MRE Regulator Survey:
CANADA

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Introduction

As marine renewable energy (MRE) is still a new industry, there are many unknowns about the potential environmental effects of MRE deployments. These concerns are largely based in the uncertainty of how wave and tidal devices interact with the environment, or how marine animals behave around devices. This uncertainty makes permitting processes for MRE projects difficult, often requiring extensive monitoring and data collection. This cautious approach may limit the implementation of MRE technologies or create financial barriers to development.

To better understand the viewpoint of regulators involved in permitting MRE devices, a survey was conducted among multiple OES Environmental countries. The survey was intended to understand the familiarity of regulators with MRE technologies, their perceptions of environmental risk, and their recommendations on best approaches to MRE development, including permitting and the potential for data transferability. The survey also included some questions to gather *Tethys* user data. This report summarizes the results from the survey of regulators in Canada.

Participants

Web links to complete the 2020 Survey on Regulatory Needs for Environmental Effects of Permitting Marine Energy in Canada were sent to 34 individuals identified by the OES-Environmental Country Analyst. Out of 8 total responses received, there were 7 complete responses and one partially complete response.

Out of the 8 regulators who completed the survey, 5 indicated that they represent a federal agency and 3 represent a provincial/territorial agency. The top focus across almost all agencies surveyed was seabed and habitat (Figure 1). Of the regulators surveyed, almost all (7 out of 8) have roles in permitting MRE developments that include advising regulators and/or developers, reviewing applications, and advising policy level decisions in their agency (Figure 2). 4 out of 8 survey participants have directly participated in the environmental permitting of an MRE device (Figure 3).

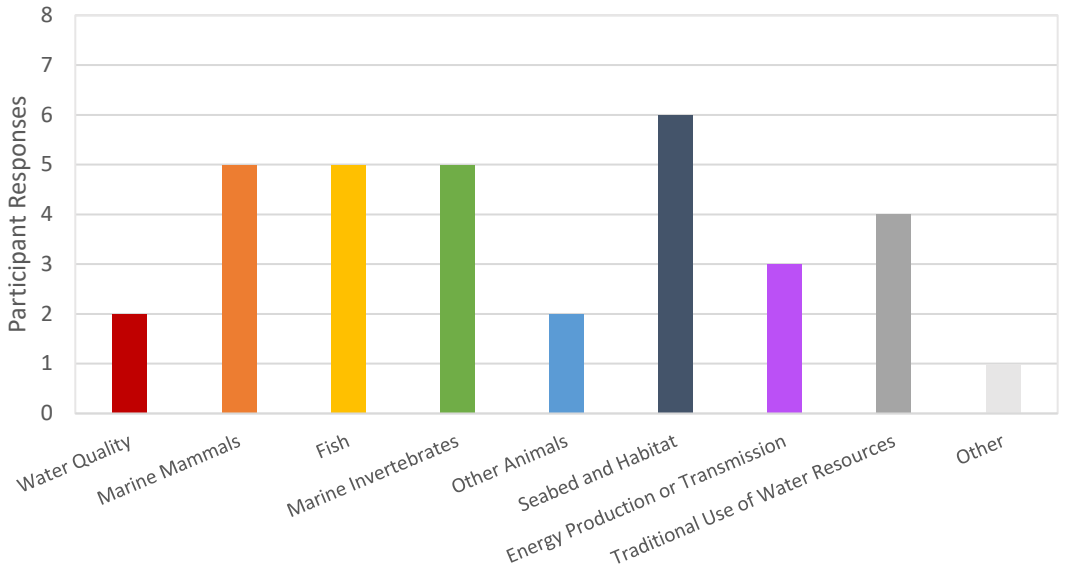

Figure 1. Top focus of agency. Participants instructed to select all that apply. 'Other' responses include "Disposal at Sea". (n = 8)

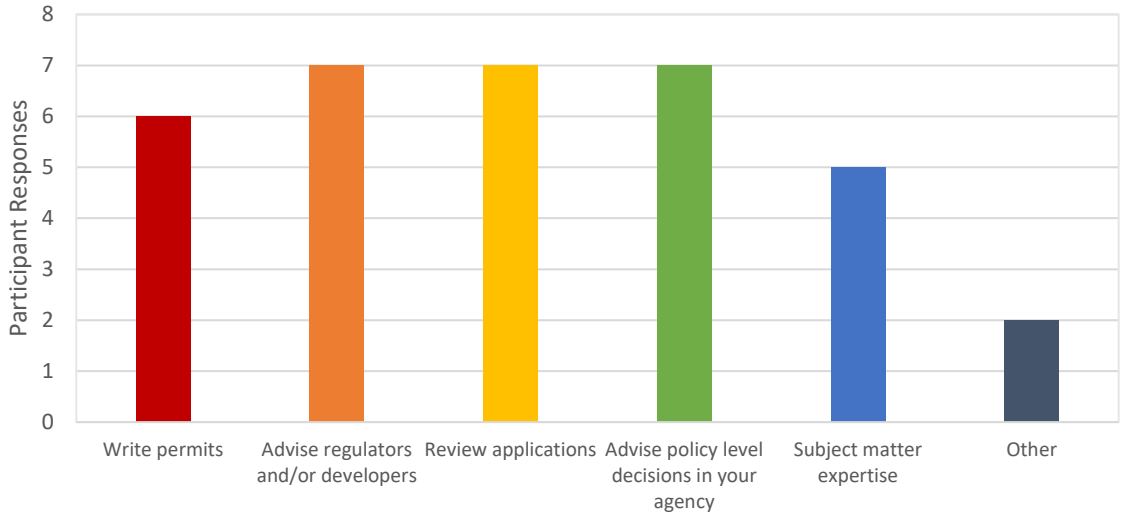

Figure 2. Individual role in marine energy project permitting. 'Other' responses include "determination of electricity rate and capacity to be allocated" and "make permit decisions on completed and evaluated applications". (n = 8)

Familiarity with MRE Technologies

Regulators were also asked to rate their familiarity with tidal and wave energy technologies on a scale of 1 (not familiar) to 5 (very familiar). The results for tidal energy devices are shown in Figure 3 and the results for wave devices are shown in Figure 4. Regulators in Canada are much more familiar with tidal devices than with wave devices. The most familiar devices are horizontal axis tidal turbines and tidal barrage systems. Regulators are equally unfamiliar with all types of wave devices.

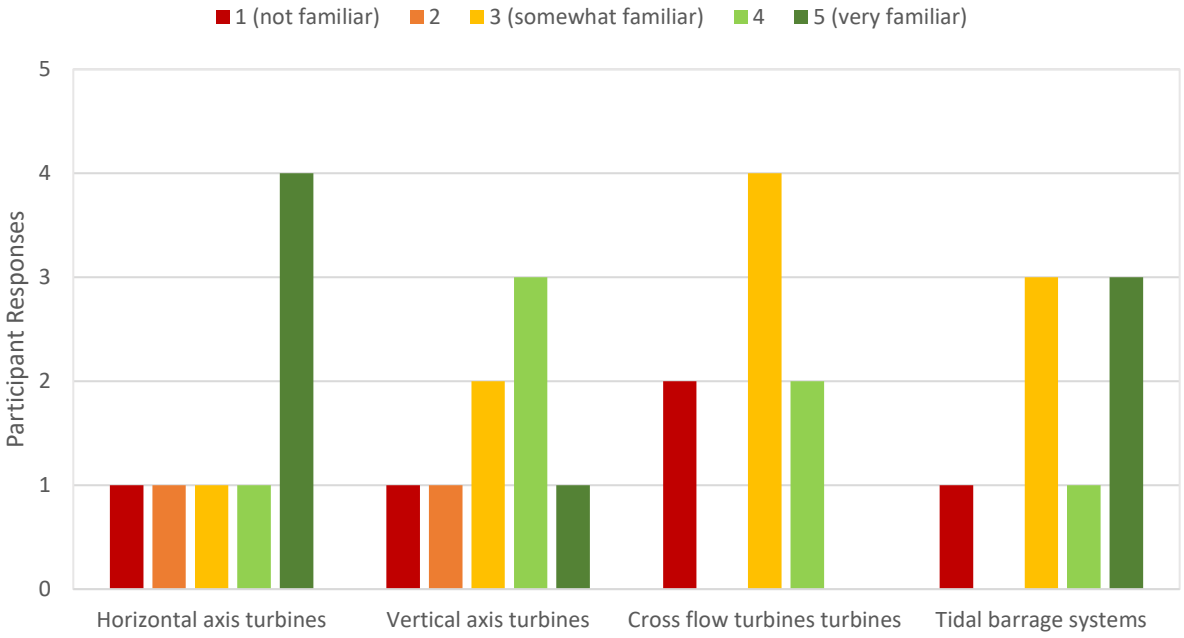

Figure 3. Familiarity with tidal devices. (n = 8)

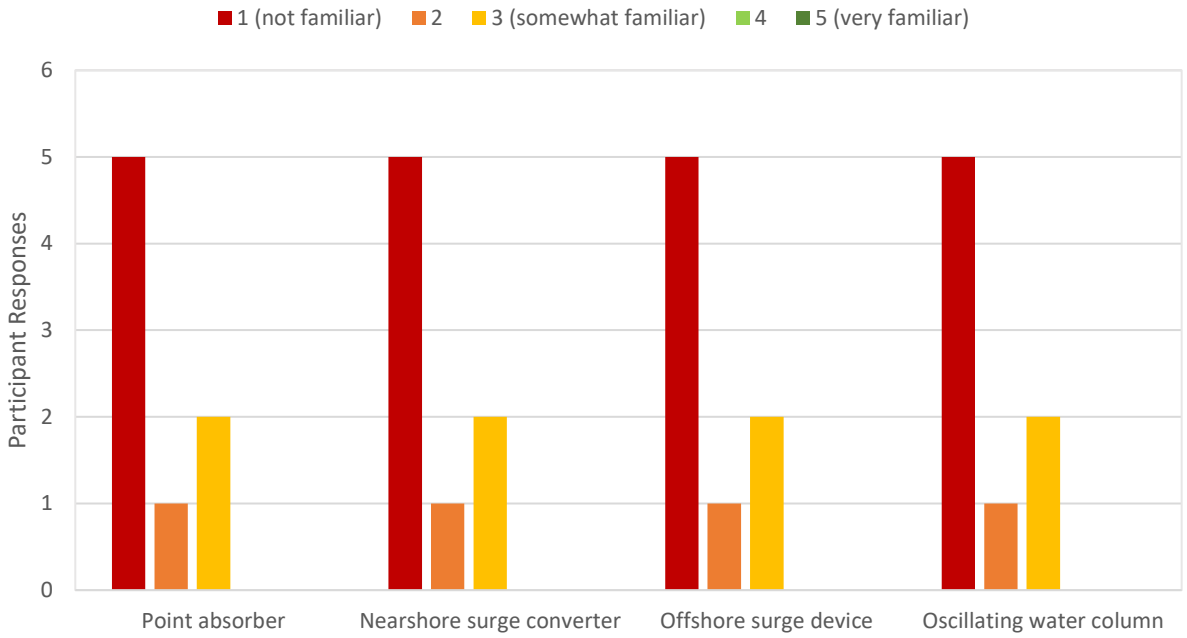

Figure 4. Familiarity with wave devices. (n = 8)

Top Challenges and Perceptions

Regulators were asked to rank the following challenges from 1 (most important) to 7 (least important) for permitting projects with single marine energy devices and for arrays.

- Chemical releases and water quality degradation
- Electromagnetic field (EMF) effect on animals
- Benthic/habitat disturbance
- Risk of animals colliding with underwater devices
- Effects of underwater sound emissions from devices on animals
- Avoidance, attraction, and/or displacement of animals
- Energy removal and effects of changes in flow on the ecosystem
- Entanglement of animals with lines and cables
- Displacement of traditional activities

The average ranking of each challenge was calculated by Survey Monkey, such that the answer choice with the largest average ranking is the top challenge.[1]

The results for **single devices** are shown in Figure 5 and the results for **arrays** are shown in Figure 6. The most important challenge identified for both single devices and arrays was risk of collision.

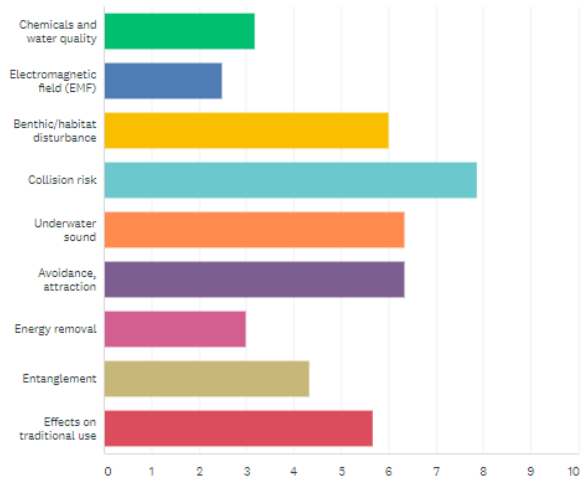

Figure 5. Ranking of challenges for single devices. (n = 7)

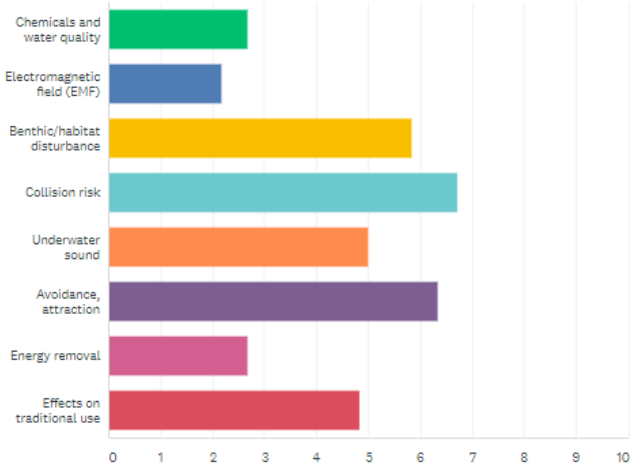

Figure 6. Ranking of challenges for device arrays. Note that due to an error in survey design, Entanglement was not presented as an option for arrays. (n = 7)

[1] Method used to calculate average rank uses the equation below, where w is the weight of the ranked position and x is the response count for each answer choice.

$$\frac{x_1w_1 + x_2w_2 + x_3w_3 \ldots x_nw_n}{Total\ Response\ Count\ (n)}$$

The survey also asked participants to respond to several statements about permitting for single devices and arrays with respect to their top ranked challenge:

1. Sufficient field data are needed to determine risks and reduce uncertainty of MRE development.
2. Numerical models play an important role in environmental permitting.
3. Policy guidance is needed to interpret risk and uncertainty.
4. Staff need to be knowledgeable and trained on technologies, projects, interactions, etc.

The results are shown below as heat maps, with responses related to **single devices** are shown Table 1, and responses related to device **arrays** in Table 2. Only one regulator disagreed with any of these statements. The strongest support was for the need for sufficient field data for both single devices and arrays. Moving from single devices to arrays, there appears to be more support for guidance and field data, while responses related to numerical models and staff training remain constant.

Table 1. Response to statements regarding single devices. (n = 7)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Sufficient field data	0	0	1	2	4
2. Numerical models	0	0	3	3	1
3. Guidance	0	1	1	4	1
4. Training	0	0	3	2	2

Table 2. Response to statements regarding device arrays. (n = 7)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Sufficient field data	0	0	0	2	5
2. Numerical models	0	0	3	3	1
3. Guidance	0	1	1	3	2
4. Training	0	0	3	2	2

Data Transferability

Regulators were asked to respond to the question: "Can data collected from other locations be applied towards environmental permitting within your jurisdiction?" Participants were given the option of 'Never', 'Maybe', and 'Absolutely' and were asked to respond based on their top ranked challenge (for most, collision risk).

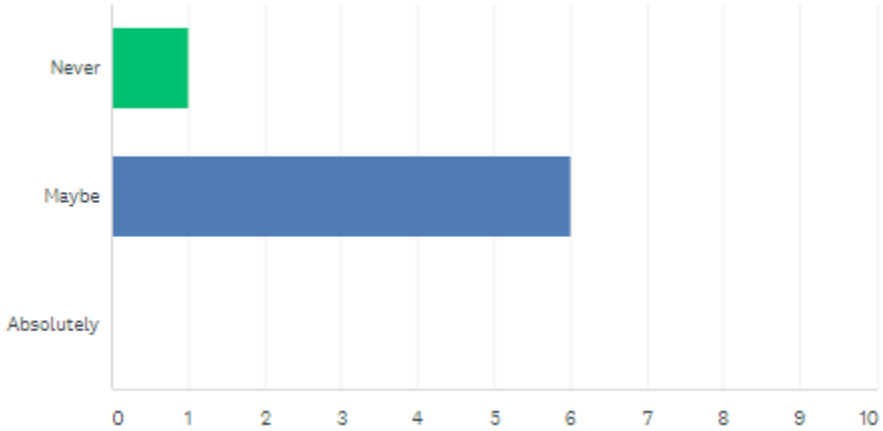

Figure 7. Can data collected from other locations be applied towards environmental permitting within your jurisdiction? (n = 7)

Most regulators (n = 6) responded 'Maybe'. Additional comments left in response to this question include:

- "Data would be considered along with environmental differences (e.g., current speed, species diversity and abundance, etc.) between locations that could influence results."
- "Data collected from other locations can be applied towards environmental permitting within my jurisdiction as long as certain aspects of the other location are analogous to my jurisdiction. Many factors would be taken into consideration when considering data collected from other locations. For example, is the local ecology the same in the location, are the technologies similar in scale and design, or are aquatic species that utilize the other location fulfilling the same life processes?"
- "This information would be useful but not significant in reducing risk. The challenge for Nova Scotia is that the resource is located in a migration corridor and productive fishing ground. Protecting ecological integrity and viability of a fishery through responsible development is integral to advancing MRE in Nova Scotia. Further challenging development is that the flow and turbidity prevent monitoring interactions with traditional monitoring equipment. Even if we are to use information obtained elsewhere or models, this must still be demonstrated before multiple devices may be deployed and demonstrated. Without the ability to monitor, advancement will be slow and incremental. At this time all information is valuable however it is not viewed as transferrable."
- "If other locations have similar baseline conditions, judgement can be used to apply the results."
- "This depends on a number of variables such as the focus of the collection of data, comparison of both the oceanographic and biological environment etc."

The regulator that responded 'Never' commented that:

- "The Bay of Fundy is a unique ecosystem other models or data do not apply."

These results suggest that most regulators are interested in transferring data if it is comparable between locations.

Best Approach to MRE Development

Regulators were asked, "Which of the following approaches best describes your vision of how the MRE industry should develop? (Choose one)". The options as provided to regulators in the survey are listed below:

- *Precautionary Principle:* There is a high degree of uncertainty and potentially negative outcomes associated with marine energy project deployment and operation. Measures should be taken to avoid the negative outcome by proceeding very cautiously or not pursuing projects at all.
- *Mitigation Hierarchy:* Impacts or risks should be systematically limited by taking actions to avoid, minimize, mitigate and/or compensate for risks through siting and/or mitigation measures.
- *Phased Approach*: Single devices should be deployed first, followed by slowly ramping up to array scale after potential risks are better understood and managed.
- *Adaptive Management:* A learning-based management approach should be applied that includes adapting monitoring and mitigation over time to understand risks, decrease uncertainty, and mitigate for impacts.
- *Survey, Deploy, Monitor:* The area of a proposed project should be surveyed before deployment, coupled with monitoring around the device before deployment can proceed.
- *Just do it:* Risks to the marine environment are almost certainly low, so projects should be able to move forward.

Results from this question are described in Figure 8. The majority of regulators (n = 5) favor a phased approach.

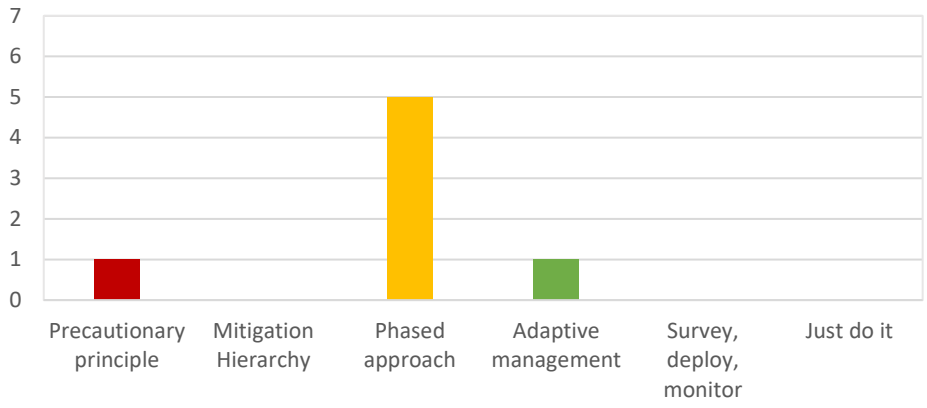

Figure 8. Preferred approaches to the development of the MRE industry. (n = 7)

Awareness of OES-Environmental

In addition to questions about permitting of MRE devices, regulators were asked about their awareness of the work of OES-Environmental.

The regulators that were aware of OES-Environmental (4 out of 7) had been aware of it for more than 12 months (Figure 9), and they find it moderately or very useful in compiling and making available information on the environmental effects of MRE developments (Figure 10).

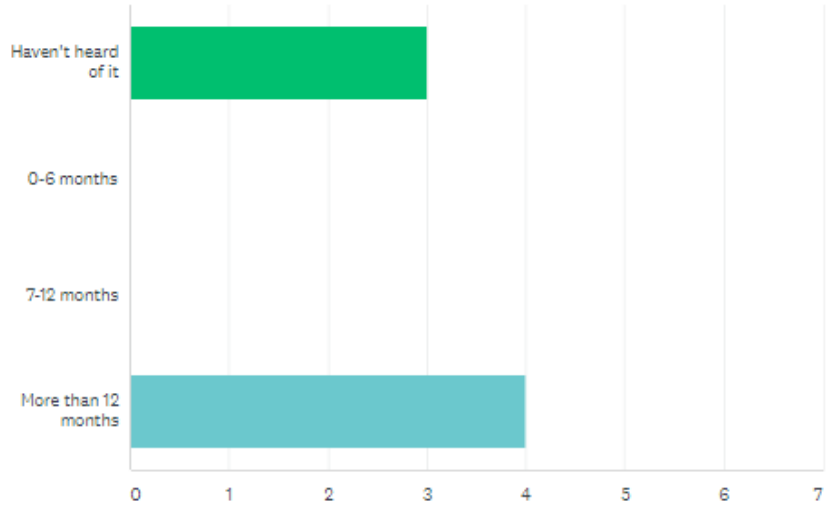

Figure 9. Awareness of OES-Environmental prior to taking the survey. (n = 7)

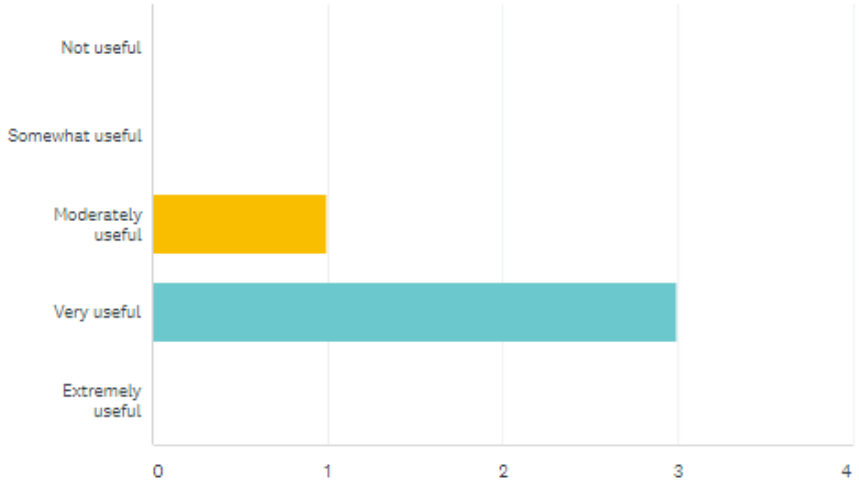

Figure 30. Usefulness of OES-Environmental. (n = 4)

The regulators were asked, “How do you make use of the work that OES-Environmental does?” and were given the following options:

- Attend webinars and expert forums
- Attend workshops and conference talks
- Use the State of the Science 2016 Report
- Other (please specify)

The results from this question are shown in Figure 12.

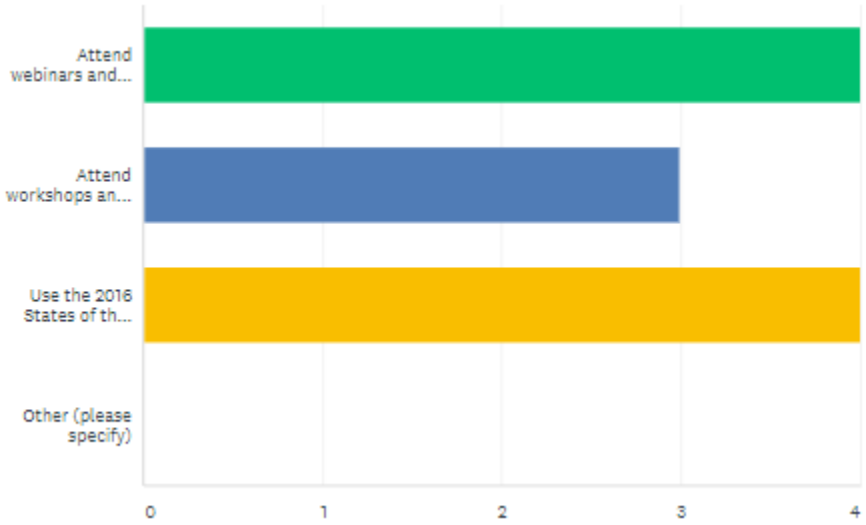

Figure 41. Uses of OES-Environmental work. (n = 4)

Use of *Tethys*

Regarding the *Tethys* platform, regulators who were aware of *Tethys* had been aware from it for more than 12 months, while several regulators had not heard of it (Figure 12).

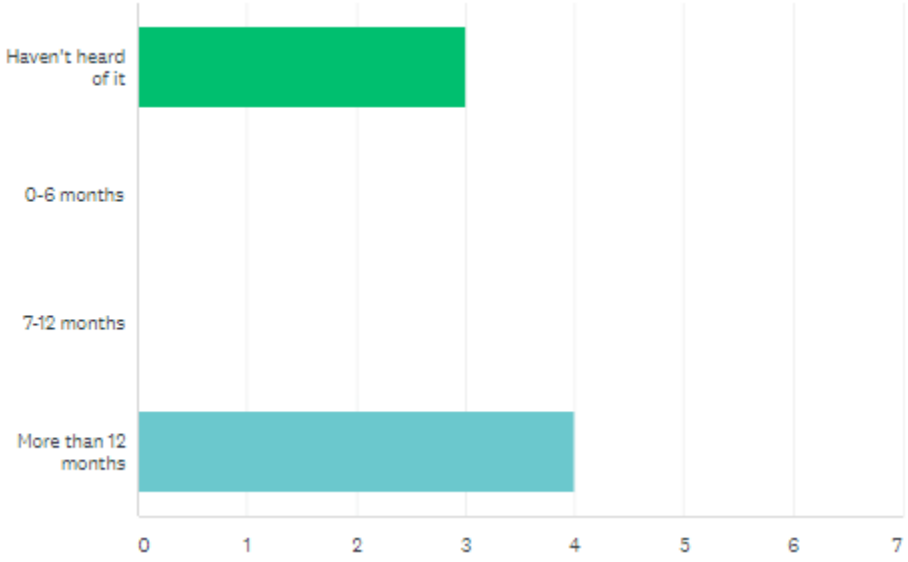

Figure 52. Awareness of Tethys. (n = 7)

Regulators were asked about their use of the following functions of *Tethys:*

- To find papers and reports on MRE environmental issues
- To learn more about the environmental effects of the MRE industry
- To participate in webinars and expert forums
- To review archived webinars and expert forums
- To receive the *Tethys* Blast newsletter
- To search the *Tethys* events calendar

All of the regulators who use *Tethys* use it to find papers and reports about MRE, to participate in webinars, and receive the *Tethys* blast (Figure 13). The regulators that use *Tethys* found it to be moderately to extremely useful (Figure 14).

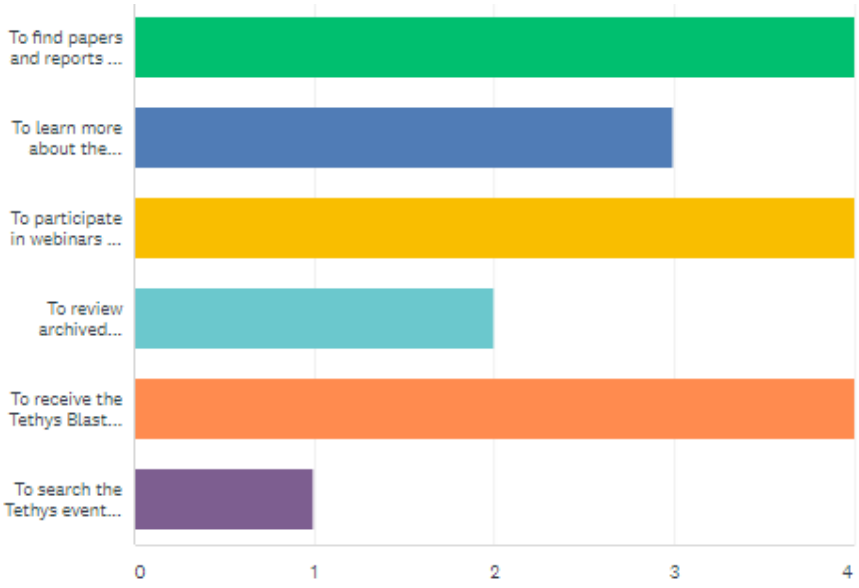

Figure 63. Uses of Tethys. (n = 4)

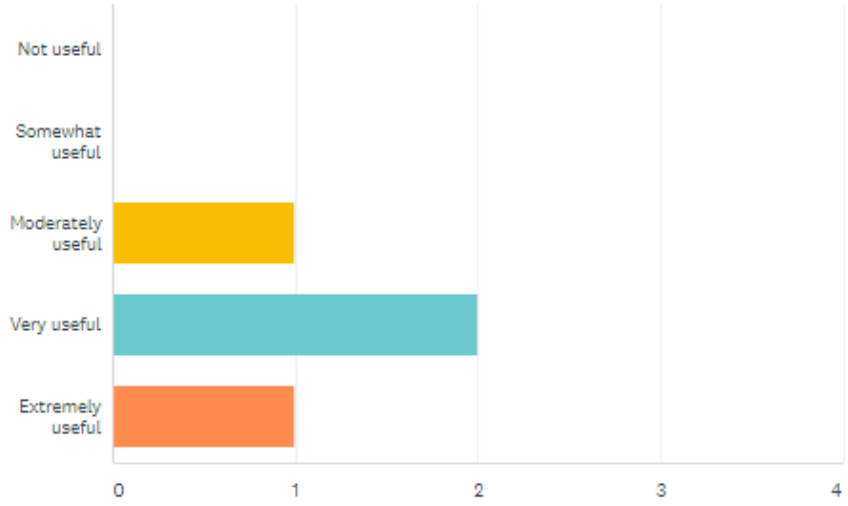

Figure 74. Usefulness of Tethys. (n = 4)

Conclusion

The Canadian regulators represented in this survey are primarily concerned about effects of MRE on the seabed habitat, marine mammals, fish, and invertebrates – especially considering collision risk and habitat disturbance. They are involved at multiple stages in the permitting process, and half (4 out of 8) have already participated in permitting an MRE device. They are much more familiar with tidal devices than wave devices across the board.

These regulators are open to the possibility of data transferability, given certain limitations. Their main concerns are around unique ecosystems, like the Bay of Fundy, and consideration of locally specific conditions and comparable baselines for transferability. Most regulators support a phased approach to permitting, though one respondent prefers a precautionary approach and another prefers an adaptive management approach.

Over half of the regulators (4 out of 7) have been familiar with the work of OES-Environmental for over a year and find it moderately to very useful. These regulators participate in webinars, workshops, and use the 2016 State of the Science Report. These same four also have been using the *Tethys* platform for over a year and have found it moderately to extremely useful. These results suggest that the work of OES-Environmental and *Tethys* is helpful to regulators, and that increased outreach about these tools and products is recommended to continue to support regulators in their permitting work. Promotion of OES-Environmental and *Tethys* among Canadian regulators is likely to improve general knowledge about environmental effects of MRE and increase support for data transferability in order to move the industry forward.