 m)

PHOTO: MARJOLAINE BENOIT

Words in boldface and underlined: see Glossary on page 54.

Main Uses

Swimming is a popular activity, especially in Gaspésie, on the Magdalen Islands and the North Shore—that is, if you don't mind the cold too much!

The **gulf**'s warmest waters reach 22°C in Chaleur Bay, compared to 28°C in Florida.

The fishing industry is vital to the economy of the North Shore, Gaspésie and the Magdalen Islands. The shellfish caught most often are Snow Crab, Northern Shrimp and lobster. The most commonly caught fish species are cod, Greenland Halibut (turbot), Atlantic Halibut, American Plaice, herring and mackerel.

FOOD FOR THOUGHT!

"Matane shrimp" do not come from Matane. Most are caught along the Quebec North Shore and out at sea off the Gaspé Peninsula.

Where did they get their name?

Quebec's first shrimp processing plan was founded in Matane.

TREASURES TO CHERISH

PHOTO: JEAN-FRANÇOIS RAIL, ENVIRONMENT CANADA

THE ATLANTIC PUFFIN

The puffin has been the symbol of the Province of Newfoundland and Labrador since 1992. Its large coloured beak has earned it the nickname "sea parrot."

Puffins are impressive divers and swimmers who use their wings to propel themselves through the water in pursuit of small fish to eat. They nest in dense colonies on cliffs and places inaccessible to land predators.

The salinity of the gulf's water (3.2% surface water) is comparable to that of the Atlantic Ocean (3.5%)!

EXAMINE THE MAP AND DRAW AN ARROW TO THE LOCATION OF THE FOLLOWING SITES:

GAME

Mingan archipelago
Chaleur Bay
Anticosti Island
Percé Rock
Magdalen Islands

IDENTIFY THESE PHOTOS OF MARINE INVERTEBRATES:

S_ _rfish

G r_ _n s_ _ u_c h_ _

S_ _ a_ _ m_ _ e

American l_ _ s_ _ r

FIND THE ODD ONE OUT!

Some algae like Irish moss contain gelatinous substances (agar, alginate, carageenan, etc.). Once they are extracted, these substances are added to various products as a thickener.

Circle the product that never contains algal extracts:

ICE CREAM	COSMETICS
SALAD DRESSING	PRINTING INK
JAM	PAINT
BREAD	FILM

At home, look at the list of ingredients on various food or cleaning products. Maybe you'll find more.

Main Uses

Stocks of groundfish like cod, redfish, plaice and halibut have declined drastically since the late 1980s. Though primarily due to **overfishing**, this decrease has been aggravated by natural factors such as **predation** by seals and the temperature drop in the Atlantic Ocean.

Environmental Pressures

The **gulf** coast is sparsely populated, especially on the northern shore.

The Gaspé Peninsula is a mainly rural environment.

Because the gulf receives very little agricultural, municipal or **industrial discharges** the water quality is generally good.

TREASURES TO CHERISH

WILD RYE

Wild rye can be found on both shores of the St. Lawrence from Montmagny to the Atlantic Ocean. Of the genus *Elymus*, wild rye helps to stabilize sand dunes along the shoreline. It tolerates dry soils well and thrives on sea spray. Its blue-green leaves are characteristically tipped by a large, pale yellow spike.

PHOTO: GUY LÉTOURNEAU, ENVIRONMENT CANADA

THE NORTHERN GANNET

The largest concentration of Northern Gannets can be found in Quebec; more precisely, in the St. Lawrence estuary and gulf. The largest gannet colony is located on Bonaventure Island, where there are more than 35 000 nesting pairs. Northern Gannets eat fish. They spot them while flying, then plummet and dive into the water. In this way, they can hit the water at speeds of more than 160 km/h and descend to a depth of 10 metres to seize their prey. They resurface after a few seconds with a fish in their beaks before taking flight again.

PHOTO: NATHALIE BURELLE @ LE QUÉBEC EN IMAGES, CCDMD

HEALTH

PHOTO: ROPED, ENVIRONMENT CANADA

The Biodiversity of the St. Lawrence

Assessing the **biodiversity** of an **ecosystem** is a painstaking task that requires a phenomenal amount of information—information that is often missing or incomplete. However, the biodiversity of the fish in the St. Lawrence has been studied in some detail. In the case of freshwater fish, a wide variety of species are thought to exist, particularly in Lake Saint-Louis and Lake Saint-Pierre. However, fish biodiversity is lower in Lake Saint-François because of the dams that block **migration** routes and stabilize water levels.

Birds

Research has shown that many bird populations once thought to be at risk have now recovered or are in the process of doing so. For example, in the 1960s, there were concerns about the survival of the Northern Gannet due to contamination from DDT, a toxic insecticide. Since then, however, the species has come "soaring" back. The proof: Bonaventure Island is home to over 35 000 breeding pairs, and their breeding success rate tops 67%. Likewise, the Great Blue Heron population is expanding: it numbers approximately 25 000 birds and the population appears to be stable. A breeding success rate of 58% indicates that the heron is healthy, despite the presence of contaminants in its eggs and in the blood of its young.

Words in boldface and underlined: see glossary on page 54

REPORT on the St. Lawrence

The St. Lawrence River has suffered tremendously over the past few centuries as a result of human activities like urban and industrial development and agriculture.

Fortunately, beginning in the 1970s, restoration and protection initiatives, most notably the St. Lawrence Action Plan, were undertaken to save this majestic river.

The results are encouraging, but a great deal of work remains to be done. Want to know more?

To assess the health of the river, biologists study a series of **indicators**, such as the abundance of animal and plant species, their **habitats**, their level of contamination, water and **sediment** quality, as well as the uses made of the river, such as swimming, shellfish harvesting, and fish consumption. In some cases, the indicators act as warning signs: they help to identify what action should be taken to remedy a problem.

Although 80% of the St. Lawrence **wetlands** have been destroyed, vast expanses remain that are home to an abundant and varied wildlife. Today, we know how important it is to protect these habitats and to rehabilitate those that have been damaged.

Wetlands

These areas are also vulnerable to invasion by exotic plants such as Flowering Rush, Purple Loosestrife and Eurasian Watermilfoil. Of the 285 plant species found in the St. Lawrence wetlands, 37 are considered exotic. In some places, they cover 44% of the wetlands!

Trespassers in the Ecosystem

There are also concerns that certain **invasive species** of exotic fish such as Round Goby and Tench may harm the freshwater fish population as well as the sport and commercial fisheries. Because they reproduce quickly, these fish compete with **indigenous** fish populations for food and habitat.

THE FOOD CHAIN

To complete the following sentence, solve the equations using the secret code.

During one meal, a Humpback Whale eats approximately ✶ X ✤ herring, each of which ate ✹ X ✤ plankter, each of which swallowed ✱ + ✧ X ✦ microscopic algae.

CODE: ✱ = 100 000 ✶ = 5
✤ = 1 000 ✹ = 6
✧ = 10 000 ✦ = 3

ENCODED MESSAGES

Under each letter, write the letter that precedes it in the alphabet:

JO RVFCFD XBUFS UIBU DPOUBJOT

NPSF UIBO 200 GFDBM DPMJGPSNT

QFS 100 NJMMJMJUSFT JT

DPOTJEFSFE VOTVJUBCMF

GPS TXJNNJOH.

GAMES

PHOTO: ROPED, COMITÉ ZIP DES SEIGNEURIES

Shellfish Harvesting

Many good **shellfish** (clams and mussels) harvesting areas are closed due to bacterial contamination. This pollution comes mainly from municipalities and isolated residences that discharge their **wastewater** into the St. Lawrence. This problem is more pronounced in the Gaspé and the Lower St. Lawrence than on the Magdalen Islands or North Shore.

One measure taken to reopen closed shellfish banks is to encourage residents whose septic systems are not up to code to make the necessary changes.

Reclaiming Use

PHOTO: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, GREAT LAKES NATIONAL PROGRAM OFFICE.

THE CONCEPT OF BIODIVERSITY

What is biodiversity?

This term refers to the diversity of the living world. **Biodiversity** includes genetic diversity within the same species, diversity between species, and the diversity within an **ecosystem**.

Why should humanity preserve biodiversity?

The greater the variety of living organisms, the better our chances of having clean air and water, developing new crops, and finding organisms that can fight pests or yield ingredients for new medicines. Unfortunately, there exist many threats to biodiversity, especially pollution, **habitat** degradation, the introduction of **exotic species**, climate change and overconsumption of resources.

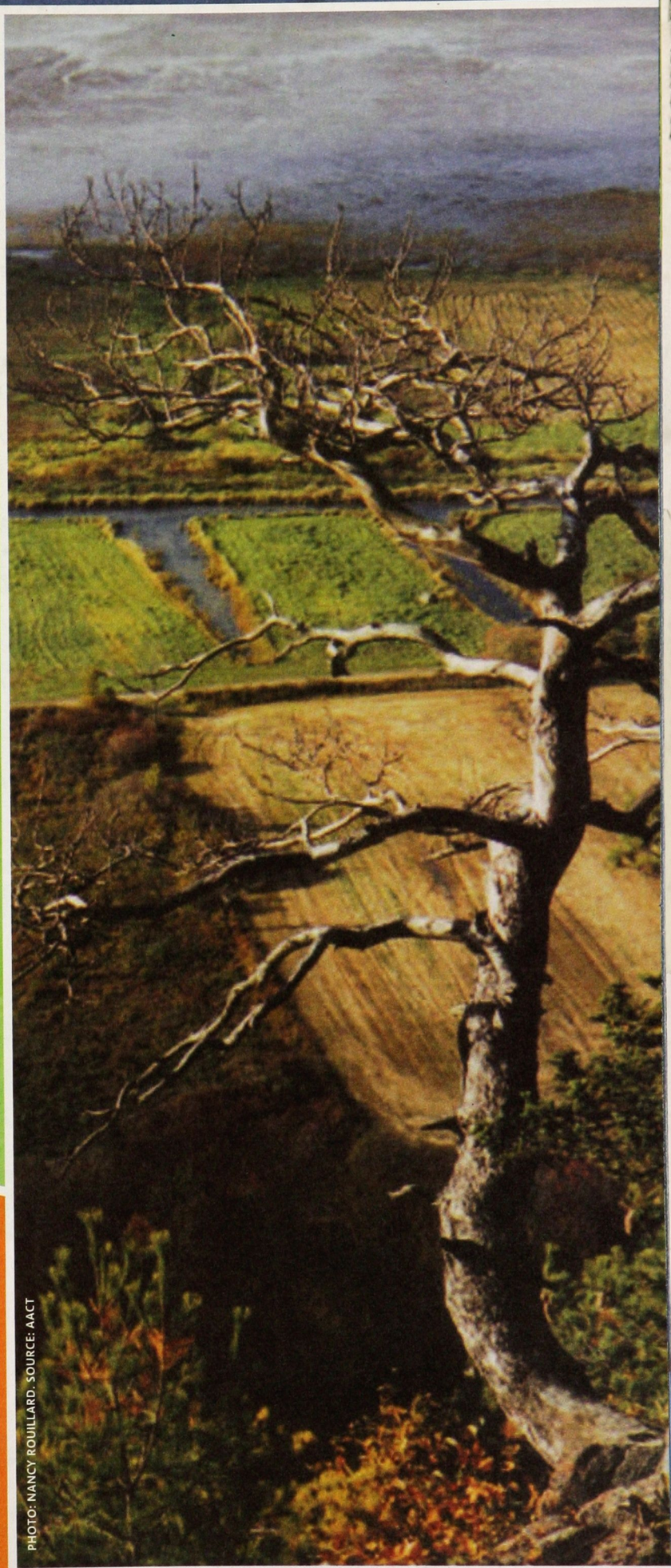


PHOTO: NANCY ROUILLARD. SOURCE: AACT

Swimming

Swimming is permitted at various sites in the **estuary** and gulf. In the fluvial section of the river, however, swimming is compromised by the poor bacteriological quality of the water. When the quantity of **fecal coliforms** in the water is too high, beaches must be closed. Such pollution can be explained by the lack of a final disinfection step in the municipal effluent treatment process, especially at the Montréal and Longueuil wastewater treatment plants. Furthermore, when it rains heavily, raw sewage flows into the river untreated. However, there is hope: there are approximately 20 sites between Montréal and Île d'Orléans where the water quality is good enough for swimming 70% of the time.

For more information on the water quality of participating beaches throughout Quebec, please visit the Web site of the *Environnement-Plage* **Program at the MDDEP: www.mddep.gouv.qc.ca/programmes/env-plage/index-en.htm**

CLIMATE CHANGE, FROM PAST TO PRESENT

The Great Lakes and the St. Lawrence are remnants of the last ice age. Even today, the climate continues to have a strong influence on this ecosystem. In recent years, global warming has caused water levels in the Great Lakes and the St. Lawrence upstream of Quebec City to drop, among other effects. This phenomenon will likely harm wetlands and adversely affect navigation and the drinking water supply. In the estuary and gulf, however, rising water levels are eating away at riverbanks and threatening shoreline roads, forests and communities.

Loss of Habitats

The drying of wetlands along the St. Lawrence deprives many animals of their feeding and breeding grounds. Furthermore, as the air warms up, so does the water. Warmer water fosters the proliferation of **exotic species** which, in turn, compete with native **flora** and **fauna**. Already weakened by the rapid changes in their **habitats**, native species can have trouble holding their own.

Navigation

For every 30-cm drop in water level, container ships must reduce their loads by approximately 5%. To compensate, they must make more trips, which increases the impact of navigation on the river and on shoreline **erosion**. Plus, in shallower water, eddies created by ships stir up contaminated **sediment** long buried in mud, thus degrading water quality.

Water Quality

Smaller water volumes mean that pollutants are more concentrated and may therefore have a greater impact. This can lead to beach closures, particularly during heat waves when the high temperatures facilitate bacterial contamination.

The Agent X Project

Every day, we can take steps to reduce the greenhouse gas emissions that cause the planet's global temperature to rise. The *Agent X Project* encourages young people to find practical ways of limiting the production of greenhouse gases. By changing their own habits, as well as the habits of those around them, they can help fight climate change. The *Agent X Project* is designed for elementary school students across Canada.

For more information, go to www.biosphere.ec.gc.ca and click on "Activities for Groups."

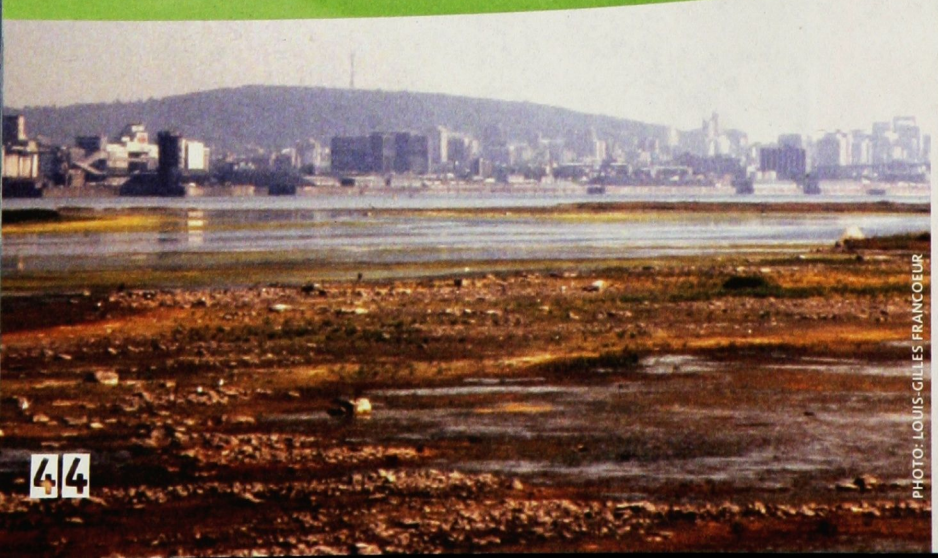


PHOTO: LOUIS-GILLES FRANCOEUR

Dried-up river bed near Montréal (1999)

Did you know?

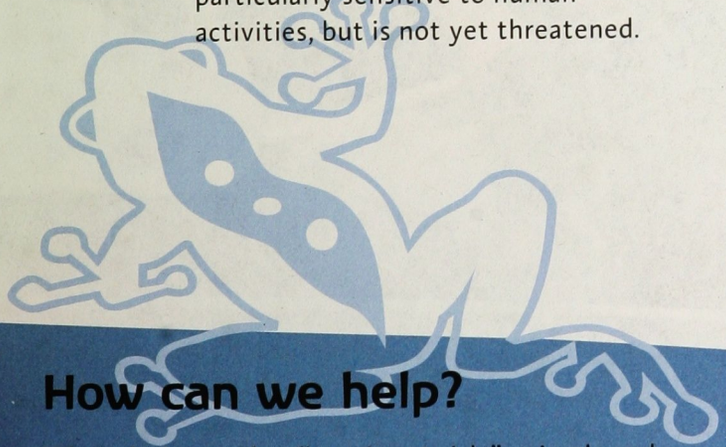
Because of climate change, sea water is infiltrating ever farther into the St. Lawrence. If this trend continues, within the next 50 years, Quebec City will no longer be able to use the river as its source of drinking water because it will have become too salty.

What is a Species at Risk?

A species at risk is one in danger of disappearing or that has already disappeared. The *Committee on the Status of Endangered Wildlife in Canada* (COSEWIC) brings together experts on wild fauna and flora. Together, they assess threats to a species and its habitat that could lead to its extinction. If these threats prove to be real, the committee adds the species to the list of species at risk.

Don't worry—they won't all disappear tomorrow! Species at risk are divided into five categories, based on the risk of extinction:

- *EXTINCT*: the species no longer exists on Earth.
- *EXTIRPATED*: the species no longer exists in the wild in Canada, but is found in other countries.
- *ENDANGERED*: the species is facing imminent extirpation or extinction.
- *THREATENED*: the species is likely to become endangered if limiting factors are not reversed.
- *SPECIAL CONCERN*: the species is particularly sensitive to human activities, but is not yet threatened.



GAME

WHO AM I?

Each of the species pictured here is designated endangered or vulnerable in Quebec.

- Bald Eagle
- Beluga
- American Water-willow
- Lake Sturgeon
- Piping Plover

PHOTO: DR. GORDON COURT

B)

PHOTO: © COREL CORPORATION

A)

PHOTO: © COREL CORPORATION

D)

PHOTO: U.S. FISH & WILDLIFE SERVICE

C)

PHOTO: © COREL CORPORATION

E)

How can we help?

When designated as "species at risk," animals and plants are protected by a federal law: the *Species at Risk Act* (SARA). They can no longer be hunted or used for commercial purposes. Steps are taken to preserve their habitat and reintroduction programs are initiated. Thanks to these efforts, 14 species identified as being at risk by COSEWIC have made such a successful comeback over the years that they no longer have that status today.

For example, the American White Pelican was categorized as threatened by COSEWIC in 1978, but was removed from the list of species at risk in 1987.

Researchers have written reports and developed action plans to protect species that are threatened or vulnerable in Quebec, including American Shad, Bald Eagle, Atlantic Sturgeon and St. Lawrence Beluga.

Action Plans

They are now protected under provincial law.

CONCRETE ACTION

Governments, lobby groups like Greenpeace or the STOP organization, and various community organizations are working to improve the condition of the St. Lawrence. And it's working!

Here are some examples:

In 1978, the Government of Quebec launched a wastewater treatment program—the *Programe d'Assainissement des Eaux du Québec* or PAEQ—to reduce the pollution generated by municipalities. After 20 years of effort and with a budget of roughly $7 billion, the program has yielded excellent results. In 1980, more than 300 Quebec municipalities discharged their **wastewater** directly into the St. Lawrence. Today, over 95% of domestic sewage is first processed at a municipal wastewater treatment plant.

Since 1988, the St. Lawrence Action Plan, a joint Canada–Quebec agreement, has helped reduce the wastewater discharged by 100-odd industrial facilities. In 2003, a long-term monitoring program for the St. Lawrence was developed.

Another achievement was the creation of the 14 community-based committees under the Priority Intervention Zone program. Made up of concerned riverside residents, the ZIP committees (the acronym for *Zones d'Intervention Prioritaire*) initiated 235 projects to clean up and stabilize the **banks** of the St. Lawrence and create wildlife **habitats**, among other projects.

PHOTO: ROPED, FFEN, ENVIRONMENT CANADA

The Freshwater Fish Ecowatch Network (FFEN)

Under the Freshwater Fish Ecowatch Network, young people are contributing to the body of knowledge on the fish species of the St. Lawrence. These students catch fish in the river and its tributaries and collect data on their observed state of health.

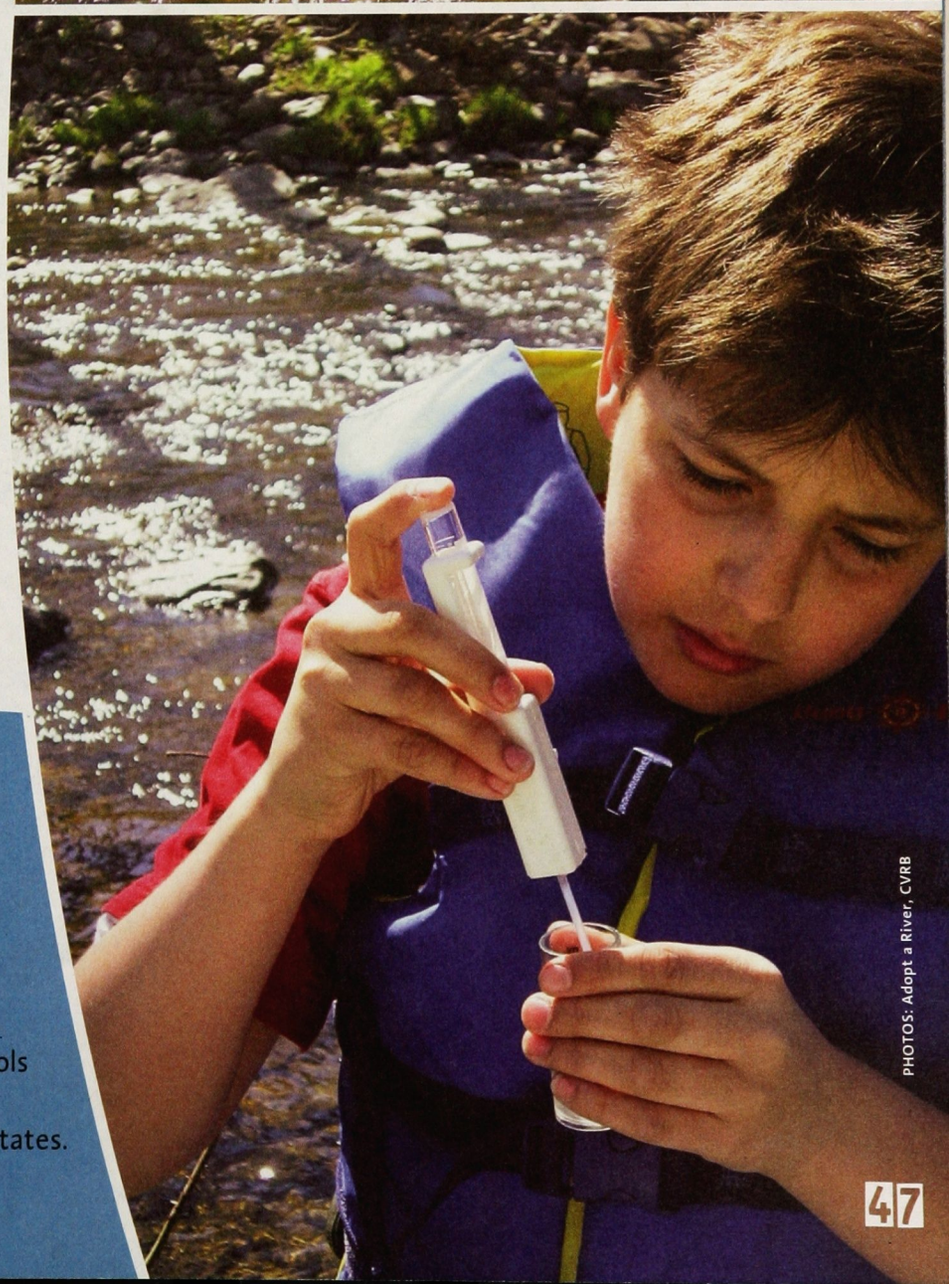
The information they gather is compiled in reports and the results are made available to scientists.

For more information, go to www.biosphere.ec.gc.ca and click on "Activities for Groups."

Water and Sediment Quality

With tighter regulations on **industrial discharges** to the river, the concentrations of most toxic substances in the water, **sediment** and organisms of the St. Lawrence are much lower than they were 30 or 40 years ago. However, some areas are still highly contaminated, including Lake Saint-Louis and the Saguenay Fjord, where mercury concentrations are quite high. It has been noted that the water quality in the **estuary** and **gulf** is better than it is in the river proper. Generally speaking, the concentration of toxic substances is not high enough to compromise the consumption of marine organisms or freshwater fishes, so long as the guidelines contained in the *Guide de consommation du poisson de pêche sportive en eau douce* are followed.

Animals at the top of the food chain, such as seals and whales, are more contaminated because they accumulate substances that can adversely affect their health.



PHOTOS: Adopt a River, CVRB

Adopt a River Project

The Adopt a River Project involves observing the benthic macroinvertabrates (insect larvae, worms, crustaceans) in a river and analysing certain water-quality parameters, such as the amount of coliforms or dissolved oxygen content in the water.

The project is intended for students attending schools located near water bodies in the Great Lakes–St. Lawrence **watershed**, in Canada and the United States.

For more information go to: www.cvrb.qc.ca/projets.php

PHOTO: LUC HÉBERT, ENVIRONMENT CANADA

Youth Summit on Water and the St. Lawrence River

In March 2006, young Quebecers gathered at Environment Canada's Biosphère in Montréal to participate in the first Youth Summit on Water and the St. Lawrence River. Together, they discussed issues related to water, especially the St. Lawrence River and its tributaries. Participants elected a youth committee with the primary mandate of promoting the ideas arising from the summit by issuing a "Youth Statement on Water and the St. Lawrence River" and by supporting initiatives taken by schools on this issue.

The summit, organized in collaboration with *Établissements Verts Brundtland* and CLUB 2/3, was such a success that it is hoped it will be repeated every year.

PHOTO: CLAUDEL HUOT

BY YOUTH, FOR YOUTH

The purpose of this statement is to inform and create awareness among youth and adults about issues related to water, the St. Lawrence River and its tributaries.

This petition was presented to the appropriate people with the aim of influencing the vision of society's leaders.

Water is life

We are youth committed to saving the St. Lawrence River, other rivers and lakes. We want to do this because:

- water is necessary for survival. Humans, plants and animals cannot live without clean water;
- the river and its tributaries are important parts of our history and culture, and contribute to leisure and employment;
- we enjoy the St. Lawrence River and Canada's rivers and lakes, and we are captivated by their beauty;
- Quebec and Canada are rich in water; we must protect this treasure.

The St. Lawrence is in trouble...

PHOTO: BERNARD BRAULT

Youth Statement on Water and the St. Lawrence River

The river is not dead—it is very much alive, but it is suffering. We feel disappointed and angry when we see how it is treated and when we learn that:

- our daily actions such as wasting water and spreading pesticides on our lawns threaten the water we drink;
- water is also polluted with toxic industrial waste, municipal sewage and by agriculture;
- some animal and plant species are unhealthy and certain introduced species (invasive species) are destroying ecosystems;
- overfishing, excessive hunting and clear cutting are examples of human actions that have destroyed the fauna and flora of the river and its tributaries;
- natural shorelines are threatened by erosion, dams, seaways and other types of structures;
- global warming may also harm the St. Lawrence River by affecting water levels;
- pollution and waste are especially shameful here when we consider that a number of countries experience shortages and droughts.

... and it needs our help

Human actions and decisions have damaged the river, but our actions and decisions can also heal it. We recognize that significant efforts have been made, but they must be sustained and strengthened. We have the will to create change and plan on taking action, individually and together. In this sense, we are now committed to:

- making our friends, relatives and the members of our communities aware of issues related to water and the river, and motivating them to participate actively in addressing the issues;
- acquiring more knowledge regarding the problems that threaten the health of the river, its tributaries and water, in general;
- changing our behaviour and ending waste, reducing pollution, using our resources responsibly, and eliminating the purchase of bottled water;
- participating in the activities of groups that work on the water and the St. Lawrence River and making them known;
- devising plans in our schools and communities to improve the health of the water and the river;
- urging leaders to become interested in water issues, the St. Lawrence River and its tributaries.

Adults and leaders must also take action

In addition to our actions, we are going to put pressure on adults and leaders. We expect that they will:

- genuinely apply and develop current environmental policies and regulations, and that this matter will become a budget priority;
- apply the *Kyoto Protocol*;
- protect natural environments such as wetlands and forests, and restore degraded habitats;
- develop a maritime and land transportation policy that limits pollution and promotes environmentally friendly modes of transportation;
- more tightly control industrial polluters and make them aware of the impact of their actions;
- decrease or eliminate the use of agricultural and residential pesticides;
- promote the use of low-polluting technologies and related research;
- encourage protection and development of parks and protected zones;
- encourage citizens to regain access to the river and its tributaries;
- consult and involve communities, ecological groups and youth in water and river projects;
- participating in the activities of groups that work on the projects in schools and communities and participate in their activities to increase awareness;
- develop an international vision of respect for water and gain inspiration from examples set by other countries.

"We are small drops of water. But when we come, together we create a strong current." *(translation)*
Mélanie Poirier, Grade 10 student

Through these actions, we hope that the St. Lawrence River and other rivers will become healthy and clean. We look to the future with hope. Through our commitment and engagement, together we can make a difference.

See additional references on page 52.

Get involved!

PHOTO: ENVIRONNEMENT JEUNESSE

ENvironnement JEUnesse is a network for youth involved in the environment in Quebec.

By working together, it is possible to make a real impact on the environment and on society. That is why ENvironnement JEUnesse brings together and motivates young people, youth groups and stakeholders in a dynamic, stimulating and well-connected network. ENvironnement JEUnesse helps young people grow and become leaders in society by accompanying them as they gain real experience in taking concrete action.

ENvironnement JEUnesse fulfills its goal by coordinating national mobilization activities like a two-day bike excursion in winter, an extreme event that generates media interest and draws attention to the causes championed by the organization.

At the regional level, local cells enable young people to mobilize in a concrete way by becoming volunteers. Visit the ENvironnement JEUnesse Web site to learn more about projects in which you can participate.

For more information: www.enjeu.qc.ca (in French only).

NatureWatch

Are you a good *SpectActor*?

NatureWatch is a series of community-based monitoring programs through which Environment Canada obtains data on **indicators** of the state of health of Canadian **ecosystems**.

For more information: www.naturewatch.ca

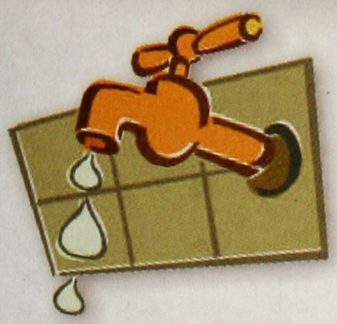
GREEN STREET YOUTH

Develop Your

The Youth Action Centre's Web site is part of Green Street's national Youth Engagement Program (YEP).

Do you have lots of ideas on how to protect the environment?

Would you like to start your own environmental club?



HOW MUCH DRIKING WATER DO YOU USE?

Check it out using the Water Use Calculator on the Biosphère's Web site: www.biosphere.ec.gc.ca

LOOK FOR THE FAUCET ICON!

ACTION CENTRE

Inner Leader!

The site provides many solutions and suggestions to implement these initiatives and to carry out your project.

You can also take part in Green Street's Youth Steering Committee.

It gives you the opportunity to connect with many other teenagers who are contributing to sustainable development.

For more information:
http://www.youthactioncentre.ca/English/index.htm
http://www.marueverte.ca/home/index_e.html

Black, Yellow, White– We Are All Equal!

CLUB 2/3

CLUB 2/3 is an international education and cooperation organization. Its mission is to raise awareness among youth, both at home and abroad, of the interdependence of human beings. It encourages them to live in justice, equity and solidarity as citizens of a world that respects the richness of their cultural diversity. It runs cooperative programs with young people and their communities to meet their common needs within the perspective of sustainable development.

CLUB 2/3 organizes events in Canada and South America. Sign up for *Échos C2T*, CLUB 2/3's bimonthly e-newsletter, to explore involvement opportunities.

Each fall, CLUB 2/3 organizes the *Colloque Jeunes Leaders*, a conference where young leaders aged 12 to 17 spend a weekend together learning about various facets of international solidarity. Every spring, some 10 000 enthusiastic young participants take part in the Marche 2/3. This colourful event is the perfect opportunity to celebrate collective engagement and to meet other young people determined to do their part to change the world. A number of volunteer projects are offered year-round to young people who want to get involved in the organization.

For more information: www.2tiers.org (English forthcoming).

PHOTO: CLUB 2/3

Get involved!

ZIP PROGRAM

On your mark, get set, go!

The mission of the Priority Intervention Zone or ZIP committees is to act to conserve the St. Lawrence.

From cleaning up the **shoreline** to installing nesting boxes, planting trees to stabilize **banks** and improving hiking trails, ZIP committees play an active part in protecting and enhancing the river. These initiatives are wide-ranging and varied, and require the commitment of many volunteers. You can get involved, too: there are 14 ZIP committees in Quebec.

Contact the one in your area to find out about projects in which you can take part.

For more information:
http://www.strategiessl.qc.ca/programmezip.html
(in French Only)

Other ways to get involved

Regroupement des organisations de bassin versant du Québec
www.robvq.qc.ca
(in French only)

Établissements verts Brundtland
www.evb.csq.qc.net
(in French only)

Environment Canada
www.ec.gc.ca/youth/index.html

ecoACTION Program
www.ec.gc.ca/ecoaction/index.html

The Biosphère
www.biosphere.ec.gc.ca

Ministère du Développement durable, de l'Environnement et des Parcs du Québec
www.mddep.gouv.qc.ca
(in French only)

Canadian Wildlife Federation
www.cwf-fcf.org

Nature Québec
www.naturequebec.org
(in French only)

S.O.S. Water! Coalition
www.eausecours.org

Ducks Unlimited Canada
www.ducks.ca

Rivers Foundation
www.rivers-foundation.org

Greenpeace
www.greenpeace.ca

Équiterre
www.equiterre.org/en

David Suzuki Foundation
www.davidsuzuki.org

Sierra Club
www.sierraclub.ca

Sierra Youth Coalition
www.sierraclub.org/youth

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Hamel, Jean-François and Annie Mercier. ***The St. Lawrence: The Untamed Beauty of the Great River.*** Les Editions de l'Homme. 2000. 221 pp.

Hamel, Jean-François and Annie Mercier. ***L'estuaire du Saint-Laurent et ses jardins secrets,*** Saint-Laurent, Les Éditions de l'Homme. 1996. 174 pp.

Ouellet, Marie-Claude. ***Le Saint-Laurent, un fleuve à découvrir.*** Montréal, Les Éditions de l'Homme. 2005. 240 pp.

Villeneuve, Claude. ***The Mighty River.*** Montréal, Québec-Amérique. 2001.

Documentaries

Back, Frederic. ***The Mighty River.*** Animated film. Canadian Broadcasting Corporation. 19

Lemire, Jean and Alain Belhumeur. ***Encounters with the Whales of the St. Lawrence.*** Poly-Productions. 1998.

Web sites

Biosphère
www.biosphere.ec.gc.ca

St. Lawrence Centre
www.qc.ec.gc.ca/csl

WORKING TOGETHER FOR THE ENVIRONMENT!

Environment Canada's Biosphère is proud to have contributed to the production of *River Action*, a magazine about the St. Lawrence River. *River Action* contains a vast array of information on the flora, fauna, uses and characteristics of the Great Lakes–St. Lawrence ecosystem, an ecosystem unrivalled in the world.

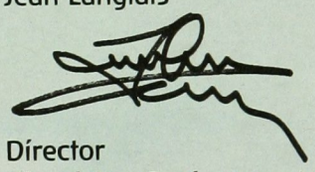
River Action was specially designed for young people who are looking for ways to take action to protect, conserve and enhance the St. Lawrence in an informed and respectful manner. We have also tried to make it as entertaining as it is educational. We hope this magazine will help you to become more familiar with and better understand the various pressures being brought to bear on the ecosystem as well as the broader environmental issues at play.

Since its creation in 1995, the Biosphère has collaborated with schools and environmental organizations to implement a number of environmental action projects designed for young people of all ages. For over ten years, more than 42 000 young people have participated in these projects, contributing to collecting field data used by scientists, increasing community awareness of environmental issues or helping to change certain behaviours in their own communities.

The concern of our youth for the environment, and especially their ceaseless and growing commitment to it, is inspirational, even contagious. They motivate the rest of us to take concrete action on behalf of the environment and the entire planet.

Congratulations to all young people who are or want to be actively involved. Your desire to take action and to build a sustainable future encourages us to pursue our own efforts towards the same goal. Your ideas and energy will always be welcome at the Biosphère. Come and visit us any time!

Jean Langlais



Director
Biosphère, Environment Canada

Exploramer
www.exploramer.qc.ca

Maurice Lamontagne Institute
www.qc.dfo-mpo.gc.ca/iml/en/intro.htm

St. Lawrence Observatory,
Fisheries and Oceans Canada
www.osl.gc.ca

Overview of the state of the St. Lawrence River
St. Lawrence Plan
www.planstlaurent.qc.ca/

The Great Lakes: An Environmental Atlas and Resource Book
U.S. Environmental Protection Agency (EPA)
www.epa.gov/glnpo/atlas

Vu du Large documentary series
www.radio-canada.ca/vudularge
(in French only)

The group for research and education on St. Lawrence marine mammals (GREMM)
www.gremm.org/eng/5/FS5.html

Quebec Marine Industry Gateway to St. Lawrence-related Events
www.lesaint-laurent.com/pages/ilinfluence.asp
(in French only)

Exhibits

Moving Giant: The Great Lakes–St. Lawrence Ecosystem,
at Environment Canada's Biosphère. Learn all about this vast ecosystem by navigating a circuit of interactive games, scale models and climbing walls.

160 Chemin Tour-de-l'Isle
Sainte-Hélène Island
Montréal, Quebec
Tel: 514-283-5000
E-mail: info.biosphere@ec.gc.ca

Glossary

ABOITEAU
A dike or dam equipped with a gate allowing the release of flood water from behind but preventing sea water from entering at high tide.

BANK
The area bordering a river or lake, etc. Also *shore* or *shoreline*.

BIODIVERSITY
All the genes, species, and ecosystems in a given region or natural environment.

BIOMAGNIFICATION
A cumulative increase in the concentrations of a persistent substance at successively higher levels of the food chain.

BOW
The front section of the hull of a ship.

CHANNEL
A passage for ships in the bed of a river or stream.

CLIMATE
Meteorological elements that characterize the average and extreme atmospheric conditions over a long period of time, in a given area or location on Earth's surface.

CONTAINER
A box generally made of metal used to transport or store merchandise or other goods or to gather several parcels together in one package.

COVE
A small, rounded bay.

DENATURALIZE
To alter or modify to make less natural.

DOWNSTREAM
Toward the direction of flow of a river or stream.

DRINKING WATER
Water that does not pose a health risk and whose quality meets legislative and regulatory provisions.

ECOSYSTEM
A complex set of relationships of living organisms functioning as a unit and interacting with their physical environment.

EROSION
The removal or wearing away of soil or rock by water, wind, or other forces or processes.

ESTUARY
The tidal mouth of a river, varying in width, characterized by the dominance of marine phenomena over river phenomena.

EXOTIC SPECIES
In its strictest sense, an animal, plant or other organism introduced into a foreign country. In a more general sense, an animal, plant or other organism that grows outside of its natural range. Also *introduced species*.

FAUNA
The animals of a region, geological period, or ecosystem.

FECAL COLIFORM
Bacteria from human or animal excrement whose presence in water indicates it is polluted and that the water may contain disease-causing microorganisms.

FLATS
Flat, muddy regions uncovered at ebb (falling) tide.

FLORA
The plants of a region, geological period, or ecosystem; a catalogue of plants of a defined area.

FLOW
Volume of water passing through a given section for a given time period; also *discharge*.

FOOD CHAIN
The transfer of food energy from plants through animals, with animals lower in the food chain being eaten by animals higher up. For example, a green plant, a leaf-eating insect, and an insect-eating bird would form a simple food chain. Any one species is usually represented in several food chains.

GULF
A vast basin formed by the ocean in an open cul-de-sac and surrounded by land.

HABITAT
For an animal, the "life range" or arrangement of food, water, shelter or cover, space, and climate suitable to that animal's needs.

INDICATOR
Signs or symptoms of changes in the health of wildlife populations in a particular area; selected key statistics that provide information on significant trends in the environment, natural resource sustainability, and related human activities.

INDIGENOUS SPECIES
An animal or plant that is naturally occurring in a region; also native species.

INDUSTRIAL DISCHARGES
A mixture of wastewaters left over from a chemical operation or a series of industrial processes.

INVASIVE SPECIES
An organism (plant, animal, fish, algae, etc.), generally transported by humans, that establishes itself in an ecosystem not its own where it develops to the detriment of the native species present in the receiving ecosystem.

LAKER
A long, shallow-draft ship designed to transport cargoes within the inland water system of the Great Lakes and St. Lawrence Seaway.

MARINE TRANSPORT
The transport of people or merchandise by sea.

MIGRATION
Regular, periodic movements of animals in large numbers, usually away from and back to a place of origin.

OVERFISHING
Fishing that exceeds the limit above which the renewal of the resource is threatened.

PILOTHOUSE
Enclosed place on the deck of a ship sheltering the steering wheel and helmsman.

PLANKTER
A planktonic organism; see *Plankton*.

PLANKTON
Organisms drifting or suspended in water, consisting chiefly of minute plants or animals, but including larger forms having only weak powers of locomotion.

PREDATION
The act of preying upon, stalking, killing and eating other animals.

RENEWABLE FRESH WATER
The supply of water replenished in the short term by precipitation.

SALINITY
The concentration of mineral salts (mainly sodium chloride or table salt) dissolved in water.

SEDENTARY
Used to describe a population that does not change habitat.

SEDIMENT
Particles (clay, sand, etc.) accumulated at the bottom of a watercourse.

SHELLFISH
Any invertebrate that has a soft body and usually a hard shell, such as a squid, snail, or mussel.

SHORE/SHORELINE
The boundary where land and water meet.

ST. LAWRENCE SEAWAY
Navigation route opened in 1959 that stretches from Montréal to Lake Superior. It comprises 19 locks enabling boats to negotiate the difference in altitude of 177 metres (the equivalent of a 59-storey building) between Lake Superior and the St. Lawrence River at Montréal.

THREATENED SPECIES
A species of animal or plant in decline that may disappear if nothing is done to save it.

TIDE
The daily alternating rise and fall of the ocean caused by the gravitational pull of the Moon (and Sun) on the Earth.

TRIBUTARY
A stream or river that flows into another watercourse; the Ottawa, Saguenay and Richelieu rivers are tributaries of the St. Lawrence River.

UNESCO
Acronym of the United Nations Education, Scientific and Cultural Organisation, established in 1946.

UPSTREAM
The section of a river or stream between a specific point and the source.

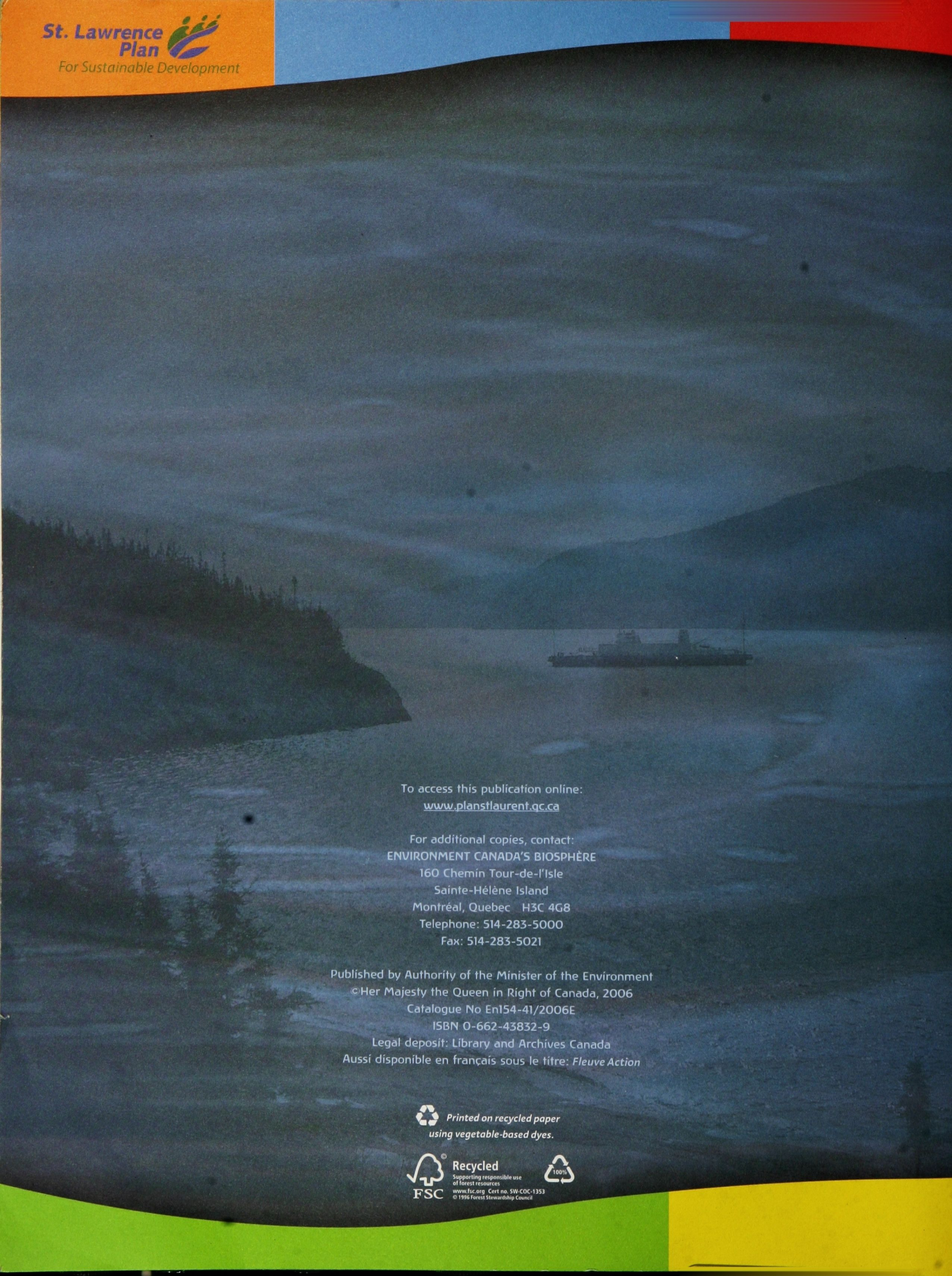
WASTEWATER
Water that has been used (e.g. by communities or industrial plants) and is no longer clean.

WATERSHED
The land area that drains into a river system or body of water. This runoff water provides sediment and nutrients to the receiving system. Also *drainage* or *hydrographic basin*.

WETLANDS
Wetlands are the transition from solid earth to deeper open water. Generally covered with shallow water for at least part, if not all, of the year, wetlands refer to any wet area where the water table is close to or reaches the surface. Wetlands include marshes, bogs, ponds, peat bogs and fens. They are an important habitat for amphibians, waterfowl, reptiles and numerous mammals.

SOURCES:
Translated from Environment Canada and ***Le grand dictionnaire terminologique***, Office québécois de la langue française.

St. Lawrence Plan
For Sustainable Development



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Published by Authority of the Minister of the Environment

Catalogue No En154-41/2006E
ISBN 0-662-43832-9
Legal deposit: Library and Archives Canada
Aussi disponible en français sous le titre: *Fleuve Action*

Printed on recycled paper using vegetable-based dyes.

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RIVER ACTION

SOLUTIONS TO GAMES AND RIDDLES!

Great Lakes–St. Lawrence Ecosystem

GAME ON PAGE 7

How many species of plants and animals live in the Great Lakes and the St. Lawrence?

GREAT LAKES: 3500

ST. LAWRENCE: 27 000

GAME ON PAGE 11

The Great Lakes contain 18% of the planet's supply of fresh surface water.

GAME ON PAGE 12

MAGTOGOEK:
THE PATH THAT WALKS

GAME ON PAGE 15

Can you identify these three vessels by studying their silhouettes and reading the clues?

A) LAKER

B) OCEAN-GOING FREIGHTER

C) OIL TANKER

Overview of the Fluvial Section

GAME ON PAGE 19

Freshwater Fish Riddles

A) BASS

B) WALLEYE (WALL-EYE)

GAME ON PAGE 21

Two exotic invasive species:

A) ZEBRA MUSSEL

B) COMMON REED

GAME ON PAGE 22

LACHINE RAPIDS

Overview of the Estuary

GAME ON PAGE 27

KEBEC:
WHERE THE RIVER NARROWS

GAME ON PAGE 28

About 3 million Quebecers get their drinking water from the St. Lawrence River (that's 45% of the population of Quebec).

GAME ON PAGE 29

When they feed in Lake Ontario, eels absorb mirex, a chemical product that remains in the environment for a long time. Some of these eels are eaten by Beluga Whales when they migrate towards the sea in the fall. The belugas then absorb the mirex and it builds up in their bodies.

GAME ON PAGE 31

Crossword

ACROSS	DOWN
1- HUMPBACK	2- BLUBBER
3- TADOUSSAC	4- PORPOISE
5- ORCA	6- BLOWING
8- FIN	7- BLUE
9- BELUGA	
10- BALEEN	

GAME ON PAGE 32

Riddle

GLASSWORT (GLASS-WORT)

Overview of the Gulf

GAME ON PAGE 37

Check the map on page 34 for the answers.

GAME ON PAGE 38

Marine invertebrates

STARFISH	SEA URCHIN
SEA ANEMONE	AMERICAN LOBSTER

GAME ON PAGE 38

BREAD

Health Report on the St. Lawrence

GAME ON PAGE 42

Food chain

5000 HERRING / 6000 PLANKTER / 130 000 MICROSCOPIC ALGAE

GAME ON PAGE 42

In Quebec, water that contains more than 200 fecal coliforms per 100 millilitres is considered unsuitable for swimming.

GAME ON PAGE 45

Threatened or vulnerable species:

A) BELUGA WHALE

B) PIPING PLOVER

C) LAKE STURGEON

D) BALD EAGLE

E) AMERICAN WATER-WILLOW