

An Environmental Risk Register: Identifying & Documenting Environmental Concerns During Marine Energy Device Design & Development

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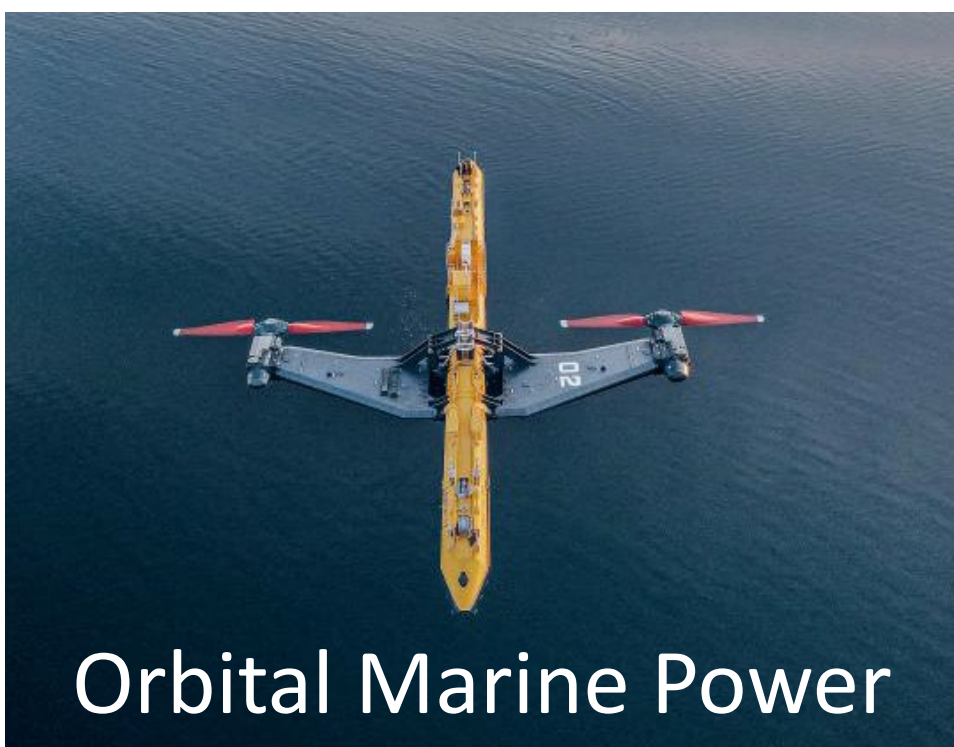


An environmental risk register (ERR) was developed to help marine energy device and project developers track and assess potential environmental risks early on and iteratively during device design and project planning.

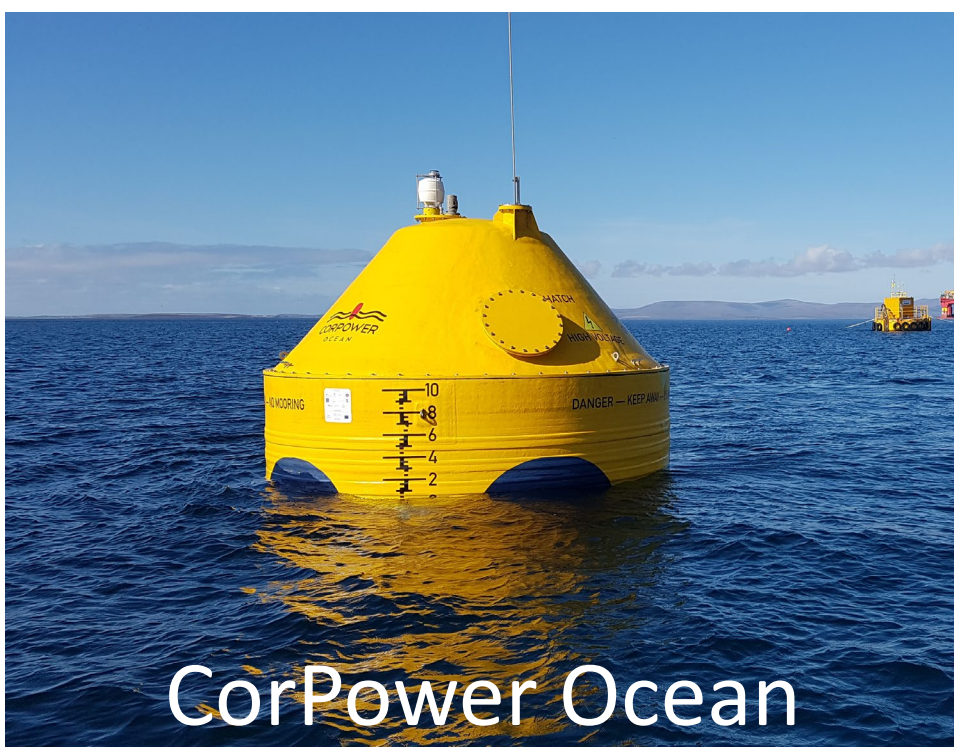


OVERVIEW

- Based on a common marine energy engineering risk register, literature review, and information from marine energy (OES-Environmental, Tethys) and offshore wind.
- Details potential environmental interactions, incorporating specific device components, current understanding of environmental risks, and site-specific information.
- Assesses likelihood and impact of each interaction and assigns a risk priority number (RPN) to help prioritize and address risks.
- Develops risk responses and strategies (mitigate, accept, or monitor) based on risk level and priority.



Orbital Marine Power



CorPower Ocean



CalWave



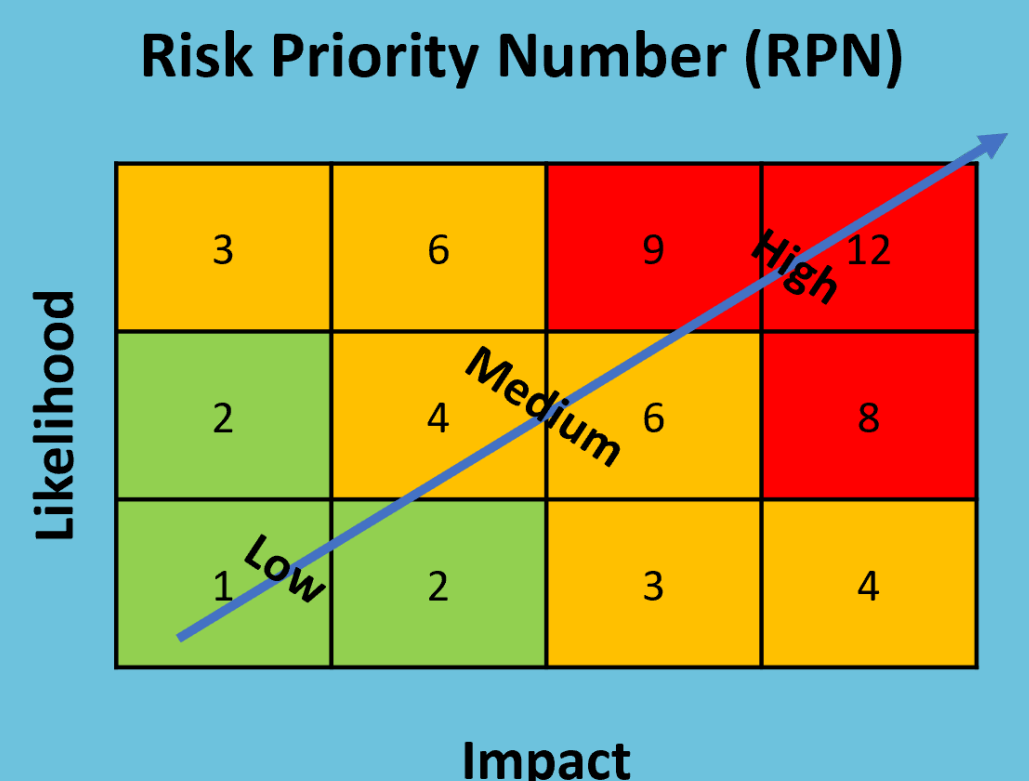
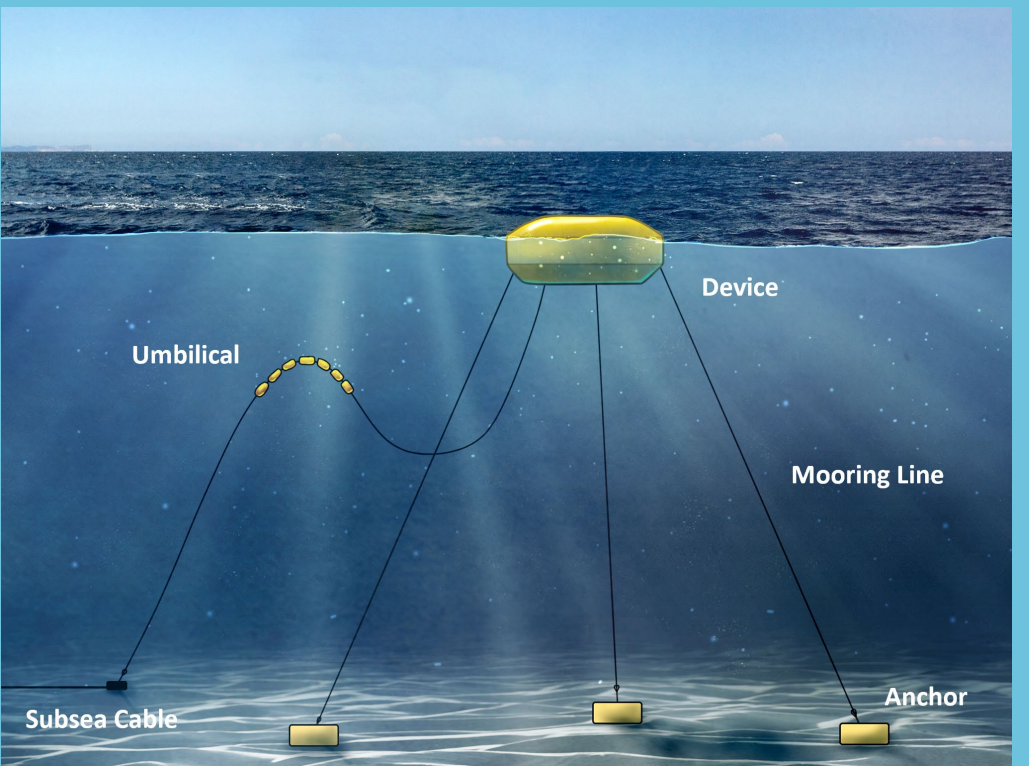
Nova Innovation



EXAMPLE ERR

Example ERR organized by device component, environmental risk, and risk response.

Device Component		Environmental Risk				Risk Response						
Device Component	Stressor	Receptor	Description	Likelihood	Impact	RPN	References	Lead Agency	Strategy	Owner	Description	Contingency Plan
Anchor	Habitat change	Benthic habitat	Addition of anchor on the seafloor that	High	Minor	6	Hemery 2020	NOAA Fisheries, USFW	Monitor	PacWave	PacWave is responsible for implementing its monitoring plans for benthic sediment and	
Anchor	Habitat change	Fish	anchor on the seafloor that may disturb or	Medium	Minor	4		NOAA Fisheries, USFW				
Power Take-Off	Noise	Marine mammals	avoidance, harm, or injury due to noise from	Low	Moderate	3	Polagye & Bassett 2020; Harding et al. 2023	NOAA, NOAA Fisheries, USFWS	Monitor	Developer /PacWave	WECs should be designed to stay below NMFS threshold (PacWave Client Handbook).	Clients will be required to take additional measures to minimize and mitigate for
Power Take-Off	Noise	Fish	avoidance, harm, or injury noise from operational	Low	Moderate	3		NOAA Fisheries, USFW				
Device	Changes in oceanographic processes	Ocean dynamics	changes to sediment transport,	Low	Negligible	1	Whiting & Chang 2020		Accept	Developer		
Umbilical	Electromagnetic fields	Fish	Electric and magnetic field	Low	Minor	2	Gill & Desender 2020; Love et al.,	NOAA Fisheries, USFW	Monitor	PacWave	PacWave is responsible for implementing its monitoring plan	If the results of field measurements or validated and
Umbilical	Electromagnetic fields	Invertebrates	Electric and magnetic field	Low	Minor	2		NOAA Fisheries, USFW				



For each environmental risk, likelihood and impact are evaluated. Based on these, a risk priority number is assigned (see risk matrix on the right) to help developers understand the priority in which they may want to address potential risks.



GOALS OF THE ENVIRONMENTAL RISK REGISTER

- Creating a clear and comprehensive ERR during design and planning can help to:
1. Systematically understand device interactions with the environment via a standard method based on regulatory criteria.
 2. Support discussions with regulators, advisors, and stakeholders during consenting processes.
 3. Make informed decisions about risk response and device/system design from an environmental effects and consenting perspective.