



Update on GOMI Journal: *Learning to Steward the Gulf*

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Letter From The Editor

By John Terry

Beginning with a Canadian Millennium Grant in 2000, every June, teachers and their students from north coastal New England and the Canadian Maritimes, under aegis of the Gulf of Maine Institute (GOMI), have convened to share their love and knowledge of the Gulf of Maine and hone their place-based education (PBE) approaches to stewarding it. Changing venues between New England and the Canadian Maritimes yearly provided much opportunity to experience and share the natural and human diversity of the watershed. Bonds between Canadians and Americans formed and joint activities, such as the National Oceanic and Atmospheric Administration's (NOAA) Gulf of Maine coastal Drifters project, flourished.

This experience was productive and meaningful to students and their adult mentors. The numbers of young people being reached were, however, small compared to the need. After a year of studying how to reach more young people, the GOMI Board of Directors concluded that a shift from a youth team approach to a teacher professional development one would remedy the problem. While the shift would lessen the quality of experience for individual students, the numbers to be reached by the new form of place-based education (PBE) would more than compensate. This is the year of that shift from a few students (45-50), fortunate to be able to be selected, to engagement of much more through PBE classrooms. The challenge, quite simply, is two-fold: 1) make the PBE experience deep and broad for each classroom setting and 2) simultaneously maintain and exceed vigorous experiential/academic quality. This is the L2SG challenge.

The answer to the challenge began this summer with two summer conferences. The first conference, held at Adelynrood Retreat and Conference Center, for our newly recruited New England teachers (11 in all), and the second at Acadia University, Wolfville, Nova Scotia for our newly recruited Maritimes teachers (6 in all). Support for these efforts included grants from NOAA, TD Bank Friends of the Environment Foundation, Toward Sustainability Foundation, Harken Foundation, and the New England Biolabs Foundation.

Both conferences focused on L2SG GOMI aims to bring the excitement and joy of PBE to the classroom. Both emphasized sharing and developing PBE ideas and approaches to prepare students to meet climate change challenges to the Gulf of Maine and its watershed. Results included an agreement to:

- Participate in building professional development sessions/experiences to hone PBE skills

- Share curricula, lessons, and ideas within and across jurisdictions

- Offer support/solutions to teachers experiencing roadblocks to their efforts to bring PBE to their schools

- Convene a joint conference of American and Canadian teachers in Nova Scotia in the summer of 2017, and

- Engage in on-going research, such as NOAA's ocean drifters, Acadia University's Tidal Energy Institute and the Ecosystems Center Marine Biological Laboratory, Woods Hole, Massachusetts.

Some of the American teachers were already engaged in GOMI's partnership with NOAA's coastal drifter projects. (See below, Alison Trimper discussion of her and her colleague's ocean

drifter experiences.) Hearing of the value and excitement around that project, our Canadian colleagues opted to join the effort and share data from across the Minas Basin and Bay of Fundy. Four drifters were launched in Minas Basin at the summer workshop. They are now part of the NOAA database and tracked by Nova Scotian students. Other teachers presented alternative ways for bringing MWEEs, (see Emily Flaherty's article in Issue 1 on MWEEs) to their students. Included in these are tidal energy and invasive/migratory species. These are efforts supported by research being done Dr. Anna Redden at Acadia University's Estuarine Research Centre and Tidal Energy Institute, and the Dr. Anne Giblin, Ecosystems Center Marine Biological Laboratory, Woods Hole, Massachusetts. The design is simple: bring on-going scientific research to students in the classroom and students to science in the field. It is, as Emily Flaherty wrote in Issue 1, through such experiences that the students build a love of science and the environment.

John Terry

[1]GOMI's place-based (PBE) approach embraces NOAA's meaningful watershed educational experience (MWEE) and:

- PROMOTES LEARNING THROUGH RIGOROUS EXPERIENCE ROOTED IN THE COMMUNITY AND ITS UNIQUE HISTORY, ENVIRONMENT, CULTURE, ECONOMY, LITERATURE, AND ART
- Emphasizes civic engagement, the ACT (s) of doing something concrete and beneficial to improve, understand, remedy and promote



John P. Terry, founded the Gulf of Maine Institute in 1999. John was Editor-in-Chief, CYD (Community Youth Development) Journal from Aug. 1994 to Nov. 2002. John has broad teaching and administrative experience at the university level including the Massachusetts Institute of Technology, 1969-1984, University of Massachusetts, Lowell, 1985-1992, and Union College, Schenectady, NY, 1964-1969. John received national recognition in 2006 when selected as Civic Ventures, 'Lead with Experience Program 2006 Purpose Prize Fellows. He is also a 2008 recipient of the Gulf of Maine Council on the Marine Environment Visionary Award.

Note From Our Naturalist

By John Halloran

Sea Turtles in the Gulf of Maine

As we learned in the last quarter from a student report, sea turtles can be found in the Gulf of Maine, contrary to popular belief. The turtles we see are descendants from some of the oldest creatures on the planet, survivors of a mass extinction at the Triassic/Jurassic period boundary. (1.)

Four species can be found in the Gulf of Maine, but only two are common visitors, the large Loggerhead, and the very much smaller Kemp's Ridley. These two turtles are coastal, feeding in shallow water for crabs and mollusks, like whelks and mussels. The rarely seen Green turtle also feeds in shallow water preferring a vegetarian diet, while the leatherback, largest of all sea turtles, feeds on jellies like sea nettle and lion's mane found in colder, more productive, deep ocean water.

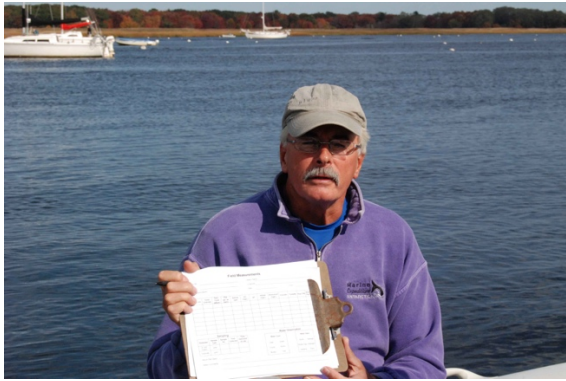
All sea turtles migrate to warmer southerly waters to nest and cooler waters to feed. Hatchlings migrate offshore beginning an ocean stage, which may last up to 7 years. These juveniles usually feed and seek protection in the Sargasso Sea off the Southeastern US coast. Eventually, they find their way into the northward moving current of the Gulf Stream, feeding in the warm waters of late summer and autumn. They generally move south when the water temperature drops but enclosed bodies of water like Cape Cod Bay tend to draw them in. They can become "cold stunned" or shocked if they do not depart soon enough causing their activity to slow, and then cease, causing them to strand. If found, they are usually underweight and possibly suffering from severe injury and infection. Recovery programs, such as that run by Massachusetts Audubon, Wellfleet Cape Cod, get turtles into rehabilitation facilities quickly where their health can be restored sufficiently to release them back into the wild. (2.)

All sea turtles in the US are protected by the Endangered Species Act (ESA). In Canada, Leatherbacks are protected by the Species at Risk Act (SARA), while Loggerheads are being considered for listing. The other two species do not occur in Canadian waters.

Sea turtles are at risk of injury from collisions, as they can be hard to see, and entanglement, in lobster buoys and fishing nets. Entangled turtles are particularly vulnerable and are best assisted by those trained to help. The National Marine Fisheries (US) maintains a hotline to report entanglements at 866-755-NOAA (6622). Stand by the animal if possible until assistance arrives or be able to provide a precise GPS location to the network. (3.)

Sources:

1. Thurston, Harry 2011, The Atlantic Coast, Vancouver, BC Canada, Greystone Books
 2. Prescott, Bob, 2015, Lecture to NOAA B-Wet Program, Wellfleet, Ma.
 3. Stellwagen Bank National Marine Sanctuary 1993, Management Plan, stellwagen.noaa.gov/management.1993 plan
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John Halloran is GOMI's Science Director and oversees the science curriculum development of all projects and workshop trainings with Dr. John Terry. A retired form the Newburyport MA school department, here he taught natural science as well as an Outward Bound and Project Adventure trainer, John is the founder and director of Adventure Learning, an educational outreach program with area schools and recreational programs. John has been in the forefront of the experiential education movement

for 36 years. Halloran is also a recent recipient of the Gulf of Maine Council on the Marine Environment Visionary Award and the 2013 recipient of Newburyport's Youth Service Annual Asset Award.

Notes from the Field

Crossing the Gulf

By Tracy Webb

Ask anyone to explain their sense of place, the importance of "where I live and why," and invariably they will try to describe this intangible feeling regarding the environment – "the air is so fresh; I need to be near the ocean; I love the woods" and so on. A key aspect of inspiring students with Place-Based Education (PBE) is to help them acknowledge and explore their environment - their unique sense of place, while teaching concepts and hopefully, instilling a feeling of stewardship for the environment, along with the way.

In recent months, a unique collaboration has developed across the Gulf of Maine and the Bay of Fundy between groups of American and Canadian teachers working together to develop common goals of sustainability, stewardship, and citizenship through scientific exploration and social forums. By applying knowledge gained through experimentation and analysis, these teachers will ultimately gain better understanding of several major issues affecting our everyday bioregions – such as climate change, the impacts of invasive species, and the positive benefits of properly harnessing tidal energy.

During the two-day GOMI conference hosted by Dr. Anna Redden at Acadia University, August 24-25th, a group of Nova Scotian teachers from the Annapolis Valley started immediately on Phase One – getting their drifters built! I was one of those teachers!

We were so fortunate that three other drifters were available for our use, as they had been recovered from other trials, so we had four to make. After problem-solving a few glitches with John Halloran and Dr. Brian Saunderson, we were ready to test them in our local swimming hole, and all were ready to go except one – glug, glug, glug. Thanks to John for being our drifter tester, especially on such a hot sunny day! Always test your gear before deployment, as it can be retrieved in a few feet of water but not so well in the ocean!

Drifters provide essential data points for analysis, and over time, can provide an emerging picture of the water flow patterns in the Gulf of Maine and the Bay of Fundy. Our group set our drifters free on Wednesday, August 24th around 18:30. There was a good wind blowing up the bay, opposite to the direction of the tide. In a lobster boat, we were tossed quite a bit as we went out about 4-5 km offshore from Hall's Harbour.

After the drifters were launched, we began to get data, and observe the drifters zigzagging back and forth over the same general area, in and out with the tide. It was fascinating to watch the updates, and sooner or later some of them will likely break out of this pattern. It was apparent that the behavior of the drifters was not easy to predict. Each drifter was like an individual puzzle piece – with a mind of its own, it seemed! With an exciting first day behind us, we celebrated our successful drifter launches with a BBQ supper and social time. It was great to have casual conversations about the overall project, and how we could work together from different schools.

Next morning we experienced the engaging Climate Café Discussion facilitated by Shari Melto, GOMI Board of Directors, facilitated and two students (Connor Saunderson and Margaret Hopkins) – great to have the inter-generational approach to learning! The format involved the first speaker posing a suggested response to an issue, followed by three listeners who then responded to the speaker in turn. They focused on a different listening skill, such as reiterating the problem and solution, and reasons, clarifications, asked more specific leading questions, etc. – valuable process and skill sets for everyone to learn and incorporate into their conversations. A Garden Tour of Acadia's K.C. Irving Environmental Science Centre then followed the discussion. It would be difficult to imagine anyone not appreciating this area, a truly magnificent place with rich biodiversity and peaceful thought-provoking paths through woods and greenery. It is open to the public at all times and is a perfect outdoor classroom for observing and learning about our native plants and flowers.

After lunch, Dr. Michael Stokesbury, Acadia University, gave an entertaining presentation, as he demonstrated further applications of scientific studies and knowledge relative to the endangered Atlantic sturgeon. With many fishers gravely concerned by the placement of large tidal energy turbines in the Bay of Fundy, it is critical to understand and explain fish behavior and potential impacts on various life stages of marine organisms. Dr. Stokesbury shared some of his research findings of the sturgeon, and it was fascinating to learn that the sturgeon tend to stay put in one or two key mid-bay areas over the winter, and often do not swim at depths greater than 50 m, usually at an average of 31 m. This bodes well for both the sturgeon and the possible placement of tidal energy turbines.

The conference drew slowly to a close with three more related experiences, one – visiting the tidal tank project of an Acadia student (Eileen Haskett), assessing the impact and effects of various tidal ranges and resulting suspended sediment load on the biota of the mudflats; two – exploring the NS Tidal Energy Atlas (Dr. Richard Karsten, Acadia University) and the diverse data sets available for analysis; three – the Tide Tank and propeller energy experiment using Logger Pro software with Meghan Swanburg, Acadia University. Excellent resources for students and teachers alike! Thanks to all who gave of their time to allow us these experiences and share in your work!

The event came to a close with the final debriefing by Dr. John Terry on the proposed Teacher Toolbox, the GOMI Journal, and expectations for all of us, as team Nova Scotia! We agreed that more time was needed to brainstorm and develop concrete plans for implementing these concepts into our courses. We expect that with a few more meetings locally over this coming year, we will have some resources in the works, and be able to report our lessons and successes, or discoveries, to our U.S. colleagues when they visit next summer!

The potential of a project of this nature is immense, with developing curriculum and activities to involve students with hands-on science, learning how to analyze data, and promoting sense of place with PBE and stewardship for sustainability. So much can be learned from the drifter data, combined with the NS Tidal Atlas, and current research from universities such as Acadia, and from Canadian and American scientists involved in oceanography and related sciences. The more we find out, the more questions we have – isn't that the idea? What a gift of learning to demonstrate, model and promote with students!

Tracy Webb, Horton High School, Nova Scotia, Canada

Tracy Webb is starting her 33rd year teaching at Horton High School in the Annapolis Regional School Board, NS. Her usual courses are Science 10, Oceans 11 and Geology 12, and she also is the Extended Essay Coordinator for the school's IB students. In addition to many professional organizations, committees, presentations and lead teams, Tracy has been actively involved in environmental issues for a long time. As a teacher, she values her position to encourage inquiry and engage curiosity, hopefully inspiring youth to get more involved with the outdoor world, and to creatively think with no box in sight!

GOMI Students at the Spencer-Peirce-Little Farm, Newbury Massachusetts

By Arleen Shea

When John Halloran, John Terry, and Marcia Samuelson (Organizers of the US GOMI Summer Workshop) approached me to host a weeklong, joint venture with GOMI students, and children of GOMI summer workshop attendees in the last week of June, I was immediately in. It has long been an interest of mine, as Education Program Coordinator for Historic New England, to integrate history and farm science at Spencer-Peirce-Little Farm. This experience, we thought, would help us determine student interest, and develop content for a possible future collaboration and summer camp for teens at the Farm.

We began the week exploring Spencer-Pierce-Little Farm's 1775 barn and collection of farm tools -- tools that were used not only on the farm but also in the great salt marsh. Students learned that John Spencer arrived from England in 1635 with his livestock to take advantage of the great salt marsh's renewable source of hay, which had lured him here. The students helped with daily chores to feed and care for the farm animals, fosters from the Massachusetts Society

for the Prevention of Cruelty to Animals. We cleared the much overgrown Eliza Little Trail that connects the farm to the Plum Island Airfield, and the Parker River Wildlife Refuge and Massachusetts Audubon's Joppa Flats. The students worked each day diligently, but what gave me a renewed sense of hope for the future were our lunch conversations, honest conversations about the environment, climate change, the Gulf of Maine and even the science and politics of farm management and food! These kids are getting it. They will be the ones to help this region flourish in the future.

When the children of the conference participants arrived on Thursday and Friday, it was fun to watch the students teach the younger children what they had learned. Lauren Healey and Chris Orlando, GOMI summer interns at Parker River Wildlife Refuge from Newburyport, joined us. We went on a native vs. invasive species safari, found many insects to identify, and played fun science riddle games. We all worked on Friday to finish the newly installed butterfly garden, adding a few perennial plants, and then bedding it and the kitchen garden with salt marsh hay. It was an exciting week for me, and I think a fun and different approach to teaching students about science, and the Gulf of Maine and its great salt marshes.

Arleen Shea is Education Coordinator, Newbury Region, Historic New England and the Spencer-Peirce-Little Farm, Newbury, MA. Historic New England is the oldest and largest regional heritage organization in the nation. At the Spencer-Peirce-Little Farm, we teach history through the use of vast collections of historical artifacts from the museum house and historical archives. Historic New England's school and youth programs serve more than 50,000 students all over New England, and the organization has received national attention for the creative way in which we use historical resources to enrich learning.

Idea Exchange

By Ali Fields

After Reading “Into The Field” by Amanda Giracca (Orion Magazine, May/June 2016)

“Humility, an understanding of the world around you, a sense of agency, the ability to form hypotheses based on observations, understanding complexity - these are the qualities educators want all students to have...” Amanda Giracca posits in her recent essay titled Into The Field in Orion Magazine. She begins her essay on the road following a van of students from Prescott College in Arizona toward the cliffs of the Verde River while explaining that learning by going out of the classroom into the world is what pulls students into real memory forming experiences.

Professor Bob Ellis, who leads this crew has the stated goal that day of having his students understand why different plants have different types of leaves, some big and broad, some small and waxy, but as a raptor glides overhead, the group stops to notice, to describe what they see. Giracca says she notices that Ellis doesn't tell the students what type of bird it is. He just wants to

get the students to be in the habit of noticing. It's not about memorizing names or facts. It's about getting kids out into the field because as an educator when you create authentic experiences, natural things happen and that's where real learning can take place. We need to give our students "ample opportunity to develop a sense of wonder or to build a set of skills that will help them think through the complexities of reality - skills that no textbook-derived information can replace... It's the experience in its purest form that seems to be missing for students."

As I read Giracca's article, I connected to it strongly. As an educator myself, I'm constantly trying to get my students out of the classroom. When you bring students out into the world, they wake up. They ask different questions - Questions that aren't triggered by workbooks and spelling tests. Professor Ellis, hiking with a group of students one time in Wyoming's Wind River mountain range decided to run to the top of a peak after setting up camp. They made it to the top to see the "setting sun send a line of cottonwoods aglow." A light rain fell, making the leaves sparkle. One of the students turned to Ellis and asked, "Bob, what role does beauty have in education?" I love this one and think we will highlight it in the margins.

When you experience the beauty of nature high on a mountain peak for the first time, you form strong connections with that place. This leads to love and respect for the place that goes deep. Whether students interview a local fisher or spend an afternoon each month visiting the same tree at the state park, the connections that they make are not superficial. I think this is the whole point of place-based education. When I've taken my 9-12-year-old students to the White Mountains to hike the ridges for a week when they leap from rock to rock, smell the alpine forest, feel the rain whipping against their face, taste tiny mountain cranberries... that is when we're hooked, connected. That is when we care, right? Think about a place that you've visited. You didn't just read about it in a guidebook. When your feet touched the earth, when you talked to people there, I'm sure you felt connected in a different way than when you were planning for that trip. When we've experienced the place, we want to learn more. Every time we hear about that place afterward, our ears perk up. We not only want to learn about our place more, but we want to take care of it. It's become our special place.

A lot of my own philosophies on teaching come from my favorite, most meaningful semester of education, a semester with The School for International Training on the South Pacific island of Western Samoa. In my memory, ten American college students sit cross-legged in an open air fale (Samoan house) learning how to make traditional art called tapa clothes by pounding and then dyeing the inner layers of tree bark. There are vendors sitting on their mats at the market selling passion fruit and papaya, colorful fabrics, and lace. The full rainbow colored wooden buses are blasting the same song from the boom box over and over. (I learned quickly on those buses to pull a child on my lap, so I didn't have to sit on the lap of some older gentleman when the bus got crowded.) We are wearing white on Sundays as our host families take us to church in the morning and again in the afternoon with an outdoor village feast between the two services. The fresh water pools on the edge of the ocean mix with seawater as the tide comes in. We respectfully leave when the 16-year-old boy with the fresh, raw tattoo covering much of his body comes to cool off. The delicious mango brought lovingly from the city by my host family mother is charmed away from me by some eight-year-old child asking for a bit then walking away with the whole thing. We, unbeknownst, were learning the meaning of place.

In my memory, I compare these delightful and sometimes challenging, always powerful experiences to my other semesters of college which are comprised of fuzzy thoughts of me sitting at a table or a desk with a book open, trying to memorize Greek verbs which I no longer remember. I did get an A- in my Ancient Greek course most semesters, and I learned how to write and rewrite Greek words over and over, how to memorize passages for the coming exam. But, regarding deep, meaningful learning, I remember thinking two weeks into my studies in Samoa, "This is what learning can be like? This is so real. It's marvelous!" I had never experienced anything like it and never realized that learning could be so engaging.

It was hard for me to get on a bus the first day we were in the country, but that was our assignment. Get on a bus. Get off in the center of town. Change buses, go where it takes you and then get back here. Our Samoan language skills were limited to "hello" and "thank you" at that point. But I did it. We all did. And we felt empowered. While we can't take all students out of the country, when we take them out of the classroom, perhaps pushing their comfort zone a little or a lot, the world becomes real, and students come alive when engaged in real out of textbook learning.

This past spring I was driving a van of 8 fifth graders to a local family farm. This was to be our 5th and final trip of the year. That day after we planted strawberry seedlings, helped with the irrigation system, covered an asparagus hill with hay to keep the weeds down, collected eggs, held tiny fluffy chicks and watched the baby goats wobble on shaky legs, we got to take turns playing on the raft in the pond which, while attached to a tree on the bank, felt as tippy and unsteady as those newborn kids. So fun! Finally, before leaving, we circled up on the grass in the shade and took turns finishing the prompt, "Before coming to this farm, I never had..." Our list went on and on. One reason was none of us wanted the day to end. Each time we'd come to the farm, we pulled into the school driveway late, just as dismissal was starting. On the way back to school that particular day, the students noticed all the political signs that were on people's lawns and started talking about what was happening with the elections. They asked thoughtful questions and pushed each other's thinking. Taking time away from the classroom gives us an opportunity - and time - to have real conversations triggered by things in the world that make us curious. It is easy, as an educator, to tell when your people are indeed engaged. Excellent point. I think this will be one of your lines we will also highlight.

"Education is a natural process carried out by the child and is not acquired by listening to words but by experiences in the environment." This is a quote by Maria Montessori. At the Montessori public school where I teach in 25 upper elementary students, I am lucky enough to be able to take students out of the classroom on a regular basis. Part of our charter is to learn about the history, culture, and ecology of the Merrimack River Valley, the area where we live. So we go out a lot. We explore the local state park and the Merrimack River. We interview people in town and invite local experts in. The history of our area is rich and deep. I feel grateful to be able to access our community outside of the classroom walls. That said, it can be hard to get out, even in our school. There's the extra time it takes to set up the trips, do the paperwork, and figure out transportation. Sometimes there are costs involved, and we have to figure out how to pay for trips. Then, there's the curriculum-that's-supposed-to-be-taught. Learning by experience indeed, takes more time than delivering the information in a lecture or written form. But really, what's the point of education?

Going outside the classroom isn't just a nice break from the routine. It's often the beauty of the natural world and the unassigned learning that drives students to explore their own curiosities further. It gives students confidence and lights joyous discovery. What's being lost in education today, Giracca says, is the "opportunity to question and grow - to be moved, to be momentarily stunned - or flummoxed - by something you couldn't have anticipated." I would add joy and delight to that list. As more and more of us are speeding through life attached to our screens and our urgent agendas, one of my great hopes for education is that we can teach our children to look up more often, to look up, to pause and to notice details of the world around them that they've never wondered about before. It can be wonderful to be flummoxed once in awhile!



Ali Fields teaches in an upper elementary classroom at River Valley Charter School, a Montessori public school in Newburyport, MA. Her love of the outdoors started as a child when she went to summer camp. There she paddled on Squam Lake and hiked in the White Mountains of New Hampshire. She still goes to camp every summer and spends much time outdoors during the rest of the year as well, cross-country skiing, backpacking, canoeing, playing and making fairy houses and, these days, trying to keep up with her seven-year-old twins. Ali spent a year out of the woods and in the wilds of Cambridge earning a Masters in Education from the Ed School at Harvard. Ali and her family recently spent a year on sabbatical working on organic farms in Chile and Denmark. Ali is an avid believer in getting children out into the world.

Student Forum

GOMI Citizen Science Training Program

By Bailey Fogel

This past spring, I was introduced to the Citizen Science Training Program, a six-day long training organized to provide students of all ages with new experiences and to teach them more about GOMI and its mission. The schedule was filled with meetings with the Parker River Refuge, taking care of the farm animals at Spencer Peirce Little Farm, working with the GOMI teacher's children and many more awesome activities. Being involved in this experience, I realized how unique and special this opportunity was, and that with just a couple of motivated people something influential could happen.

With a lot of prior planning and organization, the program started at 9 am on June 27th at Spencer Peirce Little Farm in Newbury, Massachusetts. We were introduced to the history of the farm and had the chance to feed and interact with its animals. After that, we were led to an old trail behind the farm that leads to the US Fish and Wildlife, Parker River Refuge. We were able to see the benefits in having this path cleared, and made plans to clear it, so it was available to the public. To end the day, we spent time planning more projects and training in different areas. This day gave us a small glimpse into what lay ahead for the week.

The following morning we were brought back to the farm to feed the animals. Shortly afterward, we took a trip in the van to the Refuge to meet up with Lead Biologist Nancy Pau and GOMI's summer interns, who introduced us to options for Citizen Science projects. These involved monitoring trail cameras, recording bats in the area, organizing bird banding data and a few other projects we might wish to join. To finish off the day, we were brought to Plum Island Basin to pull pepper weed, an invasive species that the Refuge works hard to control.

The third morning we worked at the farm again and then loaded up the van with life jackets and cameras and traveled to the Rowley River. Once we arrived at the river, we were loaded into a boat with a Plum Island Long Term Ecological Research Scientist (LTER) to acoustically tag fish. This was interesting. We learned how to fish in the different parts of the river are tracked through their movements and noise transmitted by an implanted tag. After the boat data collection trip, we headed back to the farm to clear the trail. This trail is open to the public and will hopefully bring visitors to both the Farm and the Refuge.

We spent the next three days mentoring the children of the GOMI teachers. While the teachers were training for their NOAA projects at Adelynrood Conference Center, their children helped on the farm taking care of the animals. We were able to rebuild a garden and take multiple trips to the Refuge. Working with these motivated young children and seeing how intrigued they were about the farm and Refuge activities made me feel the change GOMI was creating.

Throughout the week-long program, I gained a lot of experience with the help of many people. I was also able to see for the first time the benefits of GOMI. We were actively teaching young and impressionable people what GOMI strives to achieve.

Bailey is a rising junior at Newburyport High School and an active member of the Newburyport GOMI Team.

Drifter Project

By Jaeden Guldenstern



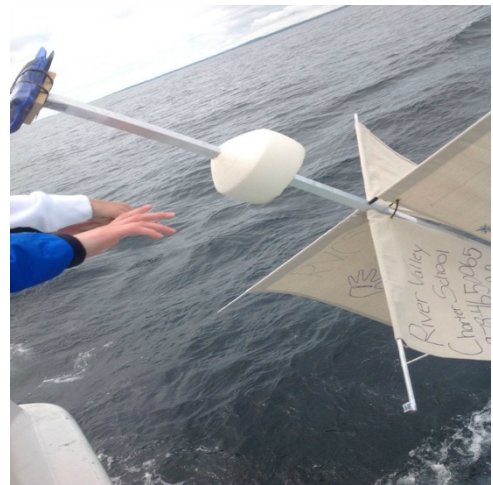
Partnering with GOMI, and taking part in the drifter project, was important to me because I learned more about the ocean and what's happening around us, and how we should be aware of it. One thing I learned was that juvenile sea turtles were coming up from the tropics to Cape Cod because they had not established territories yet. Following the food into the warmer waters of the Gulf Stream, the turtles traveled via the currents into Cape Cod Bay in the Fall and Winter. The much colder water caused the turtles to become cold shocked and unable to move. Losing their ability to swim, they could not get back to the tip of the Cape and became trapped.

The cold water currents would wash the turtles up onto

Cape Cod beaches where they needed to be rescued. Drifters, launched by students on the Cape, follow the same currents and could, therefore, help locate the stranded turtles.

The sixth graders at River Valley Charter School got to work for hands on in building two drifters to help scientists understand the changing currents. I had lots of fun building these two drifters. I worked as hard as I could know they were contributing to saving nature. After we had built the drifters, we were told we were going to set them off the coast of Newburyport.

The day we got to take out the drifters, we walked to the Newburyport boardwalk. It was exciting because the local newspaper was there and I ended up being in the article about our drifter's project. We got onto a whale watch boat and went far out into the ocean. Far enough that we couldn't see land. Then we released the drifters. There were three kids assigned to each drifter launch. I got to launch the second drifter. The drifters have a waterproof tracking device on the top, and it is hooked up to a satellite and a website called "student Drifters" at our school. The website shows us a Google Earth map of where these drifters are and where they have been. This is how we take in information, track currents, and see how the turtles get stranded.



My favorite part of this project was building the drifters and knowing I was helping our world. If I ever get a chance to work at GOMI or possibly get an opportunity to do this again or work with nature, I would do it.

- Jaedin

Jaedin is a rising junior at Newburyport High School and an active member of the Newburyport GOMI Team.

Research Updates

By Dr. Anna Redden

Tidal Energy Development in the Bay of Fundy - Pro-testing, not Protesting

The Bay of Fundy is renowned for the highest tides in the world (17m in range) and equally impressive current speeds — up to 6 meters per second in the Minas Passage. The Bay is ecologically rich, with diverse and abundant migratory species, and has been recognized as exceptionally productive and sensitive, inspiring two UNESCO World Heritage Site designations.

Numerous high flow sites in the Bay of Fundy have been identified as suitable for tidal energy development. The responsible harvesting of energy from these sites requires examination of the power potential, the environmental effects of harvesting tidal energy, and the associated socio-economic benefits and impacts on communities, fishers, and other users.

My perspective on the harvesting of Bay of Fundy tidal energy using stand-alone turbines (not housed within a barrage or dam as in the Annapolis River, Nova Scotia) has been developing since 2006. At that time, the province of Nova Scotia was actively seeking opportunities to further reduce the burning of fossil fuels and was considering the potential of the Bay of Fundy's world-class tidal energy resource to contribute to the mix of local sources of renewable energy.

As in Scotland, the province began to investigate this potential by initiating the establishment of an in-stream (barrage free), tidal turbine test centre. The selected test area is located in the northern region of the Minas Passage, Bay of Fundy, near the town of Parrsboro. This test facility, known as the Fundy Ocean Research Centre for Energy (FORCE), is a not-for-profit organization largely funded by the federal and provincial governments and is Canada's leading test center for tidal energy research and development. Its purpose is to test the performance of large, commercially-ready, stand-alone devices that are cabled to shore and connected to the province's electrical grid. In-stream turbine testing at the FORCE site will serve to inform decisions made on the role (if any) of tidal energy in Nova Scotia's energy future. FORCE also has a stewardship role, with an active environmental monitoring and research program, and engagement with the general public largely via the FORCE Visitor Centre.

The first test to demonstrate tidal turbine installation and recovery at FORCE took place in 2009-2010. Since then, subsea electrical cables have been installed on the seafloor. Two cable-connected OpenHydro turbines are expected to be deployed at FORCE in late 2016, followed by other device types as shown below.



Figure 1. Location of the FORCE test site in the Minas Passage, Bay of Fundy. The picture on the right shows the towing of the OpenHydro turbine and barge before turbine installation on the seafloor in late 2009.



Figure 2. FORCE Visitor Centre overlooking the Minas Passage and FORCE test site (red arrow).

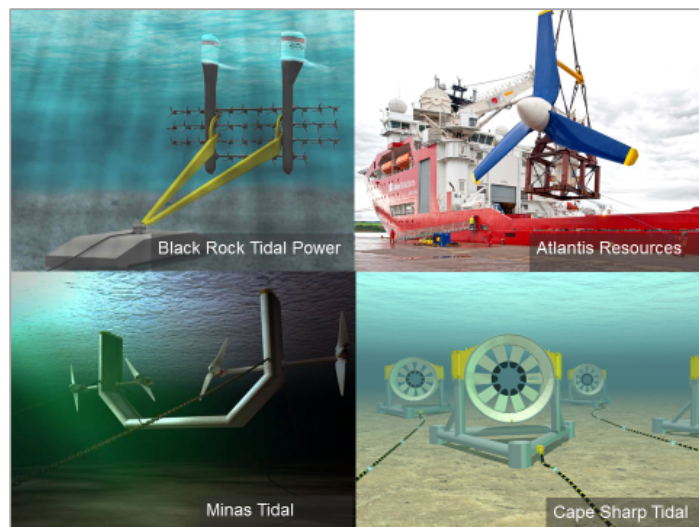


Figure 3. Proposed in-stream tidal energy turbines for testing at FORCE, commencing with Cape Sharp Tidal's new OpenHydro design (bottom right).

Development of any marine industry poses potential risk to the environment, and tidal energy is certainly no exception. Two strategic environmental assessments and a series of workshops and public information events have identified potential consequences of tidal energy development in the Bay of Fundy. Not surprisingly, the highest priority biological components of concern are migratory fish and marine mammals. But how does one assess risk of turbine interaction with marine life in a very high flow, macro-tidal environment? I can tell you that it was very challenging and that it requires much funding, much collaboration, and innovative, technological approaches.

Monitoring environmental effects require several years of baseline data on the environmental conditions and ecology of the site before the installation of turbines. Some of the environmental questions we have been addressing include: How is the FORCE test area and Minas Passage being used by migratory fish (focused on species of concern), lobsters and marine mammals? When are they present? At what depth do swimming animals transit through the passage? For the past seven years, Acadia faculty and students, and colleagues elsewhere have been trying to answer these questions with the aid of modern, acoustic technologies. Some of these technologies have been used to track the movements of fish (Striped Bass, Atlantic Sturgeon, Atlantic Salmon and American Eel) that were implanted with transmitters that emit identifiable signals (ping sequences). We have also used hydrophones to detect and record the seasonal presence and activity of harbor porpoises in Minas Passage. Their presence is heard when they vocalize for communication, navigation, and feeding. Porpoises emit a series of unique high-frequency echolocation clicks; bats use a similar echolocation system.

Perhaps the most difficult question we are asking, and which requires a turbine to be installed, is this: Can fish and marine mammals detect and avoid massive infrastructure when moving at high speed through the FORCE test area? The answer to this question is likely to vary among species and with both sizes of animal and season. Although critical, little is known about this topic largely because there have been very few stand-alone tidal turbine installations around the globe. The efficiency of some of the acoustic technologies used to detect animals is also reduced in naturally "noisy" high flow tidal environments.

Regardless of the challenges and technical limitations, attempts are being made to collect environmental effects monitoring data. The next turbine installed at FORCE (late 2016) will be fitted with both imaging and listening sensors to detect animals and their behavior near the device. It is clear that we will not learn much (if anything) about the impacts of in-stream tidal turbines in the Bay of Fundy if we do not install, test and observe the environmental interactions of a range of turbine technologies at FORCE. This test center presents an exciting learning opportunity for Nova Scotia and the Gulf of Maine bioregion, and what we are learning with this test facility has implications for tidal energy initiatives in the Bay of Fundy-Gulf of Maine system and elsewhere in the world.

We have a responsibility to future generations to be pro-testing (versus protesting) all available renewable energy options. And when there are success and commercial development proceeds,

we must ensure that development happens responsibly and sustainably. My advice to all readers is this... stay informed, communicate and educate, and be an active steward of your region!

Anna Redden is a Marine Biology Professor at Acadia University in Nova Scotia. She is also the Director of the Acadia Centre for Estuarine Research, which is primarily focused on the estuaries and nearshore coastal waters of the Bay of Fundy. Anna is the co-founder and Director of the Acadia Tidal Energy Institute and also serves as the Chair of the Fundy Energy Research Network. During the last decade, Dr. Redden has led some tidal energy environmental projects at the Fundy Ocean Research Center for Energy (FORCE) test site in Minas Passage. Anna's research activities with collaborators and students have involved understanding how marine animals utilize high flow environments. This includes tracking the movements of coastal fishes and lobsters, assessing marine mammal activity patterns and investigating sediment-animal relationships in the Minas Passage. She has been involved with the delivery of GOMI stewardship programs for many years, and currently, provides support for the L2SG teacher's program in Nova Scotia.

Climate Change Café

By Shari Melto

Debate or Dialogue?

The practice of dialogue is as old as humankind itself. For thousands of years, indigenous people have gathered in a council circle to "think together" about the challenges facing their community. But thinking together seems to have been all but lost in our culture. William Issacs, the founder of the Dialogue Project at MIT, makes the case that dialogue needs to be reinvented for the 21st century. "Neither the enormous challenges human beings face today nor the wonderful promise of the future on whose threshold we seem to be poised can be reached unless human beings learn to think together in a new way." Issacs believes that dialogue is the foundation for democracy, even more, fundamental than voting. "In a sense, we are running a famous social experiment today. We are experimenting with whether or not a society can hold itself together without the core process that has always bound communities..." the process of thinking together.

Linda Ellinor and Glenna Gerard, co-founders of the Dialogue Group, are also convinced that dialogue will be increasingly important in coming decades. "Dialogue is a powerful communication process and then transforms those who engage in it. You never see the world quite the same way again once you have allowed yourself to listen, really listen, to people different than yourself...If dialogue is adopted and practiced broadly, it will change the underlying culture to one that is more partnership and collaboratively based."

Some people consider dialogue just more talking together. In fact, it is very different – it is thinking together and learning from each other. Rather than just sharing opinions, dialogue invites people to "inter-think" with the goal of finding common ground and harnessing their collective intelligence.

Dialogue is often confused with discussion/debate. These approaches are like oil and water and lead to various results. However, both can be effective, depending on the desired outcome. The discussion is a convergent way of thinking – it breaks the whole down into many parts and tends toward "win/lose" by putting a few ideas against each other, narrowing down to one "right" answer. Debate is most useful when the best options have already been fleshed out through dialogue.

Dialogue, on the other hand, is a different way of thinking – it explores multiple best perspectives, opinions, and answers to find common ground and generate new ideas. The objective of dialogue is to come to a greater understanding of each other's point of view. There are no "winners" or "losers."

DIALOGUE	DISCUSSION/DEBATE
<ul style="list-style-type: none"> • Seeing the <i>whole</i> among the parts • Seeing the <i>connections</i> among the parts • <i>Inquiring</i> into assumptions • <i>Learning</i> through inquiry and disclosure • Creating <i>shared</i> meaning among many 	<ul style="list-style-type: none"> • Breaking issues/problems into <i>parts</i> • Seeing <i>distinctions</i> between the parts • <i>Identifying/defending</i> assumptions • <i>Persuading, selling, telling</i> • Gaining agreement on <i>one</i> meaning

Source: Dialogue by Ellinor and Gerard, p. 21

In her book, *The Argument Culture*, Deborah Tannen makes a compelling case that our society needs to move from debate to dialogue to counterbalance the "...warlike atmosphere that makes us approach public dialogue, and just about anything we need to accomplish as if it were a fight." The prevailing belief in our argument culture seems to be that "opposition is the best way to get anything done. The best way to discuss the idea is to set up a debate...and the best way to show you're thinking is to criticize." "Debate," Tannen says, "has served us well in many ways but in recent years has become so exaggerated that it is getting in the way of solving our problems."

The fact is, debate just isn't as useful when tackling "wicked" problems, like climate change, global poverty, and social justice. "Wicked" problems are longstanding, complex and challenging to define. They are caused by multiple factors and often lack agreed upon solutions. Instead of debating between two points of view, we need to broaden our perspectives, include as many other voices as possible, especially those who are affected by these problems and end up with more efficient results.

Unfortunately, in various forms of teacher-led discussions, individual thinking and argument prevail in most classrooms. Not much attention has been given to understanding the group

problem-solving function and social value of "inter-thinking" tools like dialogue. Too often, thinking together has traditionally been ignored or even repressed. Mercer and Littleton, in their book, *Dialogue and the Development of Children's Thinking* report that even though "studies show the value of collaborative learning... educational practice has implicitly argued against it. Talk between learners in the classroom has been discouraged and treated as disruptive and subversive." Typical group work is mere "cooperation" or quickly deteriorates into "argument" unless dialogue skills have been developed.

Ron Patrick, a psychologist, working with schools and mental health systems around the country searches for ways to bring dialogue into the classroom and the community." How can we take our young, our children, the people who are going to be leaders and help them, teach them skills around listening and dialogue that will allow them to make better decisions than we've made..."

Overcoming our argument culture and developing dialogue skills will be a daunting task. But we have an obligation to prepare students for an unpredictable future and help them to develop the skills they need – not just the "hard" skills like science, math, and debate, but also the "soft" skills like empathy, dialogue, and conflict resolution... And we must also encourage them to reach out to others with opposing points of view and others who are often excluded.

In his encyclical letter, *Our Care for Our Common Home*, Pope Francis urgently appeals for "...a new dialogue about how we are shaping the future of our planet. We need a conversation which includes everyone. Young people...wonder how anyone can claim to be building a better tomorrow without thinking of the environmental crisis and the sufferings of the excluded."

As educators and parents, we want to build a better future for our children and our children's children. The Climate Cafe is designed to help students develop cognitive and interpersonal skills they will need to help shape their future. Dialogue skills that are learned and practiced in the classroom can then be expanded into the community through a Climate Cafe. Each Cafe provides students with another opportunity to stand toe-to-toe with adults and explore issues that matter. "Thinking together" can help to revolutionize how students learn and work together in the 21st century.



Shari Melto spent more than 20 years with global consulting firms in the fields of talent management and organization development. She was Director of Learning & Development at McKinsey, and Director of Staffing & Recruiting at both Booz and Hewitt. With the support of a MacArthur grant, she partnered with Arts Boards in Chicago to strengthen their organizations. Shari believes that we have a moral obligation to ensure a healthy, sustainable future for our children and our earth -- and working with GOMI provides a unique opportunity to do both.

Book Review

By John Terry

Untamed: The Wildest Woman in America and the Fight for Cumberland Island Will Harlan, 2014, Grove Press, New York

Untamed, as told by biographer Will Harlan, is a gripping true story of eco-heroine Carol Ruckdeschel. "Carol Ruckdeschel," Harlan tells us early on, "is the wildest woman in America. She eats road kill, wrestles alligators and dissects dead sea turtles that wash ashore. She lives on a wilderness island in a ramshackle cabin that she built herself, and she eats mostly what she hunts, gathers and grows. She is a hard drinking, gun-toting, modern day Thoreau who is even more outspoken in protecting her Waldenesque Island." In self-defense, Carol shot and killed a "lover.". As you read on you, understand her to be more an impassioned courageous fighter for wilderness preservation than a gun- toting cowgirl. Her story is an iconic epic in the modern clash between the forces of conservation and diversity and those of exploitation. Depending on how tamed or not your perspective, she is an eco-heroine or a whacko.

Her "Waldenresque Island" is Cumberland Island off the coast of Georgia. Cumberland Island is one of the world's most biologically diverse islands and an important nesting spot for sea turtles. In no small part due to Carol's efforts in 1972 Cumberland Island was designated a National Park. Untamed reveals many layers to Carol's remarkable story. Her courage and passion helped save the island from development and to gain it National Park status. This struggle brought her into direct and bitter conflict with such diverse adversaries as the Carnegie and Rockefeller families, National Park Services, tourists and poachers. If Harlan's opening comments spark your curiosity to read the book, you will not be disappointed. You will learn much about Carol the person and the self-taught marine biologist and how passion and unflagging courage can make a difference. You may learn more about yourself and where you fit in the struggle.

Untamed raises essential questions about labeling as a means of social control. Why think Carol, a whacko? A lot of people do. How else can you explain a woman who does such bizarre things as eat road kill, shoot suitors and scare off turtle egg poachers at gunpoint and more? Who determines by what standards and for what purposes that another earns the "scarlet letter" of tagged deviant? There is a long history going back to Socrates of dissenters being labeled, devalued and punished by bullying, shunning, persecution and even death.

Carol embraces and defends the natural world's diversity and its beautiful, tactile, spiritual force as an essence never to be replicated by museums, zoos or aquariums. Untamed will gift you the image of Carol in the red glow of the setting sun riding the back of an enormous sea turtle from the shores of her island into the sea – two sentient beings intricately connected in a vast seemingly endless universe of union and mystery. In her contribution to our inaugural issue, Ali Fields too reminds us of such beauty[1], as she tells of a student who with fellow students hiked to the top of a high peak along Wyoming's Wind River. There they viewed the "...setting sun send a line of cottonwoods aglow. A light rain fell, making the leaves sparkle. One of the students turned to Ellis (the group's leader) and asked, 'Bob, what role does beauty have in

education?” “How beautiful. How important it is to share this beauty, this spiritual intimacy with our children and they with theirs to ensure perpetual stewardship of our natural world.

I would be interested to hear your thoughts.

John P. Terry



John P. Terry, founded the Gulf of Maine Institute in 1999. John was Editor-in-Chief, CYD (Community Youth Development) Journal from Aug. 1994 to Nov. 2002. John has broad teaching and administrative experience at the university level including the Massachusetts Institute of Technology, 1969-1984, University of Massachusetts, Lowell, 1985-1992, and Union College, Schenectady, NY, 1964-1969. John received national recognition in 2006 when selected as Civic Ventures, Lead with Experience Program 2006 Purpose Prize Fellows. He is also a 2008 recipient of the Gulf of Maine Council on the Marine Environment Visionary Award.