Leveraging Coral Health, Resilience, and Substrate Properties to Inform Offshore Decommissioning Strategies

Strategic Fit: Offshore oil and gas structures often function as artificial reefs, supporting corals and associated biodiversity. However, the ecological value of these systems—and the role that infrastructure materials themselves play in shaping coral health and resilience—remains poorly quantified. As decommissioning accelerates, there is an urgent need for ecological data to guide decisions that balance environmental responsibility with operational realities. This project provides science-based evidence to inform whether structures should be fully removed, partially removed, or repurposed as reefs.

Program Goal: To evaluate coral biodiversity, health, and stress tolerance on offshore infrastructure—and how these patterns relate to substrate material properties—to support conservation-informed decommissioning decisions.

Value Proposition: Examine if offshore structures provide meaningful habitat for corals and reef biodiversity. Determine how material properties (e.g., surface texture, composition, corrosion) influence coral biodiversity and resilience. Supports nature-positive decommissioning and biodiversity conservation. Improves environmental assessments and decision-making under climate change.

Program Description and Scope: We will integrate field surveys, coral physiological measurements, environmental DNA (eDNA), and material characterization to: (1) Quantify coral diversity and health on and near offshore structures, (2) Assess coral resilience to decommissioning-relevant stressors, and (3) Link coral health and performance to substrate material characteristics.

Deliverables: (1) Technical report summarizing coral health, biodiversity, and substrate-material relationships on offshore structures, (2) Decision-support framework for environmentally responsible decommissioning strategies, (3) Peer-reviewed publication(s) advancing conservation and applied marine science, and (4) Stakeholder-ready summary for regulators, conservation organizations, and industry partners.

Estimated budget: The budget depends on site access, the number of structures surveyed, molecular and material analyses, personnel, location, and depth.

Phase 1
Baseline of biodiversity and material properties on Offshore Structures

Activities:
Field surveys of corals and associated communities on selected structures (ROV, divers, eDNA).

Characterization of substrate materials (e.g., composition, surface roughness, corrosion state)

Key Outputs:
-Initial assessment of whether offshore structures function as coral habitat

-Understanding of how infrastructure materials shape reef development

-Technical memo suitable for regulators and industry partners and scientific publication

-Understanding of how infrastructure materials shape reef development

-Scientific publication

Value: Provides ecological context for decommissioning discussions

Duration: 2 years

Cost: $570,000

Phase 2:
Coral Health and Tolerance and Decision Support Framework

Activities:
Coral health measurements
(growth, reproduction, stress biomarkers)

Decision-support framework for decommissioning strategies

Key Outputs:
- Quantitative indicators of coral health and stress tolerance on offshore structures

-Identification of coral taxa or assemblages most vulnerable

-Identification of material features that promote or inhibit coral resilience

-Advice for decommissioning and offshore design

-Technical memo and scientific publication

Value: Generates mechanistic insight into coral resilience on offshore structures

Directly informs engineering and policy discussions around partial removal, reefing, or material reuse.

Duration: 2 years

Cost: 570,000