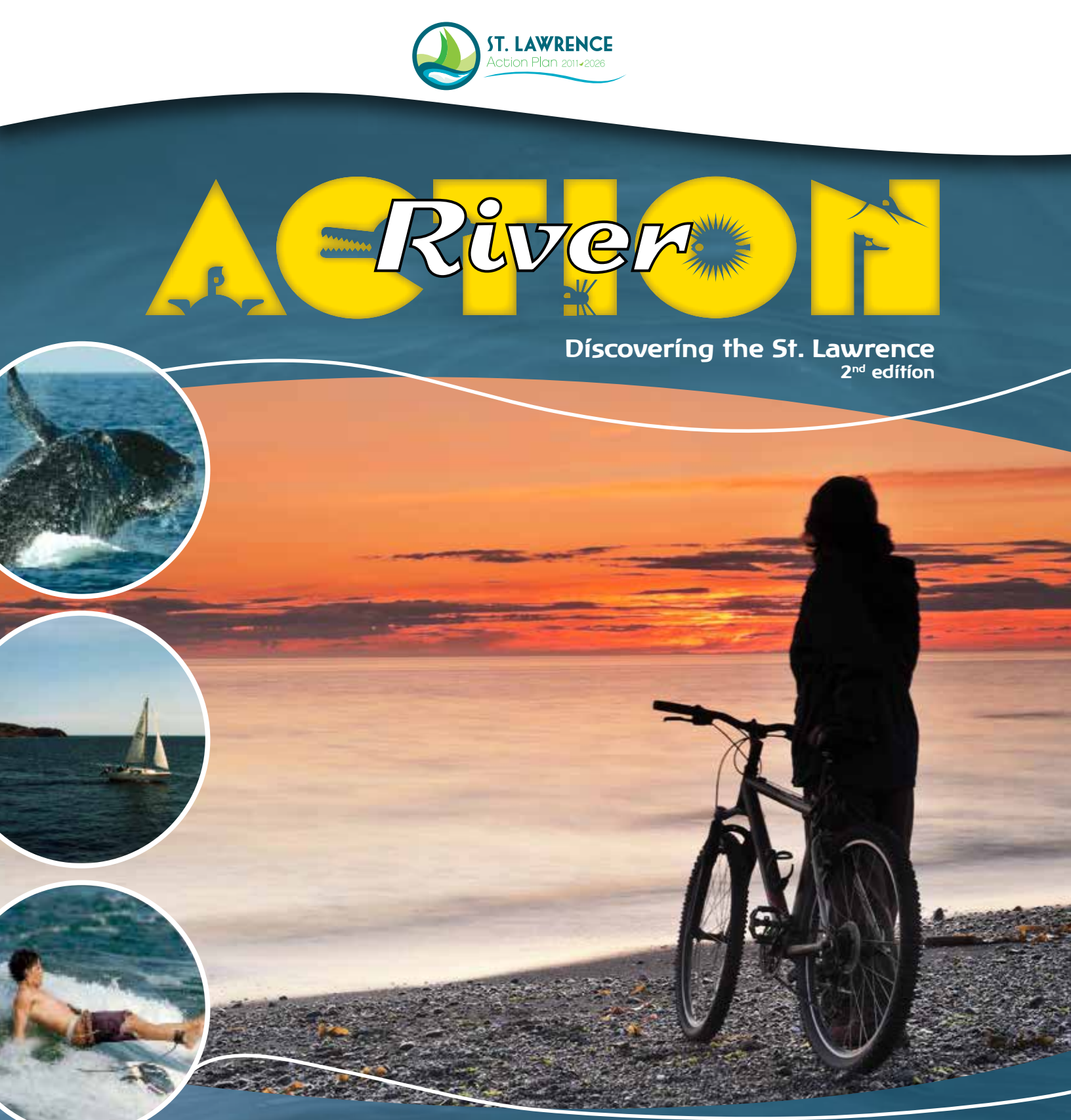
ST. LAWRENCE
Action Plan 2011-2026

ACTION River

Discovering the St. Lawrence
2nd edition



GAMES ≈ ISSUES ≈ WILDLIFE
FLORA ≈ TREASURES ≈ CHALLENGES

Canada

www.planstlaurent.qc.ca/en

Québec

A HEALTHY ST. LAWRENCE FOR GENERATIONS TO COME

As co-chairs for the St. Lawrence Action Plan 2011–2026, we would first like to congratulate you on your concern for the future of the St. Lawrence, which has been manifested since 2006 with the Youth Statement on Water that was adopted during the Youth Summit on Water and the St. Lawrence River. The statement is a clear demonstration of your awareness of the various issues the river is facing, and your unwavering concern over the years.

The governments of Canada and Quebec have been working together for over 25 years to improve the state of the St. Lawrence ecosystem. This initiative, which began in 1988, has had several positive results. For example, pollution in the St. Lawrence has decreased, human health is protected and various animal species' habitats have been conserved or rehabilitated. With 121 different maps, the St. Lawrence Action Plan website can help you find various nature observation, public access and water-based activity sites all along the St. Lawrence.

People, particularly young people like you, are more aware than ever of the importance of protecting our river, thanks to different initiatives like the Fondation Monique-Fitz-Back's "Mon fleuve et moi" ("My River and Me") contest, an educational project for youth across Quebec.

Although the St. Lawrence is in better shape now than it was 30 years ago, it is still vulnerable overall. This is confirmed in the most recent edition of the Overview of the State of the St. Lawrence, a 2014 study that provides a detailed bill of health of the river. That is why our two governments have begun implementing the integrated management of the St. Lawrence, a management approach that focuses on collaboration between communities, citizens and different organizations to conserve, protect and promote the St. Lawrence.

To make this initiative a success, youth motivation and creativity are crucial! To share your new ideas or get more concretely involved in protecting the St. Lawrence, you can contact your region's area of prime concern (ZIP) committee and, if applicable, its Table de Concertation Régionale (regional round table), whose contact information is on the St. Lawrence Action Plan website.

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Co-Chair, Canada
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River ACTION

PHOTO: TRISHA CHENEY

PHOTO: BÉRANGER THOMINET © ENVIRONMENT CANADA

PHOTO: BERNARD BRAULT

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River Action magazine was created as a part of the St. Lawrence Action Plan. This plan is a collaborative initiative of the governments of Canada and Quebec working together with various stakeholders to conserve, restore, protect and develop the St. Lawrence River.

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©iStock.com/pchoui

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OVERVIEW OF THE St. Lawrence Great Lakes–ECOSYSTEM

MAP: © ENVIRONMENT CANADA

PHOTO: NORMAN LÉVESQUE

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: FRANÇOIS LUSSIER © PARKS CANADA

Words in boldface and underlined: see Glossary on page 58

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.

Did you know?

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

LET'S THINK ABOUT IT...

It provides 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 various 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?

Words in boldface and underlined: see Glossary on page 58

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

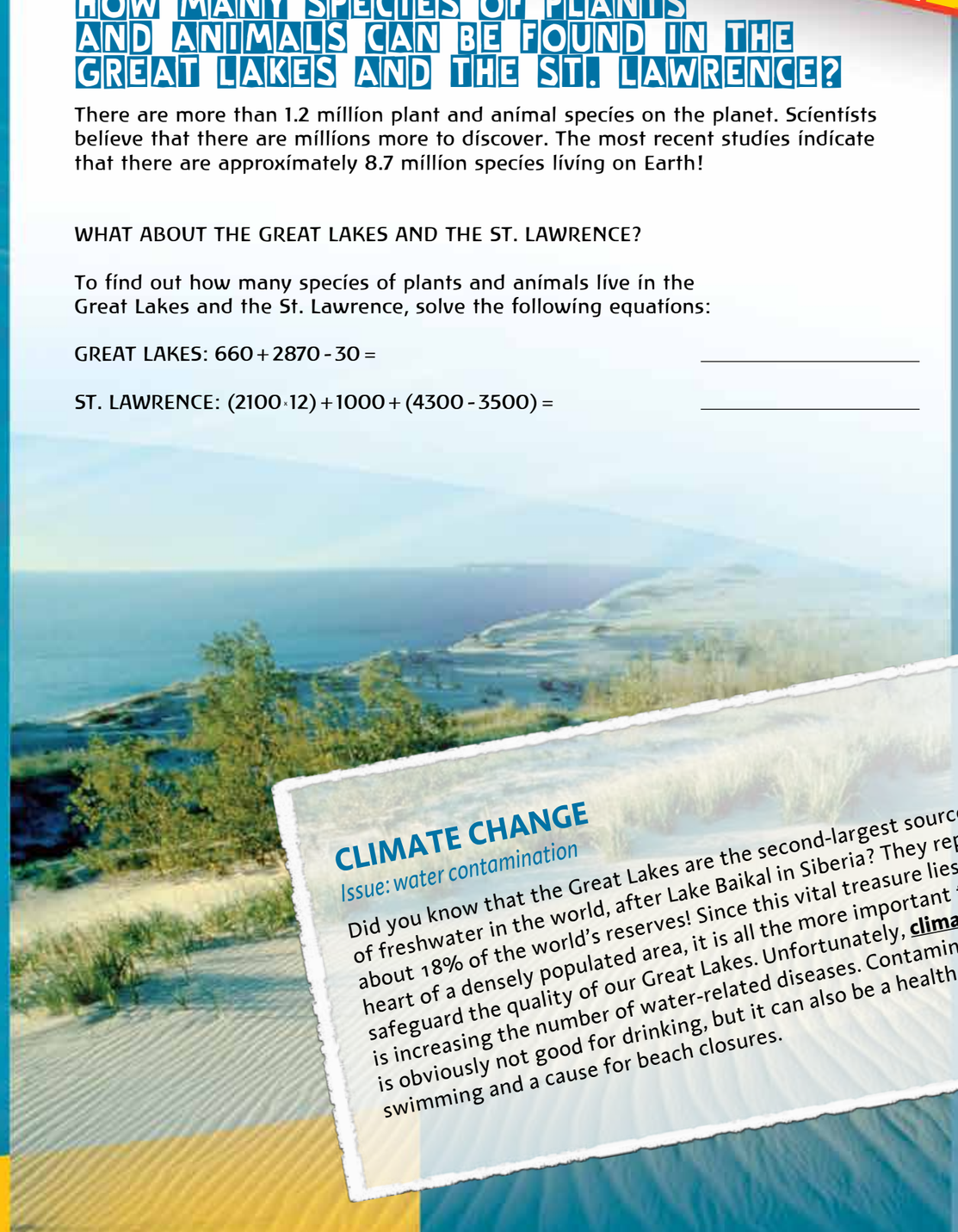
There are more than 1.2 million plant and animal species on the planet. Scientists believe that there are millions more to discover. The most recent studies indicate that there are approximately 8.7 million species living on Earth!

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 ÷ 12) + 1000 + (4300 - 3500) = _____



CLIMATE CHANGE

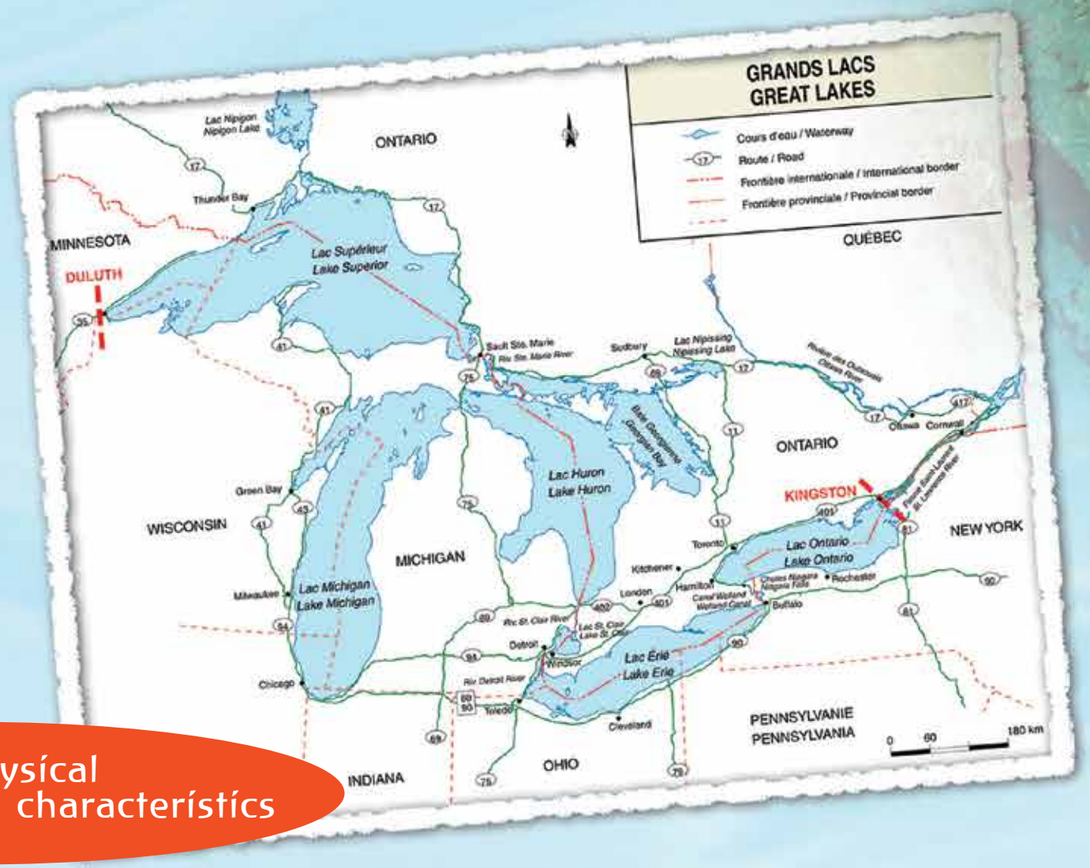
Issue: water contamination

Did you know that the Great Lakes are the second-largest source of freshwater in the world, after Lake Baikal in Siberia? They represent about 18% of the world's reserves! Since this vital treasure lies in the heart of a densely populated area, it is all the more important that we safeguard the quality of our Great Lakes. Unfortunately, **climate** change is increasing the number of water-related diseases. Contaminated water is obviously not good for drinking, but it can also be a health hazard for swimming and a cause for beach closures.

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

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 (km cubed)
SUPERIOR	563	257	406	12 100
MICHIGAN	494	190	282	4 920
HURON	332	245	229	3 580
ERIE	388	92	84	484
ONTARIO	311	85	244	1 640

MAP: © ENVIRONMENT CANADA

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

DID YOU KNOW?

THE GREAT LAKES are so vast they can be seen from the moon. They cover almost half of the land area of Quebec!

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 5½ Olympic-sized swimming pools in one second!

ACTION River

IMAGE: © GOVERNMENT OF CANADA WITH PERMISSION FROM NATURAL RESOURCES CANADA

HOW THE GREAT LAKES AND THE ST. LAWRENCE WERE FORMED

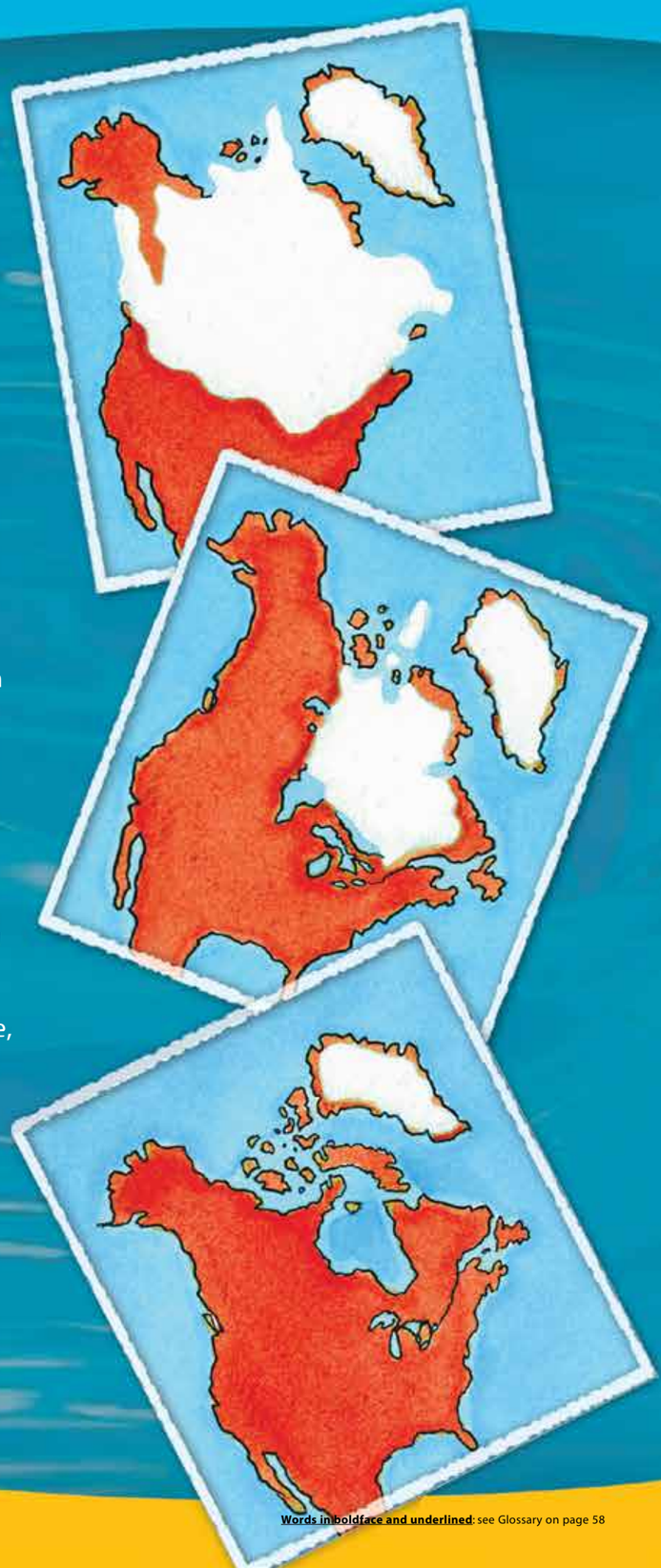
The Great Lakes and the St. Lawrence were formed during the last ice age, 20 000 years ago, at a time when glaciation was at its peak. Almost all of Canada lay beneath enormous ice sheets 1 to 3 km thick.

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 5 000 years ago, and the lake slowly became a river, the St. Lawrence.



ILLUSTRATIONS: JACQUES GOLDSTYN

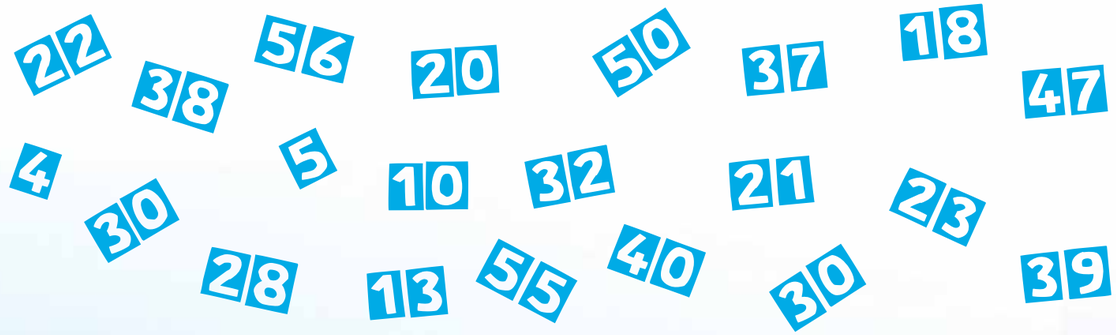
Words in boldface and underlined: see Glossary on page 58

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.



CLIMATE CHANGE, from PAST to PRESENT

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.

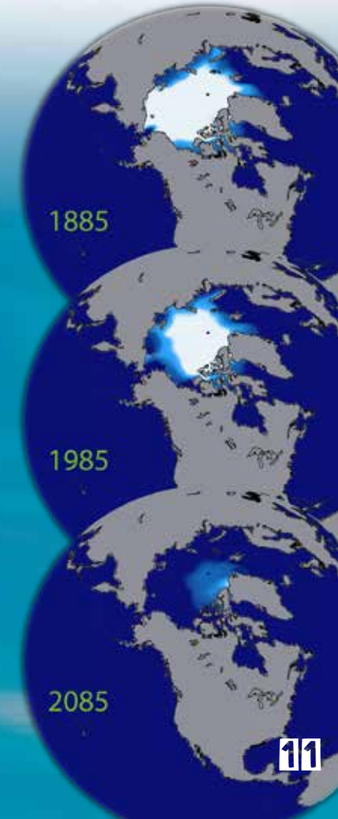


IMAGE: NOAA GFDL

Sea ice concentrations simulated by the U.S. National Oceanic and Atmospheric Administration Geophysical Fluid Dynamics Laboratory (NOAA GFDL). Three years (1885, 1985 and 2085) are shown to illustrate the model-simulated trend, of the average sea ice coverage of August, September and October, when sea ice coverage is at its annual minimum. A dramatic reduction of summertime sea ice is projected, with the rate of decrease being greatest during the 21st century portion. The colours range from dark blue (ice free) to white (100% sea ice covered).

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, the Aboriginal people 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

Words in boldface and underlined: see Glossary on page 58

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.

TREASURES TO CHERISH

THE NORTHERN 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

MAP: SECRÉTARIAT AUX AFFAIRES AUTOCHTONES, GOUVERNEMENT DU QUÉBEC

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

A LITTLE BIT OF HISTORY...

The Aboriginal people 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.

PHOTO: DANIEL BORDAGE © ENVIRONMENT CANADA

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.

CLIMATE CHANGE

Atmospheric concentrations of greenhouse gases, which are responsible for global warming, have increased considerably because of human activity. In the Northern Hemisphere, the period between 1983 and 2012 has probably been the hottest in 1400 years. Each of these three decades was hotter than the one before it! By 2050, the temperature of southern Quebec is expected to be even 2 to 3.2 °C warmer. This increase in the temperature of the Earth's surface is already causing accelerated melting of the glaciers and warming of the oceans. These processes are causing the sea level to rise. Flooding, intense precipitation and droughts are already being observed more frequently around the world. These impacts are jeopardizing our health and safety. We will increasingly have to adapt our lifestyle to the upheavals caused by climate change in the balance of our society, our environment and our economy.

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. In Lake Saint-Pierre, the high number of cormorants is a threat to fish such as the perch.

Words in boldface and underlined: see Glossary on page 58

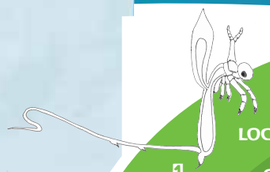
INTRUDERS IN THE ECOSYSTEM: INVASIVE ALIEN SPECIES

Over the past 200 years, it is estimated that approximately 163 **invasive alien species** (primarily plants) have invaded the Great Lakes. Of this number, at least 85 species have reached the St. Lawrence through the St. Lawrence Seaway system. They invade our river and threaten native species and species at risk. Climate change is also altering the delicate balance of habitats, increasing the vulnerability of native species and facilitating the invasion of alien species.

A large part of a region's economy is based on it's natural resources, both animal and vegetable, which we exploit. When an invasive species moves into an ecosystem the local agriculture, forestry and fishery trades can be significantly impacted. Even infrastructure, like bridges and water purification facilities, can be negatively impacted, leading to further costs to the municipalities to repair damages, and prevent future damages. For small communities this cost can be astronomical. Also, the presence of invasive alien species in a lake, for example, can diminish shoreline property values and even close the lake to recreational activities. The can also be vectors for illnesses and parasites.

YOU, TOO, can help prevent this invasion! On each fact sheet, spot the icon that indicates what you can do. See **page 47** to find out more.

Fishhook Water Flea and Spiny Water Flea



1

LOCATION At the gates of Quebec and the Great Lakes

ORIGIN Ponto-Caspian region

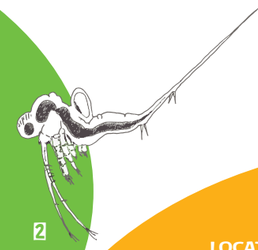
PHYSICAL DESCRIPTION Less than 1.5 cm in length, with a long tail that accounts for 60% (Spiny Water Flea, 2) to 80% (Fishhook Water Flea, 1) of it's size.

CHARACTERISTICS The females can reproduce asexually and create a colony on their own.

IMPACTS Attaches itself to fishing lines and nets, and upsets the **food chain** balance because it consumes large quantities of zoo**plankton**.

ACTIONS

Ministère des Forêts, de la Faune et des Parcs (MFFP), call 1-877-346-6763



2

Viral Hemorrhagic Septicemia

LOCATION Great Lakes, at the gates of Quebec

ORIGIN N/A

4 **PHYSICAL DESCRIPTION** Infected fish may have bulging eyes and bleeding around their eyes and at the base of their fins.

CHARACTERISTICS Infectious disease caused by a virus. No danger to humans. Affects more than 65 fish species.

IMPACTS The massive kill of native fish is extremely costly to the fishing industry.

ACTIONS

MFFP, call 1-877-346-6763

Asian carp

Bighead Carp, Silver Carp, Common Sucker and Grass Carp

LOCATION At the gates of Quebec and the Great Lakes

ORIGIN Asia

PHYSICAL DESCRIPTION Large, up to two metres in length, and weighing up to 50 kg.

CHARACTERISTICS Due to its size, it has very few predators. The Silver Carp can jump as high as one metre and can seriously injure recreational boaters.

IMPACTS Can eat up to 20% of its body weight and disrupt the aquatic food web balance and the habitat of other fish species. This can have irreversible impacts on the economy and aquatic ecosystems.

ACTIONS

MFFP, call 1-877-346-6763 3

IMAGES:
1. ***SPINY WATER FLEA***: ODÉLIE BERNARD-LABELLE © ENVIRONMENT CANADA.
2. ***FISHHOOK WATER FLEA***: ODÉLIE BERNARD-LABELLE © ENVIRONMENT CANADA.
3. FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION ARCHIVE, BUGWOOD.ORG
4. U.S. GEOLOGICAL SURVEY

OVERVIEW OF THE FLUVIAL 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.

MAP: © ENVIRONMENT CANADA

PHOTO: ALEX A. MARTIN

Physical characteristics

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

Words in boldface and underlined: see Glossary on page 58

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 water quality in the Montréal area, visit the website of the *Réseau de suivi du milieu aquatique* at: **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.

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.

PHOTO: MRNF

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 sport fishing 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

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

_____

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

_____

PHOTOS: ©ISTOCK.COM/2LBGIL

Guide de consommation du poisson de pêche sportive en eau douce: **www.mddelcc.gouv.qc.ca/eau/guide** (in French only)

ACTION River

Words in boldface and underlined: see Glossary on page 58

PHOTO: CEEDUB13, CC BY 2.0, VIA FLICKR

Moses-Saunders Power Dam at 1 km in length

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.

Montréal is the largest **container** port in Canada.

More than one million containers are handled here each year!

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 **downstream** 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: AVENUE.GDFL VIA WIKIMEDIA COMMONS

GAME

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.

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:** _____

ILLUSTRATIONS: LUCIE BENOIT

Words in boldface and underlined: see Glossary on page 58

ACTION River

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. Sixteen of the approximately 600 UNESCO World Biosphere Reserves are located in Canada.

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 is the largest heronry in Quebec—and probably the world!

Lake Saint-Pierre provides both feeding and breeding grounds for numerous species of animals; it is 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@LEQUEBECENIMAGE, 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 path. When a fish finally appears, the Great Blue Heron plunges its beak into the water with a quick thrust of its long neck to seize its prey. Herons live in pairs, and both parents take turns looking after the chicks.

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.

PHOTO: CAROLINE SAVAGE © ENVIRONMENT CANADA

PHOTO: CAROLINE SAVAGE © ENVIRONMENT CANADA

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 with potatoes.

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.

PHOTO: JEAN RODRIGUE © ENVIRONMENT CANADA

IDENTIFY THIS PLACE

GAME

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.

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: _____

PHOTO: JET-BOATING – SAUTE-MOUTONS

Words in boldface and underlined: see Glossary on page 58

Red-eared Slider Turtle

LOCATION Fresh waters of the Great Lakes–St. Lawrence **ecosystem**

ORIGIN United States

PHYSICAL DESCRIPTION Reddish spot behind its eyes and yellow lines on its skin.

CHARACTERISTICS Freshwater reptile and **cold-blooded** animal. Very tolerant and adapts easily.

IMPACTS Competes with and can be aggressive with native species when vying with them for the same egg-laying sites, feeding grounds or the same spot to bask in the sun.

ACTIONS

Atlas des amphibiens et des reptiles du Quebec (AARQ) aarq@ecomuseum.ca

MFFP, call 1-877-346-6763

European Water Chestnut

LOCATION Fresh waters of the Great Lakes–St. Lawrence ecosystem. It requires shallow aquatic environments with weak currents; for example, Rivière du Sud, the Richelieu and Ottawa rivers, and Lake of Two Mountains.

ORIGIN Asia, Europe, Africa

PHYSICAL DESCRIPTION Forms a mat on the surface of the water. Triangular leaves.

CHARACTERISTICS Plant species of great concern.

IMPACTS Deprives other aquatic organisms of light and oxygen. It can out-compete native plants. Restricts access to some waterways and hinders fishing. Water chestnut spines on the riverbed can injure animals and swimmers.

ACTIONS

Round Goby

LOCATION Fresh waters of the Great Lakes–St. Lawrence ecosystem

ORIGIN **Pontocaspian region** and Asia

PHYSICAL DESCRIPTION Black spot on its dorsal fin with fused pectoral fins.

CHARACTERISTICS May carry viral hemorrhagic septicemia (VHS) and can kill other fish. Aggressive and territorial, it eats the eggs and young of indigenous species, may also feed on insects and plants.

IMPACTS Reduces stocks of local fish and is detrimental to fishery quality.

ACTIONS

MFFP, call 1-877-346-6763

PHOTO:
1. JOY VIOLA, NORTHEASTERN UNIVERSITY, BUGWOOD.ORG
2. STEVE HURST @ USDA-NRCS PLANTS DATABASE
3. PETER VAN SLUIJS. CC BY-SA 3.0, VIA WIKIMEDIA COMMONS

CLIMATE CHANGE

*Issue: **Marine transport***

Did you know that **climate** change also affects your sneakers? It's true! They travelled on a ship before reaching the store where you bought them. For ships to sail freely, the St. Lawrence River needs to be at least deep enough so that the **hull** does not scrape the bottom! To counteract drops in the water level, structures such as **dikes**, dams and locks are used to control water levels on command. **Dredging** is also a solution that is currently in use, but this method has adverse effects on the environment because it brings contaminants found in the **sediment** to the surface and lowers the water level on both sides of the channel.

Words in boldface and underlined: see Glossary on page 58

Environmental pressures

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

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 **banks** of the St. Lawrence are densely populated and very 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."

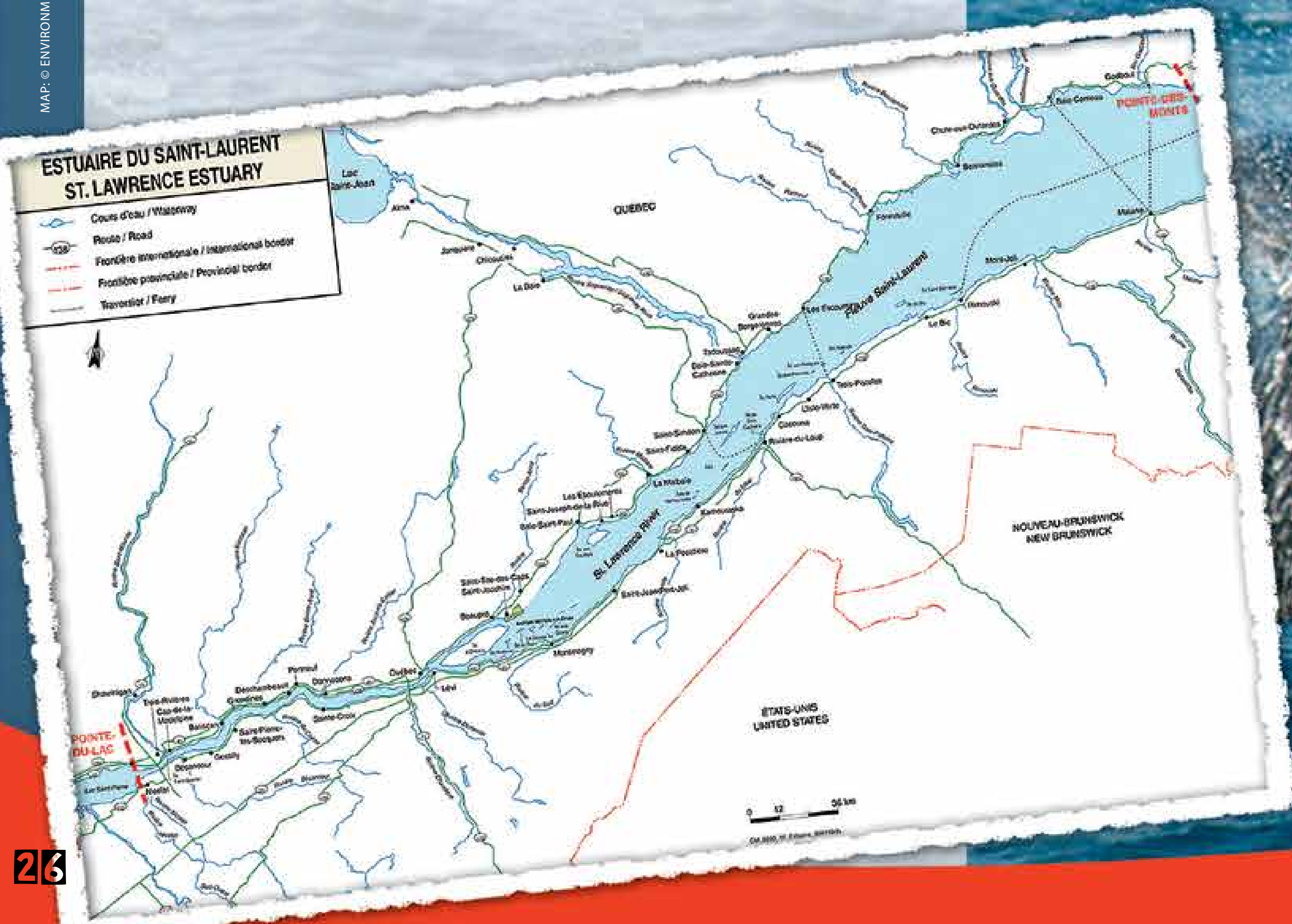
To prevent these waves from eating away at the banks, ship speed is regulated, and low protective retaining walls made of stone or concrete are erected; better yet, the banks are restored by revegetating them.

PHOTO: BÉRANGER THOMINET © ENVIRONMENT CANADA

OVERVIEW OF THE ESTUARY

Physical characteristics

LENGTH:	550 km
MAXIMUM WIDTH:	60 km (**downstream** from Baíe-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)



MAP: © ENVIRONMENT CANADA

PHOTO: TRISHA CHENEY

In the **estuary**, 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

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.

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.

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 stretch 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

Words in boldface and underlined: see Glossary on page 58

GAMES

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 5 50 100 3 2 1 250

RIDDLE

Every year, about 15 Beluga Whales are found dead on the **banks** of the St. Lawrence. Scientists examine them to determine the cause of death.

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

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 is 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**.

PHOTO: © COREL CORPORATION

Words in boldface and underlined: see Glossary on page 58

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 8000 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 is 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 4000 km and make only one real stop: the shores of the St. Lawrence. At Cap Tourmente, near Quebec City, tens of thousands of Greater Snow Geese gather to rest during their spring and fall migrations.

PHOTO: JOSÉE LEFEBVRE, GON

PHOTO: JOCELYNE PAGÉ, SOURCE: AACT

GAME

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.*

2 *The other name for the Killer Whale is …….*

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

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

5 *A small white whale that often travels in pods.*

DOWN

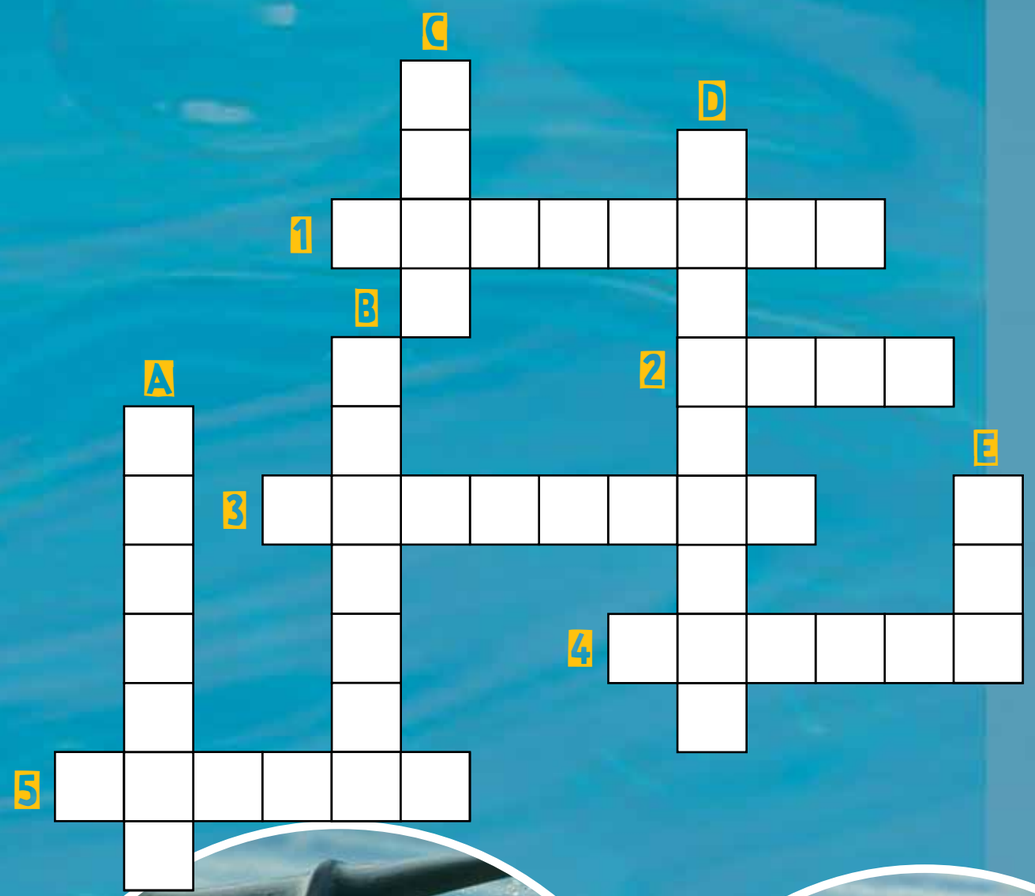
A *Whales have a thick layer of …… that protects them from the cold.*

B *When whales expel hot, moist air, we say they are ……..*

C *The largest animal that has ever lived on Earth is the ……. Whale.*

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

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



PHOTOS: JEAN AUDET © PARKS CANADA

Words in boldface and underlined: see Glossary on page 58

GAME

CLIMATE CHANGE

Issue: Drinking water

Did you know that nearly half of Quebecers get their drinking water from the St. Lawrence River? The Earth's hydrosphere is made up of 97.5% salt water and only 2.5% fresh water, 70% of which is trapped in glaciers. Because of rising temperatures, large sources of drinking water are evaporating, which reduces the amount available for consumption. One of the major challenges facing future generations is drinking water management. With the growing population and the increasing scarcity of water, a new balance will have to be established between supply and demand for this precious water, which is vital to human survival.

INVASIVE ALIEN SPECIES

Chinese Mitten Crab

1

LOCATION Great Lakes–St. Lawrence **ecosystem**

ORIGIN Yellow Sea, between China and Korea

PHYSICAL DESCRIPTION Dense hair on its claws

CHARACTERISTICS **Catadromous** species, one of the ten most undesirable **invasive alien species**

IMPACTS Digs tunnels in riverbanks leading to **shoreline** **erosion**.

ACTIONS

MFFP, call 1-877-346-6763

Common Reed

LOCATION **Wetlands** and along highways of the Great Lakes–St. Lawrence ecosystem

ORIGIN **Eurasia**

PHYSICAL DESCRIPTION Thin stem several metres high, ending in a silvery plume.

CHARACTERISTICS High reproductive capacity.

IMPACTS Dense colonies deprive other plants of light. Its rhizomes change the soil's organic composition, restrict the **flow** of irrigation water and dry up wetlands.

2

Zebra and Quagga mussels

3

LOCATION Fresh waters of the Great Lakes–St. Lawrence ecosystem

ORIGIN **Pontocaspian region**

PHYSICAL DESCRIPTION Bivalve mollusc of varying colours and shapes.

CHARACTERISTICS Great capacity for filtering suspended particles and phyto**plankton**. Attaches itself to surfaces and infrastructure, nearly impossible to dislodge.

4

IMPACTS Increases water transparency and the proliferation of aquatic plants. However, it obstructs hydraulic systems such as drinking water intakes.

ACTIONS

MFFP, call 1-877-346-6763

PHOTO: HUSSEIN ABDALLAH, CC BY 2.0, VIA FLICKR

DID YOU KNOW?

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

IDENTIFY THE CITIES BELOW. WHICH TWO CITIES RISK LOSING THE ST. LAWRENCE AS THEIR SOURCE OF DRINKING WATER?

1

_ o n _ r _ a l

2

_ _ _ b e c

3

T _ _ _ s - _ í v _ _ r e s

4

_ é v _ s

PHOTOS (INVASIVE SPECIES):
1. CHRISTIAN FISCHER CC-BY-SA 3.0, VIA WIKIMEDIA COMMONS
2. MANDY TU, THE NATURE CONSERVANCY, BUGWOOD.ORG
3. ZEBRA MUSSEL (ACTUAL SIZE): U.S. GEOLOGICAL SURVEY
4. QUAGGA MUSSEL (ACTUAL SIZE): U.S. GEOLOGICAL SURVEY

Words in boldface and underlined: see Glossary on page 58

ACTION River

PHOTOS (CITIES):
1. © VISTA PHOTO
2. © ISTOCK.COM/VLADONE
3. © ISTOCK.COM/TONY TREMBLAY
4. © CLAUDE BOUCHER. GDFL OR CC-BY-SA 3.0, VIA WIKIMEDIA COMMONS

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 APNQ

NOMADIC OR SEDENTARY?

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

The Iroquois 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 and 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).

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.

PHOTO: YVON RICHARD, MDDEP

Words in boldface and underlined: see Glossary on page 58

OVERVIEW OF THE GULF

MAP: © ENVIRONMENT CANADA

PHOTO: MARJOLAINE BENOIT

Beyond Pointe-des-Monts, the St. Lawrence becomes so wide that the opposite **shore** cannot 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 topography, 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)

Words in boldface and underlined: see Glossary on page 58

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 plant was founded in Matane.

Main uses

Swimming is a popular activity, especially in the Gaspésie, Îles de la Madeleine and Côte-Nord regions. That is, if the cold does not bother you too much. The **gulf**'s warmest waters reach 22°C in Chaleur Bay, compared with 28°C in Florida.

The fishing industry is vital to the economy of the Côte-Nord, Gaspésie and the Îles de la Madeleine. 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.

TREASURES TO CHERISH

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.

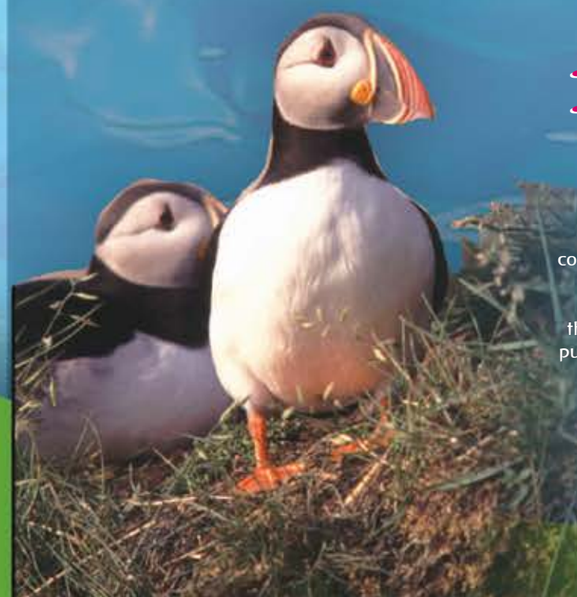


PHOTO: JEAN-FRANÇOIS RAIL © ENVIRONMENT CANADA

CLIMATE CHANGE

*Issue: Shoreline **erosion***

In the Gulf of St. Lawrence, the water level, **tides**, ice, winds, waves, rain, snow, freezing, thawing, and more frequent and more intense storms are all factors that increase coastal erosion. In addition to the environmental impacts of erosion, authorities are closely monitoring this process because it can sometimes have major, unexpected and dangerous consequences in terms of public safety. Homes, highways and other infrastructure and buildings are very vulnerable to erosion. In the Îles de la Madeleine, 70% of the coastlines are at risk. Imagine driving along in your car and suddenly seeing the road in front of you being swept away by the sea!

PHOTO: CHRISTIAN FRASER, UQAR

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

GAME

Míngan archípelago
Îles de la Madeleíne

Antícostí Island
Chaleur Bay

Percé Rock

MAP: © ENVIRONMENT CANADA

Words in boldface and underlined: see Glossary on page 58

INVASIVE ALIEN SPECIES

Green Crab
or Shore Crab

LOCATION Shallow saltwaters of the Gulf of St. Lawrence

ORIGIN Northern Europe and Africa

PHYSICAL DESCRIPTION Greenish colour

CHARACTERISTICS Adapts very well to our ecosystems

IMPACTS Attacks molluscs and eel catches, damaging the mariculture industry and the commercial eel fishery

ACTIONS

Contact the DFO office near you
Quebec: 418-648-2239
info@dfo-mpo.gc.ca

1

Dead Man's Fingers
or Oyster Thief

LOCATION Up to a depth of 18 m in the Gulf of St. Lawrence

ORIGIN Japan

PHYSICAL DESCRIPTION Greenish colour and Y-shaped ends to the stems

CHARACTERISTICS Attaches itself to rocks, reefs, infrastructure and other algae. Clings to molluscs and crustaceans, and makes them vulnerable to predators, carries oysters out to sea

IMPACTS Harms commercial mollusc and crustacean fisheries

ACTIONS

Contact the Fisheries and Oceans Canada (DFO) office near you
Quebec: 418-775-0682
info@dfo-mpo.gc.ca

2

Tunicata

LOCATION Atlantic coast of the Gulf of St. Lawrence

ORIGIN Various origins; introduced through commercial vessel biofouling

PHYSICAL DESCRIPTION Skin looks gelatinous and crusted, takes on different shapes

CHARACTERISTICS Anchors itself to underwater surfaces: rocky reefs, boat hulls, ropes and fish farm installations (marine aquaculture).

IMPACTS Threatens aquaculture and increases operating costs of the mollusc industry.

ACTIONS

Contact the DFO office near you
Quebec: 418-648-2239
info@dfo-mpo.gc.ca

3

PHOTOS:
1. LUIS MIGUEL BUGALLO SANCHEZ (LMBUGA COMMONS), VIA WIKIMEDIA COMMONS
2. FLYINGDREAM, PUBLIC DOMAIN, VIA WIKIMEDIA COMMONS
3. PARENT GÉRY, PUBLIC DOMAIN, VIA WIKIMEDIA COMMONS

GAME

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 rarely contains algal extracts:

ICE CREAM	JAM
COSMETICS	PAINT
SALAD DRESSING	BREAD
PRINTING INK	FILM

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

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.

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. Their failure to recover in that time is related mainly to fishing and possibly to predation by seals in the case of certain species and regions. Cod, American Plaice and redfish are being studied for classification as species at risk, whereas biomass levels of Atlantic Halibut are currently much higher than they were in the 1980s and 1990s.

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 LETOURNEAU, © 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 colony can be found in Île-Bonaventure-et-du-Rocher-Percé Provincial Park, where there were approximately 58 000 pairs in 2014. 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@LEQUÉBECENIMAGES, CCDMD

Words in boldface and underlined: see Glossary on page 58

HEALTH REPORT on the St. Lawrence

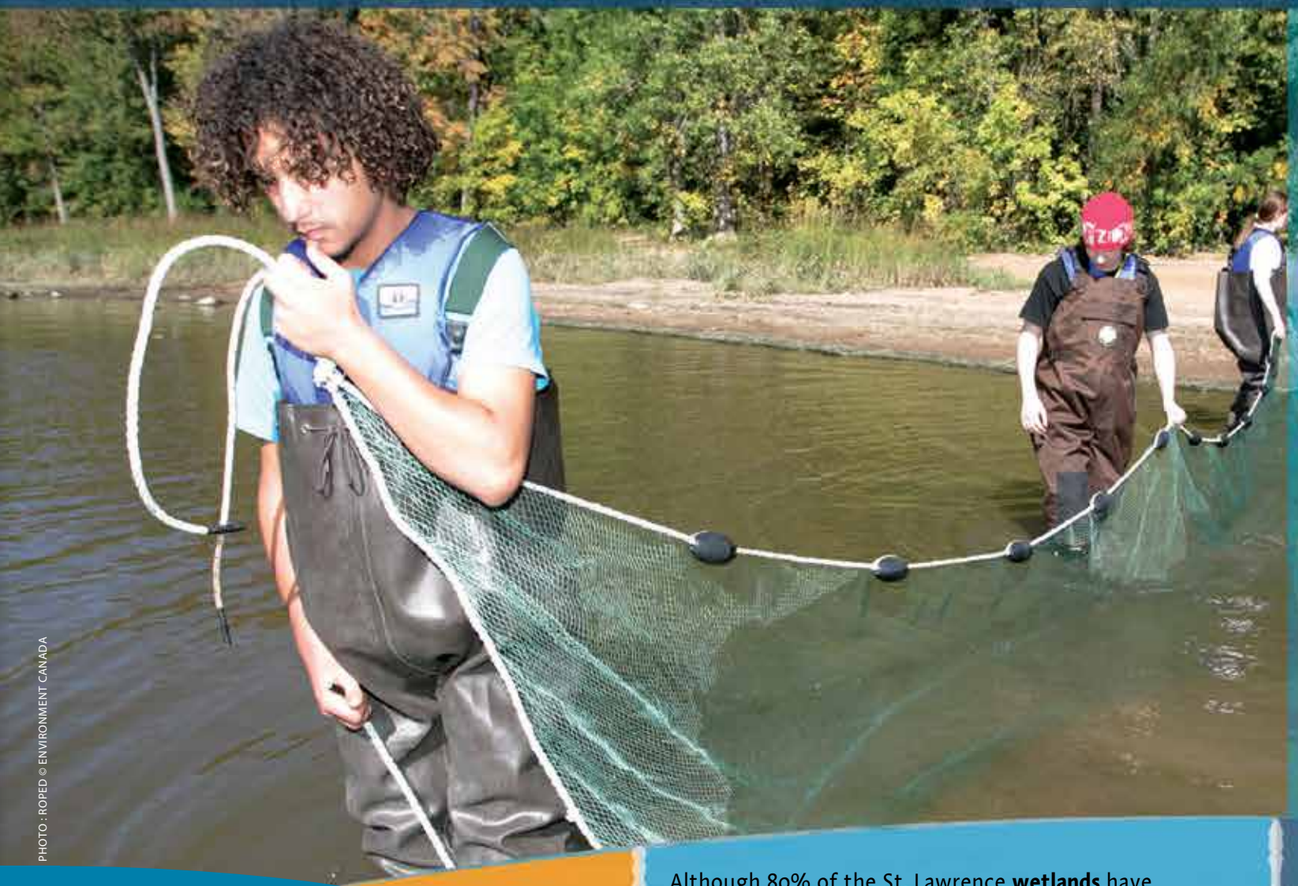
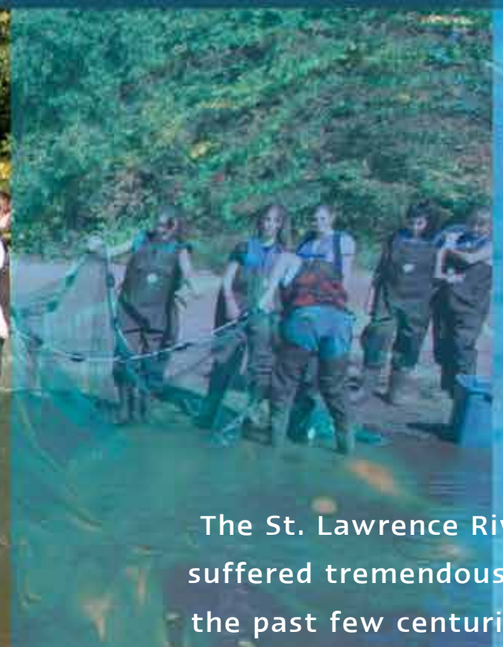


PHOTO : ROPED © ENVIRONMENT CANADA



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 recreational 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.

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.

Wetlands

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

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: Île Bonaventure is home to over 50 000 breeding pairs. The colonies are nevertheless very vulnerable, and they are closely monitored. Their reproductive success varies enormously from year to year: 37% in 2013 and 8% in 2012, which is below the levels required to increase the colony's sustainability.

Similarly, the Great Blue Heron population comprised approximately 25 000 birds when it was last estimated in 2006, and appeared stable. Concentrations of the main contaminants found in Great Blue Heron eggs (mercury, PCB, DDT, dioxins, furans and brominated fire retardants) have decreased overall by more than 55% since the beginning of the monitoring program in 1991 and are generally lower than concentrations that can be harmful to birds.

Words in boldface and underlined: see Glossary on page 58

THE FOOD CHAIN

GAME

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 MESSAGE

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.

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 **waste water** into the St. Lawrence. This problem is more pronounced in the Gaspé and the Lower St. Lawrence than on the Îles de la Madeleine 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.

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 waste water 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 website of the Environnement-Plage Program from the MDDELCC: **mddelcc.gouv.qc.ca/programmes/env-plage/index.htm** (French only)

Reclaiming use

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

Words in boldface and underlined: see Glossary on page 58

WARNING! INVASIVE ALIEN SPECIES PREVENTION AND CONTROL AREA.

Refer to the following icons to find out what you can do to curb the proliferation of invasive alien species.

Have you found an intruder?

NEVER return alien species to the wild, either dead or alive. Report their presence to the organization in charge as indicated.

Back from a boat or fishing trip?

Inspect your craft and equipment for mud, aquatic plants, and any visible organisms and debris, and clean everything up, following these five steps:
mffp.gouv.qc.ca/faune/especes/envahissantes/methodes-prevention-controle.jsp
(in French only)

Avoid moving organisms from one environment to another. Do not discard water from one lake or river into the body of water where you are currently located. Caution! Since 2013, the use of live baitfish has been prohibited for sport fishing during the summer fishing season, and dead baitfish will also be prohibited as of 2017.
mffp.gouv.qc.ca/faune/peche/poissons-appats.jsp
(in French only)

Before leaving a body of water, empty the water out of your boat and bucket on the spot.

Do you want to get rid of a pet?

Try to find a new family for it! If you are unsuccessful, do not ever dispose of your pet and its water in the wild, in the toilet bowl or down the drain. Empty the aquarium water onto dry dirt at least 30 metres away from any stream. For full information, visit
habitattitude.ca/prevention/

Do you want to make a campfire?

Above all else, do not move firewood around! It contains invasive insects, which can destroy the trees in our forests, parks and cities. Obtain wood locally instead; it can be bought in various parks, campgrounds and wildlife areas, etc.

PHOTO: NANCY HOUILLARD, SOURCE: AACT

CLIMATE CHANGE

Adapting today to tomorrow's challenges.

As you have seen, **climate** change impacts our environment. This is why we need to take action today to prepare our societies to face future challenges. But actions are not just long term! Simple everyday actions also make a difference.

Think about preserving water quality by using non-toxic products. Biodegradable shampoo is an excellent option.

Buy local products to reduce the pollution caused by transportation. Even better, repair or reuse what you already have.

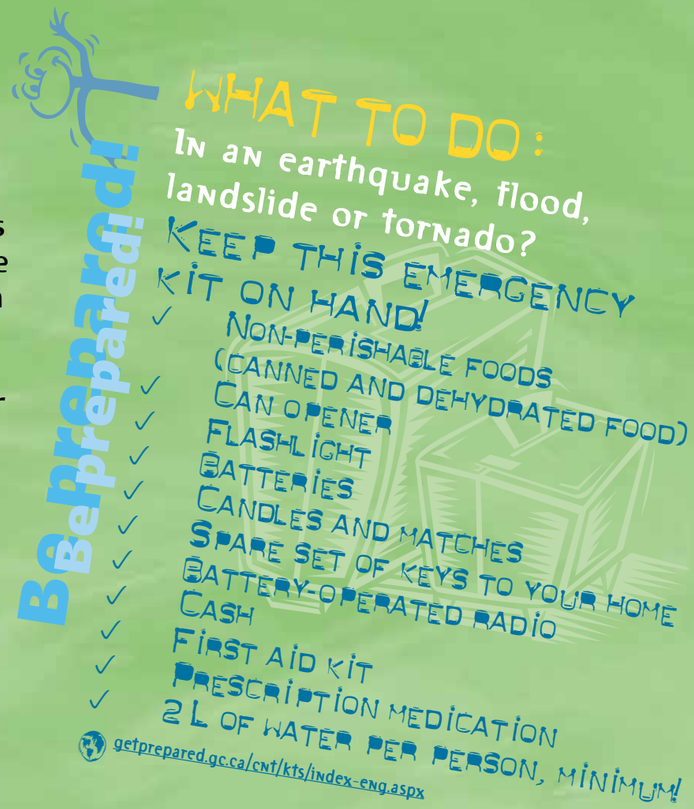


PHOTO: © ISTOCK.COM/SKYF

PHOTO: © ISTOCKCOM/MARTINE DOUCET

Species at Risk in Canada

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 will not 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 it 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 it is not yet threatened.

GAME

WHO AM I?

Each of the species pictured here is designated threatened, vulnerable or near threatened 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.

Action plans

Researchers have written reports and developed action plans to protect species that are threatened or vulnerable in Quebec, including the Copper Redhorse, the Bald Eagle and the St. Lawrence Beluga.

Laws exist to protect species at risk.

Words in boldface and underlined: see Glossary on page 58

CONCRETE ACTION

Governments, lobby groups and various community organizations are working to improve the condition of the St. Lawrence. And it is working!

Here are some examples:

In 1980, more than 300 Quebec municipalities were discharging their waste water directly into the river. Thanks to action taken under the Municipal Water Purification Program, in force since 1978, more than 95% of domestic waste water is treated in a municipal waste water treatment plant nowadays. A real revolution!

In 2003, a long-term follow-up plan for the condition of the St. Lawrence was developed. Thanks to these indicators, we have a better idea of the river's health.

In 2005, the Government of Quebec created the first aquatic reserve, the Réserve aquatique de l'Estuaire-de-la-Rivière-Bonaventure, thereby protecting a major wetland in the Gaspé, as well as helping to protect vulnerable species.

The St. Lawrence Global Observatory is the most complete source of scientific information accessible to the public for better sustainable management of the St. Lawrence ecosystem.

The ZIP (Priority Intervention Zone) committees, which are excellent models of community action, have launched more than 1000 concrete and diversified projects since the 1990s. These projects have raised the awareness of thousands of citizens about the condition of the St. Lawrence River, created wildlife habitats and new bicycle paths and, finally, cleaned up hundreds of kilometres of coastline. The ZIP committees do sustainable work and contribute enormously to our river's health.

We have a lot of work ahead of us. Although the St. Lawrence ecosystem is in good condition, it is still relatively vulnerable.

PHOTO: ROPED © 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 Facebook
facebook.com/G3EEWAG

Words in boldface and underlined: see Glossary on page 58

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, so long as the guidelines contained in the *Guide de consommation du poisson de pêche sportive en eau douce* are followed, the concentration of toxic substances is not high enough to compromise the consumption of marine organisms or freshwater fishes.

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.

G3E: Education and Water Monitoring Action Group

G3E is developing citizen science programs, educational kits and other educational activities focusing on aquatic health. For example, the Adopt a River program involves observing benthic macroinvertebrates (insect larvae, worms, crustaceans) in a river and analyzing certain water quality parameters, such as coliform content and dissolved oxygen.

To explore all the programs, see:
g3e-ewag.ca/home.html
facebook.com/G3EEWAG

PHOTOS: J'ADOPTE UN COURS D'EAU, G3E

PHOTO: LUC HÉBERT © ENVIRONMENT CANADA

Caring Together

Frédéric Back chose art to convey his environmental message through his paintings, drawings, movies, illustrations, etc. He devoted his life as an artist to working for the environment, raising awareness and promoting the beauties and challenges of our planet.

When he died on December 24, 2013, he left an outstanding legacy to future generations. Thousands of drawings and other creations will continue to convey his message long after his passing.

As a defender of oceans and rivers, he also illustrated the movie *The Mighty River*, which tells the story of the St. Lawrence River.

On his website, you will find his artwork as well as ideas to inspire you to take action. Who knows, maybe you will discover your inner artist?

Explore the educational kit *The Mighty River* and several other activities for 3- to 15-year-olds.

fredericback.com/ateliers/index.en.shtml

PHOTOS: BERNARD BRAULT

BY YOUTH, FOR YOUTH

What does this statement inspire in you?

This statement about water was written in March 2006 by participants at the Youth Summit on Water and the St. Lawrence. Young people, like you, who wanted to raise the awareness of other young people and also adults about the state of the St. Lawrence and its tributaries.

Years later, water issues are still just as important. Take a few minutes to think about all your everyday activities that require water. Unbelievable, right? Share your thoughts about the importance of water with your friends.

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.

Youth Statement on water and the St. Lawrence River

The St. Lawrence is in trouble...

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;
- participate 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 other references on page 56

GET INVOLVED!

PHOTO: ENvironnement JEUnesse

ENvironnement JEUnesse is a network for youth involvement in the environment in Quebec

ENvironnement JEUnesse brings together and motivates young people and stakeholders in a dynamic, stimulating and well-connected network. Young people live real-life experiences in it: they learn how to exercise their democratic powers, and interact and engage in joint reflection by taking concrete action. That's the method ENvironnement JEUnesse has chosen to help them grow and become leaders in society. Because by acting together, a real impact on the environment and society can be achieved.

This is accomplished through provincial outreach activities such as days of cycling in the winter. These are extreme events that attract media attention and draw attention to the causes supported by the organization. ENvironnement JEUnesse is a provincial organization that holds activities all across the province. It is a network for Quebec youth involved in the environment. Visit the website to learn more about projects that you could participate in.

enjeu.qc.ca (in French only)

NATURE WATCH

Are you a good Eco*Watcher*?

NatureWatch is a series of community-based monitoring programs through which researchers obtain data on indicators of the state of health of Canadian ecosystems.

naturewatch.ca

These are your best tools for the future:

IMAGINATION
Your ideas and creativity are part of the solutions.

SHARING
Share your ideas—they will have greater impact. Pass the word!

ACTION
However modest your actions, they help to make a difference.

COMMUNITY SPIRIT
Get involved in your community or a mutual aid network.

KNOWLEDGE
Learn about and understand the world you live in.

David Suzuki Foundation: Reconnect with the St. Lawrence!

The David Suzuki Foundation (DSF) has been working for more than 20 years to protect natural diversity and our quality of life, now and in the future. For nearly 4 years, the DSF has been inviting Quebecers to reconnect with the St. Lawrence River. Since the river flows through our communities, the river's health is our own health. Without this awareness, the pressure from our continued presence on the river will only hasten its gradual degradation. This is why the DSF has created the Ambassadors of the St. Lawrence, to provide a free conference to enable you to get a full grasp of the interconnection between us and the St. Lawrence River. Would you like to organize a conference? Explore all the events and activities for reconnecting with the river.

davidsuzuki.org/fr/ce-que-vous-pouvez-faire/renouez-avec-le-fleuve (in French only)

facebook.com/davidsuzuki

Monique Fitz-Back Mon climat et moi

The Foundation is a charitable organization focusing on sustainable development as its mission. Together with its partners, the Foundation develops educational kits on the environment, among other things. *Mon fleuve et moi* is a project to raise young people's awareness of the St. Lawrence River. *Mon climat et moi* is an interactive educational website that focuses on **climate** change and its health impacts. It is a dynamic site, where you will find images, questionnaires, current events and videos to pique your curiosity.

fondationmf.ca (in French only)

facebook.com/fondationmf

See other references on page 56

ABOVE ALL, THE FUTURE NEEDS YOUNG PEOPLE LIKE YOU TO BE TOMORROW'S DECISION-MAKERS.

OXFAM QUÉBEC

Oxfam-Québec is an organization made up of dynamic and committed people working together to build a world without poverty.

People are at the heart of its actions. They carry out development projects, save lives by delivering emergency humanitarian assistance, organize fundraisers to support populations in the South, run advocacy campaigns for sustainable change and mobilize Quebec youth. Oxfam-Québec in action is all that!

Young people like you are key to accomplishing these actions. That is why Oxfam offers a number of activities, geared to your interests, so you can become involved and be an actor for social change. By signing up on the mailing list, you will receive the e-newsletter and courses of action to explore: **oxfam.qc.ca/en/get-involved/sign-up**.

Every spring, some 10 000 youth join in Marche Monde. This colourful event is an ideal opportunity to celebrate joint commitment and meet other young people determined to do their share to change the world. There are several volunteer projects available over the course of the year if you feel like becoming involved in the organization. For further information: **oxfam.qc.ca/en/get-involved**. This year, all the walkers are providing financial support for Oxfam-Québec projects to provide access to drinking water in Burkina Faso and the Democratic Republic of Congo.

- Video: À quoi rêvez-vous comme monde **oxfam.qc.ca/video/a-quoi-revez-vous-comme-monde** (in French only)
- Oxfam-Québec's YouTube channel: **youtube.com/user/Oxfamquebec2**

PHOTO: OXFAM QUÉBEC

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. These are regional bodies that bring river users together so that they can take joint action. They find solutions to local and regional problems related to the St. Lawrence and the uses made of it. From installing nesting boxes and planting trees to stabilizing riverbanks and developing hiking trails, they play a concrete 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 13 ZIP committees in Quebec. Contact the one in your area to find out about projects in which you can take part.

Find the committee in your region:
strategiessl.qc.ca/les-organismes/les-comites-zip (in French only)

Other ways to take action:

BioKits
www.ec.gc.ca/biotrousses-BioKits/Default.asp?lang=En&n=C0269262-1

Canadian Wildlife Federation
www.cwf-fcf.org/en

Coalition Eau Secours!
www.eausecours.org (in French only)

David Suzuki Foundation
www.davidsuzuki.org

Ducks Unlimited Canada
www.ducks.ca

EcoAction Community Funding Program
www.ec.gc.ca/ecoaction/Default.asp?lang=En&n=FA475FEB-1

ENvironnement JEUnesse
www.enjeu.qc.ca (in French only)

Équiterre
www.equiterre.org/en

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

Fondation Monique Fitz-Back
www.fondationmf.ca (in French only)

Fondation Rivières
http://fondationrivieres.org/?lang=en

Greenpeace
www.greenpeace.ca

Le Réseau d'observation des mammifères marins
www.romm.ca (in French only)

Nature Action
http://nature-action.qc.ca/site/action-is-in-our-nature

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

Nature Watch
www.naturewatch.ca

Oxfam-Québec
www.oxfam.qc.ca/jeunes (in French only)

Regroupement des organismes de bassins versants du Québec
www.robvq.qc.ca (in French only)

Sierra Youth Coalition
www.syc-cjs.org/home

References

GET INFORMED!

Aquatic Invasive Species, Fisheries and Oceans Canada
www.qc.dfo-mpo.gc.ca/publications/envahissant-invasive/mesures-preventives-preventive-measures-eng.html

Environment Canada
www.ec.gc.ca

Groupe de recherche et d'éducation sur les mammifères marins
www.baleinesendirect.net (in French only)

Invasive Alien Species, Ministère Forêts, Faune et Parcs
www.mffp.gouv.qc.ca/faune/especes/envahissantes/index.jsp (in French only)

Maurice Lamontagne Institute
www.qc.dfo-mpo.gc.ca/iml-mli/institut-institute/index-eng.html

Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques
www.mddelcc.gouv.qc.ca/index_en.asp

Mon climat, ma santé
www.monclimatmasante.qc.ca/accueil.aspx (in French only)

Mon fleuve, mon histoire
www.radio-canada.ca/sujet/monfleuvemonhistoire (in French only)

St. Lawrence Action Plan
http://planstlaurent.qc.ca/en/home.html

St. Lawrence Global Observatory
www.ogsl.ca/en

Stratégies Saint-Laurent
www.strategiessl.qc.ca/english

The Great Lakes, Environmental Atlas and Resource Book
www.epa.gov/greatlakes/atlas/index.html

Youth X Change
www.youthxchange.net/main/home.asp

TO VISIT!

A Museum Experience
www.maritime.musees.qc.ca/en/index.php

Biophare
www.biophare.com (in French only)

Biosphere
www.ec.gc.ca/biosphere/Default.asp?lang=En&n=3C2E8507-1

Centre de la biodiversité du Québec
www.biodiversite.net/home

Centre d'interprétation Baie-du-Fèvre
www.baie-du-febvre.net/oies_centre_interpretation.asp (in French only)

Espace pour la vie
www.espacepourlavie.ca/en

Île Saint-Quentin
www.ilesaintquentin.com (in French only)

Parks Canada
www.pc.gc.ca/eng/index.aspx

SÉPAQ
www.sepaq.com/home/index.dot?language_id=1

KITS AND EDUCATIONAL PROGRAMS

Education and Water Monitoring Action Group
www.g3e-ewag.ca/programs.html

Établissements verts Brundtland
www.evb.lacsq.org/nos-outils/trousses-et-activites-pedagogiques/fleuves-du-monde (in French only)

Frederic Back Activity Kits
www.fredericback.com/ateliers/index.en.shtml

In-Terre-Actif
www.in-terre-actif.com/english_tools/english_tools

Vu du large
www.vudularge.ca/index777.html (in French only)

Environment Canada's Biosphere

Look up at the sky a moment… How do meteorologists predict the weather? Do you recognize a brewing storm? Why is the planet warming? Who is in the Arctic besides icebergs and Polar Bears? What will happen to them? Where does energy come from? Do you find that there are more and more extreme weather events?

What do you say? Curious to find out more?

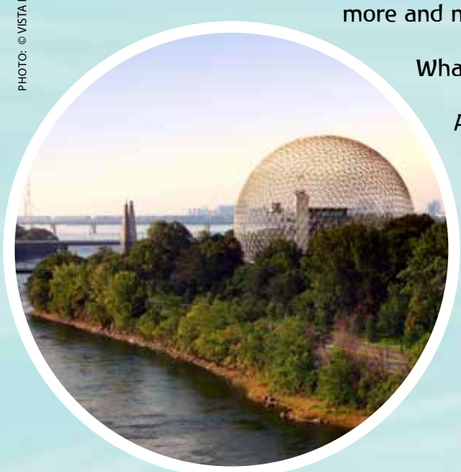


PHOTO: © VISTA PHOTO

At the Biosphere, you can share your ideas and questions with specialists. With many halls to explore there, you can discover current environmental issues. Come visit to better understand the phenomena associated with the atmosphere, water and climate. You will learn all about global warming, renewable energy, cyclones and more! After a day with us, you will understand about planetary changes, and you will leave with a head full of ideas to change the world! Come visit us with your friends, bring a picnic and feel free to ask questions!

BOOKS

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Gagne, Jean. ***À la découverte du Saint-Laurent***, Les éditions de l'homme, 2005, 338 p. (in French only)

Gingras, D. ***Capsules-éclair sur l'état du Saint-Laurent : Le fleuve… en bref***, Environnement Canada, Région du Québec, Conservation de l'environnement, Centre Saint-Laurent, 1997. (in French only)

Guay, Lorraine. ***À la découverte des îles du Saint-Laurent. De Cataracoui à Anticosti***, Cahiers des Amériques, 2003, 400 p. (in French only)

Hamel, Jean-François and Annie Mercier. ***The St. Lawrence: The Untamed Beauty of the Great River***, Montréal, Les Éditions de l'Homme, 2005, 242 p.

Hamel, Jean-François et Annie Mercier. ***L'estuaire du Saint-Laurent et ses jardins secrets***, Saint-Laurent, Éditions du Trécarré, 1996, 173 p. (in French only)

Matte, Gilles et Gilles Pellerin, ***Carnets du Saint-Laurent***, collection; Les carnets, 1999, 128 p. (in French only)

Ouellet, Marie-Claude. ***Le Saint-Laurent, un fleuve à découvrir***, Montréal, Les Éditions de l'Homme, 1999, 137 p. (in French only)

DOCUMENTARIES

Back, Frédéric. ***The Mighty River***. Radio-Canada, 1993, animated film.

Lemire, Jean and Alain Belhumeur. ***Encounters with the Whales of the St. Lawrence***, Poly-Productions, 1997.

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.

AQUACULTURE
Cultivation of aquatic species.

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.

CATADROMOUS
Marine species that lives in fresh water and breeds in the sea.

CETACEANS
The order of fully aquatic mammals that produce milk to feed their young. This group is limited to whales, dolphins and porpoises.

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 the Earth's surface.

COLD-BLOODED
Refers to an animal that does not generate its own heat and depends on the outside temperature to regulate its temperature.

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.

DIKE
Structure that forms a barrier to water to protect coastlines and lowlands or to control a river and protect its shores.

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

DREDGING
Operation usually carried out in shallow seas or freshwater areas with the purpose of extracting bottom sediments and disposing of them at a different location. This technique is often used to keep waterways open for shipping.

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.

EURASIA
Landmass consisting of Europe and Asia.

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

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

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.

GROUNDFISH
A species of fish that feeds or lives near the bottom of a body of water.

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.

HULL
Outer shell of a ship.

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.

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

INVASIVE ALIEN SPECIES
Plant, land or marine animal, alga, bacterium or virus that comes from elsewhere and is often introduced accidentally by marine transport. Invasive alien species have few enemies and multiply rapidly.

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

MARICULTURE
Refers to marine aquaculture, the branch of aquaculture specializing in the culture of marine animals in their natural environment or in water collected from this environment.

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 (phytoplankton) or animals (zooplankton), but including larger forms having only weak powers of locomotion.

PONTOCASPIAN REGION
Term designating the origin of organisms living in the Pontic steppes, the territory north of the Black Sea, stretching through southern Ukraine and Russia, and extending to the eastern side of the Caspian Sea.

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

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.

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.

WASTE WATER
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.

Great Lakes–St. Lawrence Ecosystem

GAME ON PAGE 7
How many species of plants and animals can be found 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, only 1% of which is renewable.

GAME ON PAGE 12
MAGTOGOEK:
THE PATH THAT WALKS

Overview of the Fluvial Section

GAME ON PAGE 19
Freshwater fish riddles

a) WALLEYE (WALL-EYE)
b) BASS

GAME ON PAGE 21
Can you identify these three vessels by studying their silhouettes and reading the clues?

a) LAKER
b) OCEAN-GOING FREIGHTER
c) OIL TANKER

GAME ON PAGE 23
The largest rapids in eastern North America are: THE LACHINE RAPIDS.

Overview of the Estuary

GAME ON PAGE 29
KEBEC: WHERE THE RIVER NARROWS

GAME ON PAGE 30
About 3 million Quebecers get their drinking water from the St. Lawrence River (that's 45% of the population of Quebec).

GAME ON PAGE 31
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 33

Across	Down
1. HUMPBACK	A. BLUBBER
2. ORCA	B. BLOWING
3. PORPOISE	C. BLUE
4. BALEEN	D. TADOUSSAC
5. BELUGA	E. FIN

GAME ON PAGE 35
The cities that take their drinking water from the St. Lawrence are:

MONTRÉAL
TROIS-RIVIÈRES
QUÉBEC
LÉVIS

The two cities that are at risk of losing the St. Lawrence as their source of drinking water are: QUÉBEC and LÉVIS.

GAME ON PAGE 36
GLASSWORT (GLASS-WORT)

Overview of the Gulf

GAME ON PAGE 41
Check the map on page 38 for the answers.

GAME ON PAGE 42
The product that rarely contains algal extracts is: BREAD.

Health Report on the St. Lawrence

GAME ON PAGE 46
The food chain:

5000 HERRING
6000 PLANKTER
130000 MICROSCOPIC ALGAE

Encoded message:

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

GAME ON PAGE 49
Threatened or vulnerable species:

A) BELUGA WHALE
B) PIPING PLOVER
C) LAKE STURGEON
D) BALD EAGLE
E) AMERICAN WATER-WILLOW

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