DALHOUSIE UNIVERSITY
Inspiring Minds

OCEAN TRACKING NETWORK
Newsletter

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Winter 2012/13

Continued evolution of the Ocean Tracking Network

The past year was in many ways an exceptional year for OTN. As described in the last newsletter, OTN had undertaken a strategic planning exercise, was forming a new International Scientific Advisory Committee (ISAC), and was entirely restructuring the membership of the OTN Council. All of these activities were completed by 31 December 2012, and were well received by the funding agencies. Concurrently, OTN Canada was due for its midterm review by NSERC. Thus, the OTN Canada Network researchers were required to produce an annual report as usual, in addition to a midterm report covering the first three years of the Network's activities and a formal proposal for Phase II activities (2014-2016) for peer review, and all on the same timeline as finishing the strategic plan and establishing the new ISAC and Council. At the same time as the undertaking of these enormous tasks, our OTN international and national equipment deployments continued, operations and maintenance activities expanded to accommodate the growth in existing lines, OTN absorbed the equipment and database from the former Pacific Ocean Shelf Tracking (POST) project, NSERC-funded researchers hit full stride and produced some fantastic research results, and the OTN data warehouse grew to over 29 million records!

All of this was successfully accomplished in large part through the hard work and dedication of OTN staff. The "perfect storm" of activities described above created a new and unified entity out of the formerly somewhat autonomous personnel of the CFI- and NSERC-funded portions of OTN. To meet all the demands (of 2012 but also for the future of OTN), the staff was reorganized, and a new structure, fully integrating CFI and NSERC activities, was created. Tasks have been streamed to the individuals best equipped to cope with them, and personnel have been cross-trained to provide backup in case of unforeseen problems. OTN owes a big debt of gratitude to Kyle McKenzie (Network Manager for OTN Canada) and Kes Morton (Senior Project Manager of the CFI award), who had the unenviable task in this period of helping us keep track of the mountains of details that needed to be addressed, and ensuring that we never lost sight of meeting the deadlines for the products that had to be delivered. Tracy Rounds (OTN Administrative Assistant) and Nikki Beauchamp (OTN PR and Communications) also provided critical support to the team's efforts.

We expect future editions of the newsletter will evolve markedly as OTN's vision, innovation, and partnerships advance. Ultimately, OTN is about the results of the science that is conducted using our platforms and how these results are being used to better inform management of our oceans. Amazing results from this research, carried out in all of the oceans of the world, are now beginning to unfold. It is these stories that must now take front and center—stories that will excite people about the aquatic animals that are so much a part of our human existence and stories that will illustrate the strength and fragility of the oceans' ecosystems. Stay tuned.

Sara Iverson, OTN Scientific Director
Fred Whoriskey, OTN Executive Director

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Winter 2013 Newsletter:

OTN welcomes new Council and ISAC members

The mandate of the OTN Council is to provide independent, external stewardship of OTN on behalf of Dalhousie, CFI, and all other OTN stakeholders. A new Council was formed in 2012, comprised of Canadian and international industry, research, and policy leaders who will lend their considerable expertise to assist in strategic planning, guidance, growth, and positioning of OTN.

Peter Harrison chairs the new Council. Dr. Harrison is Professor, Stauffer-Dunning Chair, and Director of the School of Policy Studies at Queen's University (Kingston, Ontario). He served as Deputy Minister of Federal Departments including Fisheries and Oceans Canada (DFO) and Natural Resources Canada. Dr. Harrison is a Fellow of the Royal Geographical Society. He is a recipient of Her Majesty Queen Elizabeth II's Golden Jubilee Gold Medal for Public Service and the J.B. Nicholls Award for lifetime contribution to ocean and coastal management in Canada.

The new Council is comprised of Tim Brodhead, former CEO of the McConnell Foundation; Bill Casey, former member of parliament for Cumberland-Colchester, Nova Scotia; Martha Crago, VP Research at Dalhousie; Albert Fischer, head of the Ocean Observations and Services Section (UNESCO); Jim Hanlon, CEO of the Halifax Marine Research Institute; Nigel Lloyd, former executive VP of NSERC; Chris Moore, Dean of Science at Dalhousie; Leo Muise, Executive Director, Fisheries and Aquaculture Nova Scotia; Ian Smith, CEO of Clearwater Seafoods; Kevin Stringer, Assistant Deputy Minister (DFO); and Zdenka Willis, Director of the Integrated Ocean Observing System (IOOS, NOAA).

OTN Council 2012 meeting attendees L-R: Kes Morton (non-voting member), Peter Harrison, Bill Casey, Zdenka Willis, Nancy Hayter (non-voting member), Sara Iverson (non-voting member), Kevin Stringer, Tim Brodhead, Fred Whoriskey (non-voting member), Nigel Lloyd, Martha Crago, Chris Moore, Leo Muise, Ian Smith. Not pictured: Albert Fischer, Jim Hanlon. Credit: Nikki Beauchamp.

OTN ISAC meeting attendees. Standing row L-R: Tracy Rounds (non-member), Svein Vagle, Aaron Fisk, Paul Cowley, Kes Morton (non-member), Fred Whoriskey, Sara Iverson, Rob Harcourt, Kyle McKenzie (non-member). Front row: Kim Holland, Steve Cooke, John Kocik, Joanna Mills-Flemming. Not pictured: Kim Aarestrup. Credit: Nikki Beauchamp.

In 2012, the former OTN Global Coordinating Committee evolved into a new International Scientific Advisory Committee (ISAC). This committee will help provide leadership and guidance on the scientific activities of OTN, and will work closely with the OTN Canada Scientific Advisory Committee (SAC). The ISAC will help OTN recommend priorities for strategic science and policy activities and advancements, identify and facilitate opportunities for international collaboration and communication, and catalyze the development of new funding opportunities.

The ISAC is comprised of researchers from around the world and is chaired by Rob Harcourt, professor of marine ecology at Macquarie University in Australia and Facility Leader Australian Animal Tagging and Monitoring System (AATAMS).

The committee members have broad expertise in animal tracking and oceanography. They include: Kim Aarestrup, Denmark Technical University; Paul Cowley, SAIAB; Steve Cooke, Carleton University (Chair of the OTN Canada Scientific Advisory Commitee (SAC) and Pacific Arena Leader); Aaron Fisk, University of Windsor (SAC member, OTN Canada Arctic Arena Leader); Kim Holland, University of Hawaii; John Kocik, NOAA; Joanna Mills-Flemming, Dalhousie; and Svein Vagle, DFO-IOS (OTN Canada Arctic Arena Leader).

> The highly skilled and experienced Council and ISAC members come from far and wide. OTN is grateful to these individuals for their immense efforts, and their enthusiasm for the OTN vision of globally integrated marine science.
>
> Fred Whoriskey,
> OTN Executive Director

HIGHLIGHTS

From OTN Canada Phase I (2010-2013) Research

The OTN Canada Network and research projects have come a long way since 2010. This year (2013) marks the completion of Phase I of the NSERC research program. Exciting plans have been laid out in the proposal for Phase II (2014-2016), which reflect an evolution of the Network, its continuing integration, and its focus on the timeliest and most exciting scientific questions. The following are short highlights from an outstanding three-year period of discovery, innovation, collaboration, and hard work...

Going south for the summer: Greenland halibut migratory patterns revealed

OTN Canada Project Leaders: A. Fisk (U Windsor), S. Vagle (DFO-Victoria, U Victoria), and S. Ferguson (DFO-Winnipeg, U Manitoba)

A primary purpose of OTN is to provide information and guidance to maintain sustainable commercial fisheries. This is especially important for new fisheries in areas where relatively little information on species distribution and abundance exists. For all fisheries, the ocean ecology and changing climate conditions can have significant impacts on the longevity and sustainability of the industry, the community, and the ecosystem.

The Arctic component of OTN Canada is the most ambitious effort ever undertaken to study key species movements and oceanographic conditions in the region. One of the most significant findings to date is the elucidation of seasonal migrations of Greenland halibut. Greenland halibut are the main commercial species of Canadian Northern fisheries. Low catches in the developing halibut fishery in Cumberland Sound prompted the OTN research into the species' movements.

Data from the Cumberland Sound receiver array revealed that halibut move from shallow northern waters in winter to deeper southern waters at the mouth of the Sound in summer. This discovery will have significant and immediate implications for fisheries development and quota allocations in the area.

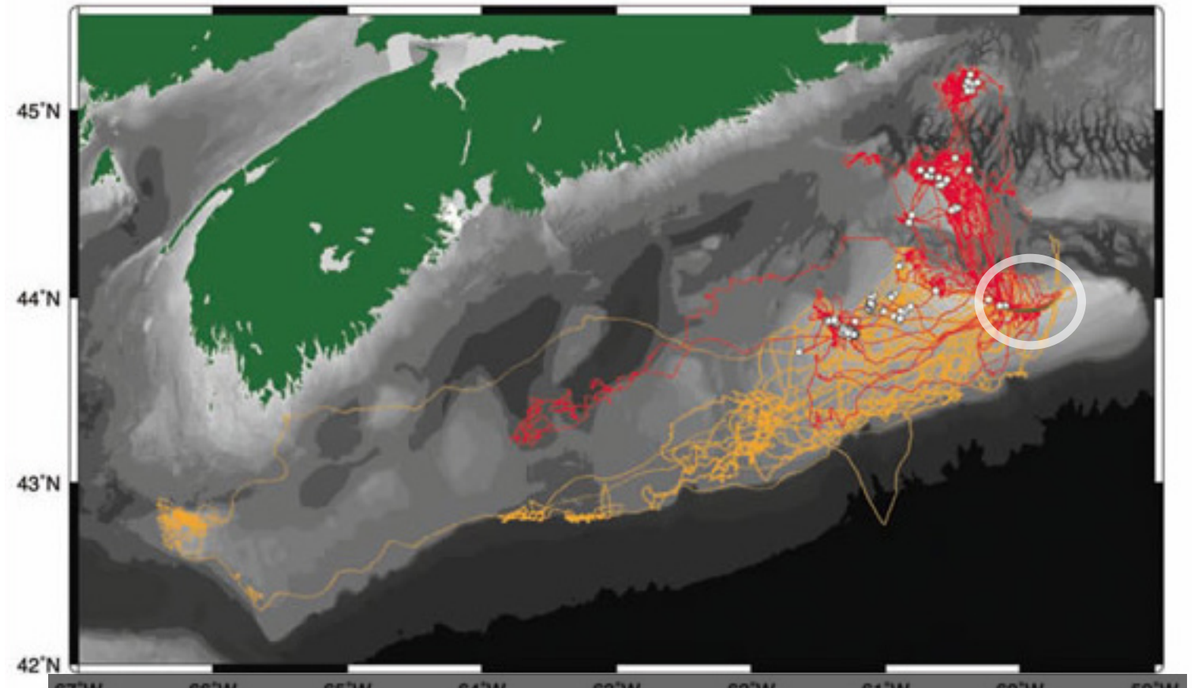
Harsh conditions in the Arctic Ocean deployments have also challenged the acoustic telemetry equipment. Receivers around Baffin Island have continued to function reliably despite temperatures dropping below zero, and a number recovered from depths of over 1,000 metres were still fully functional. The VR2W acoustic receivers are currently rated to depths of 500 metres. The Arctic team is working with VEMCO, the Halifax-based manufacturers of the acoustic receivers, on current depth ratings of the equipment.

Bioprobes: species interactions and oceanographic samplers

OTN Canada Project Leaders: S. Iverson, D. Bowen (DFO-BIO, Dalhousie), and J. Mills-Flemming (Dalhousie), *with I. Jonsen and D. Lidgard.*

The Atlantic Arena bioprobe team has made great progress in the adaptation and advancement of tracking technology carried on animals themselves. VEMCO mobile transceivers (VMTs) are two-in-one acoustic tag and receiver units and in the OTN work are carried by grey seals. This is the first time an acoustic receiver unit has been deployed on an animal. VMTs and GPS units deployed on seals are recording the at-sea associations among seals and have identified offshore banks as preferential feeding grounds ("hot spots"). These data, in conjunction with detections from OTN's fixed receiver arrays and oceanographic data collected by acoustic tags, are giving Atlantic researchers a new perspective on species interactions in the open ocean, and the critical habitats important to marine animals.

Since the beginning of the project in 2009, 74 seals have been fitted with VMTs on Sable Island, Nova Scotia. These units have recorded detections from tagged adult Atlantic cod, Atlantic salmon



Grey seals (*Halichoerus grypus*) tracked on Sable Island off Nova Scotia, Canada. Male (orange) and female (red). White points indicate seal-seal interactions. Sable Island shown in white circle. Credit: Don Bowen, Ian Jonsen, Damian Lidgard.

smolts, and Atlantic bluefin tuna in the Eastern Scotian Shelf and southern Gulf of St. Lawrence large marine ecosystems. Over 160,000 cod detections have been recorded from seal VMTs and fixed acoustic receivers. Detection data from the seal-borne receivers suggest none of these interactions involved predation. These findings, concurrent with studies showing a very low abundance of cod in grey seals' diets, are informing fisheries managers and elected officials examining recommendations to cull grey seals, which has been suggested to assist with the recovery of depleted cod populations in the North Atlantic. The science provides no evidence that a cull will foster cod stock recovery, and some marine biologists have even suggested that cod recovery would actually be hindered if grey seal numbers were reduced because populations of other fishes that prey heavily on cod could grow when they are released from seal predation.

In addition to serving as roaming detectors of marine species, grey seal bioprobes are also collecting data for ocean modelers. Tags are providing extensive data on temperature and light levels in the open ocean. Light level measures are in turn being developed by collaborating Atlantic oceanographers as a method to estimate phytoplankton standing stock. Next steps will include relating phytoplankton biomass to foraging hot spots, fish assemblages, and predations.

The bioprobe team is now experimenting with Bluetooth enabled VMTs for real-time tracking. Read more in Tech Talk on page 11.

The OTN data warehouse reaches 29 million records

The OTN data warehouse is operated by Bob Branton (Dalhousie), Lenore Bajona (DFO-BIO), Marta Mihoff (Dalhousie), and Susan Dufault (Dalhousie)

The OTN data team has been working to assimilate three acoustic receiver lines on the Canadian west coast into the OTN data warehouse. The lines, part of the former Pacific Ocean Shelf Tracking (POST) project, are critical to Pacific salmon studies and transboundary (Canada/U.S.) fisheries management. These lines, now called the OTN Northeast Pacific Node (shorthand: NE Pacific), and the former POST database were fully integrated into the OTN data warehouse in September 2012.

The OTN Northeast Pacific Node encompasses three lines, located in the Juan de Fuca Strait, the

Northern Strait of Georgia, and Queen Charlotte Strait. Their continued operation will ensure that Pacific Arena researchers can continue to collect timely and vital information to assess the causes of declining Pacific salmon populations.

Pacific sockeye salmon get the OTN treatment

OTN Canada Project Leaders: S. Hinch (UBC), S. Cooke (Carleton), K. Miller (DFO-PBS), T. Farrell (UBC), R. Thomson (DFO-IOS, UBC)

The OTN Canada Pacific Arena is a tremendous example of highly qualified personnel (HQP) training, informing policy, and social science integration in the Network. OTN Canada researchers have made huge strides in tracking Pacific salmon at various life stages, including the first mass release of acoustic tags on smolts, and have acquired a great many "firsts" in fish tagging studies. Over 1,500 smolts and 1,000 adult salmon have been tagged, arguably one of the most extensive fish tagging studies in the world.
Pacific Arena activities address key questions regarding salmon


Sockeye salmon. Credit: Kendra Robinson.

survival during migration. The need for this information has been made very clear by a report from a Public Inquiry authorized by the Prime Minister of Canada in 2009 (the Cohen Commission) that looked into an unexpected and precipitous decline in Fraser River sockeye salmon populations. For the past ten years, late-run sockeye salmon have been entering the Fraser River six to eight weeks early. This premature homeward journey has apparently resulted in unprecedented mortality. Salmon studies during Phase I have attributed increasing ocean wind stress and coastal salinity (affecting salmon's osmoregulatory adjustment) to the earlier river entry. Early prediction of ocean variables can inform the adjustment of harvests to offset the high mortality and help maintain sustainable populations.

Biologgers implanted in salmon have further documented conditions affecting salmon survival. The Pacific team has discovered energetic benefits in seeking optimal temperatures during migration and, for the first time in North America, observed that salmons' hearts stop beating during the act of reproduction.

Ongoing studies will provide further links between Pacific salmon behaviour and changing ocean climate conditions of direct relevance to fisheries management.

Making tracks: elucidating the migratory path of American eels

OTN Canada Project Leaders: J. Dodson (Laval University) and M. Castonguay (DFO-MLI)

Despite their threatened species status by the Committee on the Status of Endangered Wildlife in Canada, little information exists on the exact migratory paths of American eels. American eels have a complex life cycle, spawning once in their lives somewhere in the Sargasso Sea near Bermuda. Larvae drift for up to a year on coastal currents before settling into coastal areas and rivers, like the St. Lawrence River, where they grow for up to 20 years as juvenile yellow eels prior to becoming silver eels and undertaking a return spawning migration to the Sargasso Sea.

It's estimated that the American eel population has declined by upwards of 90 per cent due to habitat loss and fragmentation, changing ocean climate, and anthropogenic effects. OTN Canada researchers are using strategically positioned acoustic arrays in the St. Lawrence River and the Gulf of St. Lawrence to elucidate the exact out-migratory path of eels to the open Atlantic Ocean. Over 180 eels were tagged during the first three years of the study and over 90 per cent of those eels were detected on lines in the St. Lawrence River.

Out-migrating silver eels swam at night, sometimes stopping for weeks at a time before reaching the Gulf. However, the OTN Cabot Strait acoustic receiver line, which connects the northern tip of Nova Scotia to the southern point of Newfoundland, detected so few eels (less than 4 per cent of the 180 tagged eels) that researchers began to suspect extreme predation in the Gulf of St. Lawrence.

In addition to the acoustically tagged eels, seven individuals had been fitted with pop-up satellite tags, which recorded animal position, depth, and surrounding temperatures during their migration. The satellite tags were preprogrammed to release on a set date or, alternatively, release should the animal die. Tags float to the surface ("popup") and relay summaries of the data stored to investigators.

All of the eel tags released prematurely, indicating the animals had died. All showed sudden and significant rises in the ambient temperatures they were recording and big changes in the depths the animals were occupying.

The eel team began to look at the internal body temperatures and depth patterns of two endothermic fish in the Gulf: Atlantic bluefin tuna and porbeagle shark. With the help of Canadian shark expert Steve Campana (DFO-BIO), the team compared previous information about the diving behaviour of tuna and sharks with the patterns recorded on the pop-up tags. Depth profiles of porbeagle sharks and those recorded on the eel tags more closely resembled each other than those of tuna and eels.

The work has provided the first information on eel migration and predation in the St. Lawrence River and Gulf of St. Lawrence, respectively.

The eel team is collaborating with modelers and oceanographers from the Atlantic Arena to explore behaviour and strategies associated with the silver eel migration to the Sargasso Sea.

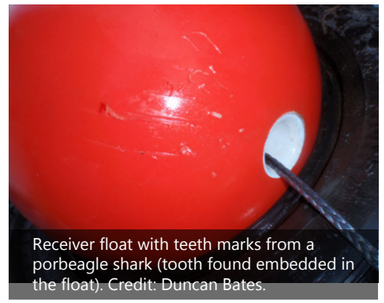
Notable Nod: The Halifax Line ("HFX"), at over 250 acoustic receiver units spanning 205 kilometres from just South of Halifax to the edge of the continental shelf, is a significant achievement for OTN.

Now the longest acoustic telemetry line in the world, HFX captures data from numerous marine species, including tuna, cod, salmon, sturgeon, and seals.

HFX will continue to be a remarkable resource for Atlantic Arena activities as well as Eastern U.S. and Canadian collaborators. The next data offload is scheduled to take place this fall. Read more in the Array Update on page 8.


OTN technician Ian Beveridge setting up a VR2W for deployment. Credit: Duncan Bates.


Porbeagle shark jaw prepared by Steve Campana (DFO-BIO). Credit: Fred Whoriskey.


Receiver float with teeth marks from a porbeagle shark (tooth found embedded in the float). Credit: Duncan Bates.


American eel fitted with a dummy tag to assess behaviour before release into the wild. Credit: José Benchetrit.

Psst...follow the links in **blue.**

Conference updates and announcements:

Second International Conference on Fish Telemetry to be held 14-19 July 2013 in Grahamstown, South Africa — The biennial conference will host biotelemetry experts and students to report on findings from fish studies taking place around the world. Paul Cowley, OTN's key South African collaborator and member of the new OTN ISAC, chairs the conference. Registration will begin in January. Visit the site for more information.

International Council for the Exploration of the Sea (ICES) Annual Science Conference to be held 23-27 September 2013 in Reykjavik, Iceland — The ICES conference focuses on ocean climate change, the impacts of industry, and ocean resource sustainability. Sara Iverson, OTN Global Scientific Director, will be a co-convener of a special session entitled: "'Hi-tech Tagging': Advances in Studying Spatial Distribution", at which she is also the invited keynote speaker.

Ocean Tracking Network Canada Symposium to be held 3-5 June 2013 in Halifax, Nova Scotia. The third annual symposium will feature workshops, poster sessions, and provide discussion forums for strategic Network direction. Coordination with Halifax Ocean's Week activities is ongoing. The Secretariat looks forward to bringing you more information over the coming months.

Taryn Murray and Dylan Howell replacing receivers in the Bushmans Estuary, South Africa. Credit: Paul Cowley.

OTN Global Array Updates: more than 1,000 listening stations and counting!

During 2012, OTN deployed 1,025 acoustic receiver stations worldwide. The lines include sites in Canadian waters, and internationally in Australia, South Africa, the Azores, Hawaii, and Norway. Collaborators at the Atlantic Salmon Federation (ASF), Québec Ministry of Natural Resources (MRNF), and Mount Allison University added another 123 receiver stations to the >500 stations on OTN arrays in Atlantic Canada, and agreed to share data with OTN.

Canadian Atlantic

On the east coast of Canada, OTN currently maintains the two longest continuous acoustic receiver lines in the world—the Halifax Line, with 256 receiver stations zigzagging southward 205 kilometres from Halifax, Nova Scotia, to the edge of the continental shelf, and the Cabot Strait Line, with 151 receiver stations spanning 100 kilometres from Cape Breton, Nova Scotia, to Newfoundland. The former picks up north-south movements of animals along the east coast of North America, and the latter documents entries and exits of tagged animals between the North Atlantic and the Gulf of St. Lawrence.

In the fall of 2012, OTN technicians undertook the monumental task of offloading data from all 407 of these stations at a time when the weather in the North Atlantic can be less than cooperative.

Thanks to the highly experienced OTN technicians and crew of the *Island Venture I*, the Cabot Strait rollover proceeded relatively quickly over two two-day missions, with about a two-week break in between to wait for the weather to clear. This marks the first continuous year of data from the entire length of the Cabot Strait Line, which was completed in October 2011. New detections include Atlantic salmon, Atlantic cod, Atlantic bluefin tuna, and grey seals.

Autumn 2012 saw the first full offload of all 256 receiver stations on the Halifax Line, the full deployment of which was completed last May. The operation spanned five different missions over six weeks and used four different vessels. Quite remarkably, there was 100 per cent successful retrieval of data and no loss of gear to fishing activities!

Two benthic pods ready for deployment in the Strait of Belle Isle, Newfoundland. Credit: Duncan Bates.

Extensive consultations with the fishing industry at the time of the deployment, led by the Line's principal investigator Peter Smith (DFO), contributed greatly to this success. Detections occurred over the entire length of the Line and included Atlantic sturgeon, Atlantic cod, Atlantic salmon, great white sharks, and Atlantic bluefin tuna as well as a number from several not-yet-identified tagging projects. The OTN data team is working with VEMCO to help identify these taggers. During these missions, two new oceanographic data–collecting benthic pods were deployed, bringing the total number of pods on this line to ten. Five were rolled over for servicing after being at sea for an entire year. DFO-BIO researchers are busy analyzing these data.

In the Strait of Belle Isle, the northern exit of the Gulf of St. Lawrence to the Atlantic Ocean, a collaborative line is in place involving OTN, which has provided VR4 receivers, and the ASF, which has provided a seasonal line of VR2Ws. ASF's VR2W stations were recovered in August, and concurrently, data were offloaded from OTN's VR4s that are deployed year-round.

In addition, OTN deployed two benthic pods— one on either side of the Strait. Each benthic pod houses a VR4 receiver along with oceanographic instruments measuring dissolved oxygen, conductivity, temperature, and pressure. Researchers at DFO-BIO plan to use the difference in pressure measurements near the two shores to estimate temporal variability in water transport through the Strait.

OTN's 12-station Minas Passage Line in the Bay of Fundy, Nova Scotia, was rolled over in July, with plans for another rollover in early 2013. Because of the value of year-round detections in this region, collaborators at Acadia University decided to risk the extreme environment and overwinter their receivers in the area for the first time. OTN receivers on this line were overwintered for the first time as well.

The OTN Canada Sturgeon Project continues to maintain seasonal deployments in the Minas Passage intertidal zone and in the Saint John River, New Brunswick. OTN's receivers in the Saint John River make up only a small portion of this array, with the bulk of the receivers on loan to Mount Allison University from ASF.

Other active receivers in the Atlantic include VMTs deployed by the OTN Canada Grey Seal Project, with 17 seals tagged with VMTs in June and two seals tagged in October with the newly developed VMTs equipped with Bluetooth communication, enabling the transmission of detection data in real-time to co-deployed satellite tags. Read more in Tech Talk, up next.

The last receiver stations for the Antigonish Harbour, Nova Scotia, Trout Project were recovered in August, marking the end of the data collection phase of this project.

Work on the OTN Canada Eel Project in the Gulf of St. Lawrence continues with the assistance of collaborators at the Québec MRNF, who deployed

some of OTN's VR2Ws on arrays that they maintain to track striped bass and walleye. These researchers continue to tag eels in the area and have agreed to share data with OTN.

Finally, with the assistance of collaborators at the DFO-Maurice Lamontagne Institute, OTN began deploying receivers on buoys of opportunity. Three VR2W receivers were attached to three different buoys in the Gulf of St. Lawrence. Deployed in the spring and recovered in late fall of 2012, these receivers recorded detections of four different species—Atlantic cod, Atlantic bluefin tuna, American eel, and Atlantic salmon. OTN hopes to expand this project to more buoys in the northern portion of the Gulf next year.

Canadian Pacific

OTN technician Ian Beveridge flew to the west coast of Canada to assist Kintama Research Services with a data offload of the Northeast Pacific Node, a series of 80 receiver stations on three subarrays that were inherited from the now retired POST project. Kintama was contracted to facilitate the transition of this infrastructure, which will now be maintained by OTN. These add to the Chilko and Fraser River receiver arrays currently maintained by OTN on Canada's west coast to track the outmigration of sockeye salmon.

Canadian Arctic

OTN continues its strong Arctic presence with arrays in three areas being maintained in association with collaborators at the University of Windsor. Thirty-nine stations were retrieved off Pangnirtung in Cumberland Sound this summer and the deployments were moved around to the northern side of Baffin Island near Clyde River in Scott Inlet, where 24 VR2W stations were deployed along with four cetacean monitoring stations. Off Resolute, 84 receiver stations were deployed this summer along with two benthic pods and two cetacean-monitoring CPODs. The receiver line in Maxwell Bay deployed in 2011 will overwinter once again.

Portugal

The last of OTN's three VR4 acoustic receiver stations was deployed off the Azores Archipelago in August. VR4 stations were added to the 14 VR2Ws deployed in February 2012 making up part of a larger array of approximately 50 stations scattered throughout the Archipelago maintained by collaborators at the University of the Azores.

Australia

In Australia, the second phase of the OTN Tasmania Array was completed in October with the deployment of 37 VR2W receiver stations off Cape Barren Island, north of Tasmania in the Bass Strait. OTN has now deployed 116 receiver stations in Australian waters. Collaborators on the west coast at Western Australia Fisheries continue to maintain the Perth Line of 53 VR2W stations, which are integrated within their Shark Monitoring Network. In late 2012, they purchased a remotely operated vehicle to help in the recovery of deep water stations not serviceable by divers.

South Africa

Phase II of the OTN South Africa Array was completed in 2012 and included installation of receiver lines in Port St. Johns, Port Alfred, False Bay, the South Africa–Mozambique border, and various estuaries along the coast.

United States

Three VR2W stations were added to the six stations on the OTN Hawaii Array deployed near Waikiki earlier in the year. OTN receiver stations are integrated within the Pacific Islands Ocean Observing System monitoring oceanographic conditions in the U.S. Pacific region.

Norway

Finally, in 2012, OTN set up a pool of VR2W receivers to loan to eligible collaborators. The first loan of 40 VR2Ws went to collaborators at the Norwegian University of Science and Technology (NTNU) where they are being used to track sea trout and other species in the Hemnefjorden fjord system.

Upcoming deployments

The first deployment of the Prince William Sound array in Alaska is scheduled for late March 2013. This array will consist of 27 VR4 and seven VR2W stations positioned across the major entrances to the Sound.

A report on the test phase of the Strait of Gibraltar Line is now available. Full deployment of this line, which will span the Strait from Spain to Morocco with a line of 35 VR4s, is tentatively scheduled for June.

As the Network continues to expand, on the horizon are deployments off Angola in West Africa, the North American Great Lakes, Puerto Rico, the mid-Atlantic Bight near Cape Hatteras, Brazil, and Réunion Island east of Madagascar in the Indian Ocean.

A female grey seal carrying a Bluetooth-enabled VMT. Units were deployed in October 2012 and recovered in January 2013. Credit: Damian Lidgard.

Tech Talk

The VEMCO mobile transceiver (VMT) acts simultaneously as both a transmitter, of the unique acoustic code from the large animal carrying it (known as a "bioprobe"), and also as a receiver, recording unique codes from transmitters carried in other animals that come into proximity.

Bioprobes have the potential to vastly expand the range over which tagged marine animals and their movements can be acoustically detected outside of fixed receiver arrays or lines. To date, VMTs have had to be recovered to retrieve the collected data, thus limiting deployments only to animals that can be reliably and routinely recaptured (e.g., grey seals breeding on Sable Island).

The bioprobe team recently collaborated with two independent companies, VEMCO, and the Sea Mammal Research Unit (Scotland), to develop a prototype Bluetooth-enabled VMT so that detection data could be retrieved in real-time without the VMT needing to be recovered. The current configuration of tags being tested on grey seals comprises two separate units (above).

Bluetooth-enabled VMT (top) and satellite tag (bottom) units. Credit: Damian Lidgard.

Detection data collected by the VMT are transferred to the satellite tag via Bluetooth, which then transmits the acoustic data, along with location, to ARGOS satellites for subsequent download.

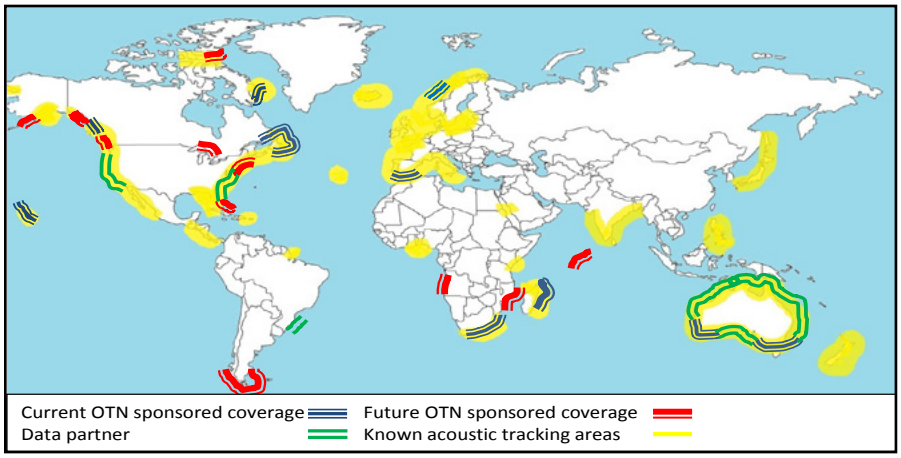
Two test units were deployed on seals on Sable Island in October 2012 and real-time data were successfully collected via ARGOS until January 2013, when the tags were recovered. To evaluate the full efficacy of the Bluetooth configuration, raw data retrieved from the tags will be compared with that transmitted via ARGOS.

This new Bluetooth configuration will greatly expand the use of VMTs, especially if fully integrated VMT tags can be developed. It will also allow bioprobe technology to be used in other marine species (both within OTN Canada and beyond) that are large enough to carry these instruments (e.g., sturgeon, sharks, other seal and marine mammal species).

Data Discourse

OTN's data warehouse now holds more than 29 million records. Global discovery metadata (project descriptions and data summaries) were reviewed by principal investigators and can now be pubicly viewed. The OTN data team encourages users to browse links and downloads, try out visualization tools, as well as discover collaborations that align with research interests.

Mystery tags (white). Credit: Bob Branton.



NE Pacific Node Update

Data, metadata, and new detections for the Juan de Fuca Strait (JDF), Northern Strait of Georgia (JDF), Queen Charlotte Strait (QCS) (which comprise the new Northeast Pacific Node) and Admiralty (ADM) receiver deployments were loaded to separate NE Pacific databases within the OTN data warehouse. Known trackers for these lines are now being individually contacted to examine results and provide the latest tag release metadata. In the meantime, discovery metadata and mystery tags for the NE Pacific as a whole can be publicly viewed.

Mystery Tags

Mystery tags are confirmed detections logged by OTN receivers for which the OTN data centre has no tag records and therefore cannot inform the investigators of their existence. This information is potentially of great value to the taggers. These mystery tag lists should be reviewed regularly. If taggers recognize mystery tags, they should contact otndc@dal.ca.

Downloading, completing, and submitting a VEMCO authorization form will permit OTN data managers to obtain tag specifications directly from VEMCO and provide trackers with new detections of their tags whenever and wherever they are encountered.

Going Forward

Progress is being made on the NE Pacific and South Africa (SE Atlantic and E Indian Oceans) regional nodes, first in Dalhousie's data centre and then at remote locations.

Future projects for the OTN data team involve developing an oceanographer-friendly acoustic telemetry data exchange standard, first for the Northwest Association of Networked Ocean Observing System (NANOOS), then for the Integrated Ocean Observing System (IOOS) as a whole, as well as establishing a long-term archive at the DFO National Oceanographic Data Centre (NODC) in Ottawa, Canada.

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