



FERN
FUNDY ENERGY RESEARCH NETWORK

Annual Report on FERN Activities and Accomplishments

1 April 2014 – 31 March 2015

Submitted to FORCE by Lisa Isaacman and Dr. Anna Redden

CONTENTS

FERN Mission & Objectives	2
FERN Membership	2
Activities & Accomplishments	4
1. Guidance and Contributions to Tidal Energy Reports.....	4
2. Capacity Building.....	4
3. Engaging Students & Young Professionals	5
4. Communication and Collaboration.....	5
FERN Subcommittees.....	6
Communications & Outreach Ad Hoc Working Group	6
Keeping Informed.....	7
Facilitating International Collaboration.....	7
Annual FERN Newsletter	7
Proposed Roles of FERN in 2015/16	8
Acknowledgements	9

FERN Coordinator: Lisa Isaacman; lisa.isaacman@acadiu.ca; 902-585-1688

FERN Office: 5th Floor Patterson Hall, Acadia University

Website: <http://fern@acadiu.ca>

FERN MISSION & OBJECTIVES

The **Fundy Energy Research Network (FERN)** is an independent non-profit organization initiated by academic and government researchers as a forum to:

Coordinate and foster research collaboration, capacity building and information exchange to advance knowledge, understanding and technical solutions related to the environmental, engineering & socio-economic needs associated with tidal energy development in the Bay of Fundy.

FERN Objectives

1. To identify and provide objective guidance on emerging and priority issues related to tidal energy proposals and developments;
2. To facilitate research collaboration and information sharing among government scientists, academia and tidal energy developers;
3. To foster collaborative research and partnerships, and training of the next generation of highly qualified people;
4. To promote investment in tidal energy research and optimization of its use by enhancing communication and cooperation among those involved;
5. To develop and maintain productive relationships with regional, national and international groups involved in tidal energy research;
6. To communicate information and research progress through meetings, seminars, conferences, reports, FERN website, and other forms of public presentation.

FERN MEMBERSHIP

- **146 registered members** from 80 institutions, 7 provinces and 8 nations (UK, US, Spain, Ireland, Australia, Africa, India and Canada)
- **20% increase in membership** in the last year
- **40 active Subcommittee members**, with 8 new members in the last year
- **8 Executive Committee members:**
 - 2 Executive co-chairs and 2 co-chairs for each of the 3 discipline-specific Subcommittees.

FERN Committee Members (new members shown in BOLD)

Name	FERN Committee	Affiliation
Alan Howell	Socioeconomics	NS Dept. Energy
Alex Hay	Natural Sciences	Dalhousie
Andrew Carlisle	Engineering	OpenHydro
Andrew Henry	Engineering	Consultant
Andrew Swanson (alt. Martin Leguizamon)	Socioeconomics	Cape Breton University
Anna Redden	Executive Committee co-chair & Natural Sciences	Acadia / ACER / ATEI
Brent Law	Natural Sciences co-Chair	DFO / BIO
Carys Burgess	Natural Sciences	Emera
Dana Morin	Socioeconomics co-chair	Fundy Tidal Inc.
Danika van Proosdij	Natural Sciences	Saint Mary's University
David Greenberg	Natural Sciences	DFO / BIO
Dean Steinke	Engineering co-chair	DSA Ltd
Dominic Groulx	Engineering	Dalhousie
Frank Palermo	Socioeconomics	Dalhousie
Gary Melvin	Natural Sciences	DFO, St. Andrews
Gerhard Pohle	Natural Sciences	Huntsman Marine Science
Graham Daborn	Natural Sciences co-chair	Acadia / ATEI
Greg Trowse	Natural Sciences	Fundy Tidal Inc.
Gregory Heming	Executive Committee co-chair & Socioeconomics	Annapolis County
Hague Vaughn	Socioeconomics	Independent
Isabel Madeira-Voss	Socioeconomics	NSCC
Jason Woods	Natural Sciences	SMRU
Joel Culina	Natural Sciences	FORCE
John Colton	Socioeconomics co-chair	Acadia / ATEI
John Shaw	Natural Sciences	GSC / BIO
Kay Crinean	Socioeconomics	Maritime Tidal Corp.
Kris MacLellan	Engineering	Minas Energy
Mary McPhee	Socioeconomics	FORCE
Michael Stokesbury	Natural Sciences	Acadia
Michelle Adams	Socioeconomics	Dalhousie
Mo El-Hawary	Engineering	Dalhousie
Peter Smith	Natural Sciences	DFO
Richard Karsten	Natural Sciences	Acadia / ATEI
Ryan Mulligan	Natural Sciences	Queen's University
Simon Melrose	Natural Sciences	FORCE
Sue Molloy	Engineering	Black Rock Tidal/ Dalhousie
Terry Thibodeau	Socioeconomics	Municipality of Digby
Tiger Jeans	Engineering co-chair	University of New Brunswick
Tony Wright	Engineering	FORCE

ACTIVITIES & ACCOMPLISHMENTS

Key activities FERN was directly engaged in during April 2014 – March 2015 are as follows:

1. Guidance and Contributions to Tidal Energy Reports

One of FERN's main objectives is to provide guidance and advice on tidal energy research and monitoring priorities. Recent involvement includes:

- FORCE's Fundy Advanced Sensor Technology (FAST) Science Advisory Committee
- FORCE's Environmental Monitoring Advisory Committee (EMAC)
- OERA Tidal Area Technical Committee
- Annex IV (Environmental Effects of MRE) Country Analyst's Committee
- IEC TC114 (MRE Standards)

In the past year, FERN members have been involved in the review and production of reports and guidance documents, including but not limited to:

- FORCE's 2015 Environmental Effects Monitoring Plan. Working with contractor SLR Consulting.
- FAST Program Overview Report. *Current Status: under development*
- FORCE's Research and Monitoring Program Summary Report: 2008-2013.
- FORCE's Environmental Effects Monitoring Program Report 2011-2014.
- Tidal Energy chapter in a new Bay of Fundy Ecosystem Partnership book. *To be released in spring/summer 2015.*

2. Capacity Building

Areas in which the FERN has had a direct impact on building capacity for the tidal energy sector in the region include:

- Training of highly qualified personnel, including research students (Honours, MSc and PhD), research assistants, technicians, interns and post-doctoral fellows;
- Acquisition of research infrastructure and equipment (at numerous institutions) for conducting world-class field and lab-based research;
- Development of expertise in research and monitoring at tidal energy development sites and enhancement of capabilities in modelling and mapping tidal energy resources, sediments and other site characteristics;

- Formation of productive multidisciplinary teams for conducting large tidal energy projects funded by federal and provincial entities;
- Participation in international research partnerships and related activities (committees working on international standards, monitoring best practices, etc.); and
- Generation of social licence (which acts to diminish risk) through transparent, collaborative and independent research, and by dissemination of research findings and related products (e.g. tidal energy toolkit) to municipal, provincial and federal decision-makers, and the broader community.

3. Engaging Students & Young Professionals

Student research in the field of tidal energy has grown at several tertiary institutions (universities, colleges) in the region. Students and young professionals make up ~20% of the FERN membership. FERN continues to serve as a popular resource for graduate and undergraduate students (Canada-wide) interested in or working on projects in tidal energy. This year, the FERN coordinator received and responded to dozens of requests for information from students and young professionals working on projects related to tidal energy, as well as those interested in potential careers in the field. FERN assists those seeking jobs and graduate opportunities by connecting them with relevant professionals and by posting resumes, and internship and job opportunities, on FERN's notice board and email listserv. FERN supported the formation of the Fundy Students Research Community, an online forum for connecting students involved in Bay of Fundy tidal energy related research.

4. Communication and Collaboration

FERN serves as a venue for information sharing, open dialogue, idea generation and collaboration. Over the past year, FERN's network of researchers and institutions has expanded regionally, nationally and internationally with over 20% increase in individual and institutional members, including eight new subcommittee members.

FERN is represented by members serving on numerous regional, national and international marine renewable energy committees, including OES-Annex IV (Environmental Monitoring), IEC TC-114 (Standards Committee), Marine Renewables Canada (MRC), FORCE, Acadia Tidal Energy Institute (ATEI), Bay of Fundy Ecosystem Partnership (BoFEP), OERA, and EMAC. Members regularly contribute to national and international conferences and research and monitoring workshops and symposia. FERN members have also been involved in several major collaborative projects and reports completed during the past year.

FERN SUBCOMMITTEES

At the heart of FERN are our three standing Subcommittees. They represent the core tidal energy research themes: **Natural Sciences (biological and physical), Engineering and Socio-Economics.**

The role of the Subcommittees is to bring together diverse interests and expertise to share information and to collectively identify and resolve priority issues related to tidal energy by:

- Strengthening relationships between academia, government and industry;
- Identifying potential project ideas and research teams; and
- Developing communication and information sharing tools to foster and facilitate research in areas of need.

Each of these Subcommittees meet regularly (in person and/or by teleconference) and communicate via email to exchange news and ideas and plan future work. FERN held 10 committee meetings in 2014/15.

The main outcomes of these exchanges have been the generation of new ideas and innovative, collaborative projects. In 2014/2015, key areas of discussion and/or advancement included:

- Environmental monitoring technologies (Natural Sciences)
- Data availability, access and sharing (Natural Sciences)
- Cable laying, connecting and monitoring (Engineering)
- Mooring in high flows (Engineering)
- Accelerated corrosion in high flows (Engineering)
- Community engagement and outreach (See below)
- Marine spatial planning (Socioeconomics)
- Research priority setting
- Overviews and updates of recent projects and other tidal related activities

COMMUNICATIONS & OUTREACH AD HOC WORKING GROUP

Based on issues and needs identified by the FERN Executive and Socioeconomics committees, FERN established a Communications and Outreach Ad Hoc Working Group to examine options to facilitate effective communication and outreach related to tidal energy. As a first step, the working group held a brainstorming session on February 12, 2015 with the key organizations involved in information dissemination related to tidal energy to discuss current engagement and communication activities, gaps that might need filling, options for coordination and collaboration and a potential role for FERN and the ad hoc committee. At the meeting were representatives from MRC, OERA, FORCE, Department of Energy, Municipality of Annapolis, Fundy Tidal and ATEI. Each organization offered an overview of their communications objectives and activities, followed by an open discussion of communication issues and needs. Highlights of the discussion include:

- Need for organizations to better coordinate communication efforts, avoid duplication, identify and address gaps, better utilize limited resources and improve accuracy and effectiveness of the messages being disseminated;
- Need for information to be made available to the public prior to the next turbine installation. We should anticipate fears and concerns and be prepared with accurate, consistent responses, both as individual organizations and as a collective.

This spring, the working group will develop a list of the communications and engagement activities by each organization, as well as their challenges, constraints and needs. The working group will facilitate a second meeting of the partner organizations to identify gaps and options to fill those gaps.

KEEPING INFORMED

FERN provides a number of communication tools, including the FERN website. The website includes recent news and upcoming events, information on past and current research activities, highlights on activities at FORCE, COMFIT sites and activities in Maine, and a searchable publications catalogue. FERN members are also kept informed on tidal energy related events and opportunities via monthly e-blasts.

FACILITATING INTERNATIONAL COLLABORATION

In 2014, FERN developed a close partnership with Annex IV to facilitate international collaboration and knowledge exchange. Highlights include:

- Co-organizing an Annex IV Environmental Webinar on ‘Tidal Energy Research in the Bay of Fundy’ held on October 27, 2014. The webinar featured presentations by four FERN subcommittee members and focused on the research being conducted in the Bay of Fundy - the tidal energy resource and potential, and findings from environmental studies;
- Supporting an Annex IV workshop ‘Environmental Monitoring, Regulatory Needs & Scientific Capabilities: A Facilitated Discussion between Scientists, Regulators and Industry’ held at Acadia University on November 1, 2014. The one-day workshop brought together Canadian, US, China and UK marine energy researchers, industry representatives and regulators to determine what data are needed and what data can realistically be collected to assist with siting and permitting (consenting), as well as with effects monitoring; and
- Updating Canadian project information (reports, publications, presentations) on the Tethys / Annex IV website.

ANNUAL FERN NEWSLETTER

The annual FERN Newsletter (Issue 4 – Fall 2014; 12 colour pages) was released in December 2014. Content highlights included:

- FERN Activities and Accomplishments 2014

- ICOE: 2014 Recap
- Research at Small-Scale Tidal Sites
- Updates from the Department of Energy & OERA
- FORCE: 2014 Highlights
- Standards Development for Marine Energy Converters
- Tidal Research in Maine
- Acadia Tidal Energy Institute
- INORE Symposium 2014
- Upcoming Events

The 2014 FERN Newsletter was distributed to members and associates via email and posted on the website (<http://fern.acadiau.ca/newsletter.html>). Hardcopies are available at the FORCE office and will be displayed at the FORCE Visitor Centre and upcoming conferences.

PROPOSED ROLES OF FERN IN 2015/16

In anticipation of turbine deployments at FORCE and elsewhere, FERN's priority is to continue to foster cooperative partnerships to build the capacity (e.g. expertise, techniques, instrumentation, infrastructure), baseline data, and political/industry support necessary to execute effective, credible, multi-disciplinary research and monitoring to resolve the environmental, technical and socioeconomic uncertainties and challenges of tidal energy development in dynamic high flow environments.

Plans for 2015/2016 include:

- Hosting webinars and data sharing workshops;
- Supporting tidal energy research & development symposiums;
- Pursuing network and project funding opportunities;
- Assisting partner organizations in the preparation of informational factsheets and outreach materials on tidal energy research & development;
- Facilitating partner organization efforts to provide credible, timely, consistent and accurate communication of information on tidal energy in Bay of Fundy;
- Strengthening FERN's partnerships with researchers and institutions regionally, nationally and internationally;
- Supporting student – professional networking, including connector events and mentorship opportunities; and
- Supporting the development of an application for an NSERC funded Strategic Research Network for marine renewable energy (in-stream, river and wave).

FERN's activities and accomplishments to date have been of direct and indirect benefit to FORCE and the province. In the coming year, FERN activities that could serve to support FORCE's ongoing research monitoring and outreach efforts include:

- Continued assistance with the preparation and review of research and monitoring reports, including the FAST Program Overview Report and 3rd Environmental Effects Monitoring Plan. These reports will support funding applications, public & industry relations, and the needs of EMAC and industry regulators;
- Organizing and facilitating research and monitoring related workshops and events, including an experts workshop on the issue of accelerated corrosion of cables and support structures in high flow conditions;
- Assisting in the preparation of national funding applications to support the long-term operational and research needs of FORCE;
- Establishing and maintaining a research and monitoring database for both data and related documents, including the FAST project. This will facilitate user access to information;
- Preparation of the annual FERN newsletter with a focus on development and research activities; and
- Website reporting of activities and successes.

FERN recognizes the importance of its role in actively engaging and educating the public on tidal energy topics of interest. Our efforts in supporting impartial collaborative research and projects, communicating broadly, engaging the community and in advancing social license creates significant benefits to FORCE, tidal energy developers, and the government sector – municipally, provincially and nationally.

ACKNOWLEDGEMENTS

The commitment and efforts of FERN's 40 volunteer committee members are greatly appreciated. We thank Meghan Swanburg (ATEI) for assistance with the newsletter and various reports. FERN is grateful to FORCE for annual funding to support the network's activities. Acadia University is thanked for providing office space and associated facility and administrative support for the FERN coordinator as well as in-kind meeting room space for FERN committee meetings and special events.