

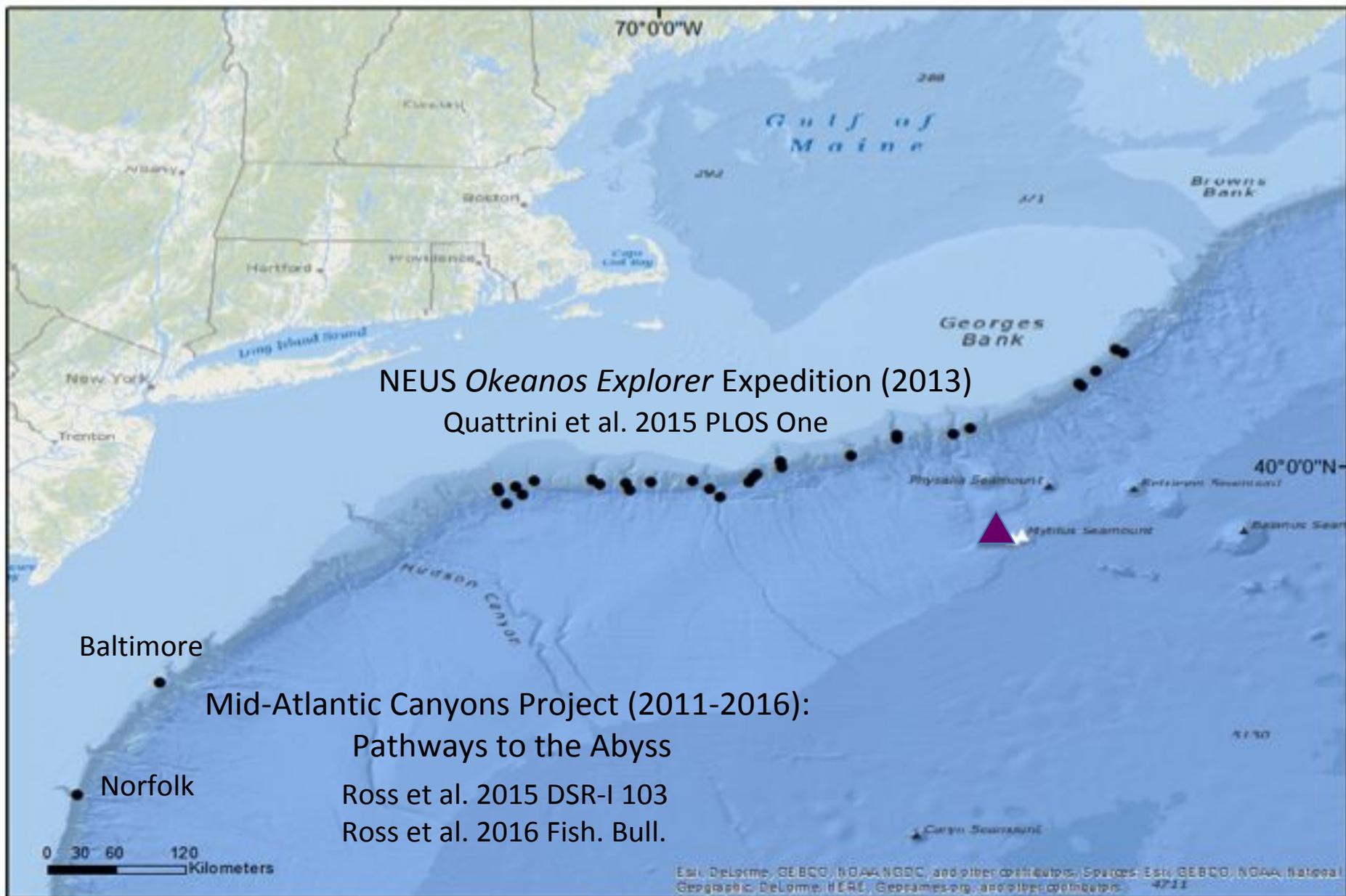


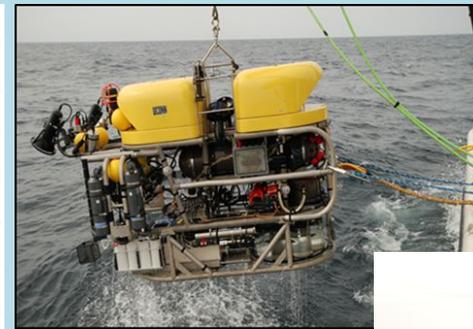
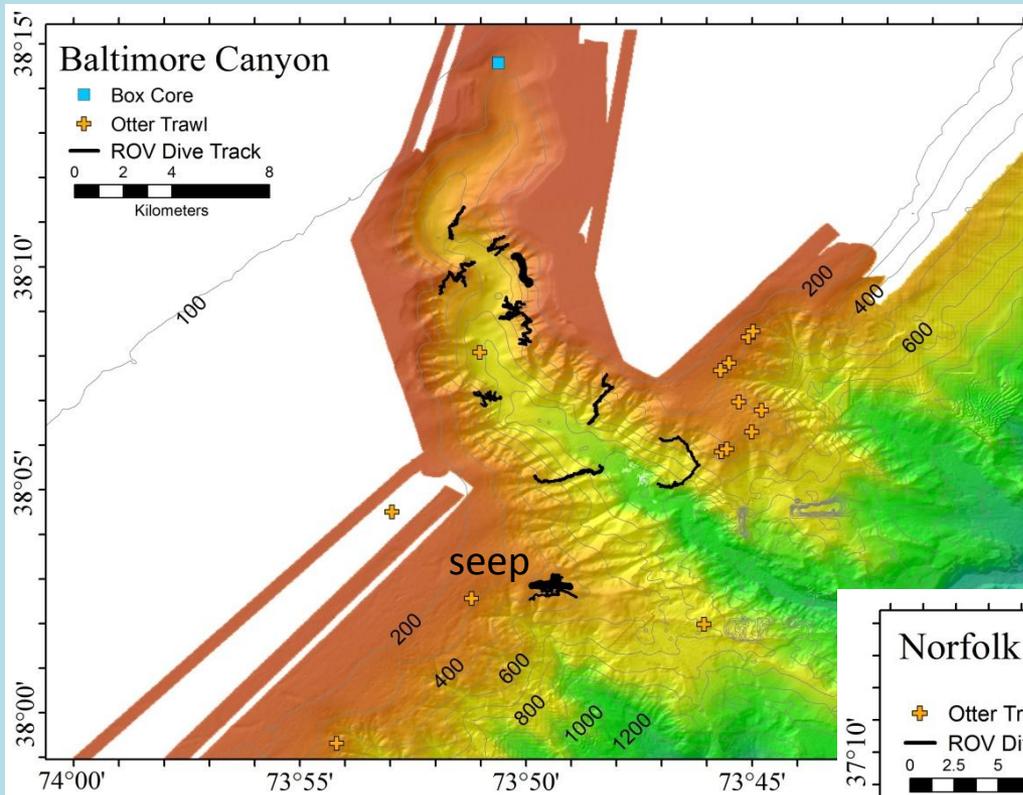
Fish Communities in and near U.S. Middle Atlantic Canyons

Steve W. Ross (Univ. NC-Wilmington)



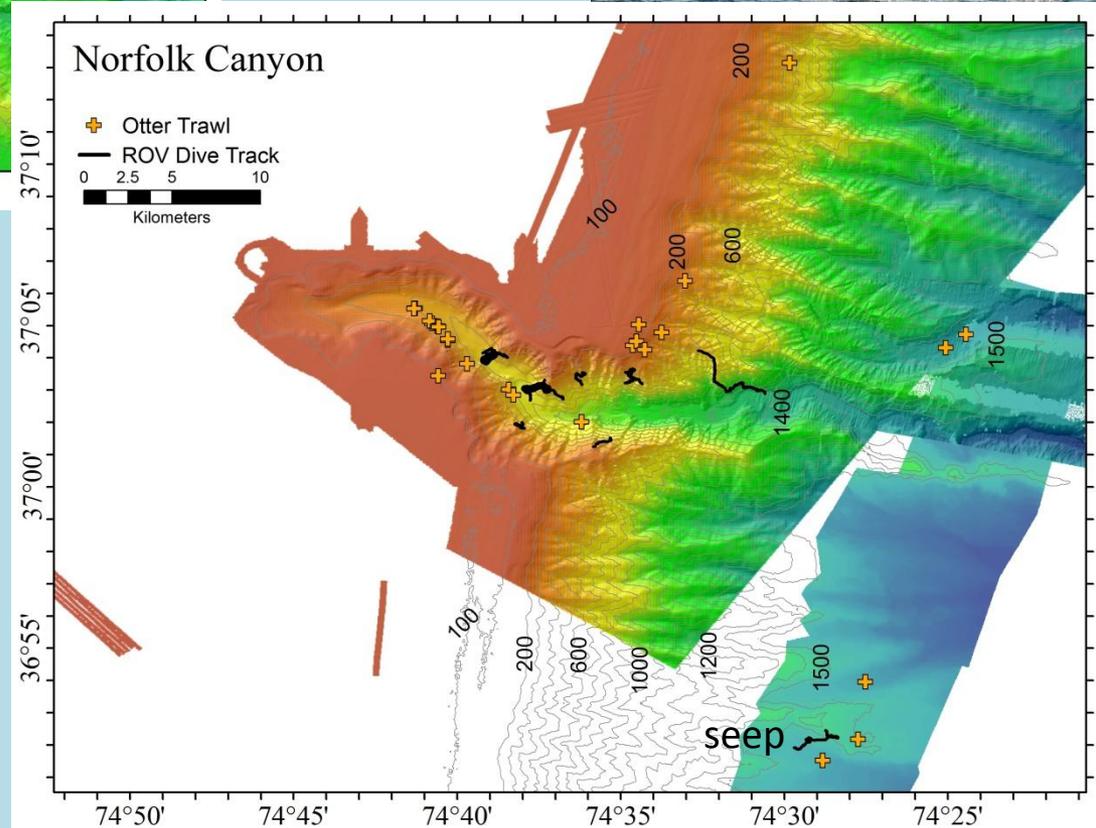
Two Mid-Atlantic Efforts Analyzed Canyon & Seep Fish Communities





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 4th 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)

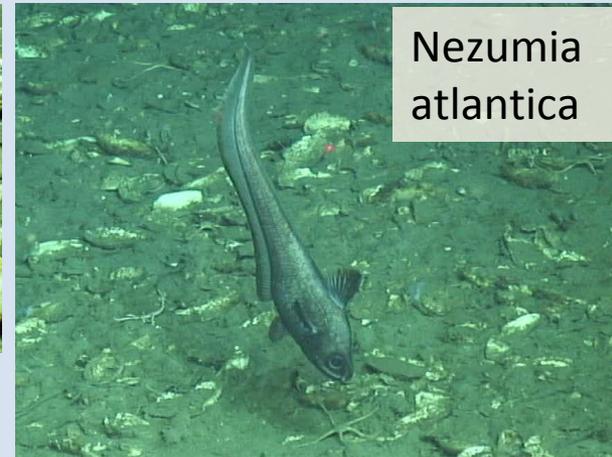
Neocyttus helgae



Dysommia rugosa



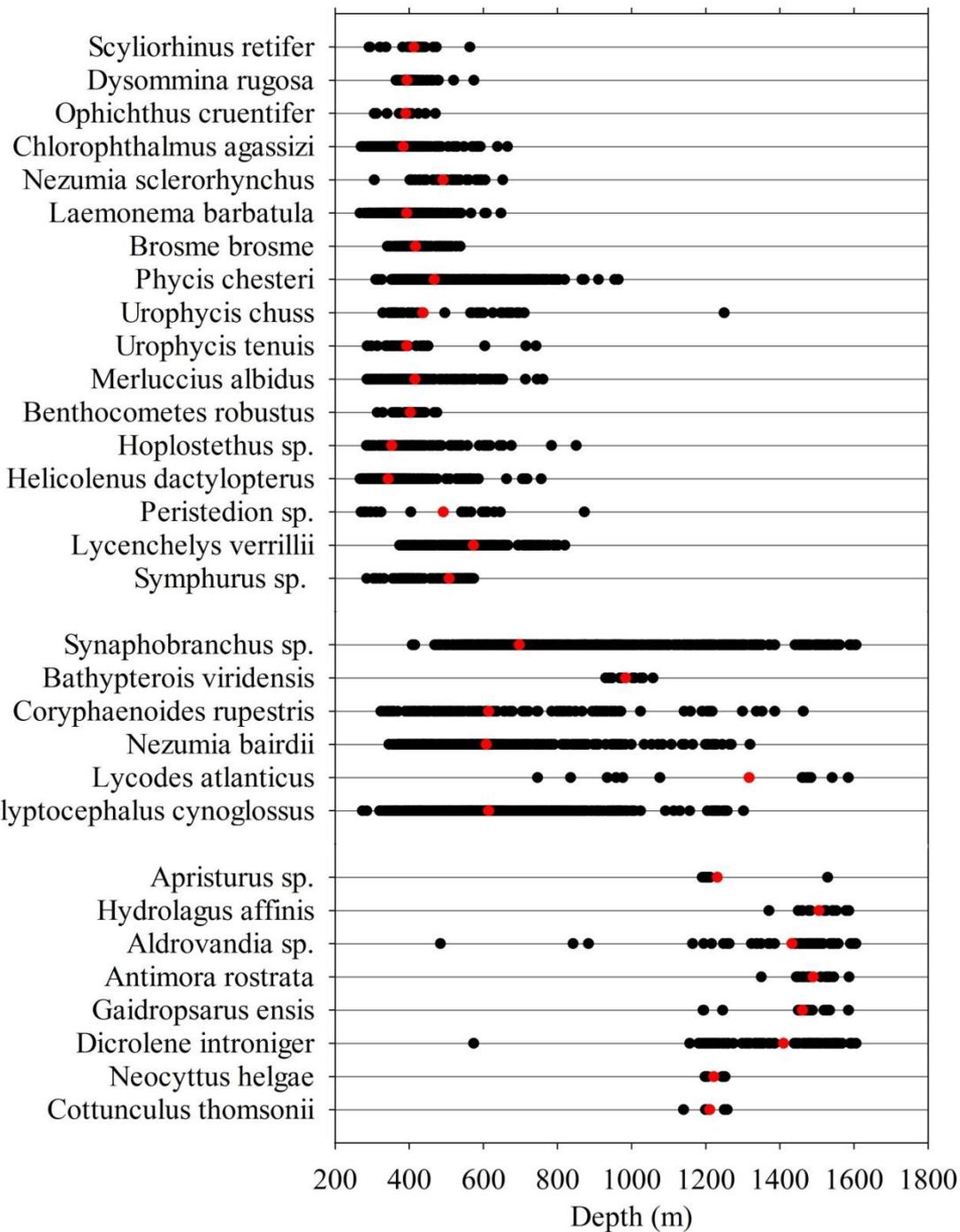
Nezumia atlantica



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

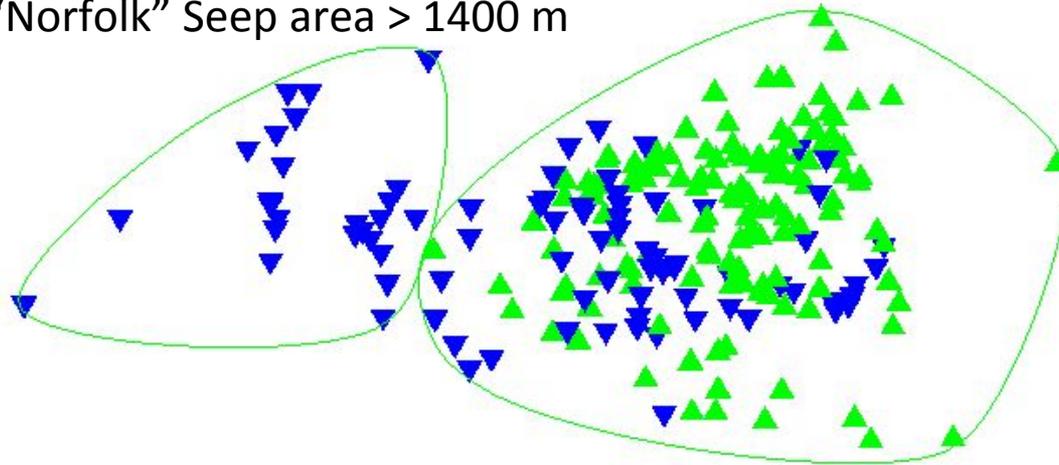
▲ Baltimore

▼ Norfolk

Similarity

5

“Norfolk” Seep area > 1400 m



Baltimore & Norfolk < 1400 m
(all habitats)

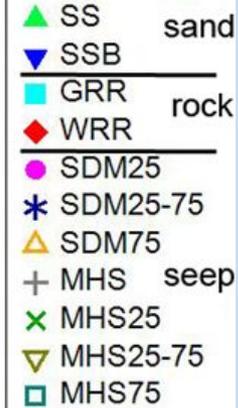
- “Deep” Norfolk 95% dissimilar from “Shallow” Baltimore + Norfolk
- Two clusters significantly different (DistLM marginal test, $p=0.001$)
- Appeared to be a gradual transition between about 800 to 1200+ m
- Fauna nearly completely different above and below 1400 m
- Differences due to depth and not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

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

<1400 m

2D Stress: 0.21

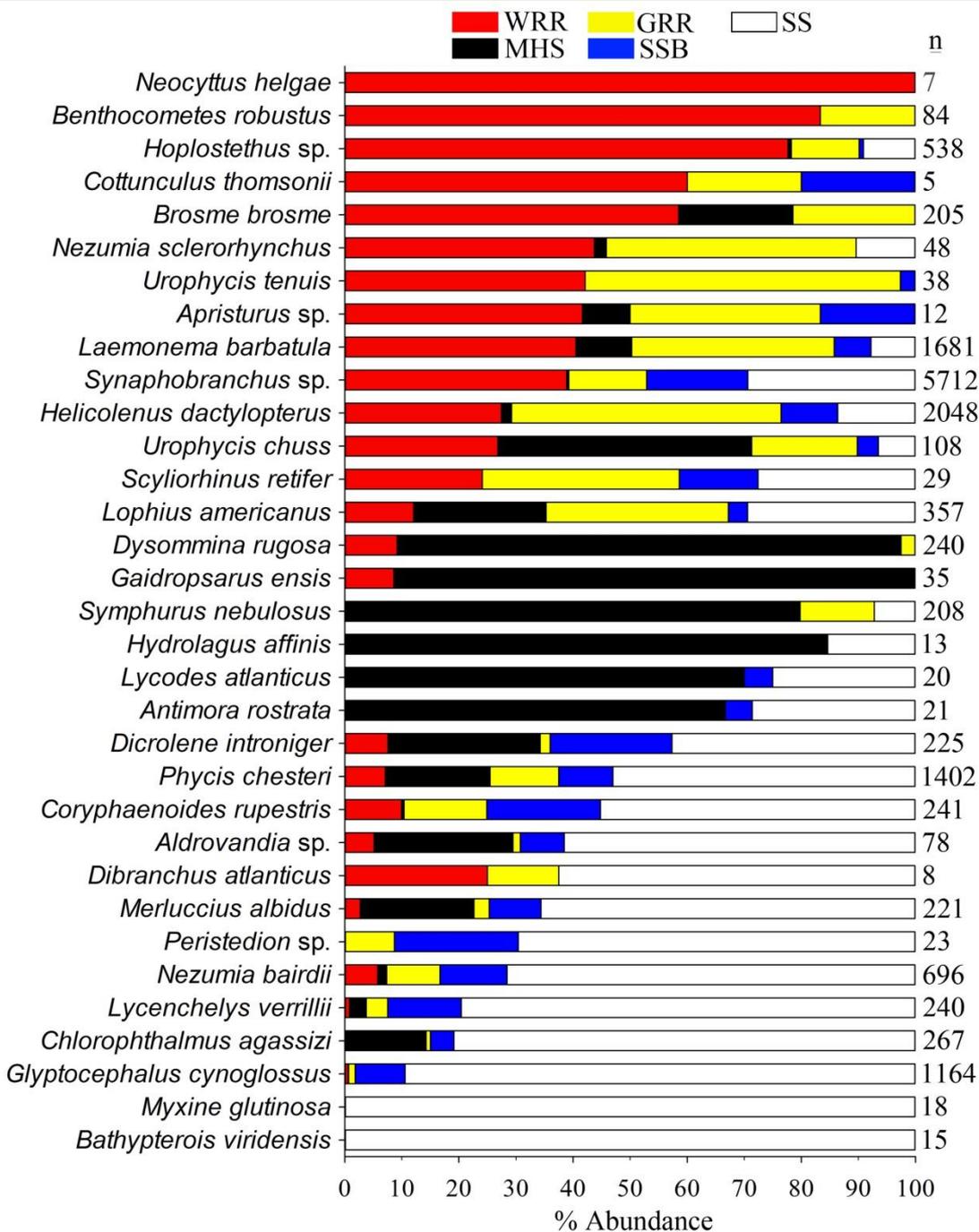
habitat type



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)

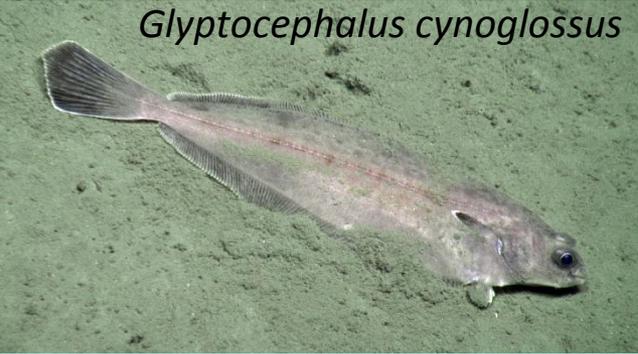
Sandy fishes (SIMPER): *P. chesteri*, *N.*, *bairdii*, *G. cynoglossus*, *L. americanus*, *M. albidus*



Phycis chesteri



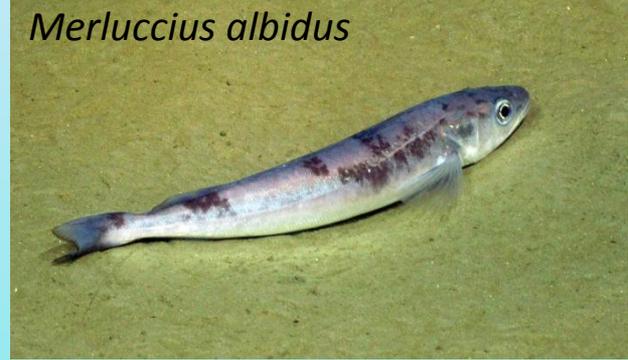
Nezumia bairdii



Glyptocephalus cynoglossus



Lophius americanus



Merluccius albidus



Laemonema barbatulum

Benthocometes robustus



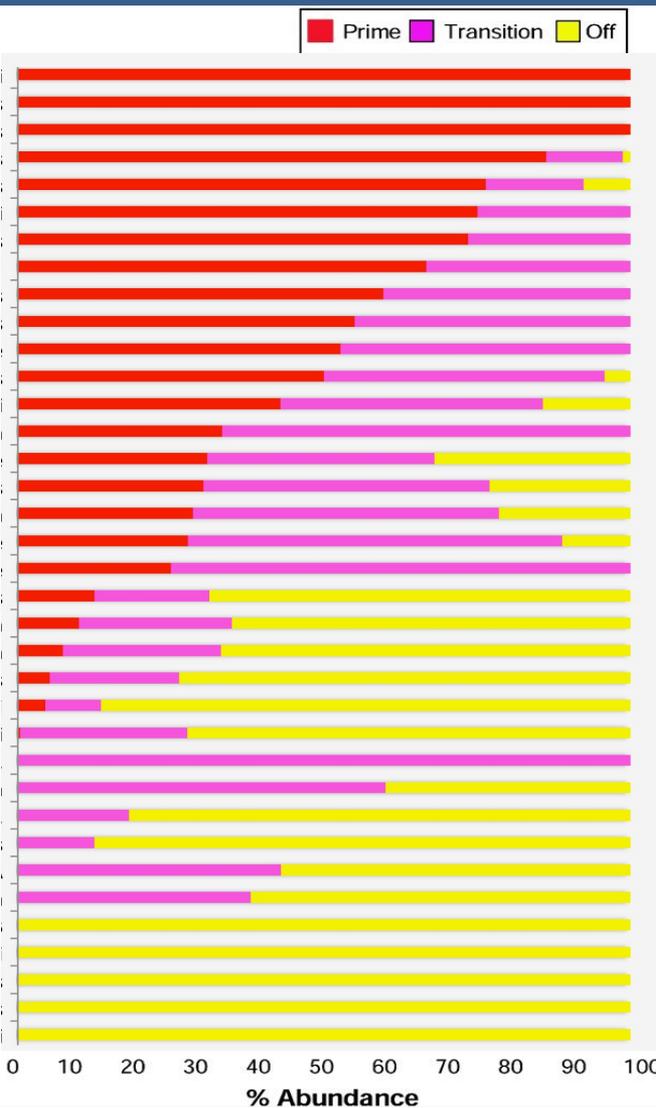
Hoplostethus sp.



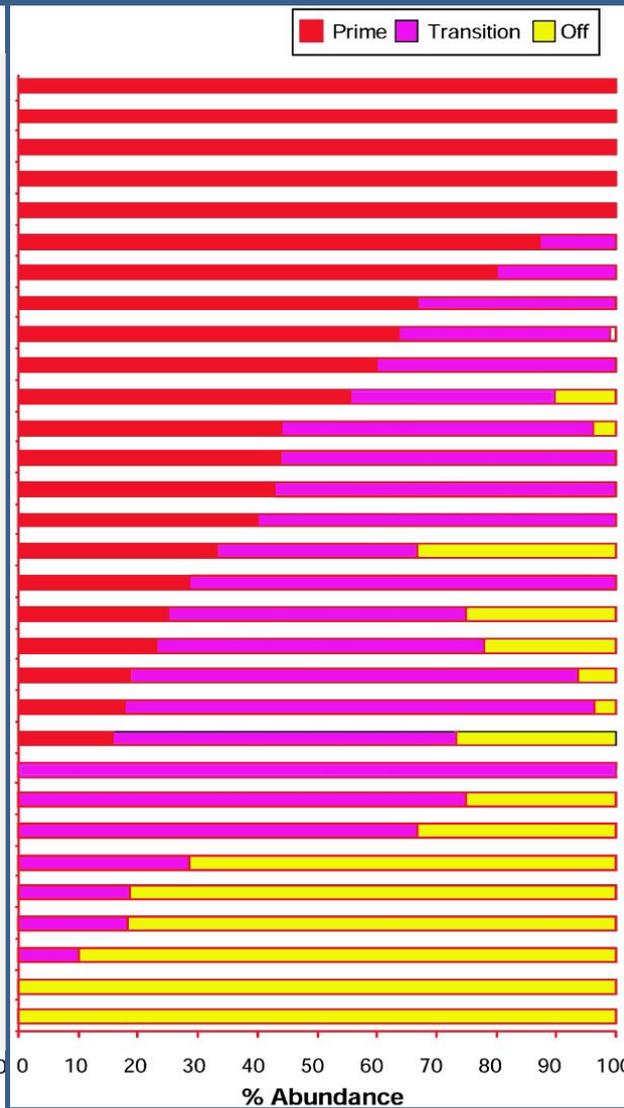
Brosme brosme

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

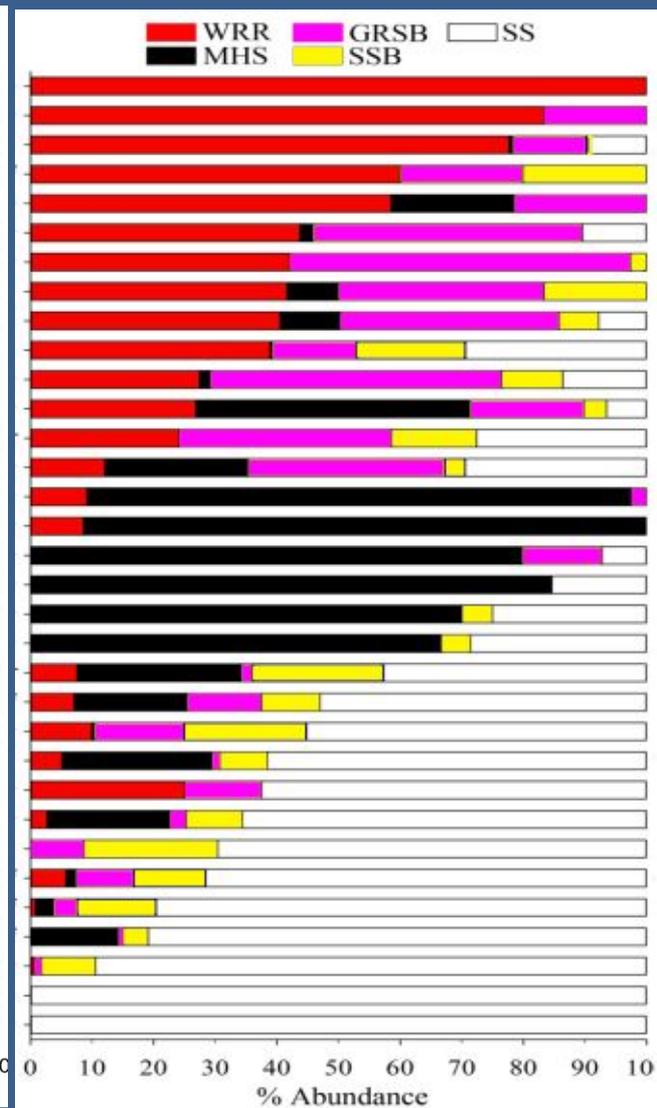
Percent usage of general habitats by fishes in US regions of the W. North Atlantic (250-1400 m)



Gulf of Mexico
(Ross et al. unpubl.)



Southeastern US
(Ross & Quattrini 2007)

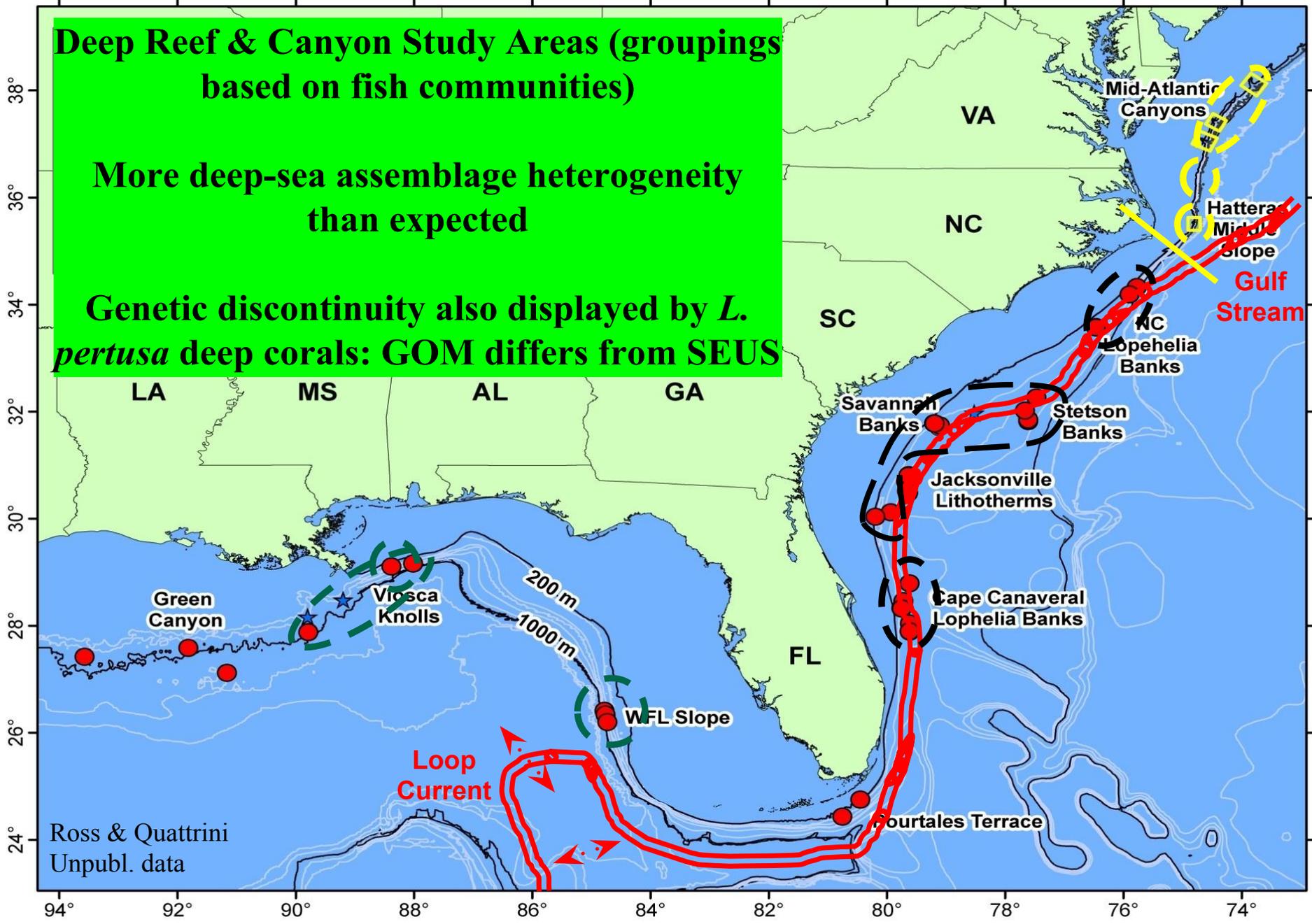


Mid-Atlantic Canyons
(Ross et al. 2015)

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

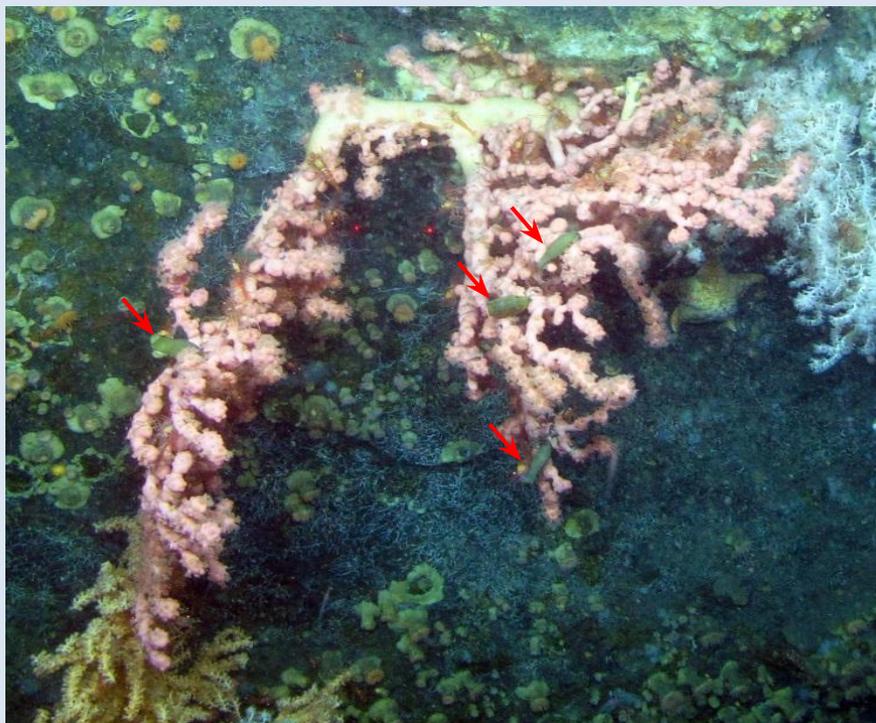


Ross & Quattrini
Unpubl. data



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

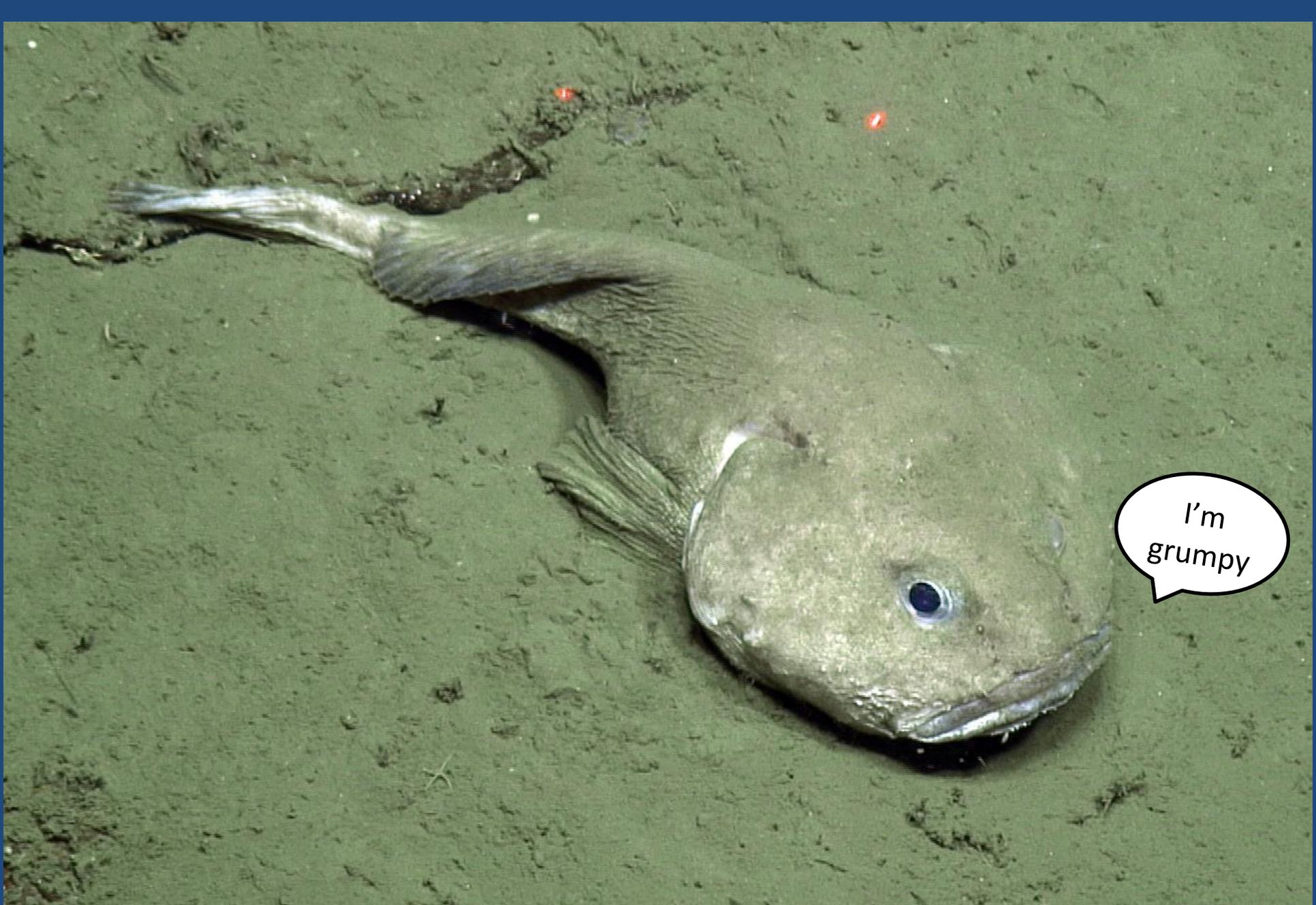
Corals – spawning substrata for some fishes (catsharks, liparids)



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