Tidal Energy Overview

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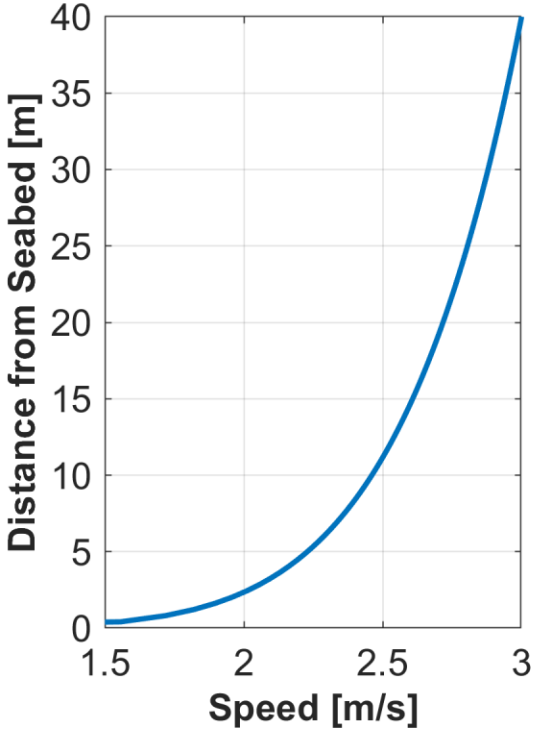
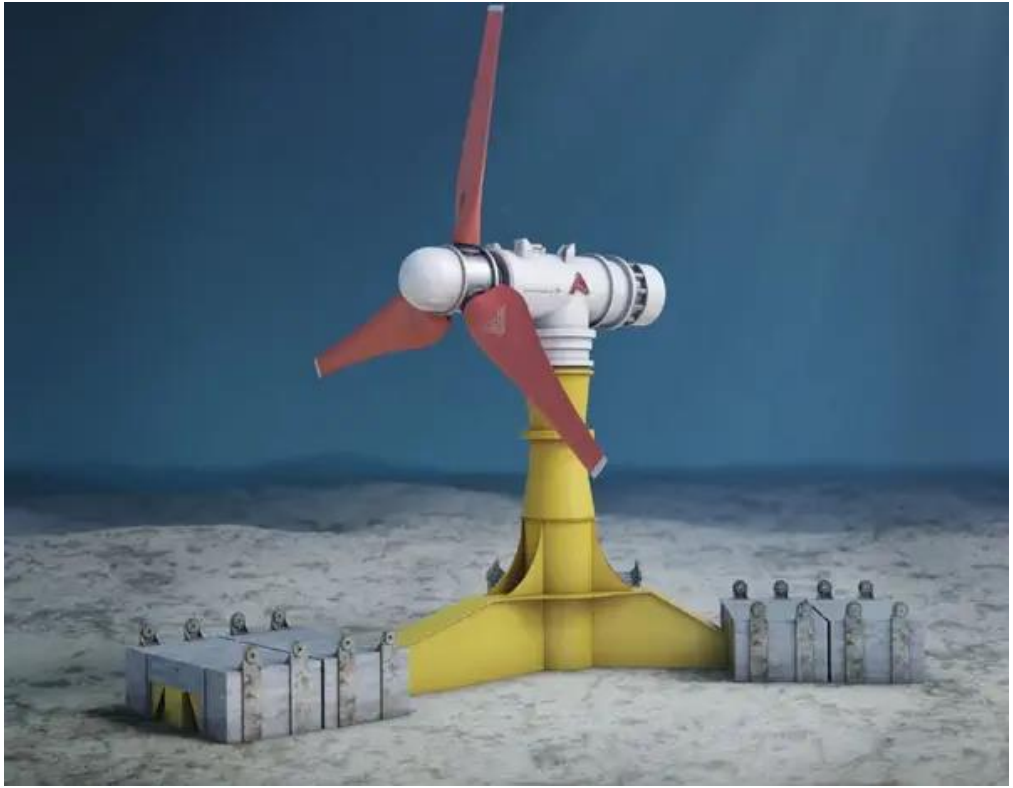
Tidal Current Characteristics

- Predictable at minute time scales over decades, but variable
- Occur in relatively narrow channels and augmented by headlands
- Highest speeds closest to the surface



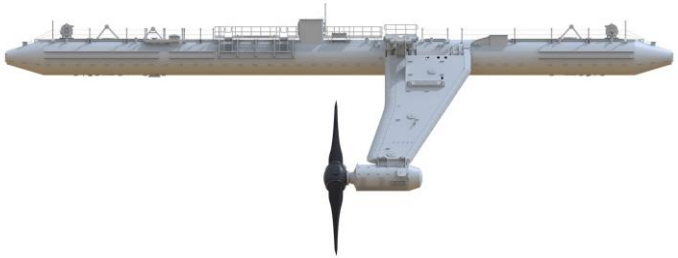
Atlantis Resources AR1500



Property	Value
Diameter	18 m
Rated power	1.5 MW
Rated speed	3 m/s
Foundation	Gravity anchor
Control	Active yaw Active pitch Variable speed
Maintenance	Recover rotor and nacelle via “stab” connection

Source: SIMEC Atlantis

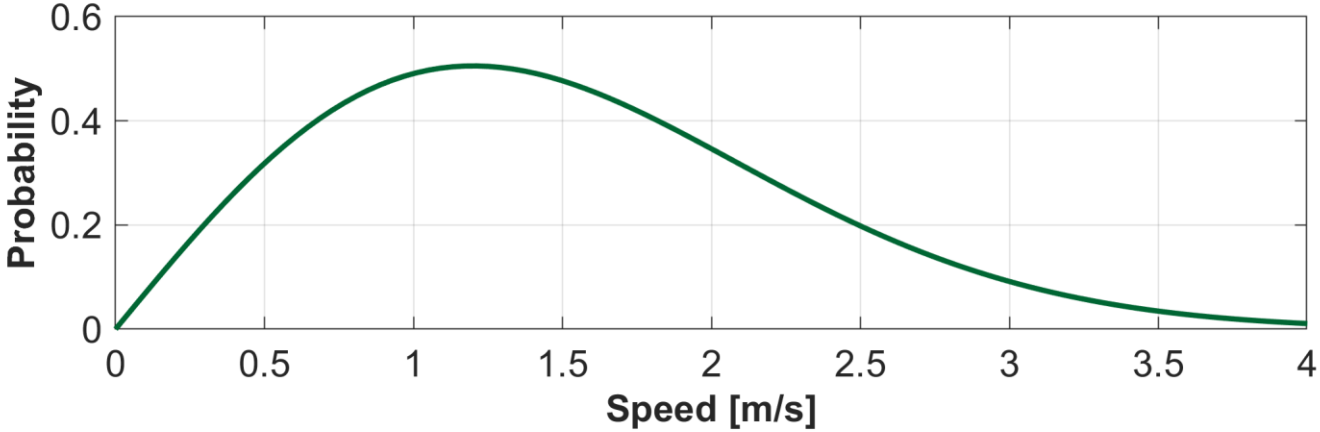
Orbital Marine Power O2

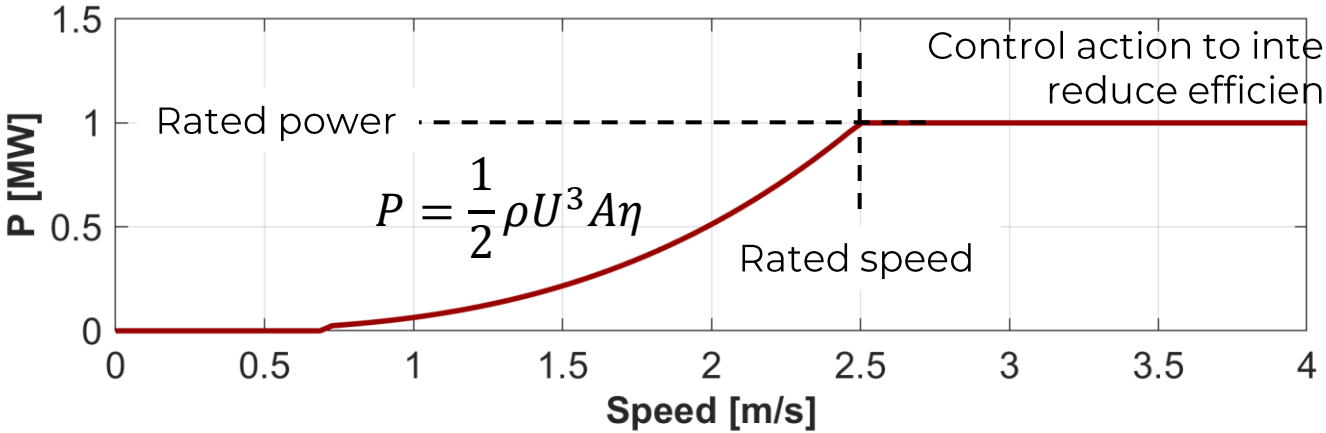


Property	Value
Diameter	22 m
Rated power	2 MW
Rated speed	2.5 m/s
Foundation	Mooring
Control	Active pitch Variable speed
Maintenance	Retract “wings”

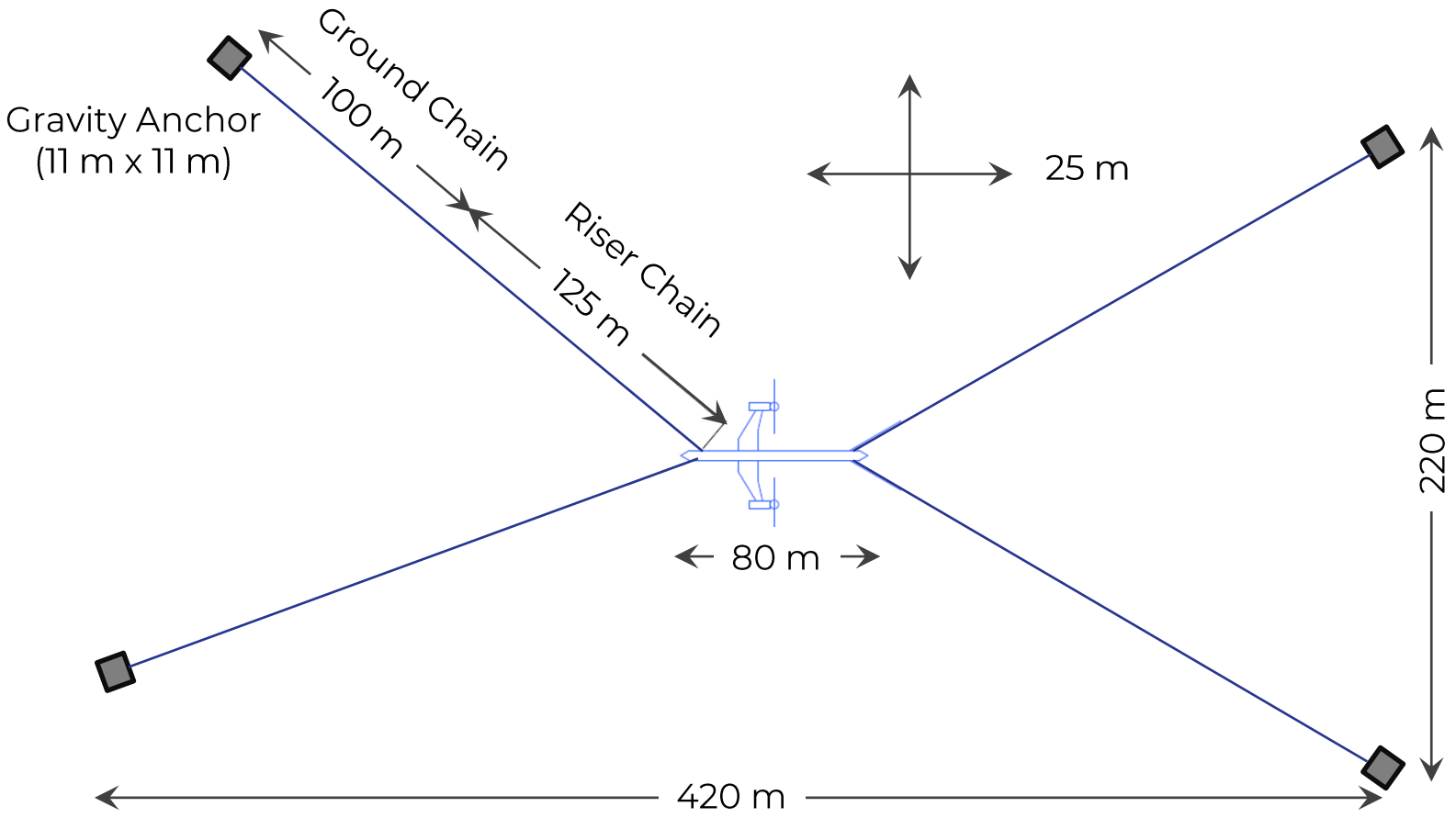
Source: Orbital Marine Power

Power Generation Fundamentals





O2 Horizontal Footprint



Environmental Considerations

- Collision
- Noise
- Displacement

Active research areas

- Habitat — Limited changes for “small” arrays
- Entanglement — Weighted lines – ghost fishing?

Collision Risk Factors

Likelihood of animal presence

- Seasonal and interannual variation

Pre-installation (?)

Likelihood of "encounter"

- Avoidance due to noise?
- Attraction due to prey aggregation?
- Attraction due to noise?

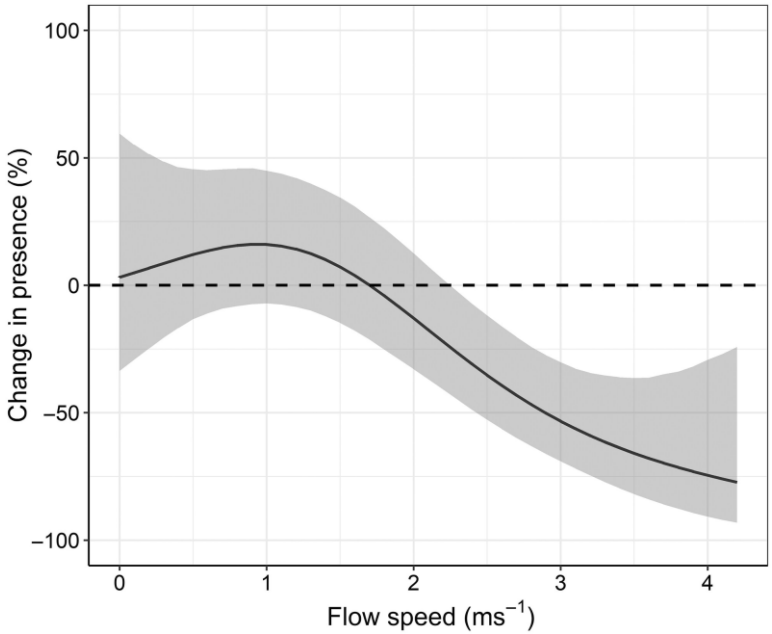
Collision severity

- Potential for evasion?
- Rotor relative speed thresholds?

(mostly) Post-installation

MeyGen: Harbor Seal Interactions

Active Sonar: Local Avoidance



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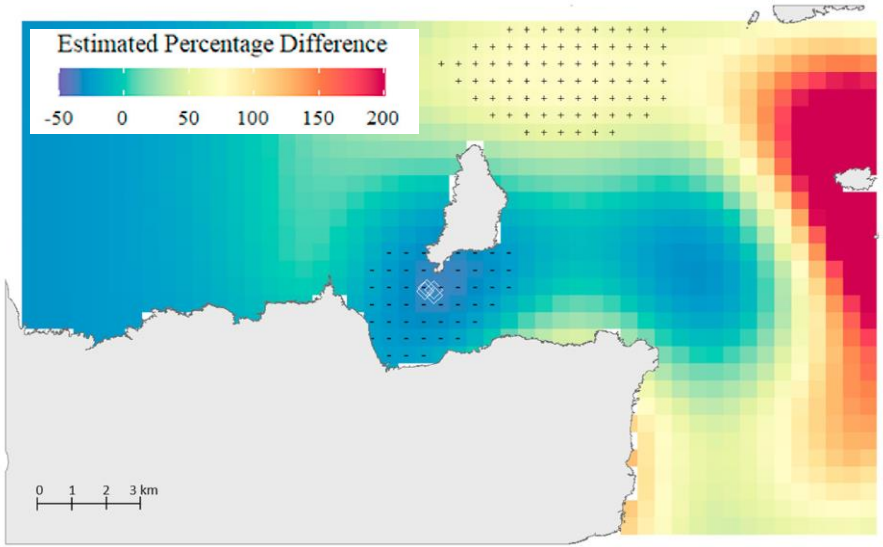
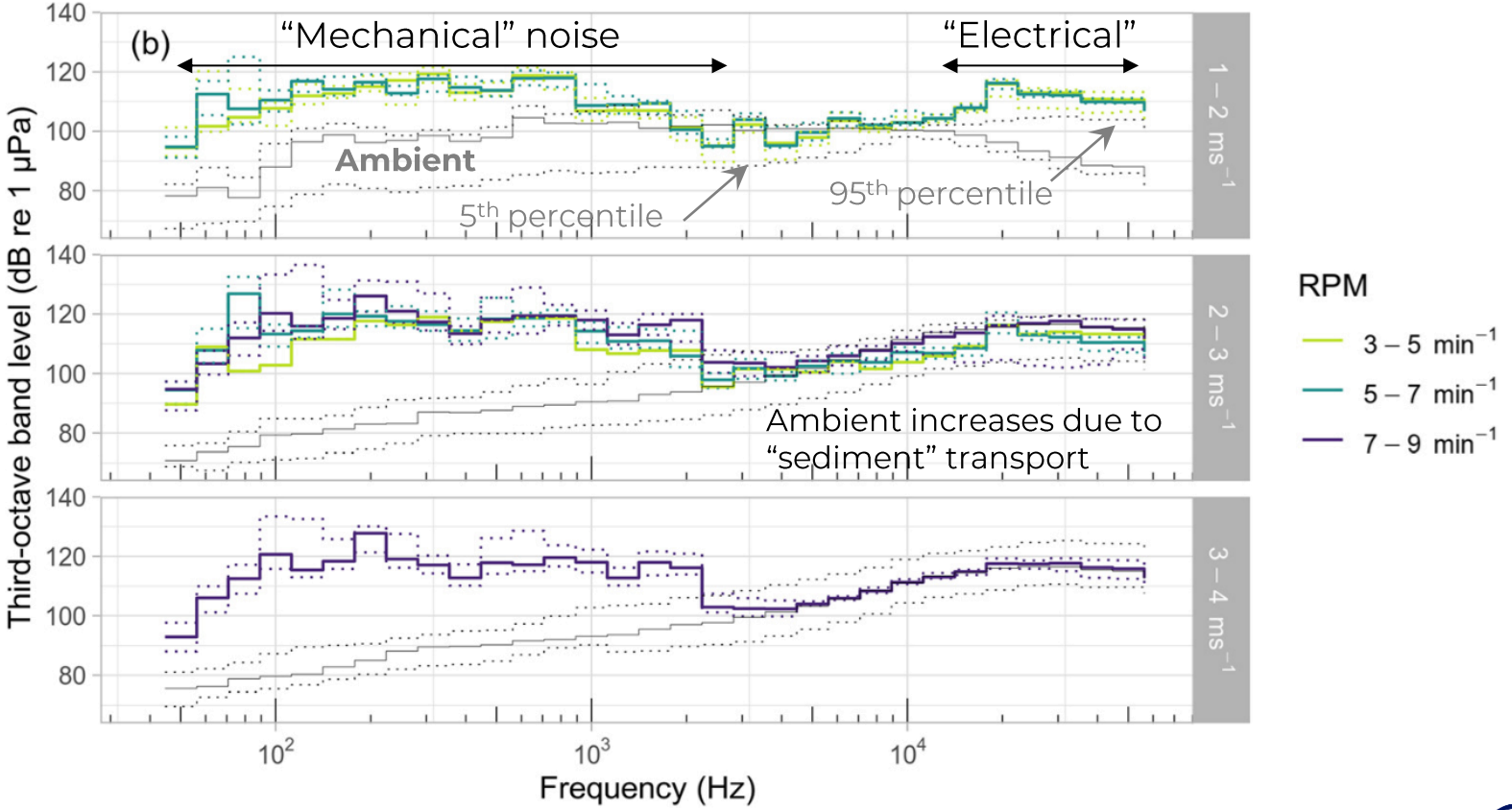
GPS Tagging: Displacement



Onoufriou, J., Russell, D.J., Thompson, D., Moss, S.E. and Hastie, G.D., 2021. Quantifying the effects of tidal turbine array operations on the distribution of marine mammals: Implications for collision risk. *Renewable Energy*, *180*, pp.157-165.

AR1500: Acoustic Footprint



Risch, D., Van Geel, N., Gillespie, D. and Wilson, B., 2020. Characterisation of underwater operational sound of a tidal stream turbine. *The Journal of the Acoustical Society of America*, *147*(4), pp.2547-2555.

Collision & Noise Summary

- No observations of marine mammal collision
- Avoidance ranges *can* be significant…
- …but opportunities exist to reduce acoustic footprints
- Focus for next stage of MeyGen (90+ turbines) is likely to be on displacement (and how to quantify it)


Questions?