

# Effect of seamounts on mesopelagic micronekton community structure around Hawaii



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# Outline

- Background information
- Study sites
- Methods of collection
- Preliminary results
- Future directions

# Tuna and seamounts



- Tuna have been shown to aggregate over seamounts
  - Recent increase in fishing pressure over Cross Seamount (Holland et al 1999; Musyl et al 2003)
  - Residence time at Cross seamount for yellowfin tuna is 15 days and for bigeye tuna it is 32 days (Holland et al 1999)
- Could this aggregation be due to increased food at Cross Seamount
  - Bigeye tuna associated with Cross Seamount were found to have fuller stomachs and ingested a higher diversity of prey (Grubbs et al 2002)
- Major food source for tuna are mesopelagic micronekton
  - Bigeye tuna have been shown to exhibit vertical migrations during the day (Musyl et al 2003)

# Just what are mesopelagic micronekton

- Important food source for tunas, other nektonic predators, and even some seabirds
- Active swimmers in the size range of 2-20 cm
- Inhabit mesopelagic depths during the day
- Many in the mesopelagic undergo diel vertical migration: reside at depth during the day then migrate to shallow depths at night



# Micronekton and seamounts

- Documented higher abundance and diversity over seamounts (Boehlert and Genin 1987; Rogers 1994)
  - Due to increase in food supply
  - Due to concentration effect
- Change in community composition
  - Southeast Hancock Seamount reported two seamount associated species, *Maurolicus muelleri* and *Gnathophausia longispina* (Wilson and Boehlert 2004)

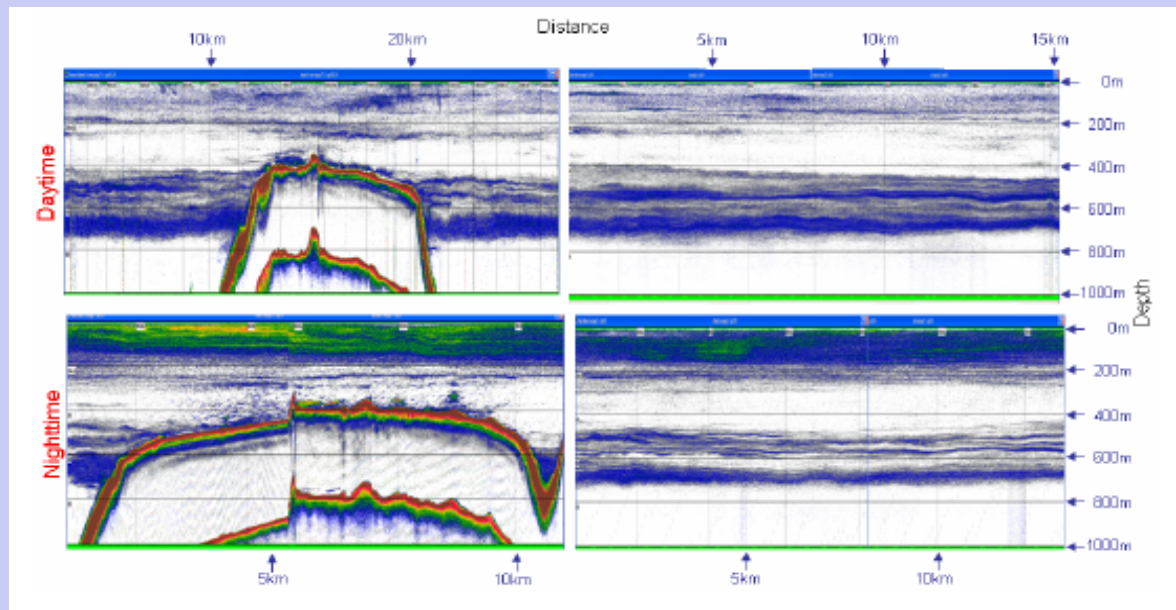
# Main Question

- Is there a larger and/or different prey source for tuna at Cross Seamount in comparison to nearby open ocean habitats?

# Acoustics

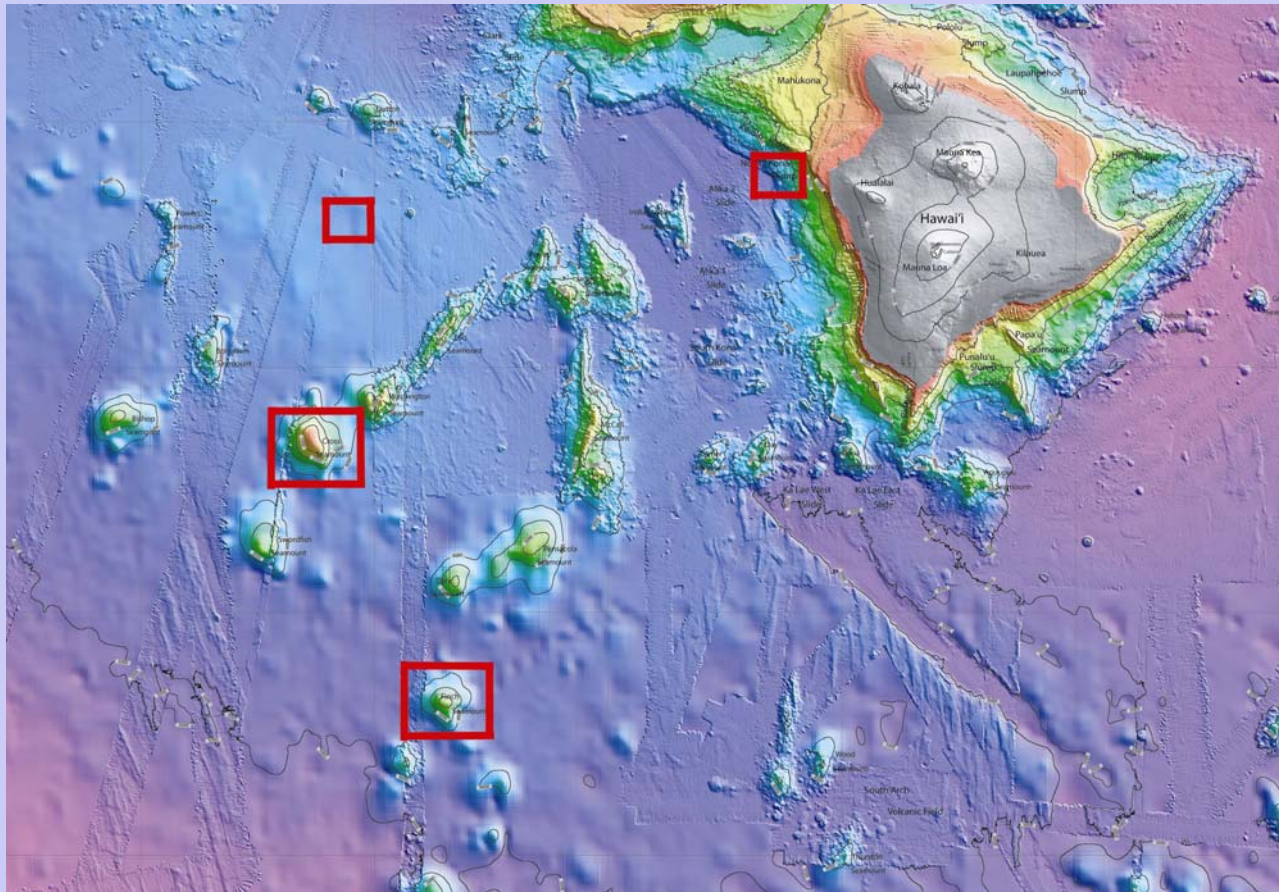
Cross Seamount

Open Ocean



- Three different types of trawls were conducted to target the Sonic Scattering Layer (SSL)
  - Day Deep
  - Night Shallow
  - Night Deep

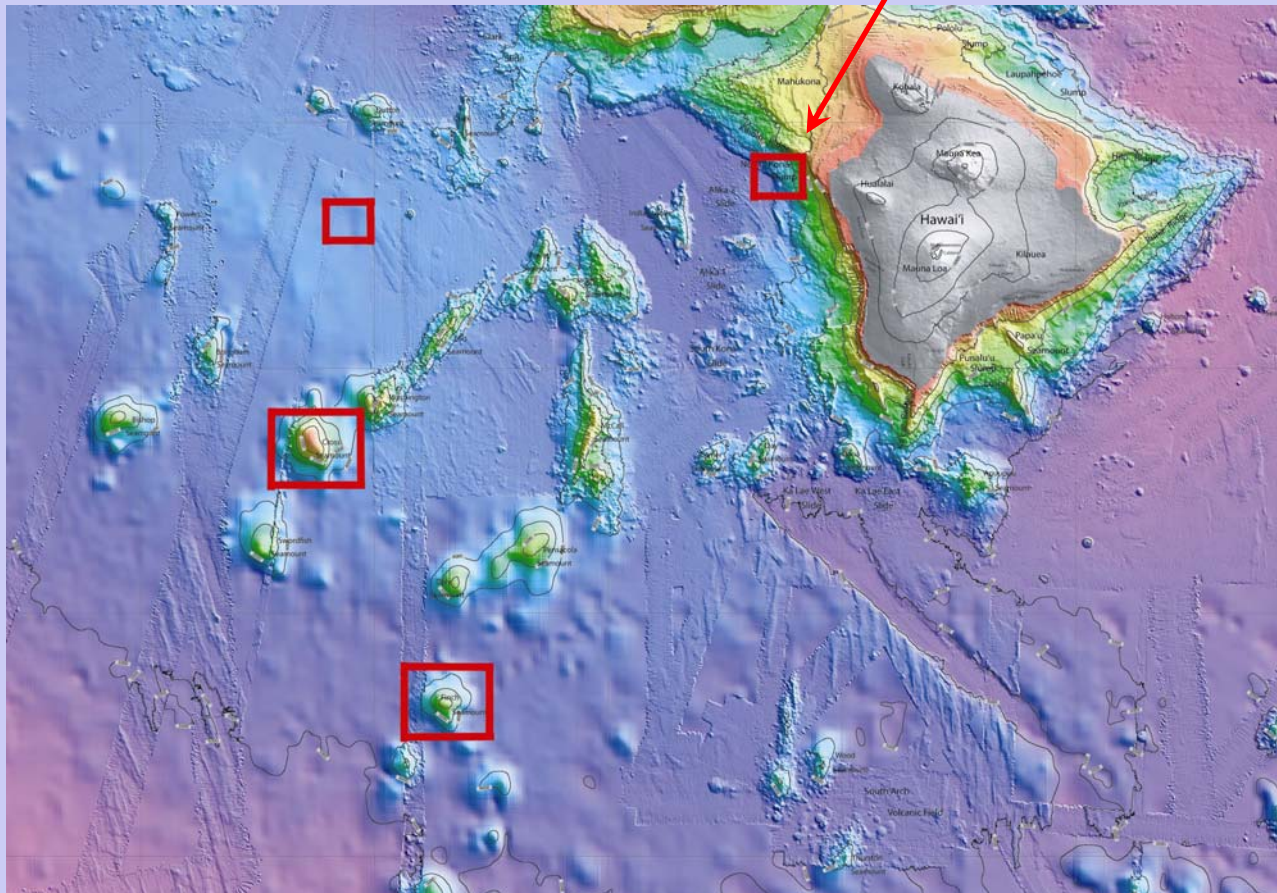
# Study Sites





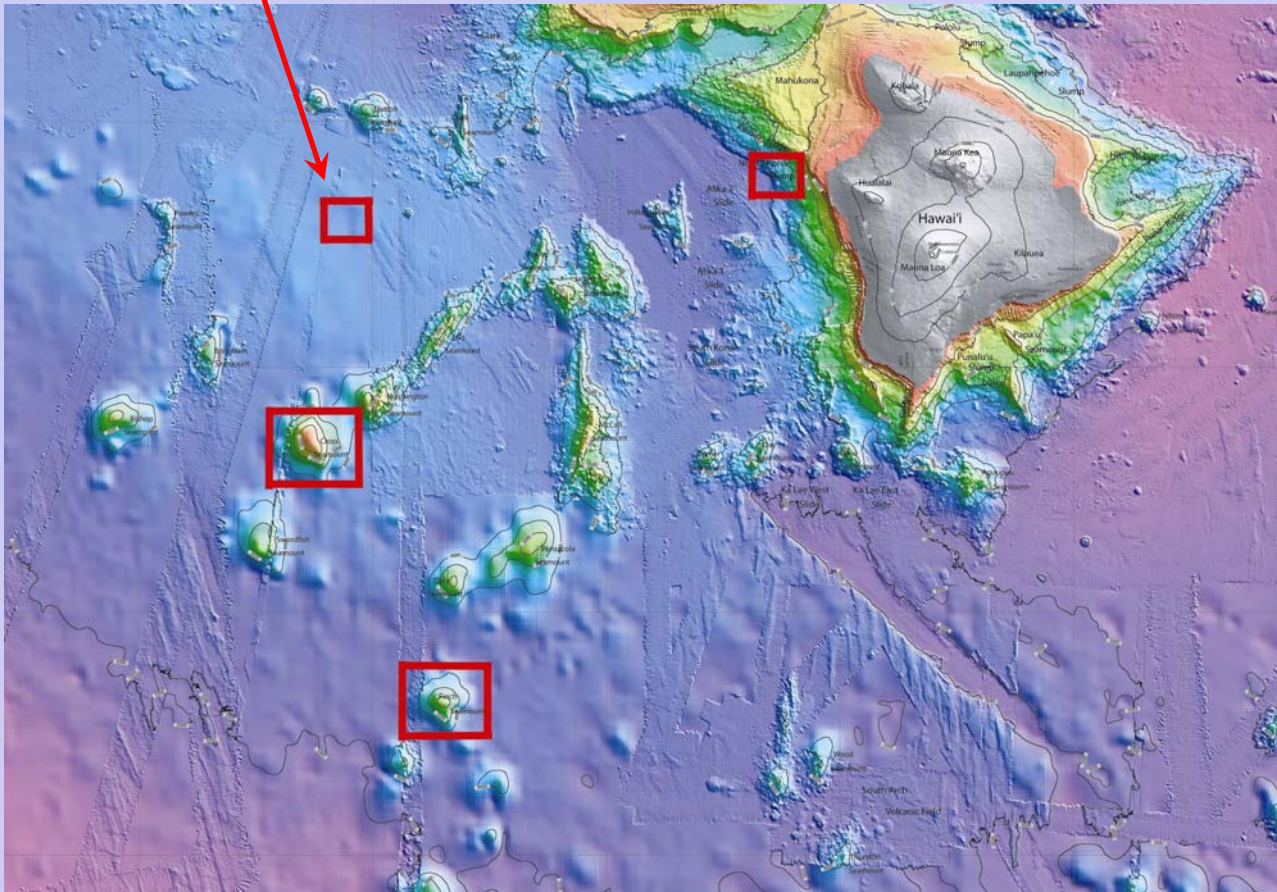
# Study Sites

**Keahole Point** (10 x 10 n.mile box centered around 19° 45' N 156° 15' W)



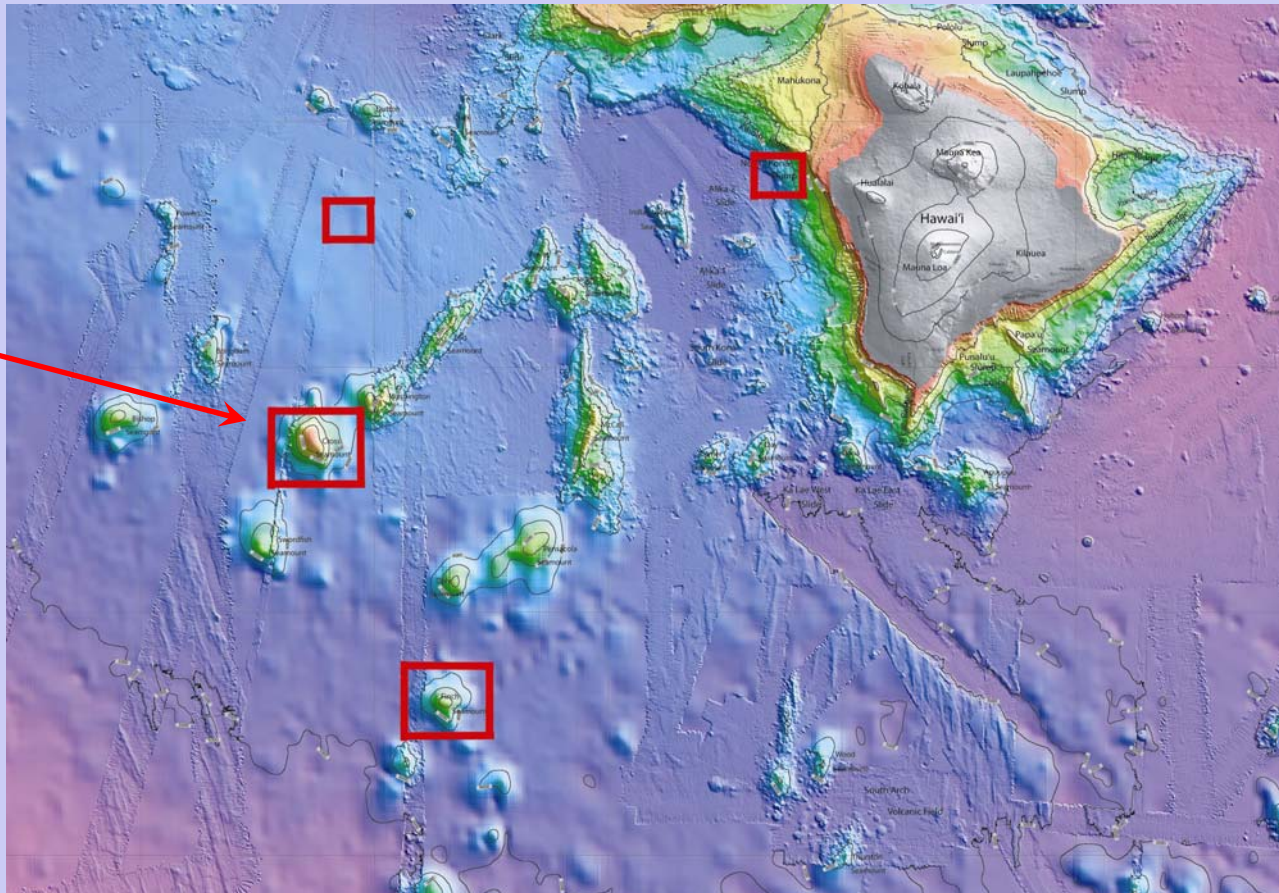
# Study Sites

**Open Ocean Control** approximately 19° 38'N, 158° 08'W

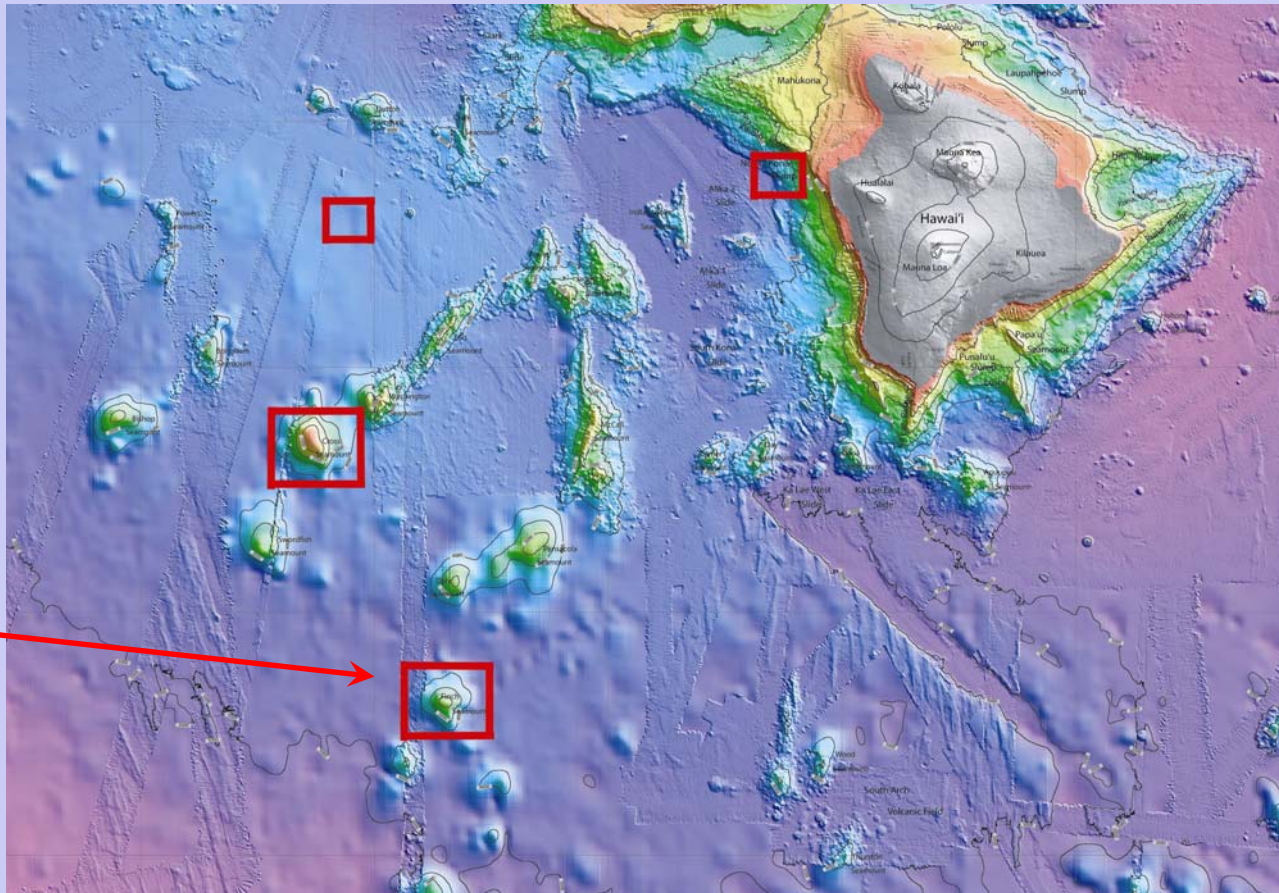


# Study Sites

**Cross  
Seamount**  
18° 40' N 158° 10'  
W



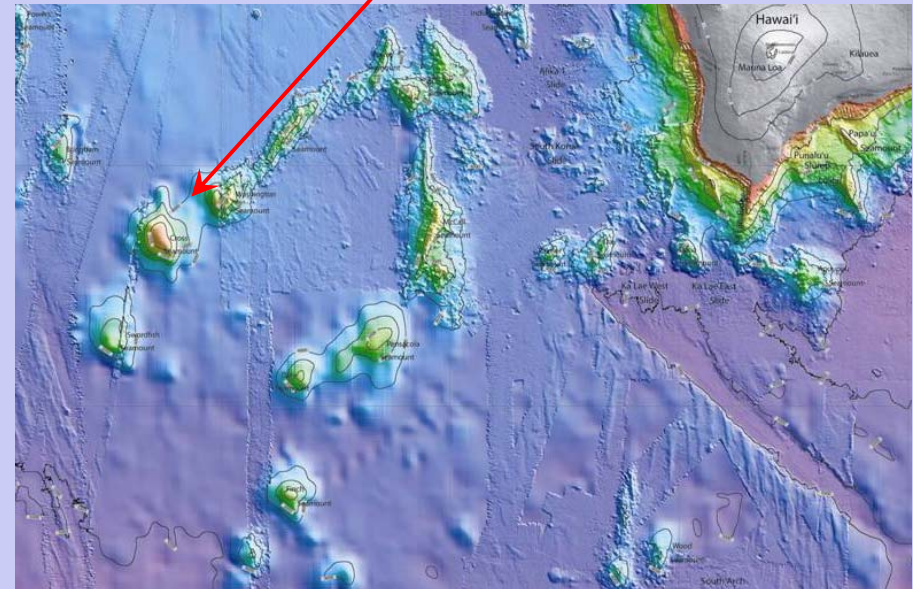
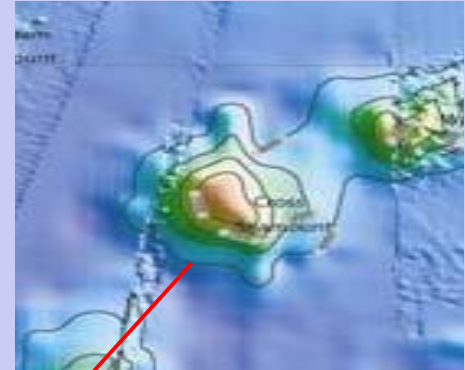
# Study Sites



**Finch  
Seamount**  
17° 40' N 157°  
40' W

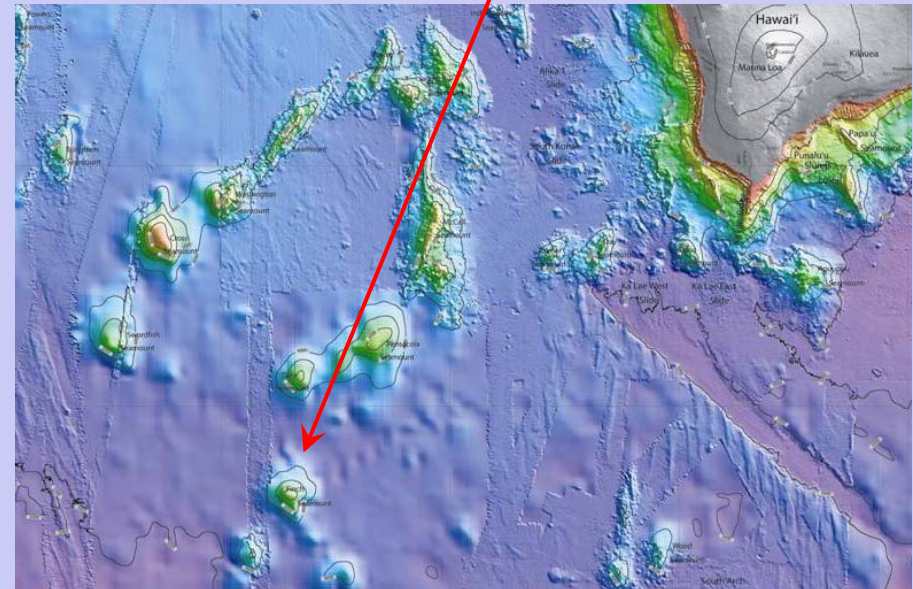
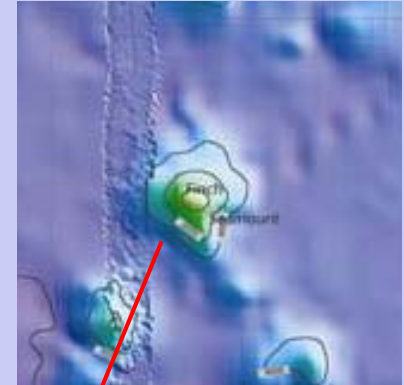
# Study Sites

- Cross Seamount
  - Plateau rises to 330 m below sea surface
  - Flat topped plateau
  - Surrounded by other seamounts
- Finch Seamount
  - Plateau is roughly 1000 m below sea surface
  - Pinnacle shaped seamount
  - Located further distance from other seamounts



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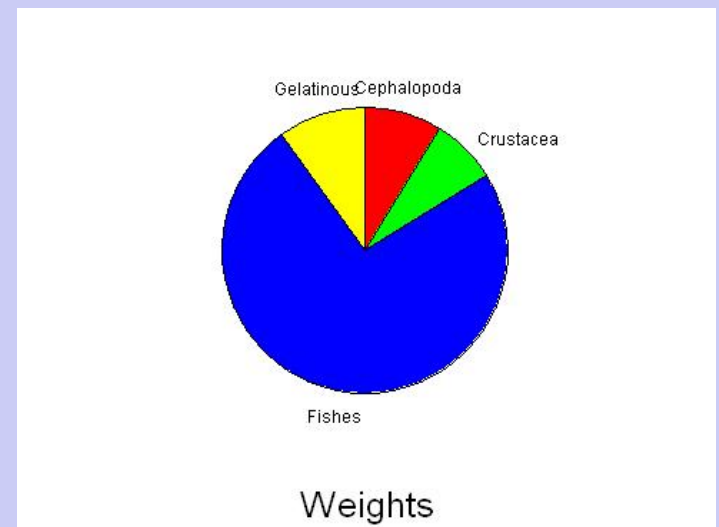
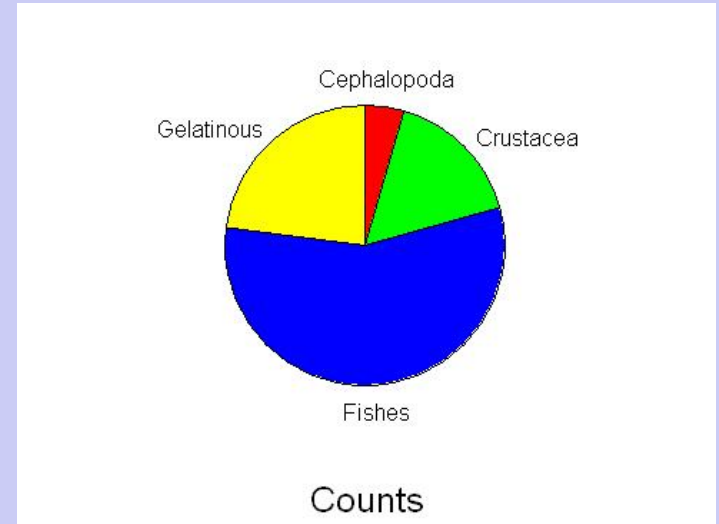


# Methods

- A total of 33 trawls were collected from the four sites on the NOAA research vessel Oscar Elton Sette Spring 2005
- Samples were collected using a dual warp modified Cobb trawl
  - Mouth opening of ~140 m<sup>2</sup>
  - Graded mesh ranging from 152 mm stretched to 3.2 mm knotless nylon delta mesh
- Organisms collected from each trawl were preserved in 10% buffered formalin
- In the lab the organisms in each trawl are sorted to the lowest possible taxon

# Preliminary Results

- Total of 15 trawls have been fully sorted.
  - 4 Keahole Point
  - 6 Finch Seamount
  - 3 Cross Seamount
  - 2 Open Ocean
- 131 taxa identified total, 18,000 individuals sorted





# Cephalopods

- 28 species within 10 families
- Dominated by Enoploteuthidae
  - *Abraliopsis sp A*
  - *Abraliopsis pacifica*
  - *Abralia trigonura*
- Cranchiidae, Ommastrephidae, and Pyroteuthidae



# Crustaceans

- 20 species in 10 families
- Dominated by Oplophoridae and Sergestidae
- Micronekton sized juveniles



# Fishes



- 79 species in 29 families
- Largely dominated by Myctophidae
  - 31 species
  - Mostly *Ceratoscopelus warmingii* and *Diaphus schmidti*
- Stomiiformes and Gonostomatidae

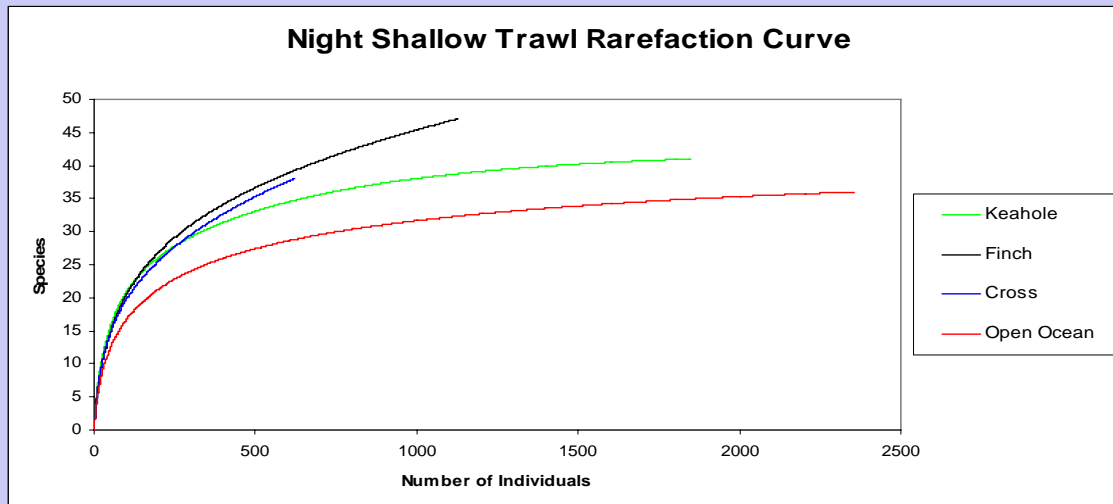
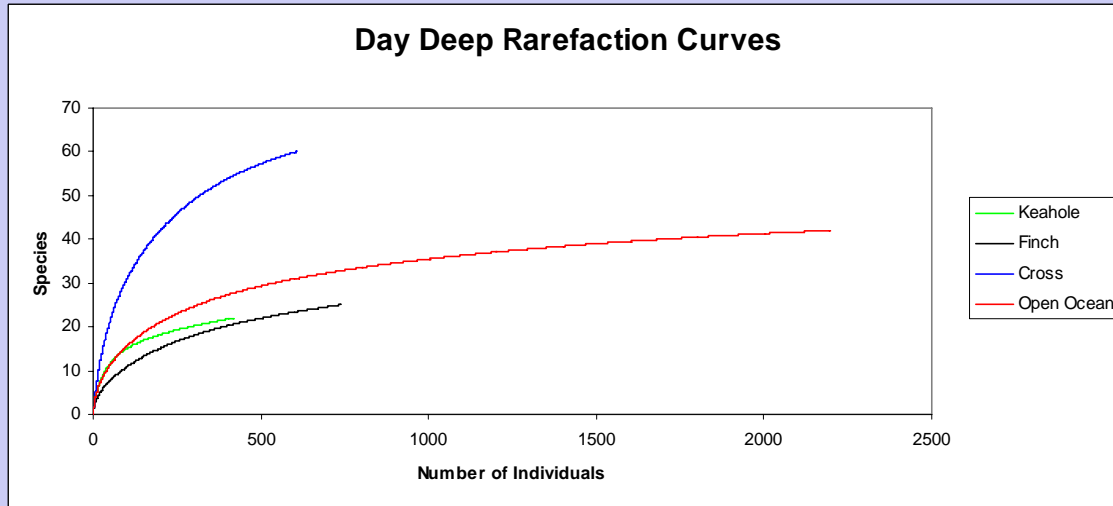
# Gelatinous



- Three main types
  - Solitary Salps
  - Colonial Salps
  - Scyphomedusa



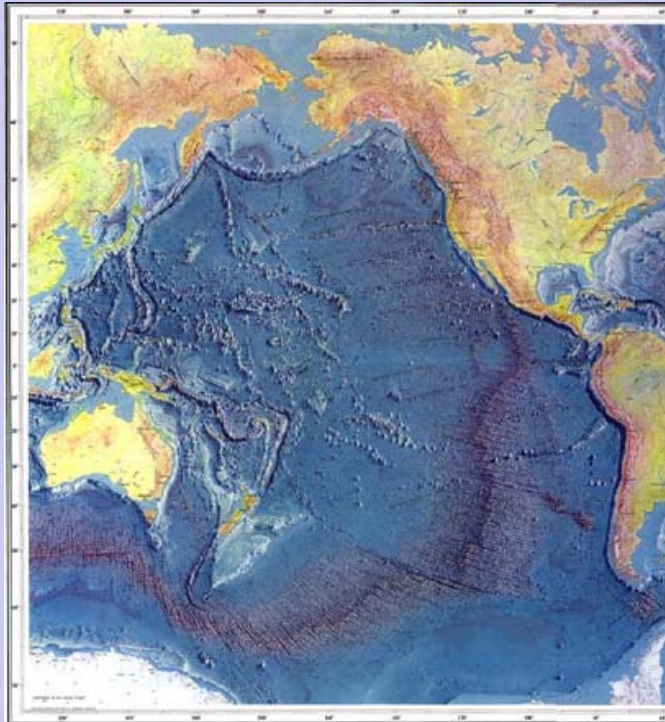
# Diversity



# Future Direction

- Lots more trawls from Spring 2005 cruise
  - Analysis of the diversity, abundance and biomass between trawls and locations
  - Determination of resident fauna at seamounts
- A cruise in February 2007 will result in addition of open ocean control and Cross Seamount samples

# Other Tuna hotspots



- ~30,000 seamounts with heights greater than 1 km (Smith and Jordan 1988)
- Aggregation associated with eddies and frontal systems
  - American Samoa Albacore fishery
  - 14 trawls collected from February 2006 cruise

# Acknowledgments

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**Thank You**