



Marine Zoning and Regulatory Review: Artificial Habitat Science Review Overview

Attraction versus Production

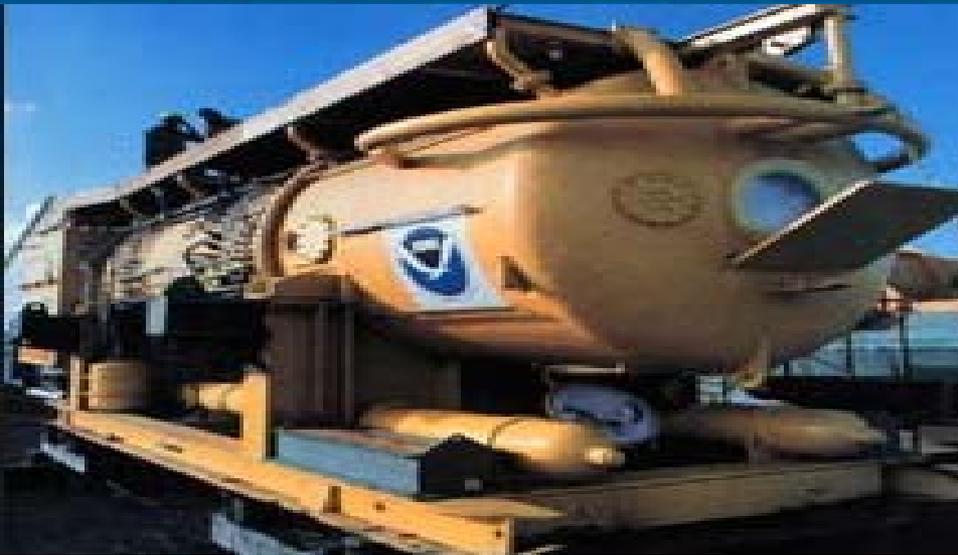


- **Production hypothesis:** reef habitat is a limiting factor and artificial reefs increase fish production by providing a habitat that would otherwise not be present.
- **Attraction hypothesis:** fish are attracted to artificial reefs, and questions whether fishes that recruit to artificial reefs could have instead recruited to natural reefs.

Outstanding Questions:

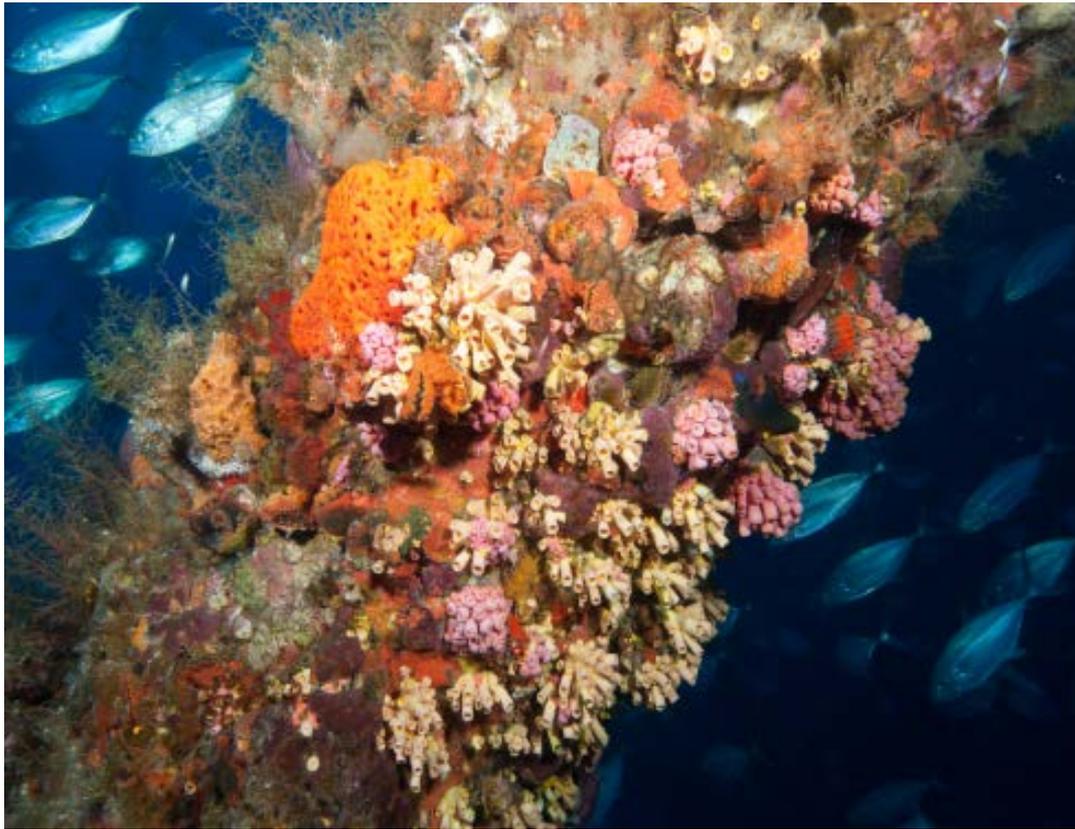
- Do artificial reefs impact growth, mortality, and emigration?
- What are the relative levels of attraction vs. production and the factors affecting them?

Range Expansion



- Provides habitat that can directly or indirectly support recruitment and range expansion for various organisms.
- Provides hard substrate, which may increase the supply of prey, shelter, and spawning sites that could alter the local distributions of species and contribute to range expansions.
- Generally not representative of natural coral reef communities (FGBNMS data).

Invasive Species, Disease Introduction or Acceleration



- Transport fouling communities.
- Provide new unoccupied habitat for establishment.
- Create corridors for further dispersal and expansion.

Toxicological Impacts

Materials of concern include:

- Oil and fuel
- Asbestos
- Polychlorinated biphenyls (PCBs)
- Paint
- Solids/debris/floatables
- Other materials of environmental concern

Impacts of concern include:

- Reproductive impacts (PCBs)
- Toxicity (copper, lead)
- Phase shift of species (iron)



Impacts to Ecosystem Attributes



- Can affect the physical and chemical attributes of the ecosystem (e.g., circulation, currents, wave force, and sedimentation).
- Can impact the diversity and density of living resources that colonize and utilize the structure of artificial reefs.

Longevity and Structural Integrity



- Impacts can result from storm and hurricane damage, waves and high surf, and other harsh environmental conditions.
- Impacts depend on the structural design, materials used, age of the artificial reef, geographic location, orientation, and water depth of the artificial reef.
- Impacts can range from no disturbance at all, to some movement, to partial or total structural modification.

Human Use and Economic Impacts



Vandenberg

- No reduction of (pressure) on the surrounding natural reefs.
- Increases in local dive charter business.
- Growth in the greater local economy in terms of sales/output, income and employment.

Spiegel Grove

- Decline in use of surrounding natural reefs.
- Increase in local dive charter business.
- Growth in local economy.



How to keep engaged and where to find more information:

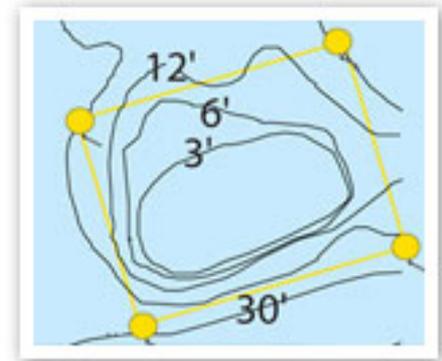


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MARINE ZONING &
REGULATORY REVIEW



Outstanding Research Questions



- Are effects of reduced pressure on natural reefs consistent over space and time?
- Do visitors value artificial reefs more than natural reefs?
- What are effects of artificial reefs on fish communities, and do fish immigrate from natural reefs or emigrate from artificial reefs/habitats? (*need fish tagging studies and fish biomass monitoring)
- What are effects of artificial reefs/habitats on invertebrate populations, including invasive invertebrates?
- What habitat modifications occur as a result of artificial reef/habitat placement?
- What are the effects of habitat transfer, e.g., sand plain to high relief, on ecosystem services?