

Northwest National Marine Renewable Energy Center MHK Resesarch, Development & Testing Program

Belinda Batten

BOEM/NREL Offshore Renewable Energy
Workshop

30 July 2014



NNMREC Mission and Objectives

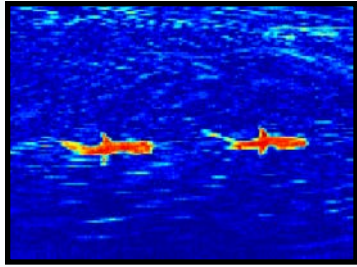
NNMREC's mission is to facilitate the development of marine energy technology, inform regulatory and policy decisions, and to close key gaps in scientific understanding with a focus on student growth and development.

NNMREC's Project Objectives:

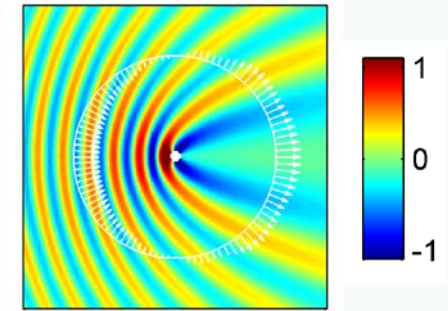
- Develop facilities to serve as integrated test Center for wave & tidal energy developers
- Evaluate potential environmental and ecosystem impacts
- Optimize devices and arrays
- Improve forecasting
- Increase reliability and survivability



Technical Approach



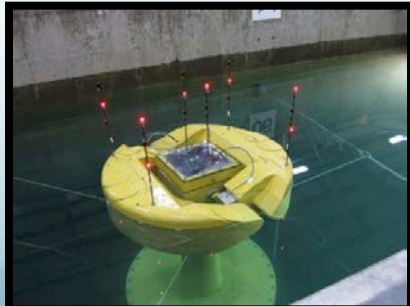
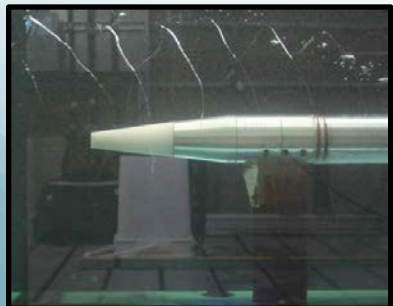
Field Studies



Numerical Modeling

Laboratory/Scale Model Tests

At-Sea Test Facilities



Research & Education

Technical

Testing / Demonstration

Wave Forecasting

Survivability / Reliability

Advanced Materials

Device / Array Optimization

Environmental

Sediment Transport

Marine Mammals

Benthic Ecosystems

EMF and Acoustics

Site Characterization

Social

Fisheries / Crabbing

Outreach / Engagement

Existing Ocean Users

Local / Oregon Economy

Field Testing

- Field test infrastructure:

- Concluded 4.5 years of data collection using the Sea Spider platform *without any loss of equipment*
- Developed prototype concept for the Adaptable Monitoring Package

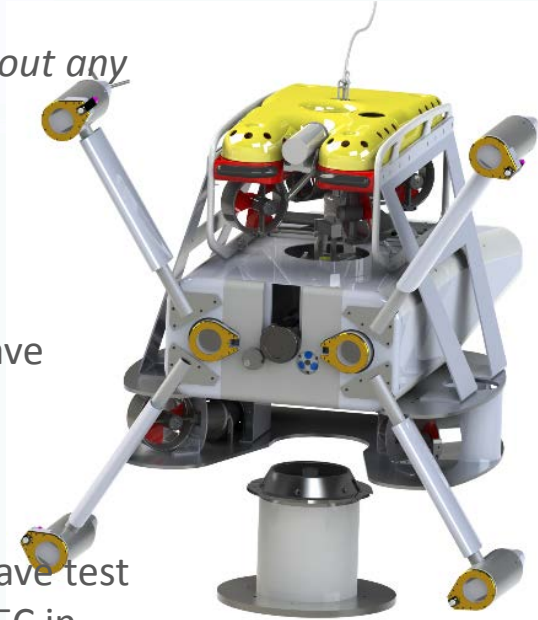
- Scaled testing:

- Tested WET-NZ, M3, new Columbia Power Technologies design in OSU wave tank; tested Shift Power in WESRF power electronics facility

- Intermediate open water testing:

- Developed Puget Sound and Lake Washington as an intermediate scale wave test site, with 3 years of data collection on Lake Washington; tested Oscilla WEC in Lake Washington

- Worked with NREL on testing protocol and instrumentation development processes



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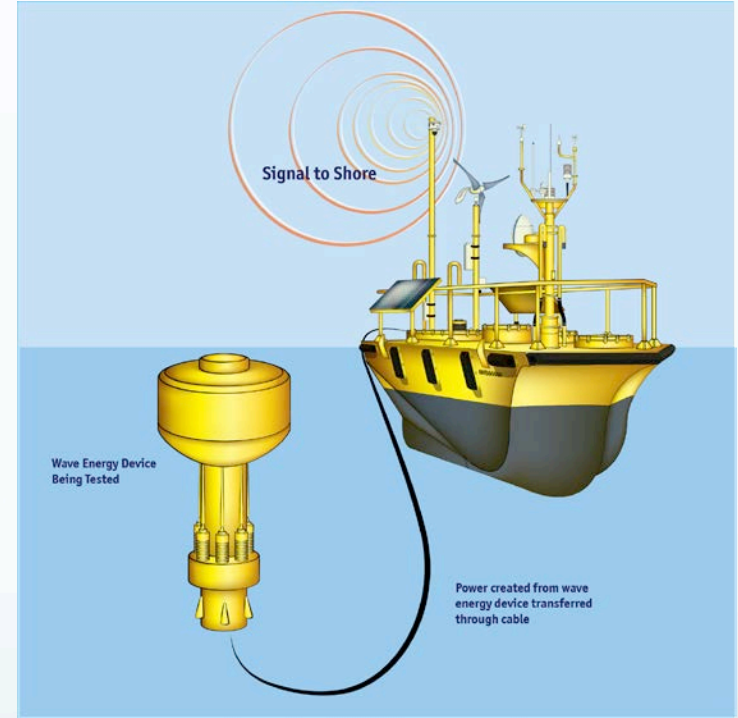
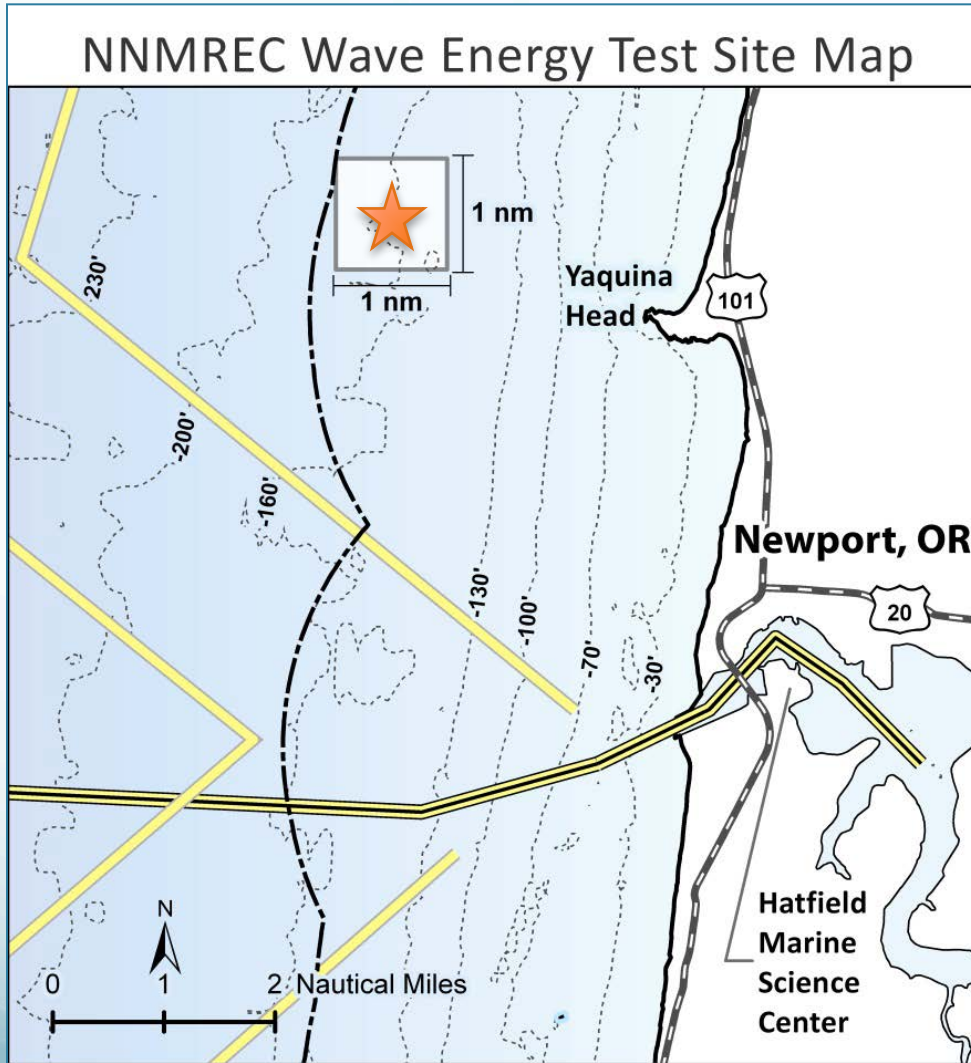
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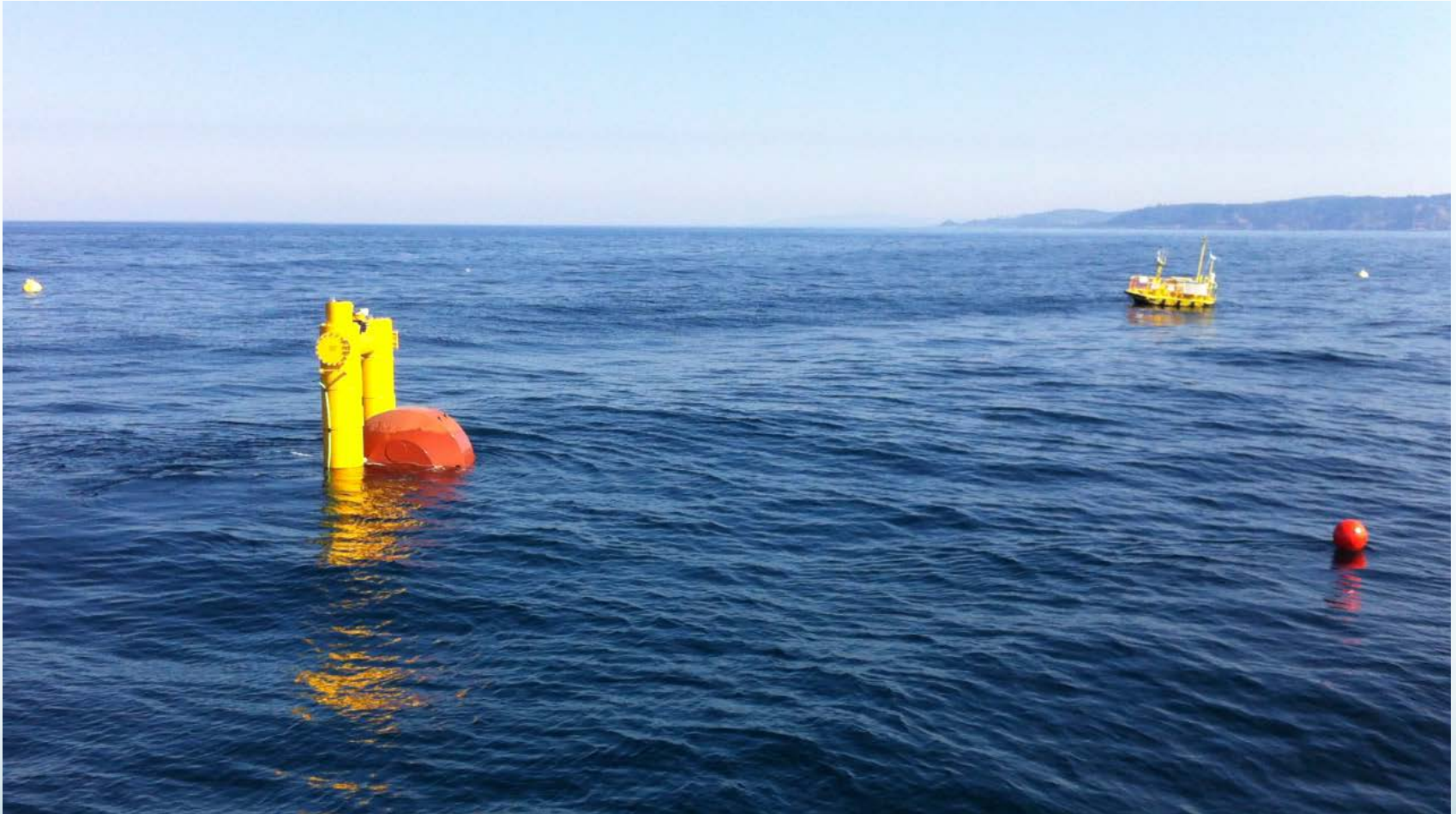
Pacific Marine Energy Center Testing



PMEC North Energy Test Site (NETS)



WET-NZ and Ocean Sentinel



Why a Grid-Connected Site in Oregon?

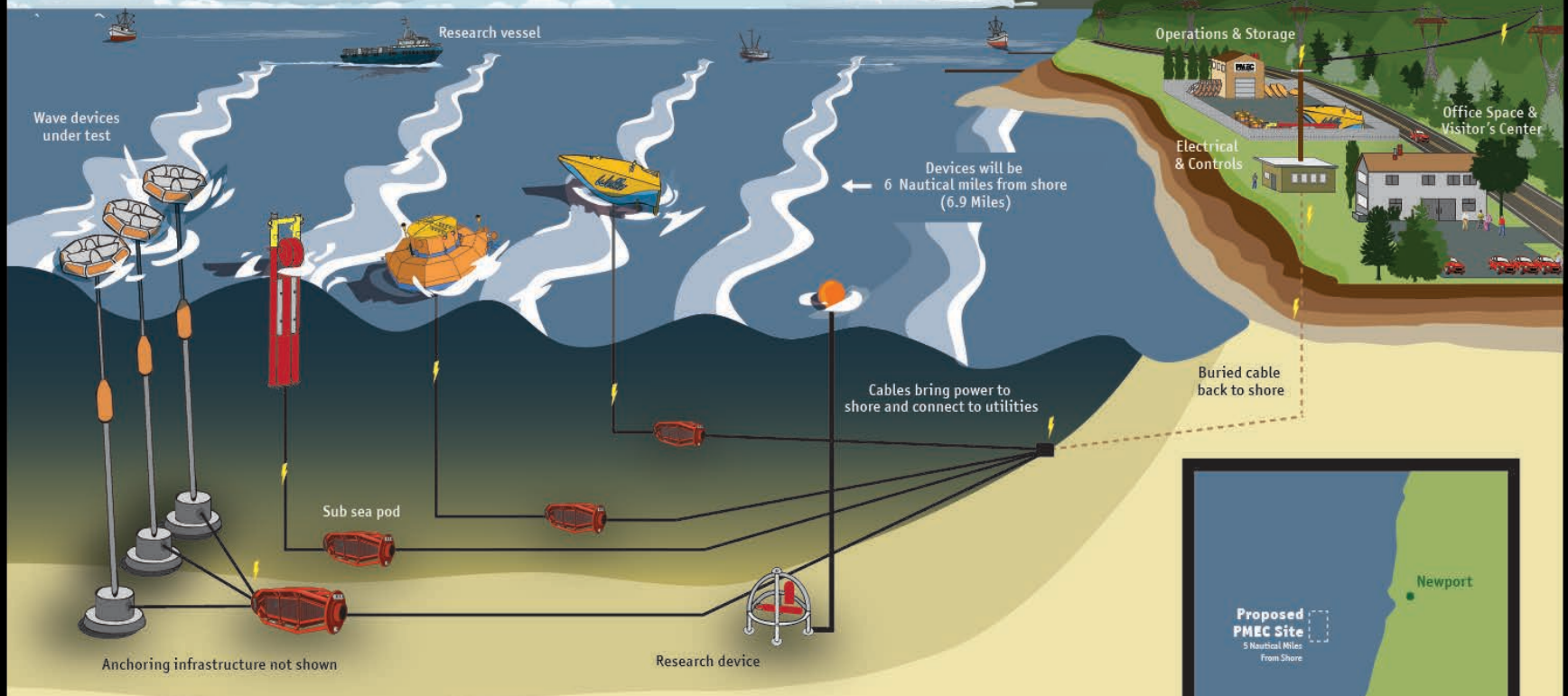
- **Vigorous resource in winter; summer mild for TRL 5-7**
- **Environmental testing results can be leveraged along the US West Coast**
- **Proximity to manufacturers**
- **Proximity to transmission infrastructure**
- **Strong state engagement; Oregon Wave Energy Trust**
- **Site accessibility**
- **Oregon State University research leadership: neutral voice of science**

ENGAGED COMMUNITY STAKEHOLDERS

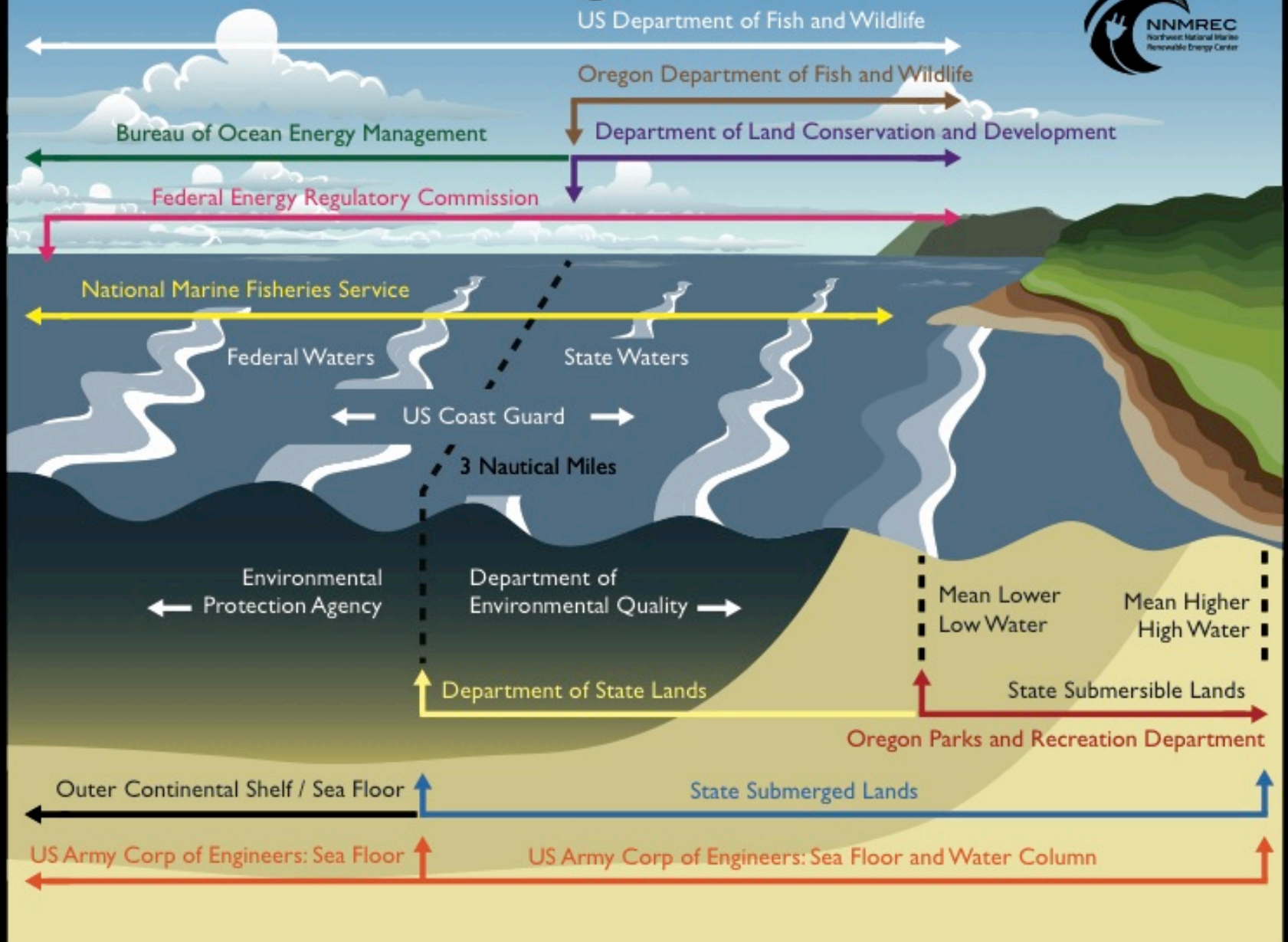


Pacific Marine Energy Center

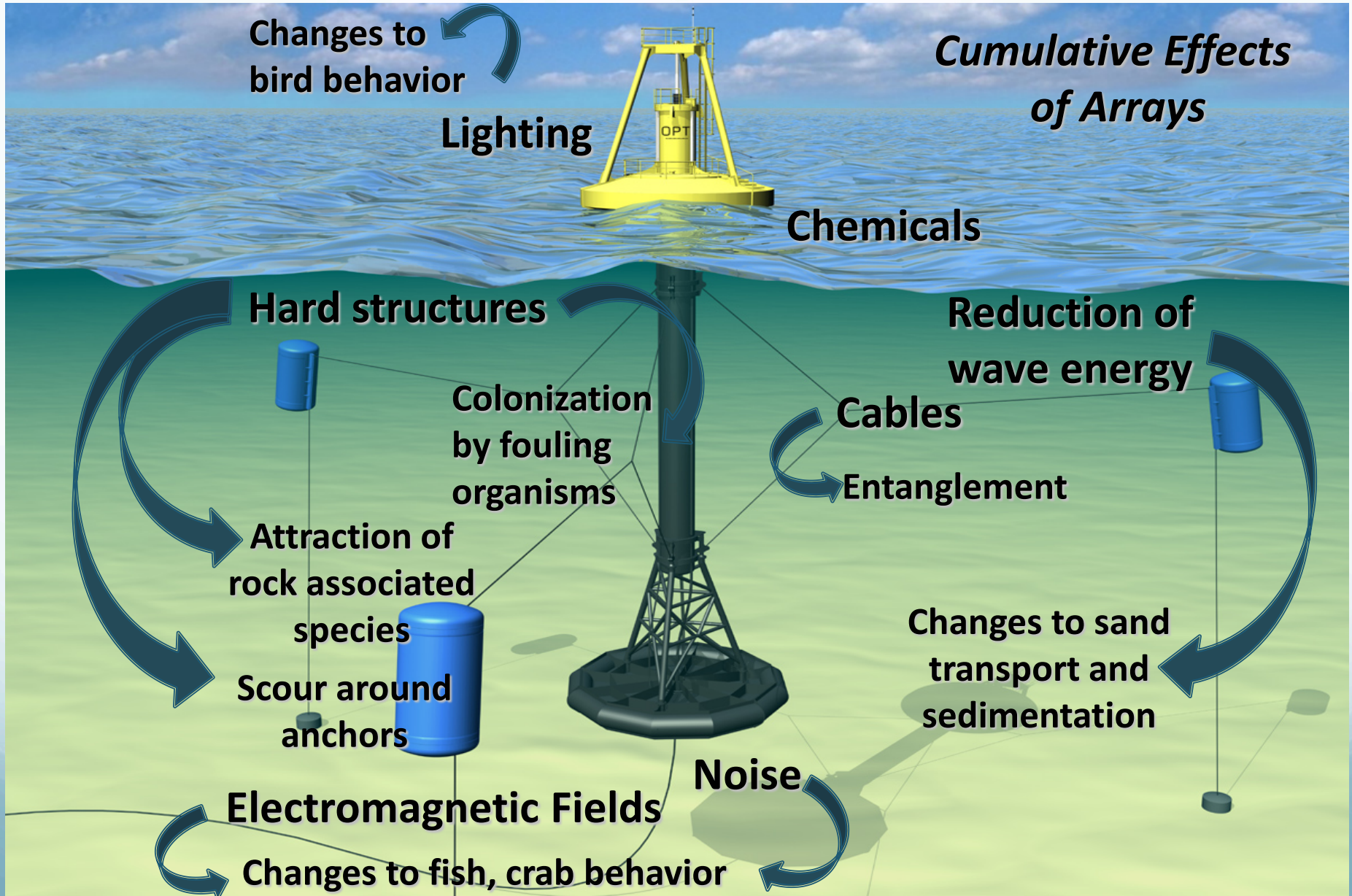
South Energy Test Site



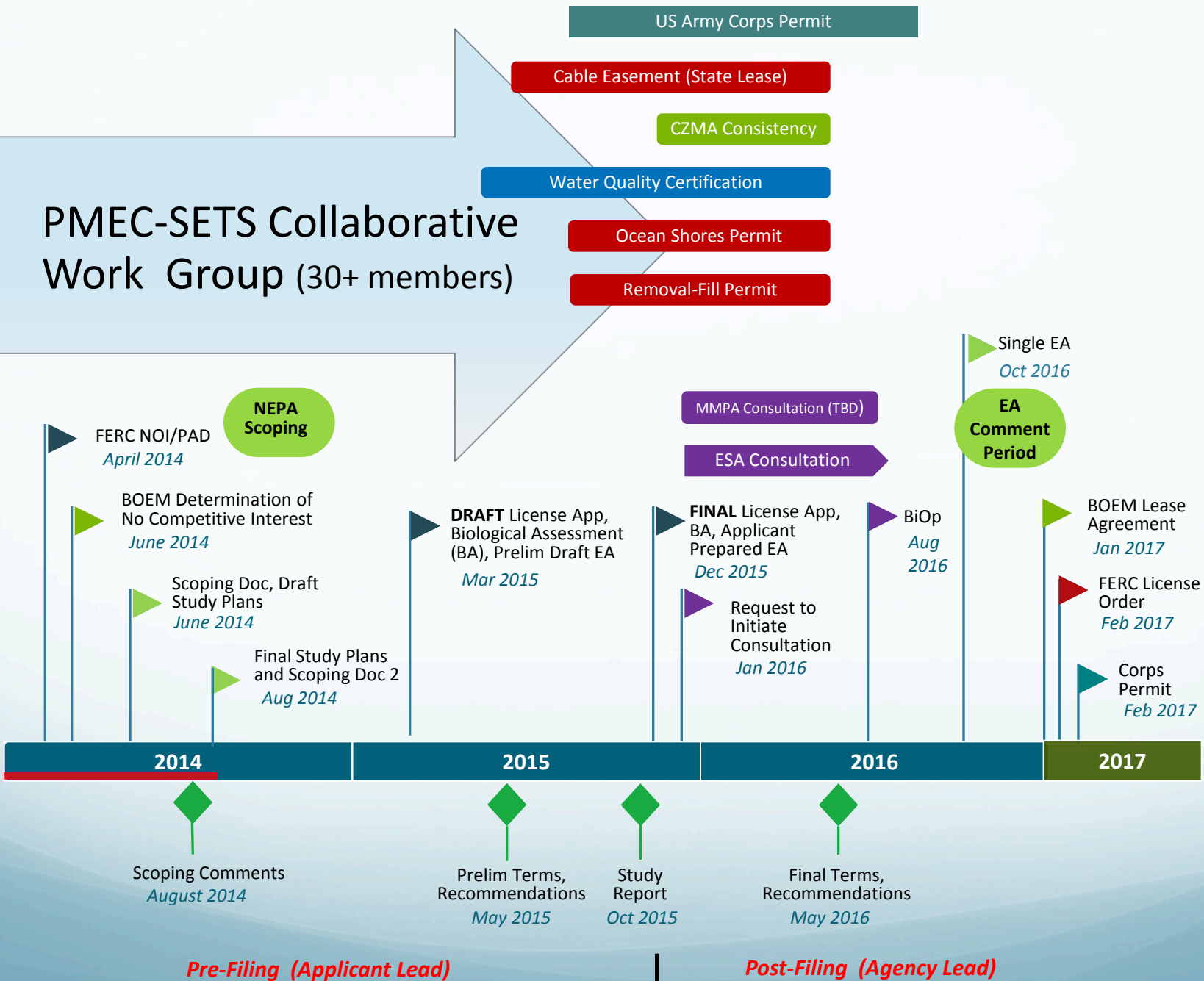
Government Ocean Regulation



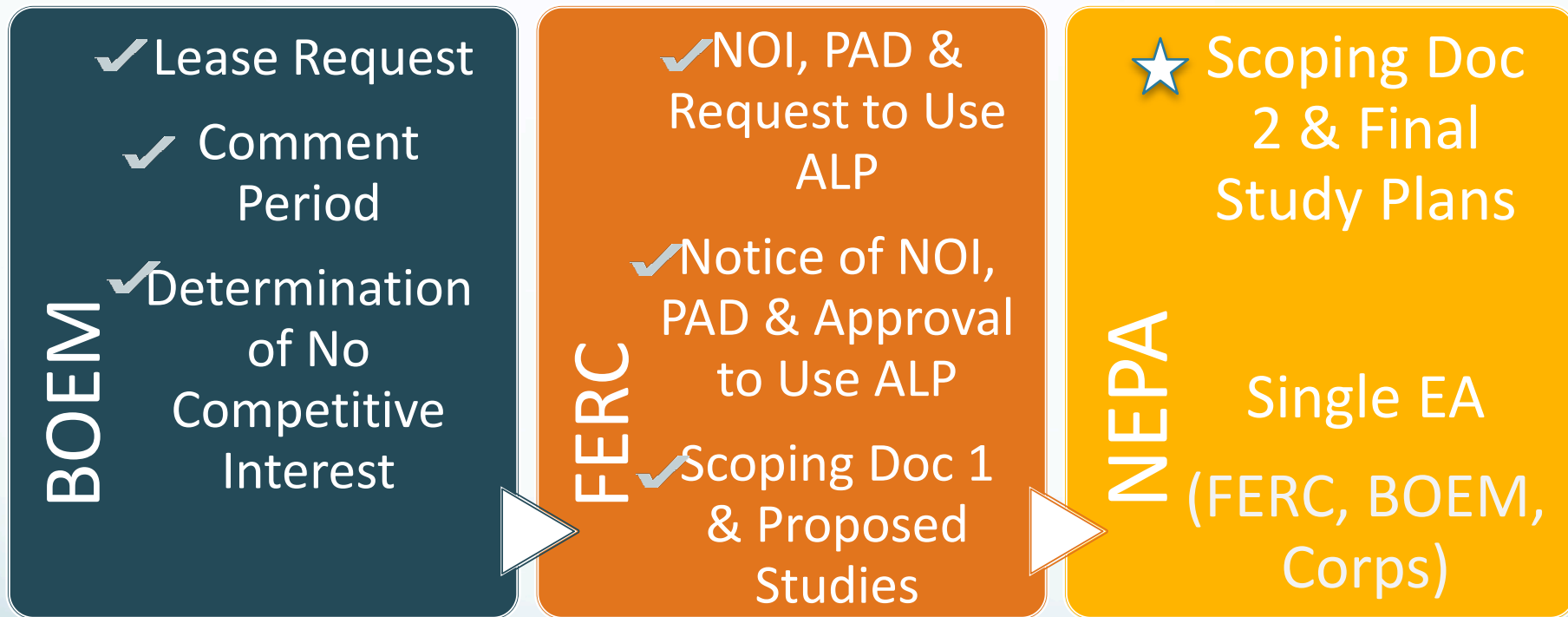
Potential Environmental Effects



PMEC-SETS Collaborative Work Group (30+ members)



Regulatory Process Status and Recent Milestones



Benefits of Collaboration/ALP

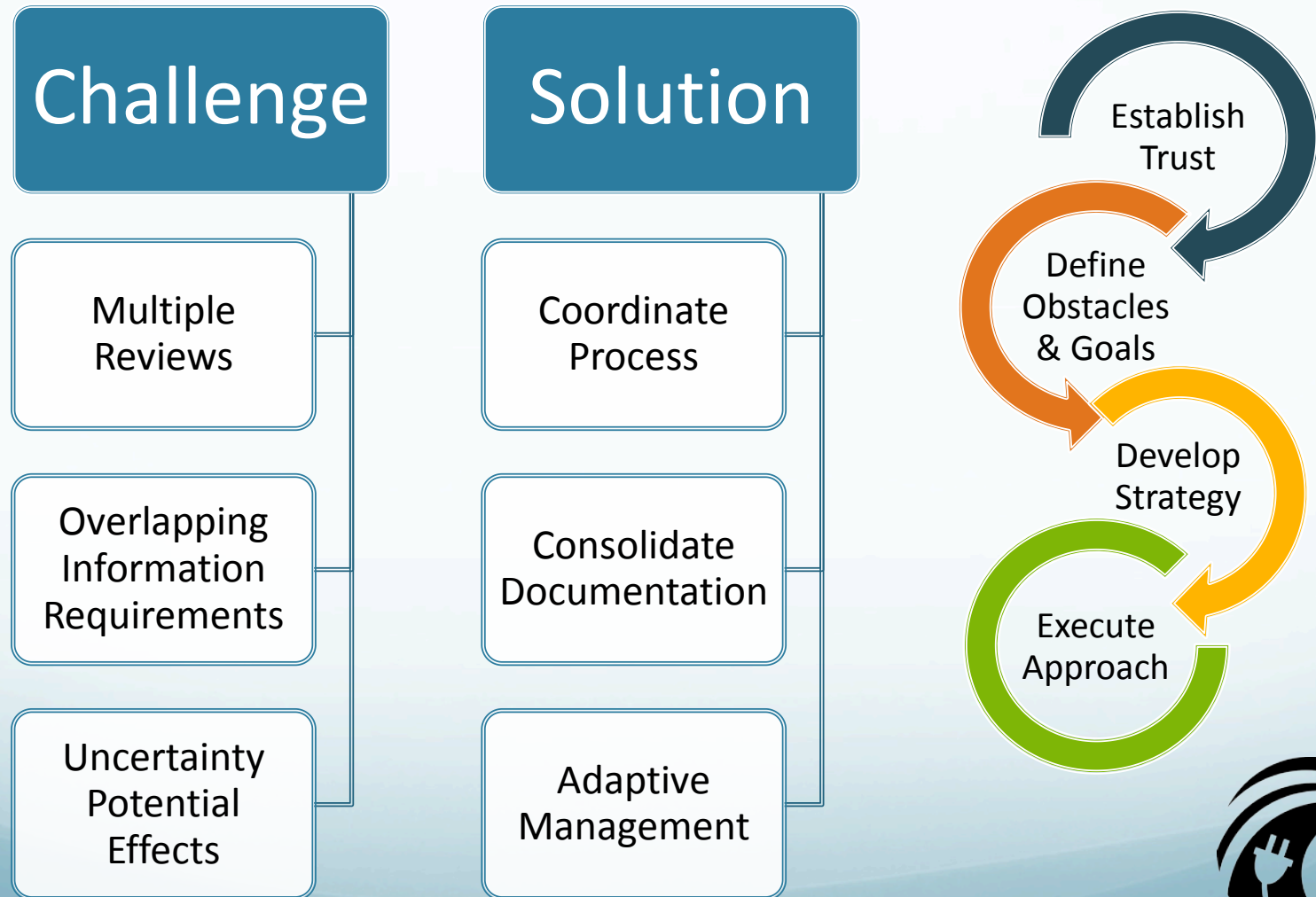
Flexibility to design and implement project-specific plan and schedule

Coordinate timing of application submittals

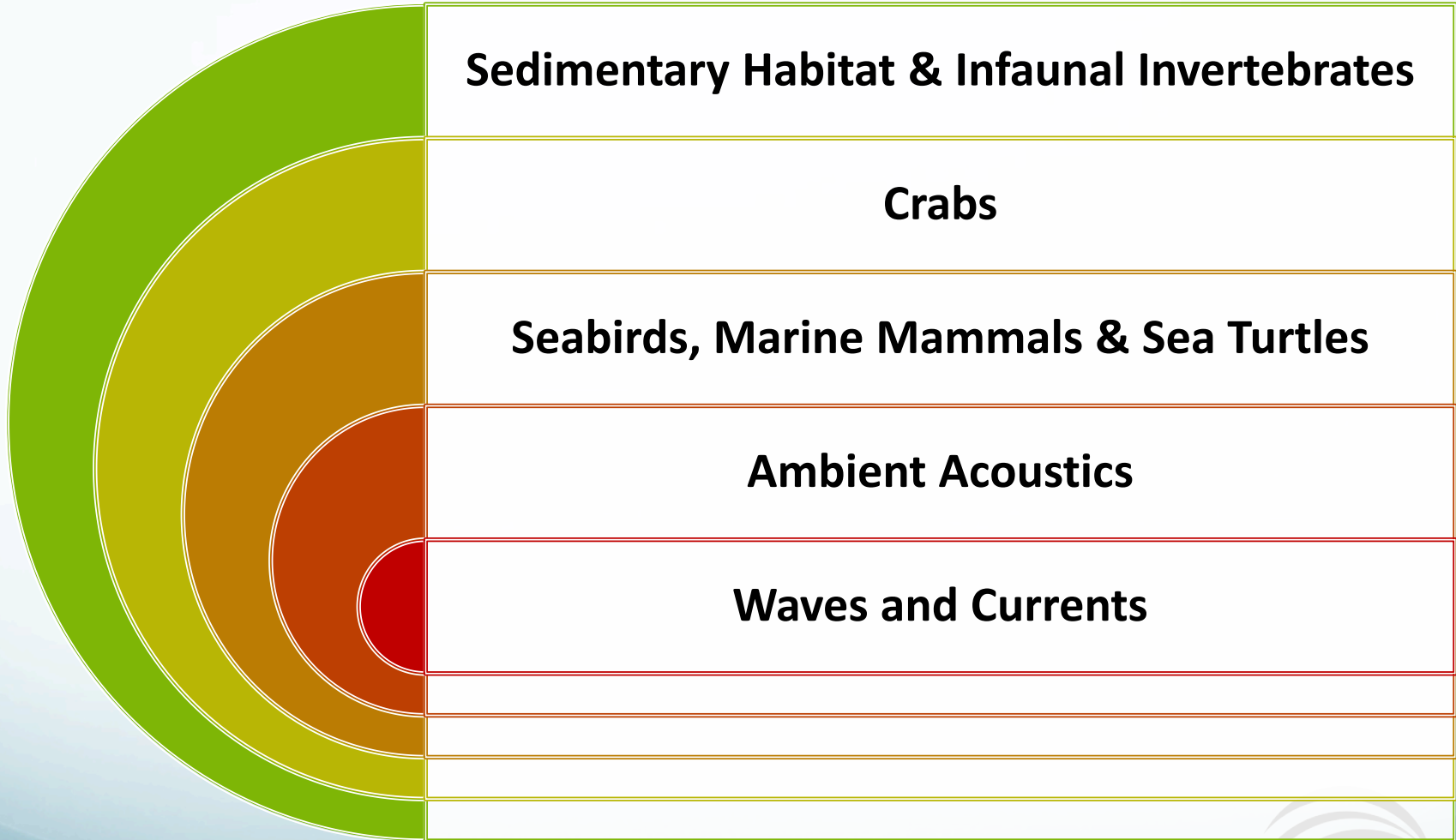
Consolidate environmental documents

Align the sequence of the FERC process with other agency reviews

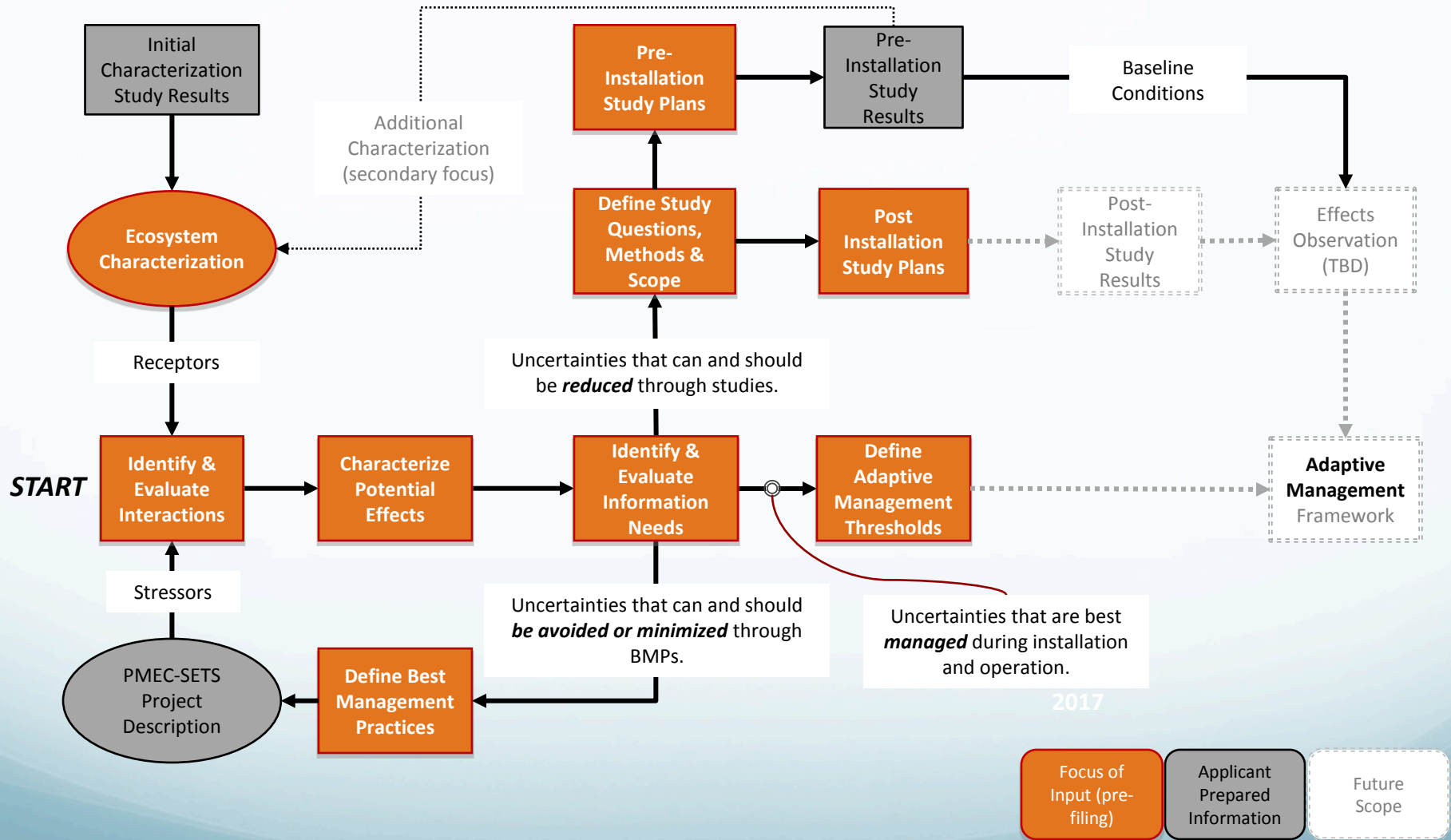
Regulatory Approach



PROPOSED STUDIES



Approach to Environmental Issues



Questions?



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www.pmec.us

