



Planning Ahead to Address Environmental Effects of Marine Renewable Energy

19 January 2023



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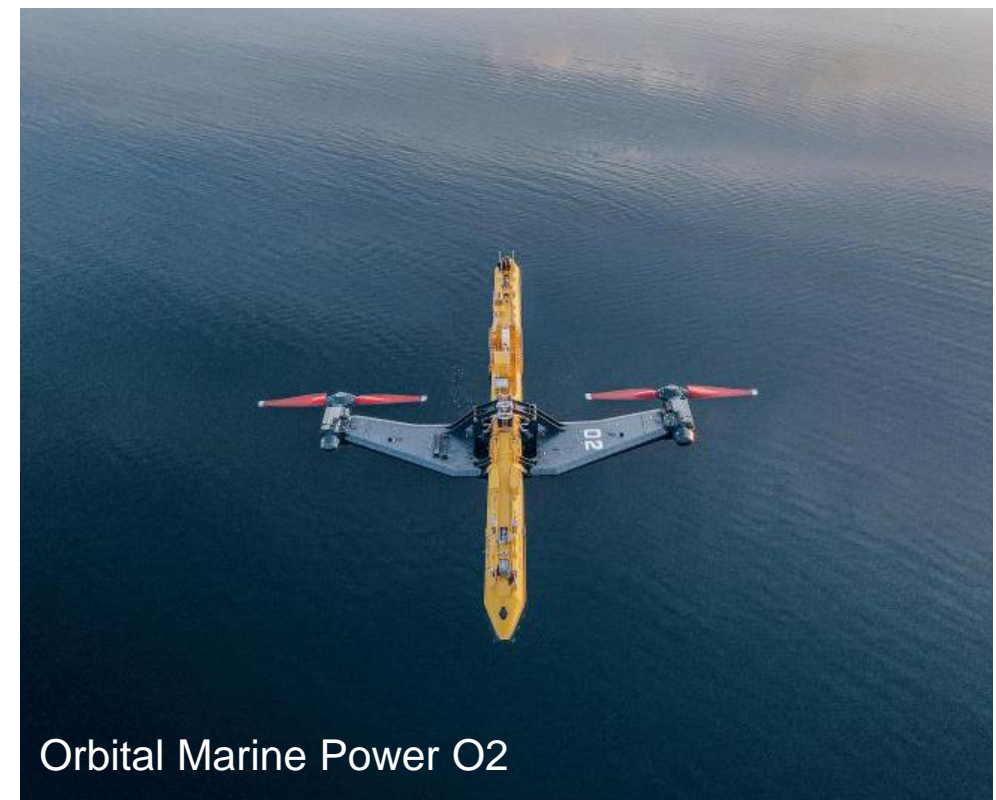
Objectives of Today's Webinar



1. Share tools and resources to aid planning for environmental effects of marine renewable energy (MRE)
2. Engage the MRE community to increase collaboration, share knowledge, and bolster understanding of environmental effects of MRE

Today's Webinar

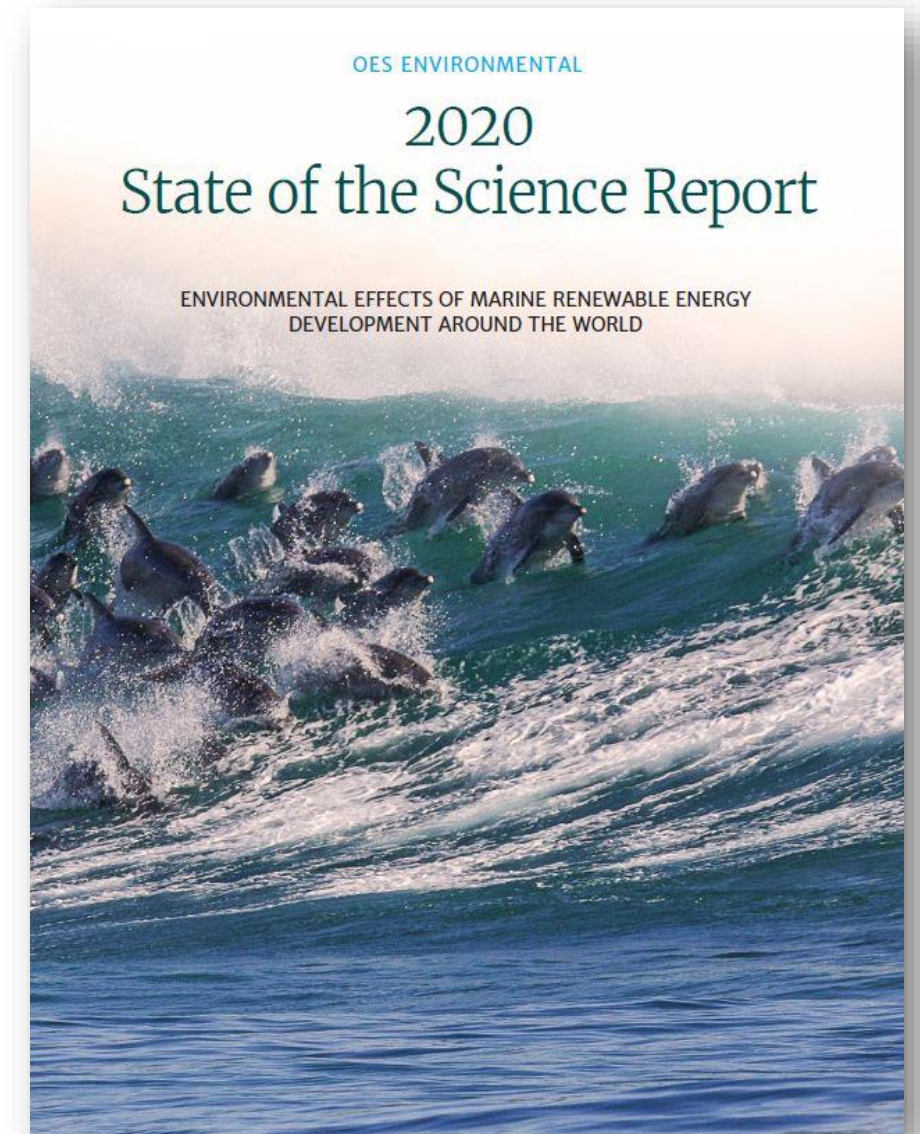
- Management Measures Tool for MRE
 - Presented by Mikaela Freeman (OES-Environmental, Pacific Northwest National Laboratory, USA)
- WEC-ERA Tool
 - Presented by Ibon Galparsoro (AZTI, Spain)
- Marine Energy Environmental Toolkit for Permitting and Licensing
 - Presented by Zach Barr (Kearns & West, USA)



OES-Environmental

<https://tethys.pnnl.gov/about-oes-environmental>

- Established by the IEA-Ocean Energy Systems in 2010
- Examines environmental effects of MRE development to advance the industry in a responsible manner
- Led by the US DOE Water Power Technologies Office and implemented by Pacific Northwest National Laboratory
- 16 member countries





<https://tethys.pnnl.gov/>

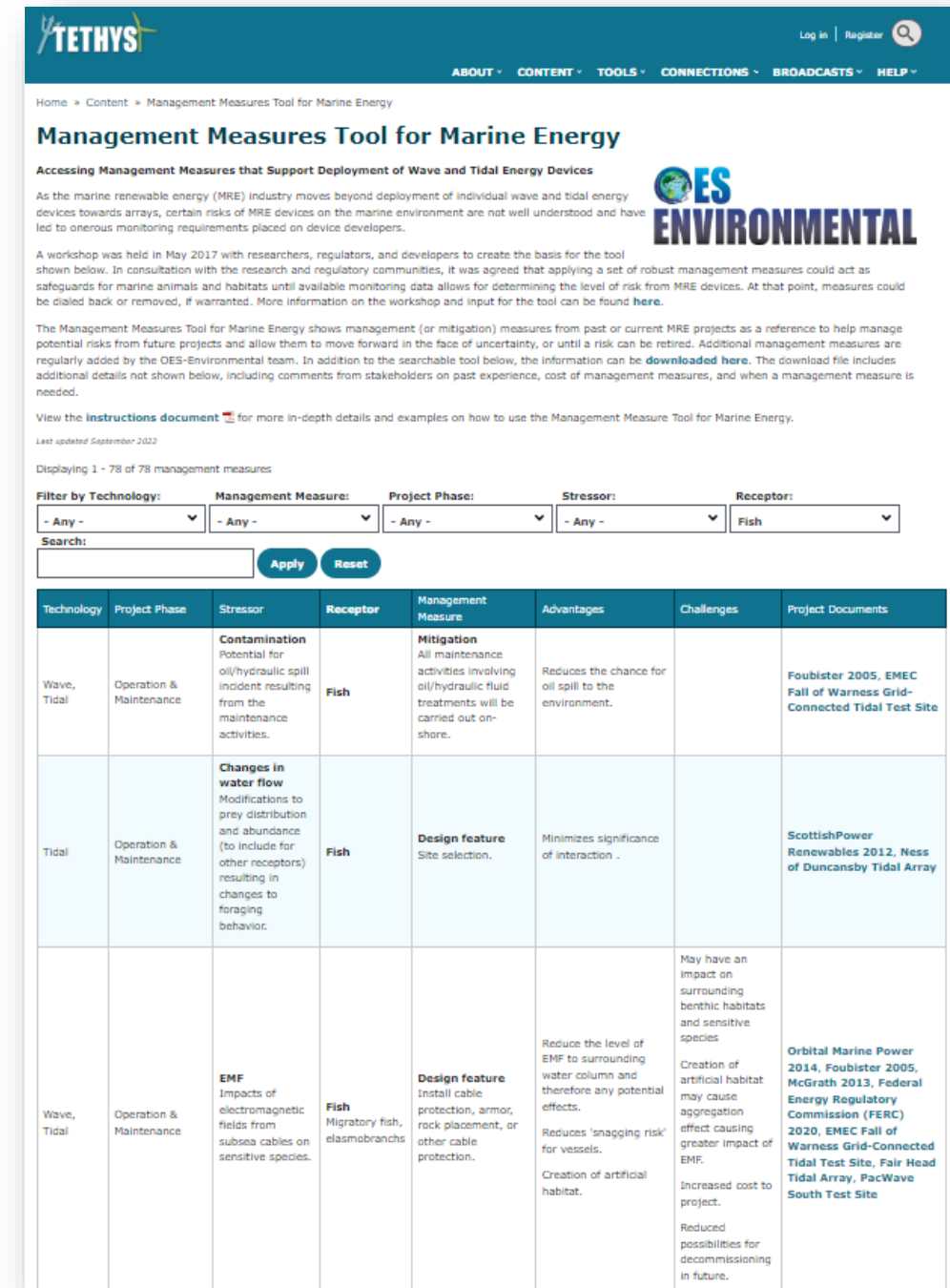
- Online Knowledge Base, marine and wind energy
- Hosts almost 4,000 marine energy documents
- Additional content, tools, and resources
 - Webinars,
 - OES-Environmental Metadata,
 - Risk retirement resources,
 - MRE Educational Resources,
 - *Tethys* Blasts, etc.

The screenshot shows the TETHYS website homepage. At the top, there is a navigation bar with links for ABOUT, CONTENT, TOOLS, CONNECTIONS, BROADCASTS, and HELP. The main header features the TETHYS logo and the tagline "Environmental Effects of Wind and Marine Renewable Energy". A prominent announcement box states: "OES-Environmental recently published a new Video Series on the environmental effects of marine energy! View all of our educational resources here!". Below the header, there are four main content cards: "MARINE ENERGY" (Generating electricity from the sea), "WIND ENERGY" (Generating electricity from wind on land and at sea), "OES-ENVIRONMENTAL" (Addressing environmental effects of marine energy internationally), and "WREN" (Resolving conflicts between wind and wildlife internationally). On the right side, there are sections for "GET STARTED" (If you are new to Tethys, start here to learn more.), "KNOWLEDGE BASE" (Access thousands of publications and more, all in a searchable database.), a calendar for "Jan 2023" with various events listed, and a "Recent Tethys Story" section titled "Developing Non-lethal Survey Methods for Marine Species and Habitat in Wind Farm Lease Areas".

Management Measures Tool

<https://tethys.pnnl.gov/management-measures>

- Online tool that collates management measures that have been implemented for current and previous MRE projects
- Search, filter, download information
- Updated in 2022



The screenshot shows the TETHYS Management Measures Tool for Marine Energy interface. It includes a navigation menu, a search bar, and a table of management measures. The table has columns for Technology, Project Phase, Stressor, Receptor, Management Measure, Advantages, Challenges, and Project Documents.

Technology	Project Phase	Stressor	Receptor	Management Measure	Advantages	Challenges	Project Documents
Wave, Tidal	Operation & Maintenance	Contamination Potential for oil/hydraulic spill incident resulting from the maintenance activities.	Fish	Mitigation All maintenance activities involving oil/hydraulic fluid treatments will be carried out on-shore.	Reduces the chance for oil spill to the environment.		Foublistler 2005, EMEC Fall of Warness Grid-Connected Tidal Test Site
Tidal	Operation & Maintenance	Changes in water flow Modifications to prey distribution and abundance (to include for other receptors) resulting in changes to foraging behavior.	Fish	Design feature Site selection.	Minimizes significance of interaction .		ScottishPower Renewables 2012, Ness of Duncansby Tidal Array
Wave, Tidal	Operation & Maintenance	EMF Impacts of electromagnetic fields from subsea cables on sensitive species.	Fish Migratory fish, elasmobranchs	Design feature Install cable protection, armor, rock placement, or other cable protection.	Reduce the level of EMF to surrounding water column and therefore any potential effects. Reduces 'snagging risk' for vessels. Creation of artificial habitat.	May have an impact on surrounding benthic habitats and sensitive species Creation of artificial habitat may cause aggregation effect causing greater impact of EMF. Increased cost to project. Reduced possibilities for decommissioning in future.	Orbital Marine Power 2014, Foublistler 2005, McGrath 2013, Federal Energy Regulatory Commission (FERC) 2020, EMEC Fall of Warness Grid-Connected Tidal Test Site, Fair Head Tidal Array, PacWave South Test Site

Background

- Certain environmental risks from MRE devices not well understood
 - Led to onerous monitoring requirements
- To safeguard animals and habitats:



- Management Measures Tool provides a reference to help manage potential risk from future projects
 - Help projects to move forward in the face of uncertainty, or until a risk can be retired

Management Measures Tool for Marine Energy

Accessing Management Measures that Support Deployment of Wave and Tidal Energy Devices

As the marine renewable energy (MRE) industry moves beyond deployment of individual wave and tidal energy devices towards arrays, certain risks of MRE devices on the marine environment are not well understood and have led to onerous monitoring requirements placed on device developers.

A workshop was held in May 2017 with researchers, regulators, and developers to create the basis for the tool shown below. In consultation with the research and regulatory communities, it was agreed that applying a set of robust management measures could act as safeguards for marine animals and habitats until available monitoring data allows for determining the level of risk from MRE devices. At that point, measures could be dialed back or removed, if warranted. More information on the workshop and input for the tool can be found [here](#).

The Management Measures Tool for Marine Energy shows management (or mitigation) measures from past or current MRE projects as a reference to help manage potential risks from future projects and allow them to move forward in the face of uncertainty, or until a risk can be retired. Additional management measures are regularly added by the OES-Environmental team. In addition to the searchable tool below, the information can be [downloaded here](#). The download file includes additional details not shown below, including comments from stakeholders on past experience, cost of management measures, and when a management measure is needed.

View the [instructions document](#) for more in-depth details and examples on how to use the Management Measure Tool for Marine Energy.

Last updated September 2022

Displaying 1 - 78 of 78 management measures

Filter by Technology:
Management Measure:
Project Phase:
Stressor:
Receptor:

Search:

Technology	Project Phase	Stressor	Receptor	Management Measure	Advantages	Challenges	Project Documents
Wave, Tidal	Operation & Maintenance	Contamination Potential for oil/hydraulic spill incident resulting from the maintenance activities.	Fish	Mitigation All maintenance activities involving oil/hydraulic fluid treatments will be carried out on-shore.	Reduces the chance for oil spill to the environment.		Foubister 2005, EMEC Fall of Warness Grid-Connected Tidal Test Site
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Management Measures Tool

Filter by Technology: - Any - |
 Management Measure: Design feature |
 Project Phase: - Any - |
 Stressor: EMF |
 Receptor: - Any -

Search:
Apply Reset

Type of device

Technology	Project Phase	Stressor	Receptor	Management Measure	Advantages	Challenges	Project Documents
Wave, Tidal	Operation & Maintenance	EMF Impacts of electromagnetic fields from subsea cables on sensitive species.	Fish Migratory fish, elasmobranchs	Design feature Install cable protection, armor, rock placement, or other cable protection.	Reduce the level of EMF to surrounding water column and therefore any potential effects. Reduces 'snagging risk' for vessels. Creation of artificial habitat.	May have an impact on surrounding benthic habitats and sensitive species Creation of artificial habitat may cause aggregation effect causing greater impact of EMF. Increased cost to project. Reduced possibilities for decommissioning in future.	Orbital Marine Power 2014 , Foubister 2005 , McGrath 2013 , Federal Energy Regulatory Commission (FERC) 2020 , EMEC Fall of Warness Grid-Connected Tidal Test Site , Fair Head Tidal Array , PacWave South Test Site

Management Measures Tool

Filter by Technology: Management Measure: Project Phase: Stressor: Receptor:

Search:

Technology	Project Phase	Stressor	Receptor	Management Measure	Advantages	Challenges	Project Documents
	Operation & Maintenance	EMF Impacts of electromagnetic fields from subsea cables on sensitive species.	Fish Migratory fish, elasmobranchs	Design feature Install cable protection, armor, rock placement, or other cable protection.	Reduce the level of EMF to surrounding water column and therefore any potential effects. Reduces 'snagging risk' for vessels. Creation of artificial habitat.	May have an impact on surrounding benthic habitats and sensitive species Creation of artificial habitat may cause aggregation effect causing greater impact of EMF. Increased cost to project. Reduced possibilities for decommissioning in future.	Orbital Marine Power 2014, Foubister 2005, McGrath 2013, Federal Energy Regulatory Commission (FERC) 2020, EMEC Fall of Warness Grid-Connected Tidal Test Site, Fair Head Tidal Array, PacWave South Test Site

Phase in which the management measures occurs:

- Installation
- Operation & maintenance
- Decommissioning

Management Measures Tool

Filter by Technology: Management Measure: Project Phase: Stressor: Receptor:

Search:

Technology	Project Phase	Stressor	Receptor	Management Measure	Advantages	Challenges	Project Documents
		EMF Impacts of electromagnetic fields from subsea cables on sensitive species.	Fish Migratory fish, elasmobranchs	Reduce the level of	water	May have an impact on surrounding benthic habitats and sensitive species Creation of artificial habitat may cause aggregation effect causing greater impact of EMF. Increased cost to project. Reduced possibilities for decommissioning in future.	Orbital Marine Power 2014, Foubister 2005, McGrath 2013, Federal Energy Regulatory Commission (FERC) 2020, EMEC Fall of Warness Grid-Connected Tidal Test Site, Fair Head Tidal Array, PacWave South Test Site

Parts of a device, result of device's functioning, or interaction with the device that may cause harm or stress

Marine animals, habitats, and ecosystem processes that may be affected by stressors

Management Measures Tool

Filter by Technology: - Any - |
 Management Measure: Design feature |
 Project Phase: - Any - |
 Stressor: EMF |
 Receptor: - Any -

Search:
Apply Reset

Technology	Project Phase	Stressor	Receptor	Management Measure	Advantages	Challenges	Project Documents
Wave, Tidal	Operation & Maintenance			Design feature Install cable protection, armor, rock placement, or other cable protection.	Reduce the level of EMF to surrounding water column and therefore any potential effects. Reduces 'snagging risk' for vessels. Creation of artificial habitat.	May have an impact on surrounding benthic habitats and sensitive species Creation of artificial habitat may cause aggregation effect causing greater impact of EMF. Increased cost to project. Reduced possibilities for decommissioning in future.	Orbital Marine Power 2014, Foubister 2005, McGrath 2013, Federal Energy Regulatory Commission (FERC) 2020, EMEC Fall of Warness Grid-Connected Tidal Test Site, Fair Head Tidal Array, PacWave South Test Site

Measure taken to minimize risk, categorized by:

- Compliance
- Design feature
- Mitigation
- Monitoring

Management Measures Tool

Filter by Technology: Management Measure: Project Phase: Stressor: Receptor:

Search:

Technology	Project Phase	Stressor	Receptor	Management Measure	Advantages	Challenges	Project Documents
Wave, Tidal	Operation & Maintenance	EMF Impacts of electromagnetic fields from subsea cables on sensitive species.			Reduce the level of EMF to surrounding water column and therefore any potential effects. Reduces 'snagging risk' for vessels. Creation of artificial habitat.	May have an impact on surrounding benthic habitats and sensitive species Creation of artificial habitat may cause aggregation effect causing greater impact of EMF. Increased cost to project. Reduced possibilities for decommissioning in future.	Orbital Marine Power 2014, Foubister 2005, McGrath 2013, Federal Energy Regulatory Commission (FERC) 2020, EMEC Fall of Warness Grid-Connected Tidal Test Site, Fair Head Tidal Array, PacWave South Test Site

Description of any changes that may occur in response to the measure or advantages/challenges to implement measure

Management Measures Tool



Filter by Technology: - Any -
 Management Measure: Design feature
 Project Phase: - Any -
 Stressor: EMF
 Receptor: - Any -

Search:
Apply Reset

Technology	Project Phase	Stressor	Receptor	Management Measure	Advantages	Challenges	Project Documents
Wave, Tidal	Operation & Maintenance	EMF Impacts of electromagnetic fields from subsea cables on sensitive species.	Fish Migratory fish, elasmobranchs	Design Install c protectio rock pla other ca protectio	Reduce the level of	May have an impact on surrounding benthic habitats and sensitive species.	Orbital Marine Power 2014, Foubister 2005, McGrath 2013, Federal Energy Regulatory Commission (FERC) 2020, EMEC Fall of Warness Grid-Connected Tidal Test Site, Fair Head Tidal Array, PacWave South Test Site

Reference documents with additional details on measure, which may include:

- Environmental impact assessments
- Licensing documents
- Monitoring reports
- OES-Environmental project metadata forms, etc.

Online Demonstration of Tool

<https://tethys.pnnl.gov/management-measures>



Collision risk example

Displaying 1 - 29 of 29 management measures

Filter by Technology: Tidal
Management Measure: - Any -
Project Phase: - Any -
Stressor: Collision risk
Receptor: - Any -

Search:

Technology	Project Phase	Stressor	Receptor	Management Measure	Advantages	Challenges	Project Documents
Tidal	Operation & Maintenance	Collision risk Potential for collision with turbine blades.	Marine Mammals	Mitigation, Monitoring, Design feature Install a 'detect and shut-down' system using active sonar and other appropriate monitoring equipment (e.g., Marine Mammal Detections Sonar System [MMDS]).	Could reduce/remove risk of collision with moving blades and enable a route through the consenting process, particularly at high sensitivity locations.	<p>Could affect power production, is expensive to implement, and does not help reduce scientific uncertainty regarding the risk.</p> <p>Uncertainty around effects of sonar on sensitive species.</p> <p>Not certain how often 'shut-downs' would be required.</p> <p>...Read more</p>	<p>Harrison et al. 2015, Orbital Marine Power 2010, European Marine Energy Centre (EMEC) 2014, Keenan et al. 2011, Davison and Mallows 2005, Xodus Group 2019, Royal Haskoning and Sea Generation (Kyle Rhea) Ltd. 2013, Aquamarine Power Ltd 2011, Minesto 2016, Magallanes Renovables 2020, Churchill Barriers - Wave Overtopping and Tidal Flow Energy Capture, Pelamis Wave Power P2 Demonstration at EMEC, EMEC Fall of Warness Grid-Connected Tidal Test Site, Strangford Lough - MCT (SeaGen), Strangford Lough - MCT (SeaGen), EMEC Billia Croo Grid-Connected Wave Test Site, Kyle Rhea Tidal Stream Array Project, Oyster 800 at EMEC</p>

← Relevant documents

← OES-Environmental metadata forms

Questions and Discussion



Please fill out our 3-minute survey!

<https://www.surveymonkey.com/r/VZ38YLP>

Thank you!

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