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Re: Final Report – Background Report for the Fundy Tidal Energy Strategic Environmental Assessment, Offshore Energy Environmental Research Association, Comments from Fisheries and Oceans Canada

Dear Mrs. Griffiths,

We have completed a review of the document *Final Report – Background Report for the Fundy Tidal Energy Strategic Environmental Assessment, Offshore Energy Environmental Research Association*, and are pleased to provide the attached comments for your consideration.

If you have questions or require clarification on the attached please feel free to contact me at 506-851-3650 or curriet@mar.dfo-mpo.gc.ca

Sincerely,

Ted Currie
Senior Environmental Analyst

Attachment/

Comments on the “Background Report for Strategic Environmental Assessment for Bay of Fundy Tidal Power Development – Offshore Energy Environmental Research Association – prepared by Jacques Whitford Ltd.”

The province of Nova Scotia is exploring the feasibility of tidal power development in the Bay of Fundy and as part of the planning of this new energy sector initiated a Strategic Environmental Assessment (SEA). The Offshore Energy Environmental Research Association (OEER) was engaged to oversee the SEA process including the preparation of a biological and socio-economic background report. The background report, prepared by Jacques Whitford, was finalized in January 2008 and Fisheries and Oceans Canada was invited to comment. The following represents a summary of the DFO review.

General comments – The document provides a high level overview of the existing environment, evaluates potential environmental impacts of tidal power technology, considers alternatives and mitigative strategies, highlights information gaps requiring further study and provides recommendations to address the above. As a background report the document does a reasonable job of describing the Bay of Fundy environment and the technologies being considered for evaluation. The physical and geological settings are detailed and provide good context.

Clear demarcation between proposed test installations and the development of commercial scale operations is required. In general, it is assumed that impacts of test installations will be localized and far field impacts will likely remain undetectable. The effects of construction of test turbines will be similar to those of other construction projects, the impacts of which are well understood. The level of disturbance of the substrate and suspension of sediment in some locations will be of the same order as that experienced due to tidal forces. Conditions would be expected to return to baseline within a short period of time after removal of the structures. Without prejudging the outcome of the environmental assessment the Fisheries Act authorization(s), processes are anticipated to be straight forward for the demonstration scale projects. However, at the commercial scale, the extent of far field effects and the likelihood of their reversal are unknown and should be the major focus of the next steps in the SEA.

As TISEC projects could be applied to many different areas in the Bay of Fundy, it is important that the SEA does not concentrate on just the regions with the greatest potential power extraction but also on areas where smaller scale operations might be appropriate. It is important to remember that as the energy increases up the Bay of Fundy, so does the amount of sediment in suspension. The presence of high levels of suspended sediment means that far field effects from energy extraction will be greatest in the areas which have the potential for the greatest return.

As next steps, we recommend that data be stored in open databases and in a manner that allows it to be manipulated within a GIS structure. The overlaying of data layers, for various constraints including fishing activity, sensitive habitats and possible locations for TISEC, could rule out certain areas of the Bay at an early stage. Many of the data sets concerning fishing activity and catches already exist in geospatial databases.

Specific Comments -

Page 1 – 1 – section 1.1 Study Objectives –

Last sentence – *“The report is intended to serve primarily as a relatively high level document to facilitate the SEA process and an important component is the identification of data gaps and recommendations for follow up activities to address gaps in data and existing knowledge.”*

Comment – We accept the high level nature of the document and as resources permit we will participate in the next steps in the SEA process.

Page 1 - 5 – section 1.4 – **Study Limitations** – Good, we recognize the assumptions and limitations up front. The scope of the study was prescribed in request for proposals issued by the OEER.

5th bullet – *“There is limited knowledge available on the cumulative interactions of more than one ocean renewable energy project in an area, or the carrying capacity of a particular development in terms of available extractable energy or environmental effects. This paucity of information is attributable, in part to the general lack of commercial scale operating experience of tidal instream developments at this time.”*

Comment – We share this concern and as resources permit, will work with the developers, OEER, and the provinces of Nova Scotia and New Brunswick, to identify monitoring requirements to assess far-field effects as well as potential cumulative interactions.

6th bullet – *“It is assumed that all specific ocean energy projects, including demonstration projects, will be subject to project and site specific environmental assessment requirements as part of a regulatory environmental approvals process. This site specific evaluation, including consultation with potentially affected stakeholders, is considered vital for a complete evaluation of potential effects and their significance as well as the development of specific mitigation and monitoring programs.”*

Comment – At this time, we believe that the placement and operation of TISEC devices will likely require authorizations under the Fisheries Act and be subject to environmental assessments under the Canadian Environmental Assessment Act. We will work with developers, and the provinces of Nova Scotia and New Brunswick, to identify site specific information requirements, consultation needs, mitigation (and where needed, compensation) as well as monitoring to confirm the predictions of the assessments.

Page 2-2 – Scoping of Key Environmental Issues, Table 2.1 Benthic Ecology.

Comment- As a point of clarification in this section, *“species of special concern are protected under the Species at Risk Act. Only species listed as endangered or threatened under SARA, June 2003 are protected under the Act. “Special Concern” is actually a listing category of the Act – but these species are not protected by prohibitions; rather the development of a management plan that prevents these species from becoming threatened or endangered is mandated by the Act. In its present use, we are not sure what the authors mean by this term. Species in process for listing under SARA have been identified by COSEWIC and will require consideration in terms of the impacts of TISEC installation in the Bay of Fundy, but they are not protected under SARA, although some may be protected under the NS and NB Endangered Species Acts. As well, some will be protected under the Canada Fisheries Act.*

Page 2-4 – Table 2.2 – **Potential Interactions.**

Comment- Please consider modification of currents as a very important potential impact on marine mammals, fish, and possibly leatherback turtles if the distribution patterns and

density of their pelagic invertebrate prey are affected. Alteration in prey distribution, specifically copepod species, may result in changes in the distribution and occurrence of some of these species. This would be of concern primarily in the outer Bay of Fundy. This also touches on the importance of “critical habitat”. Critical habitat is defined under section 2 of SARA as the “*habitat necessary for survival or recovery of a listed wildlife species and that is identified as the species’ critical habitat in the recovery strategy or in an action plan for the species*”. Under section 58 of the act, destruction of critical habitat is prohibited. Destruction of critical habitat may include alterations in prey distributions or changes in turbidity which affect prey density and distribution, rendering the critical habitat unsuitable for the recovery of SAR, as well as the physical destruction of the habitat or sediment alteration.

Comment - Fish monitoring studies – baseline acoustic surveys to monitor fish distribution and movement around and through devices have been conducted in East River, New York where TISEC devices are in place. As appropriate, these studies would need to be repeated in BoF. It is suggested that the studies also include an evaluation of fish behaviour on a seasonal basis. Essential questions to consider include: Is there an impact on feeding and spawning behaviour? Are effects different for various life cycle stages? Harmful effects on one stage or at a critical phase of the life cycle may have implications for an entire population. Striped bass, in process for SARA listing, are thought to only spawn successfully in the Shubenacadie River system at this point, so any deleterious effect on their reproduction is important. There may also be implications for inner Bay of Fundy Salmon, listed under SARA as endangered.

SAR identified in the background document.

There are many errors throughout the document regarding SAR, their status in terms of listing under SARA, and their distribution and occurrence in the Bay of Fundy. For example, harbour porpoise is not a SARA listed species, but it is listed under COSEWIC. Shortnose sturgeon is listed by COSEWIC as a species of Special Concern, not Endangered.

Referring to Table 5.6, several species occur only rarely, or not at all, or are noted as one-time, unconfirmed sightings in the Bay of Fundy. These are: northern bottlenose whale, spotted wolfish and Sowerby’s beaked whale. These species should be removed from consideration in future discussions and documents. At present, there are too many unanswered questions in terms of the impact of TISEC devices on SAR in the Bay of Fundy to definitively assess the potential risks to SAR. The following list is given as our “best estimate”, based on what is known about the biology, distribution and identified threats to these species. This is not a definitive list, and it is possible that species may be removed or added, or levels of risk changed to reflect evolving scientific knowledge and understanding of the environmental effects of TISEC technology.

SAR at Potential Higher Risk by TISEC device installation and operation:

Potential Threats: Direct contact/exposure to devices, noise, alteration of behaviour, alteration of life cycle stages or processes, habitat changes (siltation, current, food/prey distribution and abundance), near-field effects may be predominant.

SAR in the Minas Passage:

- Harbour porpoise – COSEWIC Special Concern
- Inner Bay of Fundy Atlantic Salmon – SARA, Endangered
- Striped Bass, COSEWIC Threatened
- American Eel, COSEWIC Special Concern

SAR in the Outer Bay of Fundy (Head Harbour, Digby Gut):

- Harbour porpoise – COSEWIC Special Concern
- Inner Bay of Fundy Atlantic Salmon – SARA, Endangered
- American Eel, COSEWIC Special Concern
- North Atlantic Right Whale, SARA Endangered
- Fin Whale, SARA Special Concern
- Leatherback Turtle, SARA Endangered

SAR at Potential Lower or No Overall Risk by TISEC:

Potential Threats: Alteration of life cycle stages or processes, habitat changes (siltation, current, food distribution and abundance), far-field and bay-wide effects may be predominant.

- Cusk, COSEWIC Threatened
- Atlantic cod, COSEWIC Special Concern
- Atlantic Wolffish, SARA Special Concern
- Winter Skate, COSEWIC Special Concern
- Blue Shark, COSEWIC Special Concern
- Shortfin Mako, COSEWIC Threatened
- White Shark, COSEWIC Endangered
- Porbeagle Shark, COSEWIC Endangered

TISEC development may have little impact on these species, as fishery interactions (by-catch, entanglement) is the major threat to these species, and the shark species occur seasonally or occasionally.

SAR species potentially impacted by installation of TISEC devices at the mouth of the Saint John River include:

- Shortnose Sturgeon, COSEWIC Special Concern
- Yellow Lampmussel, SARA Special Concern.

Interference with life history and reproduction would affect Shortnose Sturgeon. Habitat alteration, specifically increased siltation is of concern to the Yellow Lampmussel population in the lower Saint John River, one of only two remaining populations in Canada.

Page 2-4 / 2-5- Section 2.3 issues evaluation table 2.2 **Potential Interactions**

Comment – This section provided a good summary of issues, however, the presentation focused on the Project / Construction Phase. The effects of construction are similar to other types of marine developments and are well understood. The real area of uncertainty is operational effects both near-field and determining extent of far-field to both fish and fish habitat.

DFO plans to host one or more science workshops to consider potential interactions associated with the operation. Issues to consider will include:

- Review the Tidal Power background document prepared by Jacques Whitford (Jacques Whitford, 2008), specifically:
 - Is the report technically accurate and complete?
 - Are the conclusions of the report supported by the information provided?
 - Are any assumptions identified within the report appropriate?
 - Are the research recommendations presented in the report appropriate?

- Identify any additional information that is currently available or that will be required to enable DFO to more fully evaluate the potential impacts of tidal power projects in the Bay of Fundy, including baseline monitoring.

- Identify characteristics of the Bay of Fundy environment that may influence the evaluation of the potential impacts of tidal power projects in the Bay of Fundy, development of mitigation measures, and/or implementation of monitoring that may be required to verify/evaluate any residual impacts, specifically:
 - spatial/temporal scale, intensity, and/or significance of effects,
 - spatial/temporal scale and types of mitigation,
 - spatial/temporal scale and methodologies for monitoring.

Page 3-5 - **State of Technology** – last sentence –

Comment - We will be seeking input from other jurisdictions regarding their approaches to baseline studies and monitoring requirements.

Page 3-17 – **Seabed preparation**

Comment - We anticipate that depth will dictate the construction – site preparation methodology. Given the depth, the recovery of dredge spoils to the surface, and/or the transport for ocean disposal is not likely an option. Side casting of dredge spoils and subsequent smothering of adjacent seabed will increase the footprint of the project.

Page 3-19 – **Cabling**

Comment – Suggest the next stage of the SEA borrow from the experience of local utilities like Nova Scotia Power Inc. and New Brunswick Power with the installation, operation, and maintenance of subsea power cables.

Page 3-20 – **Maintenance**

Comment – Given the obvious challenges of high currents, turbid conditions, low visibility, etc – things like inspection methods (divers, ROV, or remote sensors), interpretation of results, should be clarified for the demonstration scale projects.

Page 3-20 – last paragraph – *“Bio-fouling is usually not a problem in areas with strong currents..”*

Comment - We understand that high currents were used to select the Race Rocks site and information on their website identifies issues with bio-fouling. Developers planning to work in the Minas Passage should plan accordingly.

Page 4-8 – 3rd para –

Comment – We are planning a meeting with representatives from NOAA to better understand the American environmental assessment - review – allocation – approval process in relation to tidal power developments.

Page 4-12 – 3rd para - last sentence – “...*deployment in sites of depth greater than 30 meters.*”

Comment – As above, page 3-20 – challenge for the developers - given the depth, current, low visibility, how will these devices be inspected and maintained?

Page 4-19 – 2nd para – “*the ADCP survey required a moving vessel to record current speed and direction over a complete tidal cycle (12.5) on both spring and neap tides.*”

Comment – Given the conditions in the Minas Passage it may not be possible to have a vessel onsite for a full tidal cycle.

Page 5-20 – 3rd para – last sentence “*Because of the high sediment load that may become trapped within, the ice may lose its buoyancy, and float at depths well below the surface.*”

Comment – Large chunks of submerged floating ice are a siting consideration and something that designers may not have encountered at other locations.

Page 5-27 – last para -*these continuing changes may well limit our success of attempts to identify the environmental effects of new energy extraction developments.* “

Comment – The challenge will be to assess the link between sedimentation and energy extraction.

Page 5-34 – 1st para last sentence – “*it is however, a potential uncertainty with regard to the effects of energy extraction in the upper bay.*”

Comment – We recognize the effects of turbidity and link to visually feeding fish.

Page 5-38 – 4th para – last sentence

“*These are the places of most interest for tidal current energy extraction, but they are also among the most poorly known as habitats.*”

Comment – As above, monitoring must consider the lag between observed physical changes and the biological response. DFO will work with the developers, and the provinces of Nova Scotia and New Brunswick to identify the most representative indicators of change in community structure, life cycle and duration of monitoring.

Page 5-39 1st para - last sentence – “*Recently, there have been indications that the distribution patterns of these abundant benthic animals may be changing, for reasons that are as yet unclear...*”

Comment – Given the dynamic nature of this environment as well as natural fluctuations we need to confirm monitoring objectives, methodology, reporting and interpretation of results.

Page 5-79 – 3rd para last sentence – *“these areas also include a number of fish farm sites. Thus consideration must be given to possible interactions and potential overlap between these two industries within these areas.”*

Comment – In support of constraint mapping, as with fisheries, established fish farm sites should be identified as areas to avoid for tidal power development.

Page 5-79- 5th para, last sentence - *“In contrast, primary benthic effects from in-stream power will likely be in terms of construction of facilities on the sea bed rather than during operation, although changes in current velocities resulting in different sediment dynamics could have indirect effects.”*

Comment – We encourage the authors to clarify the basis of this assumption during the next steps of the SEA.

Page 6-3 – 3rd para *“Because the TISEC devices will convert kinetic energy into electricity, changes in current velocity will affect the dispersion and distribution of water-borne sediments, which may affect populations at some distance.,.....during operation, the principal consequences may be the redistribution of sediments resulting from reductions in the kinetic energy of the water that has passed through the development.”*

Comment – We will be requesting the developers to consider the offsite effects of energy reductions and develop an appropriate monitoring program.

Page 6-5 – **Management Opportunities**

“Providing answers to the challenging questions about the effects of TISEC development on the critical processes of the Bay of Fundy requires a holistic, cooperative and multi-disciplinary approach.....all the skills necessary exist at universities, colleges and government agencies in Nova Scotia and New Brunswick. Participation of the fishing community and First Nations is also essential. In addition there are several community organizations such as the Bay of Fundy Ecosystem partnership, the Ecology Action Center, the conservation Council of New Brunswick, and the Fundy Marine Resource Center....

Comment – As resources permit, DFO is willing to participate in the next phases of the SEA.

Page 6-7 section 6.2.1 **Fisheries Definition and Rationale for Selection** – last sentence

“These fishing activities are of major economic and social importance to communities around the Bay, which means that the extent to which fishing activities are displaced by energy development is a key environmental and socio-economic consideration.”

Comment – For the purposes of demo scale project site selection it is essential to include established and potential fishing activity as a planning constraint. Additionally, site selection should exhaust a hierarchy of preferences (preferred option must be to avoid any areas where there will be potential interactions with fishing activity) and the least preferred option would be to compensate fishermen for lost income.

Page 6-8 – 3rd para,

Comment – The assessment must also consider the indirect effects of new energy related developments. The participants in the various phases of tidal power development will likely be competing for access to existing infrastructure like wharves.

Page 6-9 – 3rd para – *“there appears to be little or no information about electrical effects of undersea cables on lobsters, indicating a need for further research.”*

Comment – New Brunswick Power, Nova Scotia Power, and Maritime Electric have owned – and operated a number of undersea cables in the Maritimes Region. It may be useful to follow up with these local utilities as well as other jurisdictions to determine how interactions with marine life and / or fisheries have been addressed.

Page 6-9 – 4th para – 3rd sentence – *“The secondary effects of noise, vibrations, and sediment dispersions on these stocks, in affecting their movement between the Minas Basin and the Inner Bay of Fundy, need to be determined. Similarly, assessment of the long term effects of operations of a demonstration or commercial scale TISEC development of commercially important pelagic fishes requires further research.”*

Comment – As a first step, suggest we learn from the experiences of other jurisdictions to determine how these types of interactions are assessed.

Page 6-11 – bottom of page – *“The fishing industry has access to approximately 15 wharves all of which require new investment.”*

Comment – Competition for access to wharves and other infrastructure may be an indirect impact to consider in the assessment phase. Arrangements for access will need to be formalized with the appropriate Harbour Authorities.

Page 6-12 **Management Opportunities**

2nd para. last sentence”....*First Nations and the fishing sector, both to assist with, and to advise on the research. The NGO community should also be encouraged to participate.”*

Comment - DFO plans to participate in direct consultations between the province and First Nations as well as the fishing sector in support of the SEA process.

Page 6-13 section 6.3.2 **Potential Environmental Interactions – Fish and Fish Habitat**

The summary of outstanding issues include:

- Destruction or modification of fish habitat
- Direct mortality
- Effects of noise and vibration
- Indirect effects on trophic relationships

2nd para. last sentence - ..”...*TISEC installations have a small individual footprint, but arrays of such devices established in passages of limited expanse may have proportionately larger cumulative effects.”*

Comment – We will seek expert advice from other jurisdictions regarding their experience with forecasting the effects of noise and vibration on seasonal migrations of various species of fish.

Page 6-15 – **Management Opportunities**

last sentence –

Comment – as above, DFO plans to participate in direct consultations between the province and First Nations as well as the fishing sector in support of the SEA process.

Page 6-15 section 6.3.4 **Data Gaps and Follow up**

2nd para *“The response of fish to these new TISEC devices is currently unknown.”*

Comment – We will be seeking expert advice from other jurisdictions regarding their experiences with TISEC devices on avoidance, morbidity and mortality.

Page 6-16 – 1st para last sentence – *“future environmental assessments will have to consider these variables.”*

Comment – We will be seeking expert advice from other jurisdictions regarding potential effects on health, behaviour of fish in relation to noise, vibration and electrical fields.

Page 6-18 **Minas Passage (Nova Scotia)**

2nd para – last sentence *“The importance of understanding the effects of a commercial scale TISEC development on the patterns of water flow is in the critical role that these species play in the food web...”*

Comment – We will consider all potential interactions in the context of the definition of ‘fish’, as defined under the Fisheries Act.

Page 6-20 section 6.5 **pelagic communities**

Comment – As above, DFO will consider all potential interactions in the context of the definition of ‘fish’, as defined under the Fisheries Act,

Page 6-23 – section 6.6.3 **environmental planning and management considerations**

Comment – We will be seeking expert advice from other jurisdictions regarding the behaviour of marine mammals to TISEC devices.

Page 6-29 **Management Opportunities** last sentence *“enhanced knowledge and involvement of the public in coastal management and environmental issues.”*

Comment – As above, DFO plans to participate in direct consultations between the province and First Nations as well as the fishing sector in support of the SEA process.

Page 6-30 2nd para

Comment – Regarding appropriate separation distances from aquaculture sites, this may require more discussion, with both provinces and representatives from the aquaculture industry.

Page 6-48 section 6.13 **Economic Development**

Comment – As part of a working group, DFO will assist the province, review the list of potential environmental interactions, identify potential regulatory requirements and pathway of effects.

Page 7-4 1st para last sentence – *“a bay wide planning concept is needed to avoid what has been called the tyranny of small independent decisions”.*

Comment – DFO will participate with both provinces to review monitoring results, develop policies and a planning framework to assist in the management of tidal power development.

Page 8-1 Table 8.1 **Summary of Data Gaps and Recommendations**

Critical physical processes – recommendations –

Comment – DFO will work with the province of Nova Scotia and New Brunswick to establish data standards for key physical parameters to assess potential development sites.

Comment – Propose representatives from OEER follow up with local utilities like, NB Power, NSPI, Maritime Electric, Newfoundland Hydro, etc for their experience in addressing fisheries related concerns – issues with subsea cables on fish and fish habitat; marine habitat and benthic communities, marine mammals.

Comment - The only data gap listed is a requirement for better site-specific information on species presence. More information is also required on, trophic relationships, habitat characteristics and SAR, and assessment of direct and indirect risk to SAR posed by TISEC installation, and pilot, demonstration and commercial stage operation, so that current SAR species can be managed and protected. There is also critical need for baseline biological surveys that identify all organisms present in this ecosystem, and their abundances. As new SAR are identified and evaluated by COSEWIC, it is important to know “what is there now, how many and where,” so that these new species can be managed and protected in the future.

Page 8-5 top of page – present status of many phenomena parameters remains uncertain;

- absence of sufficient monitoring programs in the Bay of Fundy
- continual changes in Bay of Fundy (natural and anthropogenic)
- lack of site specific information

Comment - The above are not unique to the Bay of Fundy and probably apply to most marine environments. While we await the results of baseline studies, we can review the experience with mitigation and monitoring from other jurisdictions.

Page 8-6 top of page – challenges with TISEC development

- marine resources that may interact with a TISEC development are shared by both provinces
- cumulative effects of commercial scale array will likely extend beyond the immediate locality
- infrastructure is not necessarily available in both NS and NB
- limited resources require sharing of fed and provincial efforts

Energy extraction development in the Bay of Fundy needs to conform with coastal zone development policies in both provinces.

Comment – Based on the available information, there does not appear to be any prohibitions, restrictions, policies to guide TISEC development in the Bay of Fundy.