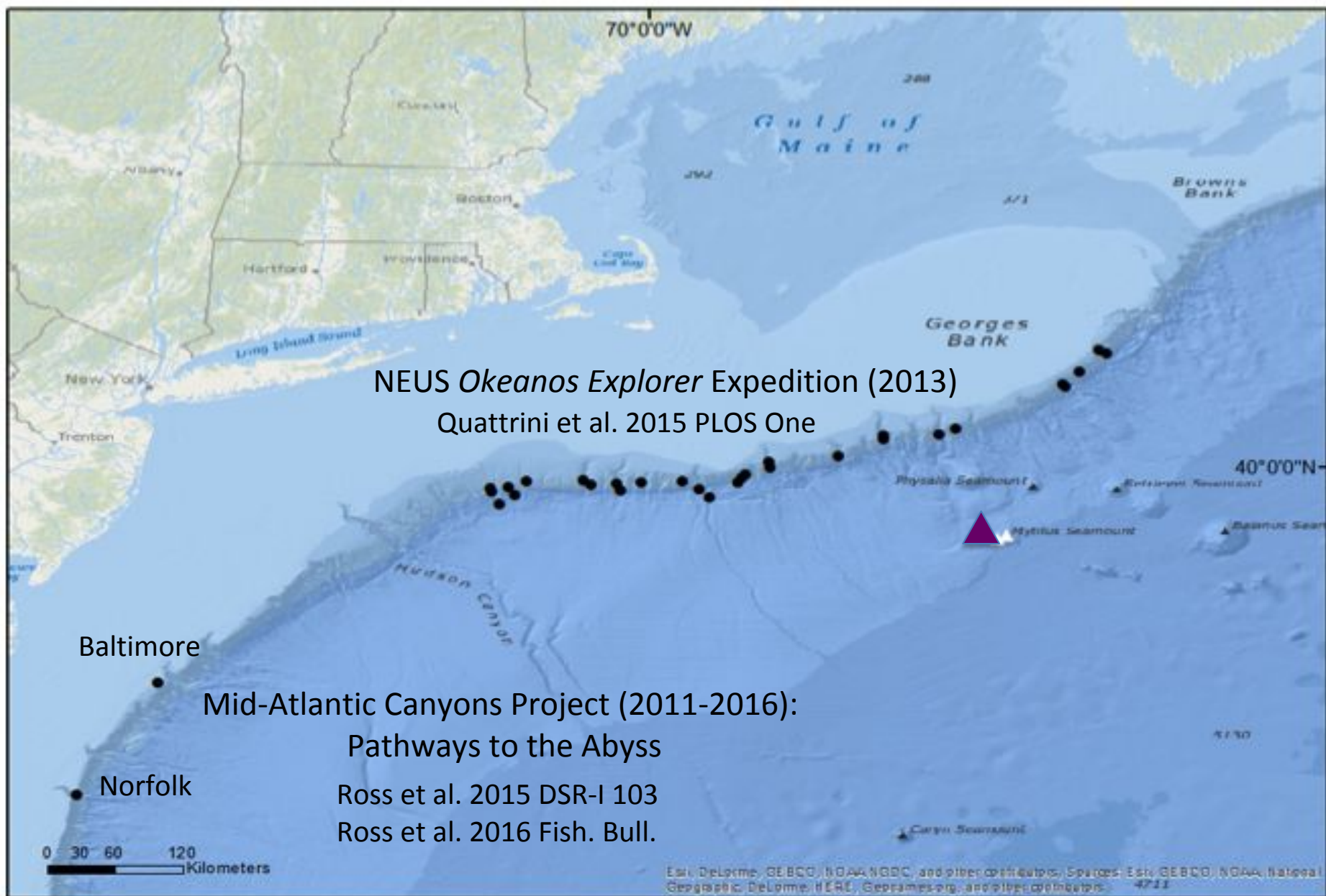


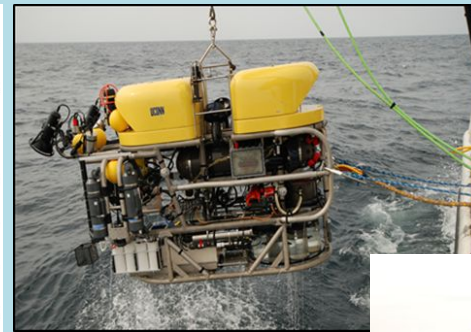
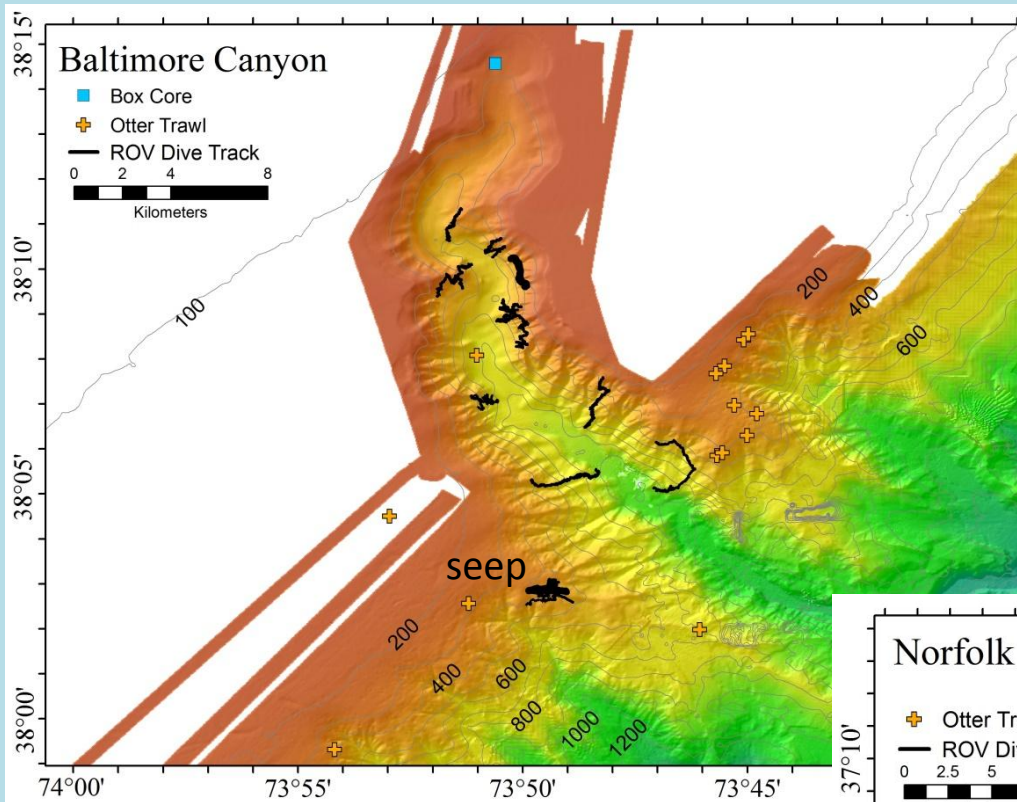
# Fish Communities in and near U.S. Middle Atlantic Canyons

Steve W. Ross (Univ. NC-Wilmington)



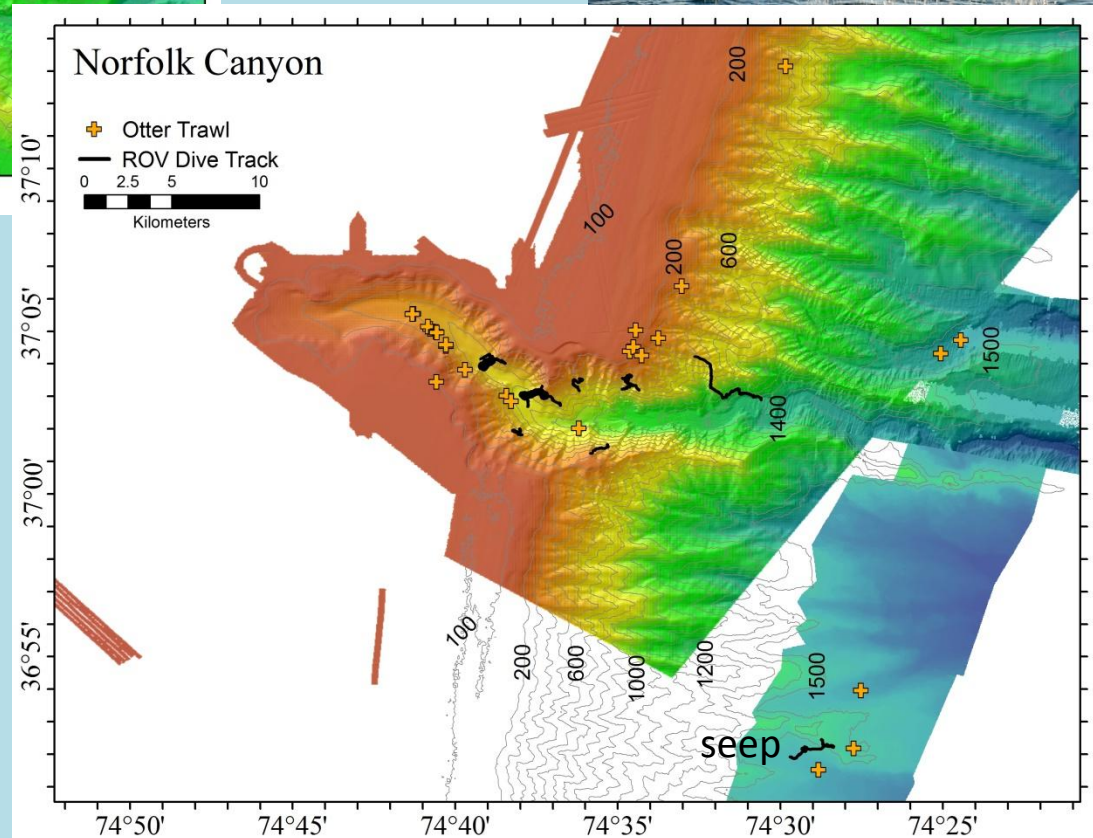
# Two Mid-Atlantic Efforts Analyzed Canyon & Seep Fish Communities





## METHODS

- Video transects across all habitats from 34 ROV dives (234-1612 m), 304 hrs bottom observations
- Supplemental data from 40, 30-min bottom trawl tows (103-1712 m)
- Primer analysis used to examine assemblage structure and habitat use (Bray-Curtis matrix with 4<sup>th</sup> root transformed abundances)



# Fishes – general results

- 123 total species (84 from ROV video); + 25 spp. from north
- 12 (+3) species are range extensions (4 below)

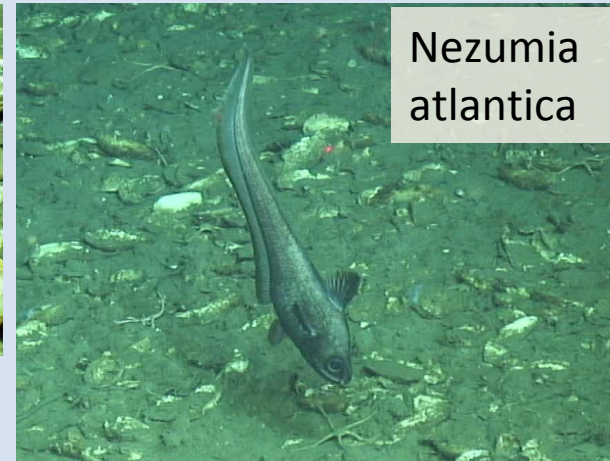
*Neocyttus helgae*



*Dysommia rugosa*



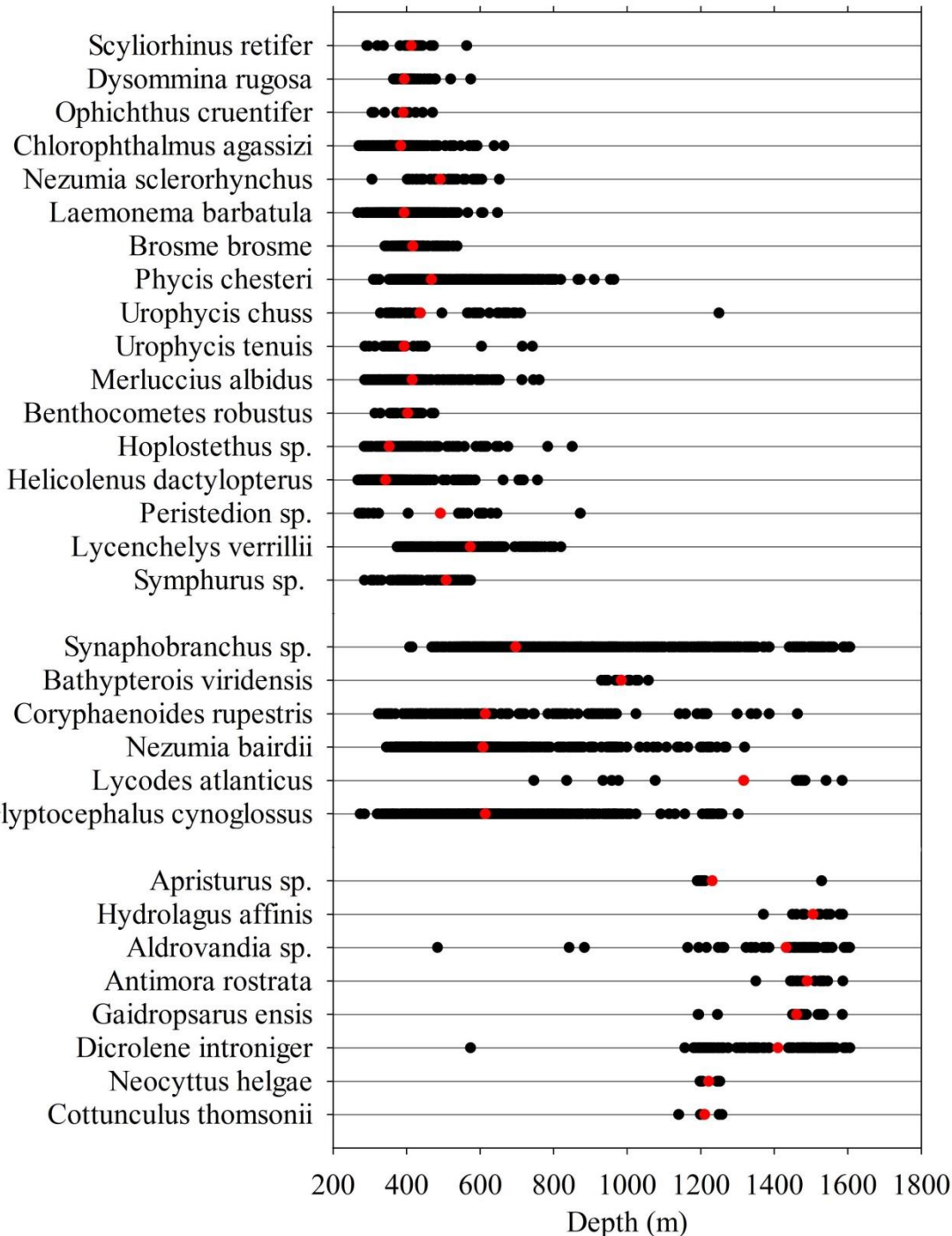
*Nezumia atlantica*



*Bythites fuscus*



- Two general depth patterns (“shallow” & “deep”) were apparent
- A third depth pattern included species of intermediate depths or which had wide depth ranges



Depth distributions of dominant benthic fishes from ROV video surveys in Norfolk and Baltimore canyons, illustrating 3 depth patterns:

- “shallow” (narrow)
- Wide range - intermediate
- “Deep” (narrow)

Black dots = full observed depth range

Red dots = mean depth weighted by abundance

## “Simplified” Depth Structuring

Standardise Samples by Total  
Transform: Fourth root  
Resemblance: S17 Bray Curtis similarity

2D Stress: 0.14

*canyon location*

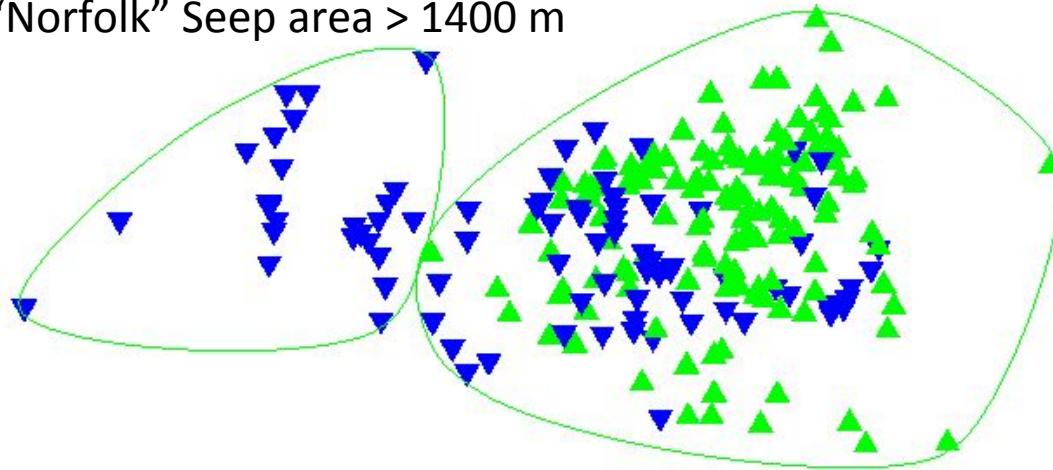
▲ Baltimore

▼ Norfolk

*Similarity*

5

“Norfolk” Seep area > 1400 m



Baltimore & Norfolk < 1400 m  
(all habitats)

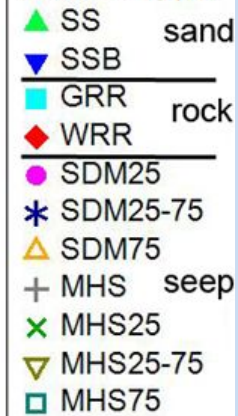
- “Deep” Norfolk 95% dissimilar from “Shallow” Baltimore + Norfolk
- Two clusters significantly different (DistLM marginal test,  $p=0.001$ )
- Appeared to be a gradual transition between about 800 to 1200+ m
- Fauna nearly completely different above and below 1400 m
- Differences due to depth and not canyon or habitat

Standardise Samples by Total  
Transform: Fourth root  
Resemblance: S17 Bray Curtis similarity

<1400 m

2D Stress: 0.21

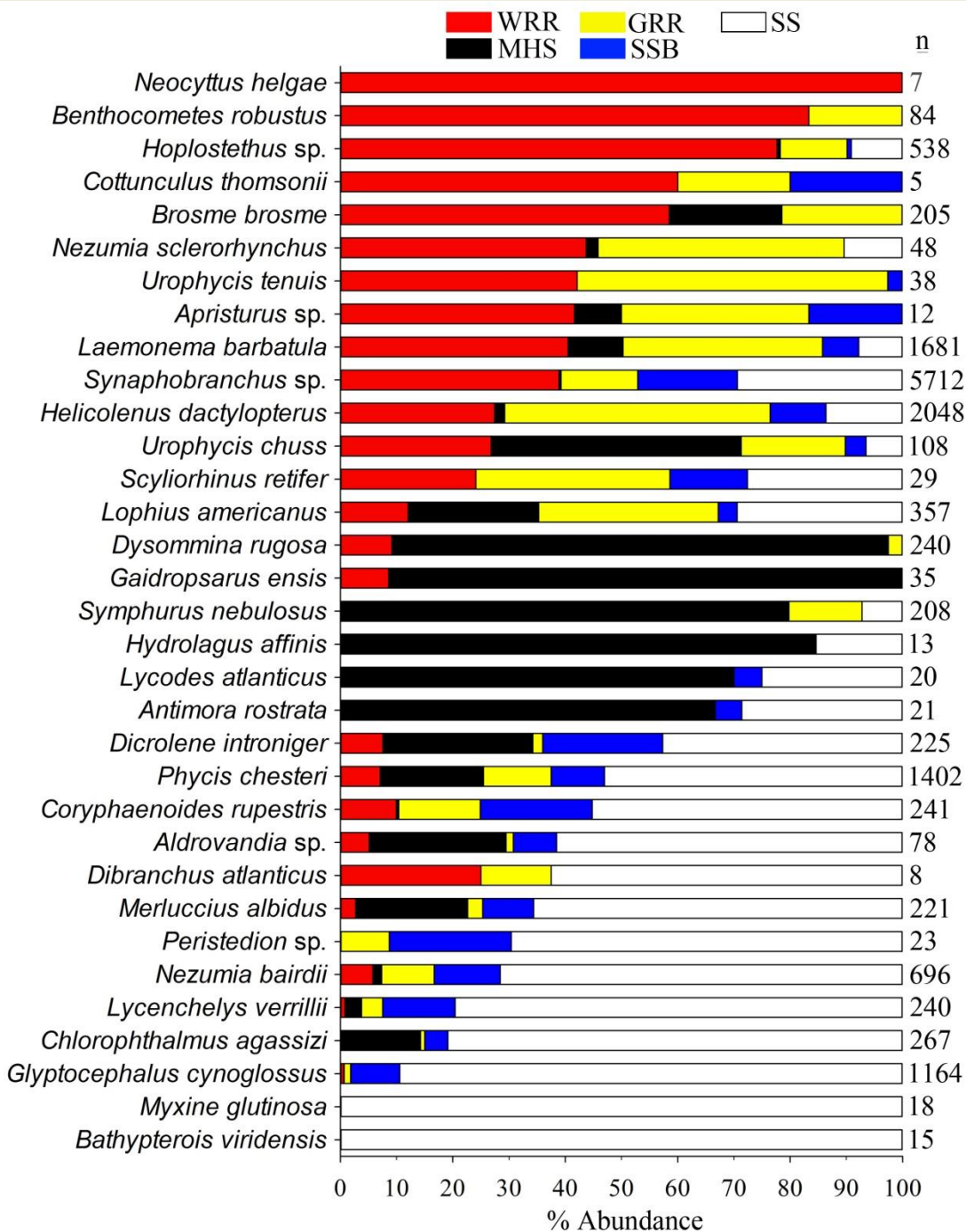
*habitat type*



## Habitat Use ("shallow")

No habitat  
differences in  
"deep" fishes.

- No difference between fish assemblages in the two Sand habitats
- Sand assemblages differed from all other habitats
- Biggest significant difference was between Sand & Mixed Hard Substrate (seep)
- Structured habitats similar to each other & dead mussel shells influenced patterns
- Presence of corals/sponges did not appear to influence fish assemblages  
( $R=0.033$ ,  $p=0.06$ )



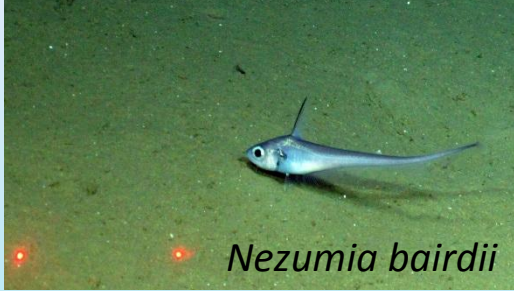
Relative abundance across  
5 major habitat types (all  
seep habitats together as  
MHS)



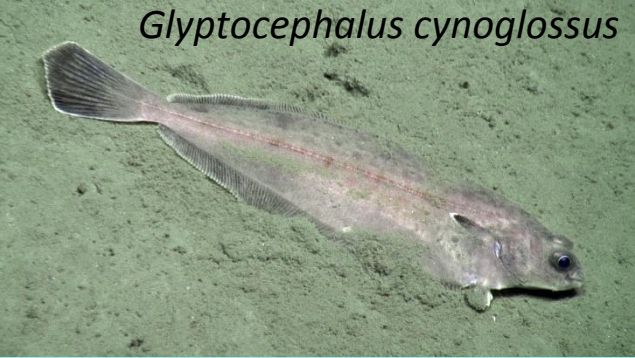
**Sandy fishes (SIMPER):** *P. chesteri*, *N.*, *bairdii*, *G. cynoglossus*, *L. americanus*, *M. albidus*



*Phycis chesteri*



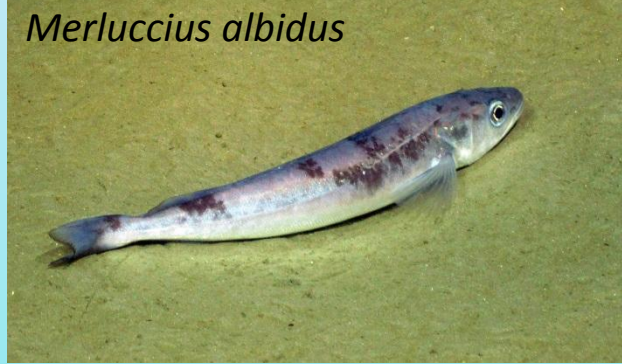
*Nezumia bairdii*



*Glyptocephalus cynoglossus*



*Lophius americanus*



*Merluccius albidus*



*Laemonema barbatulum*

*Benthocometes robustus*



*Hoplostethus* sp.



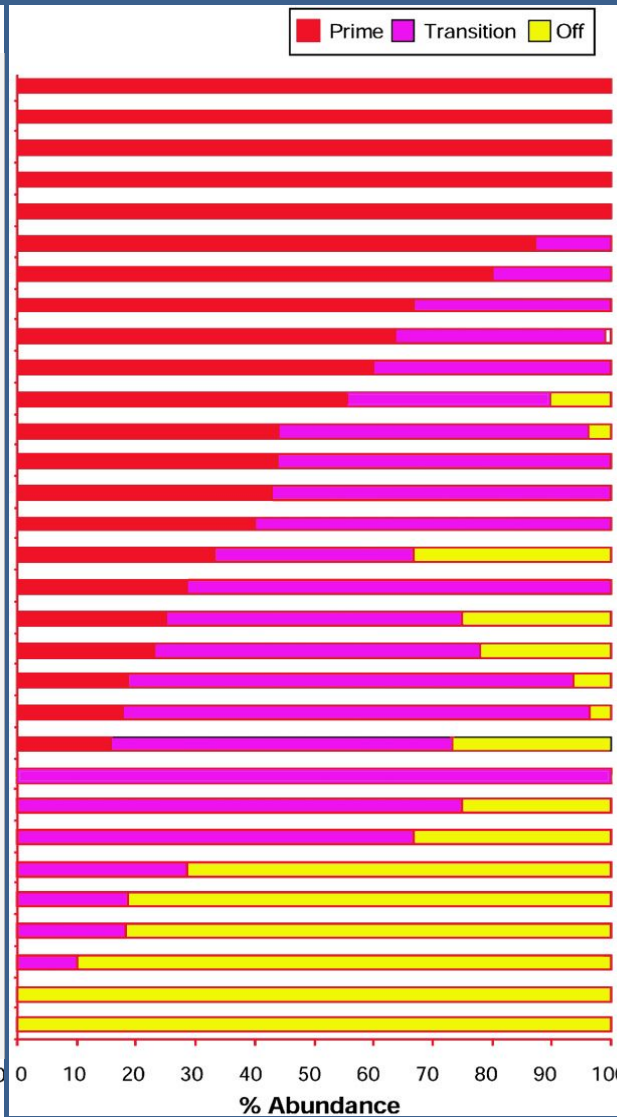
*Brosme brosme*

**Wall, rock, ridge fishes (SIMPER):** *Laemonema* sp., *Hoplostethus* sp., *B. brosme*, *B. robustus*

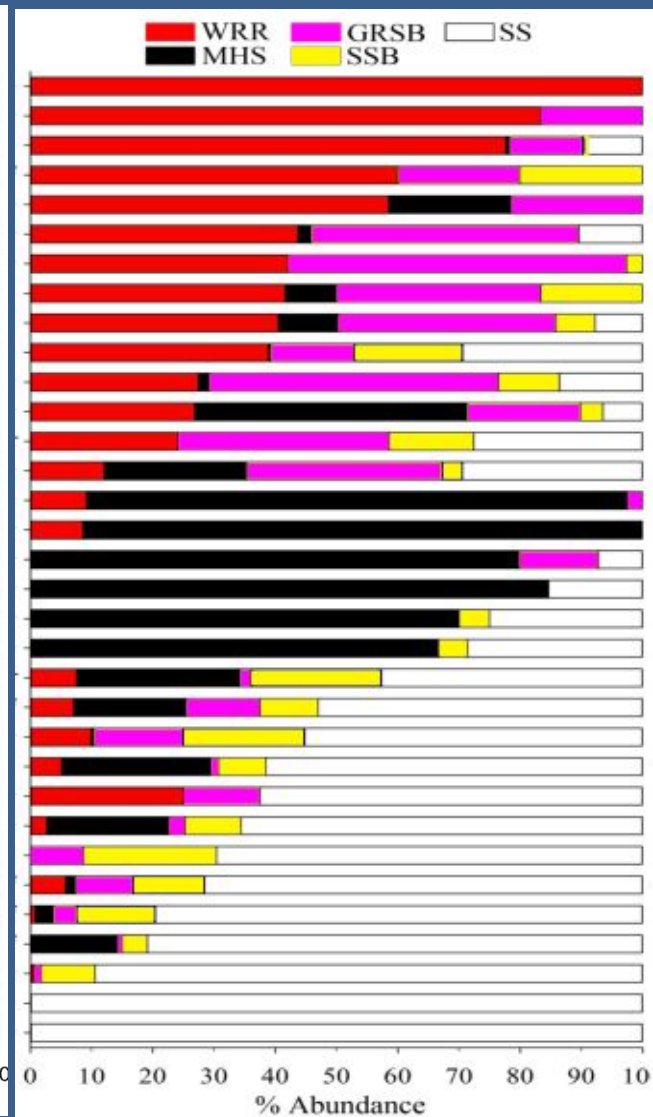
# Percent usage of general habitats by fishes in US regions of the W. North Atlantic (250-1400 m)



**Gulf of Mexico**  
(Ross et al. unpubl.)



**Southeastern US**  
(Ross & Quattrini 2007)

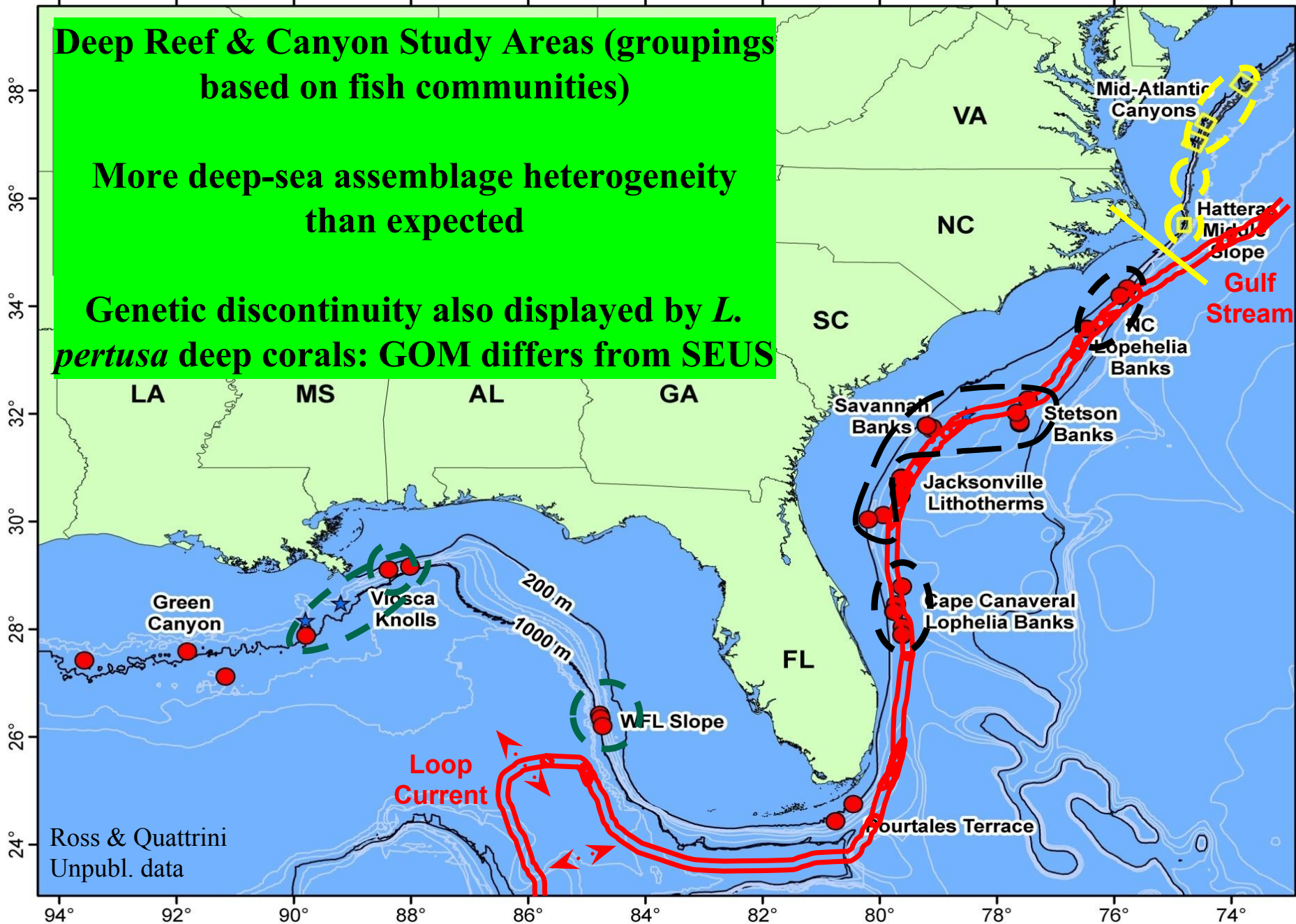


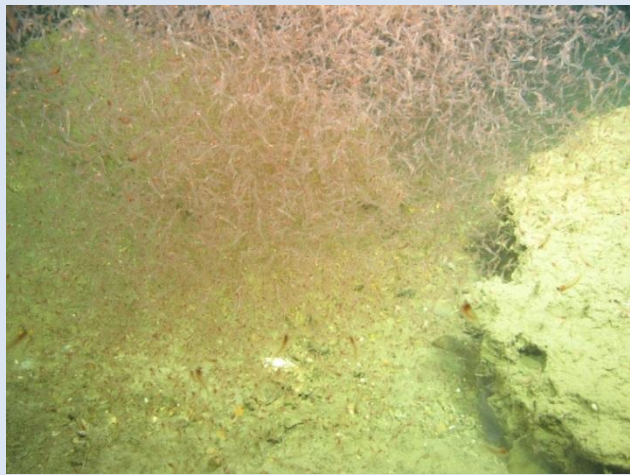
**Mid-Atlantic Canyons**  
(Ross et al. 2015)

**Deep Reef & Canyon Study Areas (groupings based on fish communities)**

**More deep-sea assemblage heterogeneity than expected**

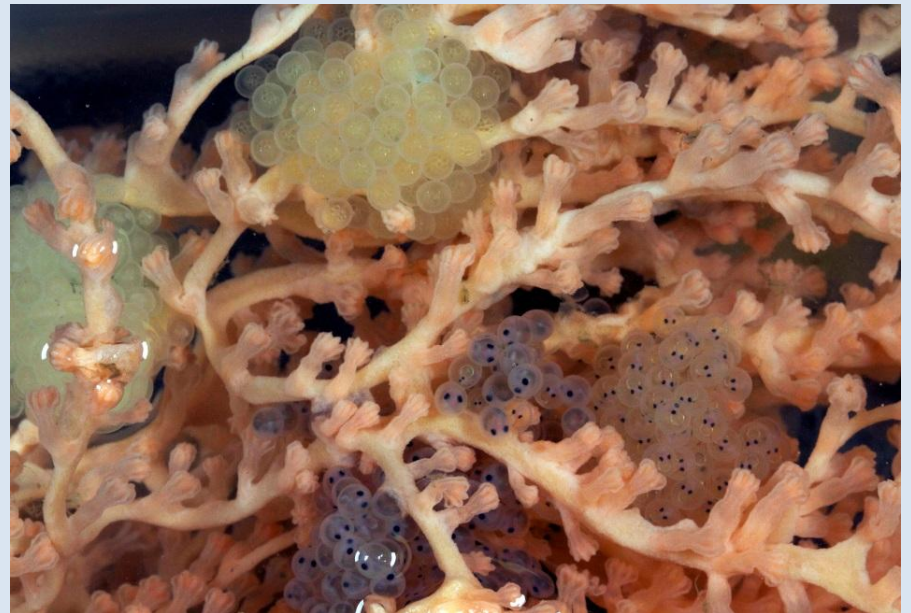
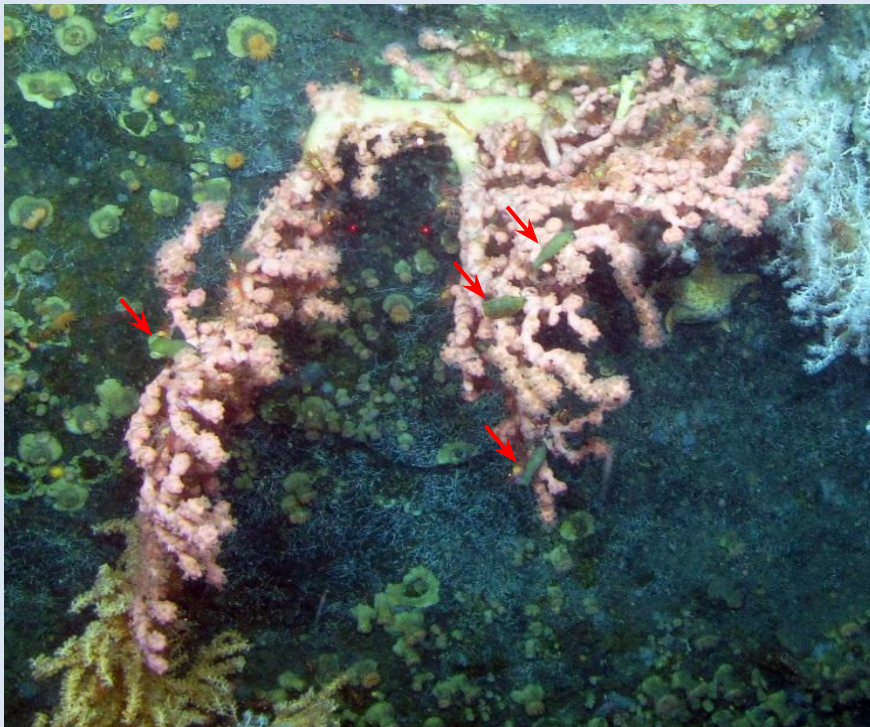
**Genetic discontinuity also displayed by *L. pertusa* deep corals: GOM differs from SEUS**





Abundant food resources:  
euphausids, mysids,  
amphipods, squid, plus rich  
benthic infauna

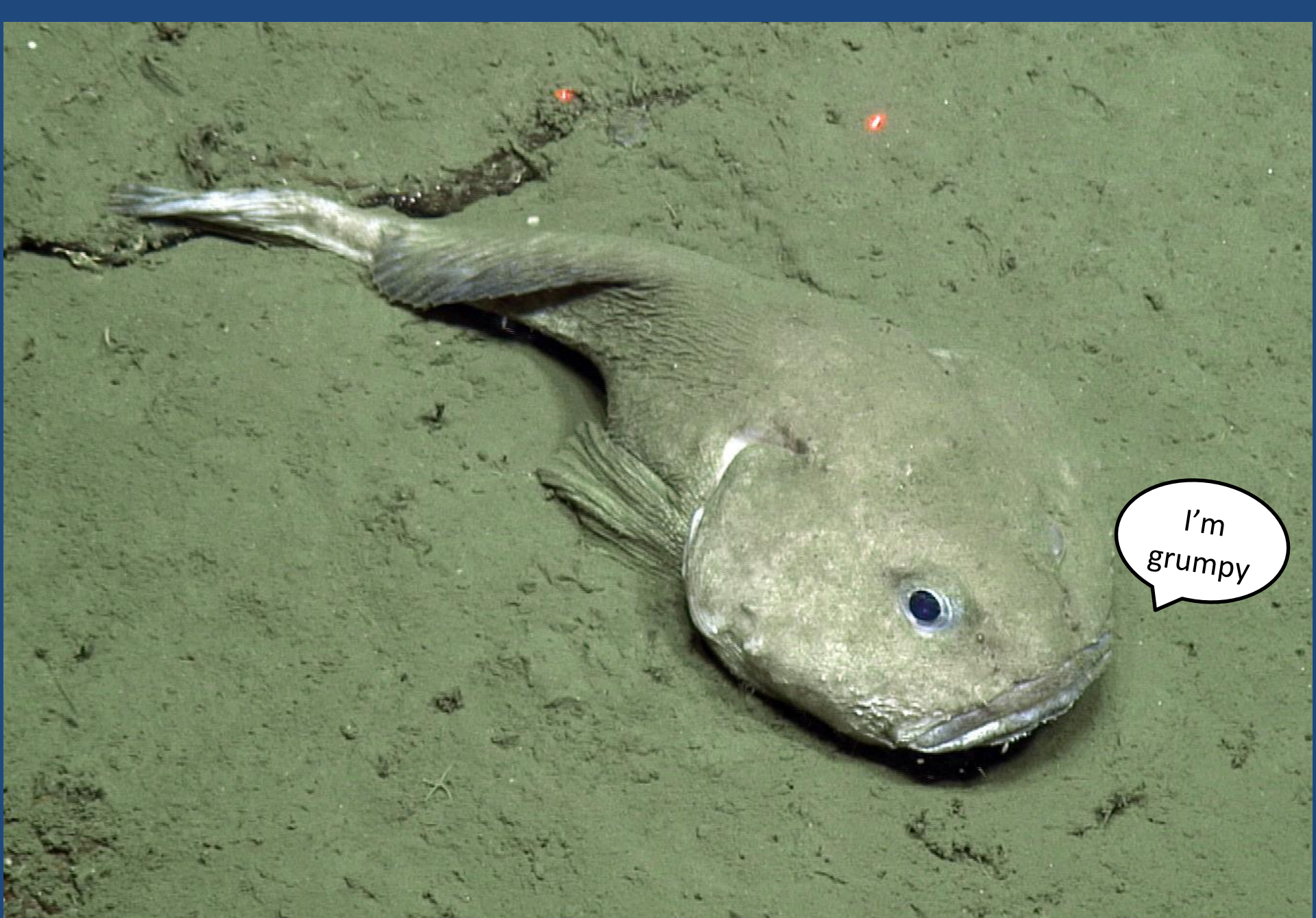
Corals – spawning substrata for some fishes (catsharks, liparids)



# Conclusions

- Few, if any, fishes are endemic to US mid-Atlantic canyons, but assemblages are influenced by canyon structures.
- Fish species compositions in canyons were somewhat different than surrounding areas; more species in canyons that preferred complex structures.
- Corals & sponges provided diverse, extensive structure (even though did not statistically affect communities).
- Likewise, seeps provided structure that influenced assemblages.
- Canyons appear to provide refuge for certain species (especially exploited species).





I'm grumpy