

## Canadian technology at the forefront

The Ocean Tracking Network provides the global environmental research community with a powerful new Canadian tool for observing our oceans. This leading-edge “made in Canada” technology enables researchers to observe marine life movements and ocean environments like never before.

The technology has already shown great success in two major pilot-scale tracking projects that monitor ocean conditions and marine life – POST (Pacific Ocean Shelf Tracking) and TOPP (Tagging of Pacific Predators), both of which are part of the Census of Marine Life (coml.org). OTN will apply this revolutionary technology worldwide.

The network enables the world’s best minds in marine science and management to collaborate among research institutions located in Canada, the United States, Chile, Argentina, Bermuda, Spain, South Africa, Japan, Australia, and elsewhere.

The Canadian government’s investment will also help fund a technology development program to further advance Canada’s state-of-the-art marine tracking technology. Acoustic and data-logging archival tags will be combined to create far more versatile devices, with improved data retrieval methods. Improved acoustic receiver technologies will allow OTN researchers to collect data from the listening lines almost in real-time, saving on the costs of ship time and enabling more rapid analysis and decision making.



Receivers ready to be deployed

Deployment

Tagging a small fish

## OCEAN TRACKING NETWORK

Headquartered at Dalhousie University, Canada

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# An evolution in ocean research



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### Consider a few startling facts:

Since the 1950s, the world has seen a **90% drop in the population of large oceanic fish**, such as bluefin tuna and swordfish.

Salmon, particularly Atlantic salmon, are well on their way toward endangered species status. Fisheries researchers don't have enough information to know how to reverse this trend.

Polar bears face loss of habitat due to melting ice cover as climate change threatens their survival.

The best way to combat the drastic decline in oceanic life is through heightened research into marine animal and fish behaviour and the changing physical properties of the oceans. In partnership with other internationally renowned scientists from around the globe, researchers at Dalhousie University in Halifax, Canada, are leading the world's most ambitious efforts to address climate change, ocean modeling, and marine resource management.

*"We know more about the dark side of the moon than we do about the ocean. We know even less about our marine life — how they live, where they go."*

**Dr. Ron O'Dor**, Scientific Director, OTN,  
Professor of Biology, Dalhousie University

# The Ocean Tracking Network – an international research partnership

Headquartered at Dalhousie University in Halifax, Nova Scotia, the Ocean Tracking Network is a global environmental research initiative that comprehensively monitors the movements and migrations of marine animals as well as the ocean conditions that affect them.

Funding from the Canada Foundation for Innovation and the Natural Sciences and Engineering Research Council will enable scientists to build a global network of animal tracking and ocean monitoring infrastructure that allows them to tag and track marine species for up to 20 years.

Acoustic receivers will be arranged approximately 800 metres apart in strategic locations along the sea floor to create invisible “listening lines,” in 14 ocean regions off all seven continents. Roughly the size of fire extinguishers, these receivers will detect coded acoustic signals identifying each tagged sea creature that passes over these lines. OTN listening lines will also include sophisticated sensors that measure the ocean’s temperature, depth, salinity, currents, chemistry, and other properties.

OTN’s international partners collect this information and feed it back to a central database at Dalhousie. This provides the ocean research community with current and reliable global records that can be analyzed and applied to environmental research efforts.

## How the listening lines work

*An acoustic receiver detects data transmitted by a tagged fish (or other marine animal) as the fish passes over a listening line. Alongside these receivers will be sophisticated sensors measuring the ocean’s physical conditions. OTN will collect the data from the receivers and ocean-sensing instruments by a variety of methods. Ships, or small robotic submarines called Gliders, will patrol over the lines, using acoustic modems to upload data from the receivers. Next-generation receivers will be able to “daisy-chain” data to the next receiver in the line until all the data are transmitted to a shore station. In some areas, receivers will be connected to underwater fibre-optic-cabled “ocean observatories” that send data to researchers instantly. Receivers can also be attached to buoys that relay data ashore via satellite.*

## Powered by knowledge

The ocean makes up more than 70% of the Earth’s surface. It feeds significant segments of the world’s population. It controls our climate and fuels powerful natural disasters. It is the most vital component of the planet’s infrastructure. Despite this we know very little about what happens below the ocean’s surface.

To effectively protect and anticipate the future, we need to learn a thousand times more than we currently know about the ocean’s biological and physical qualities, says OTN Scientific Director Dr. Ron O’Dor.

The Ocean Tracking Network provides researchers with the knowledge to understand changing marine conditions and their impact on sea animals and the environment that was previously unknown. It opens a new window on marine life, using unprecedented technical innovation developed in Canada, and improves the world’s ability to study, manage, and protect three-quarters of the planet, amid increasing threats from climate change and overfishing.

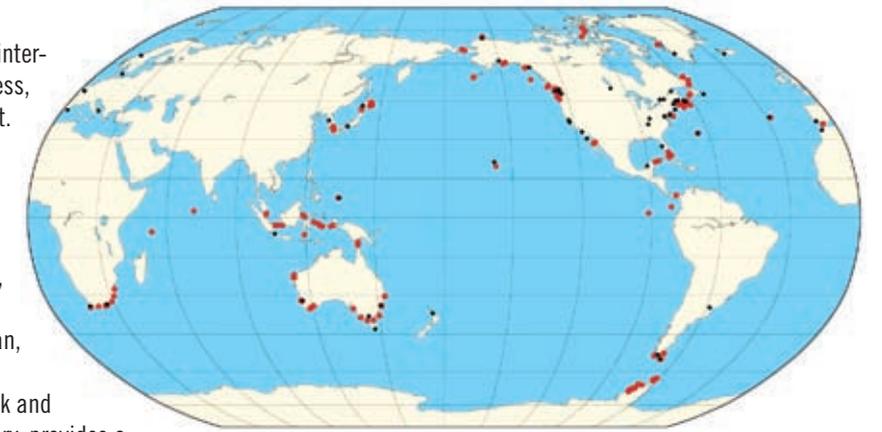
## An international effort

The power and scope of OTN come from the international partnerships of universities, business, not-for-profit organizations, and government. Dalhousie University, as a global leader in all aspects of ocean research, sits at the centre of this unique initiative.

OTN encompasses all seven continents — North and South America, Europe, Africa, Australia, Antarctica, and Asia, and covers all five oceans — the Atlantic, Pacific, Indian, Southern, and Arctic.

The vision is to build a worldwide network and infrastructure that, for the first time in history, provides a clear and detailed picture of marine life and ocean conditions around the globe.

Through an extensive web of technological communication, information from all over the world will be channeled back to Dalhousie. The distribution of OTN technology and collection of information requires partners throughout the world to coordinate the efforts. Because of these partnerships, OTN will achieve exciting scientific breakthroughs.



## OTN partners and listening lines

- Listening line
- Partner institution

## Global impact

OTN impacts the entire world. Not only does it span the globe, but the technology behind OTN and other global ocean observing systems generates billions of dollars in revenue for the global industry. Future spinoffs for Canadian and global industry include ocean research, weather observations, electronic sensor manufacturing, and more. These innovations and research capabilities allow us to advance environmental research, create employment, provide long-term financial savings, and improve fishing practices throughout the world.

These benefits, combined with the scope of a globe-spanning network of international partners, give this groundbreaking technology the potential to create tremendous social, environmental, and economic development throughout the world.

## The different methods of data collection for the Ocean Tracking Network

