



Tab P, No. 4(a)

**Habitat Protection and Restoration Committee
Meeting June 22, 2021:
Development of Generic Essential Fish
Habitat (EFH) Amendment**

Background: What is EFH?

- Sustainable Fisheries Act 1996
- What is essential fish habitat (EFH)
 - *“those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity”*
- Generic EFH Amendment completed 2004
- 5-year review 2010-2016
- Defining EFH is one of several considerations
 - See Background: 5-year review letters



SERO Recommendations from 2016 5-year review

- Update habitat protection policy
- Identify and prioritize research needs
- Amend Council's FMPs with updated habitat information as soon as possible

Committee's upcoming tasks

- Council must have definitions of EFH for all managed species
- Required to complete 5 year review (2016)
- 5-year review needs development as does an updated generic EFH amendment
- Combine two efforts
 - Goal of completion by 2022



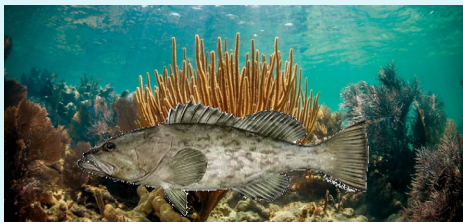
Method and Policy Considerations



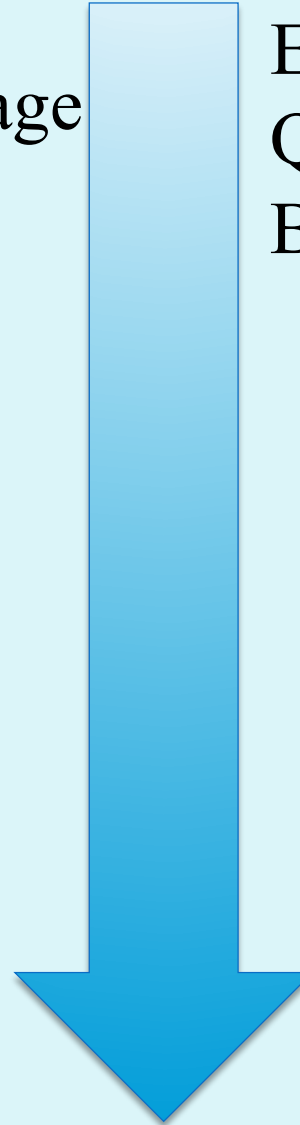
Habitat and life stage
tables
(current method)



Species
presence



Species presence
and habitat model



Established method
Quick progress
Broad

Limited species
Longer timeline
More refined

How is EFH currently defined for Gulf managed species?

- Habitat use as reported in scientific literature
- Benthic habitat characteristics as mapped in the NOAA GOM Data Atlas
 - Twelve categories
- Gulf divided into 5 ecoregions and 3 habitat zones

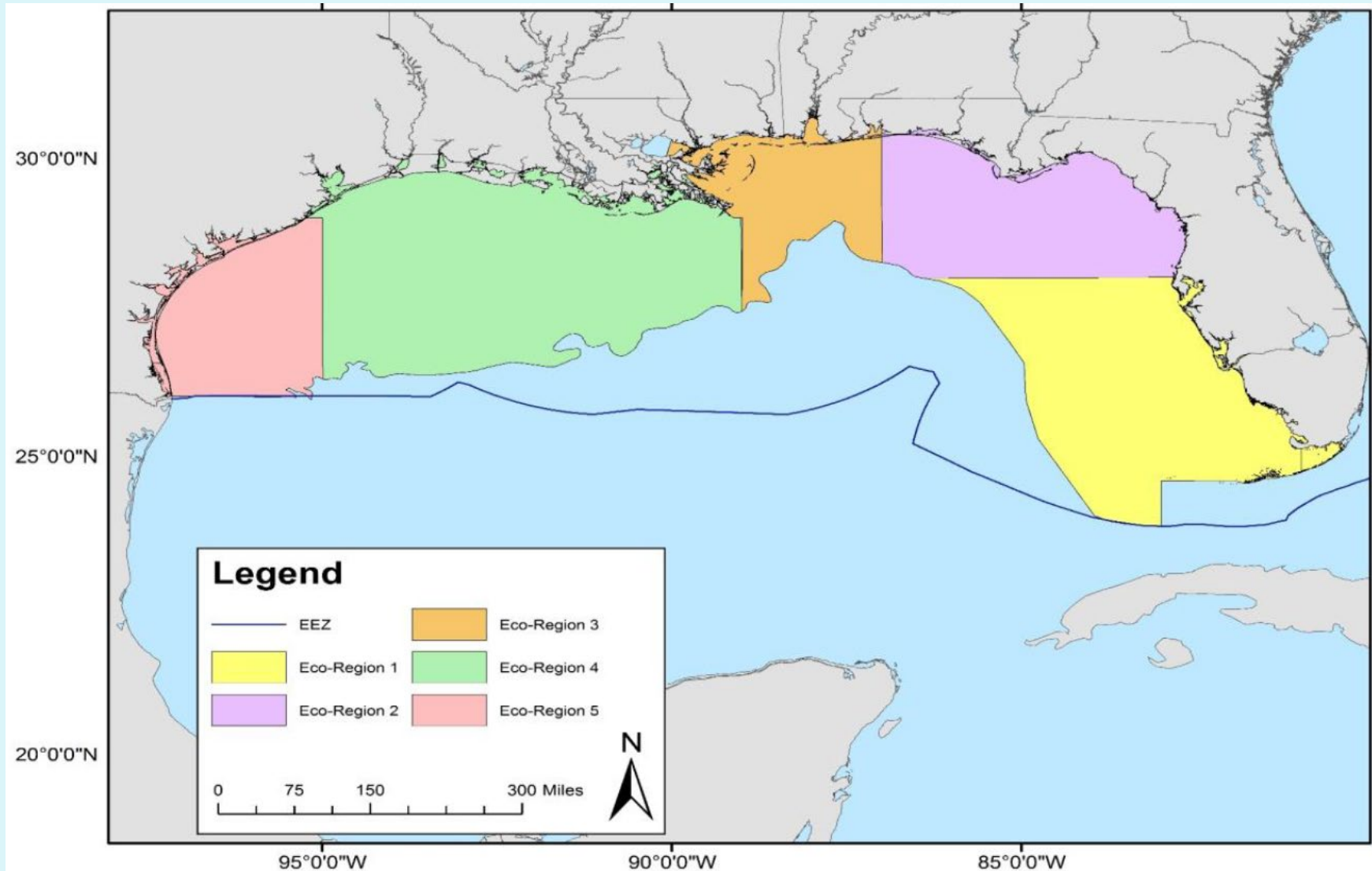


Habitat and life history tables



| Eco-region Name | Bounds | NOAA Stat Grids |
|--|--|-----------------|
| 1. South Florida | Florida Keys to Tarpon Springs | 1-5 |
| 2. North Florida | Tarpon Springs to Pensacola Bay | 6-9 |
| 3. East Louisiana, Mississippi and Alabama | Pensacola Bay to the Mississippi Delta | 10-12 |
| 4. East Texas and West Louisiana | Mississippi Delta to Freeport, Texas | 13-18 |
| 5. West Texas | Freeport, Texas to the Mexican border | 19-21 |

Habitat and life history tables



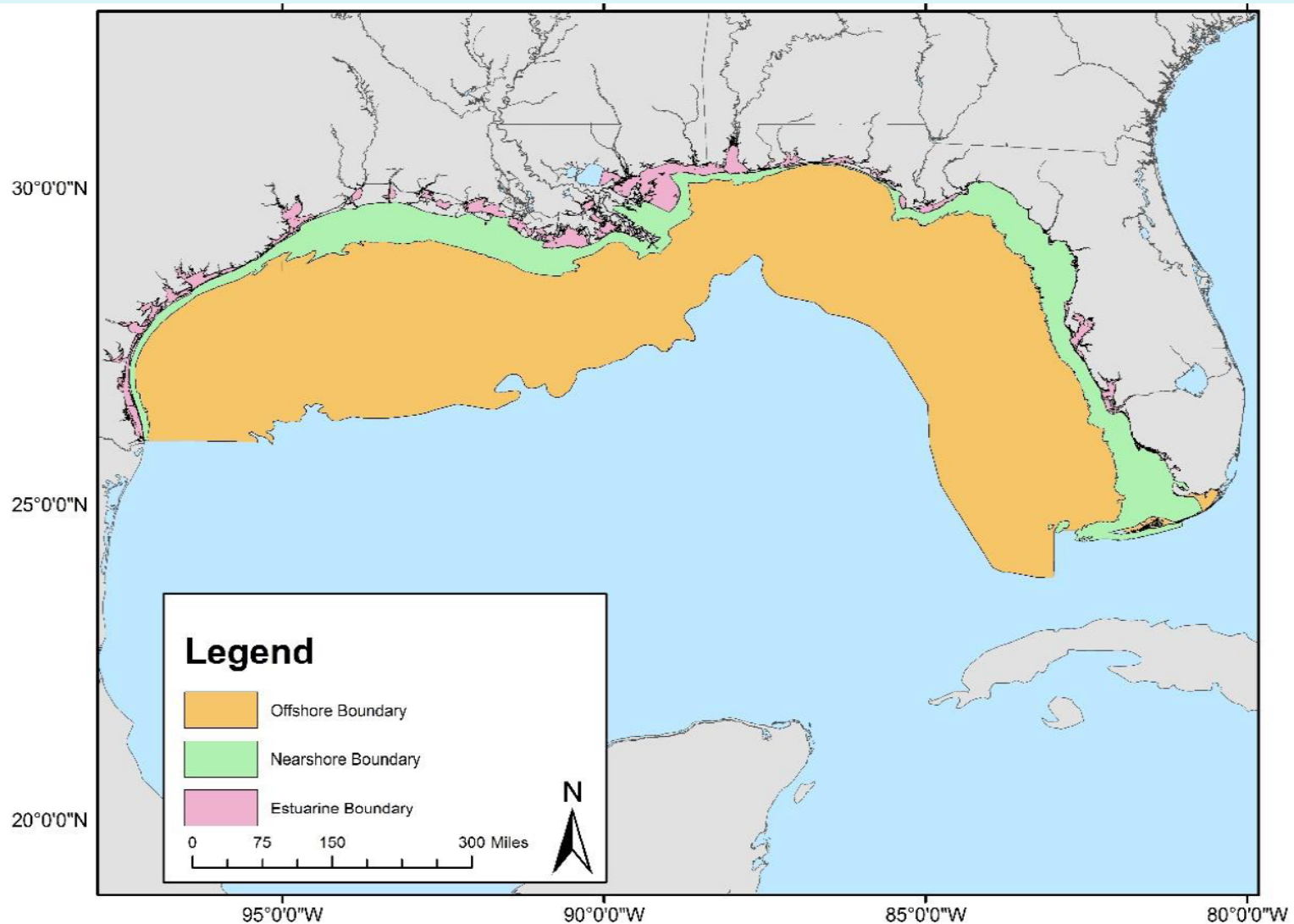
Habitat and life history tables



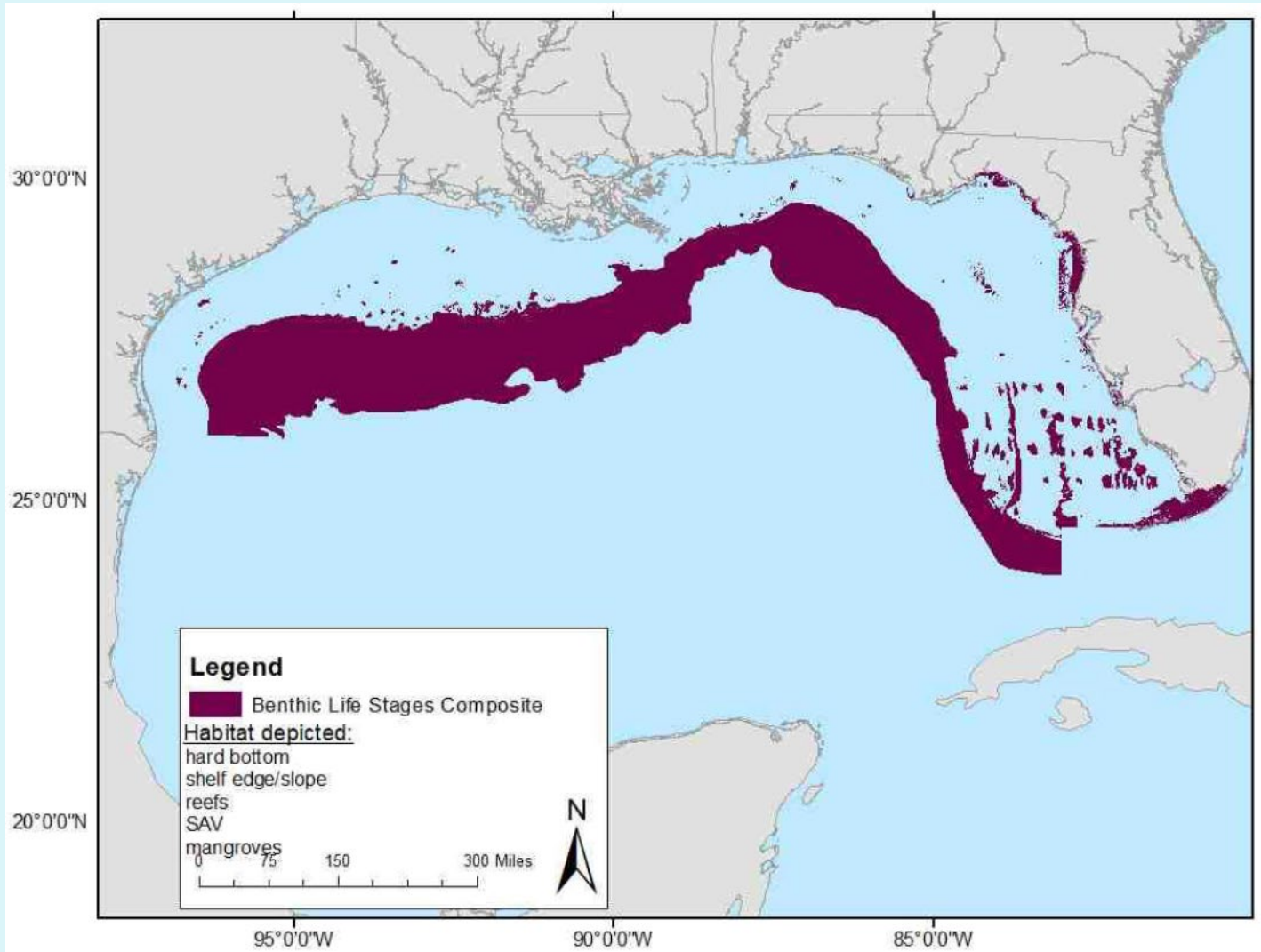
| Habitat Type | Related Terms |
|------------------------------------|--|
| Submerged Aquatic Vegetation (SAV) | Seagrasses, benthic algae |
| Mangroves | |
| Drifting algae | <i>Sargassum</i> |
| Emergent marshes | Tidal wetlands, salt marshes, tidal creeks, rives/streams |
| Sand/shell bottoms | Sand |
| Soft bottoms | Mud, clay, silt |
| Hard bottoms | Hard bottoms, live hard bottoms, low-relief irregular bottoms, high-relief irregular bottoms |
| Oyster reefs | |
| Banks/shoals | |
| Reefs | Reefs, reef halos, patch reefs, deep reefs |
| Shelf edge/slope | Shelf edge, shelf slope |
| Water Column Associated (WCA) | Pelagic, planktonic, coastal pelagic |

Note: low-relief irregular bottoms include low ledges, caves, crevices, and burrows; high-relief irregular bottoms include high ledges & cliffs, boulders, and pinnacles.

Habitat and life history tables



Habitat and life history tables: Gag grouper (all life stages)



Habitat and life history tables



| | Pros | Cons |
|---------------|---|--|
| Method | <ul style="list-style-type: none">• Established in Gulf• Data updated in 2016 review | <ul style="list-style-type: none">• Data Atlas outdated• More refined methods available |
| Policy | <ul style="list-style-type: none">• SAFMC, CFMC, WPFMC• Quickly updated• Works for most species | <ul style="list-style-type: none">• Very broad• Indirect linkages for species and habitat |

What draft options look like



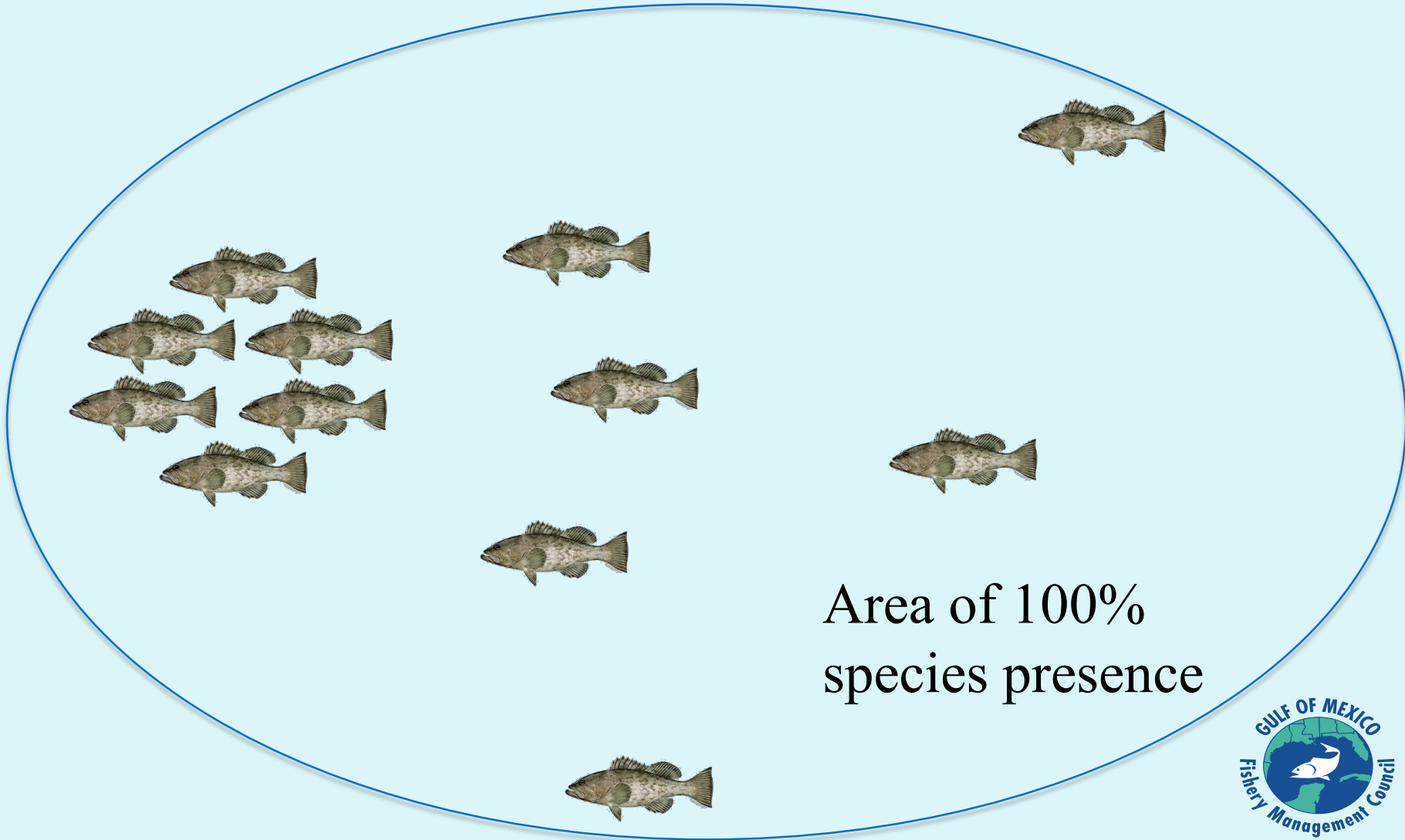
Alternative 1: No Action – Retain current description and identification of essential fish habitat (EFH) for Gulf of Mexico (Gulf) Fishery Management Plans as outlined in EFH Generic Amendment 3.

Alternative 2: Continue to use methods of habitat mapping and life history association tables to describe and identify EFH. Update habitat mapping data from the National Oceanic and Atmospheric Administration (NOAA) Atlas to a more contemporary source. Update species life history and habitat attribute tables to include primary research and technical literature sources through 2020. This alternative could be used for any and all managed species.

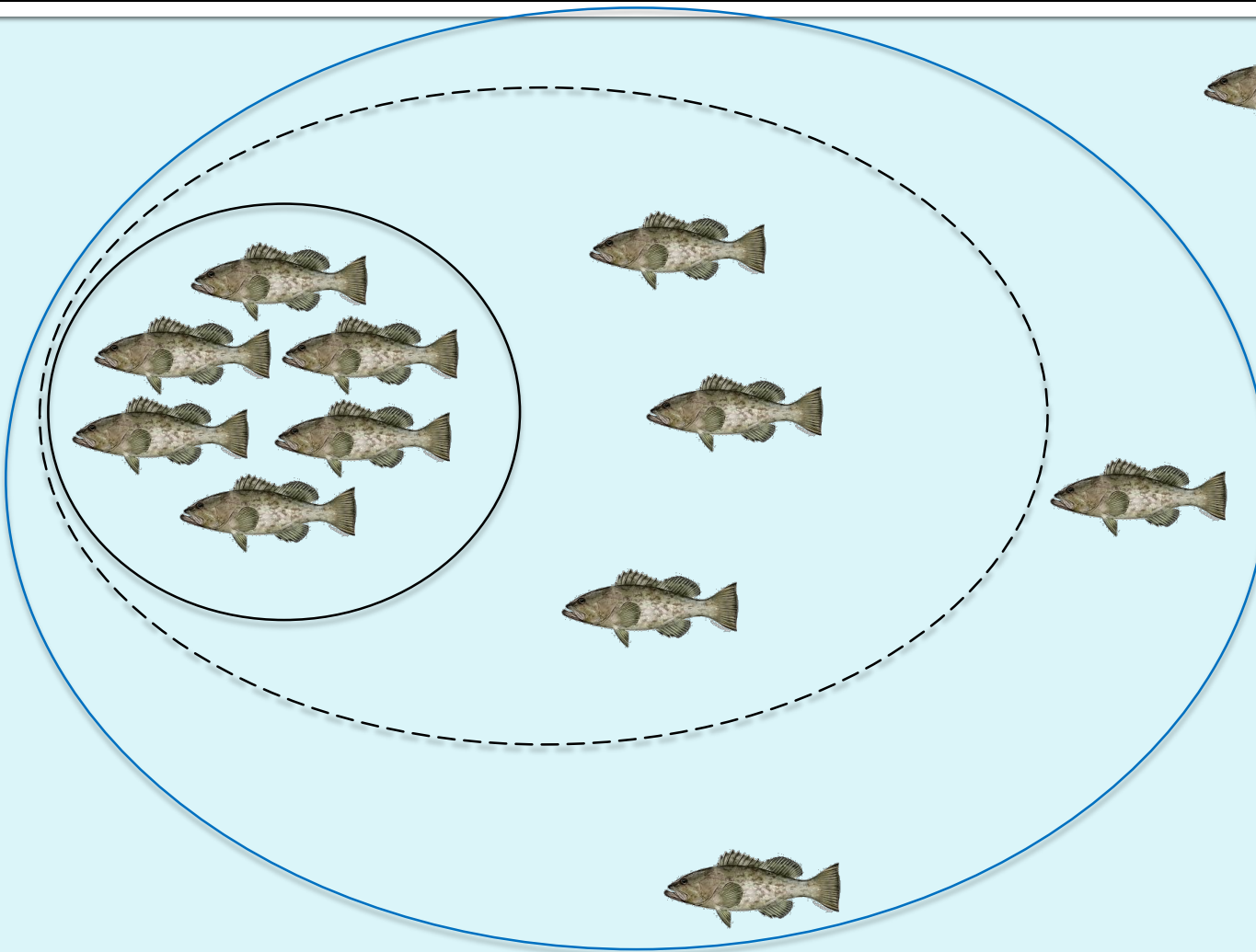
FI data available by species for other modeling methods: Grüss *et al.* 2018

| FMP | Aggregated data | Have life stage data |
|-----------|--|---|
| Reef fish | <ul style="list-style-type: none">• Black grouper• Goliath grouper• Vermillion snapper• Yellowedge grouper• Deepwater grouper• Shallow water grouper• Tilefish | <ul style="list-style-type: none">• Gag grouper• Red grouper• Red snapper |
| Shrimp | | <ul style="list-style-type: none">• White• Brown• Pink |
| CMP | <ul style="list-style-type: none">• King mackerel• Cobia | <ul style="list-style-type: none">• Spanish mackerel |

Presence only



Presence only

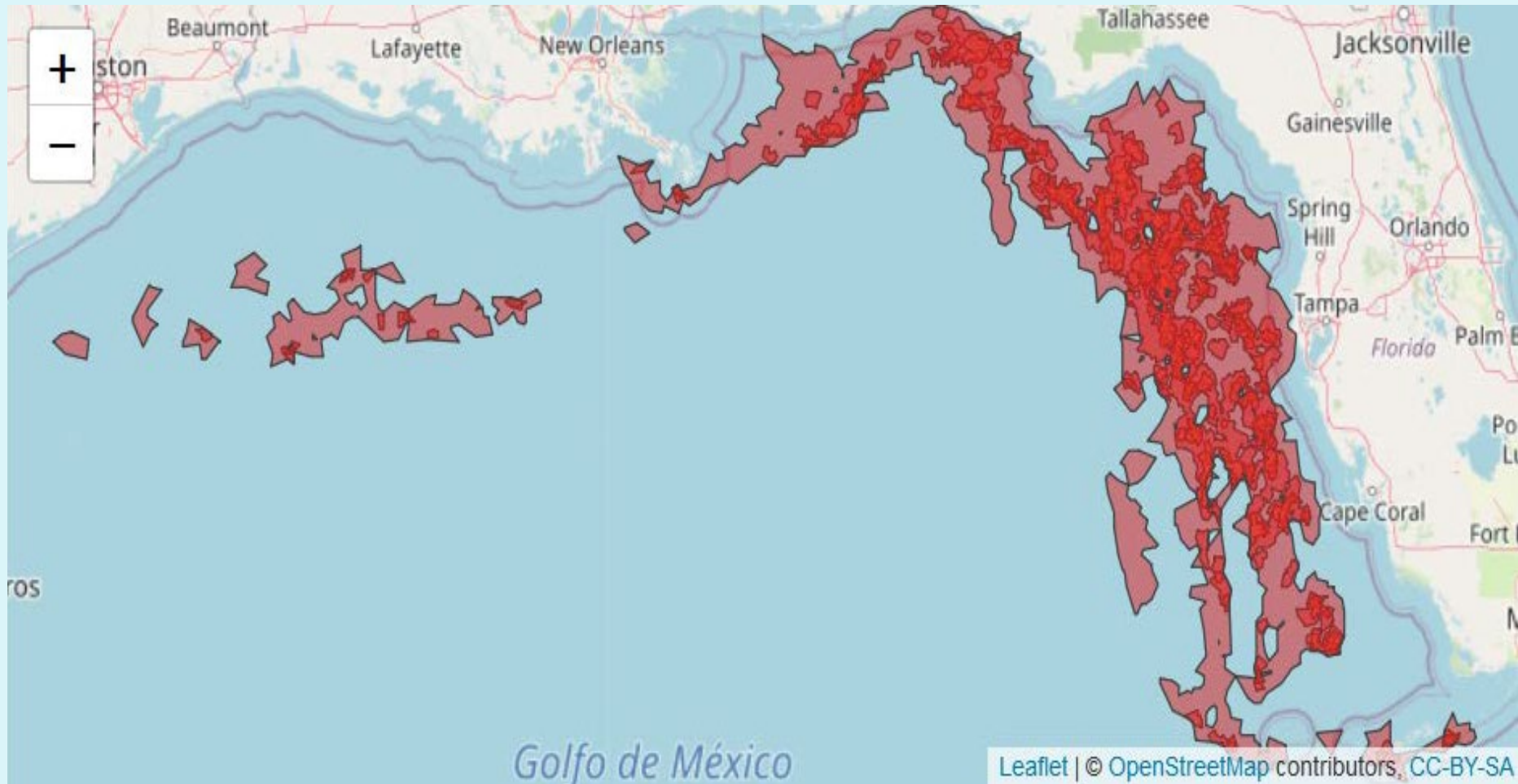


50% occurrence
(solid black line)

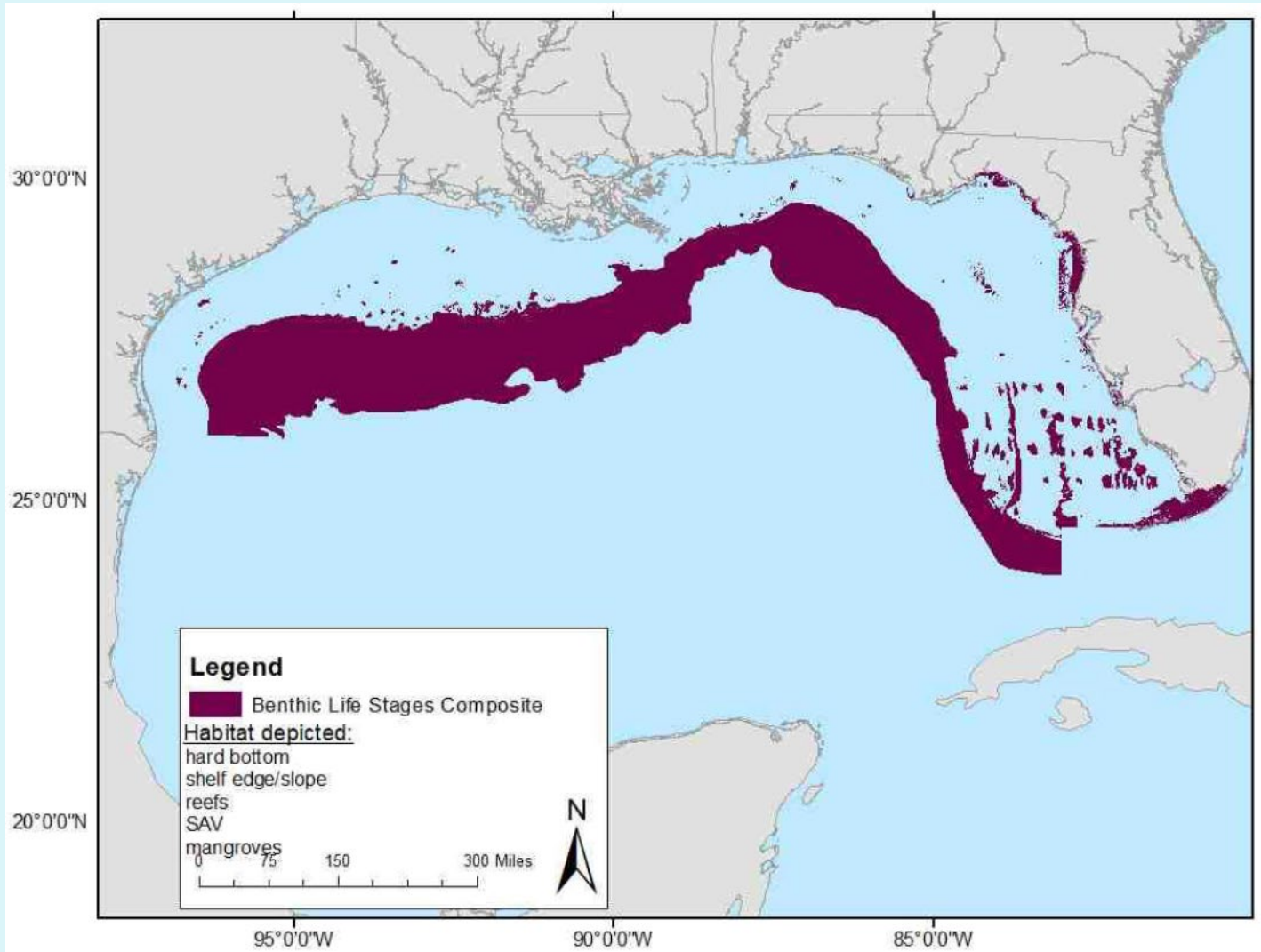
75% occurrence
(dashed black line)

95% occurrence
(solid blue line)

Presence only: Adult Gag grouper



Habitat and life history tables: Gag grouper (all life stages)



Presence only



| | | | Pros | Cons |
|--------|--|--|---|------|
| Method | <ul style="list-style-type: none">• Simple model• Data: fishery independent | | <ul style="list-style-type: none">• Data not available for all species/ life stages | |
| Policy | <ul style="list-style-type: none">• NEFMC, MAFMC, HMS• Better refine EFH• Used to inform HAPCs | | <ul style="list-style-type: none">• More actions• Species:habitat linkage tradeoff• Review by SSC | |

What draft options look like



Alternative 1: No Action – Retain current description and identification of essential fish habitat (EFH) for Gulf of Mexico (Gulf) Fishery Management Plans as outlined in EFH Generic Amendment 3.

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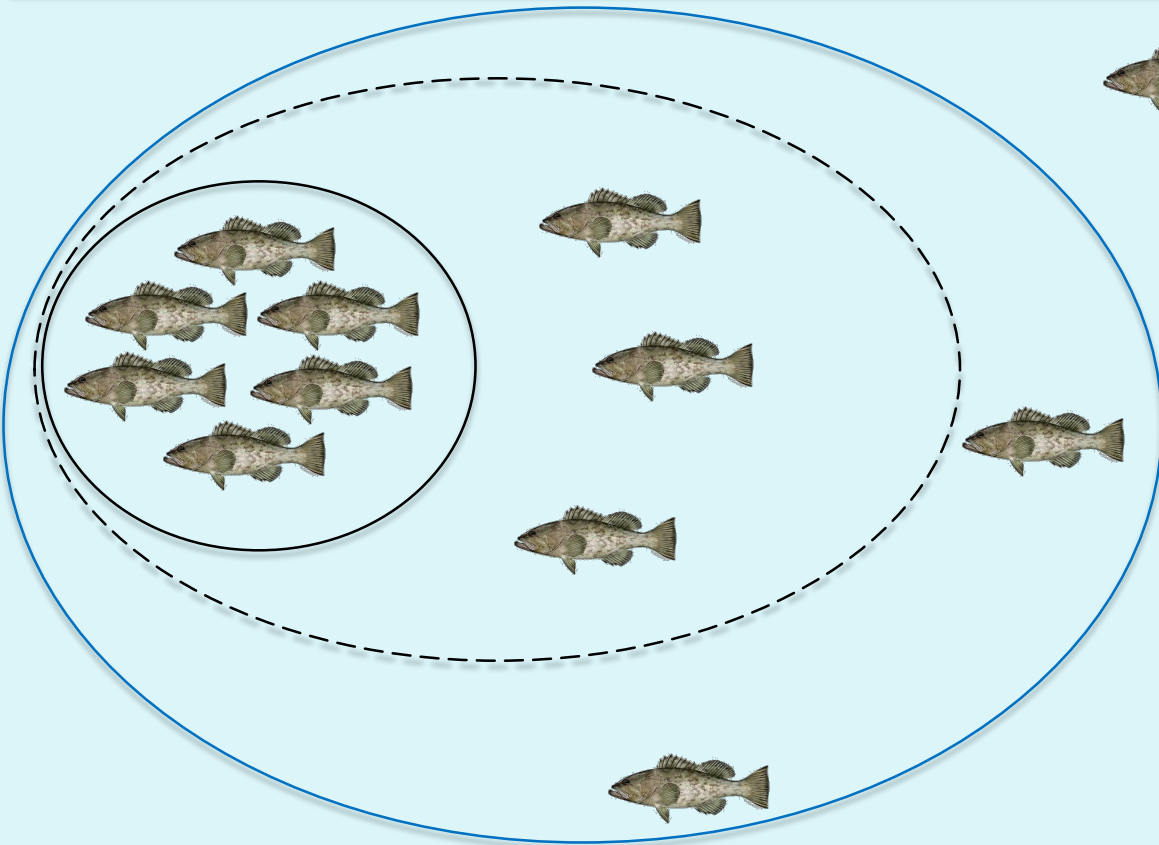


Alternative 3: Use a non-parametric kernel density estimate (KDE) approach using various fishery independent sources outlined from Grüss et al. 2018 to describe and identify EFH. This alternative could only be used to describe and identify EFH for species listed in table on slide 14.

What draft options look like



Alternative 3: Use a non-parametric kernel density estimate (KDE) approach using various fishery independent sources outlined from Grüss et al. 2018 to describe and identify EFH. This alternative could only be used to describe and identify EFH for species listed in table on slide 14.



Option 3A: 50% KDE
(solid black line)

Option 3B: 75% KDE
(dashed black line)

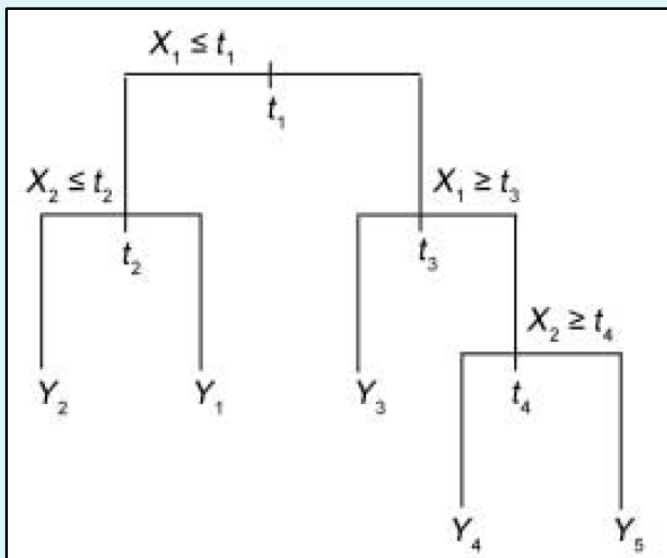
Option 3C: 95% KDE
(solid blue line)

Presence and habitat model



Location of fish

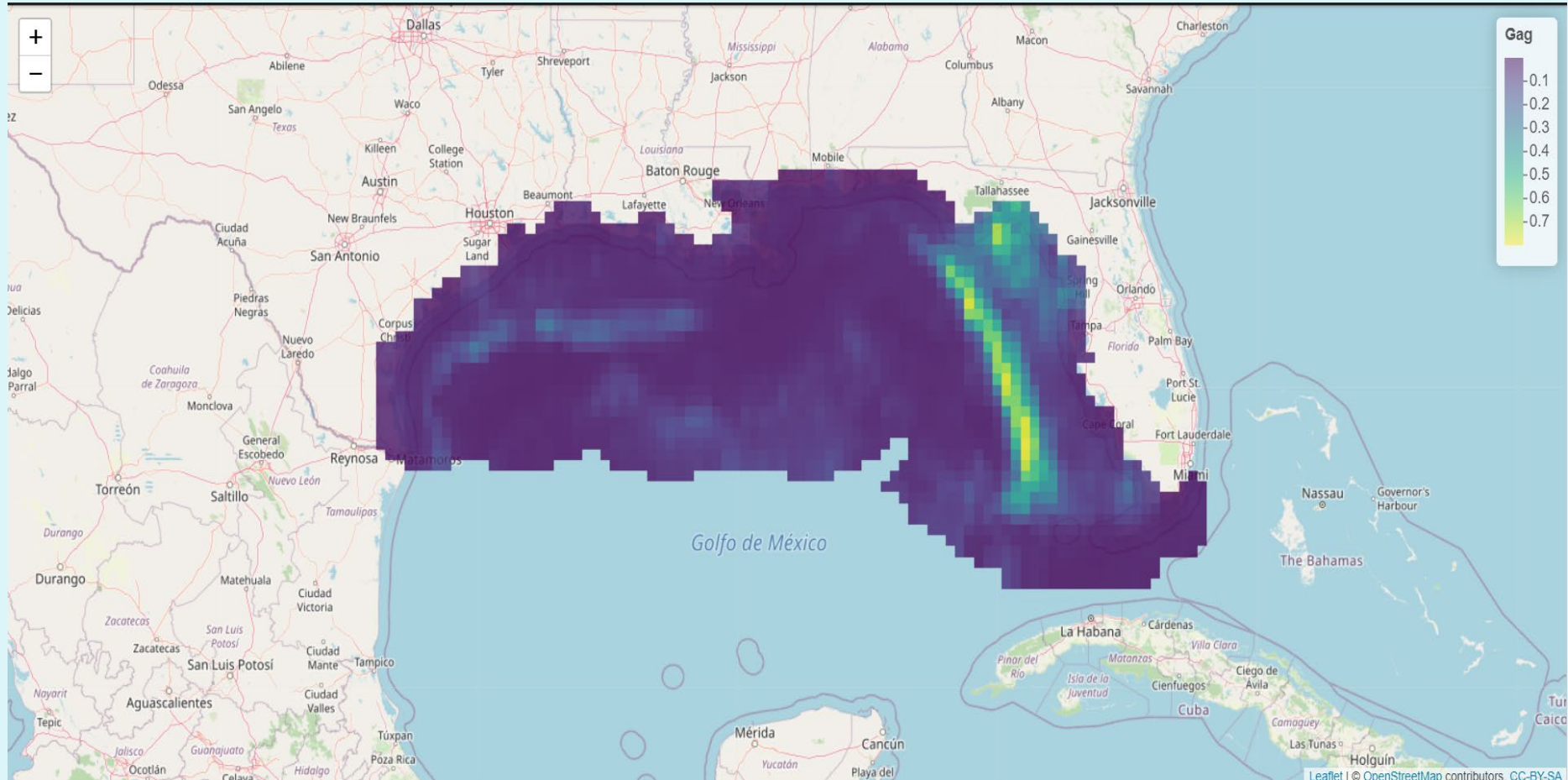
Habitat type/temperature/depth....



- **Model can handle complex interactions**
- **Construct probability maps**
- **Directly links species presence and habitat conditions**

Figure 1 from Elith *et al.* 2008

Presence and habitat model: Adult gag grouper



Presence and habitat model



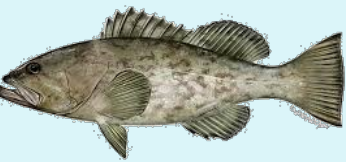
| Pros | | Cons |
|---------------|---|---|
| Method | <ul style="list-style-type: none">• Very refined• Data: fishery independent | <ul style="list-style-type: none">• Data not available for all species/ life stages• Complex model |
| Policy | <ul style="list-style-type: none">• NPFMC, PFMC• Directly links species and habitat• Used to inform HAPCs | <ul style="list-style-type: none">• Few species• Complex document• Review by SSC |

What draft options look like



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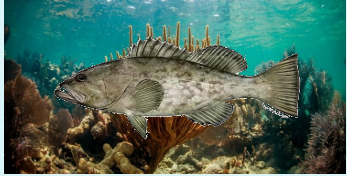


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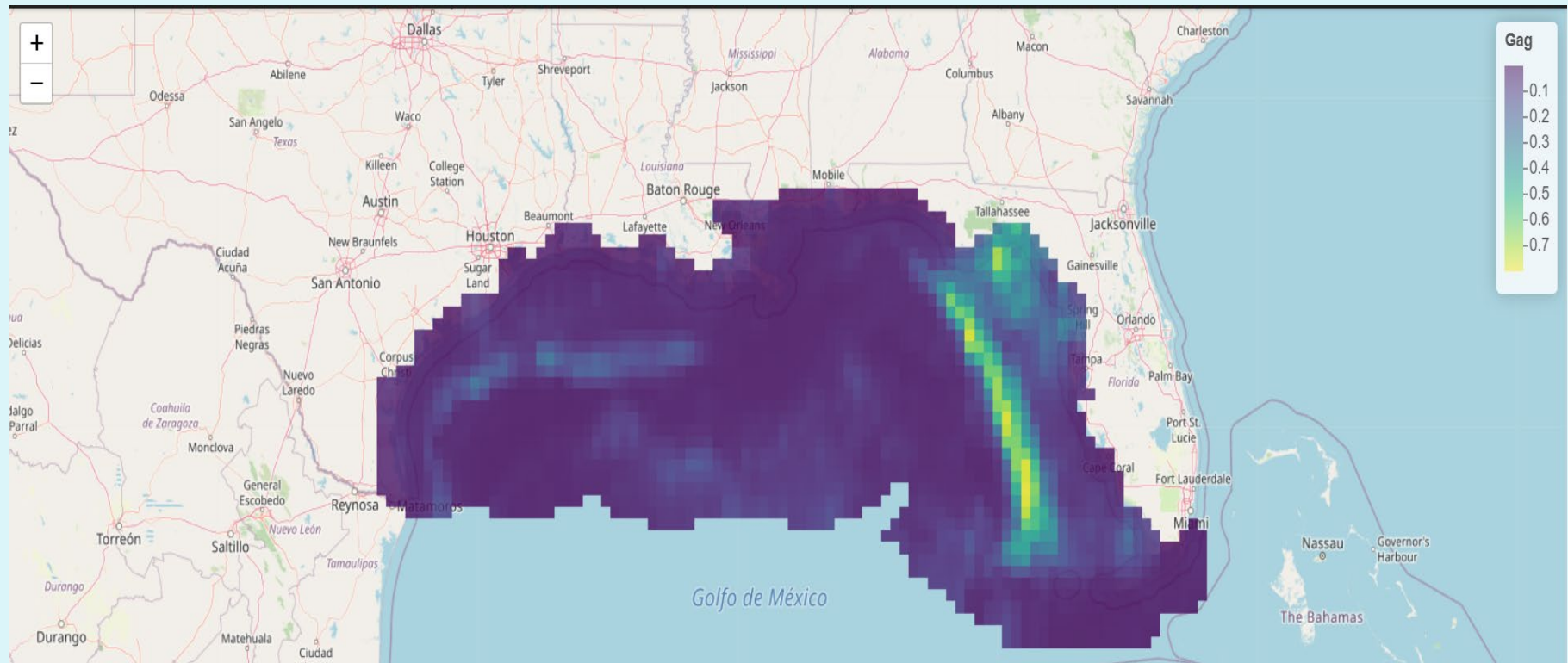
Alternative 4: Use a boosted regression tree (BRT) modeling approach using various fishery independent sources outlined from Grüss et al. 2018 to describe and identify EFH. This alternative could only be used to describe and identify EFH for species listed in table on slide 14.

What draft options look like



Alternative 4: Use a boosted regression tree (BRT) modeling approach using various fishery independent sources outlined from Grüss et al. 2018 to describe and identify EFH. This alternative could only be used to describe and identify EFH for species listed in table on slide 14.

Option 4A: 30% BRT Option 4B: 50% BRT Option 4C: 95% BRT



Potential timeline

2021

June: Presentation of draft options for EFH Amendment

July: SSC Review

August/October: Revised draft

2022

Jan: Pre-public hearing draft

April: Public hearing draft

May/June: Public hearings

Aug: SSC final review

Oct: Final Action



Some things to consider

- Not all managed species have the same data available
- Methodology presented to SSC
- Timeline of completion by 2022

Questions?

