Atlantic Arena Project I.1.1 researchers
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January 30, 2014

Sara Iverson, Scientific Director
Kyle McKenzie, Network Manager
on behalf of the OTN Canada Scientific Advisory Committee

Dear Dr. Iverson and Mr. McKenzie,

Please find attached a revised Atlantic Arena Project I.1.1 Year 4 report. The report modifications provide the context as to how project I.1.1 integrates with the other projects and why there have been delays in publication. However, direct responses to the *Requirements for the 2013 report* contained in the response letter from the SAC didn't seem to have a place in the format of the original document. Please find direct responses below, from the Ocean Gliders (OG), Ocean Observations (OO) and Accelerometry (AC) sub-projects.

Provide more explanation as to why there haven't been many publications or presentations

OG: Consistent with the OTN SNG proposal and its funding for personnel, the Phase I Ocean Glider component is primarily responsible for providing high-quality interdisciplinary data streams to OTN researchers, with a research component comprising one M.Sc. project (Matt Beck) and complementary work on novel optical data products (John Cullen with Katja Fennel). Arguably, four presentations and an extended abstract by Beck plus four invited presentations by Cullen during the reporting period can be considered adequate; it is nonetheless obvious that at least one publication should arise from each of the two research themes. Matt Beck is working diligently on his analysis. As he explained to his thesis advisory committee, who expressed no displeasure, he spent a great deal of time revising his data structures to facilitate the statistical analyses that he is now conducting. Ideally, he would have been done by now, but sometimes good science and appropriate training takes longer than we expect. In turn, John Cullen hoped to have completed a manuscript on an absorption-based modelling system by now, even though he is on a half-time appointment. It has not been completed because other professional responsibilities consumed his available time.

OO: Mathieu started his PhD after the program started. For the first two years, he spent most of his time taking courses. It is only in this last year that he began working full time on his research. As the only person supported on this component and as part of the mentoring program, he is taking the lead on the analysis and presentation of results. In the original submission, some of his presentations were missing and now added to the revised report. According to the NSERC rules, only student stipend support is allowed for adjunct faculty. There are no funds to attend conferences to make presentations. Thus, the presentations are

mainly local ones. The support for this component from OTN Canada is only the student. A large in-kind component for the actual collection comes from DFO.

AC: I've listed some points to show how we've used our limited resources to achieve some good science and technology advances as expected under NSERC/OTN rubric.

1. The accelerometry project (AC) was 'shoed-in" very late in the original OTN proposal. As it reflected "observations" it was fitted in with the ocean observation and modeling component; an odd fit, but nonetheless, that it is where it ended up.
2. Although the SAC notes that Project I.1.1 "*has a very large budget . . . relative to other projects*", the AC component is likely amongst the smallest of OTN project components in terms of budget. The majority of funds have been expended on one full-time PhD student (Broell, Oceanography), one OTN-part-time PhD student (Bezanson, Biomedical Engineering), technical support (including co-op students), and Aquatron user-fees.
3. The AC component had no access to CFI funds to help support the technology we have been developing. Thus, our budget was used to cover all of those costs. Fortunately, cost for one PSAT tag was generously covered by OTN-CFI and another by Dr. Litvak, due to our new collaboration (below). My NSERC Discovery has covered some other costs.
4. We were encouraged to collaborate and integrate with other projects and undertook successful field trials (shortnose sturgeon) with Dr. Litvak, and that incurred considerable field/travel expenses that were not within the planned budget. We have been unsuccessful in recovering those costs from any source. We embarked on another field trial in collaboration with Dr. Stokesbury (Atlantic sturgeon).
5. A consequence of the above is that my 2013 OTN budget is now carrying a $2,100 deficit and all ongoing costs are being covered under my rapidly diminishing NSERC Discovery grant.
6. The SAC noted '*relatively few publications and external presentations . . . have emanated from* [our] *OTN-funded work.*
    a. The status of our budget prevented any conference or other travel costs in 2013. In fact, conference travel costs incurred in 2012 (e.g., Ocean Sciences Meeting) were heavily subsidized by the Chair of my Department.
    b. With respect to publications, we embarked, from scratch, on a new technology, with many logistical hurdles to overcome, before credible primary publications could be considered. None the less we have: 1) primary from 2013, that is a first of its kind in the literature, 2) a recently published paper with the OTN-Social Science group (Duff et al. 2013) that was submitted/accepted in 2013 and has been added to the report, 3) a primary on "*a low-cost acceleration data-logger for monitoring animal movement*" that is near ready for submission, 4) a primary on "*measuring size-at-age in fish using accelerometer metrics"* (cod, pollock and sturgeon; lab and field) that is well underway, 5) "*activity in free-ranging fish in response to environmental variables"*, with analyses well underway, and 6) a primary on "*making acceleration data useful and informative: a critical review of data analysis methods*" that is in preliminary stages. I note also that Broell and Bezanson have acquired considerable press and web presence as well as a layperson publication, "*Fish and Chips*", in Current Tides.

7. I believe the AC component is the only OTN component that has resulted in an industrial start-up company, Maritime bioLoggers, that was recently awarded an Inovacorp Grant valued at $20,000 for early stage commercialization. The Innovacorp funding, along with OTN, is being leveraged for more funds through IRAP. An application for trade-show support and conference presentation (5th International Bio-Logging Science Symposium, later in 2014) for Maritime bioLoggers is underway through the NSBI (Nova Scotia Business Inc.). I think this kind of success is equivalent to "productivity" measured through publication and presentations and I am led to believe that NSERC is very pleased to see this kind of result to come from NSERC-supported research.
8. We have had plans to integrate the results of the accelerometry results into ocean modeling once we have usable results from our research which would proceed via Broell and Taggart with Katavouta and Thomson, as was detailed in an earlier report, and in a manner similar to that achieved from the cited eel project. Though the possibility remains, it may no longer be forthcoming due to the departure of Thompson et al. This has been addressed in the revised report.
9. Finally, I trust the SAC can appreciate that the accelerometry project does not relate to, or parallel, any past or ongoing research theme in my lab that could be used as partial contribution to publications or presentations. It is a stand-alone project that was started from 'scratch'. The publications will be forthcoming and Broell has a presentation accepted for the upcoming Ocean Sciences Meeting in Hawaii. At this time her attendance is unsure due to lack of supporting funds (see 5. above).

Produce a plan for future publishing and dissemination of results

OG Ph I: Beck's paper is not ready yet, but a poster on his latest results is being prepared for the Ocean Sciences Meeting in February. His thesis and a paper will follow. He interacts regularly with Cullen and he recently met with his committee. Cullen will retire on June 30. Up until then, and afterwards, he will do his best to contribute to scientific publications, including research that is part of OTN (e.g., the absorption-based model, analysis of glider data and the Karl Lagman analysis). It is all a matter of time.

OG Ph II: As there is no money in the Ocean Gliders budget for a student or postdoc, it is hard to formulate a solid plan for publishing from Phase II (i.e. OTN is only providing funding to keep the glider program operational, not to do research). With the addition of the echosounder to bridge trophic levels, I hope the glider data might become of higher interest to the biological sub-projects in the Atlantic Arena and am optimistic that publications could arise through the uptake of glider data into other projects in addition to ocean modeling. I am also seeking external funding for an HQP to work with the glider data.

OO: The following manuscript is under reviewed by the co-authors and should be submitted shortly:

Dever, M., Ø. Skagseth, K. Drinkwater and S. Sundby, Improved method to characterize coastally-trapped, buoyancy-driven currents: A comparison between the Nova Scotia Current and the Norwegian Coastal Current

Over the next couple of years, the following manuscripts should be completed and submitted. They serve as the basis of Mathieu's PhD thesis.

M. Dever, D. Hebert, B. Greenan and J. Kocik, Characterization of the Nova Scotia Current dynamics and its relationship with Atlantic Salmons migration patterns

Dever, M., F. Vikebø, A. Sandvik, Ø. Skagseth, K. Drinkwater and S. Sundby, Wind versus Buoyancy: would a change in the Norwegian Coastal Current dynamics affect the distribution of larvae over the Norwegian Shelf?

With partial support from OTN, the Faculty of Graduate Studies and the Oceanography Department, Mathieu will be presenting:

Dever, M., Ø. Skagseth, K. Drinkwater and S. Sundby, Improved method to characterize coastally-trapped, buoyancy-driven current: A comparison between the Nova Scotia Current and the Norwegian Coastal Current, Ocean Sciences Meeting – Honolulu, Hawaii

As well, Mathieu will present his work locally:

Dever, M., Ø. Skagseth, K. Drinkwater, S. Sundby, F. Vikebø, A. Sandvik and D. Hebert, Improved method to characterize coastally-trapped, buoyancy-driven currents: A comparison between the Nova Scotia Current and the Norwegian Coastal Current, Physical Oceanography and Meteorology Seminar Series – Halifax, Nova Scotia

Dever, M., F. Vikebø, A. Sandvik, Ø. Skagseth, K. Drinkwater and S. Sundby, Wind versus Buoyancy: would a change in the Norwegian Coastal Current dynamics affect the distribution of larvae over the Norwegian Shelf?, Conference of Dalhousie's Graduate Students – Halifax, Nova Scotia

AC: See 6b and 8 above.

Address how Ocean Observations link to Accelerometry

OG, OO, AC: Historically they were placed together because they both deal with observational technology (see **AC** comment 1 above). However, their applications and scientific outputs are only tenuously related. This has been recognized and in Phase II OG + OO and AC are separate sub-projects.

Best regards,

John Cullen (OG; Phase I)
Dave Hebert (for Peter Smith, OO Phase I; Phase II)
Chris Taggart (AC; Phases I and II)
Tetjana Ross (OG; Phase II)