



Bringing the Arctic Ocean to Eye Level

Overview of Science Outreach Projects



THE 2014-2016
SEDNA
EPIC EXPEDITION

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Arctic Ocean to Eye Level

Come aboard the 116-foot expedition vessel, the *MV Cape Race*, for an intimate, hands-on, learning experience. By setting up mobile aquariums which showcase local marine life, the 2014-2016 Sedna Epic Expedition will bring the ocean to eye level for Inuit communities in Labrador, Nunavut, and Western Greenland. This diverse educational outreach program will deliver ocean education, inspiring arctic conservation and education for citizens of the world (especially youth) who are inspired by the 2014-2016 Sedna Epic Expedition.

Sea Women Challenge

In 2016, ten amazing female explorers, divers and scientists—including three marine biologists, a chemical oceanographer, an earth scientist, a submersible pilot, an environmental lawyer and an Emmy-award winning movie maker—will take on the challenge of snorkeling over 3,000 kilometers across the Northwest Passage, the first attempt of its kind, by anyone.

The sea women will face formidable challenges as they snorkel the unforgiving and unpredictable arctic seas: hypothermia in -2 C waters, dynamically changing sea ice conditions, icebergs, gale force winds, stinging jellyfish, tusked walrus, predatory polar bears, pods of orcas, and the elusive Greenland shark, comparable in size to the great white shark.

Swimming the Northwest Passage

In July 2016, a team of ten passionate women will embark upon an epic three-month journey, snorkeling through frigid Arctic seas from Pond Inlet, Nunavut, to Inuvik, Northwest Territories. Supported by a mother ship equipped with two rigid hull boats, the snorkelers will scout, document and record the impacts of global warming on this fragile arctic ecosystem and on the aboriginal peoples' traditional ways of life.

Sedna is the Inuit goddess of the sea.

Also known as the "sea woman," she is the mother and protector of the Arctic's marine mammals.

Tried, tested and blue

But before tackling the 100-day Northwest Passage Snorkel Relay in 2016, the Team will mount a 15-day, action-packed proof-of-concept expedition in July 2014. Traveling aboard the *MV Cape Race*, along the Labrador coast to Baffin Island and, across the Davis Strait, to Western Greenland, the sea women will conduct team-building exercises, perform oceanographic studies, deliver educational outreach in Inuit communities and broadcast their findings to the world. Further, they'll demonstrate that snorkelers—using diver propulsion vehicles—can successfully navigate ice-infested arctic waters.



Flying Snorkelers

Using high-tech diver propulsion vehicles (DPVs) the snorkelers will cover great distances in frigid waters, traveling at speeds of up to five kilometers per hour. Divided into two five-woman teams, Team Narwhal and Team Beluga, the snorkelers will swim in back-to-back relays. Using one DPV per snorkeler, the women will swim in a rotation, immersed in the water for approximately one hour at a time and up to 24 hours a day.



Voices of the Arctic

Team Sedna's mission is to study the impacts of disappearing sea ice in the Arctic, and to educate and engage the public about the wonders of the Arctic and its importance to our global climate. Through cross-cultural dialogue and educational outreach, the expedition aims to exchange knowledge with Inuit groups and Elders about their home and the animals that live there. These first-hand accounts, broadcast through Sedna's global social network and media channels, aim to inform and inspire conservation for the diverse marine life of the Arctic.

Arctic Science Lab

From July 12-27, 2014, the Team will conduct three research projects to scout, record and document the marine ecosystems of the Arctic, from Labrador to Baffin Island and, across the Davis Strait, to Western Greenland:

1. Remotely Operated Vehicle ("ROV") Environmental Monitoring;
2. Seabird and Marine Mammal Surveys;
3. Arctic Marine Mini Mobile Aquarium.

1. ROV Environmental Monitoring: Beauty in the Boundaries

When pilots fly ROVs through temperature and salinity gradients known as "thermoclines" and "haloclines," respectively, they can actually observe temperature boundaries or invisible blankets that separate the mixed surface layer from the deeper colder waters. Diving through this interface reveals a surprisingly beautiful boundary layer, one that slowly shimmers like heat radiating off of a hot tarmac. Visually stunning, these boundaries serve to illustrate that ocean circulation depends on seasonal cycles to maintain the planet's temperate climate.

Led by Seattle-based Erika Bergman, submersible pilot, ROV operator and a 2013 National Geographic Young Explorer, the Team will use an inspection-class ROV to study micro-scale mixing at the halocline by **measuring conductivity, temperature, and depth** from the surface to 50 meters of water depth. The ROV will also be used to record video of mixing waters at the halocline, and to record and store imagery of the marine life encountered during their dives. These videos will be uploaded to the multiple social media platforms including Google Ocean which is freely available to the world, including educators and youth.

Using a new and very popular, open source model of ROV, Team Sedna will **engage students and the general public in science, technology, engineering and math (STEM)**. The all-female Team will serve as female role models, inspiring Inuit girls and young women from around the world to pursue STEM studies and/or careers in ocean sciences.

During the July 2014 Sedna Expedition, the Team will bring the robot (the ROV) into the **Inuit communities of Nain, Labrador, and Pangnirtung and Qikiqtarjuaq located on Baffin Island, Nunavut**. Students in these communities will be invited to examine the ROV, and, if possible, pilot them along their local shorelines as scuba divers release the animals back into their habitats. The Team will record video footage for its educational presentations, either streaming live through the Internet or during post-expedition classroom presentations.

The **data collected will be made available** to the OpenROV community, Neptune Canada's Ocean Networks Canada, Google Ocean, ExploreOcean, TELUS Spark, We are Water, the Petty Harbour Mini Aquarium, the Royal Canadian Geographical Society, WINGS Worldquest, WISE (Women in Science and Engineering) and to **school children** in the US and Canada, including students living in the Arctic. Blogs, tweets, videos, media interviews, magazine articles and other outreach materials will be broadcast to the Team's partners and sponsors.

2. Seabird and Marine Mammal Census: Count Yourself In!

During the July 2014 expedition, the Team Sedna will record seabirds observed along a line transect, scanning a 90 degree arc along the side of the vessel while following the recommended snapshot approach for flying birds. The Team will also incorporate the distance sampling methods to address the variation in bird detectability. As a sighting is made, its position and environmental parameters are recorded on standardized sighting pro formas including: **time; GPS position, orientation of the animal(s) relative to the ship; sea state; swell height; wind speed; wind direction; and visibility.**

Led by Françoise Gervais, a deep sea explorer and environmental conservation specialist with Victoria-based Ocean Networks Canada, Team Sedna will submit its census data to the well-established Eastern Canada Seabirds at Sea Monitoring Program (it also includes a marine mammal component) which is coordinated by Environment Canada.

Cetacean sightings recordings will be made from the vessel continuously during waking hours (note: we will experience virtually **24 hours-a-day** of **sunlight** during the July 2014 expedition). Video footage and photographic images will also be incorporated into the cetacean census. The methodology employed in the field will consist of an unlimited distance single line transect, with every visible or identifiable cetacean (and other animals of note) being recorded once only. Recordings will be made from the bridge of the ship and from the vessel's two zodiac boats. For each individual sighting, **the number of animals, species and behavior of animals will be recorded.** In conjunction with each sighting, the position and associated environmental parameters will be recorded. Weather conditions permitting, we will photograph as many of the seabirds and marine mammals that we encounter.

Following the expedition, **an eBook will be published** and made freely available to share these unique Canadian arctic wildlife images. The eBooks will be modeled after the Marine Life Field Guide that project coordinator, Françoise Gervais, prepared and published for Ocean Networks Canada:

<http://www.oceannetworks.ca/science/publications/general-interest/marine-life-field-guide>

3. Arctic Marine Mobile Mini Aquarium: Window Under the Ice

In order to spark conversations with the Inuit about their local marine life and their linked cultural traditions, the expedition vessel will be fitted with **several aquariums to temporarily house fascinating marine specimens**. Snorkelers, scuba divers and ROV pilots will engage in the collection and photography of amazing fish and invertebrate life along the way. Using social media, the Team will observe, record and post its findings, asking locals to contribute the Inuktitut names of these animals while describing their traditional uses, legends and stories.



Having the opportunity to see, touch and even smell these **animals up close** is a unique experience that's shared mostly by explorers, scientists and those lucky enough to visit aquariums around the world.

Beluga whales, polar bears and narwhals depend upon **fish and invertebrates which, to the locals, go largely unseen**. Fish such as Arctic cod, various sculpins, and eelpouts—as well as many invertebrates including sea stars, anemones, sea cucumbers, shrimps and clams—will act as ambassadors of their species. Under Ruby Banwait's leadership, the indigenous species collected will provide valuable **learning opportunities for local community members and students** during their visit aboard the *MV Cape Race*. These animals will be observed, filmed and photographed to share via the daily blogs, and posted on the Expedition's photo and video galleries.

As an aquarium biologist at the Vancouver Aquarium specializing in animal husbandry for fish and invertebrates of the Pacific Northwest and the Arctic, **Banwait has the requisite skills and experience to design, assemble and maintain the mobile aquariums** for the expedition team. She also has the leadership skills required to manage the expedition's five-woman science dive and snorkel team as it introduces these rarely-observed animals to the Inuit communities. In some cases, the Inuit don't even have names for these invertebrates that lie hidden beneath the waves in their back yards!

Thanks to the Vancouver Aquarium's support of the Petty Harbour Mini Aquarium, Banwait is now taking her life-changing Petty Harbour Mini Aquarium experience to the Arctic. As the Petty Harbour Mini Aquarium's curator, an animal collector and dive safety officer, she helped to collect and manage the aquarium's entire collection of over 680 animals displayed in 30 exhibits. Team Sedna hopes to bring this successful catch and release methodology—and hands on learning opportunities—with live specimens into the Inuit communities **of Nain, Labrador, and Pangnirtung and Qikiqtarjuaq located on Baffin Island, Nunavut**.



Going Online Across Canada

In order to engage youth, women, Inuit and non-Inuit alike In these dynamic research projects, the sea women will make every effort to creatively share what they observe and experience—via video, photographs, blogs, social media, webinars, magazine articles, newspaper articles and Skype. Value-added partnerships across Canada and the US would allow teachers and students to access (and connect directly to) these ten amazing explorers, divers and scientists. The Team hopes to collaborate with partners, inspiring young women towards careers in ocean sciences and educating Canadians and citizens of the world about the impacts of climate change and ocean change on these imperiled ecosystems.



The Team would like to develop an “app” which inspires youth in the Arctic and across Canada, the US and the world to interactively contribute to a site documenting what lives in frigid arctic waters. The Team hopes to create the app in English, French and Inuktitut, inviting people from around the world—especially residents of the Arctic—to participate in its creation.

Media Launch at the Petty Harbour Mini Aquarium

The Petty Harbour Mini Aquarium (located near St. John’s, Newfoundland) will host of the national media launch for the 2014-2016 Sedna Epic Expedition, an undertaking of monumental proportions which will captivate the country. On July 10, the ten sea women will speak to media in front of the Mini Aquarium, thanking their generous sponsors, announcing the expedition’s official beginning and encouraging students, women and the general public to follow the expedition online. All ten women will be together to answer questions and to sign autographs!

Newfoundland WISE Women Lecture at MUN (Memorial University of Newfoundland)

Team Sedna has partnered with the Newfoundland Women In Science and Engineering (WISE). Following the media launch, the Team will present the Expedition (its mission and objectives) to 30 female high school students enrolled in a WISE summer camp and to the general public at one of MUN’s lecture theaters. This public presentation will encourage the audience to follow the expedition which begins the next day. The Team hopes to inspire young women to get involved in science and exploration—making a difference by taking action—and to follow their dreams, no matter how out-of-the-box they may appear.

Nain Community School Engagement

Teacher Mandy Arnold, the Kangdiluasuk Student Program Director in Nain, Labrador, has been supportive in working with local community to build a public launch involving schools and community groups around the 2014-2016 Sedna Epic Expedition. After the media launch in St. John’s, the women will travel to Nain to meet their ship to begin their sail. On July 12, the women will invite school children on board the *MV Cape Race* to explore the scientific labs that will be used to conduct the three science projects: the ROV Environmental Monitoring, Seabird and Marine Mammal Censuses and the Mobile Arctic Aquarium. Children will be encouraged to follow Team Sedna’s journey, using social media, inspiring curiosity about the Arctic.

The 2014-2016 Sedna Epic Expedition will proudly carry a WINGS Worldquest expedition flag and a Royal Canadian Geographical Society (RCGS) expedition flag. WINGS Worldquest is a US-based organization which supports women-only expeditions around the world.

Many of the women are members and fellows of the Explorers Club. As such, Team Sedna will also apply for an Explorers Club expedition flag for the July 2014 expedition.

Seeking Funding from Far and Wide

The 2014-2016 Sedna Epic Expedition's fundraising goal is ambitious. Accordingly, we're seeking partners who may support a multi-year opportunity to engage in science exploration across the North, during the proof-of-concept expedition in July 2014 and the 3,000-kilometre-long 2016 Snorkel Relay of the Northwest Passage, from Pond Inlet, Nunavut, to Inuvik, Northwest Territories.

Below, for your perusal, is an excerpt from a letter written by Johnny Issaluk, manager of administrative services for the Government of Nunavut. Issaluk, a recipient of the 2012 Queen Elizabeth II Diamond Jubilee Medal and a member of Team Sedna's advisory board, wrote the following words in support of Team Sedna's application for a RCGS grant:

Susan has embarked upon an adventurous expedition and I find her work to bring attention to climate change to be inspiring. The group of women who are part of Team Sedna are going to be ambassadors of change for young women around the world. The notion of citizen science and archaeology is another component that will engage people who already had an interest and will provide first-hand experience that will have a lasting impact. Connecting Susan with Inuit women and youth... will benefit many Inuit.

These ten amazing sea women have signed up for an adventure of a lifetime. Your support, in launching and sustaining this initiative, has the power to change lives, shift career paths, alter behaviours, and spark a trans-Canadian and global movement.

In closing, I would be delighted to answer any questions you may have. Further, I'd be pleased to present you with an expedition budget and the proposed terms of partnership participation.

Respectfully yours, Susan

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