

Fish Community and Trophic Structure at Deepwater Shipwreck Sites in the Northern Gulf of Mexico



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Artificial Reefs



Artificial Reefs: Shipwrecks



Deep Wrecks Study: Vertebrate Objectives

1) To examine community structure of fishes associated with deep water shipwrecks in the northern Gulf of Mexico

2) To estimate source(s) of C and trophic structure of fishes associated with deep water shipwrecks



Vertebrate Methods: Community Structure

- Video: Transects flown over, immediately adjacent to, and 300 m away from wreck sites
- Fish: Sampled with traps and a suction sampler attached to the ROV



ROV



Chevron Trap



Suction Sampler



Baitfish Trap

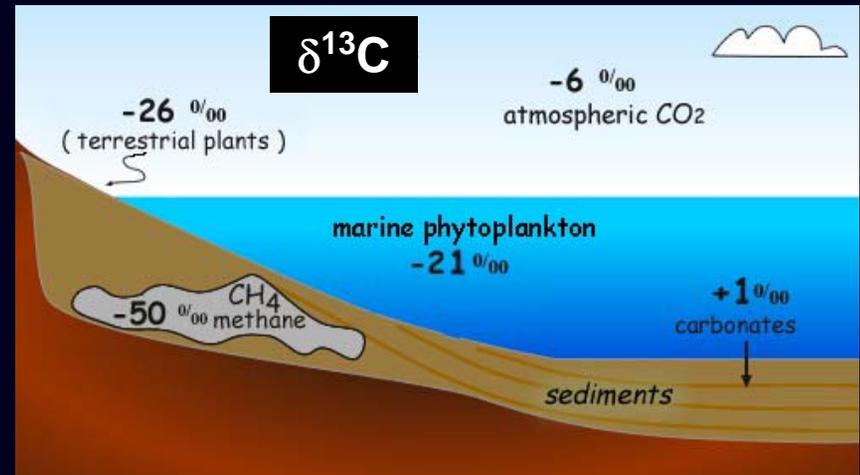
Vertebrate Methods: Community Structure

- **Video:**
 - Identified individuals to lowest taxonomic level possible
 - Enumerated using Min/Max Method (NMFS 1989)
 - Community differences tested with multidimensional scaling (MDS) and analysis of similarity (ANOSIM)



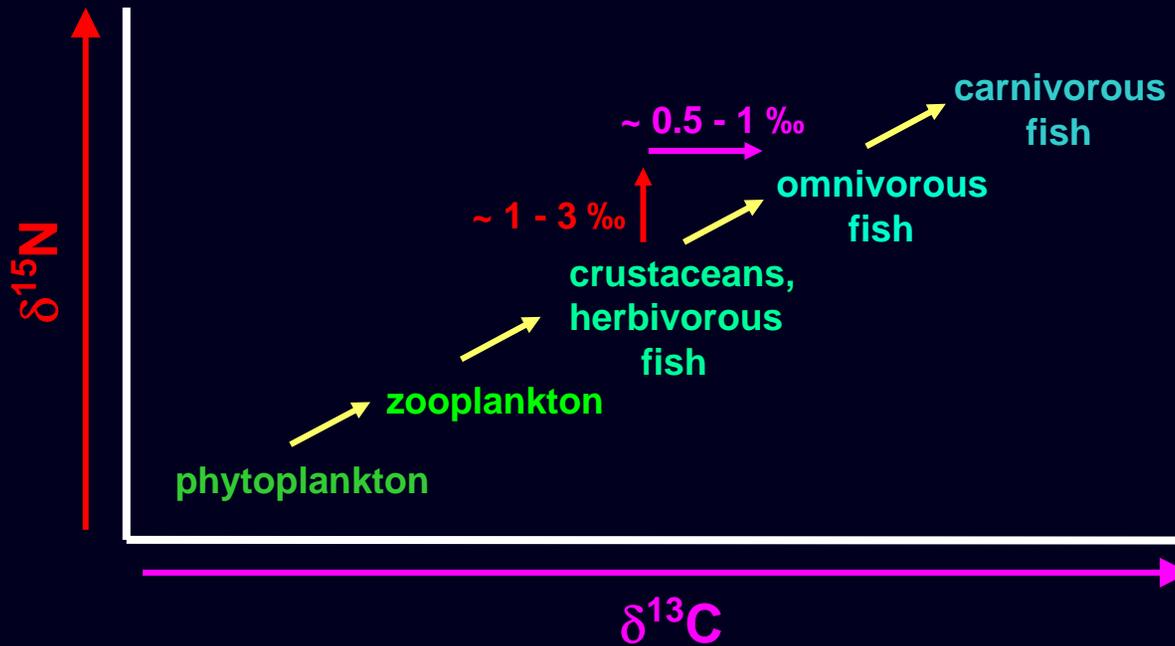
Vertebrate Methods: Trophic Structure

- **Gut Content Analysis: Stomachs dissected and prey identified to lowest taxon possible**
- **Stable Isotope Analysis: Muscle samples analyzed to infer trophic position and source of C**



Stable Isotope Methodology

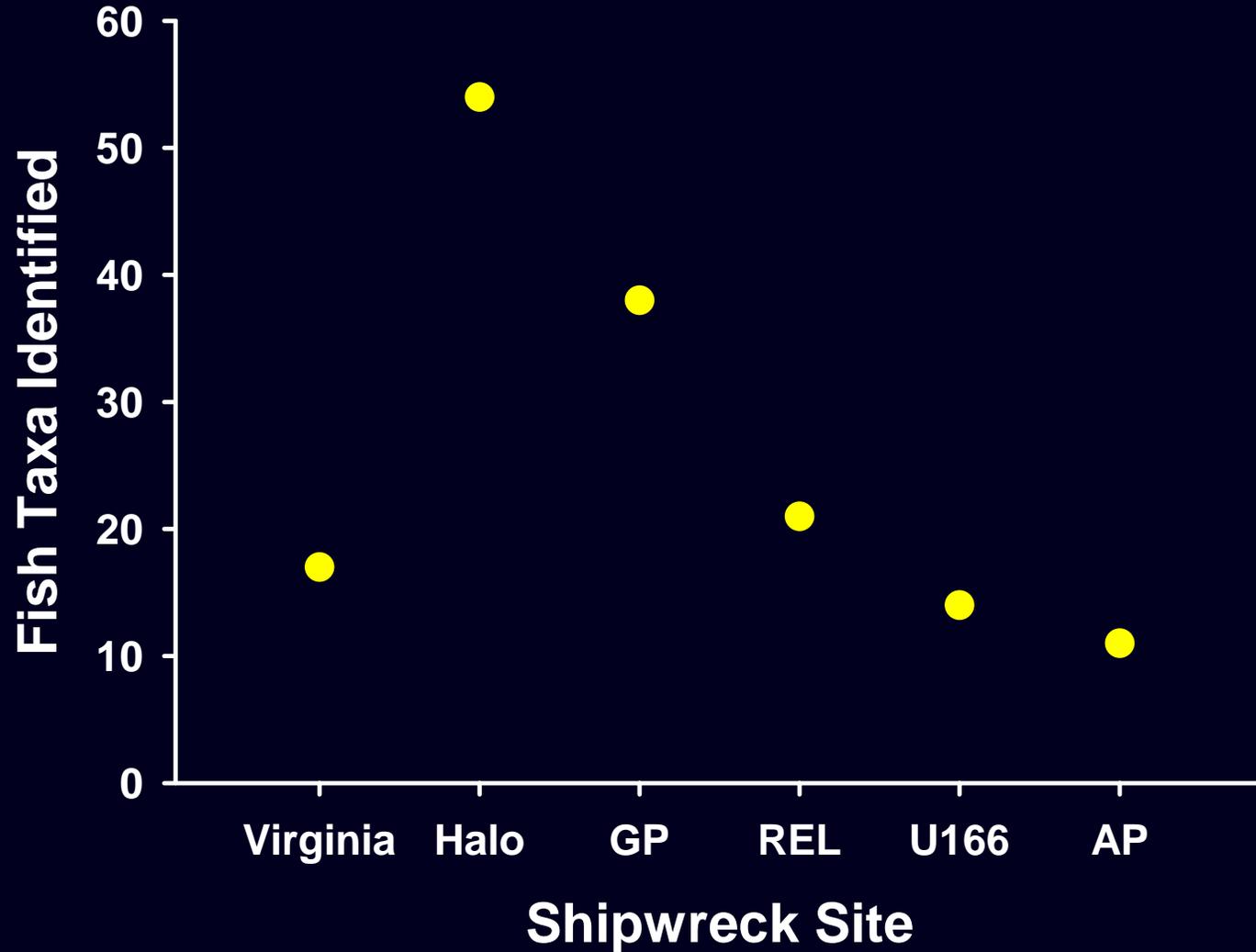
- Trophic Level:



- Source of Production:



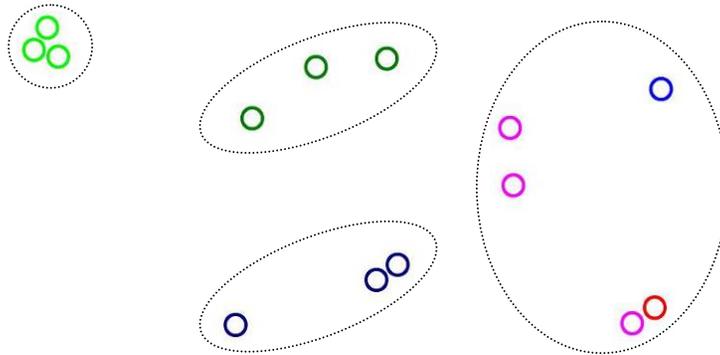
Fish Taxa Identified at Shipwreck Sites



MDS Plots of Fish Community at Wreck Sites

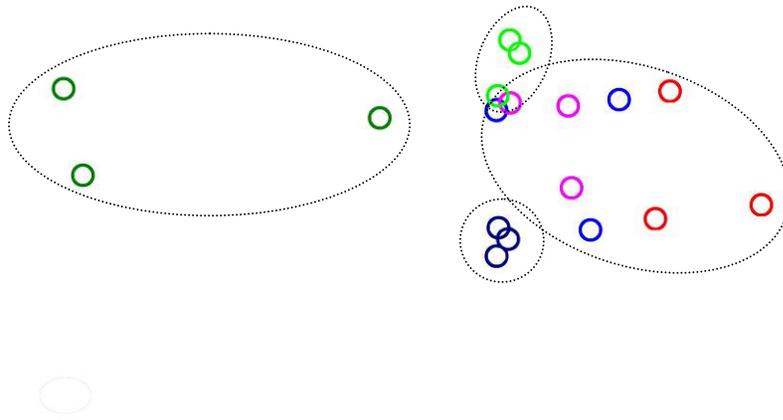
Over

Stress = 0.01



Away

Stress = 0.06



- Virginia
- Halo
- Gulf Penn
- U166
- Robert E. Lee
- Alcoa Puritan

Virginia Fish Community

Over



Away



Halo Fish Community

Over



Away



Gulf Penn Fish Community

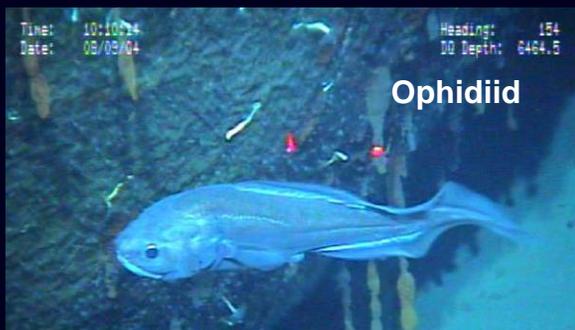
Over



Away



REL, U166, and Alcoa Puritan Fish Communities

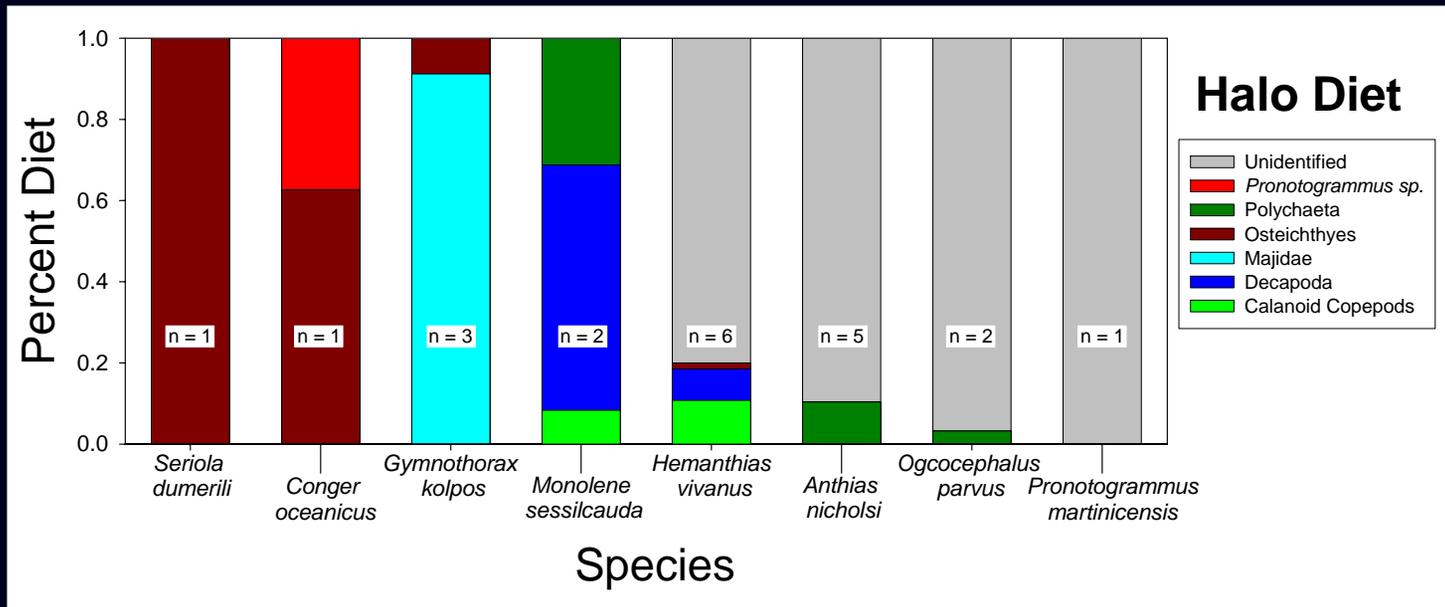
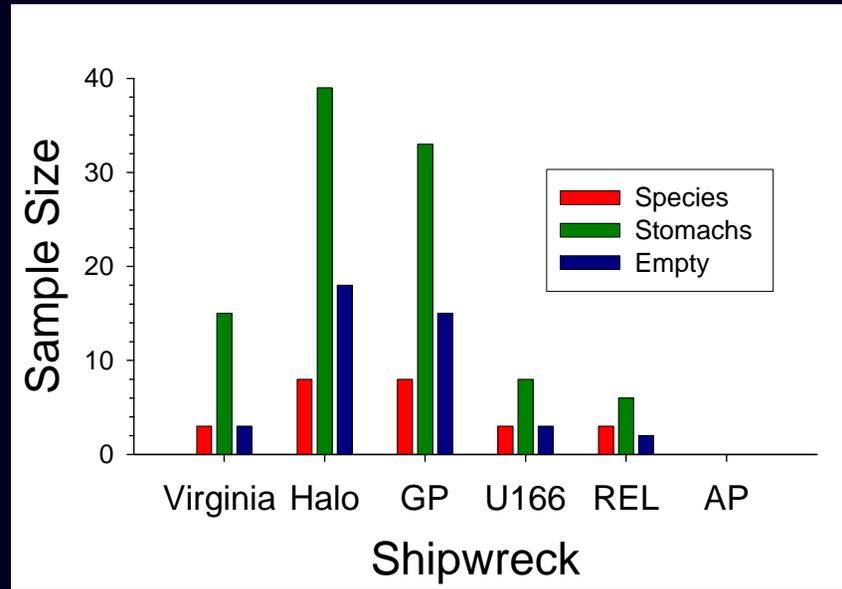


Community Structure Summary

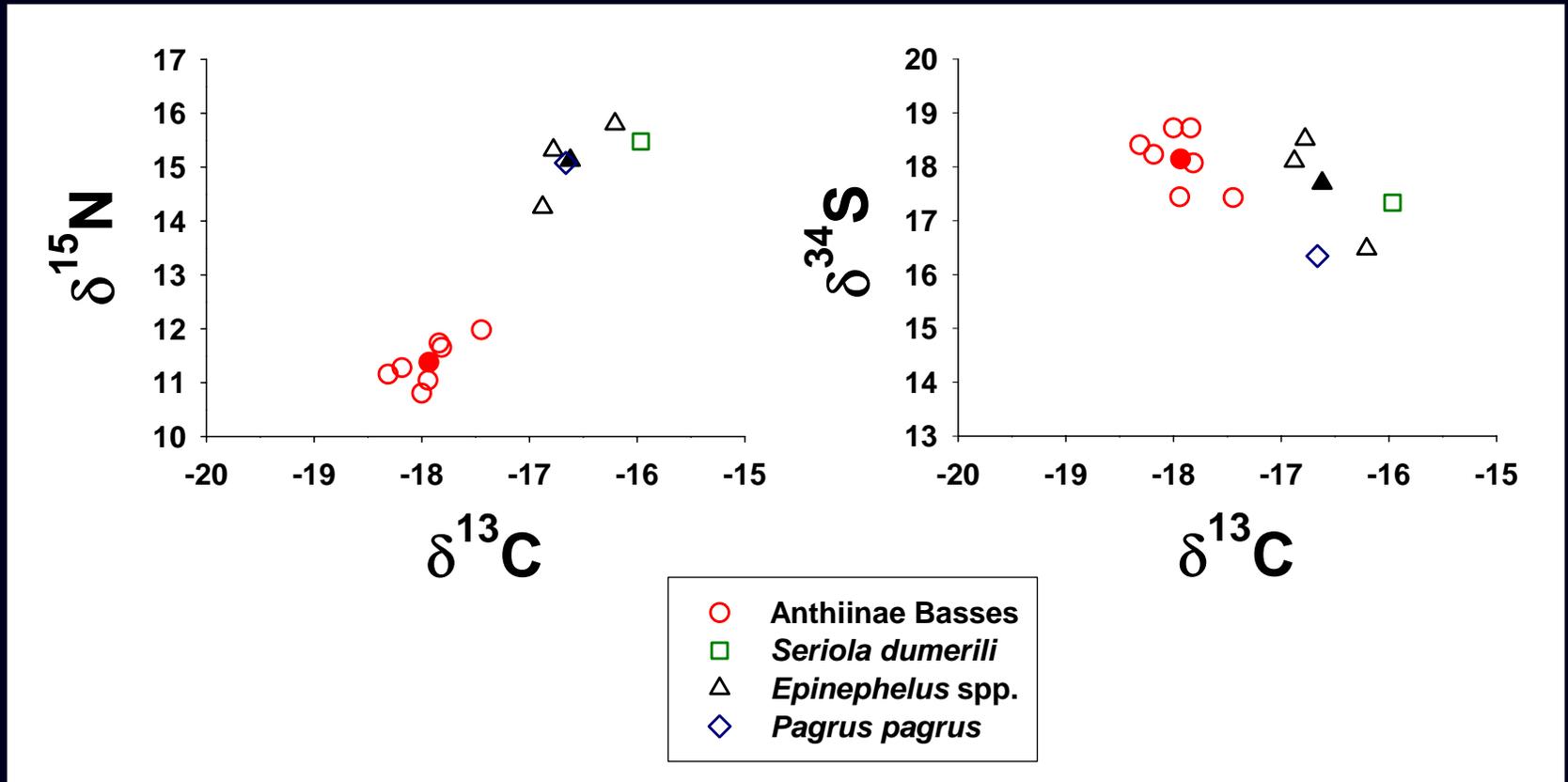
asd

- Reef fishes present at the three shallowest sites
- Fish community different among sites and locations within sites
- Fish community similar among deep sites; “reef effect” not apparent

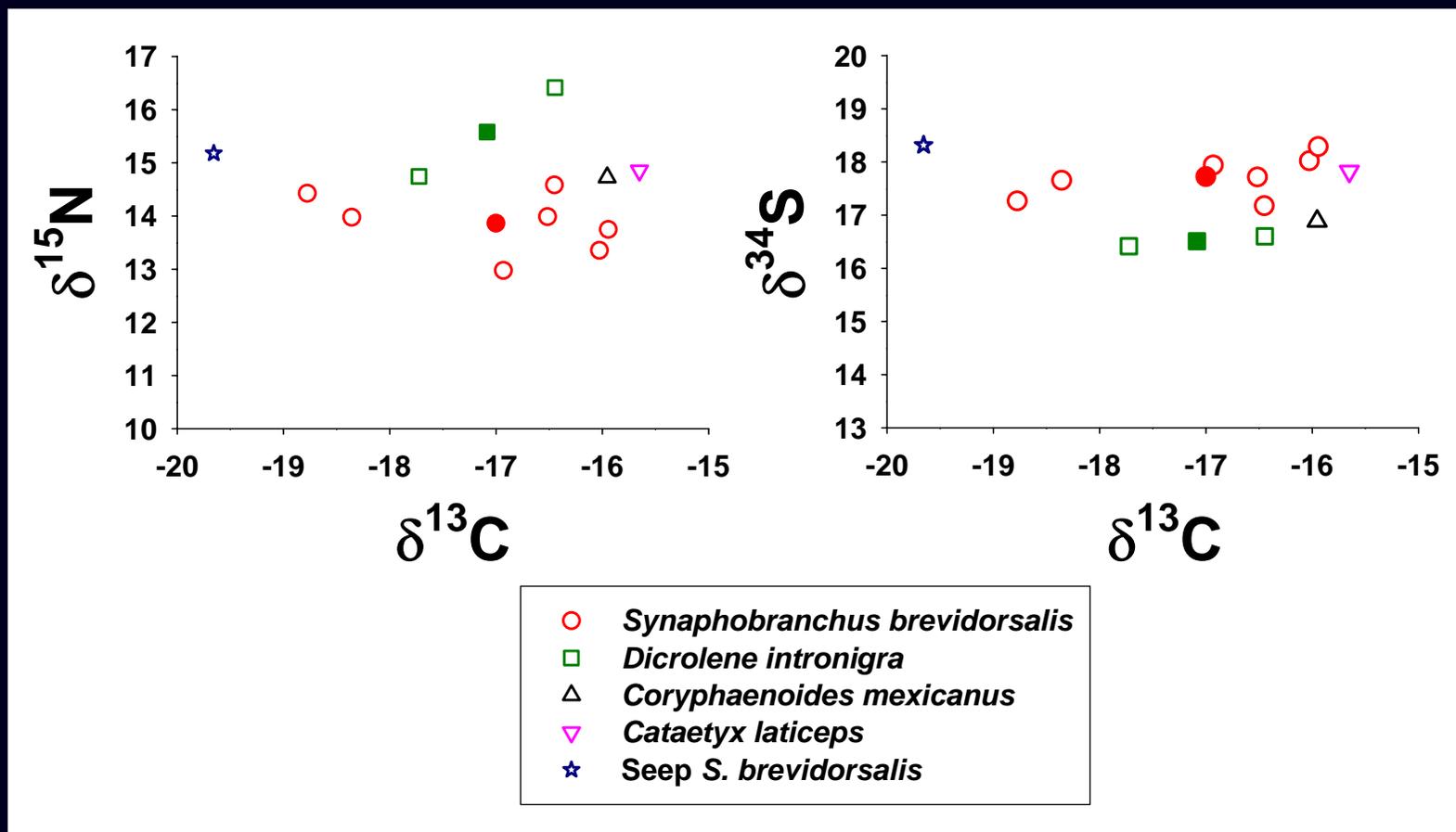
Fish Diet Analysis



Stable Isotope Ratios: *Halo*



Stable Isotope Ratios: *REL* and *U166*



Trophic Structure Summary

- **Stable isotope ratios revealed trophic position and source of C**
- **Planktivorous reef fishes at Virginia and Halo important for transfer of C from lower to upper trophic levels**
- **Some evidence of chemosynthetic production in fish biomass at deepest sites but photic zone production more important**

Conclusions

- Artificial reef effect was apparent at shelf and slope shipwreck sites.
- Fish sampled at deep sites had stable isotope signatures that indicated photic zone (i.e., phytoplankton) primary production was most important although some level of chemosynthetic production was evident.



Acknowledgments

