

Our Marine Treasure

*Nine Experts
on the Future
of the Gulf*



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Nine Experts on the Future of the Gulf

July 2015

Blue Whale Campaign

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Editor's note:

Welcome to Our Marine Treasure, an attempt to educate the public on the hazards of oil and gas development in the Gulf of St Lawrence. For the past many months, experts on the physical, biological and anthropogenic aspects of this semi-enclosed sea were invited to answer a simple question: is oil and gas development in the Gulf of St Lawrence compatible with the long term safety, sustainability and prosperity of this region and the endangered species within?

Their answers have been collected into this document.

Each expert was encouraged to answer this question from their own perspective, calling on their specific expertise and, if possible, research they themselves participated in. The resulting document before you is diverse and enlightening, giving these experts a platform on which to share their work in a time when the voice of science too often falls on deaf ears.

Enclosed are the assessments of researchers working with birds, whales, sharks, commercial fish species, ocean currents, underwater noise pollution, public administration, conflicts with industry and much more. The question they've been asked to answer is of particular importance now, with oil and gas development working toward regulatory approval in the Gulf of St Lawrence.

Since the late 1990s, the petroleum company Corridor Resources has had their eyes set on a site known as the Old Harry Prospect, 460 metres underwater in the heart of the Gulf of St Lawrence. They have until January 15, 2016 to begin drilling.

This would be the first major oil and gas operation to take place in the Gulf, a region identified as the most productive marine ecosystem in Canada and also one of the most vulnerable to development. The cultural and economic value of this body of water to Maritime communities is impossible to quantify. The ability for Atlantic Canadians to make informed decisions about this development is the ultimate goal of this document.

Our Marine Treasure is an initiative of the Blue Whale Campaign, which aims to educate Atlantic Canadians about endangered species occupying our coast and to encourage sustainable management of the Gulf of St Lawrence. These goals intersect at the Old Harry

Prospect, a region slated for drilling which could jeopardize the entire Gulf ecosystem, and thus the endangered species depending on it. The critically endangered blue whale is one such species.

It's estimated there are fewer than 250 of these gentle giants left in Atlantic Canada. We in the Blue Whale Campaign have a real fear that oil and gas development in the Gulf will result in their disappearance.

If the contents of this document stirs you, if you're moved by our efforts to preserve the critically endangered blue whale and to oppose oil and gas development in the Gulf, please consider contributing to our cause. If donating isn't in the cards for you, consider adding your voice to ours and follow us online. See the links below.

But the most important action you can take on behalf of the blue whale and the Gulf of St Lawrence is to become informed. There's no better place to start than with the document in front of you. All of our experts speak for themselves and have important perspectives to offer.

Enjoy,

Zack Metcalfe

Campaign Coordinator, Blue Whale Campaign

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“Without a healthy and productive Gulf our economies, so dependent on fisheries, aquaculture and marine and coastal tourism, would be decimated.”

Dr Irene Novaczek, Marine Ecologist

As a marine ecologist who has worked in the Gulf of St Lawrence since the 1970s, and most recently as a marine ecologist assessing the health of the only Marine Protected Area (MPA) in Prince Edward Island, Basin Head, I am convinced that any type of petroleum development in the Gulf will directly threaten this hugely important ecosystem and its endangered species.

It was 1973 when Professor Loutfi of McGill University, in the course of an ecological assessment of the Gulf, proclaimed it the most productive marine ecosystem in Canada, and to this day Fisheries and Oceans Canada not only agrees (DFO, 2010 Marine Ecosystems Status and Trends Report) but also has pointed out that the Gulf is extraordinarily sensitive and vulnerable to industrial development (DFO Maritime Provinces Regional Habitat Status Report 2001).

As one of the largest estuarine/marine systems in the world, the Gulf is hugely complex, both in terms of biological and physical systems. It has also been subject to several hundred years of pollution, overfishing, habitat destruction and most recently, climate change impacts which have already caused profound and disturbing changes to the marine food chain and its supporting environment.

Nevertheless the Gulf continues to provide an exceptional quality of life and spiritual solace to the people of the five east coast provinces who are fortunate enough to live along its shores, whose cultures are enriched by stories, music and art inspired by this inland sea. Without a healthy and productive Gulf our economies, so dependent on fisheries, aquaculture and marine and coastal tourism, would be decimated.



Photo: Emilie Novaczek



Photo: Rylie Arnell

There are plans for developing additional Marine Protected Areas in the Gulf, as is proper considering the wealth of globally important feeding and nursery areas, seabird colonies, deepwater krill populations, migratory fish and marine mammal pathways that exist here. However, an MPA can only protect marine resources if the surrounding waters are also kept clean and functional, as water flows through all boundaries constructed by humans and laid down on paper.

In the tiny MPA at Basin Head, we are already in danger of losing the phenomenal micro-ecosystem the MPA was intended to protect, because of the influences of nutrient inputs from land, invasive species and a changing climate. The challenge of conserving marine biodiversity for the future is becoming more and more difficult, largely because of our untrammled burning of fossil fuels. To think of adding to this pernicious problem by extending drilling even into our most productive and vulnerable marine ecosystems is madness.

Yet, scientific research efforts in the Gulf have been woefully inadequate and there are massive gaps in our understanding of this precious ecosystem. It is therefore essential for all affected jurisdictions and federal agencies to work together to immediately develop and set into motion research efforts, policies and programs for the conservation and active restoration of this ecosystem and its myriad species.

Photo: Emilie Novaczek



Sea Urchins in the Gulf

Oil Spills: Did you know?

In the case of an oil spill, there are several factors which would complicate a clean up effort in the Gulf of St Lawrence:

- It is an inland sea seventy times smaller in volume than the Gulf of Mexico;
- Extremely variable instantaneous currents;
- Large amounts of confined water and;
- Is prone to frequent winter ice cover which poses extreme difficulties as there is no sound method to clean up oil spills on ice.

“Any important societal decision regarding oil and gas developments in the Gulf of St Lawrence cannot be carried out without considering greenhouse gases emissions.”

Daniel Bourgault, Ph.D, Physical Oceanographer
Institut des sciences de la mer de Rimouski (ISMER)



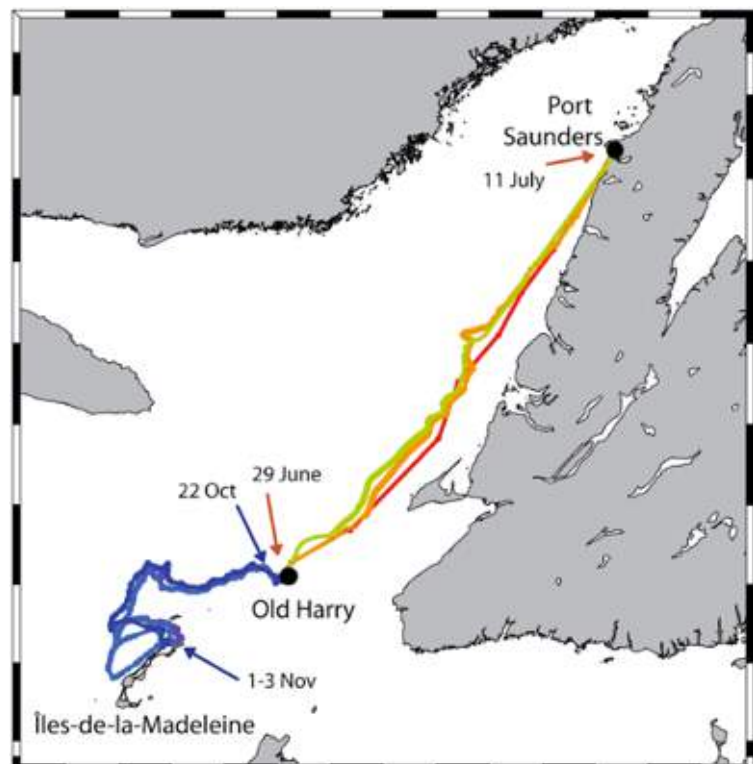
Figure 1 (below): Trajectories of surface drifters released at Old Harry on 29 June (warm colours) and on 22 October (cold colours). A cluster of three drifters were released each time. (Source: Dany Dumont and Daniel Bourgault as part of a MEOPAR-funded research project entitled Combining Innovative Models and Observations of Seasonally Ice-Infested Waters for Improving Surface Drift Forecasts)

The Gulf of St. Lawrence is relatively small and semi-enclosed. In terms of volume, it is about 3 times smaller than the North Sea and about 70 times smaller than the Gulf of Mexico. Therefore, its capacity for diluting pollutants to low, harmless concentration for the ecosystem is much less compared to other larger semi-enclosed seas where important oil and gas activities are taking place.

The semi-enclosed nature of the Gulf and the currents that characterize its circulation are such that any pollutant accidentally released within it, either at the surface or at greater depths, has little chance of being evacuated into the vast North Atlantic Ocean without first recirculating within the Gulf with a high probability of touching surrounding coastlines in its journey. This can be appreciated by examining the computer simulations we have carried out on the spreading and dispersion of inert floating substances released near the Old Harry prospect. These results are presented in the plain language video that accompanies our scientific publication on this issue: [Numerical simulations of the spread of floating passive tracer released at the Old Harry prospect](#).

While these preliminary results were obtained from computer simulations of fluid mechanics, and are therefore subject to uncertainties, new field measurements of surface trajectories measured from floating drifters now strongly support our findings.

Three drifters released at Old Harry in summer 2014 have drifted along the western coast of Newfoundland and have washed out near Port Saunders, 12 days later ([TV journalists help scientist confirm oil spill model](#)). We have released a second set of drifters in fall 2014, again at Old Harry, and these have this time washed out on Île-de-la-Madeleine about 10 days later (Figure 1).



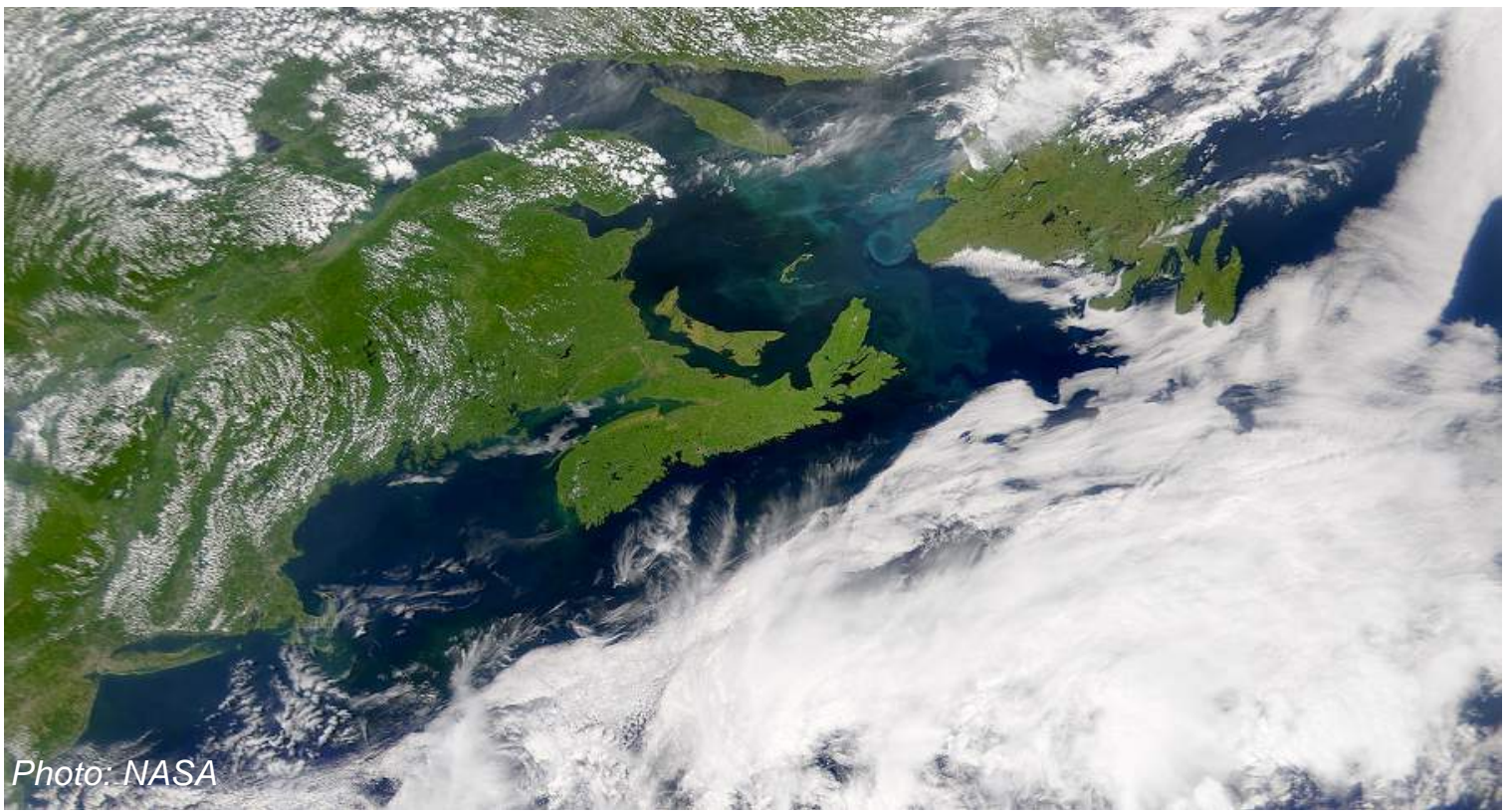


Photo: NASA

Above: This satellite image gives a spectacular view of the Gulf of St Lawrence and a phytoplankton bloom taking place within. This image shows the complexity of the surface circulation in the Gulf. Pay special attention to the complex meandering patterns and eddies. Interestingly and coincidentally, there is a large eddy right next to Old Harry.

*Below: Kelp in the Gulf
Photo: Emilie Novaczek*

When people think about the pollution risk associated with offshore oil and gas activities, the first thing that probably comes to mind is the risk associated with acute oil spill incidents, like the Deep Horizon case in the Gulf of Mexico. While these risks certainly need to be assessed, it must not be forgotten that much less spectacular chronic spills (small release of pollutant over long period of time) may in fact be more harmful for the marine ecosystem in the long run than episodic and rather rare acute spills.

The impact on the ecosystem of chronic spills that inevitably arise from activities associated with the normal operation of an offshore platform must also be evaluated. In that respect, our results on Old Harry, briefly discussed above, can also be interpreted in terms of chronic spills.

Our results suggest that the entire west coast of Newfoundland, the Îles-de-la-Madeleine and Cape Breton would be continuously subject to receive some amount of pollutant associated with a platform that would be located at Old Harry. The concentration might be negligible and acceptable for the marine ecosystem but this remains to be determined and studied before any development of oil and gas in the Gulf of St Lawrence.



Photo: Emilie Novaczek



“Seismic air guns extensively damaged fish ears at distances of 500m to several kilometres.”

Lindy Weilgart, Ph.D
Marine Bioacoustician

My expertise encompasses the impacts of underwater noise on marine life, particularly whales. Oil and gas development produces noise through seismic air gun surveys, drilling platforms, dynamic positioning of supply ships, other shipping noise and the decommissioning of oil rigs. Thus, there is a considerable amount of underwater noise generated during the exploration and exploitation of an oil or gas field.

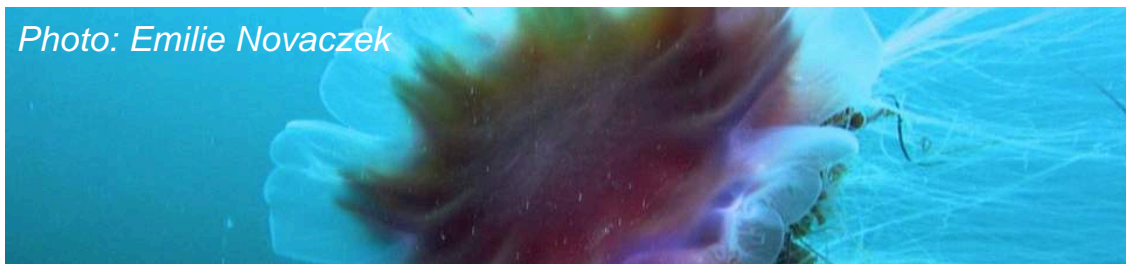
Here, I focus just on seismic air gun surveys, as these are the loudest sources of human-made noise except for explosions. Noise from a single seismic survey, used to discover oil and gas deposits sometimes hundreds of kilometers under the sea floor, can blanket an area the size of Newfoundland and Labrador, raising background noise levels 100 fold continuously for weeks or months. These air gun surveys are loud enough to penetrate hundreds of kilometers into the ocean floor, even after going through thousands of meters of ocean. This exposes marine life to chronic noise, which can compromise the welfare of populations and the entire ecosystem, including marine biodiversity. Seismic noise has been thought to at least contribute to some species' declines or lack of recovery. This exposes marine life to chronic noise, which can compromise the welfare of populations and the entire ecosystem, including marine biodiversity.

The endangered blue whale inhabits the Gulf of St Lawrence (Northwest Atlantic population). When observed off the coast of California (Northeast Pacific population), this species has been shown to stop calling in the presence of seismic surveys 10km away. In contrast, blue whales in the St Lawrence increase their calling during a low-power seismic survey, probably to compensate for the additional noise. Marine mammals also avoid seismic noise by leaving the area, often well beyond the survey length.

Old Harry: Did you know?

- This geological structure was named in honour of the closest settlement: the little fishing village of “Old Harry” in the Magdalen Islands.
- Old Harry is also a nickname given to the devil (also called “Old nick”!)

Photo: Emilie Novaczek



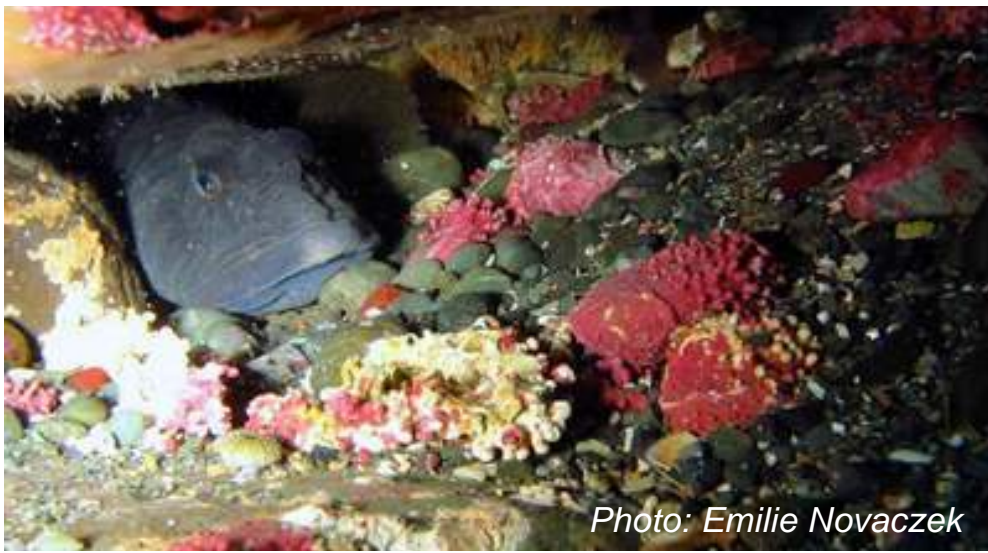


Photo: Emilie Novaczek

*A pout fish,
photographed off the
coast of Newfoundland.*

Seismic air guns are a probable cause of whale strandings and deaths as well. Seismic noise broadcasts have been shown to cause stress effects or physiological changes in fish, invertebrates and marine mammals, which, if chronic, can inhibit the immune system or otherwise compromise the health of animals. Many stranded or entangled dolphins or whales have been shown to have profound hearing loss, which could have led to their stranding or entanglement in the first place.

Seismic air guns extensively damaged fish ears at distances of 500m to several kilometres. Reduced catch rates of 40%–80% and decreased abundance have been reported near seismic surveys in species such as Atlantic cod, haddock, rockfish, herring, sand eel and blue whiting. These effects can last up to five days after exposure and at distances of more than 30km from a seismic survey.

Seismic noise can also impact fish eggs and larvae, damaging or killing them or reducing their growth. Giant squid have stranded, showing massive internal injuries and badly damaged ears near seismic surveys. Other invertebrates exhibited decreased catch rates due to seismic noise exposure. Snow crabs, clams and wild scallop larvae showed stress responses, developmental delays and body malformations.

In conclusion, at least 37 marine species have been shown to be affected by seismic air gun noise. These impacts include reduced feeding, avoidance of seismic noise, changes in calling rates, avoidance of important habitat, stress, decreased egg viability and growth, decreased catch rates, hearing impairment, massive injuries and even death by strandings. Seismic air gun noise must be considered a serious marine environmental pollutant. Thus, oil and gas development is not safe nor appropriate for the Gulf of St Lawrence ecosystem.

"Seismic noise broadcasts have been shown to cause stress effects or physiological changes in fish, invertebrates and marine mammals, which, if chronic, can inhibit the immune system or otherwise compromise the health of animals."

“Chronic oil pollution from small spills has the potential to significantly reduce seabird populations over time.”

Dr. Gail S. Fraser

Associate Professor, Faculty of Environmental Studies,
York University, Toronto



If we are to manage an ecosystem sustainably, we must have a detailed understanding of the population dynamics of the species in that ecosystem and of the natural and anthropogenic processes which impact those populations.

Ocean ecosystems are complex and not well understood, particularly organisms such as seabirds, which spend most of their lives at sea, coming to land only to breed. Seabirds, like blue whales, are long-lived, have delayed reproductive maturity and low reproductive rates. For species with these traits, activities which kill adults can have significant and negative consequences for their populations. Taken together, it is particularly important that industries which operate in these ecosystems, which are in publically owned waters, contribute to our knowledge base to further enhance our abilities to protect and sustain these ecosystems.

Environmental assessments (EAs) in Canada are meant to help protect the environment from development and contribute to overall sustainability. Seabirds are considered a “valued ecosystem component” in EAs completed for offshore oil production in Newfoundland and Labrador (NL).

Four such EAs have been completed in this region from 1985 to 2011 and there are two re-occurring concerns for seabirds: 1) mortality due to exposure to oil pollution either chronically from small, frequent spills or from larger infrequent spills; and 2) attraction and mortality due to light pollution from lights and gas flaring. In these EAs there is a great deal of information on the biology of various species, but I argue (as do others) that these projects have contributed little to our understanding of how seabird populations are potentially impacted from oil production on the Grand Banks of Newfoundland.

For example, chronic oil pollution from small spills has the potential to significantly reduce seabird populations over time. This was recognized by Environment Canada in their reviews of the aforementioned EAs.

The most recent EA stated there was no significant effect on seabirds from small spills, but provides no regional data to support that prediction: no data on the industry's success in responding to those oil spills or how they assessed the impacts of those spills on seabird populations.

The effects of light pollution on seabird populations are likewise poorly understood. We know that some species, like Leach's storm petrels, are particularly disoriented by and attracted to light, like moths to a flame. Petrels have "wrecks" where hundreds are attracted to light and crash onto islands, boats or offshore platforms. Experiments to understand this issue were proposed by independent researchers 15 years ago but were prevented from occurring because independent researchers were not allowed on offshore platforms. Only very recently was there some concession by industry to take this issue seriously. Unfortunately, Leach's storm petrels appear to be declining and we have little quality information from offshore production platforms as to their role in the decline (if any).

The Leach's storm petrel is a species of bird attracted to artificial light, so much so light pollution from offshore oil and gas development could be having significant impacts on their orientation. Shown in this photo is a "bird wreck," where hundreds of birds crash into a lighted ship at sea.

This photo was taken anonymously



This lack of data has not been addressed by subsequent EAs. Industry may argue that they've done enough, but it's clear from an analysis of the EA processes and from the poor quality of "data" collected by operators on platforms, that seabirds, a "valued ecosystem component," are simply not their priority.

The environmental impacts of offshore oil production on seabirds in the northwest Atlantic Ocean are not well understood after three decades of oil production in the region. There is a serious lack of transparency regarding access to environmental data due to legislation (Canada-Newfoundland and Labrador Atlantic Accord Implementation Act). The EA processes, which have been used to determine and mitigate environmental impacts, is not protecting seabirds. Based on past practices, we cannot expect oil and gas development to be any different in the Gulf of St. Lawrence and therefore, it is not compatible with the protection of ecological sustainability in the region.

“This industry should not be allowed to take hold in the Gulf, particularly in the context of climate change.”

**Anne Fauré, Ph.D Student in public administration
École Nationale d'administration publique, Montréal**

My work points out a big gap between integrated coastal zone management policies and hydrocarbon resource development in the Gulf of St Lawrence. Without real public participation; a tangible, integrated approach; and knowledge of the potential impacts (social, economic, environmental) of oil and gas development, this industry should not be allowed to take hold in the Gulf, particularly in the context of climate change.

My Ph.D research is centred on the integrated coastal zone management tools proposed by the governments of Canada and Québec, tools which are meant to enable the sustainable development of coastal zones and marine resources. One of the deficiencies in these tools, shown by our research, is the lack of opportunity for coastal communities to debate and oppose oil and gas projects formally. These elements are absolutely necessary for the common good.

Integrated coastal zone management tools call for the contribution of a wide variety of stakeholders in order to achieve sustainable development in the Gulf of St Lawrence. That is why, in addition to the governments of Canada and of the five Atlantic Canadian provinces (Québec, New-Brunswick, Nova Scotia, Prince Edward Islands and Newfoundland and Labrador), there is a call for non-governmental organizations, users, companies, fishermen, citizens and environmentalists, to pool their knowledge and experience to contribute to sustainable development.

For example, the St Lawrence River has a long history of environmental programs to support the sustainable development of its unique ecosystem. In their policies, the governments of Canada and Québec made a common effort to place the communities of coastal zones at the heart of governance for this ecosystem. In this way, the St Lawrence Action Plan proposed different tools to involve both citizens and stakeholders.



Photo: Anne Fauré



Photo: Anne Fauré

"The St Lawrence River has a long history of environmental programs to support the sustainable development of its unique ecosystem."

Furthermore, the federal Oceans Act (1996) recommends the implementation of integrated management, the precautionary approach and sustainable development in all of Canada's oceans and seas. There are also the Large Ocean Management Areas (LOMA) planning tools proposed for the St Lawrence Estuary and the Gulf of St Lawrence. They are supposed to address "the socio-economic needs of humankind while preserving the health of the marine ecosystem." (DFO, 2014)

However, the boom of hydrocarbon development in Canada exposed the limits of these various tools, as they are largely ignored by the promoters of industry and governments, who are distracted by economic potential. Both these groups tend to frame consensus building processes in industry's favour and avoid contestation.

Another issue is the piecemeal approach proposed by the federal government, which is to promote hydrocarbon development separately in each of the five provinces surrounding the Gulf of St Lawrence. This brings about a multiplication of instruments and the fragmentation of marine territory, which runs contrary to the integrated approach.

For example, things like Strategic Environmental Assessments (SEA) are done separately in each province. Quebec SEAs and Newfoundland SEAs are distinct. In both cases, they showed a lack of consultation and consideration for coastal communities, which forces us to question the legitimacy of this decision making process. Such assessments do not easily allow the expression of the territorialized common good and give few opportunities for coastal communities to influence decisions and participate in real co-governance of the Gulf of St Lawrence.

In this way, latent or open conflicts arise in different forms, locations, and at different scales over time. It's interesting to note that these conflicts are essential to maintaining a bit of democracy.



Photo: Anne Fauré

“Shorebirds in the Gulf include sandpipers and plovers, including the endangered Piping Plover, several gull species, cormorants and many waterfowl, all of whom will die in large numbers if oil from a catastrophic spill hits land anywhere around the Gulf.”

Ian L. Jones, Marine Ornithologist
Professor, Department of Biology, Memorial University

Birds in the Gulf can be classed into two groups, seabirds and ‘shorebirds’ (here, including cormorants, gulls and waterfowl). Seabirds are defined by their offshore life except during the breeding season when they gather at dense breeding colonies.

The eastern Gulf (a productive shallow basin nearly enclosed from the open ocean by land masses) is low in both diversity and number of seabirds compared to the northwest Atlantic to the east of Nova Scotia, Newfoundland and Labrador. However, seabirds in the ‘most vulnerable to oil’ category (Atlantic Puffins, Common Murres and Razorbills) occur and breed in the eastern Gulf in small numbers, at sites close to the proposed oil field at the Old Harry Prospect.

Northern Gannets and Black-legged Kittiwakes (somewhat less vulnerable to oil than auks) also breed at Île Brion and Rochers-aux-Oiseaux in the Gulf. In winter, local breeders are joined by northern migrant seabirds such as Dovekies and Thick-billed Murres that occur in areas free of continuous ice cover.

For auks, any exposure to crude oil is usually fatal, while gulls and gannets die only if more heavily oiled. Chronic, small oil spills that typify offshore oil extraction activities are deadly to auks, and a catastrophic release of oil (blowout) would also be serious. However, the impact of catastrophic spills are generally exaggerated compared to chronic spills - the latter kill more seabirds annually.

Most seabird species of the Gulf have small, depleted populations persisting from historic persecution and habitat destruction, making them even more vulnerable to extirpation by oil spills. Because the Gulf is surrounded by shorelines with many beaches (e.g., Îles-de-la-Madeleine and Port-au-Port Peninsula) and productive estuaries, oil spills offshore are more likely to affect shorebirds than the more ‘pelagic’ seabirds, when the oil drifts to land.

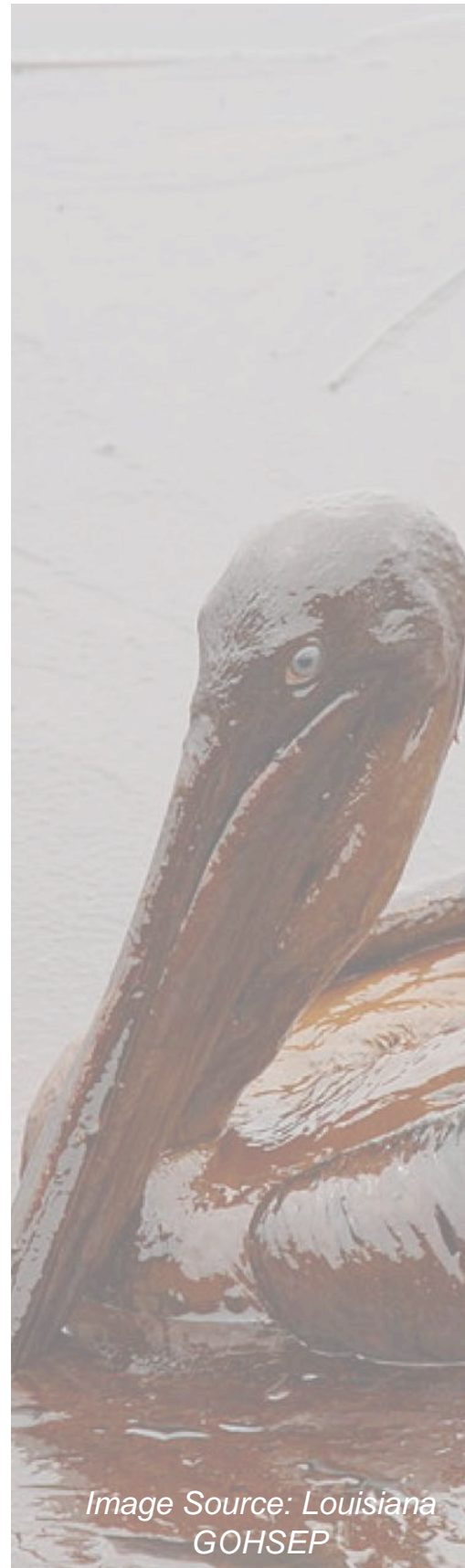
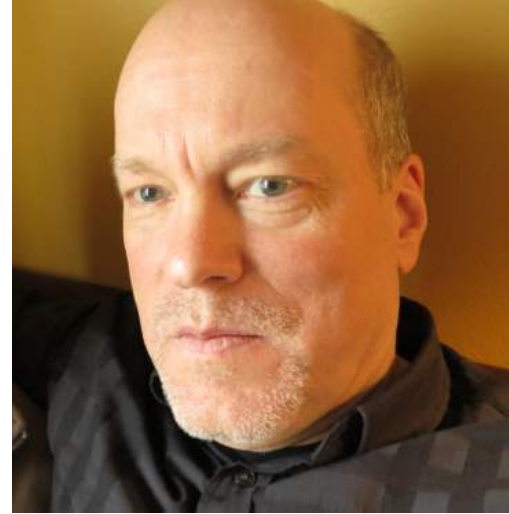


Image Source: Louisiana
GOHSEP

The piping plover is a sparrow-sized shorebird which builds its nest on beaches surrounding the Gulf of St Lawrence. It was listed as an endangered species in Canada in 1985 and has since made no significant strides towards recovery

*Image Source:
ShutterGlow*



Shorebirds in the Gulf include sandpipers and plovers (including the endangered Piping Plover), several gull species, cormorants and many waterfowl, all of whom will die in large numbers if oil from a catastrophic spill hits land anywhere around the Gulf.

Although several auk species and shorebirds like the endangered Piping Plover are threatened by offshore oil development in the Gulf, the main threat is less imperfections in drilling technology than it is the weakness of relevant environmental legislation and enforcement in Canada.

Like other large Canadian energy projects, offshore oil development in the Gulf is in the jurisdiction of energy boards like the Canada-Newfoundland and Labrador Offshore Petroleum Board and the National Energy Board. The usual environmental laws will not apply and are superceded by the power of these unaccountable boards, which are controlled by insiders in the oil, gas and mining industries.

If offshore oil development proceeds in the eastern Gulf, we can expect to see no enforcement of Canadian environmental laws and treaties (e.g., the Migratory Bird Treaty Act), complete secrecy covering emergency response plans, lack of disclosure of the damage caused by pollution events and essentially self-regulation by the Canadian Association of Petroleum Producers (the lobby group for Big Oil) and its subservient energy boards. This is a form of systemic corruption.

This indicates grim prospects for the maintenance of healthy bird populations (especially seabirds) in the Gulf, should the proposed activities proceed.

"The main threat is less imperfections in drilling technology than it is the weakness of relevant environmental legislation and enforcement in Canada."

“Beyond the fact that it would weaken an already altered ecosystem, it would represent the failure of us humans to cohabit in the St Lawrence and share its resources.”

Lyne Morissette, Ph.D.

Marine mammal expert & ecosystem ecologist
CEO of M – Conservation

The Gulf of St Lawrence is a vast and very complex ecosystem on which we all depend for food, navigation, jobs, tourism and leisure. Once seen as an infinite source of goods we could just take from, we now realize that ocean resources are not infinite, and that serious threats like climate change, overfishing, pollution, noise disturbance, etc. are now facing the big blue. This is also true for the Gulf of St Lawrence.

We tend to think the St Lawrence belongs to fishermen or oil and gas companies, or others. This is not the case; it belongs to us, and to future generations. In 1997, Robert Costanza quantified the value of goods and services provided by ecosystems of the world, trying to show that the worries for environmental conservation were not only the whims of some rabid “greens.” For all ecosystems of the world, the value summed up to \$33 trillion per year, with oceans accounting for \$21 trillion. The same exercise done for the Gulf of St Lawrence gives us an impressive value of \$400 billion.

The black-gold rush we are now facing has made everyone believe that we need to develop fast, heads down, to extract all the potential oil and gas resources in the Gulf, thinking more about what we could maybe win than of everything we could lose. Industry is moving fast towards the development of oil and gas projects in the Gulf of St Lawrence, way faster than our scientific capacity to quantify the potential impacts of such development. What we already know about the potential impacts of oil and gas exploration and exploitation in the Gulf should be enough for us to slow down and reconsider these projects: (*see side bar*)



Potential Impacts of oil and gas projects in the Gulf: Did you know?

- Toxic stress for some species of crustaceans (lobster, crab);
- Disturbance during the reproductive season of some fish (e.g. redfish);
- Substantial overturning of migration patterns for grey whales and;
- Disturbance in migrating patterns for fish species (redfish, halibut, turbot, plaice).





Photo: Lyne Morissette

And this is only when everything goes well, when everything is under control. But what about oil spills? The increasing occurrence and magnitude of these events is worrying scientists now more than ever. The now famous BP Oil Spill in the Gulf of Mexico has led to serious consequences for this ecosystem. Here in colder waters, however, with organisms living on a much lower metabolism, with currents, with ice...it's a very different story.

If we want to compare and explore the potential effects of a spill in the Gulf of St Lawrence we should compare it instead with what happened to the Exxon Valdez in Alaska. This was 26 years ago and most populations of fish, birds and mammals are still recovering.

Whales, particularly...

Seismic surveys during the exploration phase of oil and gas projects produce powerful sounds that greatly affect whale populations, causing changes in behavior, avoidance of some areas (like feeding areas), changes in migration patterns, but also severe lesions and real physical injuries that could affect their communication, their orientation, and ultimately their survival.

Thirteen species of cetacean live in the Gulf of St Lawrence. More than half of them are now considered threatened, endangered, or at risk in some way. Oil and gas development represents an important threat for cetaceans living in the St Lawrence. Can we afford to lose these species? Are they really important? We now know that most marine mammals are key species for marine ecosystems, that it is important to protect biodiversity in its whole. And while ecosystems might recover and reach a new, totally different, equilibrium if some species disappear, their loss would still be very damaging.

Beyond the fact that it would weaken an already altered ecosystem, it would represent the failure of us humans to cohabit in the St Lawrence and share its resources. That, for me, is the scariest thing, and this a worry shared by most scientists working on different species or aspects of the St Lawrence ecosystem.

"Seismic surveys during the exploration phase of oil and gas projects produce powerful sounds that greatly affect whale populations"



“How much more oil and gas do we need and how long before the Gulf succumbs to degeneration and widespread ecosystem failure?”

Richard Sears

Founder and Director of the Mingan Island Cetacean Study

Is oil and gas development in the Gulf compatible with the long term safety, sustainability and prosperity of this region and the endangered species within? My answer is a resounding no.

The Gulf of St Lawrence is akin to an inland sea, bordered on all sides by land, with two large openings to the Atlantic Ocean and an estuary coming from the heart of North America. Because this estuary flows from the core of North America, through densely populated areas of concentrated industry and commercial farming, the Gulf is loaded with wastes of all types. These include pesticides, fertilizers, highly toxic materials, as well as many forms of medically used chemical compounds that have passed through humans and farm animals alike. Added to this mix is inadequately treated urban wastewater and solids. This affects all species living in the Gulf of St Lawrence ecosystem and will eventually affect the North Atlantic Ocean.

These wastes, entering the Gulf via the St Lawrence River, cause oxygen dead zones as far down river as the marine estuary, cause hormonal imbalances and increased toxic loads in krill, fish, birds, mammals and humans, affecting immune systems and reproduction.

Blue whales appear to be suffering from reproductive failure, with only 23 calves recorded in 36 years of study in the Gulf of St Lawrence. There is evidence this could be caused by accumulation of toxic loads in their blubber, which act as hormonal disrupters. When you add oil exploration to this mix, with its strident noise levels from seismic work and added pollutants that will make their way into benthic and water column communities, you are at the very least irresponsible.

Studies of marine mammals in the Gulf have shown they are very sensitive to loud noises in their environment, because their acoustic sense is vital to their survival. The noise caused by oil drilling, added to seismic foraging of the seabed and increased shipping traffic, will further contribute to impoverishing the marine ecosystem, the survival of marine mammals and other species.

We already face serious ecosystem imbalances due food change disruption and the threat of climate change. Adding oil exploration to this ecosystem, when the amount of oil produced in North America now rivals that produced in the Middle East or Russia, seems superfluous and ill advised.

In fact geologists have indicated that the amount of oil and gas that can be extracted by drilling in the Gulf of St Lawrence is relatively low, and that the economic return would negligible. Can one, therefore, justify the risk of oil extraction in this productive yet fragile inland sea? The cumulative effects of the above factors on the Gulf of St Lawrence is similar to the build up of toxicity in a living being, toxicity which causes breakdowns to its immune system and eventually death. How much more oil and gas do we need and how long before the Gulf succumbs to degeneration and widespread ecosystem failure?

Our data on baleen whales indicates a decline in the number of blue whales returning to the Gulf of St Lawrence since the 1990s. Is this caused by a decline in the ecosystem, and is oil exploration worth the risk to this and other species?



“No shark could survive for long if its gills were clogged by oil.”

Jeffrey Gallant, M.Sc., Shark Researcher
President and Scientific Director of GEERG

Oil and gas development in the Gulf of St. Lawrence is a highly volatile topic in Québec. Fracking for natural gas on Anticosti Island and the possibility of drilling for oil in the Old Harry Prospect, which lies close to the Magdalen Islands, has thousands of Québécois up in arms.

Whilst both of these undertakings appear to be in limbo, a pipeline project that would carry the toxic commodity from Alberta to the St Lawrence has moved to the forefront of the anti-oil movement, which has found a silent but highly charismatic ally.

The promoters of the Trans-Canada pipeline have only themselves to blame since they made the faux pas extraordinaire of planning to build the shipping terminal right in the heart of the endangered St Lawrence beluga whale's nursery. The strategic yet justifiable use of the beluga whale as the emblematic animal for the crusade against oil in the St Lawrence was a determining factor in the movement's apparent victory against the now doubtful construction project at Cacouna.

However, when the more distant battle resumes in the Gulf, the beluga may no longer be able to champion the cause. It is therefore unfortunate that sharks still do not hold anywhere near as much sway with the general public as do any of the endearing whale species that share their habitat, since sharks may well bear the brunt of a major oil spill in the remote and unseen depths of the vast St Lawrence.

If a catastrophic spill such as the one that devastated large swaths of the Gulf of Mexico in 2010 were to occur in our Gulf, its resident and seasonal shark populations would undoubtedly be harmed. And if studies on the impact of the Deepwater Horizon oil spill are any indication, benthic sharks such as the Greenland shark and black dogfish, whose numbers are still unknown, would certainly be affected by large-scale deposits of oil on the seafloor such as those which now contaminate wide expanses of the Gulf of Mexico.



*Passive observation of a Greenland shark in the St Lawrence Estuary, near Baie-Comeau.
Jeffrey Gallant photo*

In simple terms, benthic sharks are bottom-feeders that feed on a long chain of other bottom feeders ever decreasing in size. The contaminants in all of the prey items are passed on from one animal to the next and ultimately accumulate within the apex predator. Although sharks in general are believed to be highly resistant to toxins and disease, one has to wonder how they could survive if significant populations of their fragile prey, such as Greenland halibut and crabs, were wiped out for any length of time.

The impact on sharks from the Gulf of Mexico spill was little studied, yet large numbers of them were reportedly displaced to shallow coastal areas, possibly to avoid their oil contaminated deepwater habitat, or to pursue equally displaced or entirely different prey. In the St Lawrence, the black dogfish is not known to venture into shallow water, and our telemetry research on the Greenland shark shows that its movements in shallow water are impeded by environmental barriers including warmer temperatures. In the event of a major oil spill, the Greenland shark, which is the Gulf's largest carrion-feeding vertebrate, could remain at depth and instinctively feed on the oil-tainted carcasses of the multitude of other animals killed by the spill. No shark could survive for long if its gills were clogged by oil.

Seasonal shark species would also be affected by a large spill, including the basking shark, which is the largest fish in the Gulf and the second largest fish in the world. The massive filter feeder could inadvertently ingest large concentrations of oil as it sieves surface waters throughout the Gulf in search of plankton.

Unknown numbers of the similarly sized whale shark – also a filter feeder – were unable to avoid oil slicks in the Gulf of Mexico in 2010. Since the bodies of dead sharks would have sunk in deep water, no one knows how many were killed at the time of the disaster, or how many will suffer or die from the long term effects of absorbing high concentrations of oil or chemical dispersants.

In conclusion, the threat to sharks from oil and gas production in the Gulf of St Lawrence is real, but in the absence of definitive population studies or sufficient knowledge on ocean dynamics, such as the effect of currents and ice conditions, we cannot accurately predict what would happen in the event of a catastrophic oil spill.



Pristine Baie-Saint-Pancrace, near Baie-Comeau, Québec, where Jeffrey Gallant has been studying the Greenland shark since 2003

I have nonetheless chosen to speak out of concern for sharks that are already suffering from pollution, overfishing and by-catch, and not to further demonise the oil industry or our present way of life. For I fully appreciate that our shark research and conservation efforts would not currently be possible without the use of the very power source that now threatens the animals we seek to better understand and protect, but this is a quandary fraught with political, economic, and social considerations for which this humble shark scientist can offer no viable solution.

For more information on the Greenland shark and its St. Lawrence habitat please visit www.geerg.ca