



FERN

FUNDY ENERGY RESEARCH NETWORK



Annual Newsletter

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Issue 4

Fall 2014

Message from the FERN Coordinator

On behalf of the FERN Executive Committee, I am pleased to present the Fall 2014 issue of the FERN Newsletter. This year has marked some notable milestones in tidal energy research in the Bay of Fundy, Canada and internationally. With turbines scheduled to go into the water at FORCE and Grand Passage, and the deployment of FORCE's environmental monitoring platforms, the coming year promises to be even more exciting for tidal energy research & development in the region!

Lisa Isaacman
(lisa.isaacman@acadiau.ca)

Fostering Collaboration in Tidal Energy Research



Power Cable Installation at FORCE (Credit: RJ MacIsaac Construction)

FERN Executive Committee (as of October 2014)

Executive Committee Co-Chairs:

Anna Redden, Acadia University
Gregory Heming, Annapolis County

Engineering Committee Co-Chairs:

Tiger Jeans, University of New Brunswick
Dean Steinke, Dynamic Systems Analysis Ltd.

Natural Sciences Committee Co-Chairs:

Graham Daborn, Acadia University
Brent Law, Fisheries and Oceans Canada (BIO)

Socio-Economics Committee Co-Chairs:

Dana Morin, Fundy Tidal Inc.
John Colton, Acadia University

FERN Activities and Accomplishments

2014 Annual General Meeting

The 2014 FERN AGM was held on October 28 at Acadia University. The AGM began with the announcement of the Executive Committee election results (both co-chairperson positions, as well as one co-chair from each subcommittee) (see pg. 1). Thanks were extended to the previous co-chairs (Peter Smith, Sue Molloy, and Richard Karsten) for their many contributions. This was followed by a review of network and subcommittee activities in 2014, as well as ideas and priorities for the coming year. Simon Melrose and Greg Trowse then reported on the research and monitoring activities at FORCE and the Digby area COMFIT sites, respectively. The AGM concluded with lunch graciously sponsored by **SLR Consulting**.

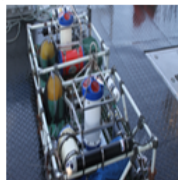
Network Highlights

- 148 members from 81 institutions, 7 provinces & 7 nations;
- 20% increase in membership over the last year;
- FERN committee member representation on regional, national and international MRE committees (IEC TC-114, OES-Annex IV, MRC, FORCE, OERA, EMAC, etc.);
- Project collaboration and capacity building;
- Participation in national and international conferences, workshops & symposia;
- Progress reporting on FORCE's research, monitoring and FAST programs;
- Coordinated activities with OES-Annex IV, including a Bay of Fundy focused webinar and an environmental monitoring workshop;
- Support for networks of students & young professionals;
- Contributions to various projects and reports.

Subcommittee Highlights

- 40 active members represent core academic, government, and private sector research groups and institutions involved in tidal energy research of relevance to Fundy.

- Key areas of discussion and advancement over the past year include:



NATURAL SCIENCES

- Environmental monitoring technologies
- Data availability, access and sharing

SOCIO-ECONOMICS

- Community engagement
- Marine spatial planning



ENGINEERING

- Cable laying, connecting and monitoring
- Mooring in high flows

Plans for 2015

- Growing the FERN Network with researchers and institutions regionally, nationally and internationally;
- Pursuing network activity and project funding opportunities;
- Establishing a communications & outreach working group to explore ideas to enhance engagement of industry, regulators, decision-makers and other stakeholders in tidal energy knowledge exchange and research;
- Hosting information and data sharing events (e.g. webinars and workshops) and supporting student – professional networking;
- Supporting the development of an application for an NSERC funded Strategic Research Network for marine renewable energy (in-stream, river and wave).



ICOE 2014 Recap

This past November, Nova Scotia was host to the largest marine renewable energy event in the world. The **5th International Conference on Ocean Energy (ICOE)** (<http://www.icoe2014canada.org/>), hosted by Marine Renewables Canada, was held in Halifax, November 4th-6th, attracting international industry leaders, research experts, and government leaders from over 25 countries. ICOE is a significant event for the emerging global marine renewable energy industry as it is aimed at stimulating collaboration, building partnerships, and sharing recent experiences from development, demonstration, and technology transfer efforts to advance growth of the marine renewable energy industry.



Exhibition at ICOE 2014 (Credit: Meghan Swanburg)

ICOE 2014 was a significant milestone for Canada, as it marked the first time the event was held outside of Europe, signifying Canada's role as one of the leading countries in marine renewable energy development. Interest in Canada's marine renewable energy activity was evident, with the event attracting over 700 delegates, 121 exhibitors, and over 220 presenters. Participants included utilities, tidal/wave/river energy device developers, multinational corporations, government, project developers, academia, and supply chain companies and service providers with marine, energy, hydro, offshore oil and gas, and/or ocean technology expertise.

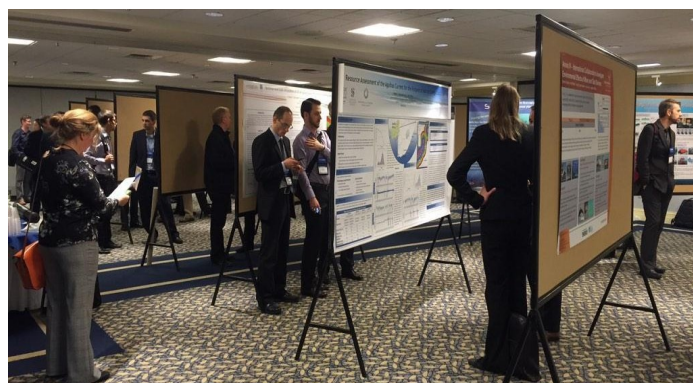
The event played an important role in showcasing Canada's strengths in wave, tidal, and river energy development. Conference sessions featured researchers, companies, and government officials from across the country. Canadian companies and organizations were further able to highlight their strengths and meet with potential business contacts at the exhibition which included a 38-company Canadian pavilion.

In addition to increasing Canada's profile amongst the international industry, ICOE 2014 also served to raise awareness of the sector locally in Nova Scotia. A site visit to the Fundy Ocean Research Center for Energy (FORCE) included participation from

individuals in the town of Parrsboro, international delegates visited Digby to learn about tidal energy supporting activities and infrastructure, and local organizations worked with Marine Renewables Canada to provide information and education to the public on what potential opportunities tidal energy brings to Nova Scotia.

ICOE 2014 was successful in reinforcing Canada's leadership role in the global marine renewable energy sector. Now is the time to build on this success and momentum by continuing to develop experience in early projects, build relationships with local and international partners, and firmly establish Canada as one of the countries that will build this new industry.

Marine Renewables Canada intends to host a mission to the next ICOE, to be held in Edinburgh, Scotland in February 2016. With only a little over a year away, planning has started – please contact amanda@marinerenewables.ca if you are interested in participating in the ICOE 2016 mission.



Poster Session at ICOE 2014 (Credit: Marine Renewables Canada)

Elisa Obermann, Director, Marine Renewables Canada
(elisa@marinerenewables.ca)

ICOE Award Recipients

ICOE 2014 Navigator Award: MeyGen Project

Ocean Energy Systems Student Poster Awards

1st Prize: Amin Abolghasemi, Imperial College London: Tidal Turbine Actuator Disc Method with Adaptive Grid Refinement and Appropriate RANS Turbulence Model

2nd Prize: Bret Bosma, UCC HMRC/Oregon State University: Design and Modeling of the Floating Power System for the Galway Bay Wave Energy Test Site

3rd Prize: Qiun Liu, Tsinghua University: Experimental Study on Performance of Wave Buoys in Measuring Waves



Research at Small-Scale Tidal Sites

Building Partnerships

Working with a consortium of industry and academic partners, Fundy Tidal has continued to advance COMFIT small-scale tidal energy projects in Grand Passage, Petit Passage, and Digby Gut toward deployment of turbines in late 2015 and/or early 2016. Fundy Tidal recently partnered with International Marine Energy with agreements to develop current and future projects in Atlantic Canada, Quebec, and Nunavut. The partnership provides opportunities to expand project development opportunities beyond Nova Scotia.

Fundy Tidal follows a start small, step-wise approach to development. Our work focuses on meeting technical needs for our initial site developments, while:

- helping to develop methods for site assessment and environmental monitoring;
- addressing challenges with adding power to grid in remote maritime communities; and
- evaluating turbine technologies best fit to site conditions.

EcoEII Project

Innovations associated with the Acadia-led NRCan ecoEII project titled, "Reducing the cost of in-stream tidal energy generation through comprehensive hydrodynamic site assessment" are leading to the successful collection of site data, computer modeling required for detailed design of our projects, and economic analysis required for finance. The consortium is developing a recommended approach for site assessment, starting with community knowledge and low cost, highly reliable data collection to determine project feasibility and refine areas of interest, before collecting higher cost data needed for detailed engineering design. This work builds upon previous success with OERA and NSERC funded projects. More information on the approach can be found at: http://www.oera.ca/wp-content/uploads/2014/06/Trowse-Presentation_2014.pdf

Environmental Monitoring

A small-scale cabled observation system is currently deployed, including a cabled ADCP collecting flow, waves, pressure, and temperature data. We plan to upgrade the cabled lander in 2015 to accommodate additional monitoring equipment.

Fundy Tidal applies a look and listen approach to environmental monitoring. Recent work has focused on assessing background conditions while supporting the development of sensors needed for monitoring potential near and mid-field marine life effects. The 2014 OERA-funded Marine Life Observer Program was successful in documenting significant marine life diversity and abundance at our sites, and engaging the public in monitoring and protection of the marine environment.

The program created local employment with free training from Dr. Moira Brown (Canadian Whale Institute), and included the public in opportunistic "citizen science"-based data collection. During the same time period,



Cabled Lander in Grand Passage
(Credit: Mike Huntley)

Fundy Tidal also conducted a short-term deployment of a passive acoustic hydrophone with Akoostix, and a cabled deployment of the iListen HF hydrophone with OceanSonics that transmitted real-time ocean sound data to the field office for a period of one week. The high marine life encounter rate, relatively low cost and low risk for instrument deployments, and the opportunity to validate sensor tests with observation data, makes the Digby area sites an ideal testing ground for environmental sensors and integrated monitoring systems.

Next steps in environmental monitoring include supporting the development of integrated monitoring systems, including passive and active acoustics, video and marine observations. Next steps require monitoring systems in water during summer 2015 for testing and development, followed by implementation in our environmental monitoring programs. More information on Fundy Tidal's environmental monitoring can be found at: http://tethys.pnnl.gov/sites/default/files/attachments/Fundy-Webinar_Trowse-2014.pdf.

(Continued on page 8)



Marine Life Off Digby Sites (Credit: Greg Trowse, Reid Gillis, & Jordan Crocker)



Updates from the Department of Energy & OERA

Best Practices & Legislation

Coinciding with the week of ICOE, the NS Department of Energy (DOE) officially released the **Statement of Best Practices for In-stream Tidal Energy Development and Operation (SOBP)** (<http://energy.novascotia.ca/renewables/marine-renewable-energy/current-activity>) which was developed collaboratively with Marine Renewables Canada and with extensive consultation with various stakeholders. The SOBP is intended to be a living guide and reflects the Province of Nova Scotia's commitment to clarify, facilitate and improve decision-making processes for the development of in-stream tidal energy as a viable sector. The SOBP provides guidelines against which in-stream tidal project proposals and plans will be measured using key elements of regulatory considerations, tidal resource/environmental evaluation, and community and First Nations engagement and information sharing. It will also provide direction for applying these practices to the life cycle of an in-stream tidal project, from conception to decommission, and will complement, but not replace, existing regulatory processes and requirements.



Delegates of the OES-Annex IV Environmental Monitoring Workshop at Acadia University, one of four pre-ICOE workshops held on Nov 1, 2014 (Credit Annex IV)

In the coming year, the DOE is also continuing to develop new Marine Renewable Energy Legislation which will provide further regulatory direction and appropriate oversight to the marine renewable energy industry in Nova Scotia.

Pre-ICOE Workshops

On November 1, 2014, prior to the 5th International Conference on Ocean Energy (ICOE) (see p. 3), the DOE, Dalhousie University, and Acadia University co-hosted a series of research workshops. These workshops were attended by national and international academics and professionals and focused on the multi-disciplinary aspects of tidal energy, including site and resource assessment, marine technology, policy and regulatory best practices, and environmental monitoring. The workshops facilitated collaboration and knowledge exchange in an

effort to identify the challenges and opportunities facing the marine renewable energy sector.

*Natasha Power, Policy Analyst, Sustainable and Renewable Energy Division, Nova Scotia Department of Energy
(Natasha.Power@novascotia.ca)*

Canada-UK Research Competition

Collaboration between Canada and the United Kingdom on tidal research began as an informal conversation some years ago. Steady transatlantic efforts since then have led to two milestone achievements, namely, the signing of a Memorandum of Understanding in March 2014 between the Offshore Energy Research Association (OERA), the Nova Scotia Department of Energy, and Innovate UK (formerly the Technology Strategy Board); and the launch of a joint Canada-UK research competition in August 2014 to develop new technologies for tidal in-stream energy applications.

The objective of the competition is to bring together Canadian and British expertise from industry and research organizations to create novel, commercially focused environmental monitoring, sensing and instrumentation technologies suited to high flow/harsh in-stream tidal energy environments. The expectation is that implementation of such technologies will lead to acquiring better data through improved data collection and analysis methods. Better data in such areas as resource assessment, site characterization, turbulence, and fish monitoring

will, in the longer term, facilitate the reduction of risk, uncertainty and cost to the industry. Successful applications require a deployment field trial plan at an approved test site in the Bay of Fundy and/or UK waters. The Province of Nova Scotia and the UK Government are jointly investing approximately \$1.4 million in the competition.

Expressions of Interests closed on 28 November 2014, yielding nine submissions. A short list of proponents will be invited to submit full proposals which are due in late February 2015, with the announcement of successful projects scheduled for early April 2015. The OERA and Innovate UK will jointly administer the call process and provide support to proponents over the coming years where by 2018, both Canada the UK expect to see research outcomes that will bring positive and step-wise change to the industry.

To monitor progress on the competition, please visit the OERA website, www.oera.ca

Jennifer Pinks, Research Manager, OERA (jpinks@oera.ca)

FORCE: 2014 Highlights

Infrastructure

FORCE reached a major milestone in 2014: the installation of four **underwater power cables**.

The four cables laid along the sea floor of the Minas Passage give FORCE the largest transmission capacity for tidal power in the world. With a combined length of 11 kilometres, the four cables have a total capacity of 64 megawatts, equivalent to the power needs of 20,000 homes at peak tidal flows. Each 34.5 kilovolt cable, together with its reel, weighed over 100 tonnes.

Planning took roughly two years, and the operation itself lasted the entire month of October, from mobilization through sea trials and finally cable deployment. Over 25 personnel were directly involved in planning, mobilizing, surveying, and installing the cables. The project used expertise from Nova Scotia, the Maritimes and abroad. Antigonish-based R.J. MacIsaac Construction acted as lead contractor for marine and onshore activity. Video is available at <https://vimeo.com/110195098>.

Other news this year included:

- FORCE welcomed **two new berth holders** – OpenHydro and Black Rock Tidal Power – as well as another potential developer, DP Energy. Minas Energy also formed a new partnership with Bluewater to create an advanced floatation system to deploy turbines in the Bay of Fundy.
- FORCE received over **\$4 million from the Province of Nova Scotia** to fund the expansion of our onshore electrical infrastructure to accommodate up to 20 MW; this will allow small turbine arrays to connect to the electricity grid.
- FORCE welcomed **new talent**: Anne-Marie Belliveau as the new director of operations, and Simon Melrose as the FAST project manager. Janet MacMillan and Paul Jamer joined FORCE's newly expanded board as independent directors.
- FORCE welcomed a record-breaking 5,400 guests to our visitor centre in 2014, up from 4,300 in 2013.

Installing Connectors on Power Cables
(Credit: FORCE)



Cable Loaded on Barge
(Credit: FORCE)



Power Cable Installation, October 2014 (Credit: RJ MacIsaac Construction)

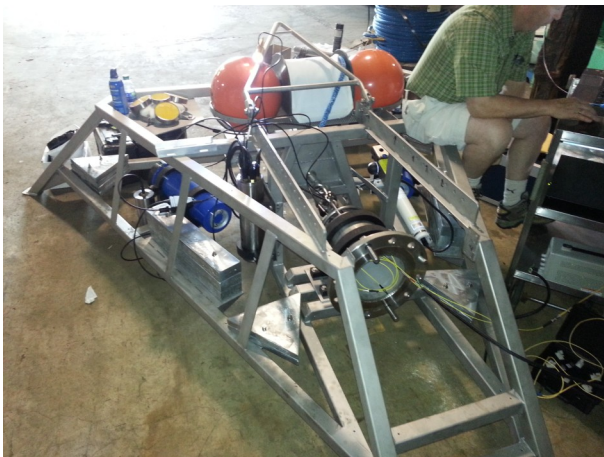


FORCE: 2014 Highlights

Environmental Monitoring

FORCE completed construction and testing of its **mini-lander**, designed to house scientific instruments to measure the marine environment in real time via cable connection. Some of the Nova Scotia companies involved include Open Seas Instrumentation Inc., EMO Marine Technologies Ltd., and Mackenzie Atlantic Tool and Die Ltd. Deployment is expected for early 2015. The mini-lander is the first underwater platform created for the **Fundy Advanced Sensor Technology (FAST) platform** program. Completion of the main FAST platform is expected in early 2015.

As part of the FAST program, FORCE achieved the first successful mooring of a commercial barge during peak flow tide in the Minas Passage, laying the groundwork for future complex operations at the site. FORCE also conducted a survey of the FAST data cable, establishing useful methods and equipment for monitoring and maintaining FORCE's subsea assets.



Testing Mini-lander Components In-shop (above) and In-water (below), July 2014 (Credit: FORCE)



FORCE completed phase one of the **Vectron** project (with partners Nortek Scientific and Dalhousie University), the development of an instrumentation system (to be installed on the main FAST platform) to accurately measure turbulence at turbine hub height.

FORCE integrated our shore-based **monitoring systems**, including X-band radar and meteorological tower, with our off-shore tide gauge, providing a multi-dimensional understanding of our real-time operating environment.

FORCE launched a new collaboration with Ocean Networks Canada to support the FAST program by enhancing the accessibility of our **real-time data** to scientists and developers around the world.

FORCE committed to coordinate common standards to collect and analyze tidal data with other test centres from Europe, Asia, and North America.

FORCE released an RFP for an expert consultant to create a new **environmental effects monitoring program** in anticipation of upcoming in-stream turbine deployment (more info at <http://fundyforce.ca/media-center/opportunities/>).

*Matt Lumley, FORCE Communications Director
(Matt.Lumley@fundyforce.ca)*



Radar and Weather Station at the FORCE Visitors Centre near Parrsboro (Credit: FORCE)



Standards Development for Marine Energy Converters

Update from the Canadian Subcommittee of IEC TC114

This past year was an active period for the Canadian Mirror Committee (SMC) of the International Electrotechnical Commission Technical Committee 114 (IEC TC114). In April Canada welcomed international representatives and experts from 13 countries to Vancouver for the TC114 plenary meeting. The week included project team meetings to develop content for technical specifications (TS), and was wrapped up by a plenary meeting to update country activities, review the status of TSs under development, and plan future work items.

SMC has been busy contributing to the development of TSs. Highlights from select project teams in 2014 include:

- Completion of Canada-led TS 62600-10 Assessment of Mooring System for Marine Energy Converters (to be published in 2015 pending international approval);
- Completion of TS 62600-101 Wave Energy Resource Assessment and Characterization (to be published in 2015 pending international approval);
- Development of the first draft of TS 62600-2 Design Requirements for Marine Energy Systems;
- Completion of TS 62600-201 Tidal Energy Resource Assessment and Characterization (to be published in 2015 pending international approval);

ing international approval);

- Establishment of Canada-led 62600-300 Electricity Producing River Energy Converters – Power Performance Assessment;
- Establishment of 62600-301 River Energy Resource Assessment and Characterization;
- Establishment of 62600-40 Acoustic Characterization of Marine Energy Converters.

SMC is also funding three research projects to support the development of standards in Canada:

- Impact of Channel Blockage and Free-Surface Proximity on the Performance of Cross-Flow Hydrokinetic Turbines (Laval University);
- Extended Wave Modeling and Buoy Data Collection (University of Victoria); and
- Evaluation of Performance Assessment Procedures for a Floating River Energy Turbine (Mavi Innovations).

We would welcome new participants to join mirror committees for document reviews. For more details please visit www.iec.ch/tc114 or <http://tc114.oreg.ca/>.

*Russell Stothers, SMC/IEC TC114 Chair
(russell.stothers@cleancurrent.com)*

(Continued from page 4)

Environmental Monitoring at Digby Sites (cont.)

Fundy Tidal is also currently working on advancements in:

- unmanned aerial vehicles to survey the intertidal zone and significant flow features (SkySquirrel);
- cost-effective shallow geotechnical surveys using light-weight dynamic penetrometers and video (Virginia Tech); and
- use of data from low-profile surface drifters for validating FVCOM numerical model predictions (Acadia University).

Community engagement activities focused on seeking community input to minimize impacts of tidal energy developments on fishing, marine life, and navigation. Public meetings were held in Westport and Freeport, followed by door-to-door meetings with local fishing captains. A fishing area and navigation chart of Grand Passage was produced, which was used for selecting the preferred turbine berth sites. Fundy Tidal will conduct similar work for Petit Passage and Digby Gut.

Greg Trowse, Chief Technology Officer, Fundy Tidal (gtrowse@gmail.com)



1) Dynamic Penetrometer; 2) SkySquirrel; 3) Drifter (Credit: Greg Trowse, Reid Gillis & Jordan Crocker)



Tidal Research in Maine

Update from the Maine Tidal Power Initiative

The Maine Tidal Power Initiative (MTPI) has been focusing much of its attention on environmental monitoring around Ocean Renewable Power Company's (ORPC) latest device, the OCGen® power system, deployed in Cobscook Bay, Maine in August 2014. Our research group employed several different monitoring methods to document fish in this region: stationary down-looking hydroacoustics, mobile down-looking hydroacoustics, stationary side-looking hydroacoustics, and trawling.

The overall goal of this recent research, funded by the US Department of Energy, is to quantify aquatic animal behaviour changes around a deployed marine hydrokinetic (MHK) device. Our first objective is to continue the long-term seasonal hydroacoustic dataset we started in 2009. At that time, research was associated with ORPC's TidGen® device. Since then we have collected data on fish presence and depth distribution, as well as trawling samples, every year near the TidGen® turbine, around its bottom support structure, and now around the OCGen® turbine.

We are also working on new acoustic analysis techniques to improve species identification in the hydroacoustics data. With this type of analysis, we hope to determine if different fish species react differently to the presence of a device. In addition, we are using the data we have collected over the years to de-

velop a model to estimate the chances of fish encountering a device. This model will provide researchers and tidal power developers an estimate of the proportion of fish that may actually encounter an MHK device and at what distance fish alter their behaviour to avoid such a device. Fish behaviour data collected this summer will be combined with a high-resolution hydrodynamics model of Cobscook Bay to simulate fish responses to the flow fields around the OCGen® device. This highly collaborative project will evaluate the degree to which MHK devices like ORPC's TidGen® and OCGen® alter hydrodynamics in their deployment locations and what those effects have on the aquatic species there.

For further information about MTPI check out the recently published *Sustainability Science* paper by the MTPI human dimensions team. It describes MTPI's structure, research approach, stakeholder engagement, and how this approach created opportunities or challenges for the team, their research, and their stakeholders.

Spelke Jansujwicz, J. and T.R. Johnson. 2014. The Maine Tidal Power Initiative: transdisciplinary sustainability science research for the responsible development of tidal power/ *Sust. Sci.* DOI 10.1007/s11625-014-0263-7. (<http://link.springer.com/article/10.1007/s11625-014-0263-7>)

Gayle Zydlewski and Megan Altenritter
School of Marine Sciences, University of Maine
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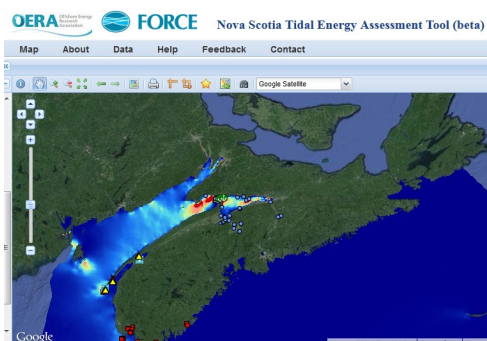
Hydroacoustic Data Collection in Cobscook Bay, Maine (Credit: Gayle Zydlewski)



Acadia Tidal Energy Institute (ATEI)

The Acadia Tidal Energy Institute (ATEI) is a non-profit organization conducting tidal energy research, training, education and outreach to support sustainable development of the emerging tidal energy industry. In 2014 our interdisciplinary team have focused on the following projects:

Online Interactive GIS Platform



A joint project with OERA, FORCE, Tekmap Consulting and ATEI, this data mapping project aims to consolidate and make accessible a range of spatial data from tidal

energy projects in the Bay of Fundy. The project brings together otherwise disparate sets of data for display and manipulation in a Geographic Information System (GIS).

A proof-of-concept GIS platform was developed in the spring of 2014 and successfully integrates high-resolution hydrodynamic model data in the FORCE and Digby regions and several other layers of interest into an online map. The mapping tool can also query and highlight regions of particular interest (e.g. high tidal power density, minimal turbulence areas). Development of the GIS platform is expected to continue in 2015 with plans to include more features and relevant regional data.

Implications of MRE for Indigenous and Local Communities

The latest research into how Marine Renewable Energy (MRE) affects local communities looks at the indigenous maritime rights in case studies from Canada, Scotland, New Zealand and Australia, actual and potential interactions between MRE activities and coastal communities and how indigenous and community rights can play a role in securing a fair balance between

industry needs and a just settlement for affected communities. To learn more, the article *Rights and ownership in sea country: implications of marine renewable energy for indigenous and local communities* can be found in Vol. 52 of the journal *Marine Policy*.

Winter & Early Spring Marine Mammal Presence in Minas Passage

Acadia's most recent marine mammal study in Minas Passage involved CPOD hydrophone deployments in and near FORCE to fill a seasonal data gap (winter and early spring) in marine mammal presence in the Minas Passage and FORCE test area. The Acadia Centre for Estuarine Research also deployed an instrument lander, housing both iListenHF and CPOD hydrophones. The performance of the two hydrophone technologies are being compared, and the effectiveness of shrouding the iListenHF hydrophone (to reduce noise effects) is being tested.

Other Activities

- Contributions to preparing the Value Proposition for Tidal Energy in Nova Scotia
- Ongoing tidal energy site and resource assessment and modeling at Digby region COMFIT sites (ecoENERGY funded project, p. 4)
- Participation in MRE standards development (TC 114)
- Software development with Tekmap to facilitate mapping and analysis of hydrodynamic data
- Tidal energy MOU with University of Maine
- International tidal energy research & teaching with institutions in Iceland, US and UK
- Tidal energy presentations to communities and the Nova Scotia Science Teacher's Conference
- Tidal energy short course to Life Long Learners
- Hosting of tidal energy workshops and webinars with OES-Annex IV and NS DOE
- Development of Tidal Energy School Outreach program with hands-on activity



Left: Richard Karsten teaching the course "Understanding the Power of the Bay of Fundy Tides" to the Acadia Lifelong Learning class. Right: Anna Redden presenting environmental research results at the ICOE in Halifax, November 2014.



INORE Symposium 2014

On October 31st, 35 young researchers representing eight countries arrived in Halifax to participate in a symposium put on by the International Network on Offshore Renewable Energy (INORE). Over the course of three days, attendees presented their research, listened to keynote speakers, discussed collaborative opportunities, experienced Canadian culture AND endured Nova Scotian weather. The symposium, which was only the second of its kind in North America, was a roaring success for both the organization as a whole and the INOREans in attendance.

What is INORE?

INORE (pronounced "eye-NORE") is an association of graduate students and early-stage researchers working on topics related to all aspects of offshore renewable energy (technological, social, environmental, etc.). It has more than 1000 members from over 70 countries and is run by a dedicated group of volunteers. Each year, INORE hosts several free events to bring its members together, but the annual symposia are truly the heart of the organization. In many ways, they are like a typical conference with poster presentations and keynote speakers, but they also include social and recreational activities that casually foster the development of collaborative relationships. These relationships often extend beyond the symposia as was highlighted in a plenary session at the International Conference on Ocean Energy (ICOE).

Highlights from Halifax

Despite the pouring rain, hurricane-force winds and blowing snow, the Halifax symposium had several highlights:

- Collaborative "speed dating" activity where potential "matches" were pre-determined by organizers;
- Keynote speakers discussed recent developments in the Bay of Fundy;
- Joint reception with the Nova Scotia Department of Energy;
- Hike to Cape Split where both the power of the tidal currents and the huge tidal range were on display; and
- Canadian social events: Mooseheads hockey game, live music at the Old Triangle and the grand finale...CURLING!

The symposium was a great precursor to ICOE and it was a thrill to host the young, motivated and talented researchers in our region.

It goes without saying that financial and in-kind support from sponsors is crucial for the success of INORE events. Thank you to our sponsors: Dalhousie University Engineering, NS Dept. of Energy, FORCE, OERA, Nortek, Teledyne RDI, NNMREC, Stan-

INTERNATIONAL NETWORK ON
INORE
OFFSHORE RENEWABLE ENERGY



INOREans at Cape Split, NS, November 2014



Poster Session at INORE

tec, Dynamic Systems Analysis and the Acadia Tidal Energy Institute.

For more information about INORE or to join, please visit <http://www.inore.org/>

*Justine McMillan, INORE Symposium Chair
(mcmillanjustine@gmail.com)*



Upcoming Tidal Energy Events

Local Prosperity: New Economics for Rural Canada

Cornwallis, NS, April 9-12, 2015

<http://www.localprosperity.ca/>

Oceans '15 MTS/IEEE

Genova, Italy, May 18-21, 2015

<http://oceans15mtsieee.genova.org/index.cfm>

Thetis MRE, International Convention Marine Renewable Energies

Nantes, France, May 20-21, 2015

<http://www.thetis-emr.com/>

34th International Conference on Ocean, Offshore and Arctic Engineering (OMAE)

St. John's, NL, May 31 – June 5, 2015

<http://asmeconferences.org/omae2015/>

Energy Ocean

Portland, Maine, June 2-4, 2015

<http://www.energyocean.com/>

European Wave and Tidal Energy Conference (EWTEC)

Nantes, France, September 6-11, 2015

<http://www.ewtec.org/ewtec2015/>

About FERN

FERN is an independent non-profit organization initiated by academic and government researchers as a forum to coordinate and foster research collaborations, capacity building and information exchange to understand the environmental, engineering & socio-economic implications of tidal energy development in the Bay of Fundy.



FERN was initiated in 2010. **Membership is FREE** and open to all those involved or interested in tidal energy-related research, including universities & colleges, government agencies, environmental NGOs, consultants, and the private sector.

For more information about becoming a member, please visit our website, <http://fern.acadiau.ca>



FERN
FUNDY ENERGY RESEARCH NETWORK

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We welcome your feedback on this issue and any suggestions for future issues of FERN's annual newsletter.

