



## Striped Bass Here Year-Round

By Sandy Graham

Some researchers have used special tags placed on striped bass and other species, from which the research concluded many striped bass are in the Bay of Fundy year round, and don't just come to spawn was some of the scientific findings revealed by Dr. Haley Viehman during FORCES "Tidal Talks" presentation at the Ships Company Theatre on November 16th.

Attended by about thirty people, the presentation was billed as a first of a series presented by FORCE to share experiences and information related to tidal energy research. Topic for the first presentation was called "Fish and Tidal Power", and focused on "what we're learning about fish at tidal energy sites and technology used to conduct the research." There were two presenters for the evening. The first was Dr. Haley Viehman, a post-doctoral fellow at Acadia University, who has been doing fish research at the FORCE site, and in Maine, who was followed by Tyler Boucher, an ocean technologist with FORCE.

After a welcome and introduction by Mary McPhee, FORCE Facilities Manager, Ms Viehman began her talk, projecting a photograph of a mother polar bear and cub on an isolated ice floe. As she described it, this was meant to frame the conversation within the context of global warming, the effects of which, it is hoped, technologies such as tidal energy will go some ways to mitigate.

It was a useful and perhaps strategic marker, laying down the kind of stakes that are involved for all parties, whatever their views regarding tidal power and perceived threats to the ecology of the Bay of Fundy, and the fisheries. Ms. Viehman said her research was to try to collect and analyze enough data to help understand how to use tidal power with the least impact and harm to fish populations.

The evening presentations would be dominated by research methods and findings, absent any political or environmental antagonism. Using more projected photos, she elaborated on the use of various kinds of technology to carry out underwater research.

These include acoustic and sonar technologies, employing amongst other equipment the Fundy Advanced Sensor Technology or "FAST", built and deployed by FORCE. The FAST technology enables monitoring of marine life activity, currents, turbulence and other underwater data. Ms. Viehman projected various computer

images and graphics that showed the kinds of fish data that they have been able to monitor, and explained the rationale behind the kind and degree of monitoring, pointing out the need to be able to see fluctuations in fish populations as a pattern related to tidal and light levels, and seasonal changes.

In previous research at the University of Maine, she studied fish interactions in Cobscook Bay, where an in-stream tidal turbine was deployed. Ms. Viehman demonstrated how her research there could be applied to the FORCE site. Two graphics in particular showed fish primarily moving or subsisting in the higher or lower water depths, suggesting a turbine placed in between would have the least interaction with fish and therefore be the ideal placement for installation.

In a response to a question from local fisher, Jerry Taylor, about whether individual fish species could be identified with this acoustic imaging, Ms Viehman said wasn't generally possible, but the overall size of species was evident. She went on to explain other researchers have used special tags placed on striped bass and other species, from which the research concluded many striped bass are in the Bay of Fundy year round, and don't just come to spawn.

In front of the audience on the theatre floor were scale models of some of the sensing equipment that FORCE is using in its research, including the Acoustic Doppler Current Profiler (ADCP). Tyler Boucher, FORCE ocean technologist took the floor to describe how these work, how they are deployed, and in some cases the learning curve involved, since these are prototype technologies that require specific software to transmit their data for computer transmission and modeling. It was evident from Mr. Boucher's projected images this equipment must withstand some of the harshest underwater conditions and deployment requires considerable care.

The specialized research yielded data which would not have been available a generation ago. This includes various environmental characteristics such as: fish and zooplankton abundance, depth, sea floor stability, temperature, conductivity, salinity, particulate matter, acoustics (passive noise detection), and current profiles and turbulence.

Photo courtesy Field and Stream

## Proof is in Process: Transformation of a Living Resource to a Machine

By Darren Porter

In 1984 the Annapolis tidal station came on line, the first of its kind in North America. It had significant adverse effects on population levels of marine life that were near field and far reaching, these were documented by multiple scientists. The Annapolis tidal station has set precedent on how government and industry will deal with the effects of tidal power on marine life and ecosystems, they simply don't.

In 2009 Fundy Ocean Research Centre for Energy (FORCE) demonstration site was approved.

The objectives of the FORCE demonstration were:

To build and operate a tidal energy Demonstration Facility to test the commercial potential of in-stream tidal energy devices designed to convert tidal kinetic energy to electrical energy; To acquire information necessary to assess the performance of tidal energy devices including their effect on the environment and the effect of the environment on the devices; and, To develop monitoring techniques and methodologies for these devices in the tidal environment.

Each demonstration was supposed to last one to two years, with a maximum of three machines demonstrated on the FORCE site. The Environmental Assessment (EA) also noted that it was important to underline the main objective of FORCE is to demonstrate technology, rather than sell electrical power. These were key mitigations measures to prevent harm to marine life and the ecosystem.

The Department of Fisheries and Oceans (DFO) opted to bypass Population Biological Removal levels (PBR), which is defined as the maximum number of animals or marine life, not including natural mortality, that may be removed from a marine stock while allowing that stock to reach or maintain its optimum sustainable population. Other countries do this prior to site selection of these devices and authorizing these tidal turbine installations. DFO decided it was going to concentrate instead on confirming the tidal power proponents' prediction of marine life's possibility of avoiding of these machines.

It is important to note that if the PBR process had not been skipped by DFO, this project would not meet the PBR test. With the current knowledge 100% of the Species at Risk Act (SARA) listed white sharks which are acoustically tagged and use the Minas Passage have been detected on the FORCE site, as well as the knowledge that over 50% of all acoustically tagged SARA listed Inner Bay of Fundy salmon also use the FORCE site.

To date, after two deployments, FORCE and Cape Sharp Tidal have not lived up to their objective of determining environmental effects on the ecosystem. There has yet to be any marine life collision monitoring, nor any strike monitoring, let alone any monitoring of mortality at the FORCE site.

The government and industry publicly stated marine life would be able to avoid the devices. To date there is no confirmation regarding these statements that fish and other marine life are able to avoid these devices at the FORCE site. In fact, what little information has been gathered indicates the opposite. Fishermen have always stated marine life will not avoid these devices in the Minas Passage.

Before any answers concerning adverse effects on marine life or the ecosystem had been determined, Nova Scotia Energy (NE), the regulator tasked with protecting the marine environment in regards to the FORCE site, lobbied the Canadian Environmental Assessment Agency (CEAA) to remove the 5 megawatts threshold, which was originally placed on the demonstration site as a mitigation measure to assist in preventing adverse effects on the marine environment. This threshold was removed and a new one of 50 megawatts put in place. The major tenfold upscaling of the FORCE site was done prior to understanding any effects on the any marine environment and the life within.

Further upscaling took place and two more berths were added to the FORCE site. Subsequently the Nova Scotia Government gave incentives through The Developmental Tidal Feed-in Tariff (FIT) program to attract new developers with grossly inflated financial incentives over a fifteen year peri-

od. The inflated pricing falls directly on the Nova Scotia rate payers shoulders. This is contrary to the guidelines in the EA document.

Currently, according to news reports, we are seeing the newest up scaling by way of the Marine Renewable Act and its amendments to open Nova Scotia's waters to more tidal development. All of this upscaling has been done prior to understanding the effects of in-stream tidal turbines on marine life and the ecosystem in our province.

Emera, owner of NSP, part owner of Cape Sharp tidal, and the grid owner in NS, is now moving forward with the Atlantic Link (previously referred to as the tidal power link) going from Coleson Cove, NB, to Massachusetts. The significance of this link going mainly unnoticed by the public, is the New England states made it clear to the NS Government they did not want their predictable tidal power unless they could make it firm energy.

Currently the only way to make tidal power for export to the New England states is to run tidal power turbines down the Bay of Fundy, ensuring there will always be turbines turning somewhere in the Bay as there is approximately a two hour difference in tide times from one end of the bay to the other.

When Margaret Miller (then Min. of Environment, mandated to regulate the effects of tidal energy), was asked, "What happens if these devices have adverse effect on population levels and shut down our fisheries?" Her response was, "resources evolve". She further gave an example to the fishery, "there were once 3000 farms in NS and now there are only 300."

If all mentioned above is not troubling enough, in 2016, the NS Department Environment ignored one piece of advice from DFO's letter of recommendation, which was the most crucial piece in those recommendations to protect the environment and marine life in the Bay of Fundy.

DFO's recommendation letter on Proposed Environmental Effects Monitoring Program 2016-2020-Fundy Ocean Research Center for Energy (FORCE) and Cape Sharp Tidal Venture (CSTV), stated "Before any future deployments at the FORCE site, potential impacts on fish and fish habitat from these devices should be assessed." This was, in fact, the most important mitigation measure to prevent further environmental harm by these devices. One must remember the Dept. Environment was tasked with preventing tidal turbines from harming the environment and marine life. They have instead opened the doors to further development time and time again, prior to any answers regarding the effects on marine life are reached at FORCE.

Anybody who watches the progression of the tidal turbine industry, whether it be barrage or in stream, would be blind and or hard pressed to see or defend the decisions which have been made to move forward with the industry regardless of its effects on environment. Tidal power has seemingly been determined to be the new mega export industry FORCED on NS and we are now witnessing the evolution of a living resource to a machine.

Our government, neither provincial nor federal, ran on a platform of risking, or replacing existing aboriginal and non-aboriginal fisheries with machines.

The responsible solution moving forward must be: to address the situation at Annapolis Royal Tidal station by restoring that ecosystem and rebuilding the public's confidence; entertaining new technologies which are less invasive to the ecosystem and the fisheries; and properly monitoring all devices for their potential effects on the ecosystem and marine life before moving forward.

I must also note site selection of tidal turbines is the number one internationally recognized mitigation measure to help prevent adverse effects on the ecosystem and marine life. We have to stop the practice currently in place in Nova Scotia, where site selection is determined simply on grid connection availability and linear tidal flows. The ecology and marine life must be put first and foremost in any site selection process moving forward.

Darren Porter is spokesperson for Fundy United Federation

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