Marine Renewable Energy Regulator Survey: *IRELAND*

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Table of Contents

Introduction

As the marine renewable energy (MRE) industry progresses around the world, understanding of the potential environmental effects of MRE has improved. Opportunities to investigate the environmental effects of operational MRE devices have increased in recent years with more projects in the water. Despite these advancements, some areas of uncertainty persist. Key concerns remain about how MRE devices and arrays interact with surrounding environments, and how marine animals behave around them. These uncertainties continue to pose challenges during permitting processes for MRE. Additionally, the development of larger-scale MRE devices and arrays presents new questions and uncertainty for MRE permitting processes, particularly in understanding how potential environmental effects of MRE scale up and interact with other ocean activities.

To better understand how regulators and advisors perceive and manage environmental risks during permitting processes for MRE projects, a survey was conducted across several OES-Environmental member countries beginning in 2025. Building on a previous regulator survey conducted by OES-Environmental for multiple countries from 2017-2021, this survey included updated questions to reflect changing information needs regarding the potential environmental effects of MRE. Its purpose was to understand regulators and advisors' familiarity with MRE technologies, perceptions of potential environmental risks associated with MRE technologies across varying scales, and views on best approaches to MRE development, including permitting and the applicability of data transferability. The survey also included questions to collect information on the use of Tethys. A list of questions and answer options is provided in Appendix A.

This report summarizes the results from the survey of regulators and advisors in **Ireland**. Results are compared to the previous survey for Ireland, conducted and published in 2019[1].

Participants

Email invitations for the 2025 Survey on Regulatory Needs Regarding Environmental Effects of Marine Renewable Energy were sent to 26 individuals known to be involved in permitting MRE in Ireland. Out of eight responses received, three were complete and retained for analysis.

All of the respondents work at an organization representing a national level of the Irish government. No respondents self-identified as working at an organization representing a regional, county, or local-level government.

Figure 1 shows the reported number of planned, permitted, or operational projects in each respondent's jurisdiction. Two respondents reported that there are no projects, and one respondent reported more than 10. However, these results are self-reported and vary across jurisdictions. In addition, some responses may conflate MRE with offshore wind, meaning the

[1] Rose, D.; Freeman, M. (2019). MRE Regulator Survey Report: Ireland. https://tethys.pnnl.gov/publications/mre-regulator-survey-report-ireland

reported results may not accurately represent the current number of planned, permitted, or operational MRE projects in Ireland.

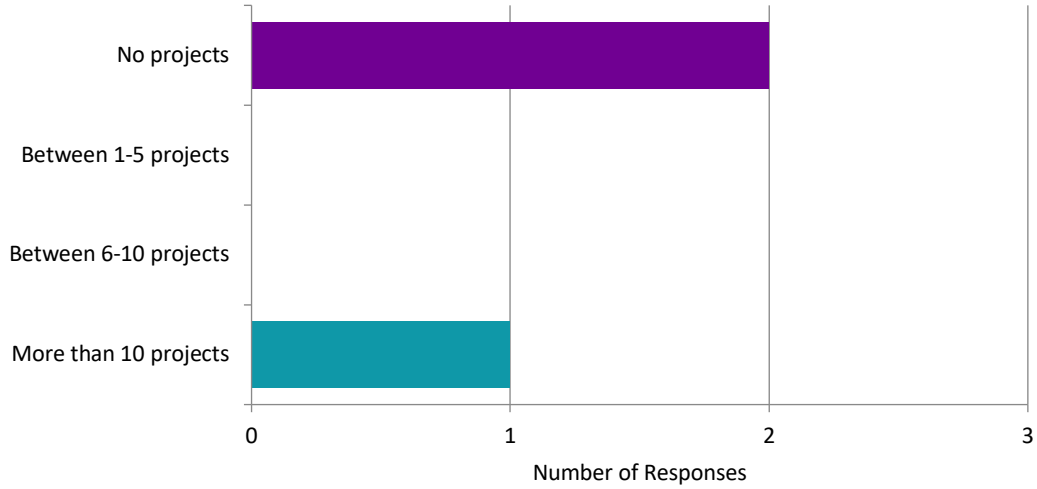

Figure 1. Number of planned, permitted, or operational marine renewable energy projects in respondent's jurisdiction. (n = 3)

Respondents were also asked to indicate their agency's focus for permitting MRE developments. As shown in Figure 2, the represented agencies focus on permitting for seabed and habitat, other animals, fish/fisheries, marine mammals, and water quality. Two of the agencies also focus on social and economic aspects, energy production, and oceanographic systems. One respondent provided an additional response to further explain the broad permit focus of their agency: "All of the above are taken into consideration with regard to licensing and consenting of maritime usages as prescribed by the Maritime Area Planning Act 2021".

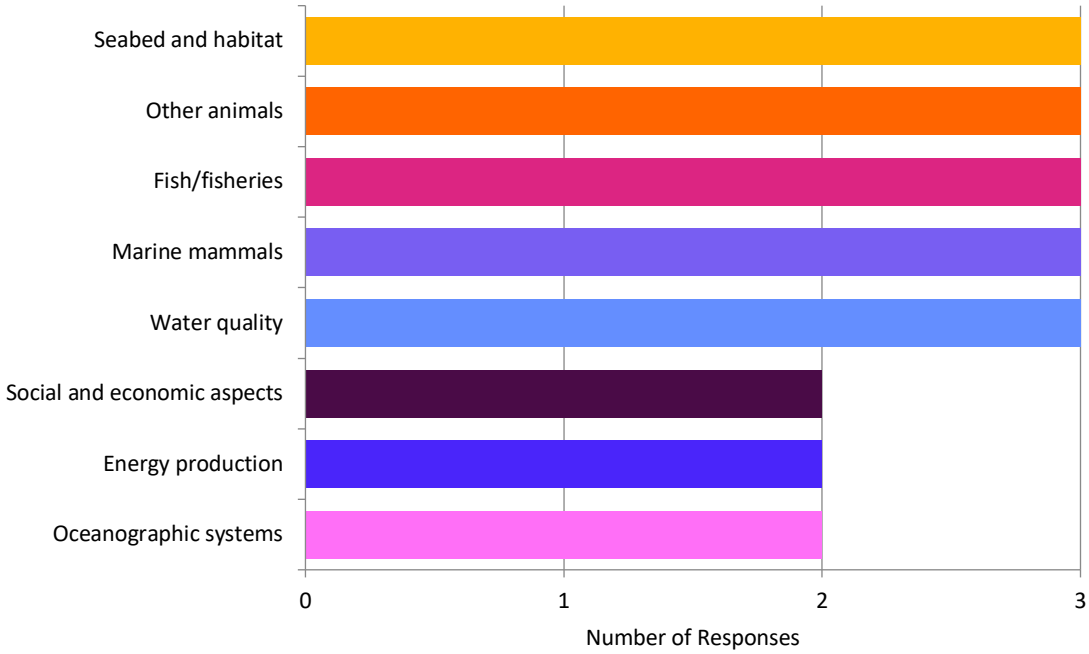

Figure 2. Agency focus in permitting marine renewable energy projects. (n = 3)

Figure 3 shows respondents' role in permitting MRE projects. The most common role is issuing licenses/permits, followed by managing licenses/permits during the operational phase of an MRE project. One respondent also advises policy-level decisions in their agency, reviews or advises applications for permits, and advises regulators or provides consultations.

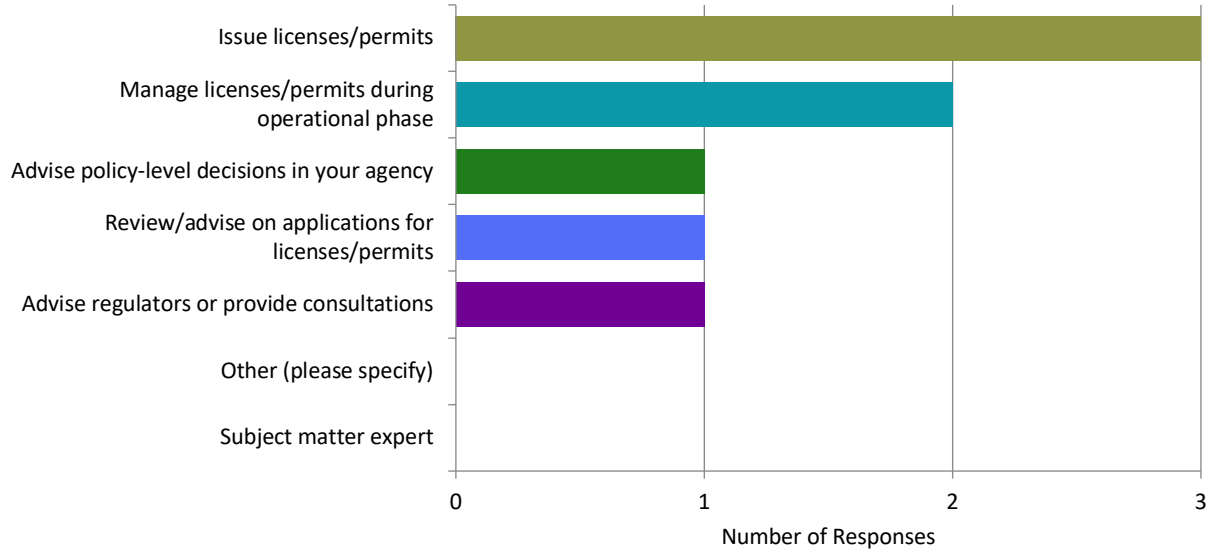

Figure 3. Respondent's role in permitting marine renewable energy projects. (n = 3)

Figure 4 shows the length of time respondents have been in a position related to the permitting process for MRE projects. Two of the respondents have been in this position for 1-2 years and one respondent has been in this position for 3-5 years.

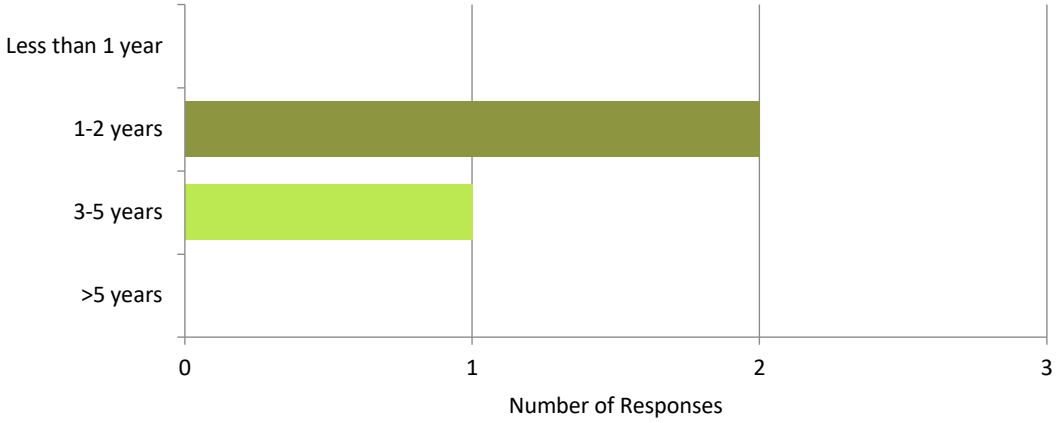

Figure 4. Length of time in a position related to the permitting process for marine renewable energy projects. (n = 3)

Respondents were also asked if they had directly participated in the regulatory process for an MRE project. While all three respondents have participated in a permitting capacity, none indicated that they have participated in the management of an operational MRE project or decommissioning process.

It is important to note that the Irish Maritime Area Regulatory Authority (MARA) was established in 2023. Prior to its establishment, a different regulatory framework and staffing structure applied to MRE permitting processes, which may help contextualize respondents' self-reported length of tenure and stage of involvement in the MRE regulatory process.

Familiarity with MRE Technologies

Respondents were asked to rate their familiarity with MRE technologies (e.g., ocean current energy, tidal energy, wave energy, ocean thermal energy conversion, salinity gradient, riverine energy) on a scale of 1 (not familiar) to 5 (very familiar). They were provided with explanations of all of the terms presented from https://openei.org/wiki/PRIMRE/Basics. The results are presented in Figure 5. The overall level of familiarity was fairly low for all technologies, though the respondents are more familiar with wave, tidal, and ocean current than riverine, and less familiar with salinity gradient and ocean thermal energy conversion technologies.

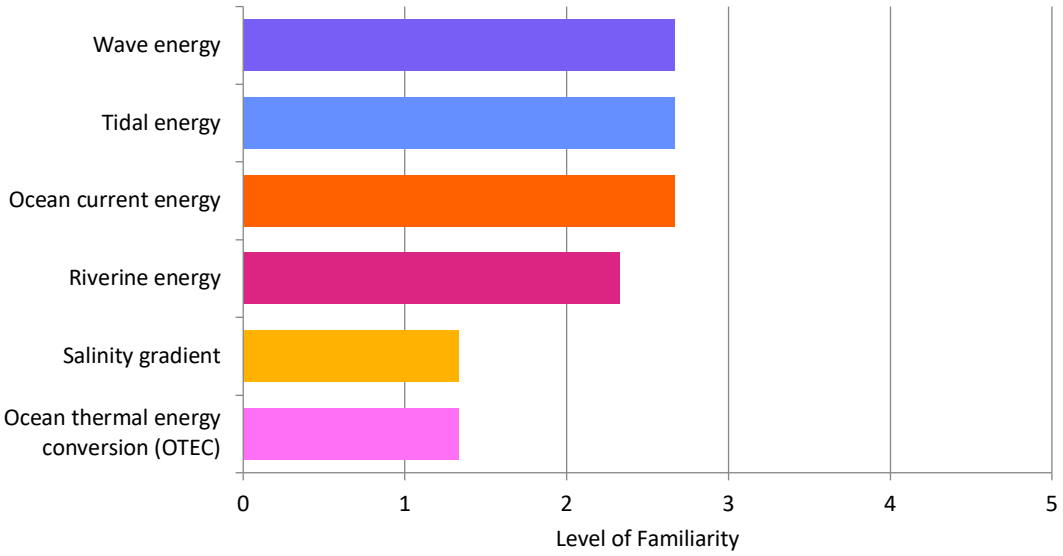

Figure 5. Average level of familiarity with marine renewable energy technologies from 1 (not familiar) to 5 (very familiar). (n = 3)

Top Challenges and Perceptions

The following questions differentiated between small arrays (one to six devices) and large arrays (more than 6 devices) of MRE devices to understand how perceptions of risk and information needs vary for different MRE project scales. Small arrays refer to projects with one to six devices, and large arrays refer to projects with more than six devices.

Small arrays

Respondents were asked to rank the following environmental effects by how challenging they are when permitting small arrays.

- Effects of electromagnetic field emissions from underwater cables and other electrical infrastructure on marine animals
- Attraction, avoidance, or displacement of marine animals
- Changes to habitats
- Effects of underwater noise from devices on marine animals
- Risk of marine animals colliding with turbine blades
- Changes in oceanographic systems (e.g., energy removal, sediment transport, etc.)
- Entanglement of large marine animals with mooring lines and underwater cables

Figure 6 shows respondents' perceptions of the level of challenge posed by environmental effects when permitting small arrays, when asked to rank from most challenging to least challenging. The top-ranked challenges were calculated by Survey Monkey, such that the answer choice with the largest average ranking, or value, is the top challenge. In Ireland, the top challenges for respondents in permitting small arrays are changes to habitats and attraction, avoidance, or displacement.

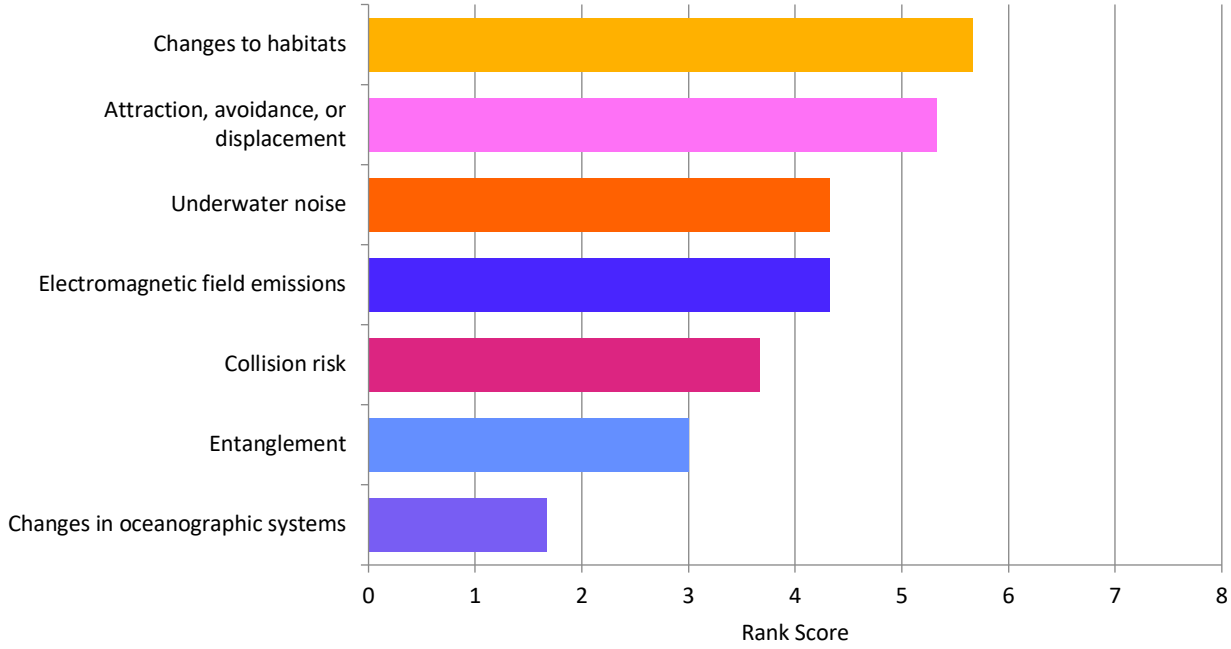

Figure 6. Ranking of challenges to permitting small arrays (one to six devices). (n = 3)

Respondents were also asked to rank their agreement with several statements regarding additional needs for permitting for small arrays, with respect to their top-ranked challenges for small arrays.

The results of this question are summarized in Table 1. Respondents agreed or strongly agreed with all statements except "Validated numerical models are needed for environmental permitting," where one respondent disagreed, one was neutral, and one strongly agreed.

Table 1. Perceptions of small array statements. (n = 3)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Additional research/studies are needed to better understand the likely risk	0	0	0	1	2
Field data are needed to determine the risk and uncertainty of an MRE project	0	0	0	3	0
Validated numerical models are needed for environmental permitting	0	1	1	0	1
Organization/policy guidance is needed to interpret potential environmental risk and manage uncertainty	0	0	0	2	1
Regulators/advisors need to be knowledgeable and trained on MRE technologies, environmental interactions, etc.	0	0	0	3	0
Additional monitoring methods, instruments, etc. are needed to document environmental interactions	0	0	0	3	0

Large arrays

Respondents were asked to rank the following environmental effects by how challenging they are when permitting large arrays. Note that cumulative effects and ecosystem-wide effects were added for this question in contrast to small arrays.

- Effects of electromagnetic field emissions from underwater cables and other electrical infrastructure on marine animals
- Attraction, avoidance, or displacement of marine animals
- Changes to habitats
- Effects of underwater noise from devices on marine animals
- Risk of marine animals colliding with turbine blades
- Changes in oceanographic systems (e.g., energy removal, sediment transport, etc.)
- Entanglement of large marine animals with mooring lines and underwater cables
- Cumulative effects with other anthropogenic activities/marine developments, including other MRE projects
- Ecosystem-wide effects

Figure 7 shows respondents' perceptions of the level of challenge posed by environmental effects when permitting large arrays, when asked to rank from most challenging to least challenging. The top-ranked challenges were calculated by Survey Monkey, such that the answer choice with the largest average ranking is the top challenge. In Ireland, the top challenges for respondents in consenting large arrays are underwater noise; cumulative effects;

changes to habitats; attraction, avoidance, or displacement; ecosystem-wide effects; and entanglement.

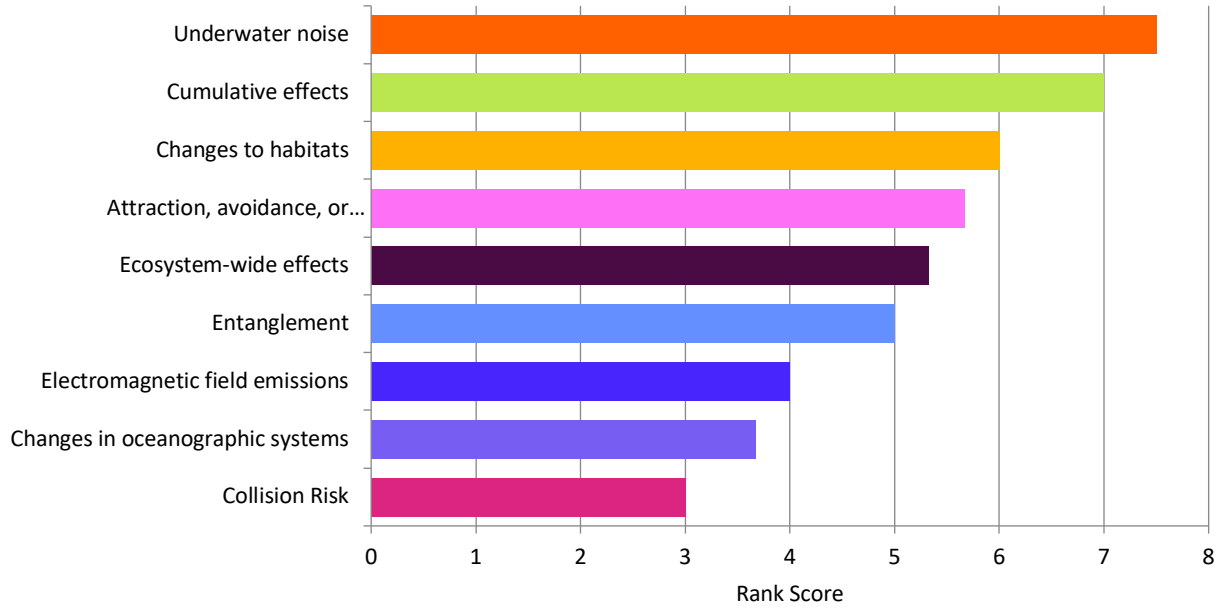

Figure 7. Ranking of challenges to permitting large arrays (more than six devices). (n = 3)

Respondents were also asked to rank their agreement with several statements regarding additional needs for permitting large arrays, with respect to their top-ranked challenges for large arrays. The results of this question are summarized in Table 2. Most of the respondents were in agreement (agreed or strongly agreed with all statements). However, one respondent was neutral on the need for validated numerical models while another respondent strongly disagreed with the need for regulators and advisors to be knowledgeable and trained on MRE.

Table 2. Regulator perceptions of large array statements. (n = 3)

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Additional research/studies are needed to better understand the likely risk	0	0	0	2	1
Field data are needed to determine the risk and uncertainty of an MRE project	0	0	0	2	1
Validated numerical models are needed for environmental permitting	0	0	1	2	0
Organization/policy guidance is needed to interpret potential environmental risk and manage uncertainty	0	0	0	2	1
Regulators/advisors need to be knowledgeable and trained on MRE technologies, environmental interactions, etc.	1	0	0	2	0

Additional monitoring methods, instruments, etc. are needed to document environmental interactions	0	0	0	2	1

Barriers to Permitting

Respondents were asked to select statements that "Describe a barrier to permitting for you or your agency regarding environmental effects of MRE projects". The predefined statements and associated responses are shown in Figure 8.

For all three respondents, barriers to permitting MRE projects are scientific uncertainty regarding environmental effects; lack of expertise and/or access to subject matter experts; and limited availability of research or environmental monitoring data. Two of the respondents perceived difficulty accessing information/data from other MRE projects or jurisdictions/locations as a barrier. One respondent identified low social acceptance or public opposition as a barrier to permitting. Inadequate technical knowledge and insufficient guidance for managing environmental risks were not selected as barriers to permitting by any respondents.

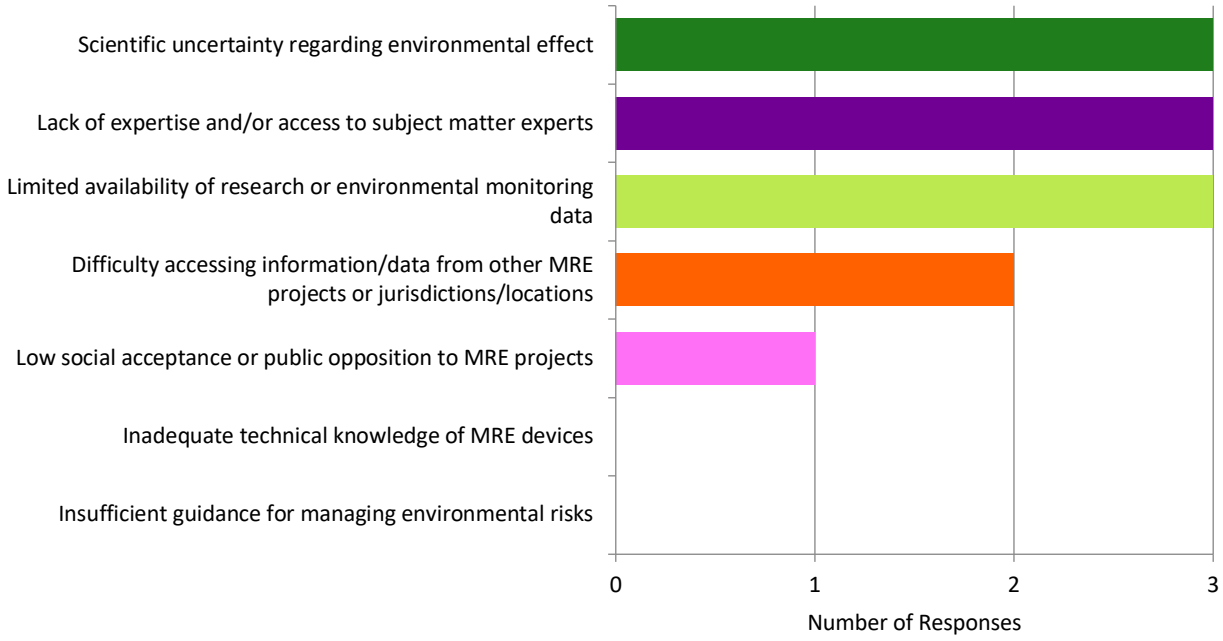

Figure 8. Barriers to permitting marine renewable energy projects. (n = 3)

Data Transferability and Risk Retirement

Risk retirement is a process to help simplify permitting processes for MRE devices by "retiring" risks of specific environmental interactions that are unlikely to cause harm to marine animals or habitats so that extensive investigations for every new MRE project are not required. Through data transferability, MRE developers, regulators, and advisors may rely on what is known from

already permitted projects, from related research studies, or from findings from analogous offshore industries. Risk retirement does not take the place of any existing regulatory processes or replace the need for appropriate data collection before, during, and after MRE device deployment. To guide the application of risk retirement and data transferability by MRE developers, regulators, and advisors, OES-Environmental has created various tools and resources available on the Tethys Risk Retirement page and Data Transferability page.

Respondents were provided with the following definition of risk retirement:

> "Risk retirement is a process by which available data and information are examined to identify environmental effects that are unlikely to cause significant effects on marine habitats, animals, or ecosystem processes. These effects can therefore be retired and may not require extensive investigation for each new MRE project."

Based on this definition, respondents were asked, "Can any of the following potential risks be retired for small arrays (one to six devices) in your jurisdiction?" Respondents ranked the ability to retire each of the following potential environmental risks as either strongly disagree, disagree, neutral, agree, or strongly agree.

- Effects of electromagnetic field emissions from underwater cables or other electrical infrastructure on marine animals
- Changes to habitats
- Attraction, avoidance, and displacement of marine animals
- Effects of underwater noise from devices on marine animals
- Risk of marine animals colliding with turbine blades
- Changes in oceanographic systems (e.g., energy removal, sediment transport, etc.)
- Entanglement of large marine animals with mooring lines and underwater cables

Figure 9 shows respondents' perceptions on the ability to retire each environmental risk for small arrays (one to six devices). While two respondents agreed on the ability to retire underwater noise and one respondent agreed on the ability to retire collision risk, respondents were overall neutral towards risk retirement. However, one respondent disagreed with the ability to retire the risk of electromagnetic field emissions. None of the respondents selected strongly disagree or strongly agree.

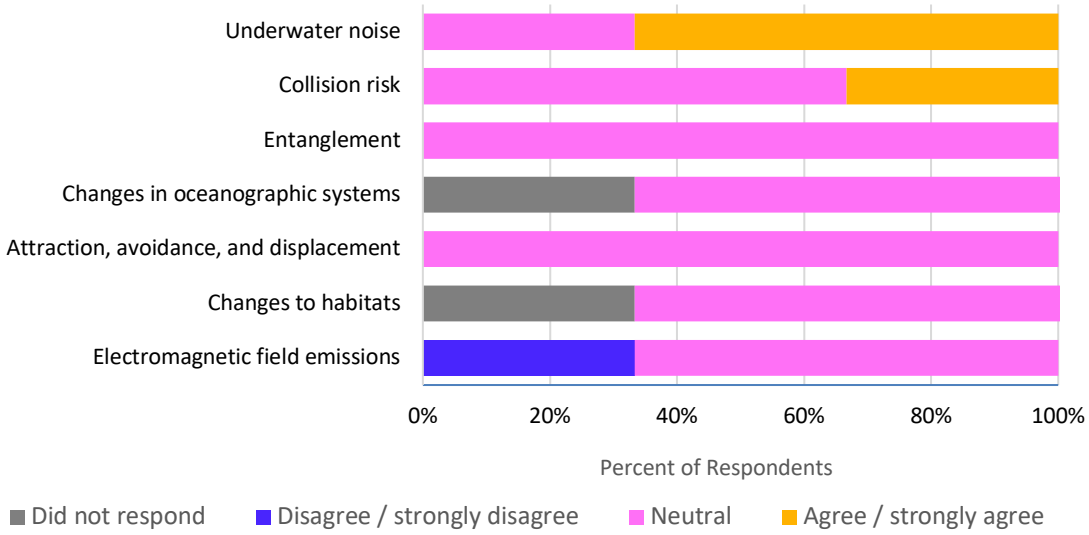

Figure 9. Ability to retire risks for small arrays (one to six devices). (n = 3)

An additional comment was provided by the respondent who agreed with the ability to retire underwater noise and collision risk, and was neutral on the ability to retire electromagnetic field emissions: "It is too early for the most part in the deployment of MRE to consider risk retirement."

Respondents were also asked to respond to the question: "Can data collected at other locations be used to inform permitting processes for proposed MRE developments within your jurisdiction?" Respondents were given the options of 'Never', 'Maybe', and 'Absolutely'. One respondent selected 'Absolutely' while the other two respondents selected "Maybe". One of the respondents that selected "Maybe" provided an additional comment: "It depends on the purpose of the data - for instance, certain species have been observed to have different behavioral patterns in other jurisdictions."

Best Approach to MRE Development

Respondents were asked, "Which of the following approaches best describes your strategy for managing environmental risks and uncertainties during the permitting process when moving from small arrays (one to six devices) to large arrays (greater than six devices) (Choose one)". The options, as provided to respondents in the survey, are listed below:

- *Precautionary principle*. Potential environmental risks should be avoided through preventative measures and consideration of alternatives to avoid unacceptable impact, particularly when there is scientific uncertainty. Project proponents are responsible for proving that a risk will not cause irreversible environmental harm.
- *Mitigation hierarchy*. Potential environmental risks should be systematically limited by taking actions to avoid, minimize, mitigate and/or compensate for risks through siting and/or mitigation measures.

- *Adaptive management*. Potential environmental risks and scientific uncertainty can be managed through a flexible, learning-based approach that includes adapting monitoring and mitigation over time to understand risks, decrease uncertainty, and mitigate impacts.
- *Survey, deploy, monitor*. Potential environmental risk level should be identified through surveys or available data at a proposed project site. If low risk, permitting may be fast-tracked. If high risk, the project may require additional surveys. Surveys and post-deployment monitoring should be based on a risk-based approach and proportionate to the project scale.

Two respondents selected precautionary principle while one respondent selected mitigation hierarchy.

Off-grid MRE

Respondents were asked:

> "MRE devices are being designed for uses other than supplying electricity to the national grid. These systems are likely to consist of fewer and/or smaller-scale devices, to provide power to remote, coastal, or island communities or at-sea applications such as aquaculture, ocean observations, and navigation. Would the permitting process for these smaller MRE projects differ from national grid-scale projects in your jurisdiction?"

Responses were open-ended. All respondents indicated that the process would not likely be different for off-grid projects. One respondent additionally stated:

- "Such projects are likely to subject to the same assessment procedure for environmental impact and permitted conditions would depend on the mitigation of likely significant effects where appropriate."

Use of Tethys

In addition to questions about permitting MRE projects, respondents were asked how they find information on the environmental effects of MRE and their awareness and use of the Tethys online database. The results are provided in the subsections below.

Finding Information

Respondents were asked, "What resources or methods do you use to find information on the environmental effects of MRE and support permitting? (check all that apply)".

Figure 10 shows that all three respondents obtain information on the environmental effects of MRE from government agency reports. Two respondents obtain information from scientific journals, conferences and workshops, and other regulators/colleagues. Only one respondent obtains information from Tethys and MRE project developers, and none from newsletters.

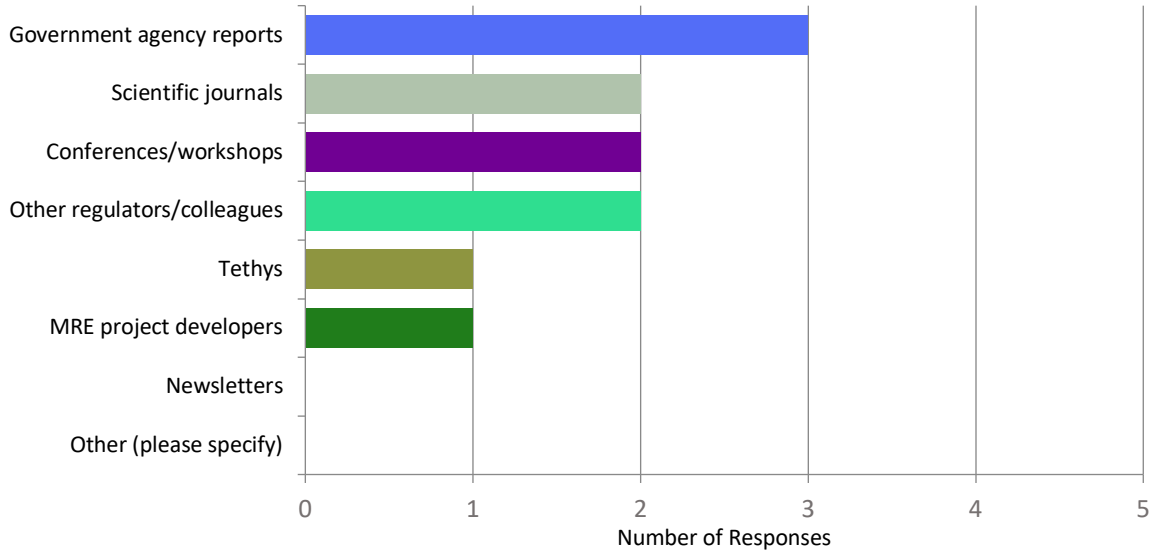

Figure 10. Resources and methods used to find information on environmental effects of marine renewable energy and support permitting. (n = 3)

Awareness, Purpose, and Usefulness

When asked if they had heard of Tethys, two respondents selected “yes” and one respondent selected “no”. The respondent unfamiliar with Tethys was asked a follow-up question, “After learning about Tethys, is it likely that you will explore it further?”. The respondent expressed potential interest, selecting "Maybe”.

Respondents who were familiar with Tethys were asked to indicate how they use Tethys by indicating all uses that apply from the following list:

- To find papers and reports on the environmental effects of MRE
- To view live or archives webinars and expert forums
- To receive Tethys Blast newsletter
- To find project information (e.g., OES-Environmental metadata)
- To use tools and resources (e.g., data discoverability matrix, management measures tool, etc.)

Only one respondent uses Tethys to access tools and resources, to find project information, and to find papers and reports on environmental effects of MRE. The other respondent did not select any answer options and explained in an additional comment that “Currently this country [Ireland] does not participate in Tethys”[2].

Respondents who were familiar with Tethys were also asked how useful they find Tethys (not useful, somewhat useful, very useful). One respondent finds Tethys very useful while the other does not find it useful.

[2] See Conclusion (p. 15).

Conclusion

The three respondents in Ireland are primarily involved in issuing licenses and permits for MRE projects. They are most familiar with wave, tidal, and ocean current energy, somewhat less familiar with riverine energy, and have limited familiarity with salinity gradient energy and ocean thermal energy conversion. All respondents work for national-level agencies focused on various aspects of MRE permitting, including seabed and habitat, fish and fisheries, marine mammals, other animals, and water quality. Two of the three respondents work for agencies that cover all aspects of MRE permitting, including social and economic aspects, energy production, and oceanographic systems.

Listed below are the key findings from the 2026 Ireland Regulator Survey:

- The respondents perceived changes to habitats and attraction, avoidance, or displacement as the most challenging environmental effects of MRE when permitting small arrays (one to six devices), and moderately challenging when permitting large arrays (more than six devices). This suggests that the risk of potential habitat alteration and changes to animal behavior resulting from MRE deployments remain an important environmental permitting consideration for respondents in Ireland, regardless of project scale.

- The respondents perceived underwater noise as a moderately challenging environmental effect of MRE when permitting small arrays (one to six devices) and the most challenging environmental effect when permitting large arrays (more than six devices). Given that respondents perceived cumulative effects as the second most challenging environmental effect when permitting large arrays, this suggests that respondents in Ireland may have heightened concern regarding the potential additive or multiplicative effects of underwater noise as additional devices are deployed within an array.

- The respondents indicated that the need for validated numerical models for environmental permitting is greater for large arrays (more than six devices) than small arrays (one to six devices). This suggests that as MRE deployments increase in scale, environmental permitting processes may increasingly rely on the development and validation of numerical models capable of assessing array-scale and system-wide environmental effects.

- The respondents agreed on the need for regulators and advisors to be trained and knowledgeable on MRE technologies for small arrays (one to six devices), but one respondent strongly disagreed with this need for large arrays (more than six devices). This suggests that some respondents in Ireland may perceive larger MRE deployments as falling outside their scope, or they may view knowledge of MRE technologies as

broadly transferable across array scales – though broader conclusions about this are difficult to draw due to only having three respondents.

- The respondents were predominantly neutral about retiring specific environmental risks but open to the ability to retire environmental risks in general, citing the early stage of MRE development as a limiting factor. They indicated similar openness towards the use of data collected at other locations to inform permitting decisions in their jurisdiction.

- While reported use of Tethys was low, the comment left by one respondent noting that Ireland does not participate in Tethys appears to reflect a misunderstanding. Tethys is a knowledge hub, curated by the Pacific Northwest National Laboratory (PNNL), that does not require national participation or membership. All resources and information available on Tethys are freely accessible for public use, regardless of national affiliation. Additionally, Ireland is a participant of OES-Environmental and Tethys hosts over 60 Ireland-specific MRE documents within the Tethys Knowledge Base.

Additionally, similarities and differences in responses were identified between the 2025 Ireland Regulator Survey and the previous Ireland Regulator Survey conducted by OES-Environmental in November 2019[3] (four respondents). Overall, respondents across the two survey iterations shared a cautious but open stance toward data transferability, with slightly higher levels of support reported in 2025. However, the top challenges identified for arrays differed between the two survey iterations. In 2019, Irish respondents perceived collision risk as the second most challenging environmental effect of MRE for arrays. In contrast, responses to the 2025 survey perceived collision risk as one of the least challenging environmental effects of MRE for both small arrays (one to six devices) and large arrays (more than six devices). While this shift may suggest that collision risk is now perceived as a lower risk in environmental permitting processes in Ireland, it is important to note that the definitions of 'array', 'small array', and 'large array' varied slightly across the two survey iterations and that with small numbers of respondents, it is difficult to generalize changes over time in contrast to individual regulator variability.

Understanding regulators and advisors' needs and challenges over time helps address key barriers to the advancement of the MRE industry. By identifying these evolving needs, information and tools can be developed that are relevant in various contexts.

[3] Rose, D.; Freeman, M. (2019). MRE Regulator Survey Report: Ireland. https://tethys.pnnl.gov/publications/mre-regulator-survey-report-ireland

Appendix A

#	Question	Potential Choices
1	What level of government does your organization represent?	- National - Regional - County - Local - Other (please specify)
2	How many MRE (wave, tidal, current, thermal or salinity gradient) projects are currently planned, permitted or operational in your jurisdiction?	- 0 - 1-5 - 6-10 - >10
3	Please indicate your agency's focus for permitting MRE projects. Check all that apply.	- Water quality - Marine mammals - Fish/fisheries - Other animals - Seabed and habitat - Oceanographic systems - Energy production - Social and economic aspects - Other (please specify)
4	Please indicate your role in permitting MRE projects. Check all that apply.	- Issue licenses/permits - Manage licenses/permits during operational phase - Advise regulators or provide consultations - Review/advise on applications for licenses/permits - Advise policy-level decisions in your agency - Subject matter expert - Other (please specify)
5	How long have you held a position related to the permitting process for MRE projects?	- Less than 1 year - 1-2 years - 3-5 years - >5 years
6	Have you directly participated in the regulatory process for an MRE project?	- Permitting - Management of an operational project - Decommissioning - No
7	How familiar are you with the following MRE technologies on a scale of 1 (not familiar) to 5 (very familiar)? For more information on these technologies, see https://openei.org/wiki/PRIMRE/Basics.	- Ocean current energy - Tidal energy - Wave energy - Ocean thermal gradient conversion (OTEC) - Salinity gradient - Riverine energy
8	How challenging are the following MRE environmental effects when permitting **small arrays (1-6 devices)**? Rank the below options from 1 (most challenging) to 7 (least challenging).	- Effects of electromagnetic field emissions from underwater cables and other electrical infrastructure on marine animals - Attraction, avoidance, or displacement of marine animals - Changes to habitats - Effects of underwater noise from devices on marine animals - Risk of marine animals colliding with turbine blades

		- Changes in oceanographic systems (e.g., energy removal, sediment transport, etc.) - Entanglement of large marine animals with mooring lines and underwater cables
9	Based on your top-ranked response from Question 19, how strongly do you agree or disagree with the following statements for **small arrays (1-6 devices)**?	- Additional research/studies are needed to better understand the likely risk - Field data are needed to determine the risk and uncertainty of an MRE project - Validated numerical models are needed for environmental permitting - Organization/policy guidance is needed to interpret potential environmental risk and manage uncertainty - Regulators/advisors need to be knowledgeable and trained on MRE technologies, environmental interactions, etc. - Additional monitoring methods, instruments, etc. are needed to document environmental interactions
10	How challenging are the following MRE environmental effects when permitting **large arrays (greater than 6 devices)**? Rank the below options from 1 (most challenging) to 9 (least challenging).	- Effects of electromagnetic field emissions from underwater cables and other electrical infrastructure on marine animals - Attraction, avoidance, or displacement of marine animals - Changes to habitats - Effects of underwater noise from devices on marine animals - Risk of marine animals colliding with turbine blades - Changes in oceanographic systems (e.g., energy removal, sediment transport, etc.) - Entanglement of large marine animals with mooring lines and underwater cables - Cumulative effects with other anthropogenic activities/marine developments, including other MRE projects - Ecosystem-wide effects
11	Based on your top-ranked response from Question 11, how strongly do you agree or disagree with the following statements for **large arrays (greater than 6 devices)**?	- Additional research/studies are needed to better understand the likely risk - Field data are needed to determine the risk and uncertainty of an MRE project - Validated numerical models are needed for environmental permitting - Organization/policy guidance is needed to interpret potential environmental risk and manage uncertainty - Regulators/advisors need to be knowledgeable and trained on technologies, environmental interactions, etc. - Additional monitoring methods, instruments, etc. are needed to document environmental interactions
12	Do any of the following statements describe a barrier to permitting for you or your organization regarding environmental effects of MRE projects? Select all that apply.	- Insufficient guidance for managing environmental risks - Limited availability of research or environmental monitoring data - Inadequate technical knowledge of MRE devices - Lack of expertise and/or access to subject matter experts - Difficulty accessing information/data from other MRE projects or jurisdictions/locations - Scientific uncertainty regarding environmental effect - Low social acceptance or public opposition to MRE projects
13	Can environmental data collected at other locations be used to inform permitting processes for proposed MRE developments within your jurisdiction?	- Never - Maybe - Absolutely - Comment box: Please explain your answer.

14	Risk retirement is a process by which available data and information are examined to identify environmental effects that are unlikely to cause significant effects on marine habitats, animals, or ecosystem processes. These effects can therefore be retired and may not require extensive investigation for each new MRE project. Can any of the following potential risks be retired for **small arrays (1-6 devices)** in your jurisdiction? (Strongly disagree, disagree, neutral, agree, strongly agree)	- Effects of electromagnetic field emissions from underwater cables or other electrical infrastructure on marine animals - Changes to habitats - Attraction, avoidance, and displacement of marine animals - Effects of underwater noise from devices on marine animals - Risk of marine animals colliding with turbine blades - Changes in oceanographic systems (e.g., energy removal, sediment transport, etc.) - Entanglement of large marine animals with mooring lines and underwater cables - Comment box: For environmental effects that cannot be retired, please explain
15	Which of the following approaches best describes your strategy for managing environmental risks and uncertainties during the permitting process when moving from small arrays (1-6 devices) to large arrays (greater than 6 devices)? (Choose one)	- Precautionary principle. Potential environmental risks should be avoided through preventative measures and consideration of alternatives to avoid unacceptable impact, particularly when there is scientific uncertainty. Project proponents are responsible for proving that a risk will not cause irreversible environmental harm. - Mitigation hierarchy. Potential environmental risks should be systematically limited by taking actions to avoid, minimize, mitigate and/or compensate for risks through siting and/or mitigation measures. - Adaptive management. Potential environmental risks and scientific uncertainty can be managed through a flexible, learning-based approach that includes adapting monitoring and mitigation over time to understand risks, decrease uncertainty, and mitigate impacts. - Survey, deploy, monitor. Potential environmental risk level should be identified through surveys or available data at a proposed project site. If low risk, permitting may be fast-tracked. If high risk, the project may require additional surveys. Surveys and post-deployment monitoring should be based on a risk-based approach and proportionate to the project scale. - Comment box: Please explain your answer or note a different approach used.
16	MRE devices are being designed for uses other than supplying electricity to the national grid. These systems are likely to consist of fewer and/or smaller-scale devices, to provide power to remote, coastal, or island communities or at-sea applications such as aquaculture, ocean observations, and navigation. Would the permitting process for these smaller MRE projects differ from national grid scale projects in your jurisdiction?	- Open comment box
17	Tethys (https://tethys.pnnl.gov/) is an online knowledge hub with information and resources on the environmental effects of MRE. Have you heard of Tethys?	- Yes - No
18	After learning about Tethys, is it likely that you will explore it further?	- Yes - No - Maybe

19	Do you find Tethys useful?	- Not useful - Somewhat useful - Very useful
20	How do you use Tethys? Indicate all that apply.	- To find papers and reports on environmental effects of MRE - To view live or archived webinars and expert forums - To receive the Tethys Blast newsletter - To find project information (e.g., OES-Environmental metadata) - To use tools and resources (e.g., data discoverability matrix, management measures tool, etc.) - Other (please specify)
21	What resources or methods do you use to find information on the environmental effects of MRE and support permitting? (check all that apply)	- Other regulators/colleagues - MRE project developers - Conferences/workshops - Newsletters - Scientific journals - Government agency reports - Tethys - Other (please specify)