OES-Environmental & Tethys: Helping the Marine Energy Community Understand Environmental Effects

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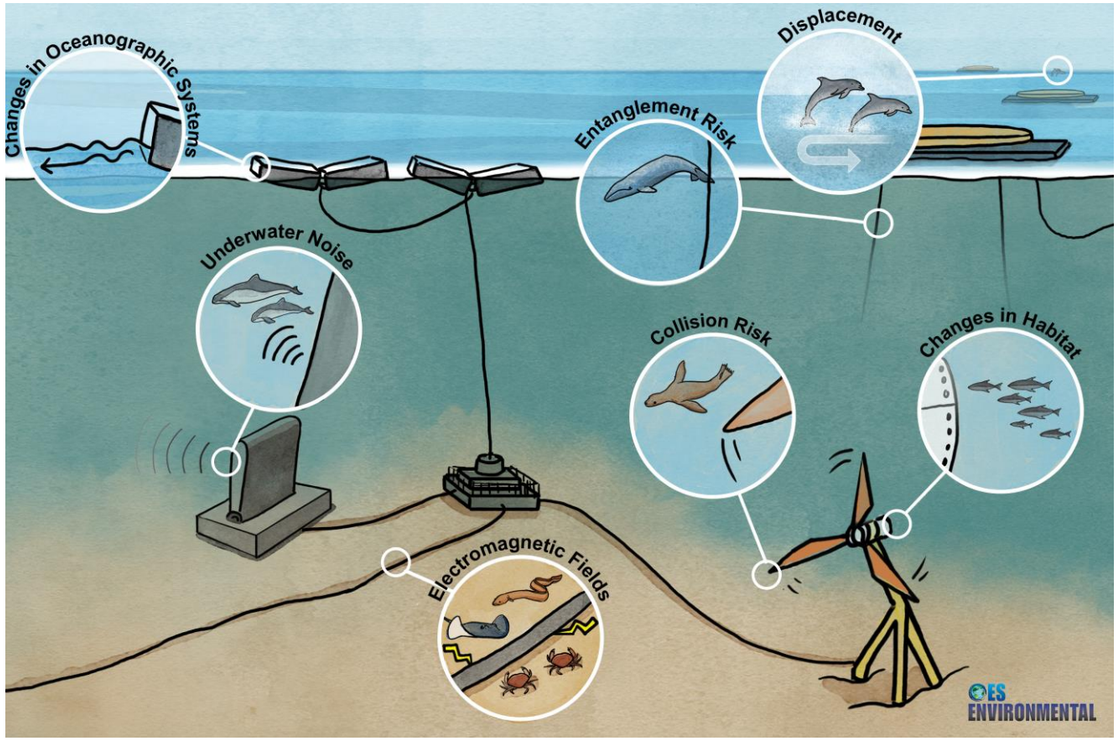
Why study environmental effects of marine energy?

Challenges for the marine energy industry:

- Uncertainty or limited knowledge on environmental effects
- New technologies, unknown potential for harm
- Regulatory processes not well established
- Long permitting timelines



➢ Major barriers for getting projects in the water!

OES-Environmental

- Established by the International Energy Agency-Ocean Energy Systems in 2010
- Examines environmental effects of marine energy development to advance the industry in a responsible manner
- Led by the U.S. Department of Energy Water Power Technologies Office and implemented by Pacific Northwest National Laboratory
- Phase 5 (2024-2028): 15 countries + European Commission

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

What can be done about environmental effects?

- **Need to decrease uncertainty and streamline permitting**

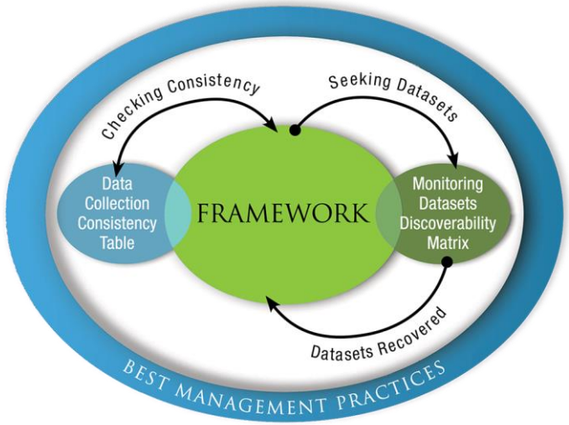
1. Develop processes for making environmental data available and regulatory-friendly
   - Risk Retirement
   - Data Transferability

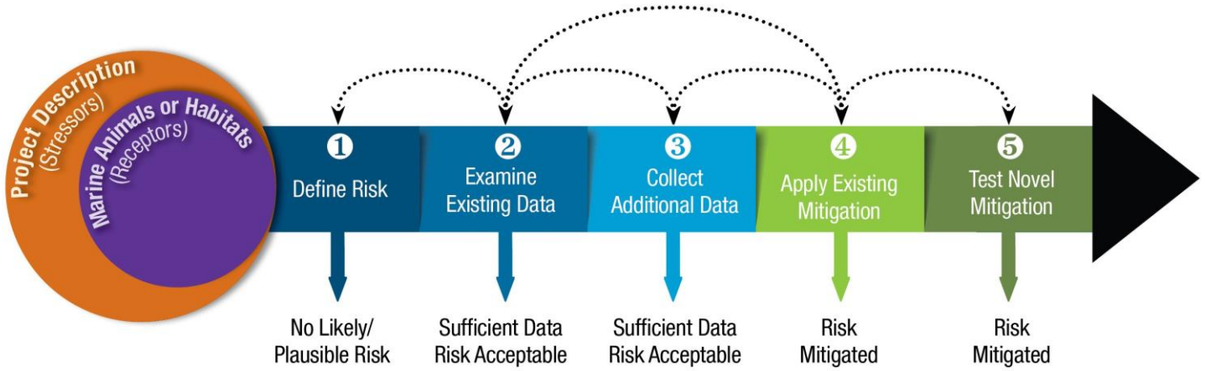
2. Make all available information publicly accessible
   - OES-Environmental 2024 State of the Science Report
   - Tethys: documents, webinars, Blast

3. Going further – new areas of research
   - Environmental acceptability
   - Off-grid effects
   - System-wide effects
   - Social and economic effects

Processes to Aid Permitting

- For certain stressor-receptor interactions, potential risks need not be fully investigated for every project (risk retirement)
- New marine energy projects informed by what is already known (data transferability)
- For use during permitting processes by regulators, advisors, developers, consultants
  - Guidance documents help make scientific information accessible for use
  - Best management practices provide actionable steps for implementing the risk retirement process





Information Publicly Accessible

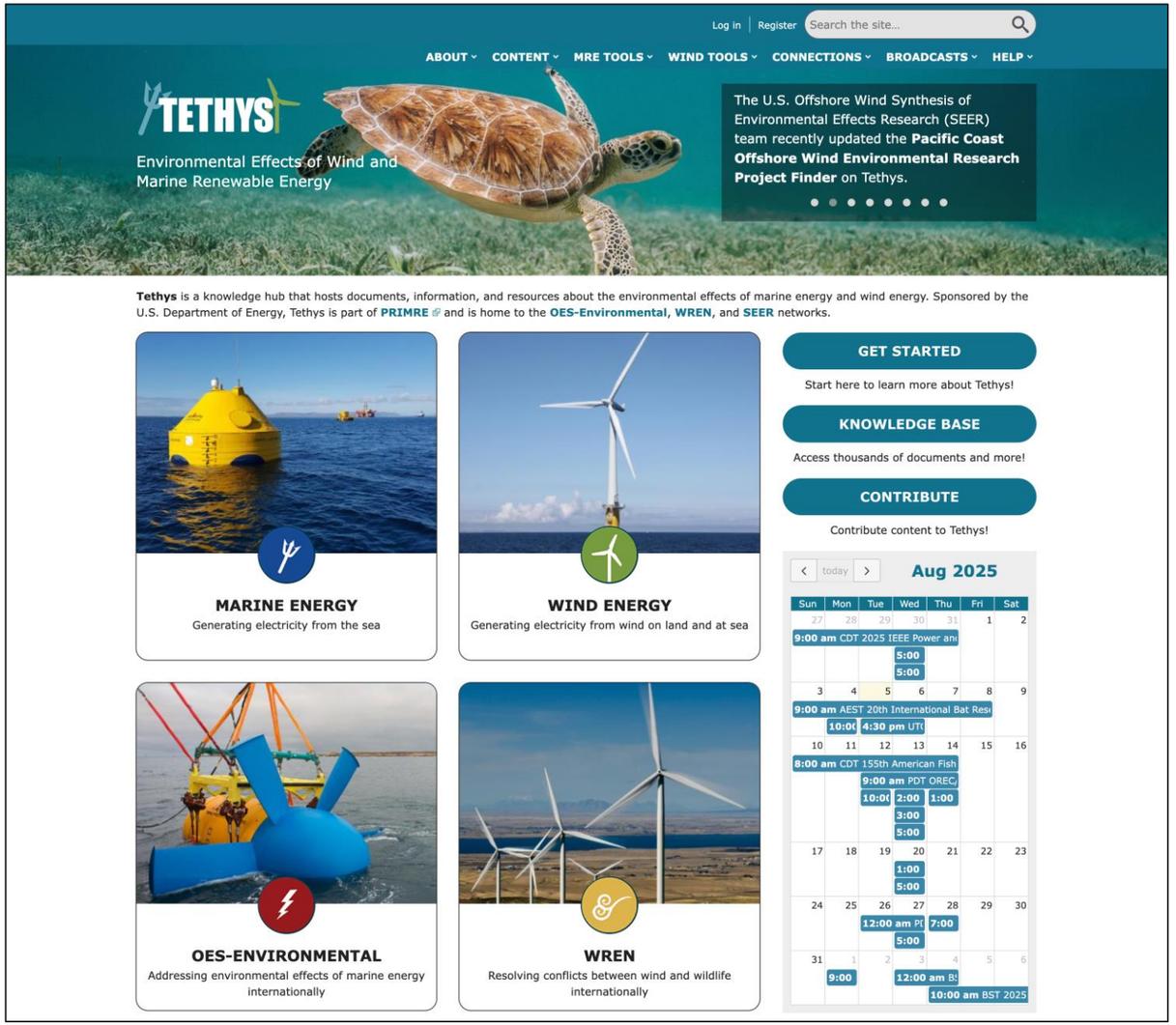
- Highlights the current state of knowledge on environmental effects of marine energy
  - Stressor-receptor interactions (Chapter 3)
  - Stakeholder engagement (Chapter 5)
  - Strategies to facilitate consenting (Chapter 6)
  - System-wide effects approach, like scaling up (Chapter 9)
  - And more!

- Access the full report and other resources:
  - Executive summary in 8 languages
  - Short science summaries
  - Overview webinar recording

https://tethys.pnnl.gov/2024-sos

Information Publicly Accessible

- Publicly available knowledge management system
- All OES-Environmental activities are documented on Tethys
- Over 4,000 documents on the environmental effects of marine energy
- Additional features:
  - Tethys Blast
  - Events Calendar
  - Archived Webinars
  - Summaries & Fact Sheets



https://tethys.pnnl.gov

Information Publicly Accessible

Other OES-Environmental resources on Tethys:

Evidence Bases

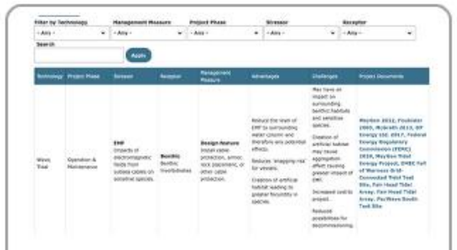
For key stressors, OES-Environmental has developed evidence bases (i.e., key research papers, monitoring reports) that inform risk retirement for small numbers of devices.

Guidance Documents

OES-Environmental has created a series of guidance documents that can be used to evaluate environmental, social, and economic effects within a general regulatory context.

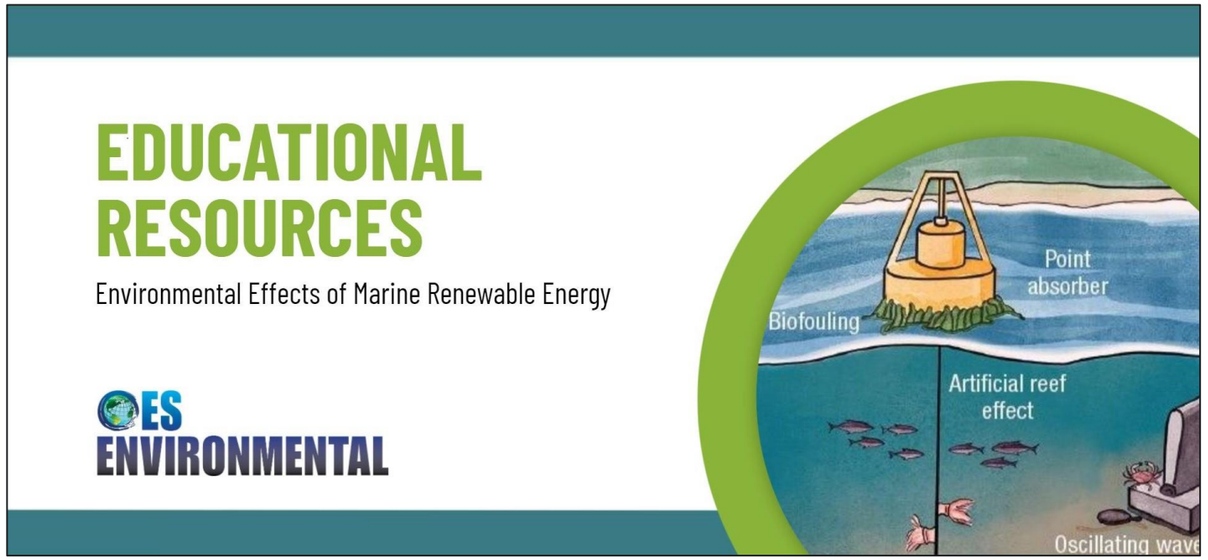
Monitoring Datasets Discoverability Matrix

The Matrix classifies monitoring datasets from already consented MRE projects for six stressors. The interactive tool allows users to discover and evaluate available datasets.

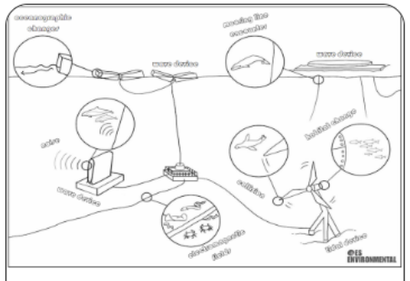


Management Measures Tool

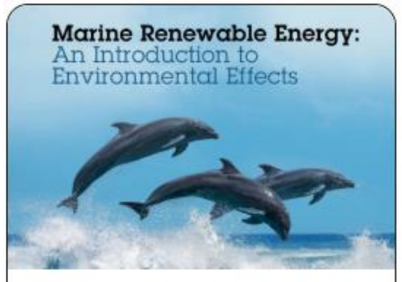
The Tool shows management (or mitigation) measures from past or current marine energy projects as a reference to help manage potential risks from future projects and help them move forward in the face of uncertainty.



Marine Energy Video Game



Marine Renewable Energy Coloring Book



Marine Renewable Energy Brochure

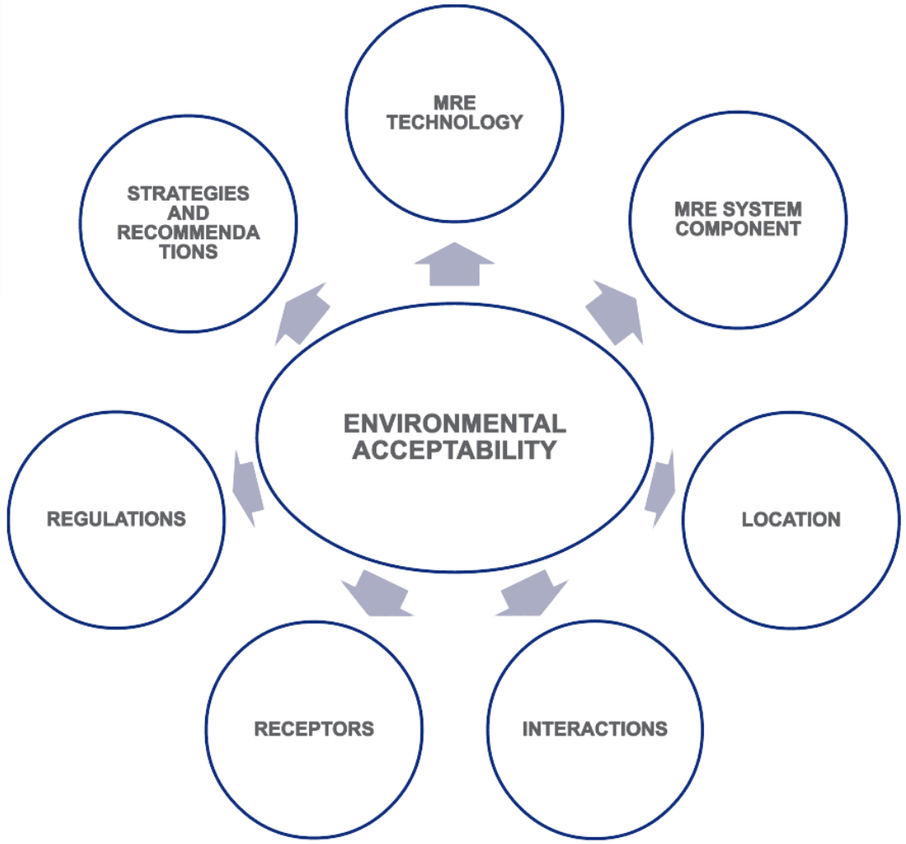
https://tethys.pnnl.gov/

New Areas of Research

❖ Environmental Acceptability

Proactive guidance that will allow for harnessing marine energy resources efficiently while limiting the risks to the environment (marine animals, habitats, ecosystems), assuring compliance with environmental regulations, and promoting benefits.

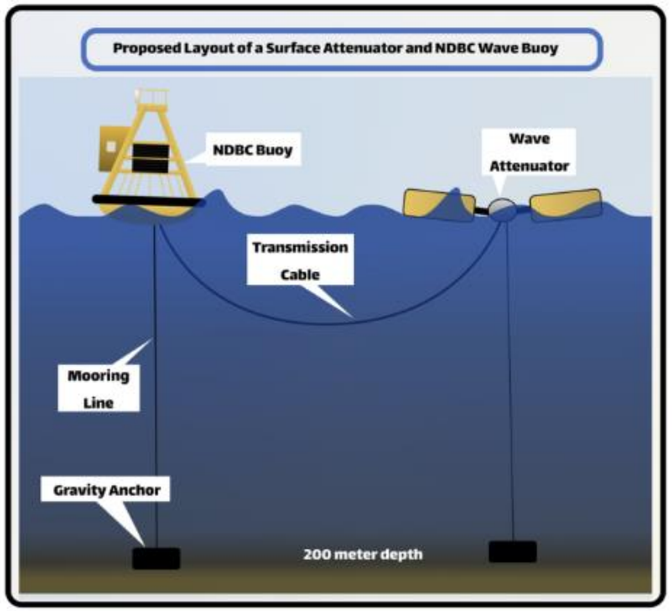
- Examine wave and tidal device types to understand specific environmental risks associated with each component
- Develop guidance for the environmental acceptability of marine energy devices
- Assess potential induced benefits

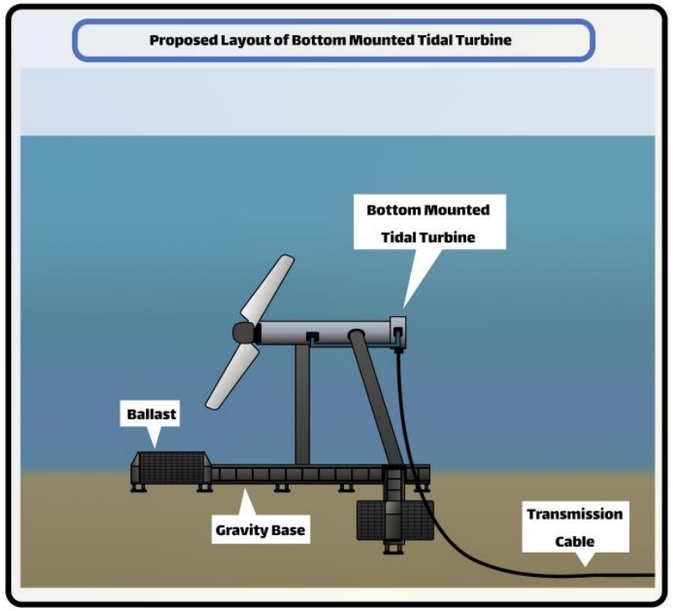


New Areas of Research

❖ Environmental Effects of Off-grid Applications

- Develop use cases for off-grid marine energy applications (i.e., power at sea, remote communities)
- Understand how environmental effects may differ from grid-scale applications
- Develop guidance on specific environmental monitoring needs, mitigation measures, and/or permitting





New Areas of Research

❖ System-wide Effects

- Understand how knowledge of potential environmental effects of marine energy might differ as arrays and larger projects develop in the coming year

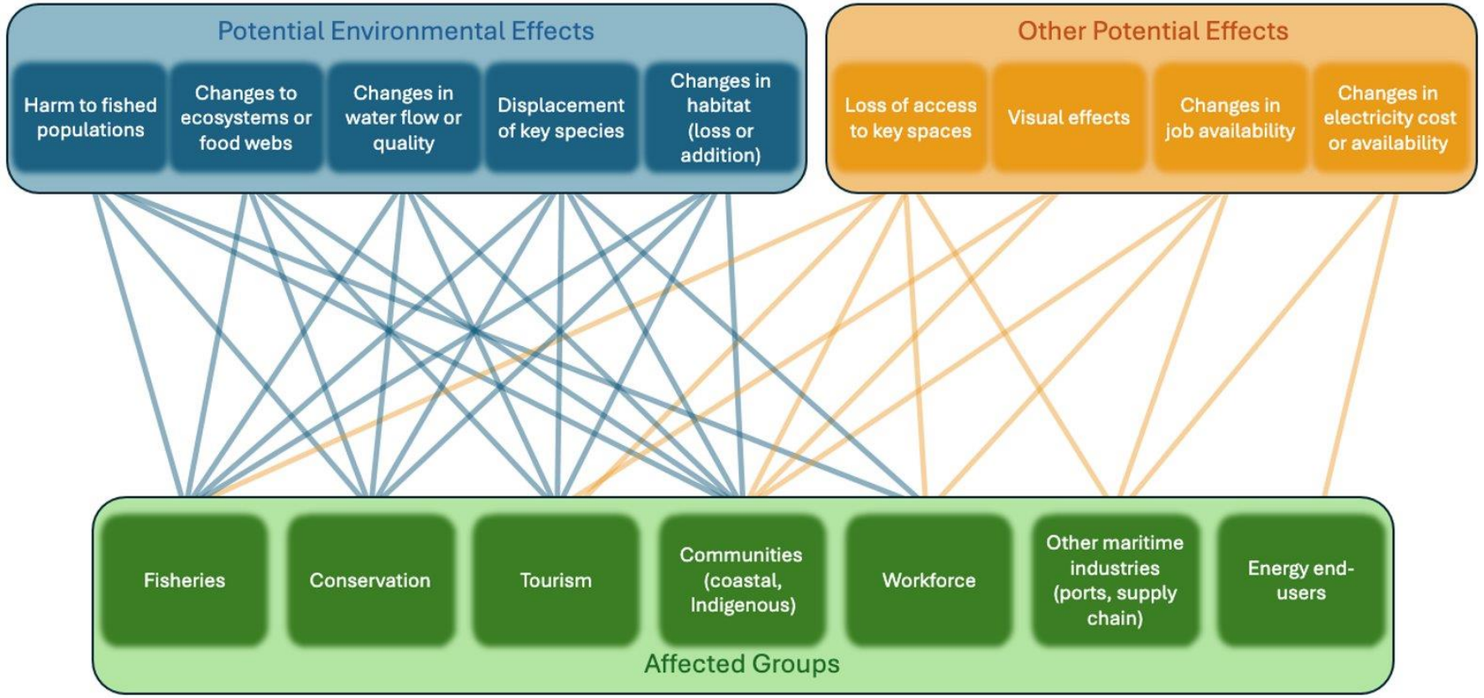
  - Topics:
    - Scaling up to arrays (Hasselman et al. 2023)
    - Ecosystem approach (Le Marchand et al. under review)
    - Cumulative effects
    - Tropical regions


CorPower Ocean

New Areas of Research

❖ Social and Economic Effects

- Coordinate an international working group to investigate the relationships between the environmental and socioeconomic effects of marine energy



What can you do?

- Stay informed:
  - Get familiar with risk retirement, data transferability
  - Tethys Blast https://tethys.pnnl.gov/subscribe-tethys
- Give access to your data/information collected around devices
  - Add your data and papers
- Collaborate with OES-Environmental on new and emerging issues
- Progressing the industry takes all parties:
  - Device and project developers
  - Researchers
  - Regulators and advisors
  - Students
  - Communities

Pacific Northwest
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Thank You!

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U.S. DEPARTMENT of ENERGY