



Data Transferability for Marine Renewable Energy: Monitoring Datasets Discoverability Matrix

Mikaela Freeman

Pacific Northwest National Laboratory



PNNL is operated by Battelle for the U.S. Department of Energy



Today's workshop

- Introductions
 - Purpose for the workshop
 - Introduction to the topics
- Data transferability process
- Monitoring Dataset Discoverability Matrix
- Next Steps



OES-Environmental

- International initiative under Ocean Energy Systems (OES)
- 15 countries currently participating:
 - Australia, Canada, China, Denmark, France, India, Ireland, Japan, Norway, Portugal, South Africa, Spain, Sweden, United Kingdom, United States
- Environmental effects of marine renewable energy (MRE)
- Major themes: data transferability and risk retirement



Environmental Effects of MRE

- Stressors:



Collision Risk



Underwater Noise



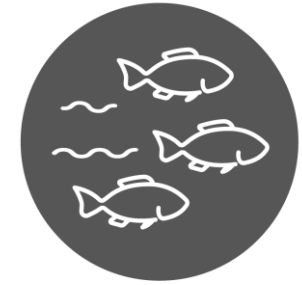
EMF



Habitat Changes



Physical Systems



Displacement

- Receptors:

- Marine animals
- Habitats
- Oceanographic conditions

Barriers to Consenting/Permitting

- MRE industry perceptions:
 - Long time to get projects in the water
 - Complex, extensive consenting requirements (baseline and post-installation)
- We perceive that the regulatory community:
 - Faces many challenges
 - ✓ Novel technologies
 - ✓ Uncertainty of environmental effects
 - Mandate to protect environment and uphold regulations
 - Key for getting devices deployed



OES-Environmental is working to bridge these gaps

Data Transferability

- **Data Transferability**

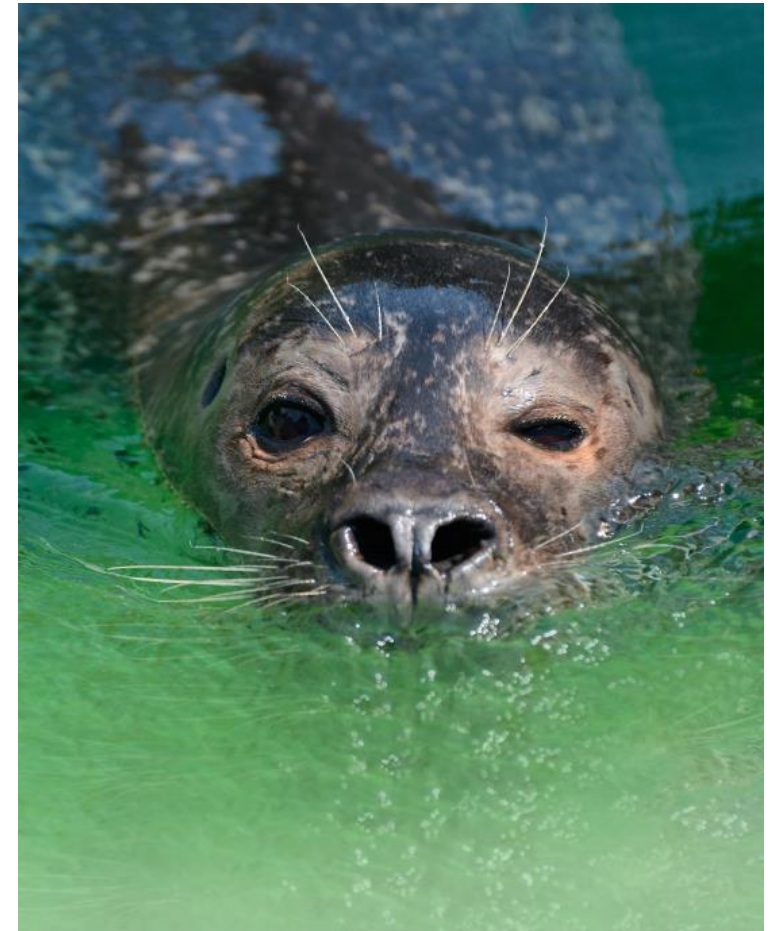
- Using data from an already consented MRE project or analogous industry to be “transferred” to inform potential environmental effects and consenting for a future MRE project
- Data that might be “transferred” need to be collected consistently for comparison

- By “**data**”, we mean

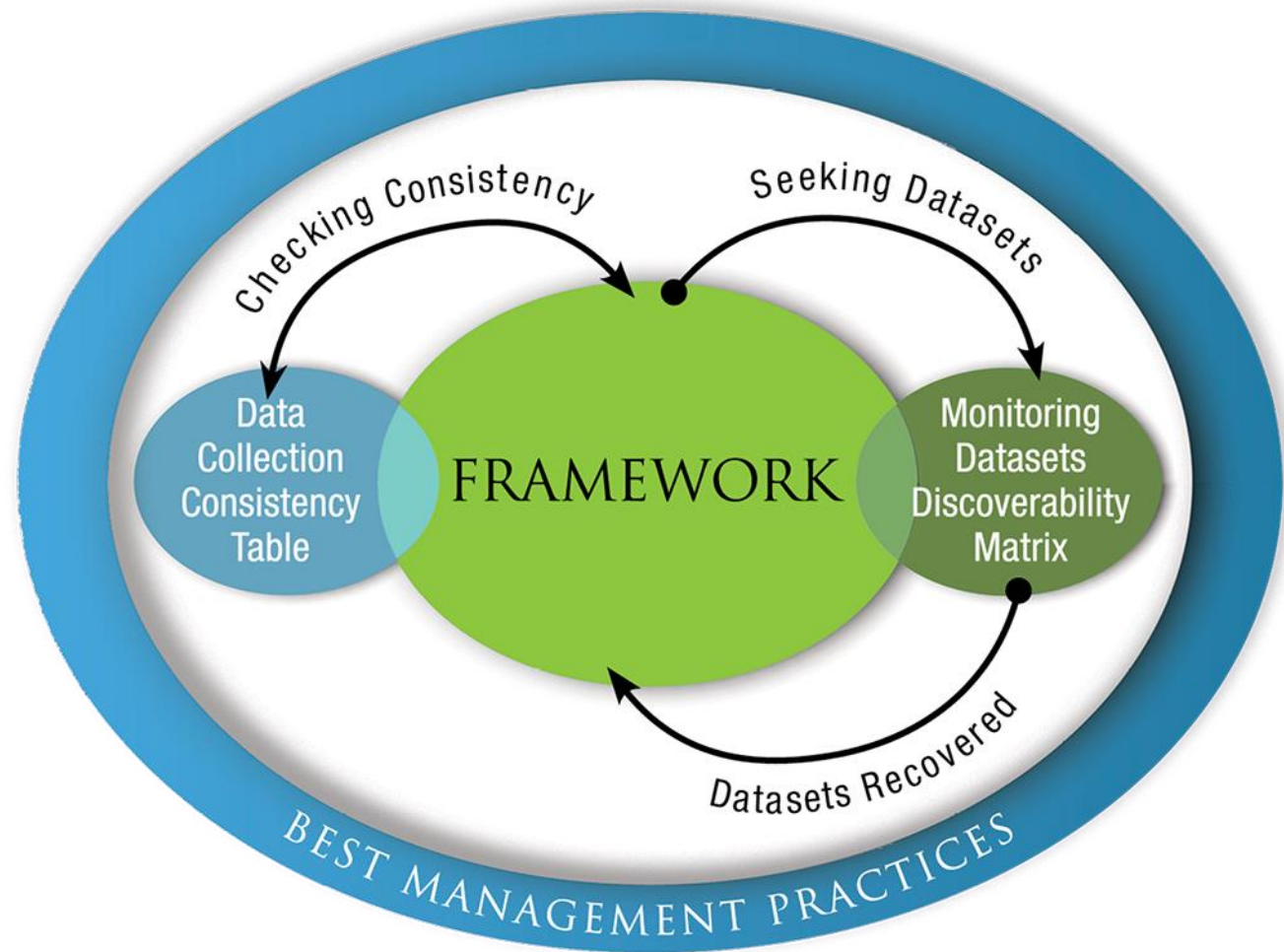
- Data and information

Could be raw or quality controlled data

More likely analyzed data and information, synthesized data to reach some conclusion, reports, etc.

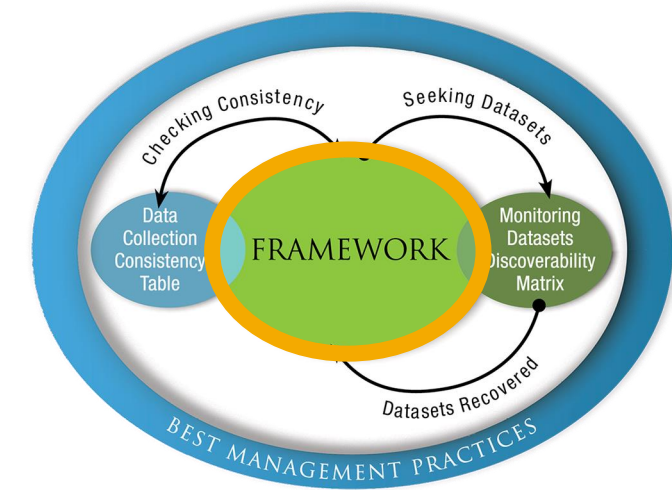


Data Transferability

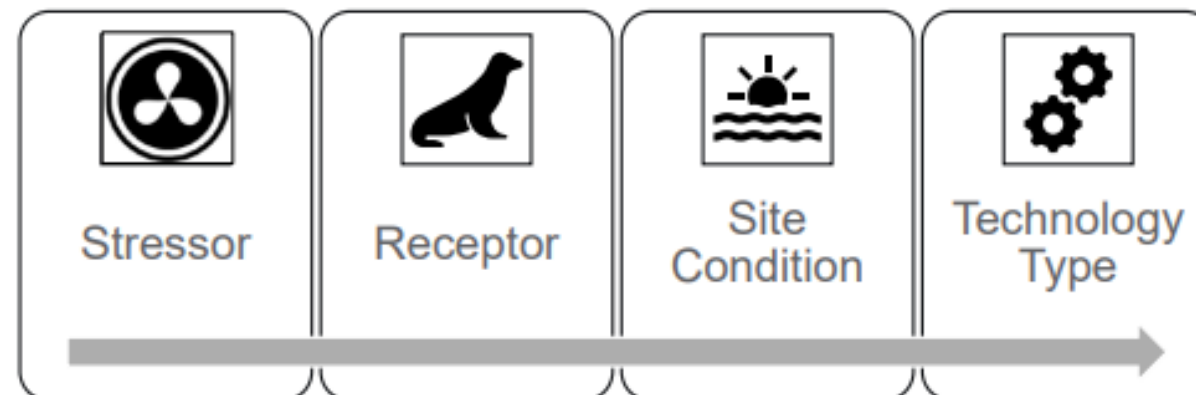


- Framework – classifies stressor/receptor relationships
- Data Collection Consistency Table – outlines parameters for comparison of data between projects
- **Monitoring Datasets Discoverability Matrix** – catalogues relevant datasets
- Best Management Practices – suggest four practices for implementation

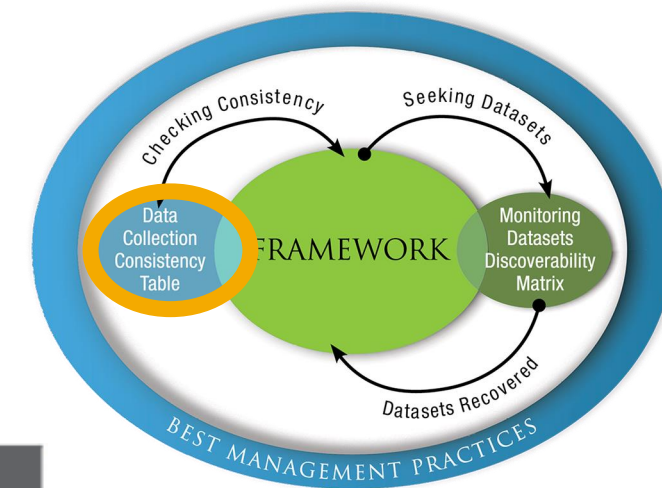
Framework



- Guides the process for data transfer
- Develops common understanding of data types and parameters
- Brings together datasets from already consented projects in an organized fashion
- Uses four variables to define an interaction
- Compares the applicability of each dataset for transfer

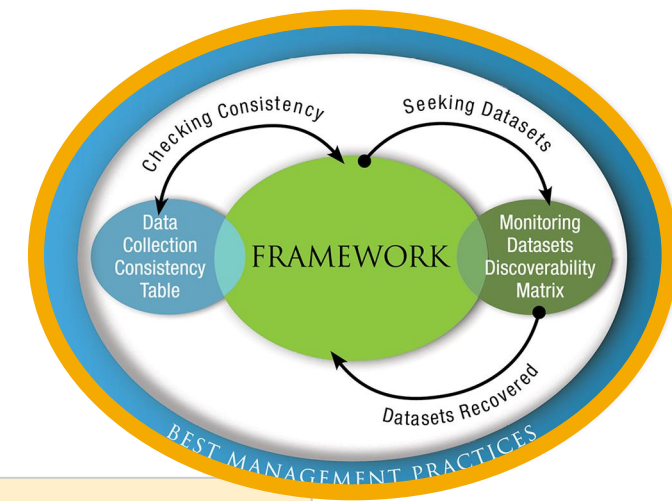


Data Collection Consistency



Stressor	Process or Measurement Tool	Reporting Unit	Analysis or Interpretation
Collision Risk	Sensors include: acoustic only, acoustic + video, Other	Number of visible targets in field of view, number of collisions	Number of collisions and/or close interactions of animals with turbines used to validate collision risk models.
Underwater Noise	Fixed or floating hydrophones	<ul style="list-style-type: none"> Amplitude dB re 1 μPa at 1 m Frequency: broadband or specific frequencies 	Sound outputs from MRE devices compared against regulatory action levels. Generally reported as broadband noise unless guidance exists for specific frequency ranges.
EMF	Source: Cable, other, shielded or unshielded	AC or DC, voltage, amplitude	Measured EMF levels used to validate existing EMF models around cables and other energized sources.
Habitat Change	<ul style="list-style-type: none"> Underwater mapping with: sonar, video Habitat characterization from: mapping, existing maps 	Area of habitat altered, specific for each habitat type	Compare potential changes in habitat to maps of rare and important habitats to determine if they are likely to be harmed.
Changes in Physical Systems	Numerical modeling, with or without field data validation	No units. Indication of data sets used for validation, if any	Data collected around arrays should be used to validate models.
Displacement/ Barrier Effect	Population estimates by: human observers, passive or active acoustic monitoring, video	Population estimates for species under special protection	Validation of population models, estimates of jeopardy, loss of species for vulnerable populations.

Best Management Practices



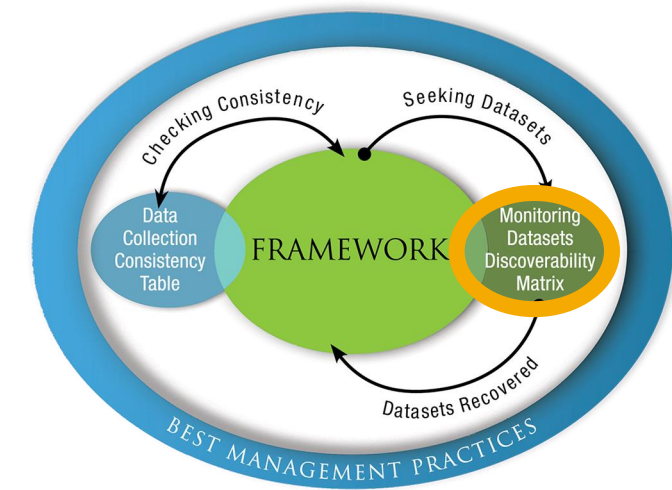
BMP 1: Meet the necessary minimum requirements to be considered for data transfer.

BMP 2: Determine likely datasets that meet data consistency needs and quality assurance requirements.

BMP 3: Use models in conjunction with and/or in place of datasets.

BMP 4: Provide context and perspective for datasets to be transferred.

Monitoring Datasets Discoverability Matrix



- The *Monitoring Datasets Discoverability Matrix* (Matrix) is an interactive tool to guide data transfer
 - Makes datasets from existing projects accessible for regulators, developers and MRE community to transfer data to future projects
- Categorized by the six stressors



Collision Risk



Underwater Noise



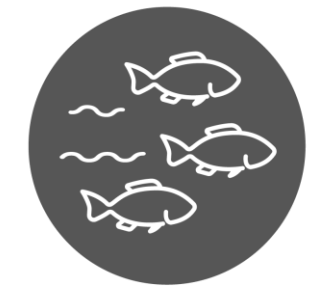
EMF



Habitat Changes



Physical Systems



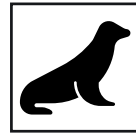
Displacement

How it Works

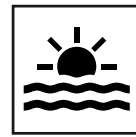
- Classifies existing monitoring datasets by defined characteristics:



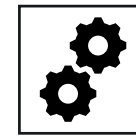
Stressor



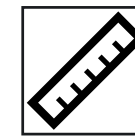
Receptor



Site
Conditions



Technology
Type



Project Size

- Datasets come from OES-Environmental metadata for MRE project sites and research studies
- The Matrix filters this information and allows users to sort through the stressors and characteristics to retrieve relevant datasets for future projects

Using the Matrix: Underwater Noise

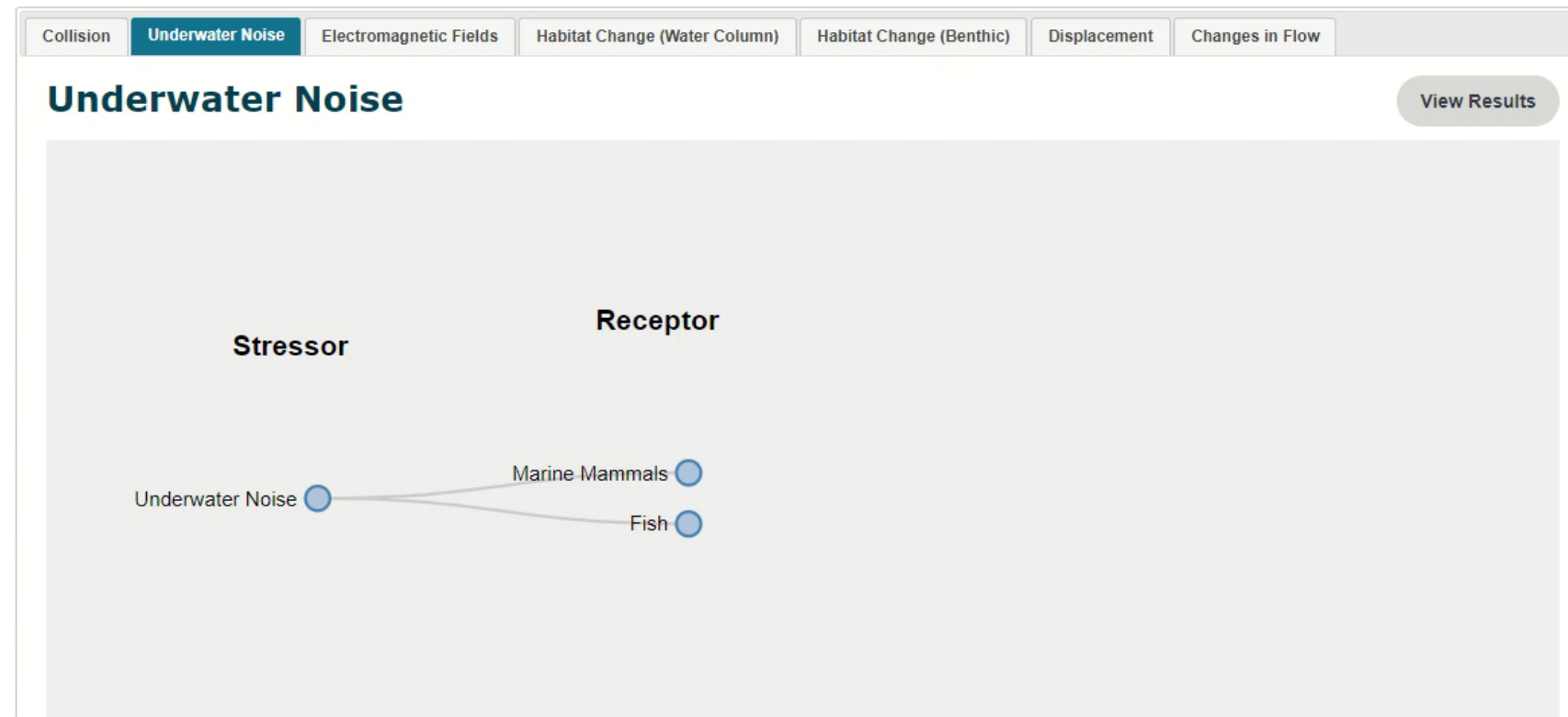
- Example: tidal turbine in a noisy environment; interested in the potential impacts of underwater noise on marine mammals



Monitoring Datasets Discoverability Matrix

The **Monitoring Datasets Discoverability Matrix** (Matrix) is an interactive tool that classifies monitoring datasets from already consented (or permitted) projects for six key environmental **stressors**. The goal of the Matrix is to allow regulators, developers, and the larger marine renewable energy community to easily discover datasets from already consented projects that can be used to aid consenting processes for future MRE projects (see [Data Transferability](#) page for more information).

You can find instructions on how to navigate the Matrix below.



Accessing the Matrix

Link:

<https://tethys.pnnl.gov/monitoring-datasets-discoverability-matrix>



Discussion and Feedback

- What are your thoughts on “data transferability”?
- Does the Matrix make sense?
- Could you make use of the Matrix for transferring data and consenting MRE projects?
- General feedback on the Matrix?

Next Steps

Please provide any additional feedback on the Matrix by **March 17th** to mikaela.freeman@pnnl.gov

OES-Environmental

- Matrix public webinar
- Guidance documents
 - To provide guidance on risk retirement in an accessible format for the entire evidence base that regulators can use
 - Developed for each stressor
 - Focus on risk retirement for single devices





Thank you!

Mikaela Freeman

Pacific Northwest National Laboratory
mikaela.freeman@pnnl.gov

Andrea Copping

Pacific Northwest National Laboratory
andrea.copping@pnnl.gov

