

9 FIGURES

9 FIGURES		9-1
Figure 1.1.1	The regulatory and advisory roles of the Gulf Council and NMFS related to essential fish habitat.	9-5
Figure 2.1.1.	Diagrammatic relationship between the level of information and the extent of EFH.	9-6
Figure 2.1.2.	Flow diagram to demonstrate the formulation and analysis of alternatives for preventing, mitigating, or minimizing the adverse effects of fishing.	9-7
Figure 2.1.3.	NMFS Statistical Grid, Gulf of Mexico	9-8
Figure 2.1.4.	A comparison of management approaches that are based on levels of uncertainty and the potential cost of errors.	9-9
Figure 2.1.5.	A decision diagram to determine the applicable type of management approach on the basis of effort thresholds and the current level of ecological knowledge.(After Auster 2001).	9-10
Figure 2.3.1.	EFH Alternative 6 (Preferred) for the Red Drum FMP.	9-11
Figure 2.3.2.	EFH Alternative 6 (Preferred) for the Reef Fish FMP.	9-12
Figure 2.3.3.	EFH Alternative 6 (Preferred) for the Coastal Migratory Pelagics FMP.	9-13
Figure 2.3.4.	EFH Alternative 6 (Preferred) for the Shrimp FMP.	9-14
Figure 2.3.5.	EFH Alternative 6 (Preferred) for the Stone Crab FMP.	9-15
Figure 2.3.6.	EFH Alternative 6 (Preferred) for the Spiny Lobster FMP.	9-16
Figure 2.3.7.	EFH Alternative 4 (Preferred) and 6 for the Coral FMP.	9-17
Figure 2.3.8.	EFH Alternatives 4 and 5 for the Red Drum FMP.	9-18
Figure 2.3.9.	EFH Alternatives 4 and 5 for the Reef Fish FMP.	9-19
Figure 2.3.10.	EFH Alternatives 4 and 5 for the Coastal Migratory Pelagics FMP.	9-20
Figure 2.3.11.	EFH Alternatives 4 and 5 for the Shrimp FMP.	9-21
Figure 2.3.12.	EFH Alternatives 4 and 5 for the Stone Crab FMP.	9-22
Figure 2.3.13.	EFH Alternatives 4 and 5 for the Spiny Lobster FMP.	9-23
Figure 2.3.14.	HAPC Alternative 3 designations in the West Gulf of Mexico.	9-24
Figure 2.3.15.	HAPC Alternative 3 designations in the East Gulf of Mexico.	9-25
Figure 2.3.16a.	HAPC Alternative 8 designations in the West Gulf of Mexico, based on sensitivity to fishing activities	9-27
Figure 2.3.16b.	HAPC Alternative 8 designations in the East Gulf of Mexico, based on sensitivity to fishing activities	9-28
Figure 2.3.17.	HAPC Alternative 8 designations in the Gulf of Mexico, based on sensitivity to non-fishing activities	9-29
Figure 2.3.18a.	HAPC Alternative 8 designations in the West Gulf of Mexico, based on stress and development activities	9-30
Figure 2.3.18b.	HAPC Alternative 8 designations in the East Gulf of Mexico, based on stress and development activities	9-31
Figure 2.3.19a.	HAPC Alternative 8 designations in the West Gulf of Mexico, based on habitat rarity	9-32
Figure 2.3.19b.	HAPC Alternative 8 designations in the East Gulf of Mexico, based on values of habitat rarity	9-33
Figure 2.3.20.	HAPC Alternative 9 designations in the Gulf of Mexico, as discussed in Section 2.2.2.	9-34
Figure 3.1.1.	Bathymetry of the Gulf of Mexico.	9-35

Figure 3.1.2.	Detailed Gulf of Mexico Bottom Sediments.	9-36
Figure 3.1.3.	Summarized Gulf of Mexico Sediments and Bottom Habitat Types.	9-37
Figure 3.1.4.	Bottom dissolved oxygen in the west and central northern Gulf of Mexico.	9-38
Figure 3.2.1.	Map Legend for the landward boundaries of EFH in the Gulf of Mexico.	9-39
Figure 3.2.2a.	Landward boundary of EFH for the Laguna Madre region.	9-40
Figure 3.2.2b.	Landward boundary of EFH for the Corpus Christi Baffin Bays region.	9-41
Figure 3.2.2c.	Landward boundary of EFH for the Matagorda and San Antonio Bays region.	9-42
Figure 3.2.2d.	Landward boundary of EFH for the Galveston Bay region.	9-43
Figure 3.2.2e.	Landward boundary of EFH for the Sabine and Calcasieu Lakes region.	9-44
Figure 3.2.2f.	Landward boundary of EFH for the Vermillion and Atchafalaya Bays region.	9-45
Figure 3.2.2g.	Landward boundary of EFH for the Timbalier and Barataria Bays region.	9-46
Figure 3.2.2h.	Landward boundary of EFH for the Lake Ponchartrain and the Chandeleur Sound region.	9-47
Figure 3.2.2i.	Landward boundary of EFH for the Mobile and Pensacola Bay region.	9-48
Figure 3.2.2j.	Landward boundary of EFH for the St. Andrew and St. Joseph Bay region.	9-49
Figure 3.2.2k.	Landward boundary of EFH for the St. George Sound and Apalachee Bay region.	9-50
Figure 3.2.2l.	Landward boundary of EFH for the Crystal Bay region.	9-51
Figure 3.2.2m.	Landward boundary of EFH for the Tampa Bay region.	9-52
Figure 3.2.2n.	Landward boundary of EFH for the Charlotte Harbor and Estero Bay region.	9-53
Figure 3.2.2o.	Landward boundary of EFH for the Whitewater and Florida Bay region.	9-54
Figure 3.2.3.	Distribution of seagrasses, marsh, and oysters around Texas.	9-55
Figure 3.2.4.	Distribution of mangroves, seagrasses, marsh, and oyster around Louisiana.	9-56
Figure 3.2.5.	Distribution of mangroves, seagrasses, marsh, and oysters in the Big Bend of Florida.	9-57
Figure 3.2.6.	Distribution of mangroves, seagrasses, marsh, and oysters from Tampa Bay to Charlotte Harbor.	9-58
Figure 3.2.7.	Distribution of mangroves, seagrasses, and coral in southern Florida.	9-59
Figure 3.2.8.	Distribution of oil and gas structures in the Gulf of Mexico.	9-60
Figure 3.2.9.	Distribution of oil and gas pipelines in the Gulf of Mexico.	9-61
Figure 3.2.10a.	Habitat rarity index for the West Gulf of Mexico.	9-62
Figure 3.2.10b.	Habitat rarity index for the East Gulf of Mexico.	9-63
Figure 3.2.11.	Frequency plot of the number of habitat parcels in each habitat rarity category (relative scale).	9-64
Figure 3.2.12a.	Habitat use by Red Drum FMP species in the West Gulf of Mexico	9-65
Figure 3.2.12b.	Habitat use by Red Drum FMP species in the East Gulf of Mexico	9-66
Figure 3.2.13a.	Habitat use by Reef Fish FMP species in the West Gulf of Mexico	9-67
Figure 3.2.13b.	Habitat use by Reef Fish FMP species in the East Gulf of Mexico	9-68
Figure 3.2.14a.	Habitat use by Shrimp FMP species in the West Gulf of Mexico	9-69
Figure 3.2.14b.	Habitat use by Shrimp FMP species in the East Gulf of Mexico	9-70
Figure 3.2.15a.	Habitat use by Stone Crab FMP species in the West Gulf of Mexico	9-71
Figure 3.2.15b.	Habitat use by Stone Crab FMP species in the East Gulf of Mexico	9-72
Figure 3.2.16.	Habitat use by Spiny Lobster FMP species in the Gulf of Mexico	9-73
Figure 3.2.17a.	Habitat use across FMPs (Red Drum, Reef Fish, Coastal Migratory Pelagics, Shrimp, Stone Crab, Spiny Lobster) in the West Gulf of Mexico.	9-74

Figure 3.2.17b.	Habitat use across FMPs (Red Drum, Reef Fish, Coastal Migratory Pelagics, Shrimp, Stone Crab, Spiny Lobster) in the East Gulf of Mexico.	9-75
Figure 3.3.1.	Map of all existing fishery management closed areas in the Gulf of Mexico	9-76
Figure 3.3.2.	Reef fish handline fishing effort.	9-77
Figure 3.3.3.	Reef fish bottom longline fishing effort.	9-78
Figure 3.3.4.	Fish trap fishing effort.	9-79
Figure 3.3.5.	Spear fishing effort.	9-80
Figure 3.3.6.	Powerhead fishing effort.	9-81
Figure 3.3.7.	Coastal pelagics handline fishing effort.	9-82
Figure 3.3.8.	Shrimp trawl fishing effort.	9-83
Figure 3.3.9.	Stone crab trap fishing effort.	9-84
Figure 3.3.10.	Lobster trap fishing effort.	9-85
Figure 3.3.11.	Shark bottom longline fishing effort.	9-86
Figure 3.3.12.	Recreational fishing on party/charter boats.	9-87
Figure 3.3.13.	Recreational fishing on private/rental boats.	9-88
Figure 3.3.14.	Recreational fishing from shore.	9-89
Figure 3.5.1.	Schematic otter trawl gear (From Barnette 2001).	9-90
Figure 3.5.2.	Schematic frame trawl gear (From Barnette 2001).	9-91
Figure 3.5.3.	Schematic skimmer trawl gear (From Barnette 2001).	9-92
Figure 3.5.4.	Schematic bottom longline gear (From Barnette 2001).	9-93
Figure 3.5.5.	Schematic fish trap gear (From Barnette 2001).	9-93
Figure 3.5.6.	Schematic crab pot gear (From Barnette 2001).	9-94
Figure 3.5.7.	Schematic speargun gear (From Barnette 2001).	9-94
Figure 3.5.8.	Schematic slurp gun gear (From Barnette 2001).	9-95
Figure 3.5.9.	Schematic oyster dredge gear (From Barnette 2001).	9-95
Figure 3.5.10.	Schematic bull rake gear (From Barnette 2001).	9-96
Figure 3.5.11.	Schematic oyster tong gear (From Barnette 2001).	9-97
Figure 3.5.12.	Schematic gillnet gear (From Barnette 2001).	9-97
Figure 3.5.13.	Schematic trammel net gear.	9-98
Figure 3.5.14.	Schematic purse seine gear (From Barnette 2001).	9-99
Figure 3.5.15.	Schematic components of a purse seine net (From Barnette 2001).	9-100
Figure 3.5.16a.	Habitat sensitivity to all fishing gears in the West Gulf of Mexico.	9-101
Figure 3.5.16b.	Habitat sensitivity to all fishing gears in the East Gulf of Mexico	9-102
Figure 3.5.17a.	Fishing impact index for reef fish handline gear in the West Gulf of Mexico.	9-103
Figure 3.5.17b.	Fishing impact index for reef fish handline gear in the East Gulf of Mexico	9-104
Figure 3.5.18a.	Fishing impact index for reef fish bottom longline gear in the West Gulf of Mexico	9-105
Figure 3.5.18b.	Fishing impact index for reef fish bottom longline gear in the East Gulf of Mexico	9-106
Figure 3.5.19.	Fishing impact index for fish traps in the Gulf of Mexico	9-107
Figure 3.5.20.	Fishing impact index for spear fishing gear in the Gulf of Mexico	9-108
Figure 3.5.21.	Fishing impact index for powerhead fishing gear in the Gulf of Mexico	9-109
Figure 3.5.22a.	Fishing impact index for coastal pelagics handline gear in the West Gulf of Mexico	9-110
Figure 3.5.22b.	Fishing impact index for coastal pelagics handline gear in the East Gulf of Mexico	9-111
Figure 3.5.23a.	Fishing impact index for shrimp trawls in the West Gulf of Mexico	9-112

Figure 3.5.23b.	Fishing impact index for shrimp trawls in the East Gulf of Mexico	9-113
Figure 3.5.24.	Fishing impact index for stone crab traps in the Gulf of Mexico	9-114
Figure 3.5.25.	Fishing impact index for lobster traps in the Gulf of Mexico	9-115
Figure 3.5.26a.	Fishing impact index for shark bottom longline gear in the West Gulf of Mexico	9-116
Figure 3.5.26b.	Fishing impact index for shark bottom longline gear in the East Gulf of Mexico	9-117
Figure 3.5.27a.	Habitat sensitivities to non-fishing threats in the West Gulf of Mexico	9-118
Figure 3.5.27b.	Habitat sensitivities to non-fishing threats in the East Gulf of Mexico	9-119
Figure 3.5.28	Sum of sensitivity indices by non-fishing activity for all habitat types.	9-120
Figure 3.5.29a.	Index for Non-Fishing Impacts in the West Gulf of Mexico.	9-121
Figure 3.5.29b.	Index for Non-Fishing Impacts in the East Gulf of Mexico.	9-122
Figure 3.5.30.	Non-fishing effects weighting factors for Essential Fish Habitat types in the Gulf of Mexico by NMFS Statistical Unit.	9-123
Figure 3.5.31.	Total non-fishing effects scores by NMFS Statistical Unit.	9-123
Figure 4.3.1.	Hypothetical graph of externalities associated with habitat damage.	9-124
Figure 4.4.1.	Chart of cumulative impacts on habitats in the Gulf of Mexico	9-125

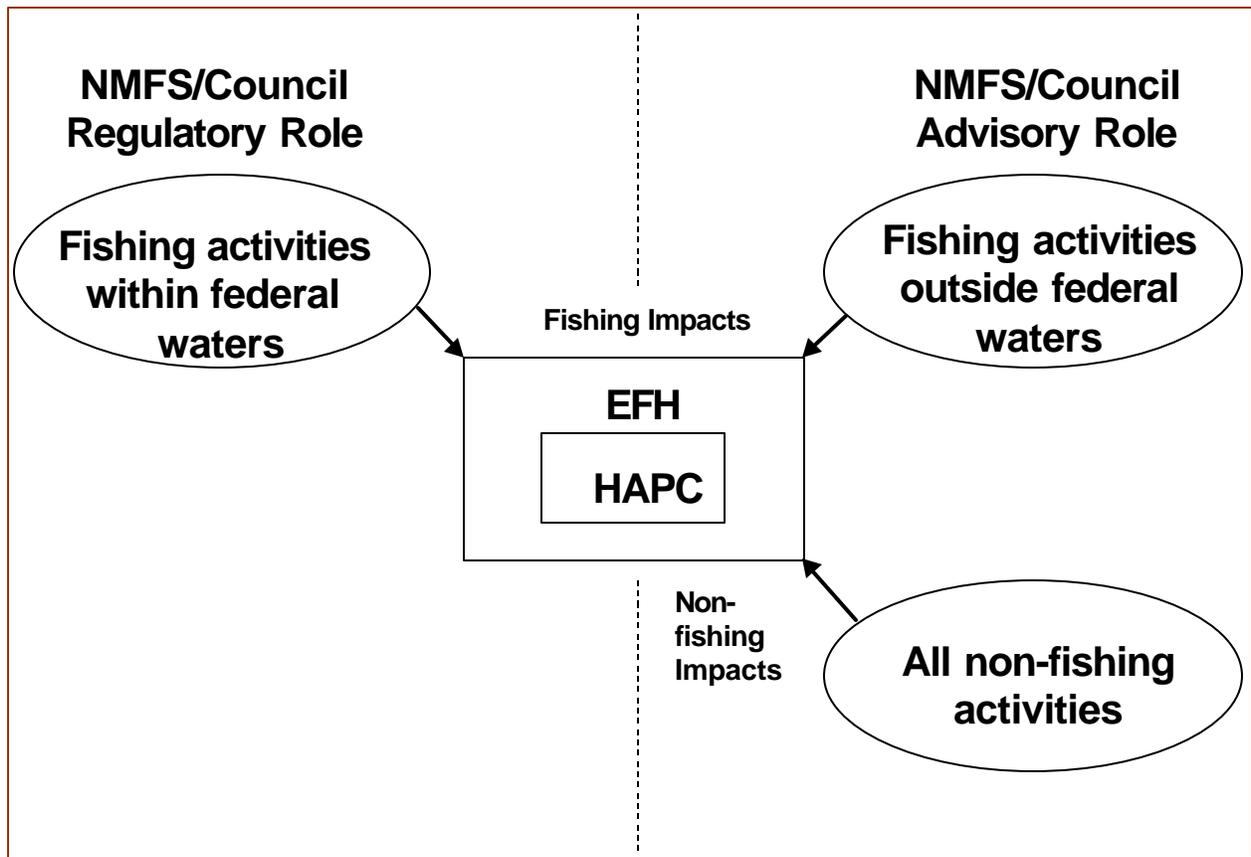


Figure 1.1.1 The regulatory and advisory roles of the Gulf Council and NMFS related to essential fish habitat.

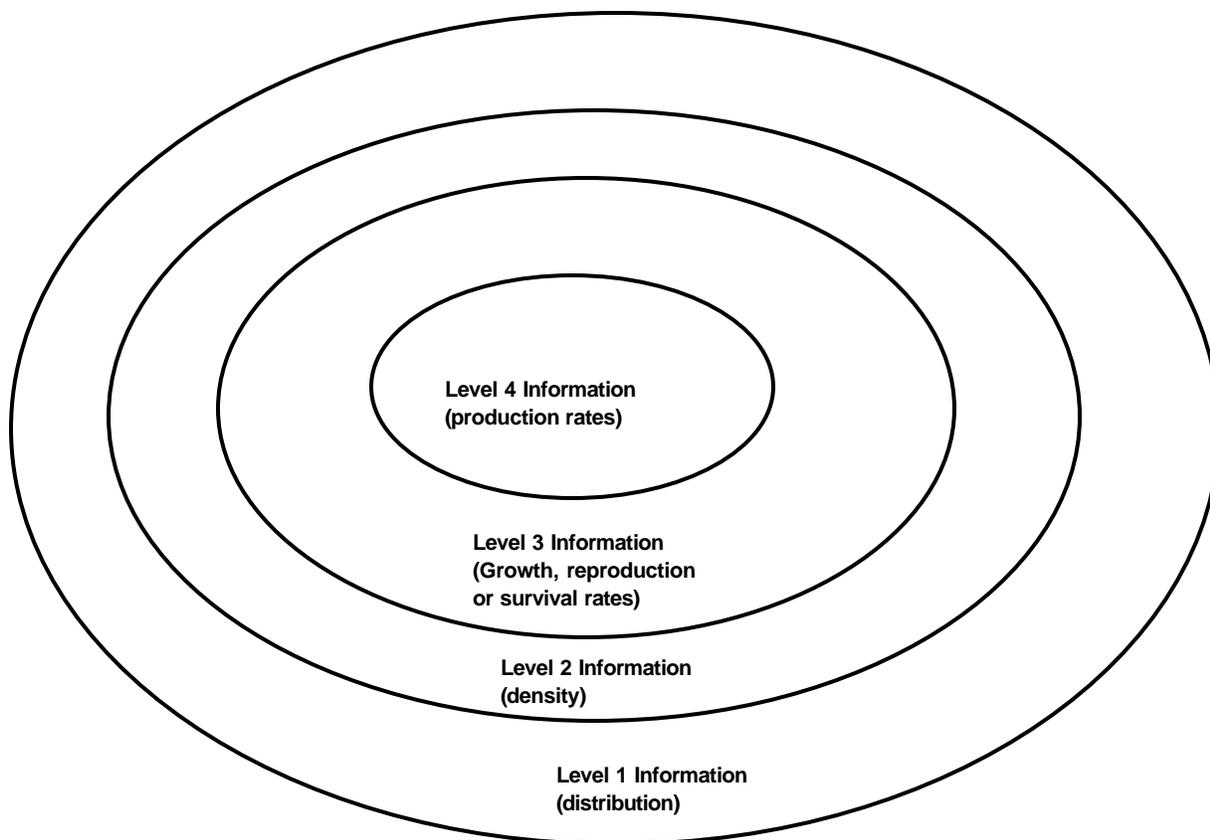


Figure 2.1.1. Diagrammatic relationship between the level of information and the extent of EFH.

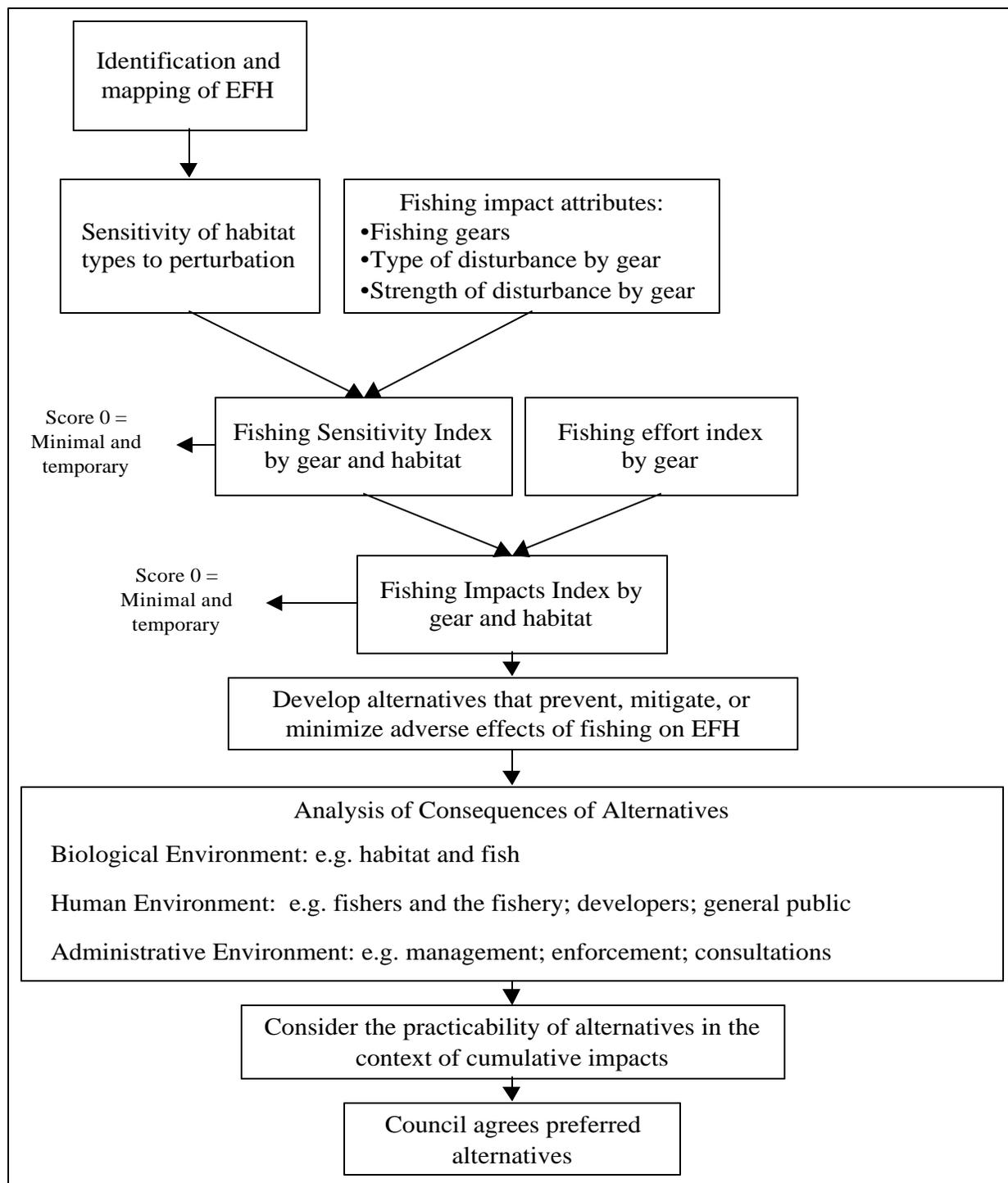


Figure 2.1.2. Flow diagram to demonstrate the formulation and analysis of alternatives for preventing, mitigating, or minimizing the adverse effects of fishing.

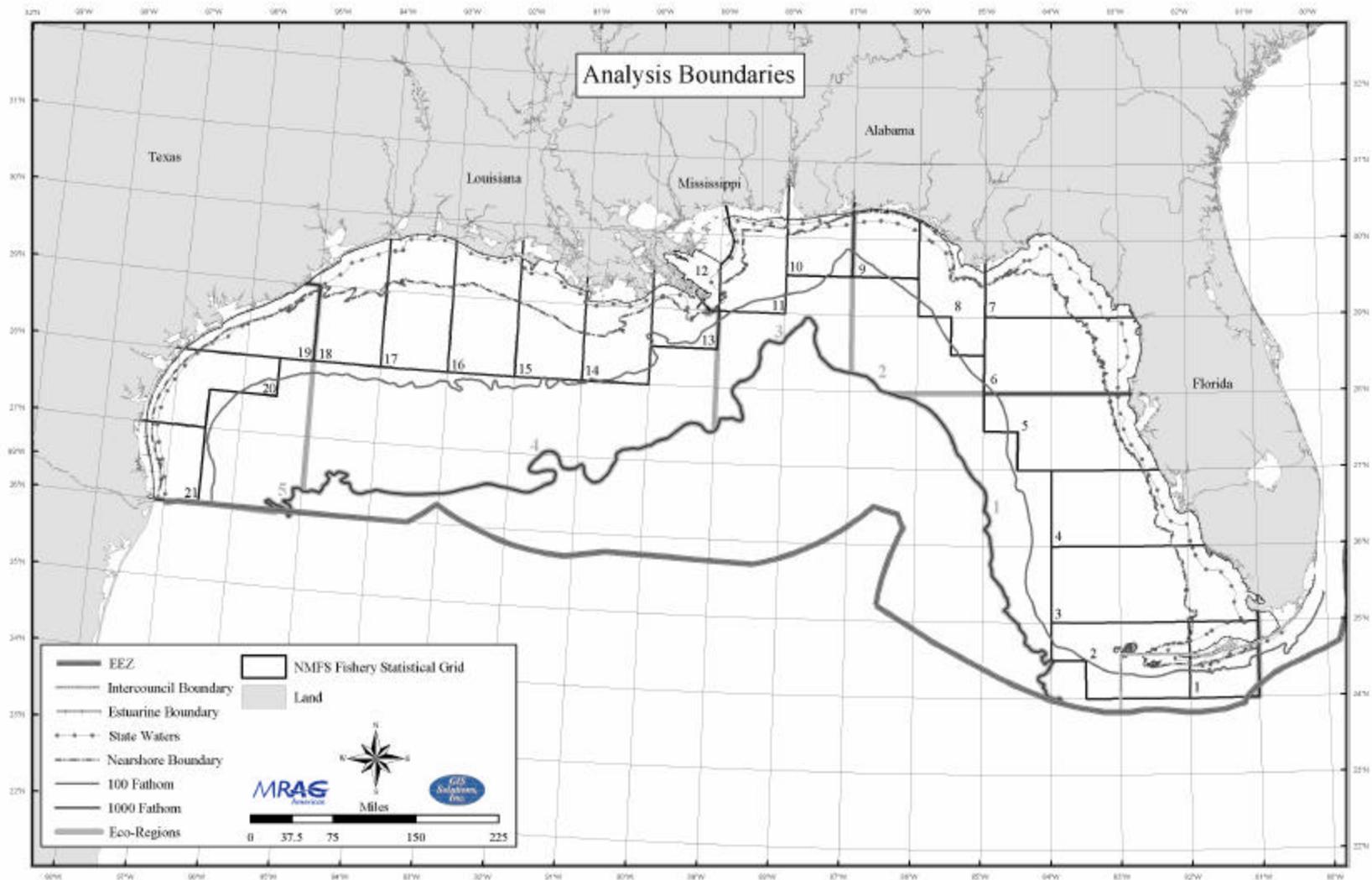


Figure 2.1.3. NMFS Statistical Grid, Gulf of Mexico

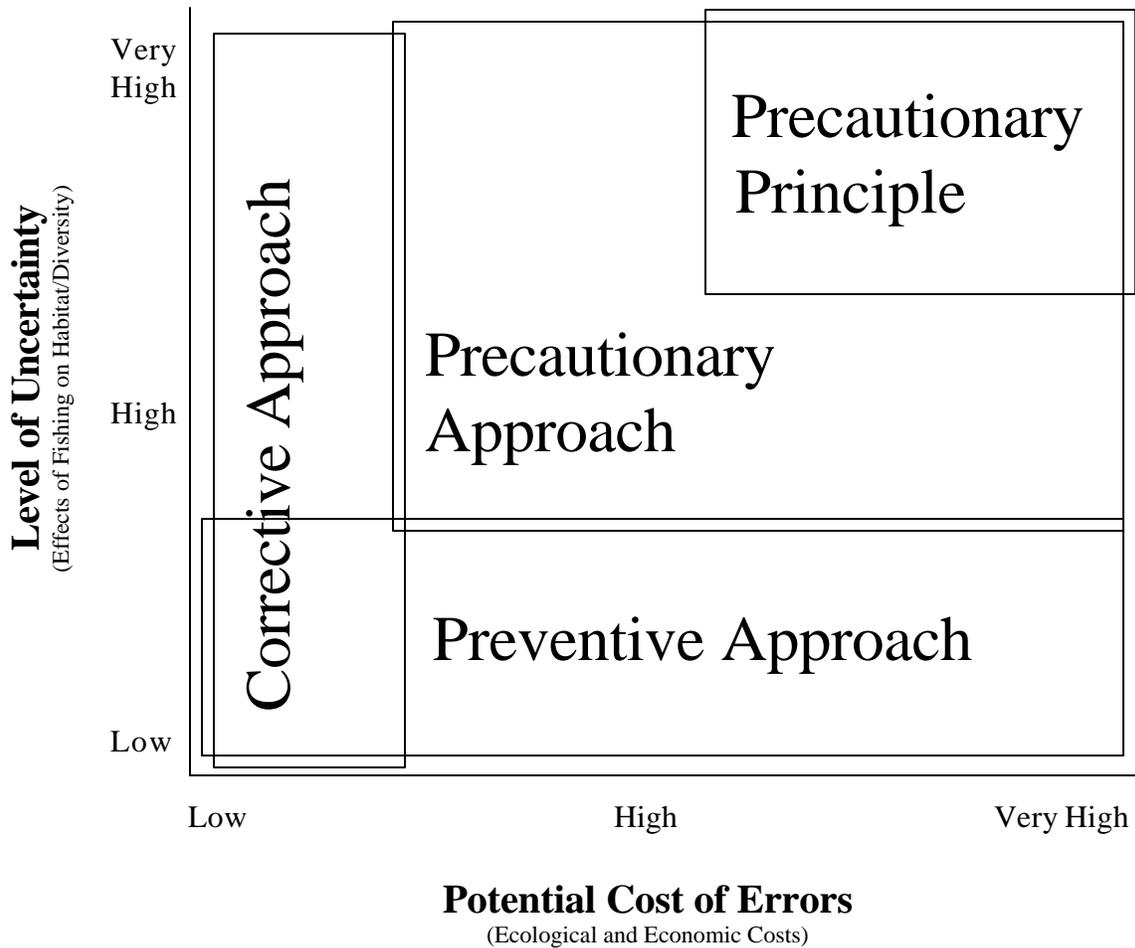


Figure 2.1.4. A comparison of management approaches that are based on levels of uncertainty and the potential cost of errors.

(Auster 2001, modified from Garcia [1996]).

Costs should be considered in both ecological and economic terms (e.g., lost economic opportunities when the ecological functions of habitat are damaged or regulatory actions limit fishing due to the endangerment of particular taxa). The level of uncertainty is based on our understanding of the effects of fishing practices on both habitat metrics and biological diversity.

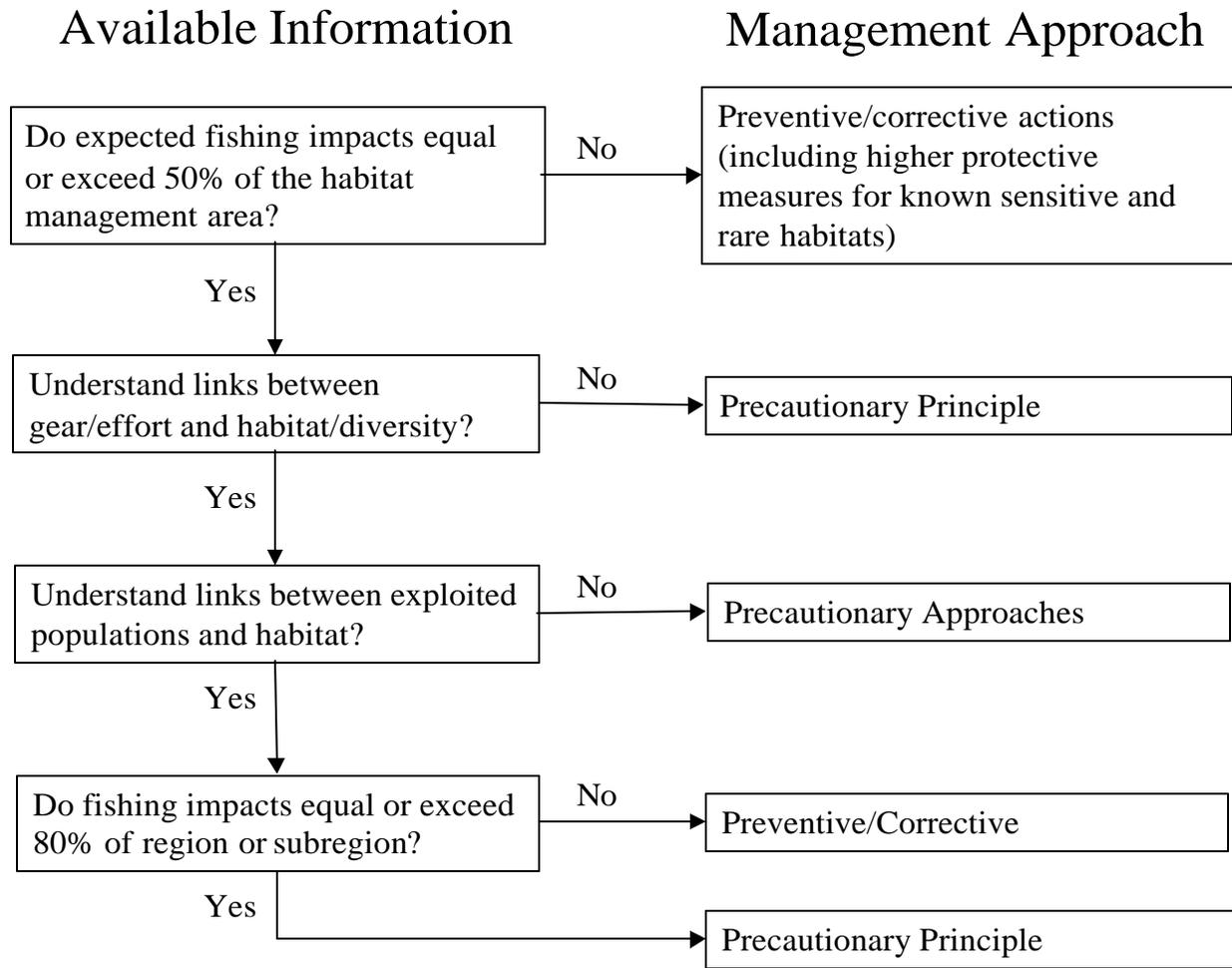


Figure 2.1.5. A decision diagram to determine the applicable type of management approach on the basis of effort thresholds and the current level of ecological knowledge.(After Auster 2001).

Note that the precautionary principle is invoked immediately (at the 50% threshold for a habitat management area) when our overall understanding of the effects of fishing on the general characteristics of habitat and biological diversity is low.

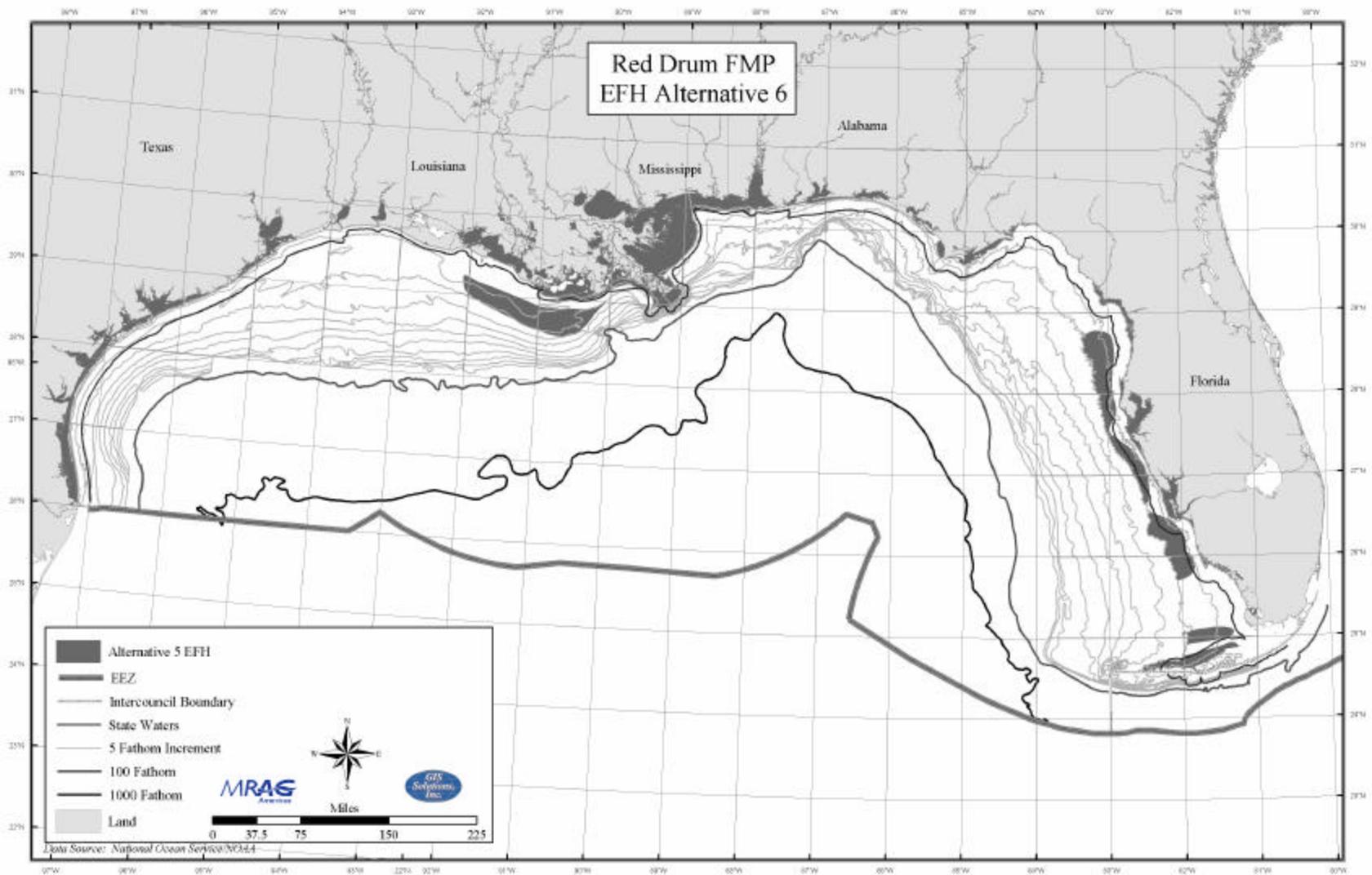


Figure 2.3.1. EFH Alternative 6 (Preferred) for the Red Drum FMP.

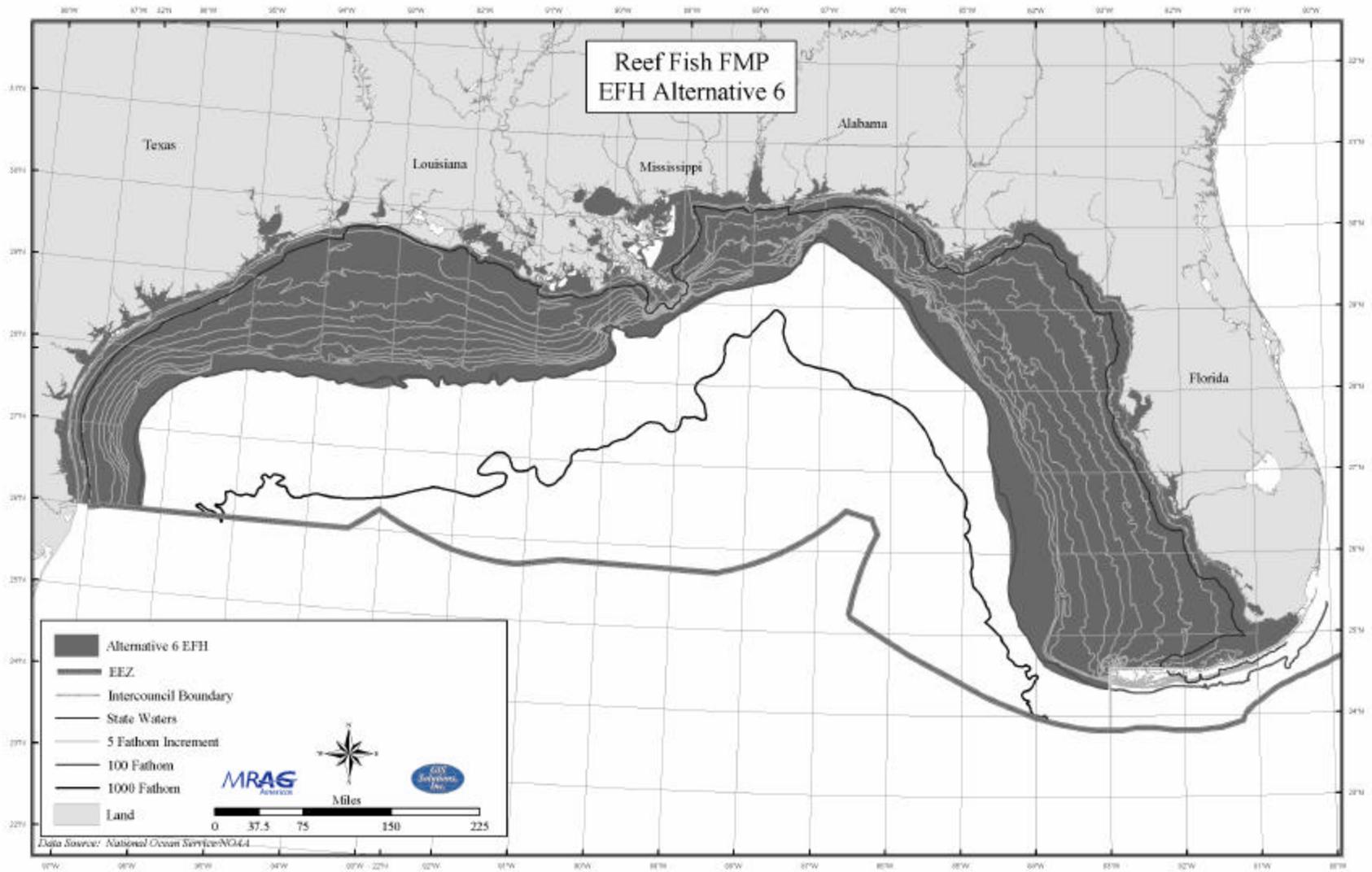


Figure 2.3.2. EFH Alternative 6 (Preferred) for the Reef Fish FMP.

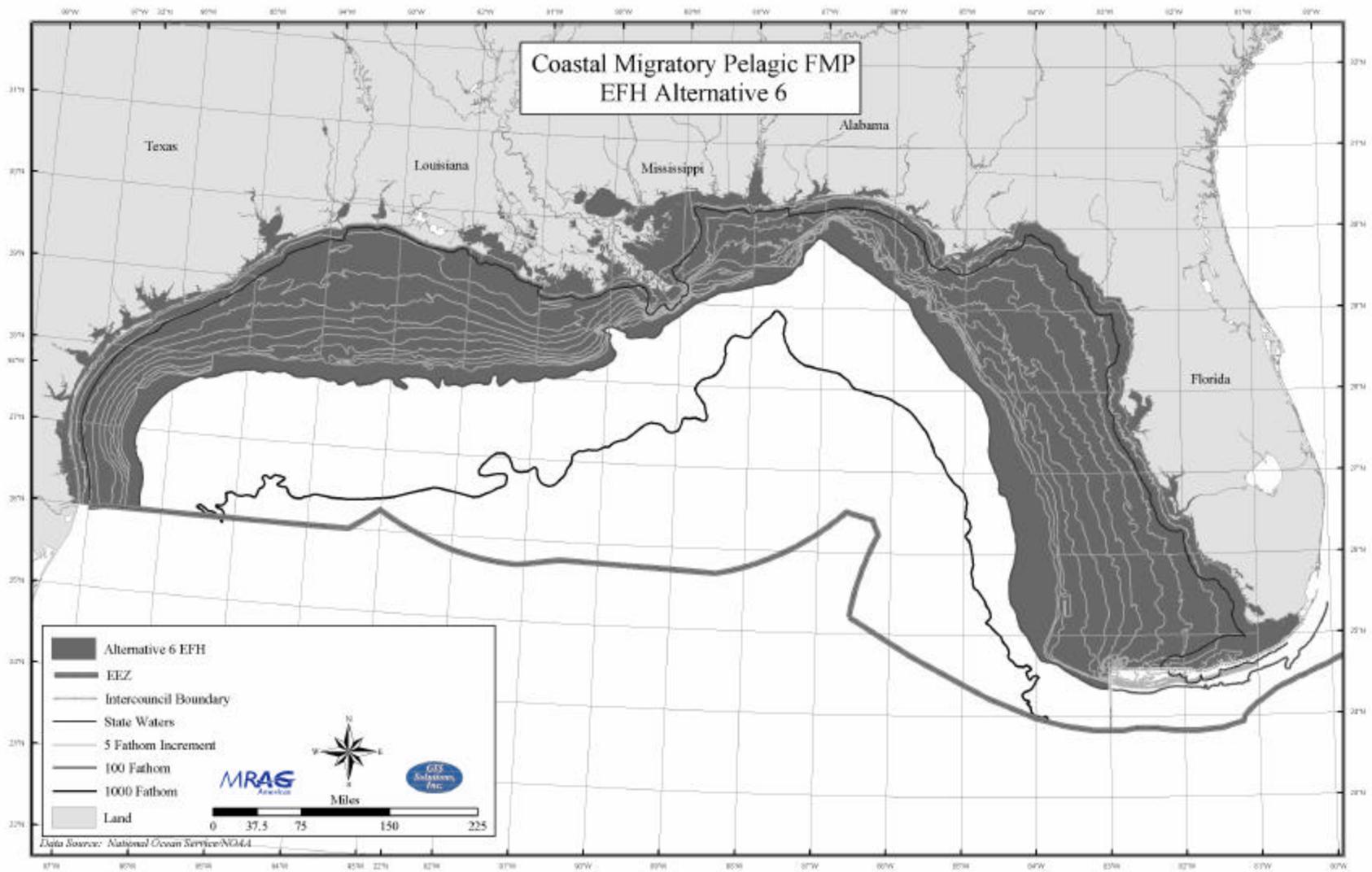


Figure 2.3.3. EFH Alternative 6 (Preferred) for the Coastal Migratory Pelagics FMP.

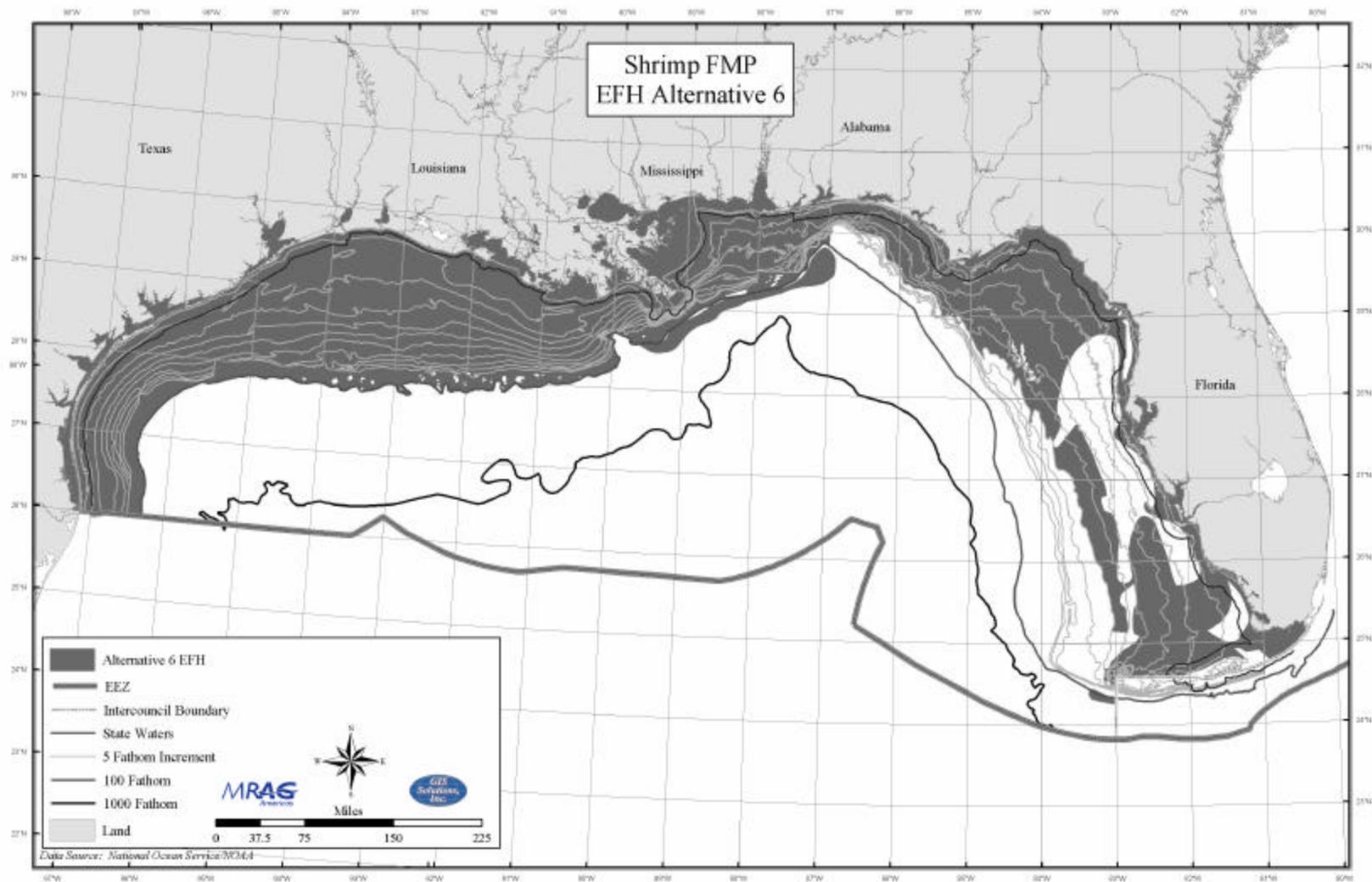


Figure 2.3.4. EFH Alternative 6 (Preferred) for the Shrimp FMP.

The large area lying offshore of Florida from approximately Crystal River to Naples, which is not shaded in this figure is a mosaic of patchy hard bottom with sand/shell habitats. This area has been identified as hard bottom for the purposes of mapping (Fig. 3.1.3). Shrimp in the Gulf of Mexico associate less with hard bottom than soft bottoms. Therefore this area it is not considered to be EFH for shrimp under this alternative.

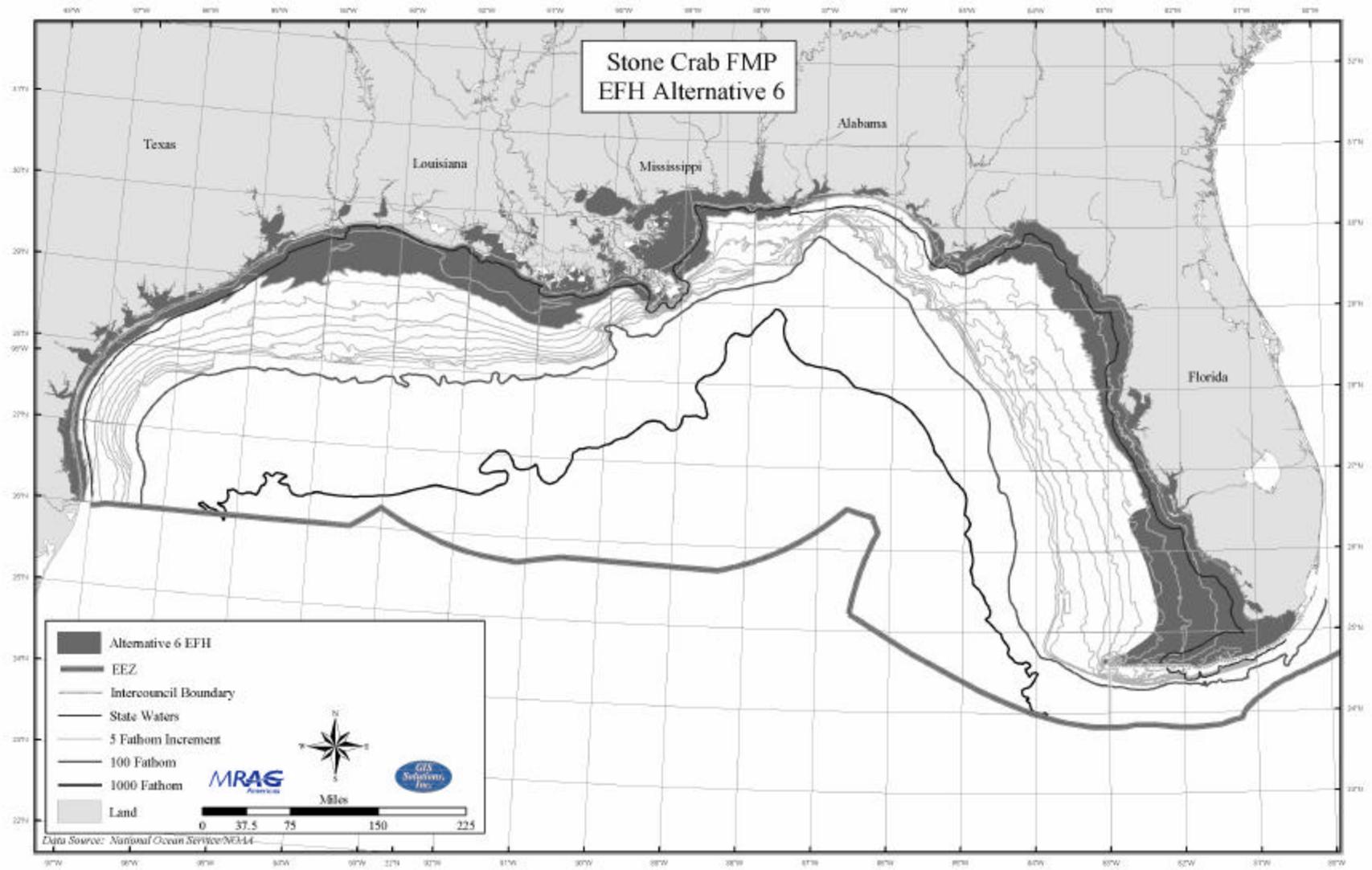


Figure 2.3.5. EFH Alternative 6 (Preferred) for the Stone Crab FMP.

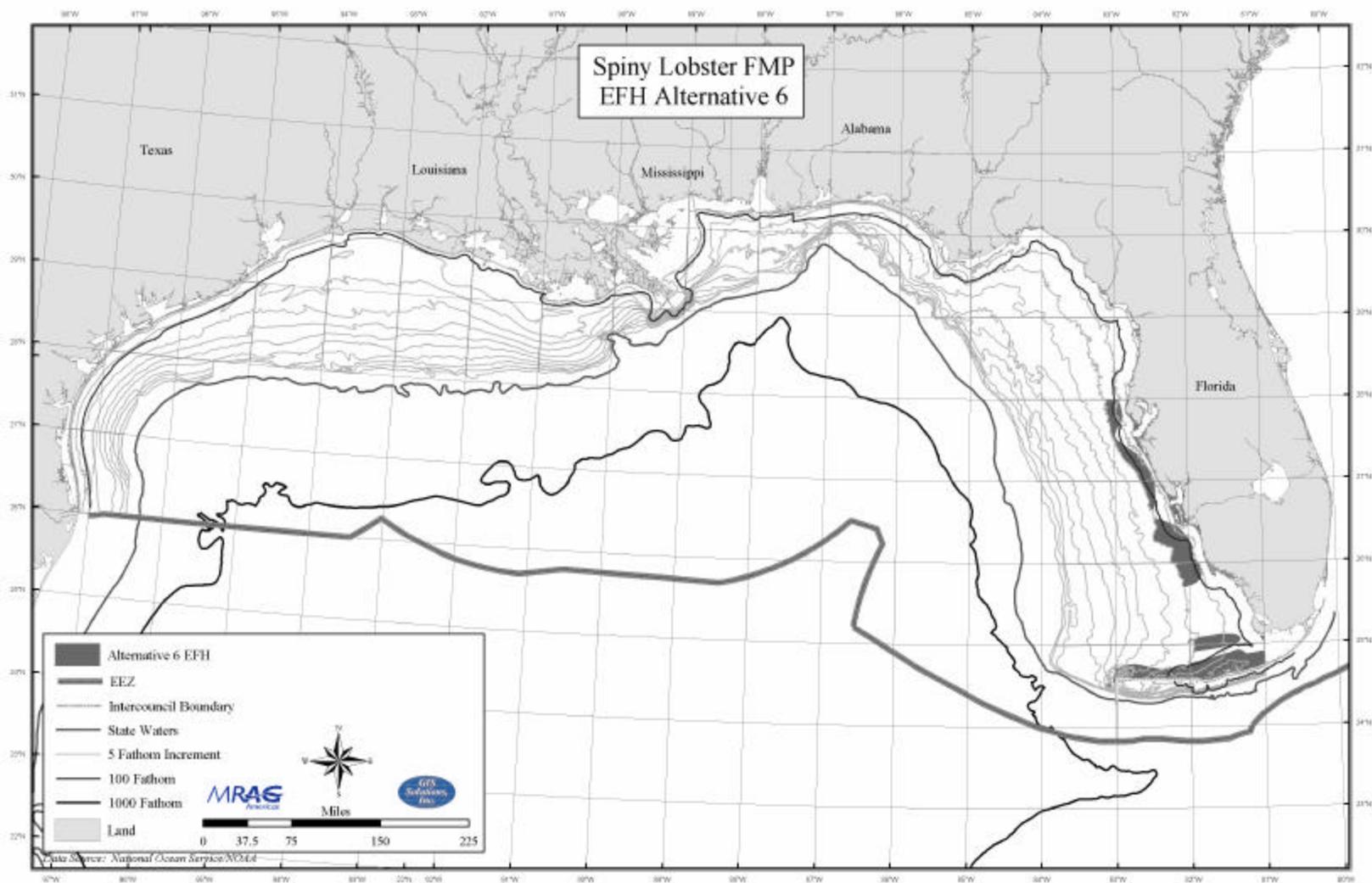


Figure 2.3.6. EFH Alternative 6 (Preferred) for the Spiny Lobster FMP.

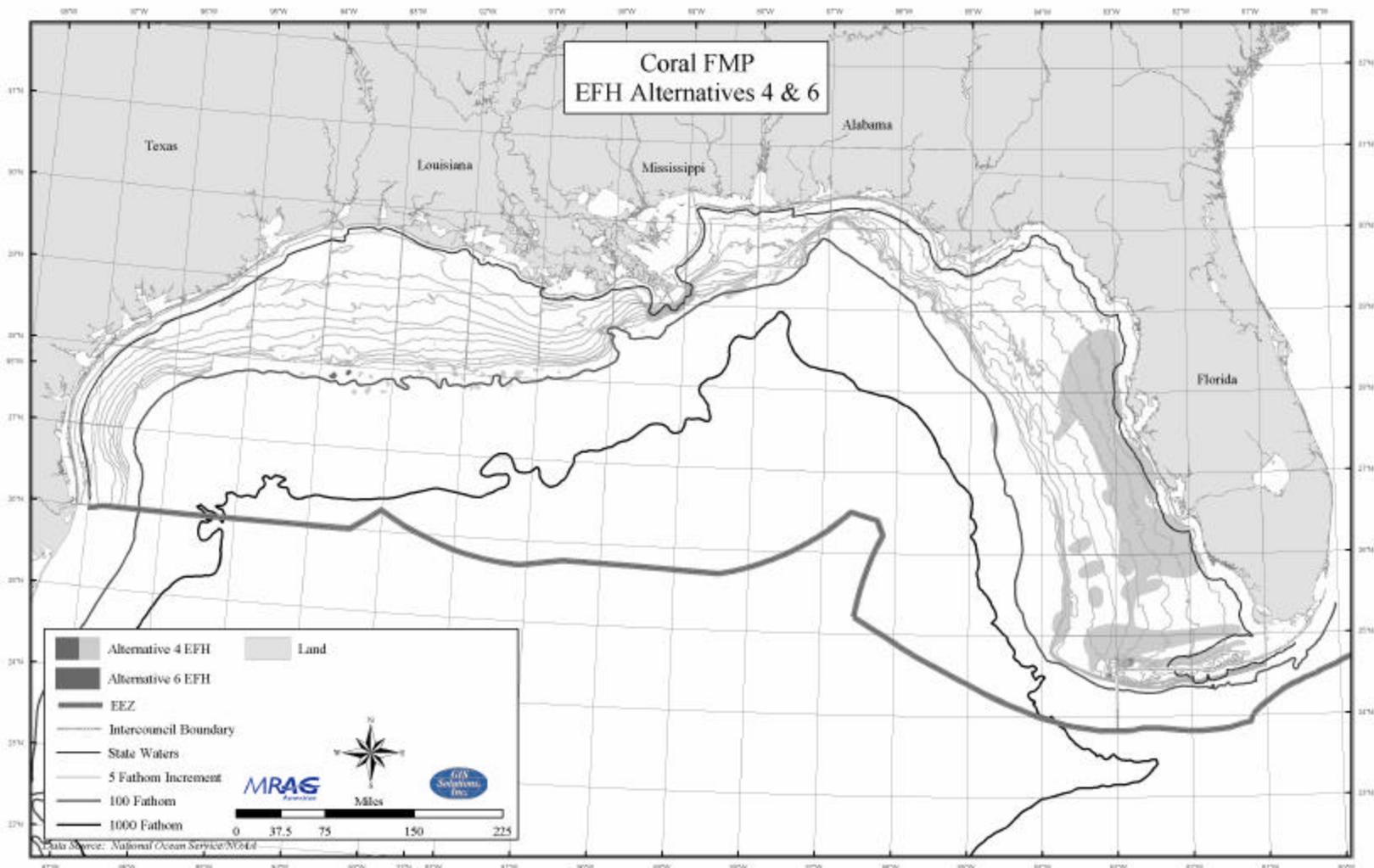


Figure 2.3.7. EFH Alternative 4 (Preferred) and 6 for the Coral FMP.

The large shaded area offshore of Florida from approximately Crystal River south to the Keys is a mosaic of patchy hard bottom and sand/shell habitats. Corals exist on the hard bottom patches of this area, but the locations of individual patches of hard bottom are not mapped separately. The entire area is therefore identified as EFH under Alternative 4.

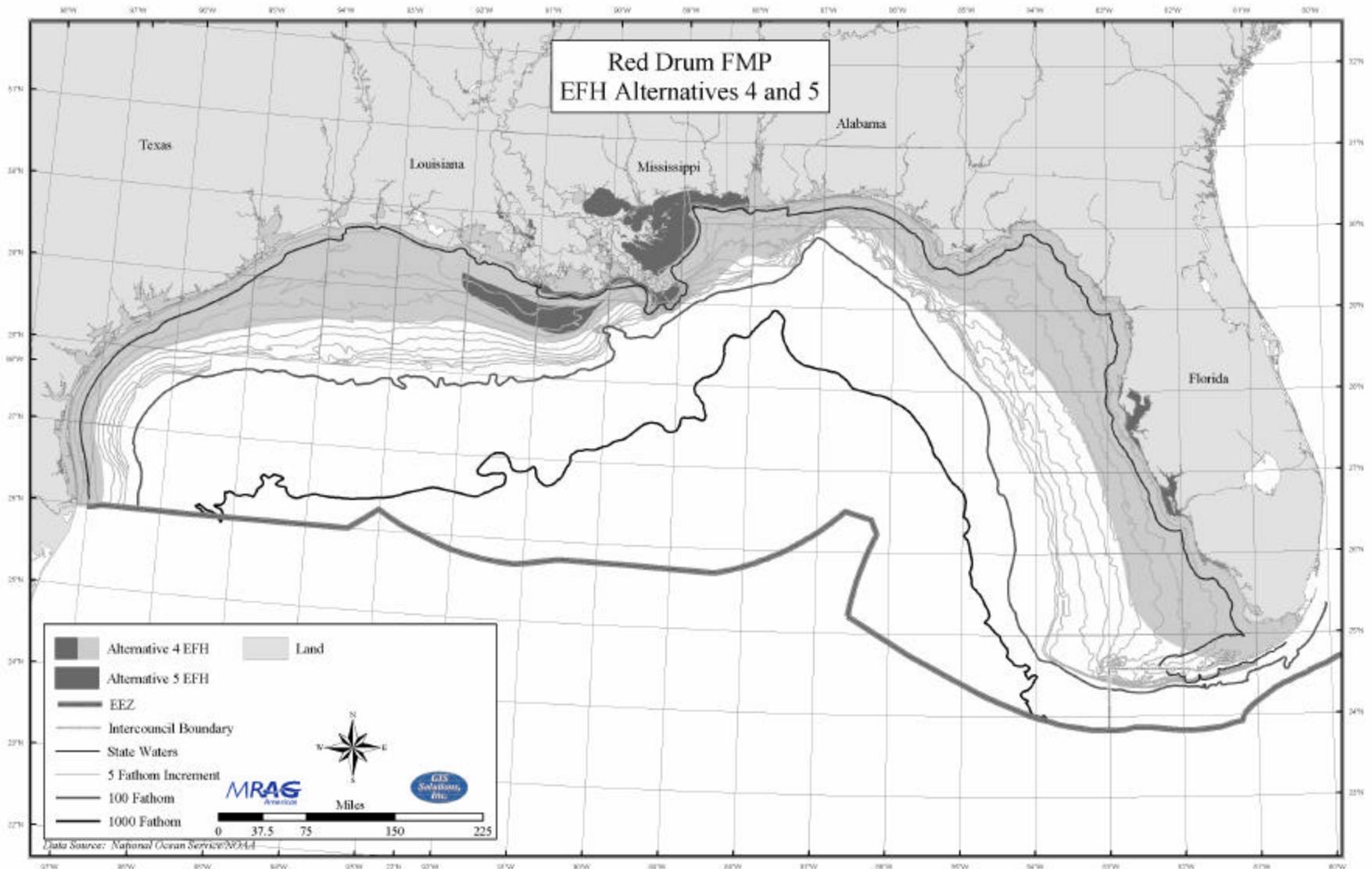


Figure 2.3.8. EFH Alternatives 4 and 5 for the Red Drum FMP.

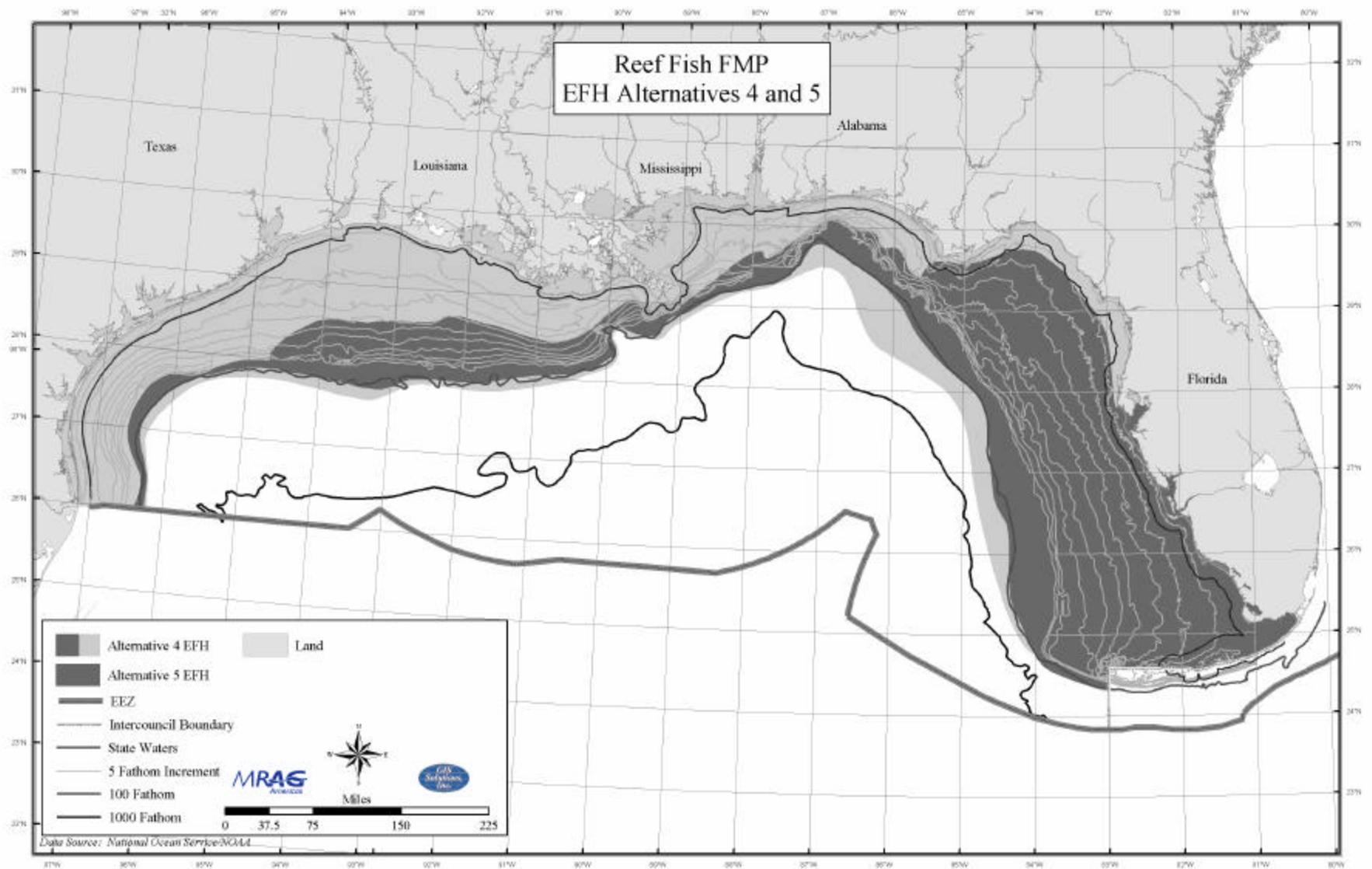


Figure 2.3.9. EFH Alternatives 4 and 5 for the Reef Fish FMP.

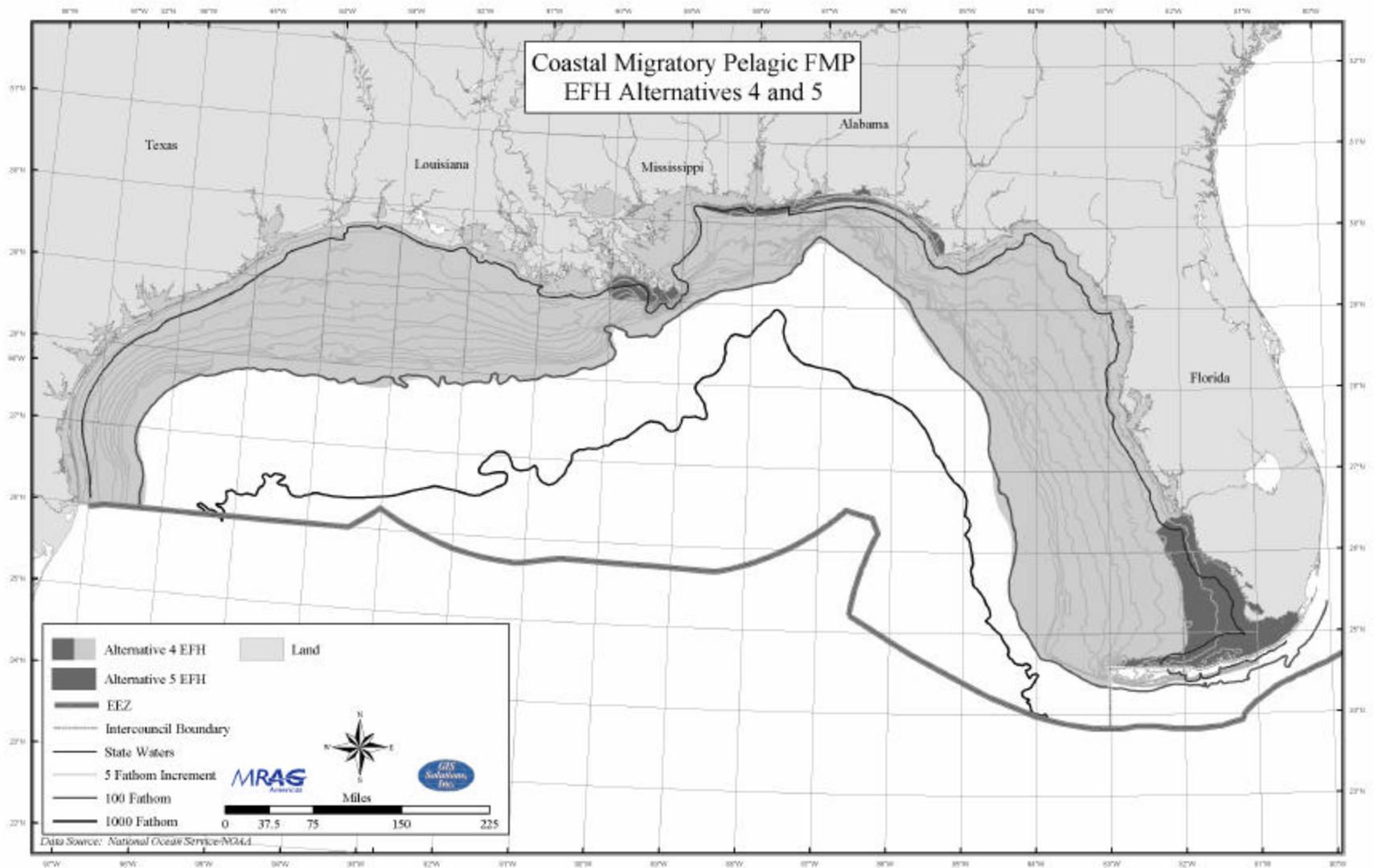


Figure 2.3.10. EFH Alternatives 4 and 5 for the Coastal Migratory Pelagics FMP.

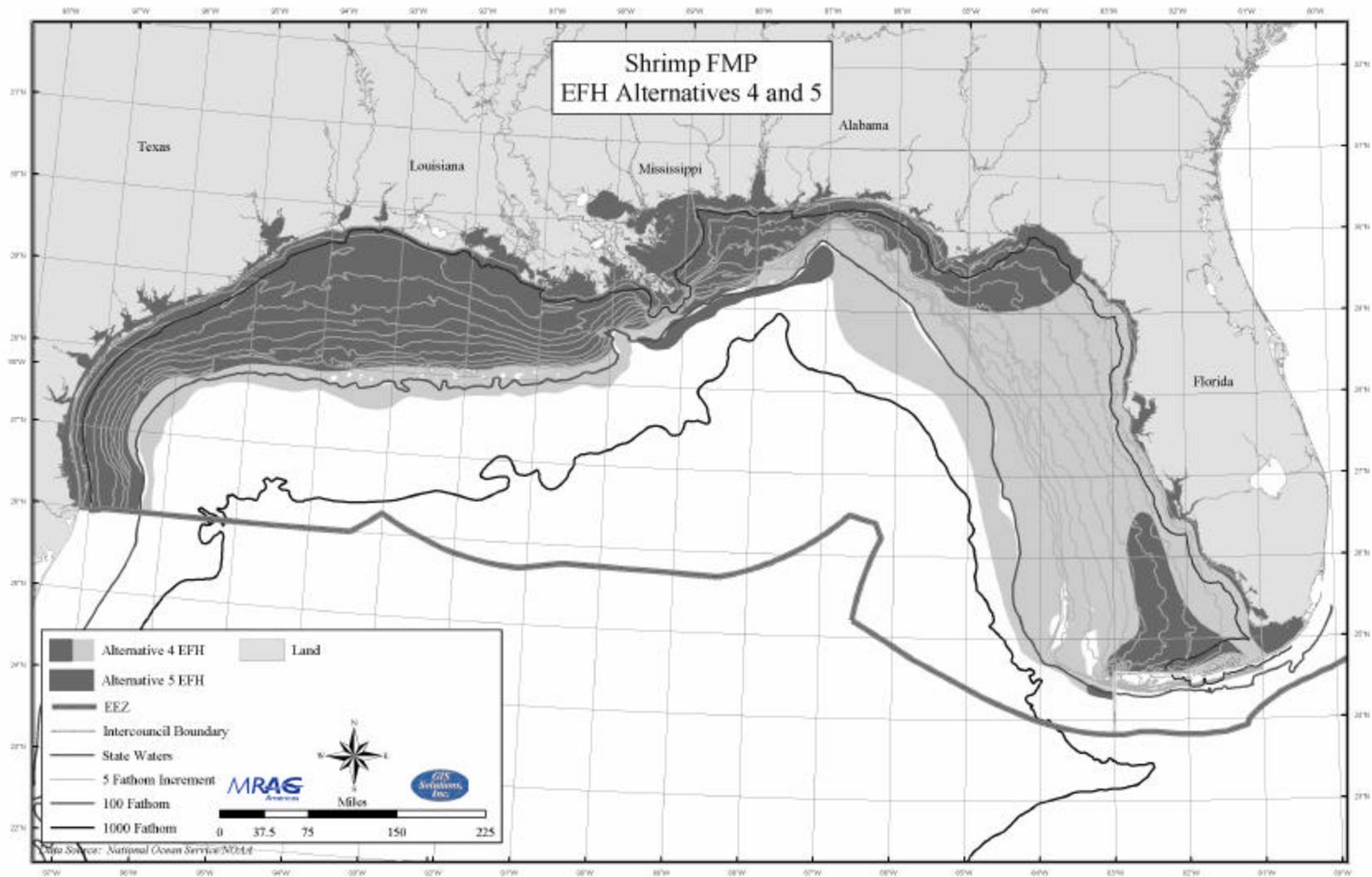


Figure 2.3.11. EFH Alternatives 4 and 5 for the Shrimp FMP.

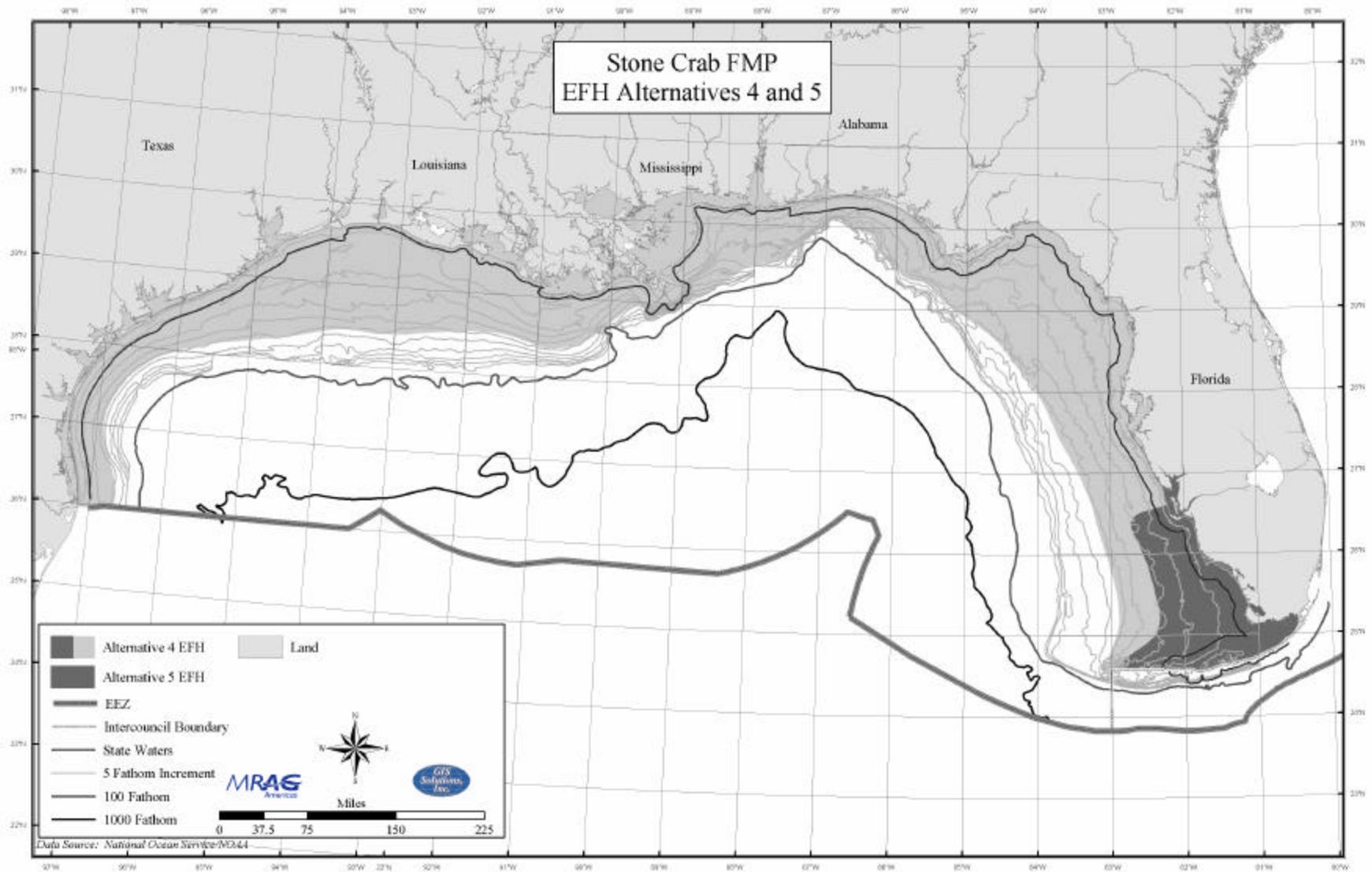


Figure 2.3.12. EFH Alternatives 4 and 5 for the Stone Crab FMP.

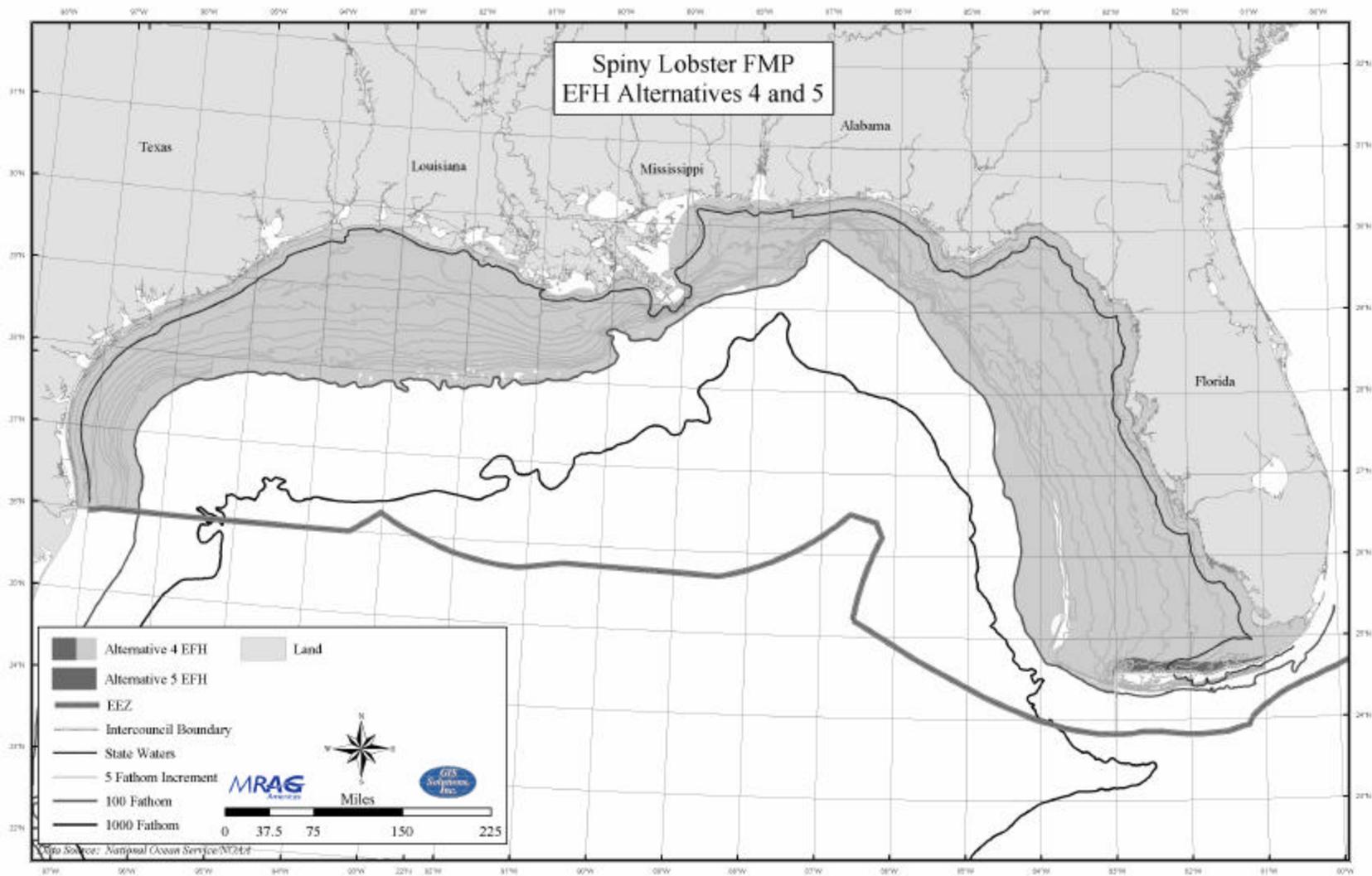


Figure 2.3.13. EFH Alternatives 4 and 5 for the Spiny Lobster FMP.

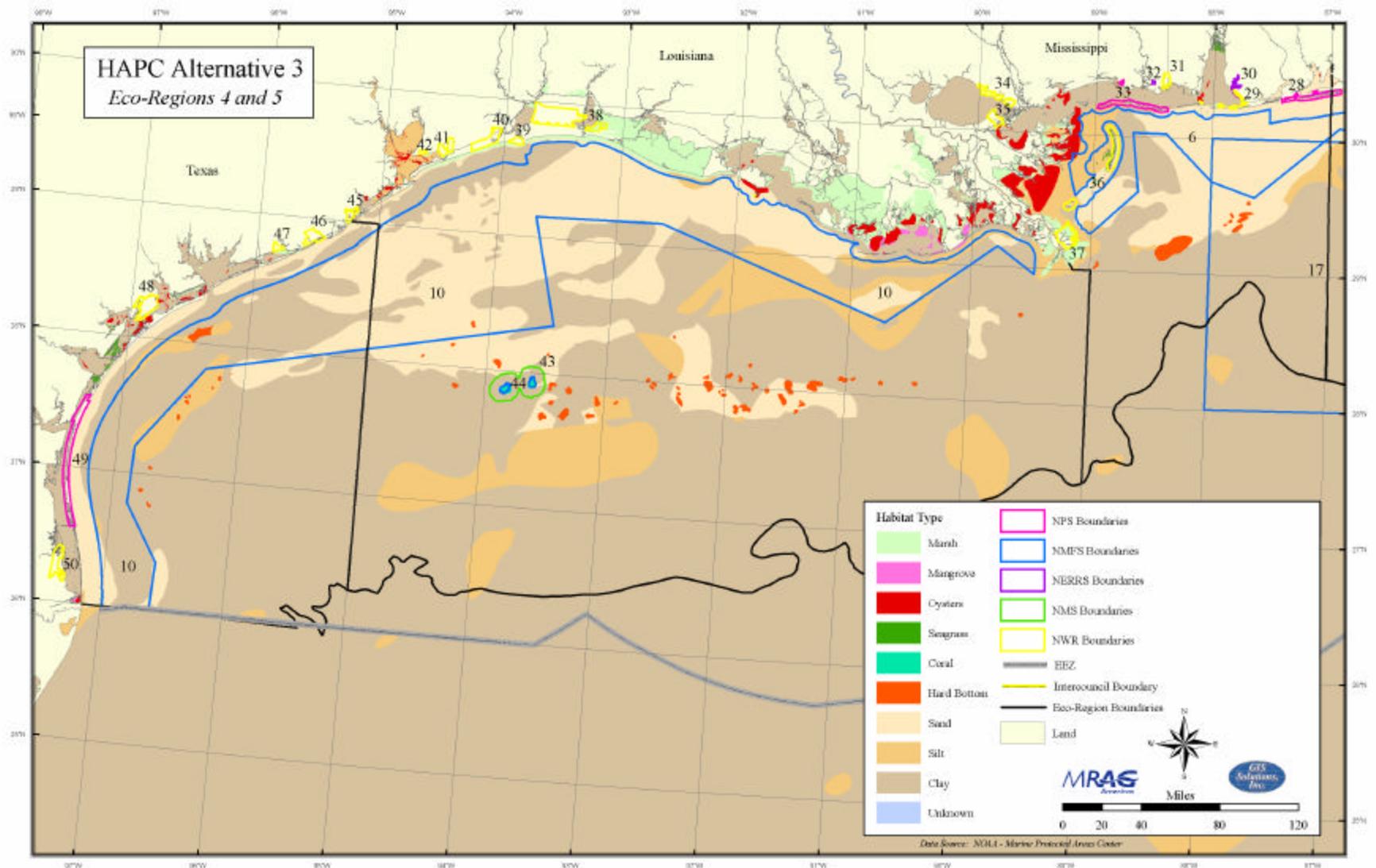


Figure 2.3.14. HAPC Alternative 3 designations in the West Gulf of Mexico. (See site reference list, p. 9-26 and description in Section 2.4.3).

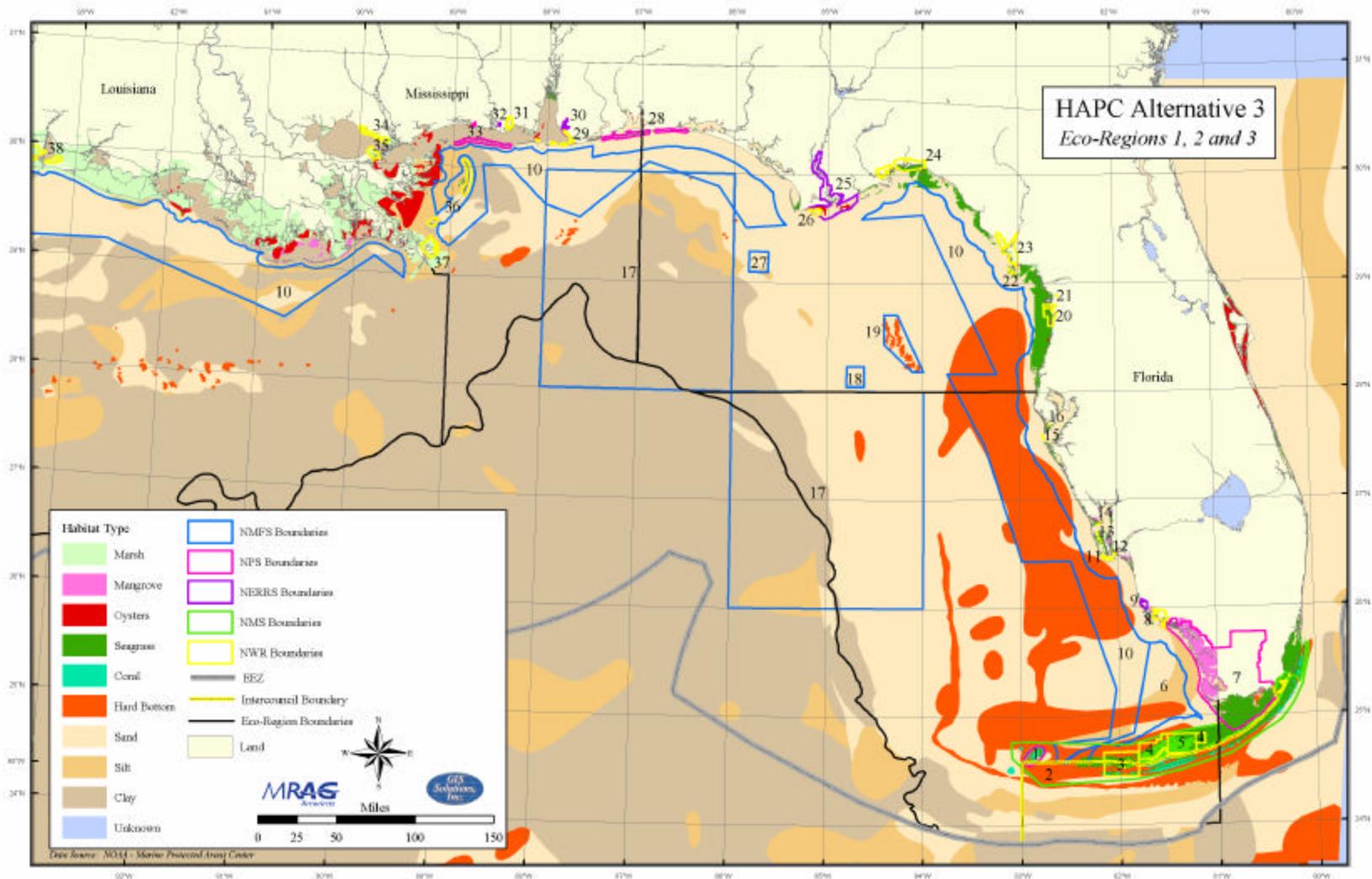


Figure 2.3.15. HAPC Alternative 3 designations in the East Gulf of Mexico.
 (See site reference list, p. 9-26 and description in Section 2.4.3).

Alternative 3 Site Reference List

1. Dry Tortugas National Park
2. Florida Keys National Marine Sanctuary
3. Key West National Wildlife Refuge
4. Great White Heron National Wildlife Refuge
5. National Key Deer Refuge
6. Tortugas Shrimp Sanctuary
7. Everglades National Park
8. Ten Thousand Islands National Wildlife Refuge
9. Rookery Bay
10. Reef Fish Stressed Area
11. J N Ding Darling NWR
12. Matlacha Pass NWR
13. Pine Island NWR
14. Island Bay NWR
15. Egmont Key NWR
16. Pinellas NWR
17. DeSoto Canyon Closed Area
18. Steamboat Lumps Spawning Site
19. Florida Middle Grounds HAPC
20. Chassahowitzka NWR
21. Crystal River NWR
22. Cedar Keys NWR
23. Lower Suwannee NWR
24. Saint Marks NWR
25. Apalachicola Bay
26. Saint Vincent NWR
27. Madison-Swanson Spawning Site
28. Gulf Islands National Seashore
29. Bon Secour NWR
30. Weeks Bay
31. Grand Bay NWR
32. Grand Bay
33. Gulf Islands National Seashore
34. Big Branch Marsh NWR
35. Bayou Sauvage NWR
36. Breton NWR
37. Delta NWR
38. Sabine NWR
39. Texas Point NWR
40. McFaddin NWR
41. Anahuac NWR
42. Moody NWR
43. Four Mile Zone
44. East and West Flower Garden Banks HAPC
45. Brazoria NWR
46. San Bernard NWR
47. Big Boggy NWR
48. Aransas NWR
49. Padre Island National Seashore
50. Laguna Atascosa NWR

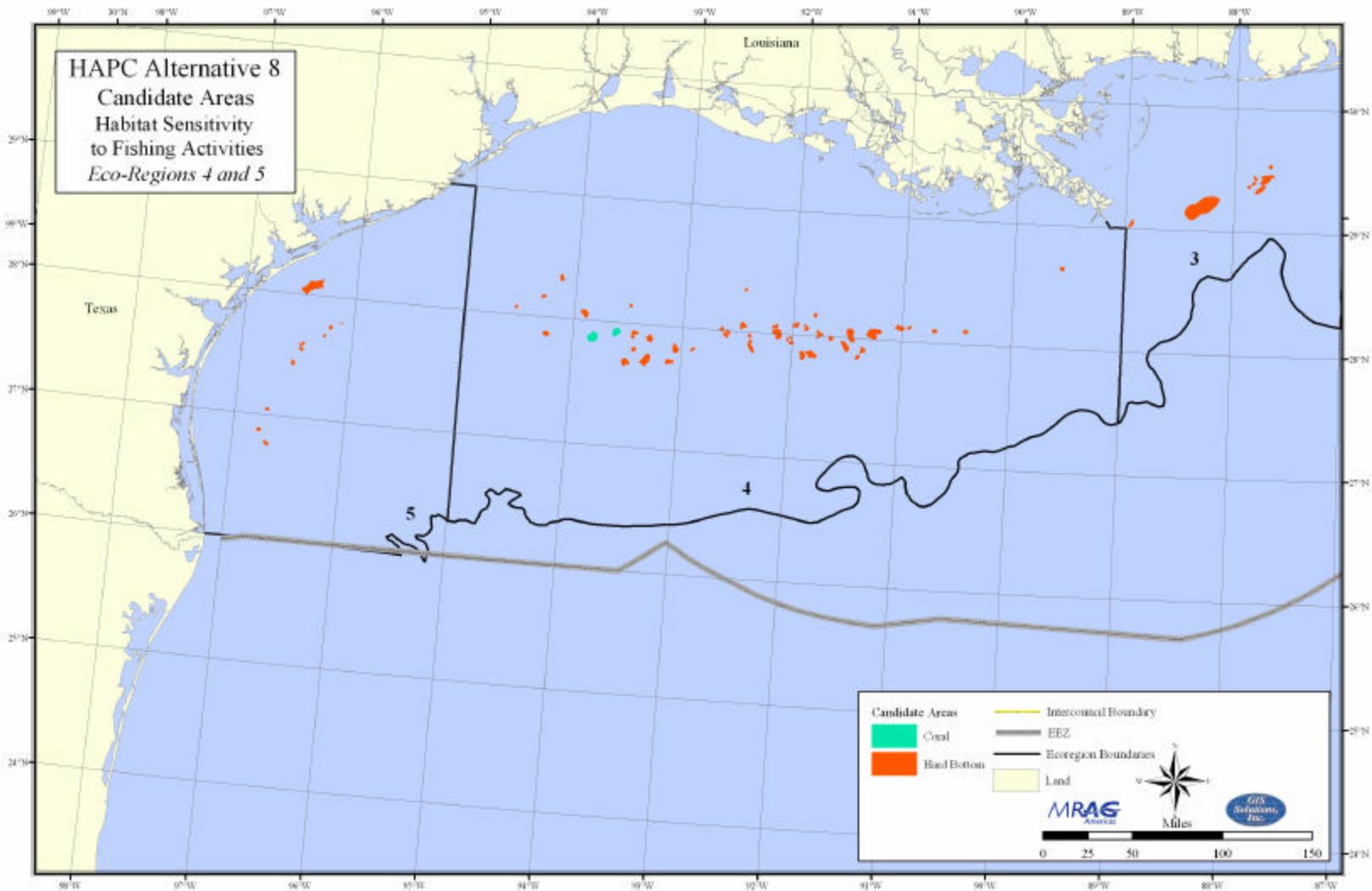


Figure 2.3.16a. HAPC Alternative 8 designations in the West Gulf of Mexico, based on sensitivity to fishing activities as discussed in Section 2.4.4.

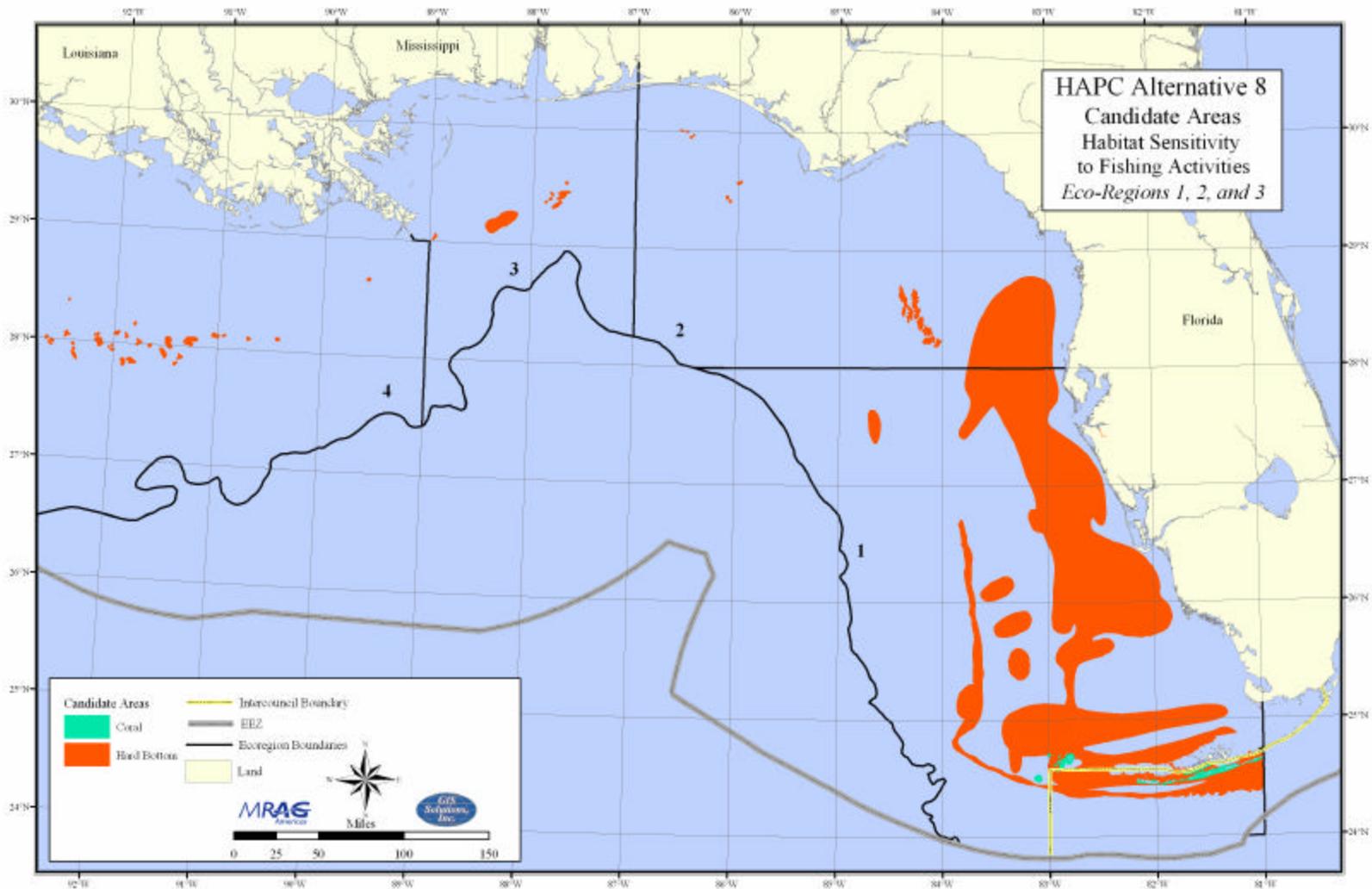


Figure 2.3.16b. HAPC Alternative 8 designations in the East Gulf of Mexico, based on sensitivity to fishing activities as discussed in Section 2.4.4. The large area designated as hard bottom in eco-regions 1 and 2 is actually a mosaic of hard bottom and sand/shell habitat, but it has been classified as hard bottom for the purposes of mapping (see Fig. 3.1.3).

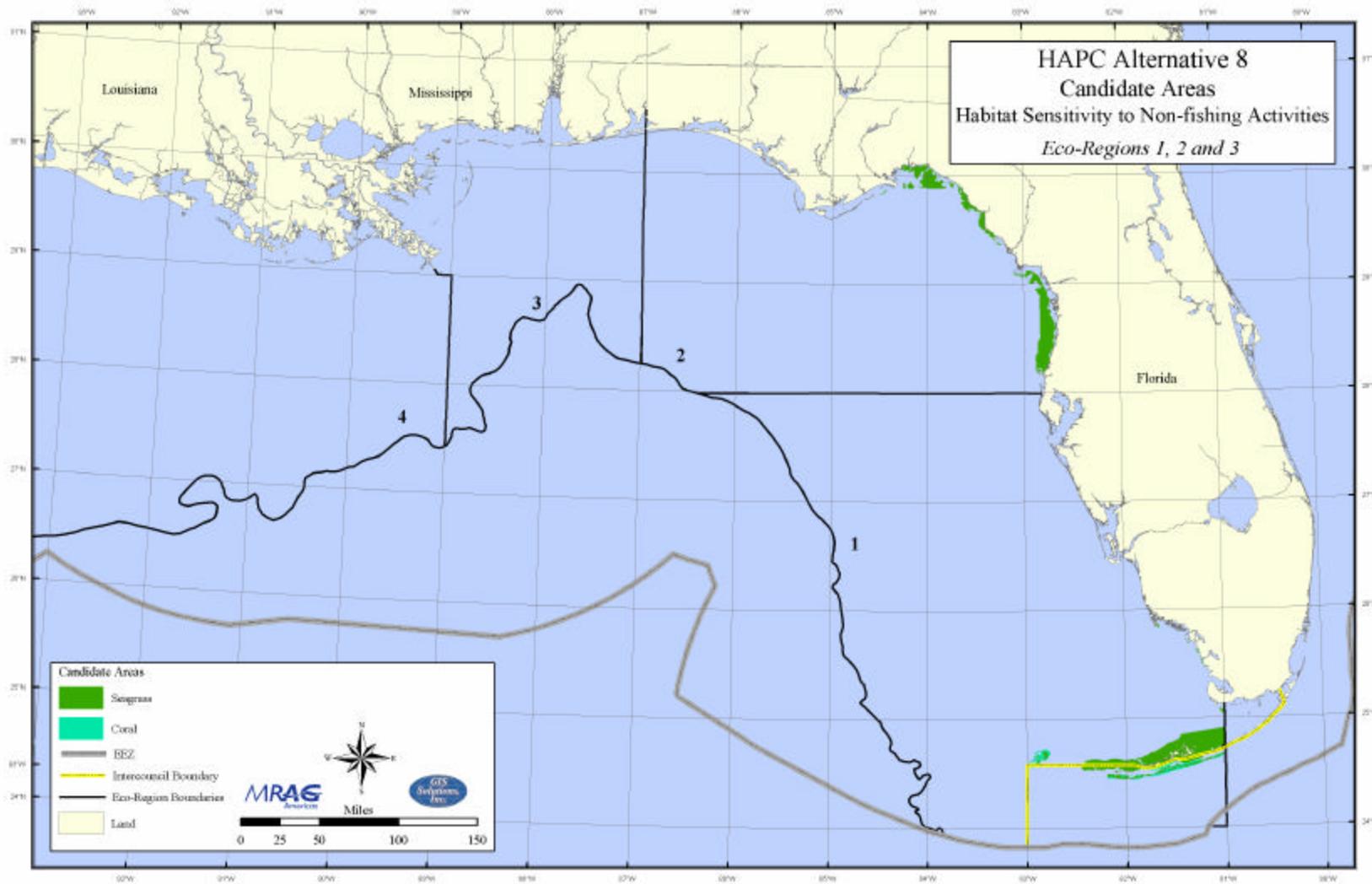


Figure 2.3.17. HAPC Alternative 8 designations in the Gulf of Mexico, based on sensitivity to non-fishing activities as discussed in Section 2.4.4.

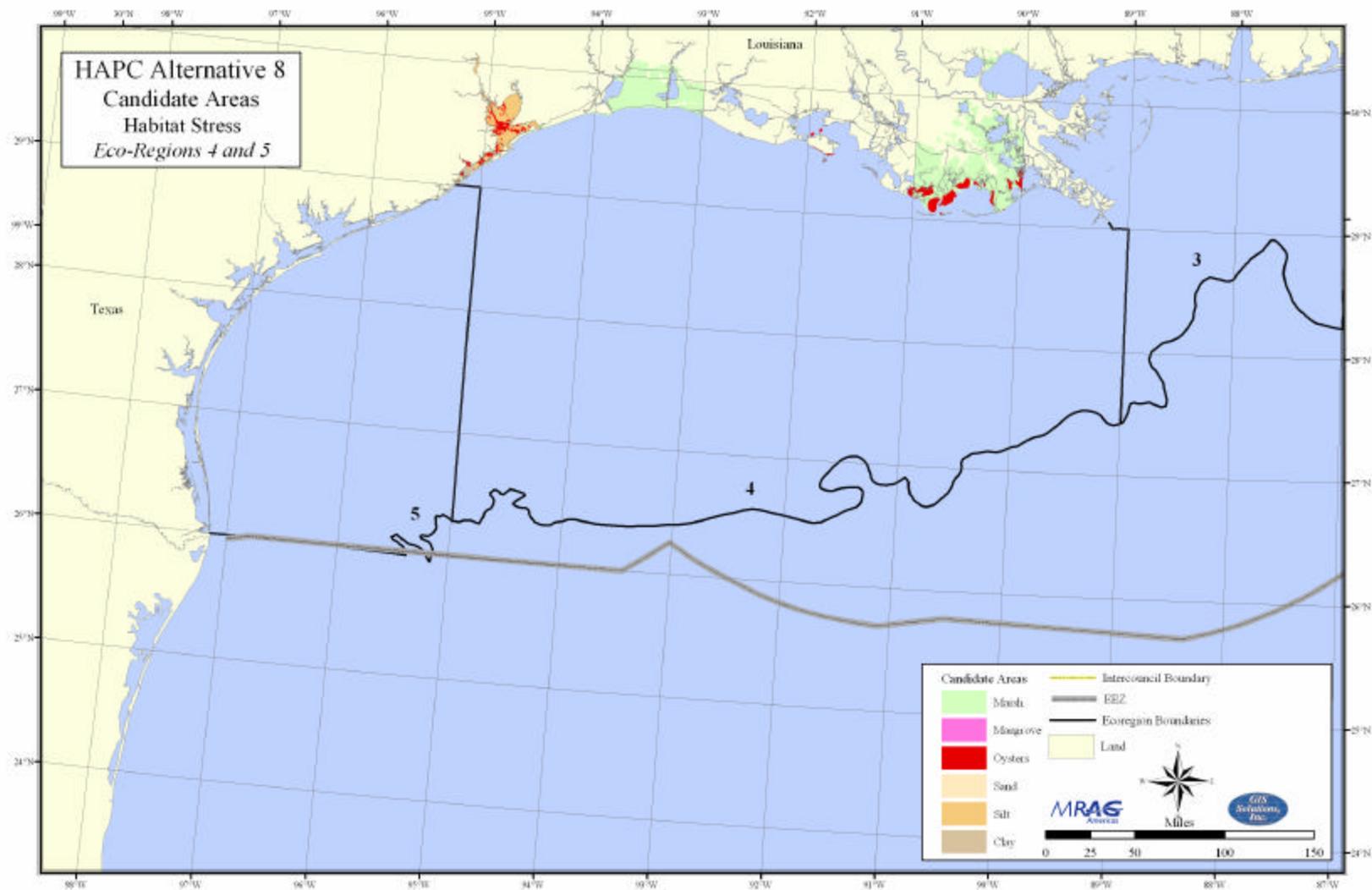


Figure 2.3.18a. HAPC Alternative 8 designations in the West Gulf of Mexico, based on stress and development activities as discussed in Section 2.4.4.

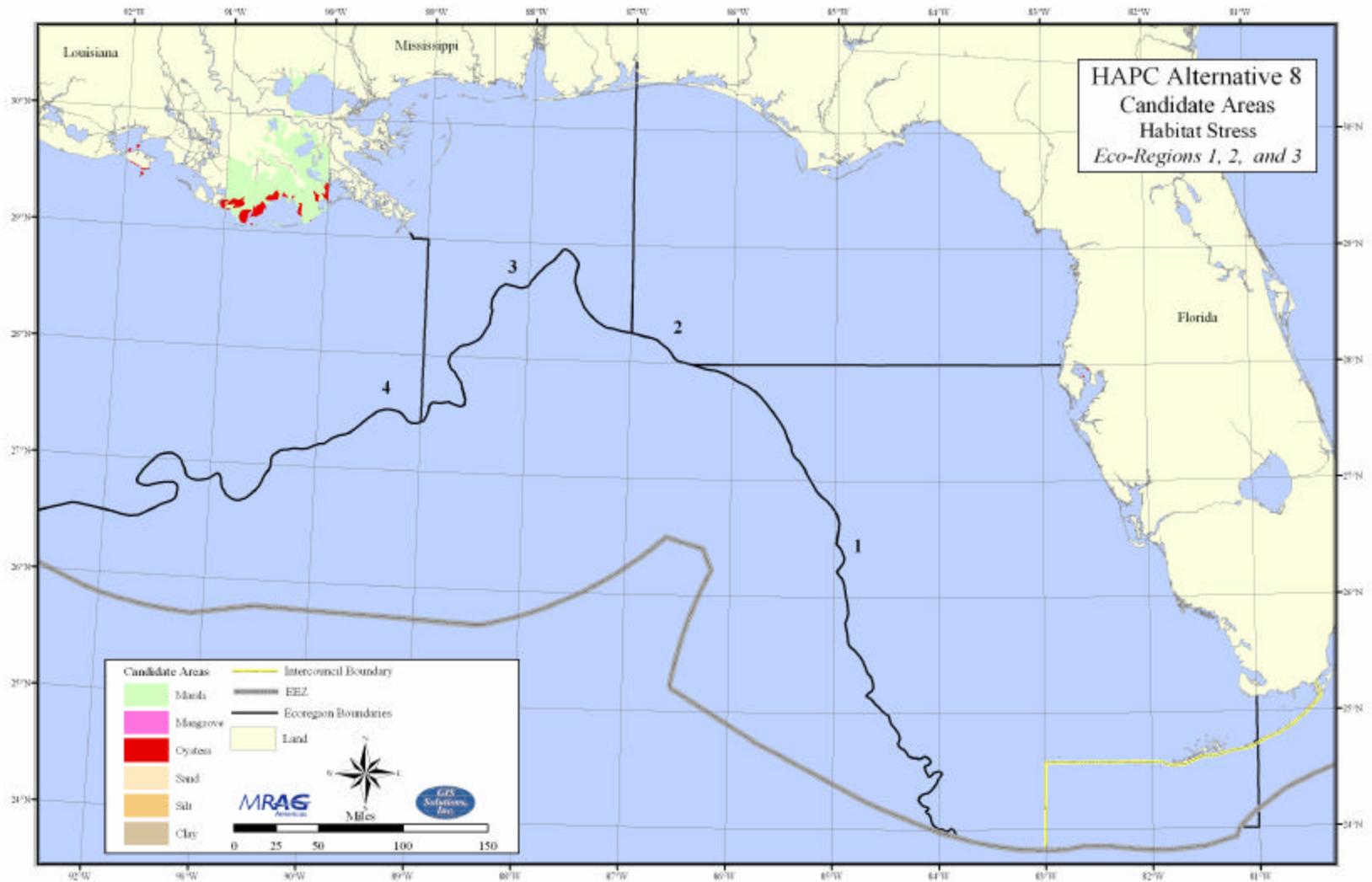


Figure 2.3.18b. HAPC Alternative 8 designations in the East Gulf of Mexico, based on stress and development activities as discussed in Section 2.4.4.

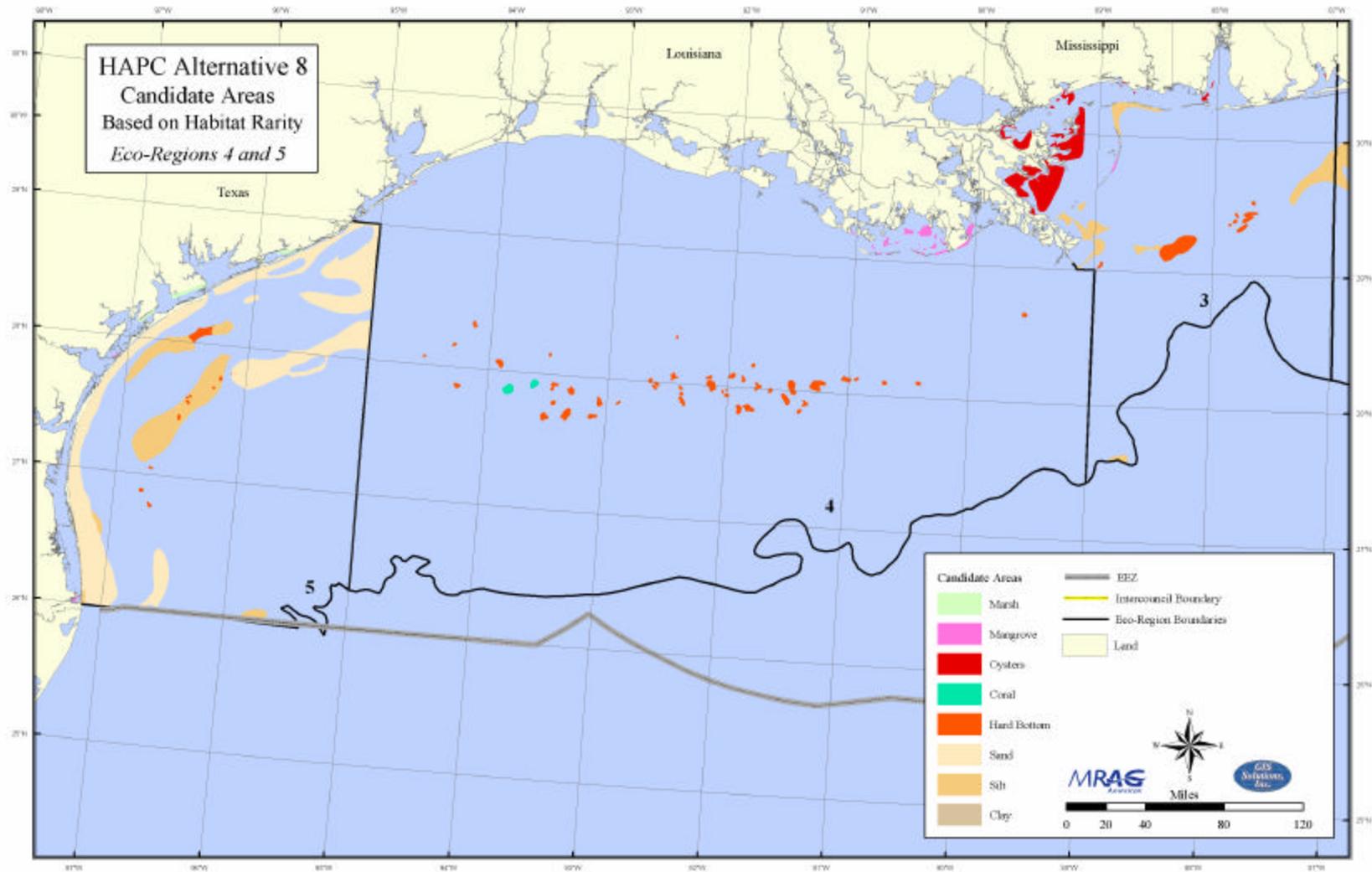


Figure 2.3.19a. HAPC Alternative 8 designations in the West Gulf of Mexico, based on habitat rarity as discussed in Section 2.4.4.

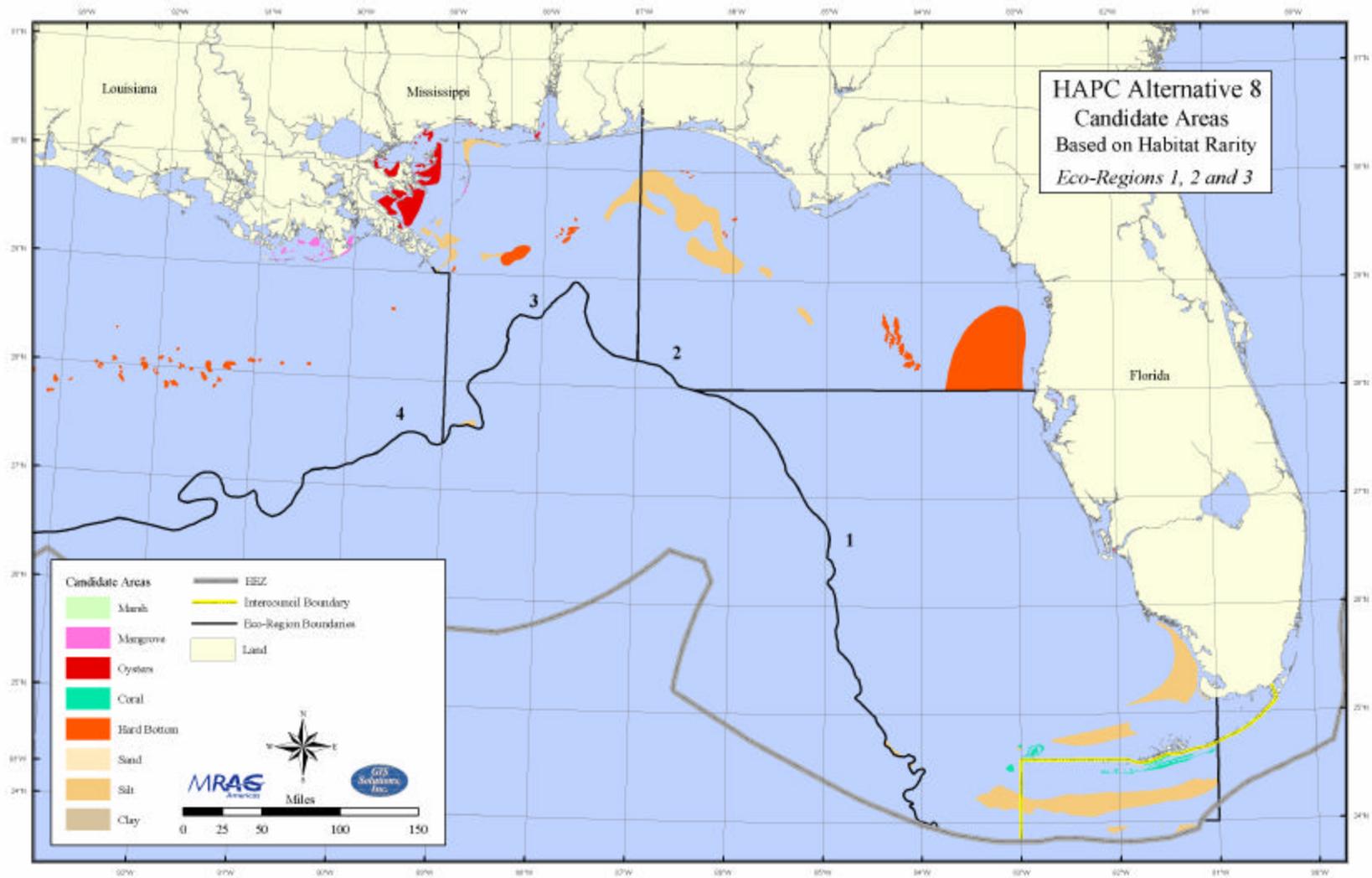


Figure 2.3.19b. HAPC Alternative 8 designations in the East Gulf of Mexico, based on values of habitat rarity calculated as described in Section 2.4.4.

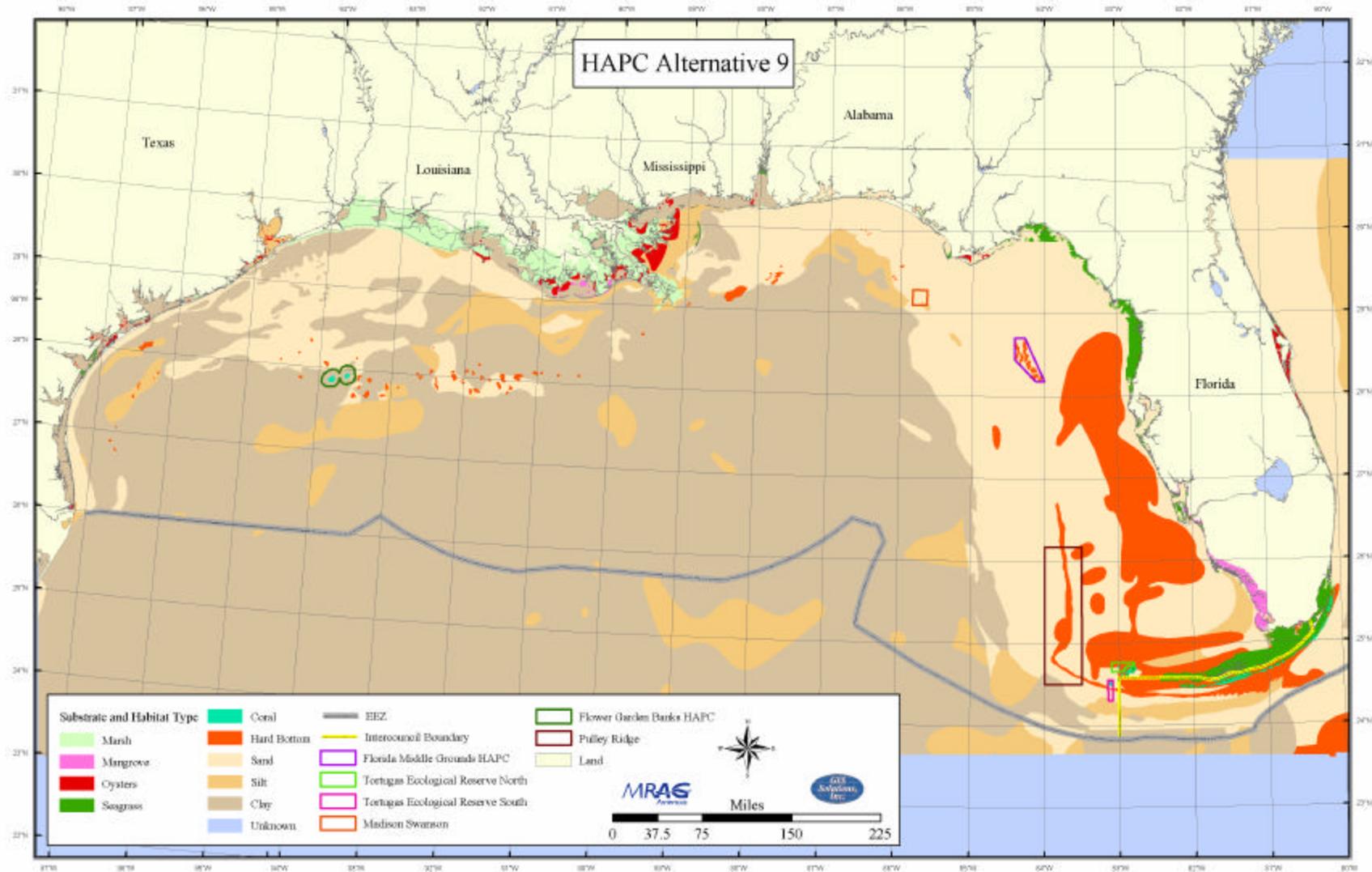


Figure 2.3.20. HAPC Alternative 9 designations in the Gulf of Mexico, as discussed in Section 2.2.2.

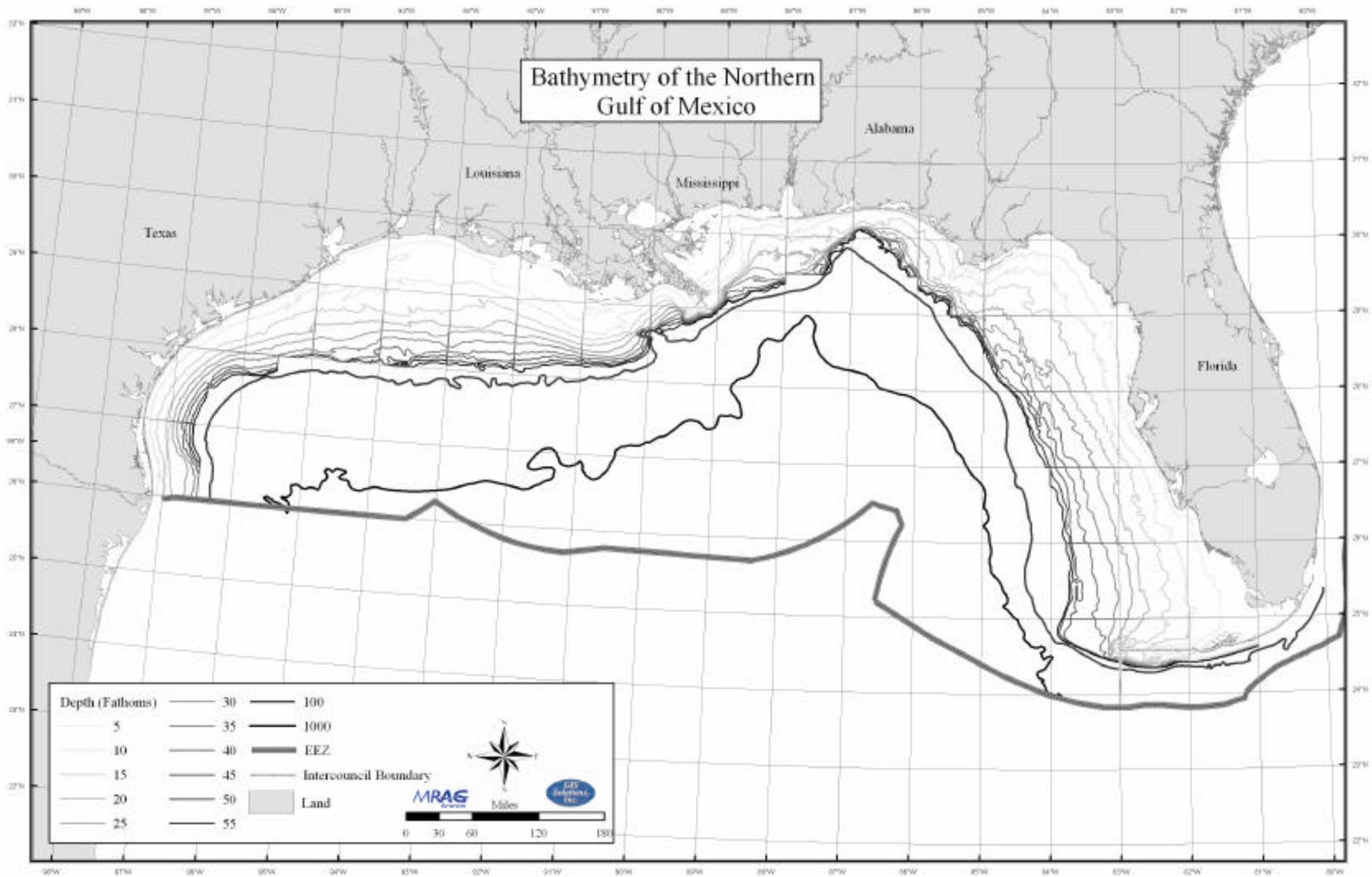


Figure 3.1.1. Bathymetry of the Gulf of Mexico.

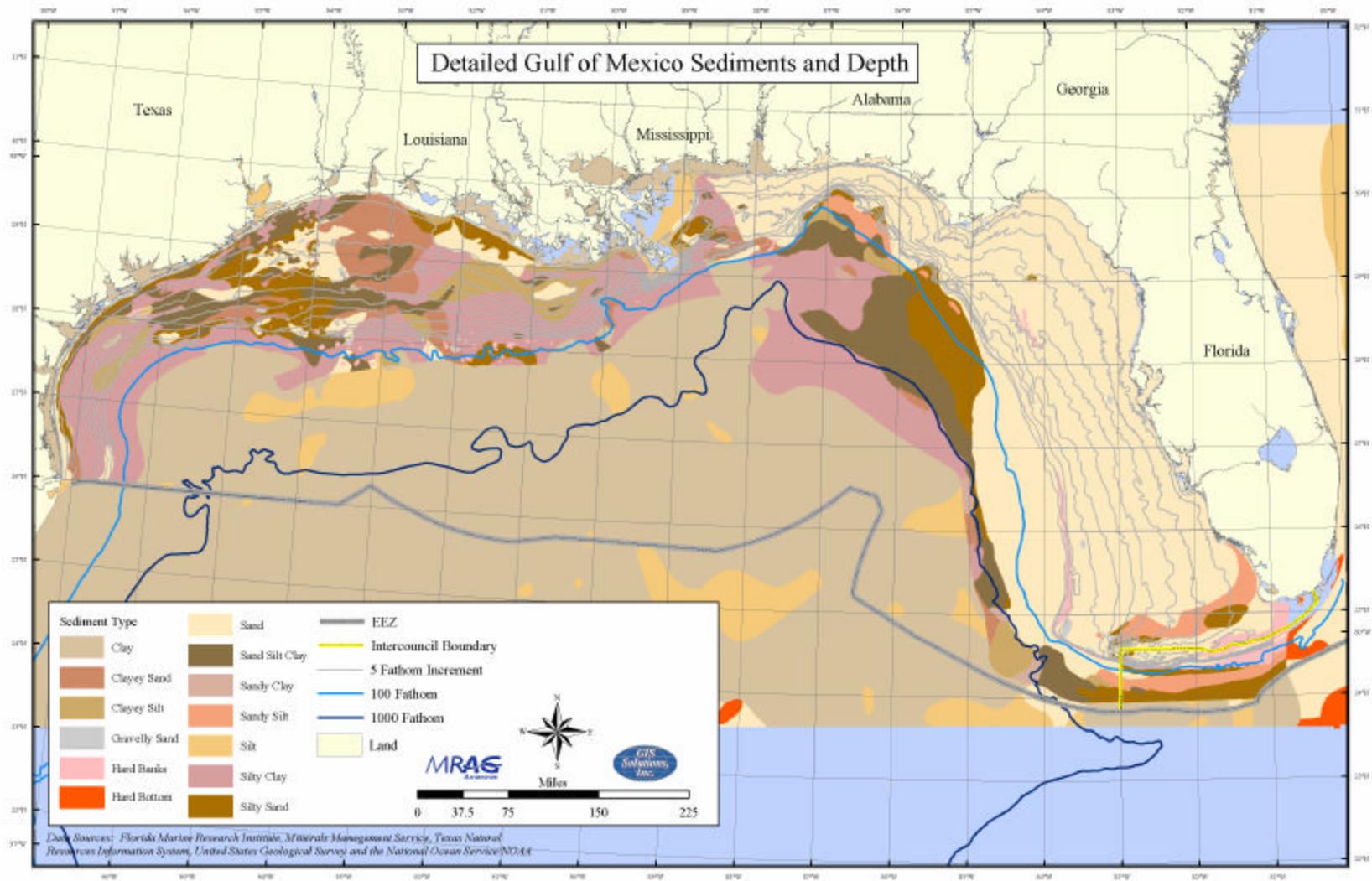


Figure 3.1.2. Detailed Gulf of Mexico Bottom Sediments.

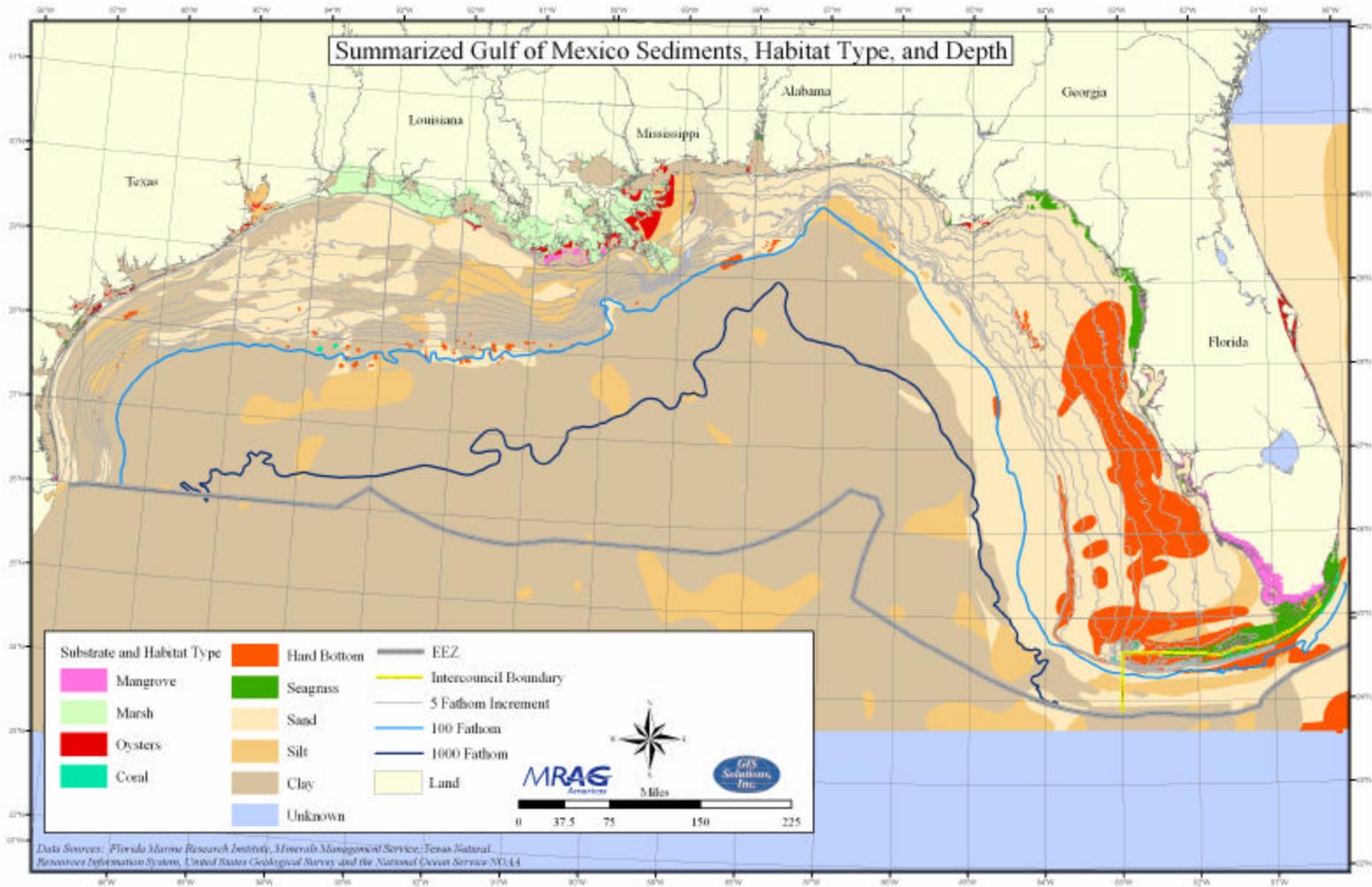


Figure 3.1.3. Summarized Gulf of Mexico Sediments and Bottom Habitat Types.

The large area offshore of Florida from approximately Crystal River south to the Keys is a mosaic of patchy hard bottom and sand/shell habitats. It has been identified as hard bottom for the purpose of mapping.

July 21-26, 2002 - Area of Bottom Hypoxia

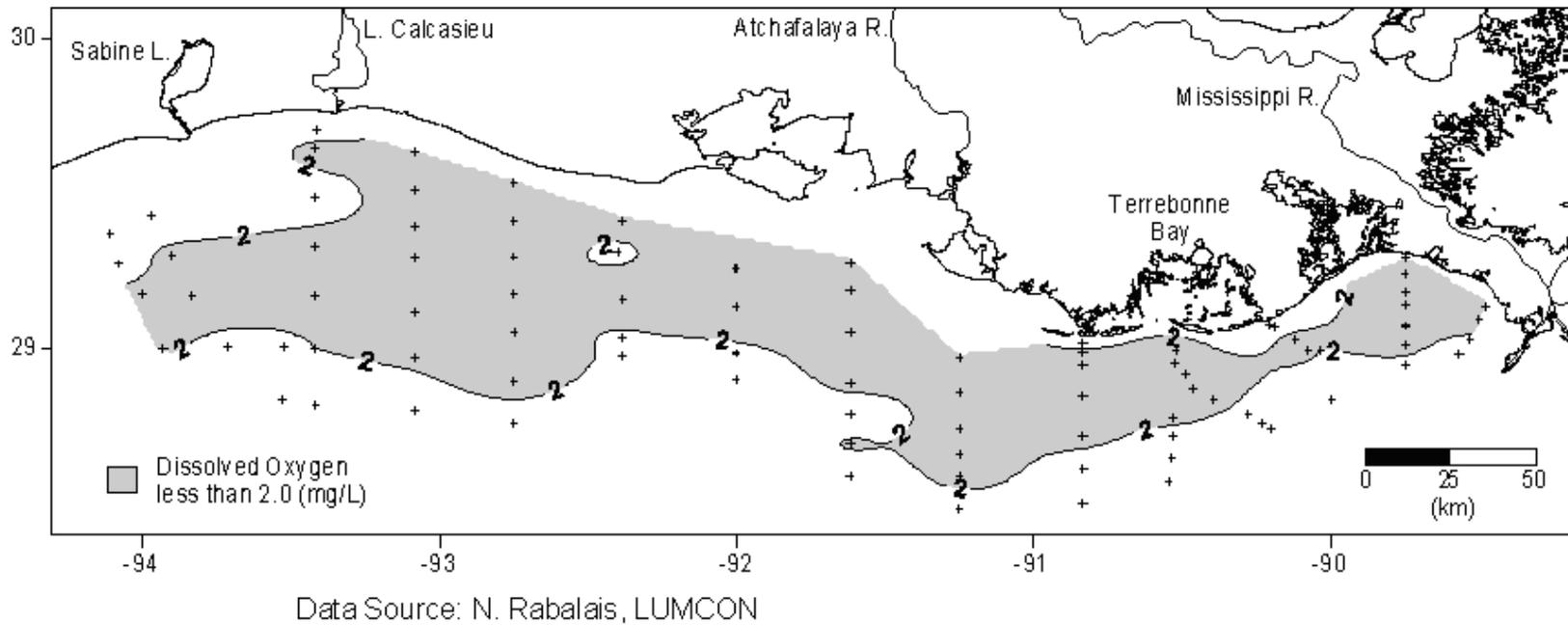


Figure 3.1.4. Bottom dissolved oxygen in the west and central northern Gulf of Mexico.

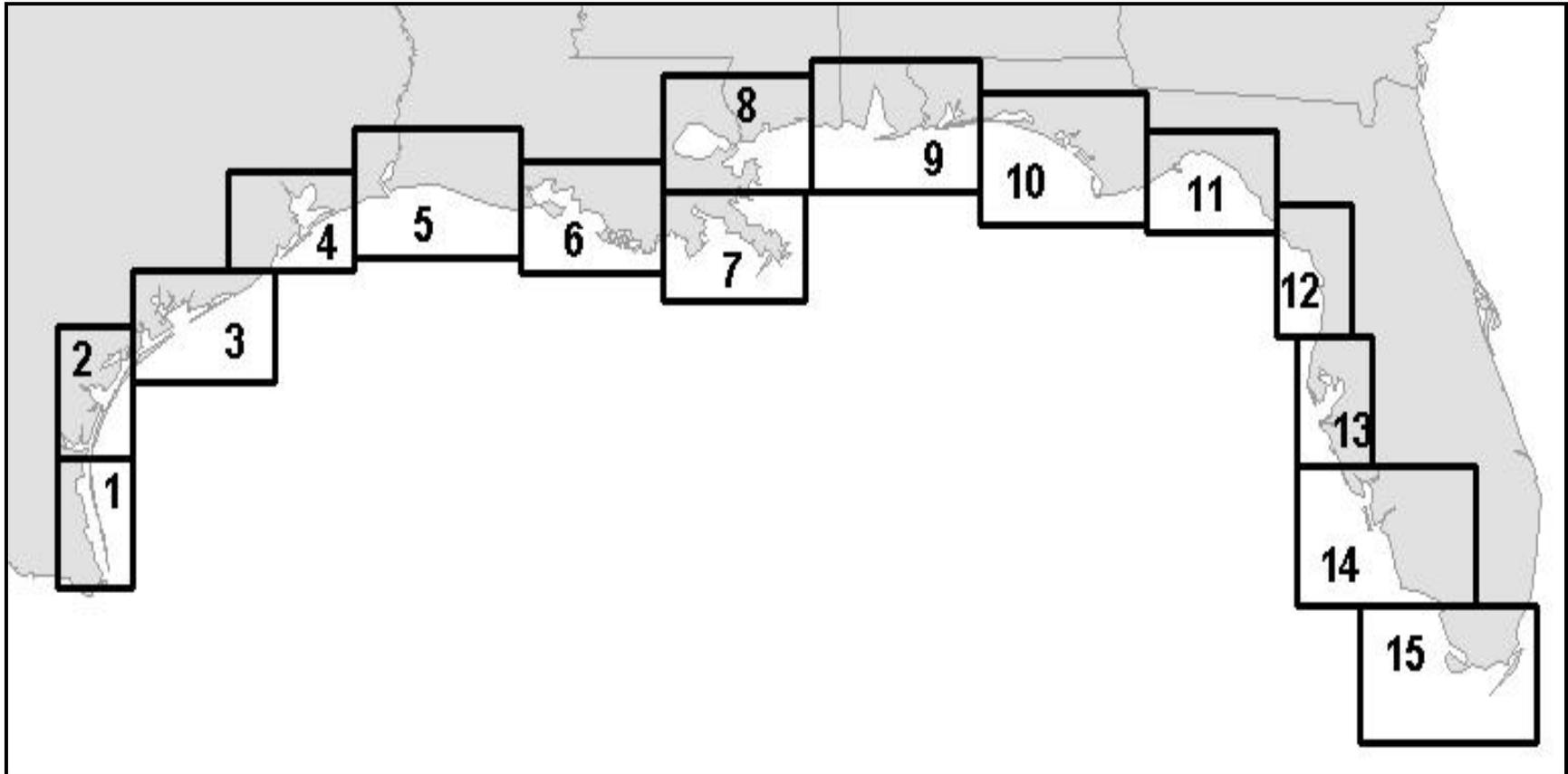


Figure 3.2.1. Map Legend for the landward boundaries of EFH in the Gulf of Mexico.

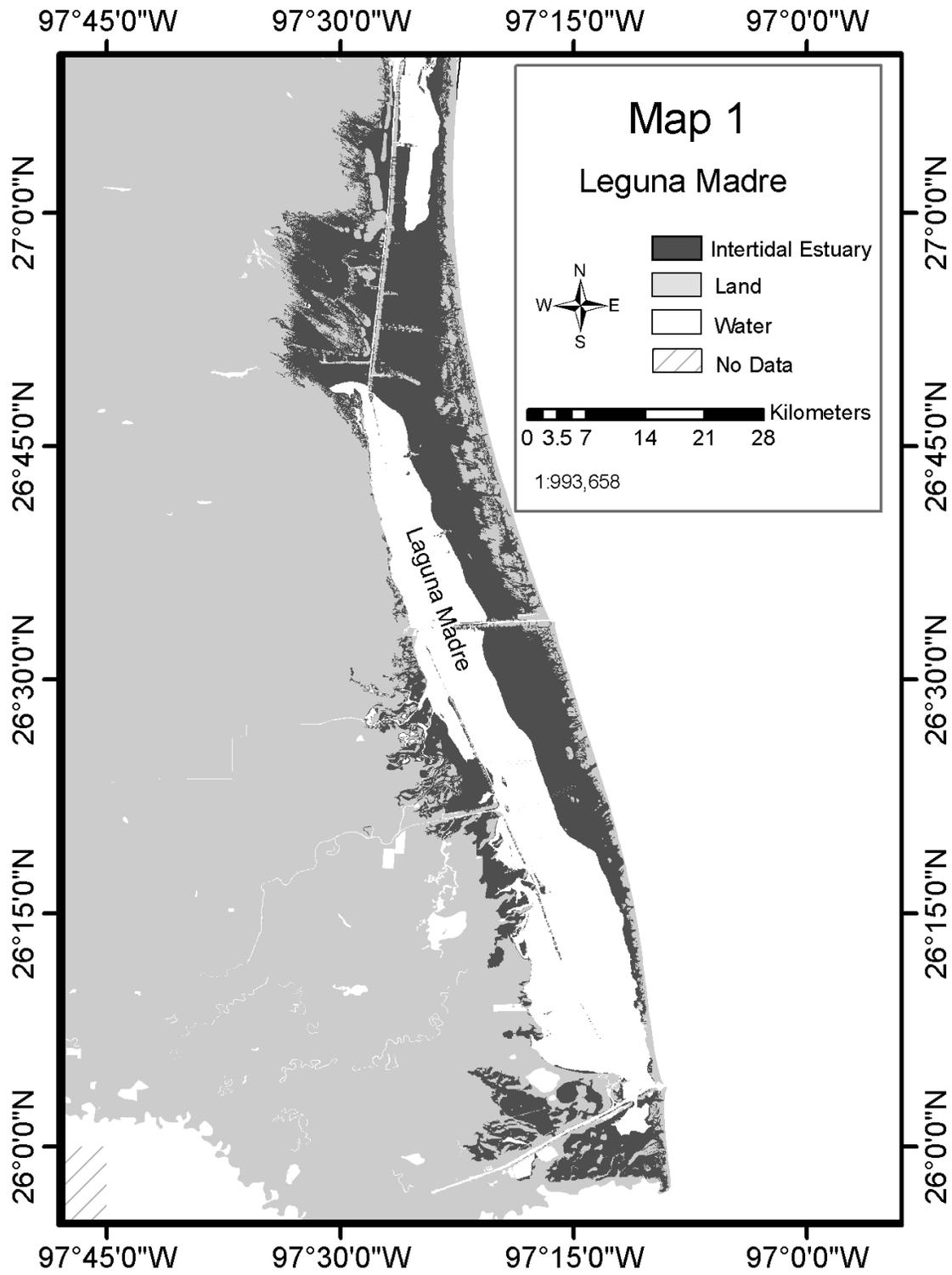


Figure 3.2.2a. Landward boundary of EFH for the Leguna Madre region. Where EFH borders the estuarine - freshwater interface, the NWI data for the intertidal estuary – land boundary mapped here forms the inshore boundary of EFH.

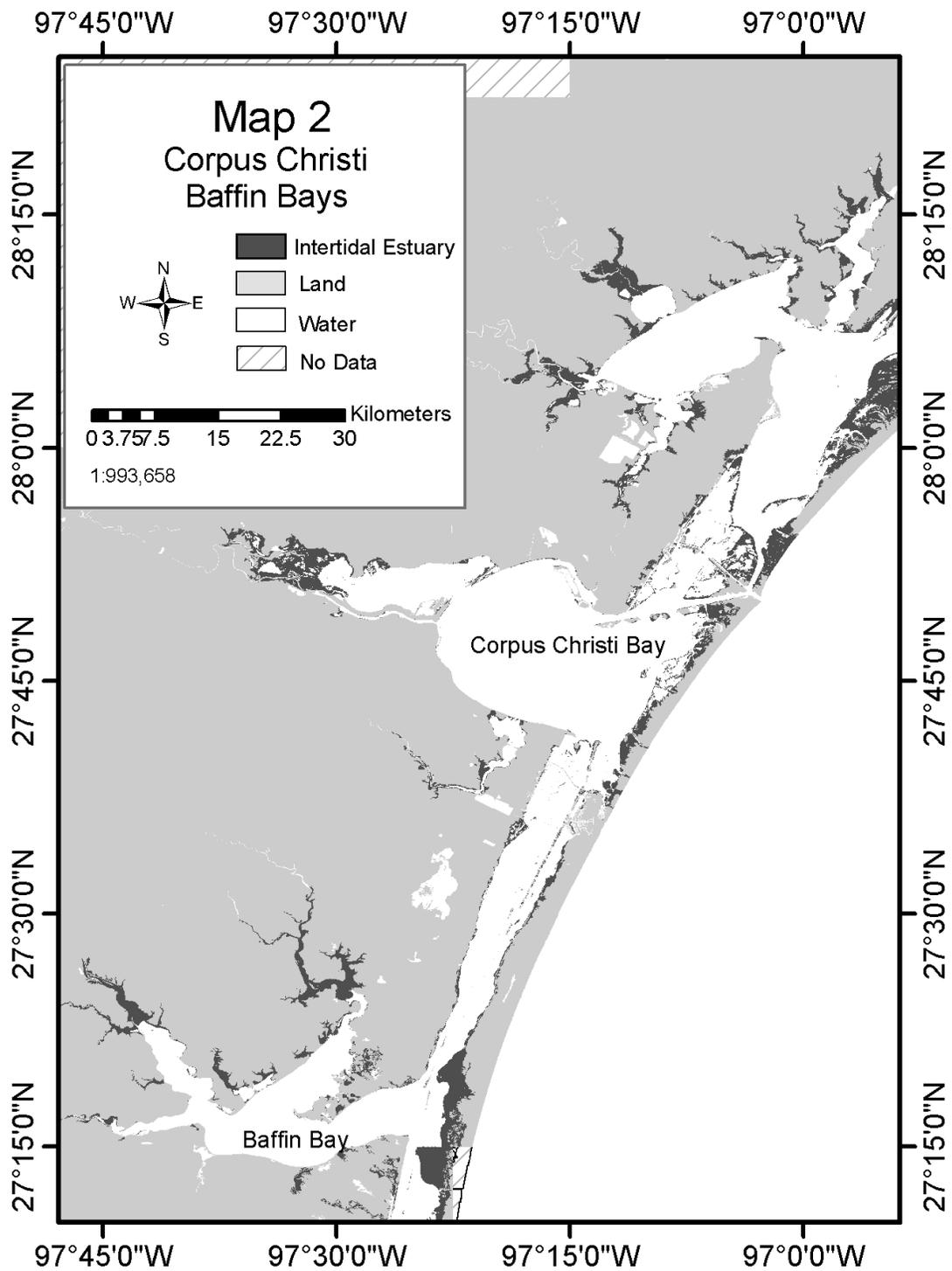


Figure 3.2.2b. Landward boundary of EFH for the Corpus Christi Baffin Bays region. Where EFH borders the estuarine - freshwater interface, the NWI data for the intertidal estuary - land boundary mapped here forms the inshore boundary of EFH.

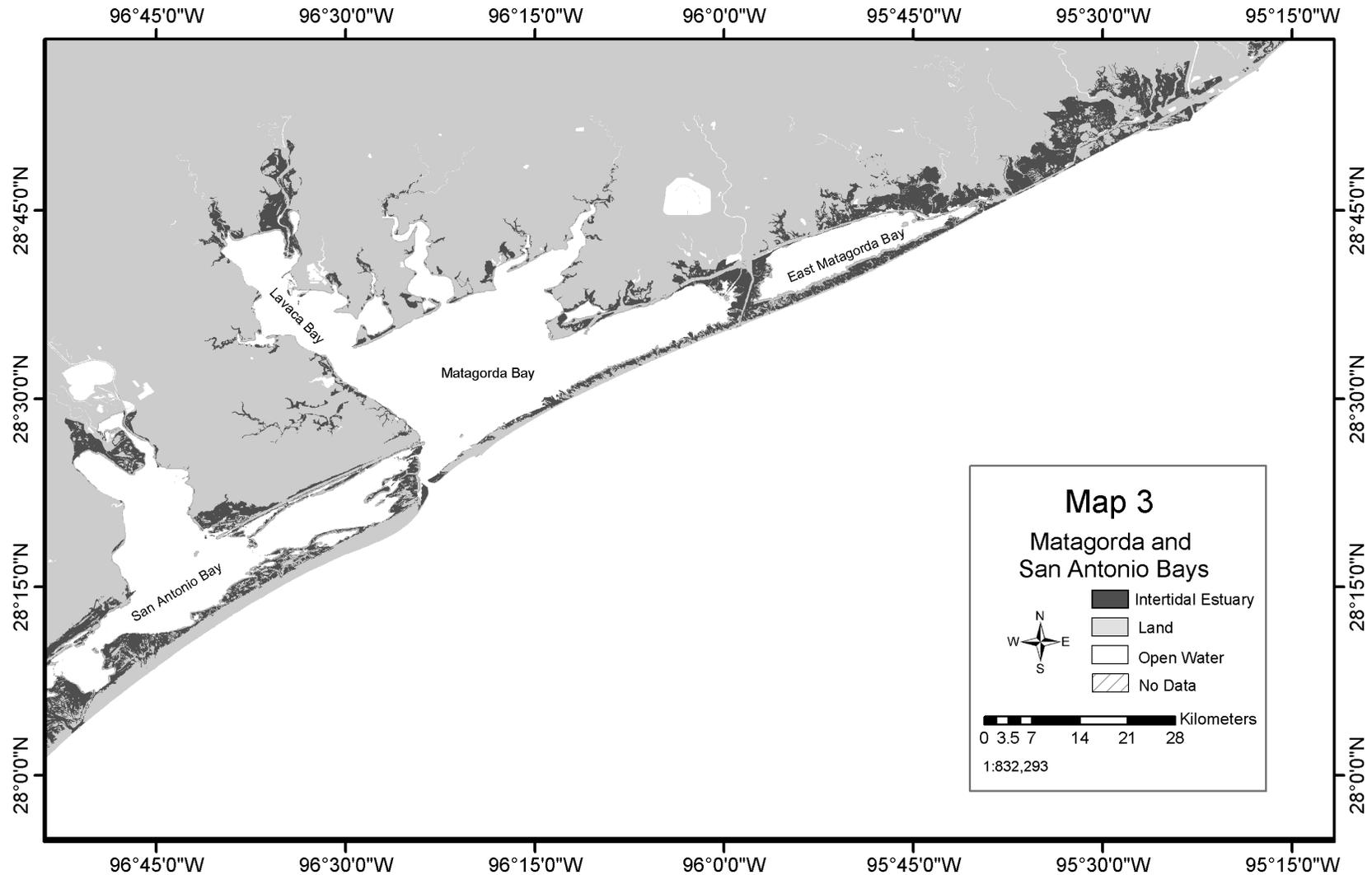


Figure 3.2.2c. Landward boundary of EFH for the Matagorda and San Antonio Bays region.

Where EFH borders the estuarine - freshwater interface, the NWI data for the intertidal estuary – land boundary mapped here forms the inshore boundary of EFH.

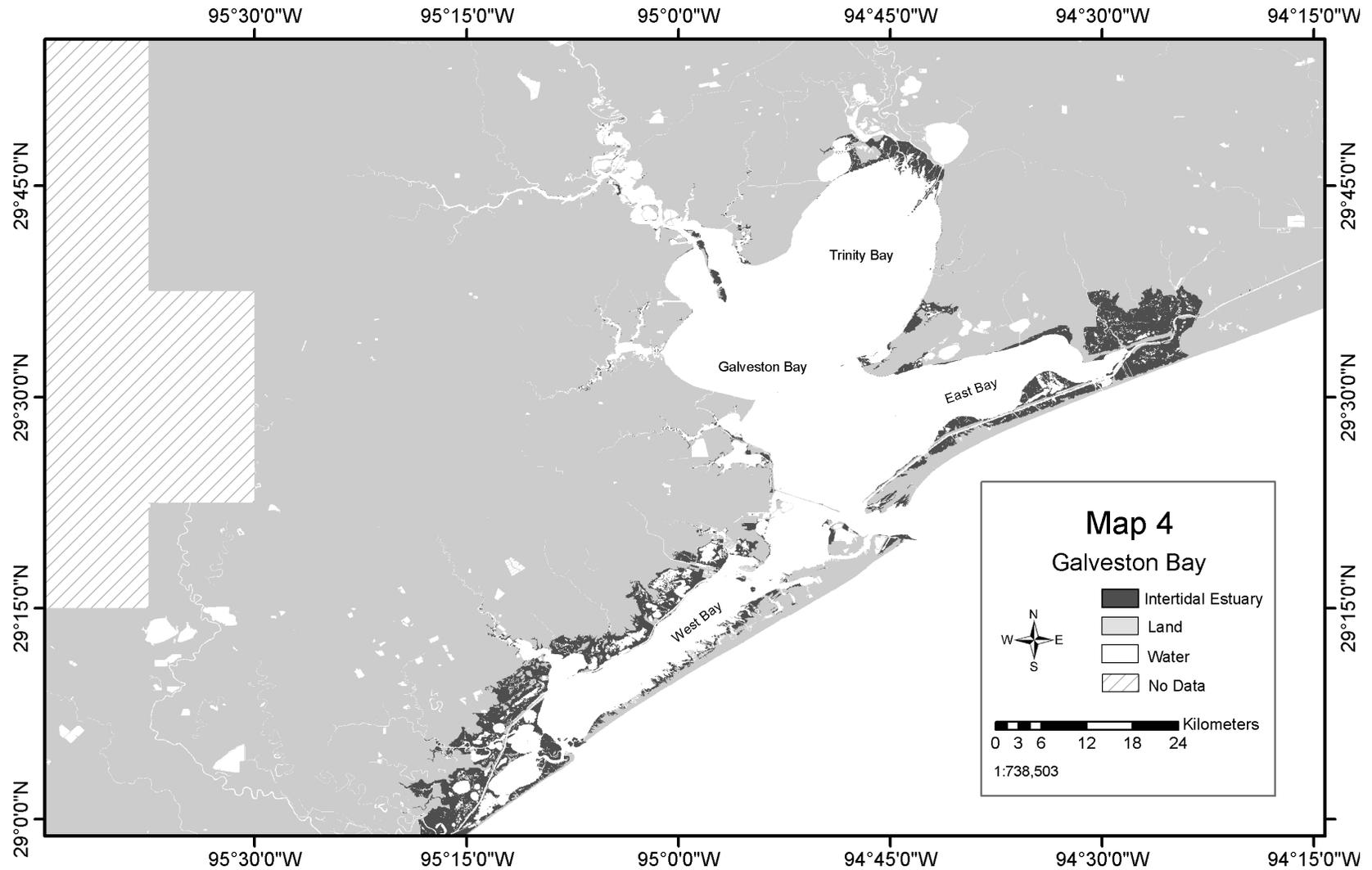


Figure 3.2.2d. Landward boundary of EFH for the Galveston Bay region.

Where EFH borders the estuarine - freshwater interface, the NWI data for the intertidal estuary – land boundary mapped here forms the inshore boundary of EFH.

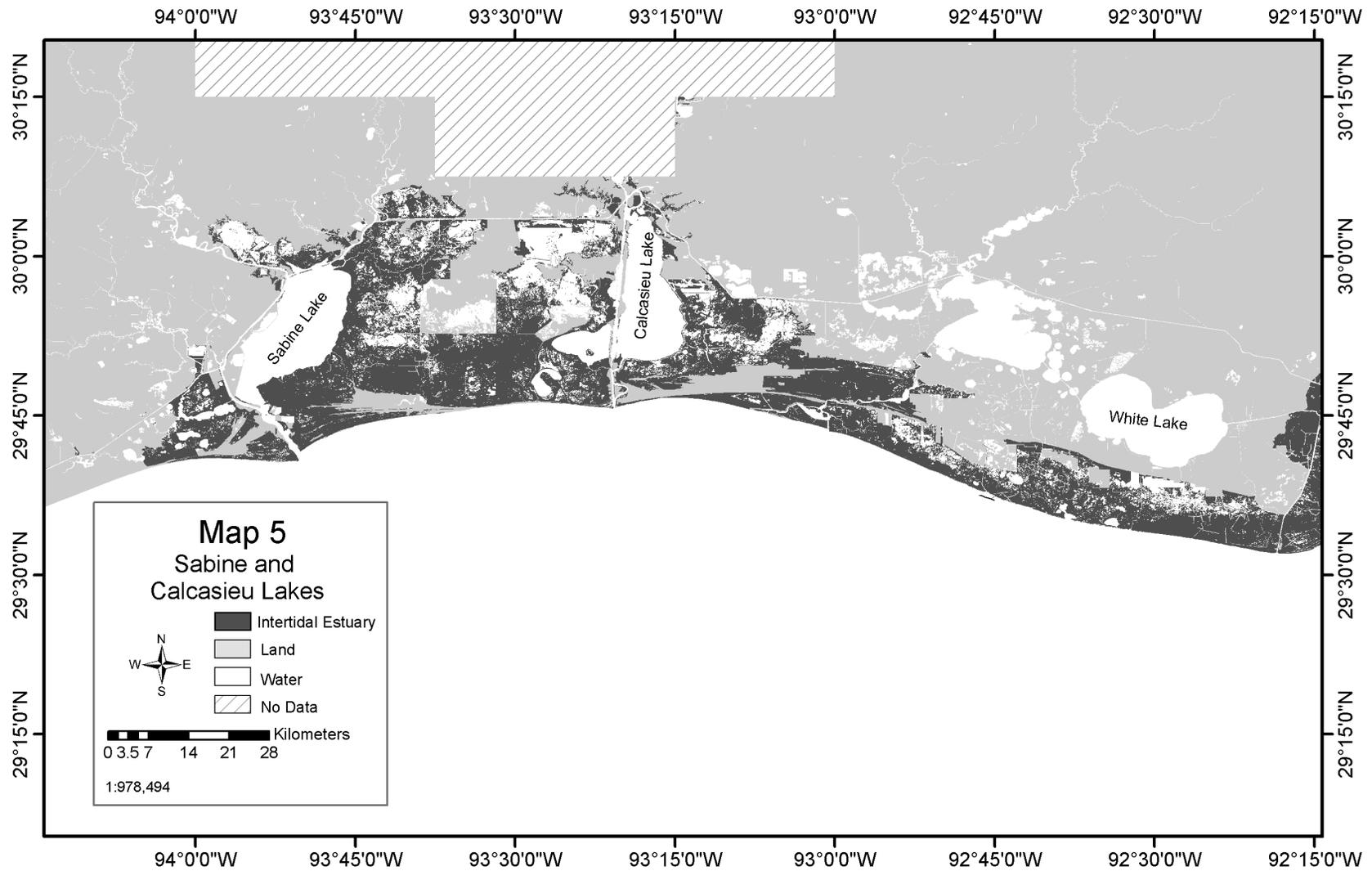


Figure 3.2.2e. Landward boundary of EFH for the Sabine and Calcasieu Lakes region.

Where EFH borders the estuarine - freshwater interface, the NWI data for the intertidal estuary – land boundary mapped here forms the inshore boundary of EFH.

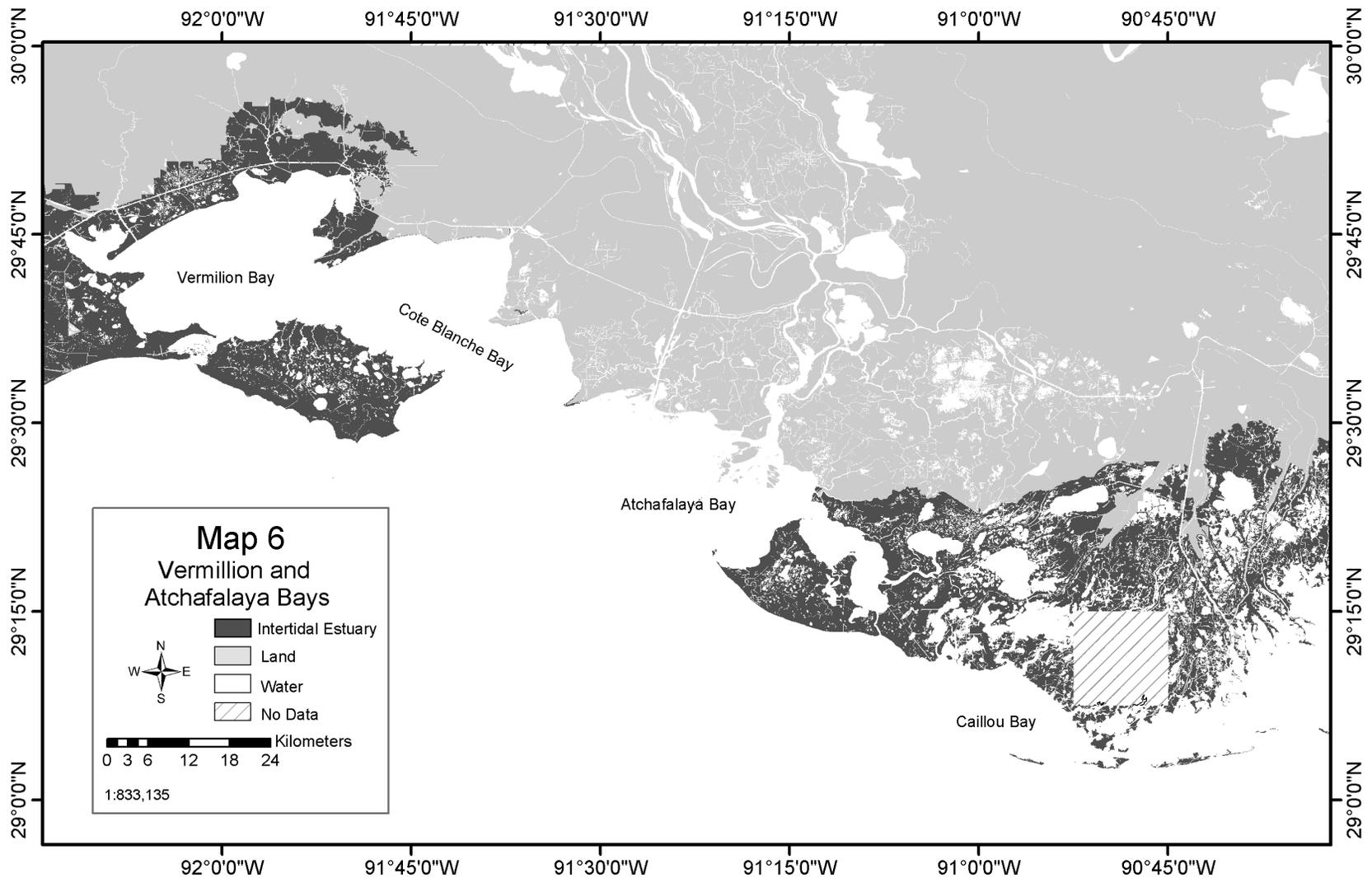


Figure 3.2.2f. Landward boundary of EFH for the Vermillion and Atchafalaya Bays region.

Where EFH borders the estuarine - freshwater interface, the NWI data for the intertidal estuary – land boundary mapped here forms the inshore boundary of EFH.

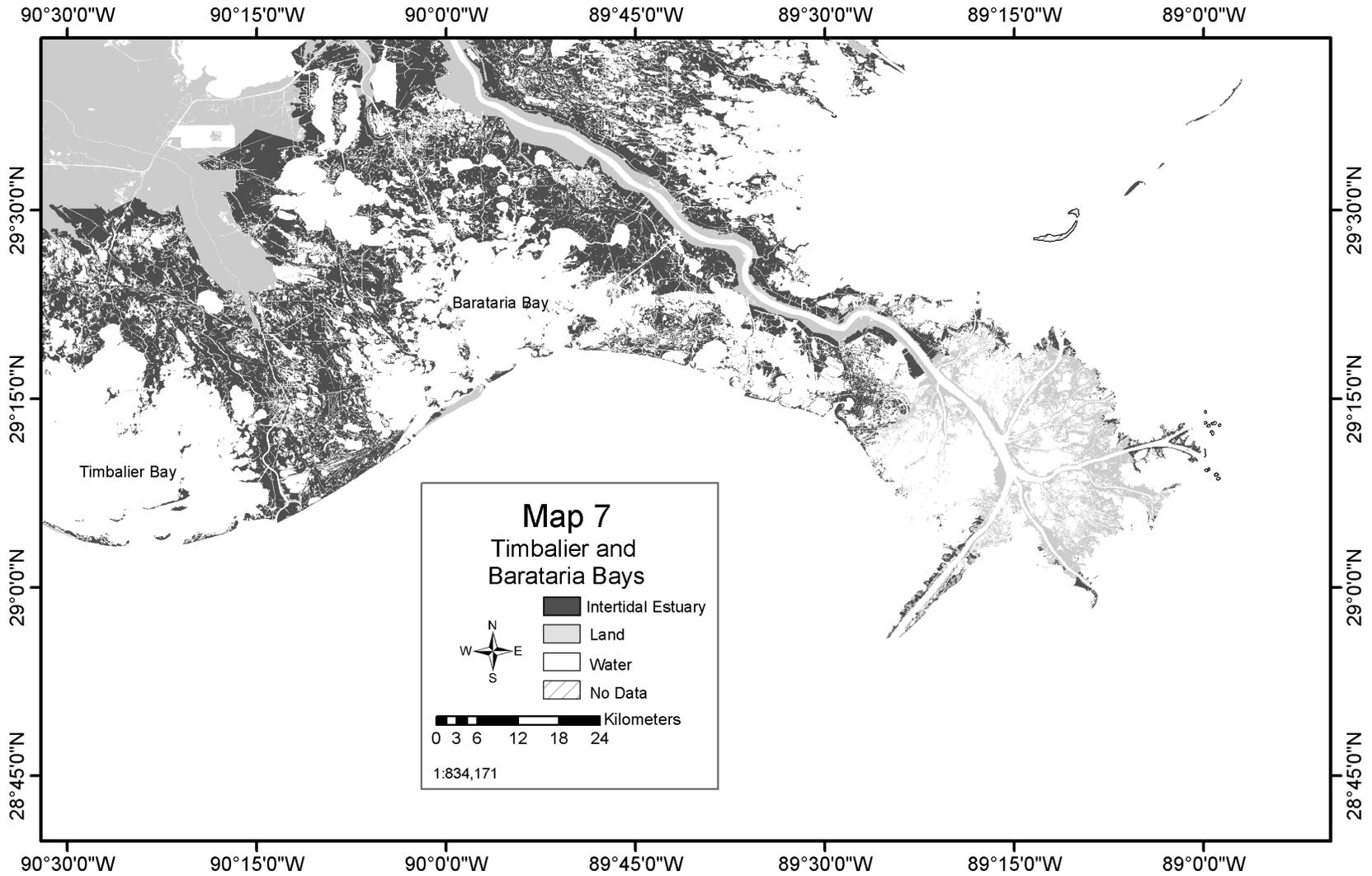


Figure 3.2.2g. Landward boundary of EFH for the Timbalier and Barataria Bays region.

Where EFH borders the estuarine - freshwater interface, the NWI data for the intertidal estuary – land boundary mapped here forms the inshore boundary of EFH.

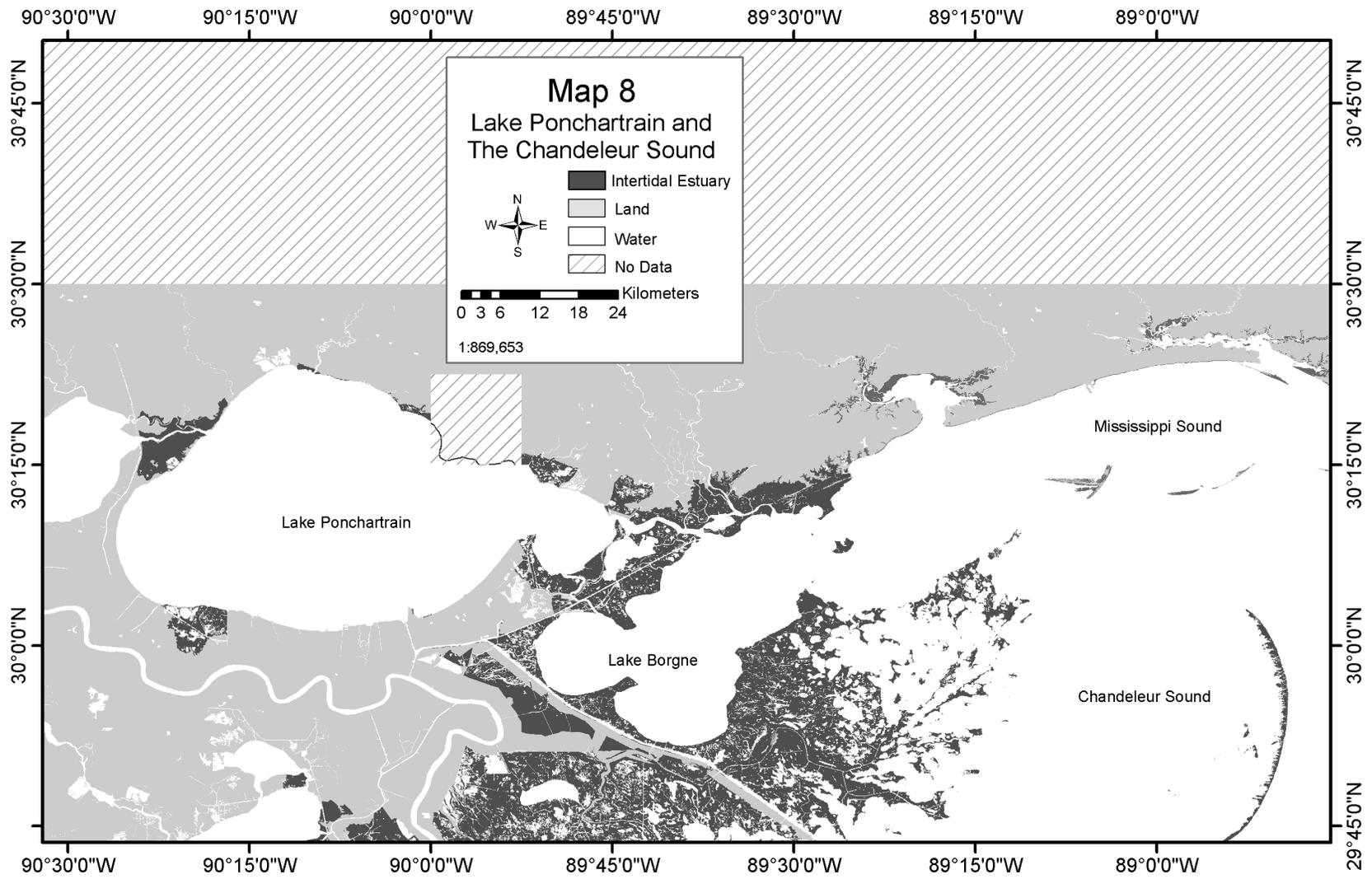


Figure 3.2.2h. Landward boundary of EFH for the Lake Ponchartrain and the Chandeleur Sound region.

Where EFH borders the estuarine - freshwater interface, the NWI data for the intertidal estuary – land boundary mapped here forms the inshore boundary of EFH.

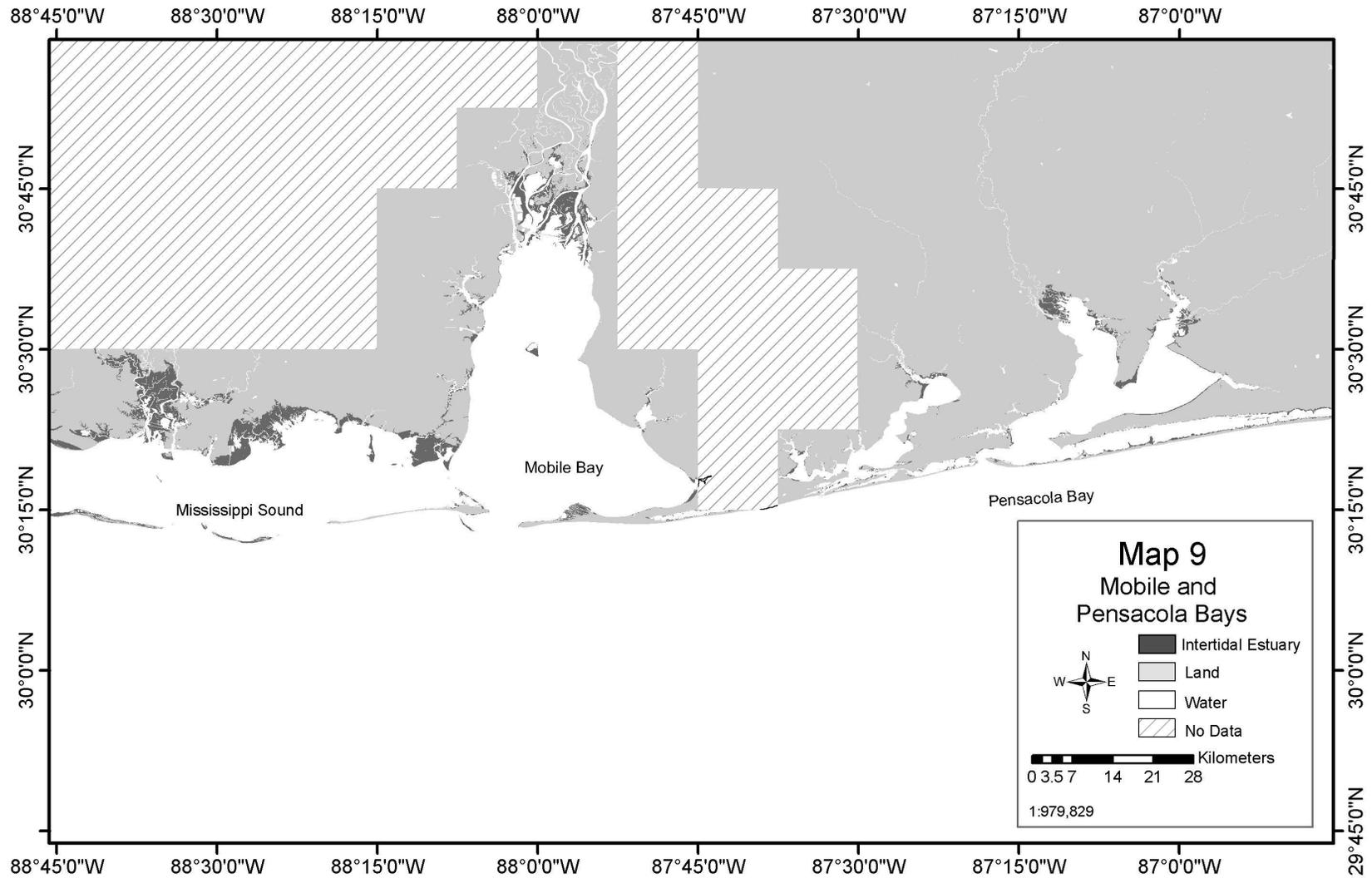


Figure 3.2.2i. Landward boundary of EFH for the Mobile and Pensacola Bay region. Where EFH borders the estuarine - freshwater interface, the NWI data for the intertidal estuary – land boundary mapped here forms the inshore boundary of EFH.

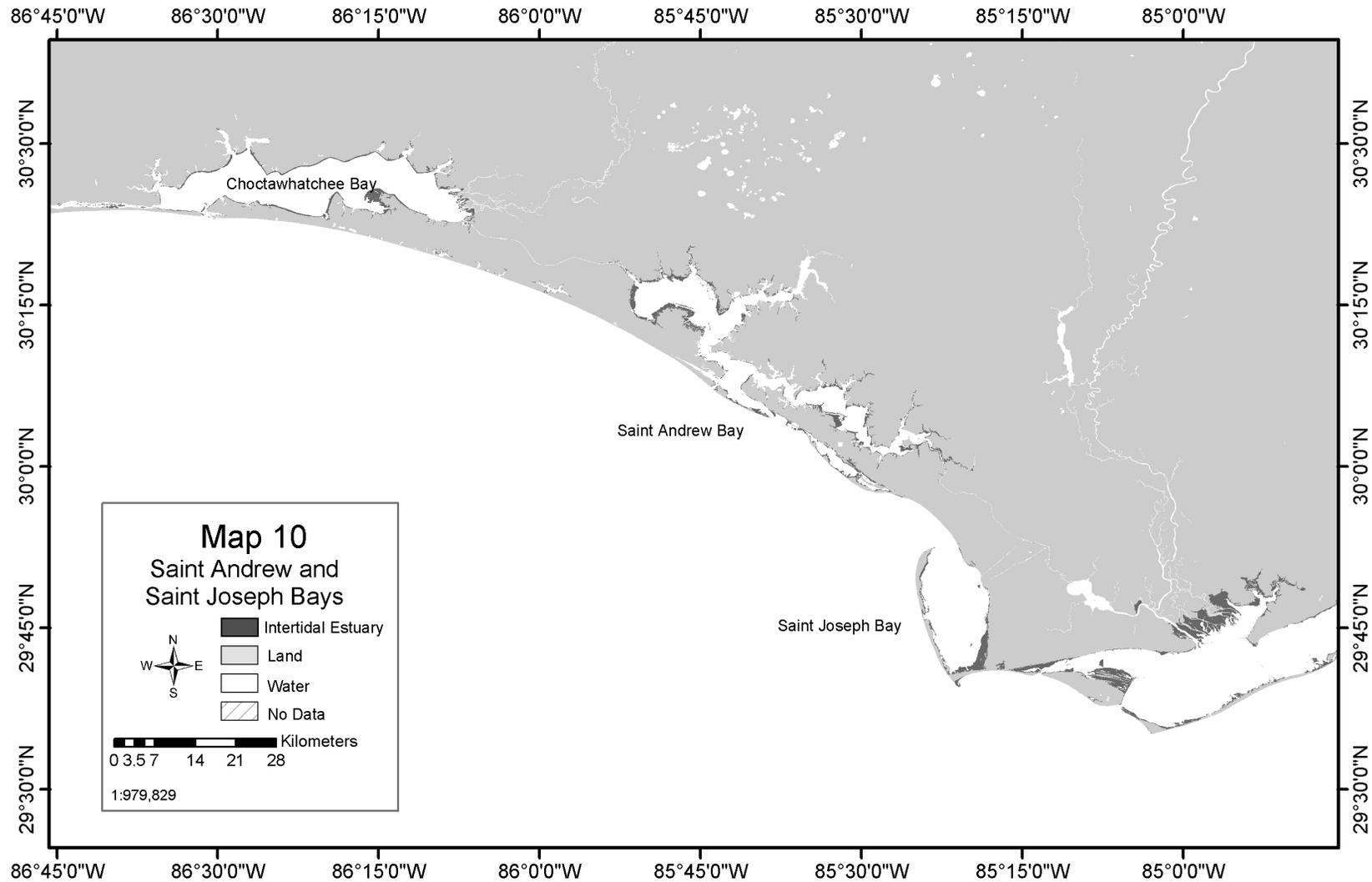


Figure 3.2.2j. Landward boundary of EFH for the St. Andrew and St. Joseph Bay region.

Where EFH borders the estuarine - freshwater interface, the NWI data for the intertidal estuary – land boundary mapped here forms the inshore boundary of EFH.

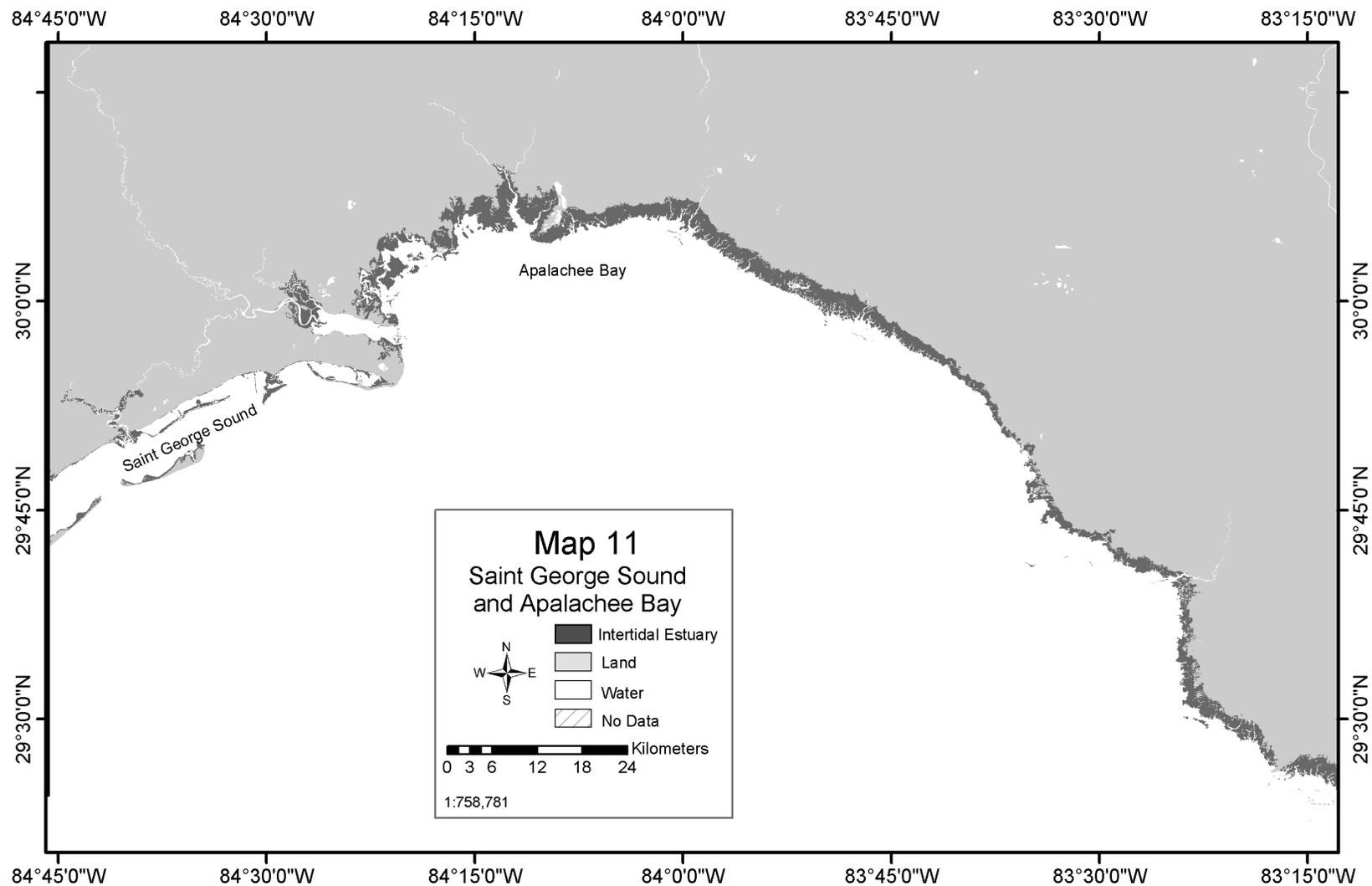


Figure 3.2.2k. Landward boundary of EFH for the St. George Sound and Apalachee Bay region. Where EFH borders the estuarine - freshwater interface, the NWI data for the intertidal estuary – land boundary mapped here forms the inshore boundary of EFH.

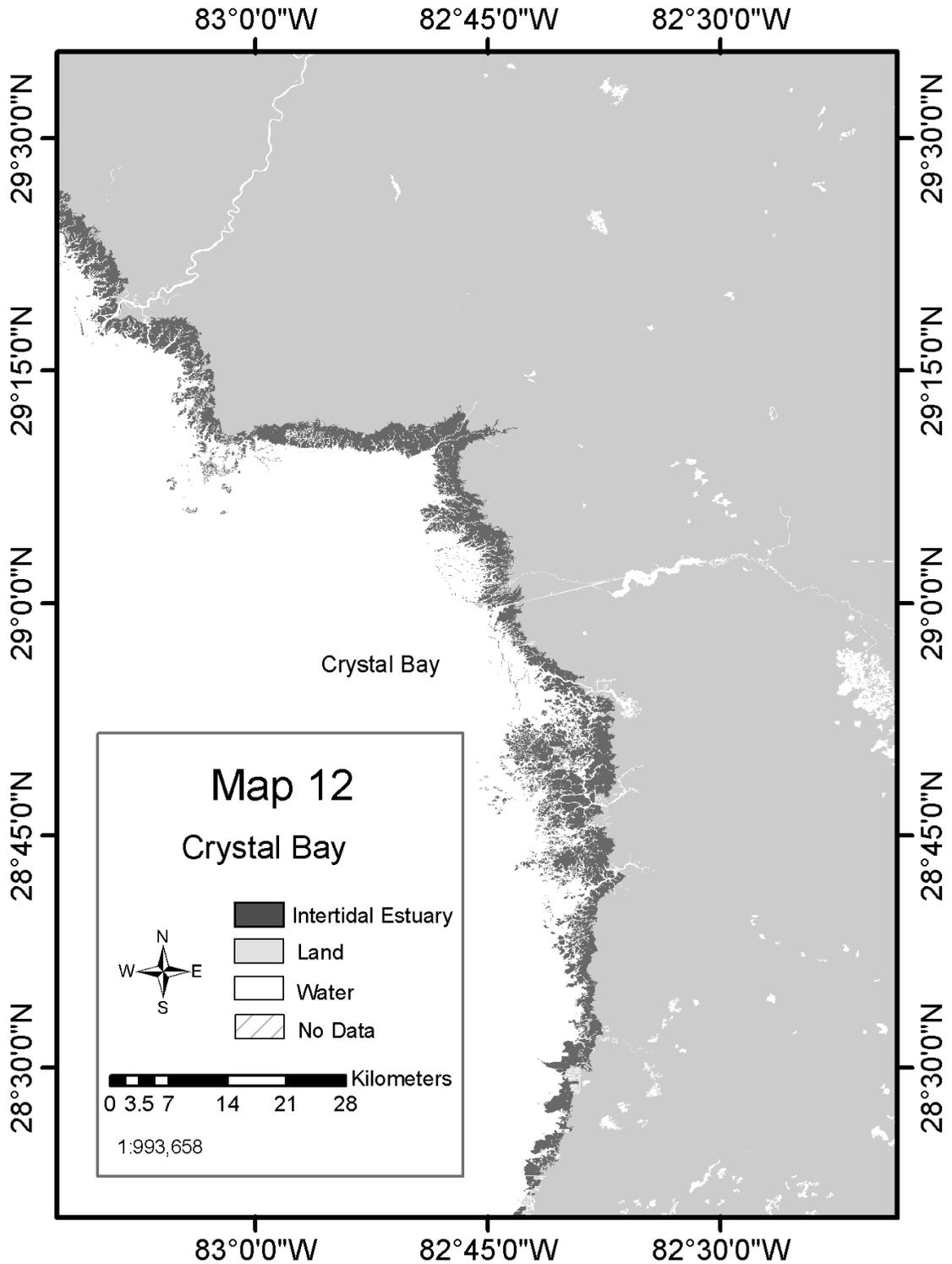


Figure 3.2.21. Landward boundary of EFH for the Crystal Bay region.

Where EFH borders the estuarine - freshwater interface, the NWI data for the intertidal estuary – land boundary mapped here forms the inshore boundary of EFH.

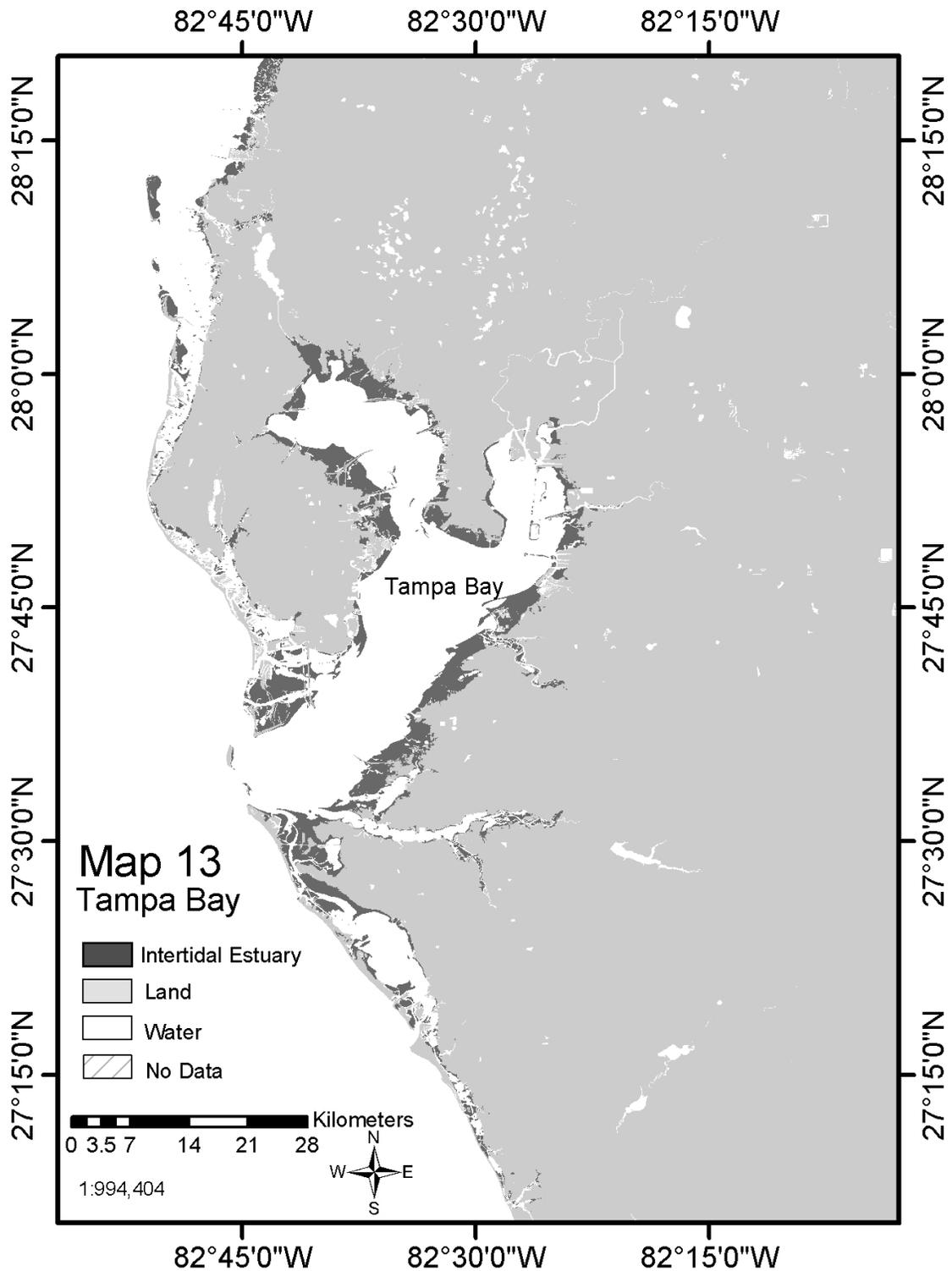


Figure 3.2.2m. Landward boundary of EFH for the Tampa Bay region.

Where EFH borders the estuarine - freshwater interface, the NWI data for the intertidal estuary – land boundary mapped here forms the inshore boundary of EFH.

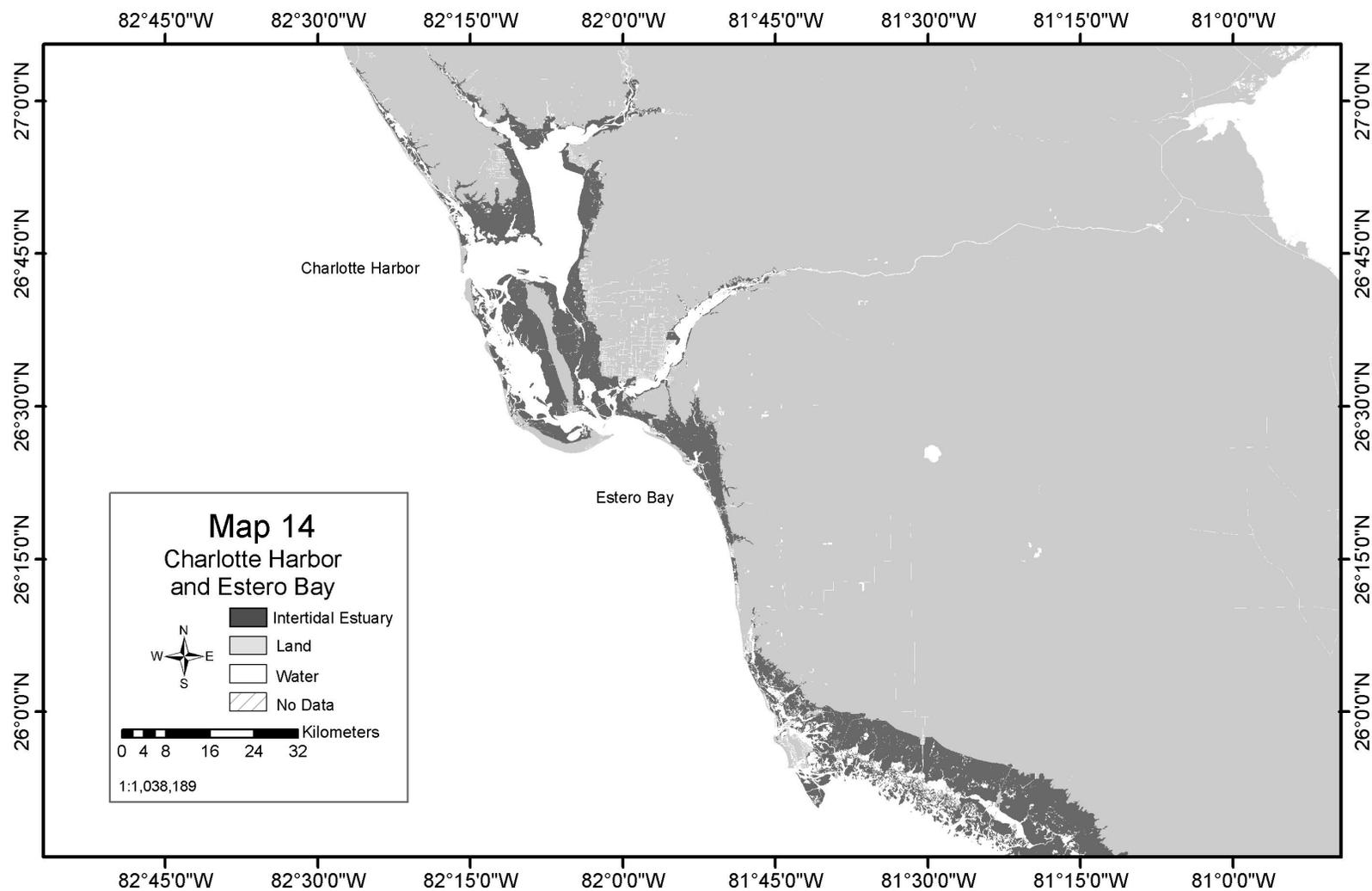


Figure 3.2.2n. Landward boundary of EFH for the Charlotte Harbor and Estero Bay region.

Where EFH borders the estuarine - freshwater interface, the NWI data for the intertidal estuary – land boundary mapped here forms the inshore boundary of EFH.

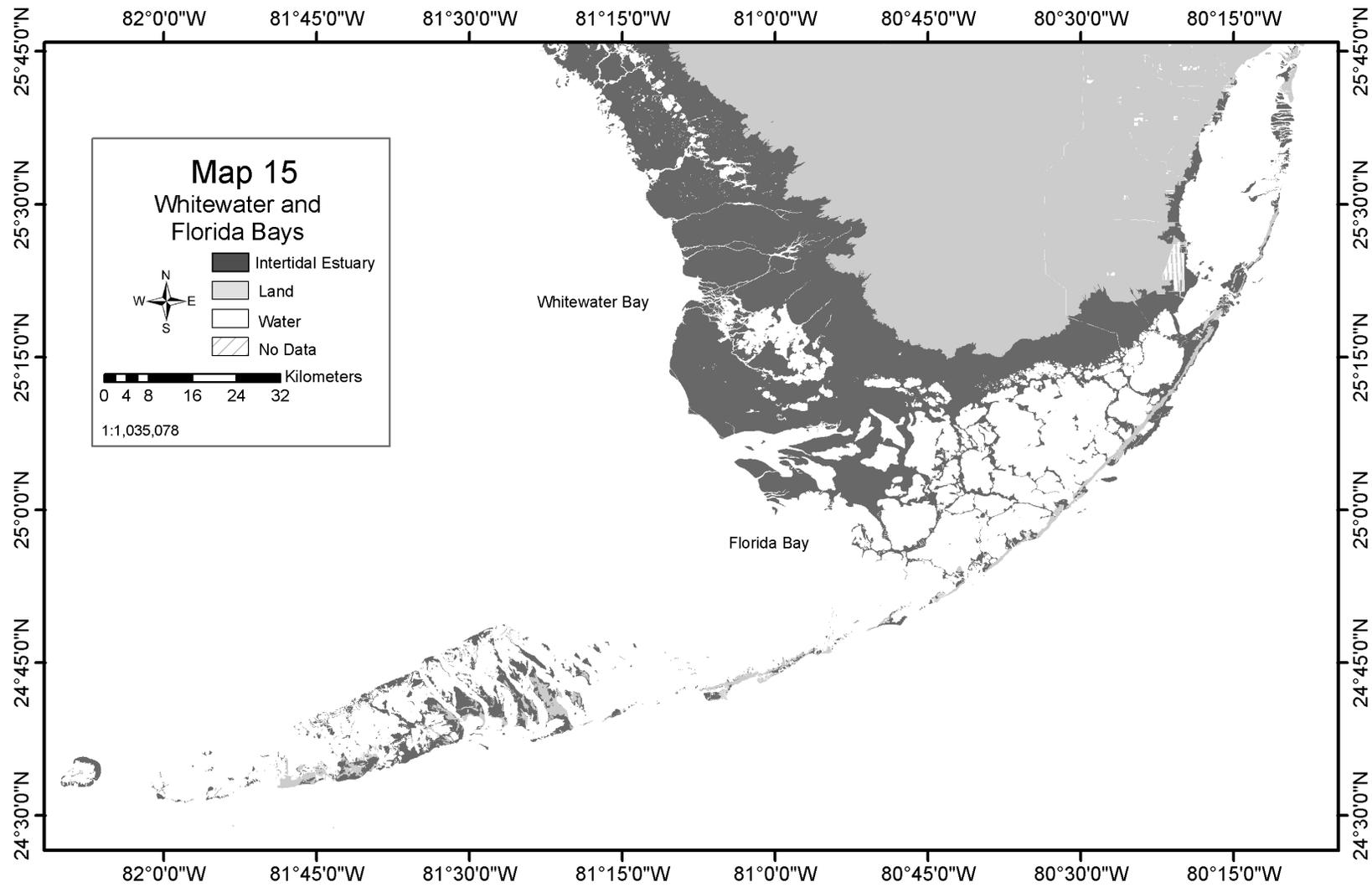


Figure 3.2.2o. Landward boundary of EFH for the Whitewater and Florida Bay region. Where EFH borders the estuarine - freshwater interface, the NWI data for the intertidal estuary – land boundary mapped here forms the inshore boundary of EFH.

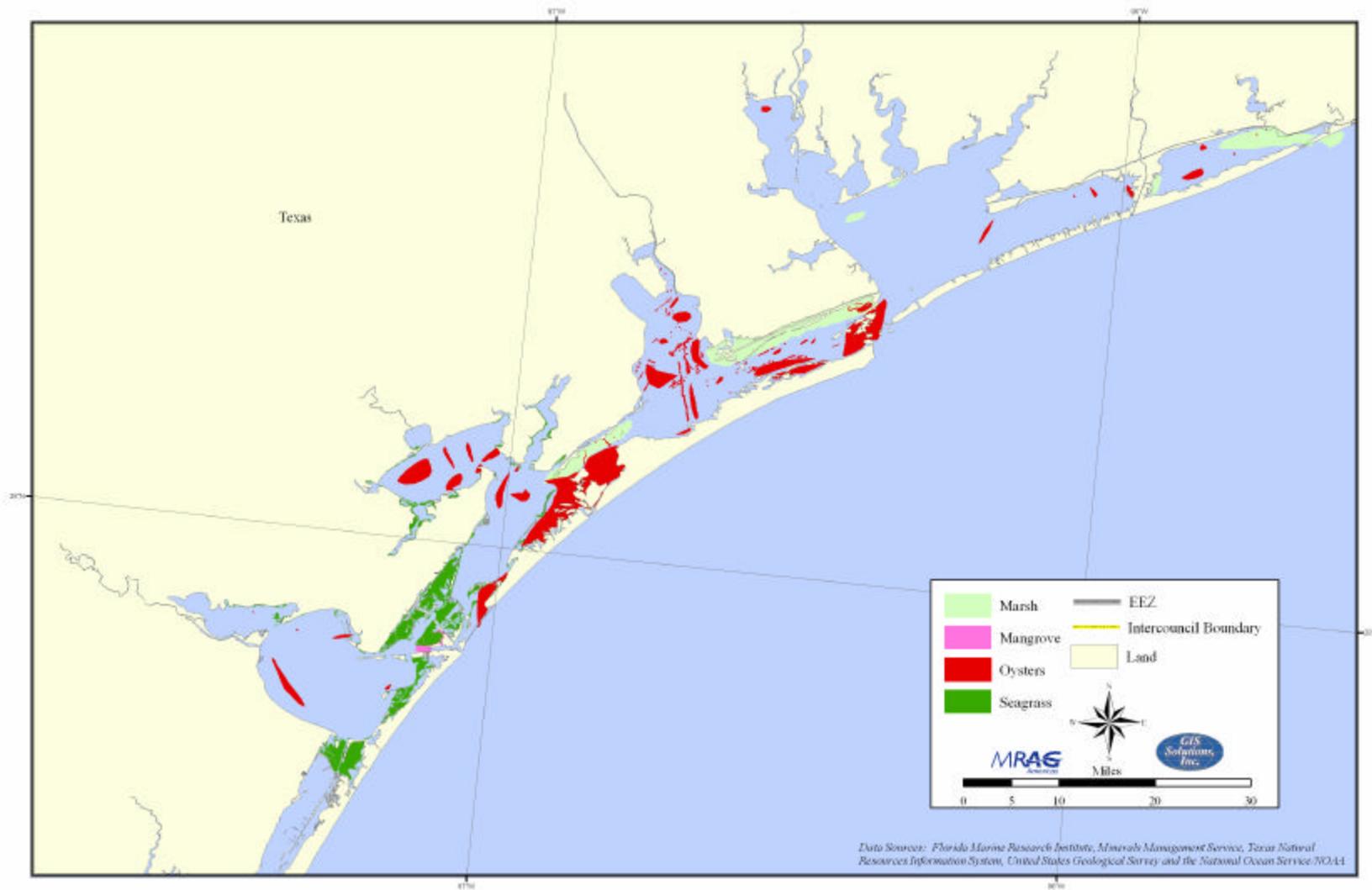


Figure 3.2.3. Distribution of seagrasses, marsh, and oysters around Texas.

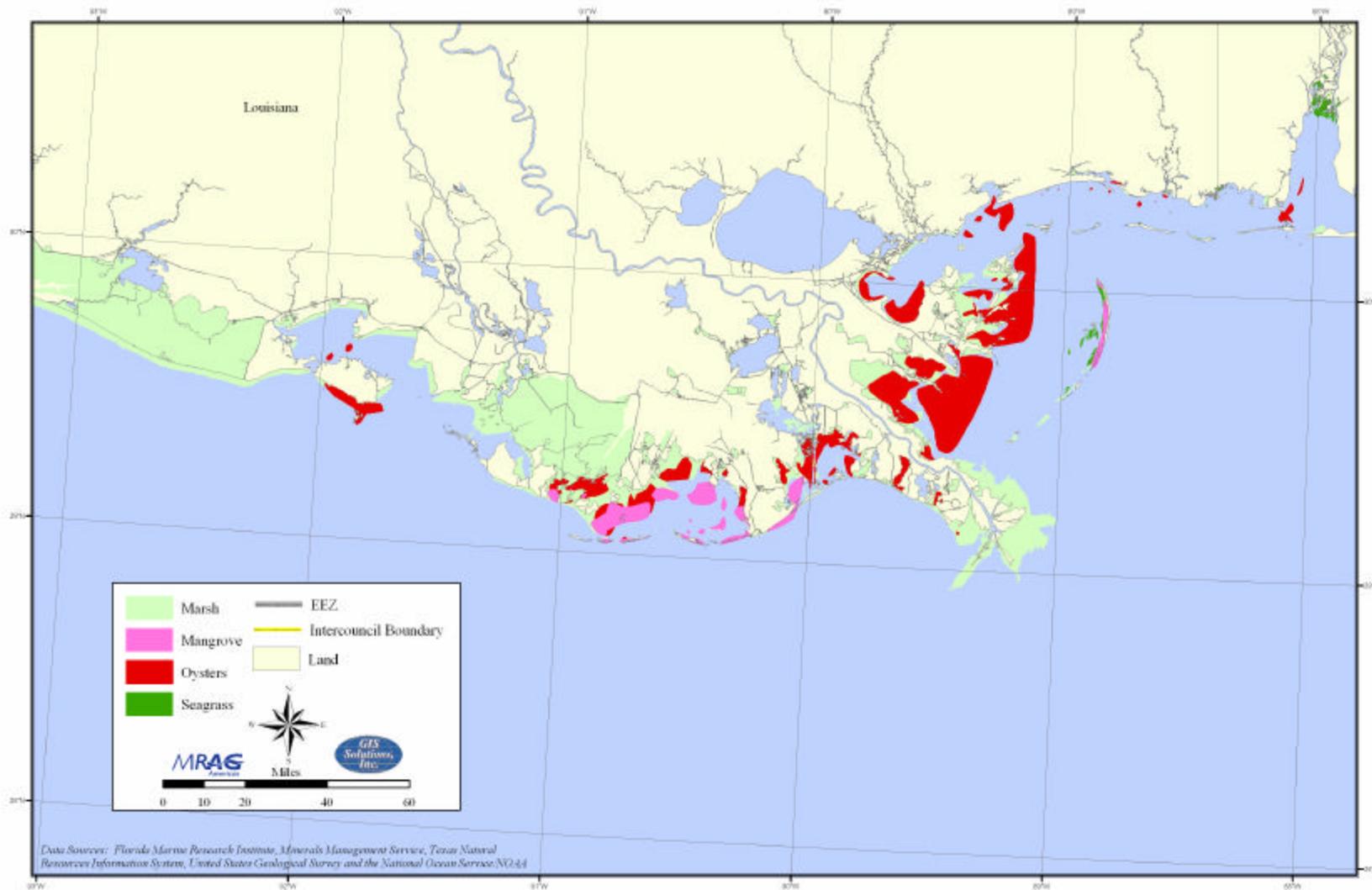


Figure 3.2.4. Distribution of mangroves, seagrasses, marsh, and oyster around Louisiana.

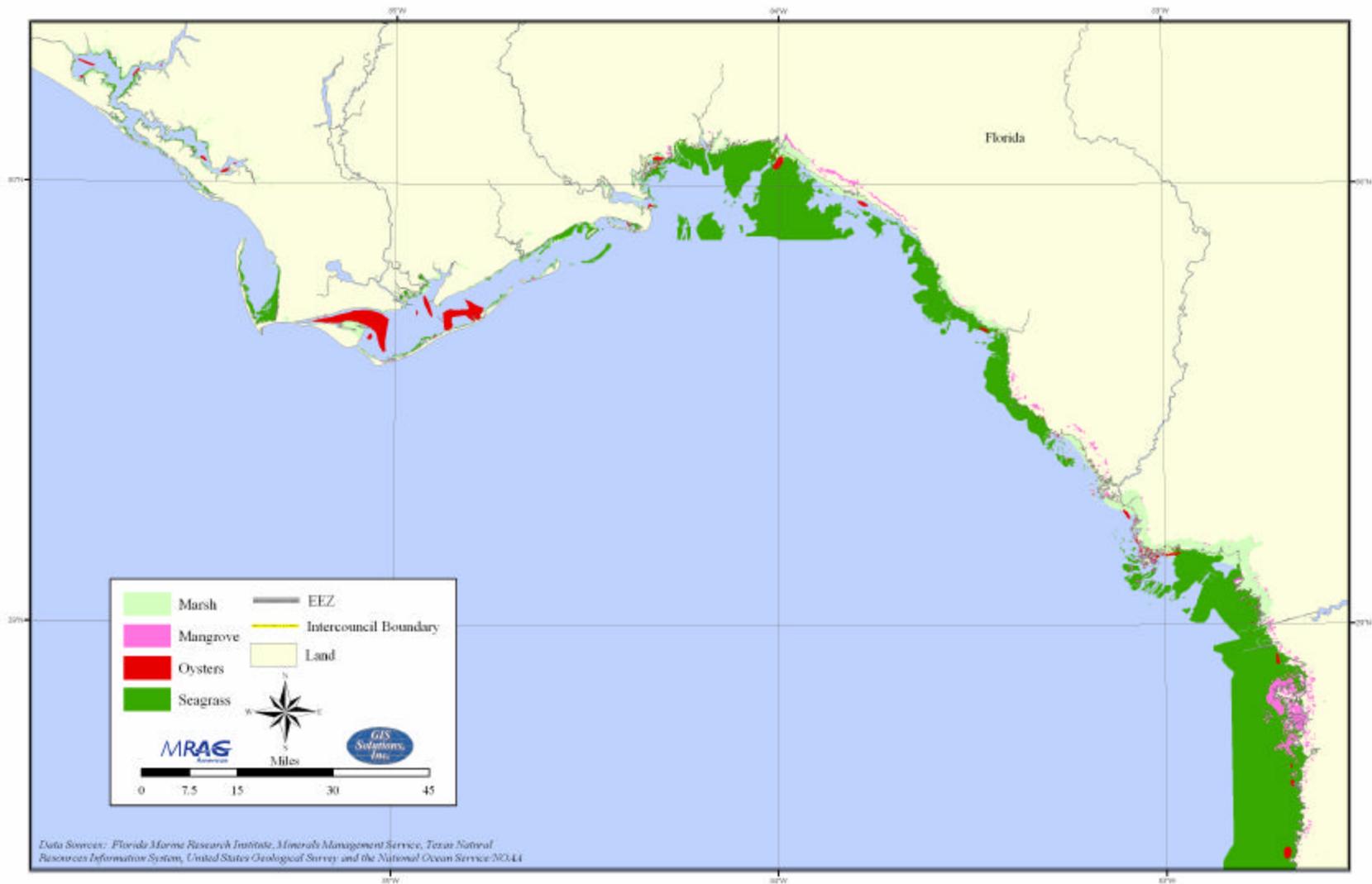


Figure 3.2.5. Distribution of mangroves, seagrasses, marsh, and oysters in the Big Bend of Florida.

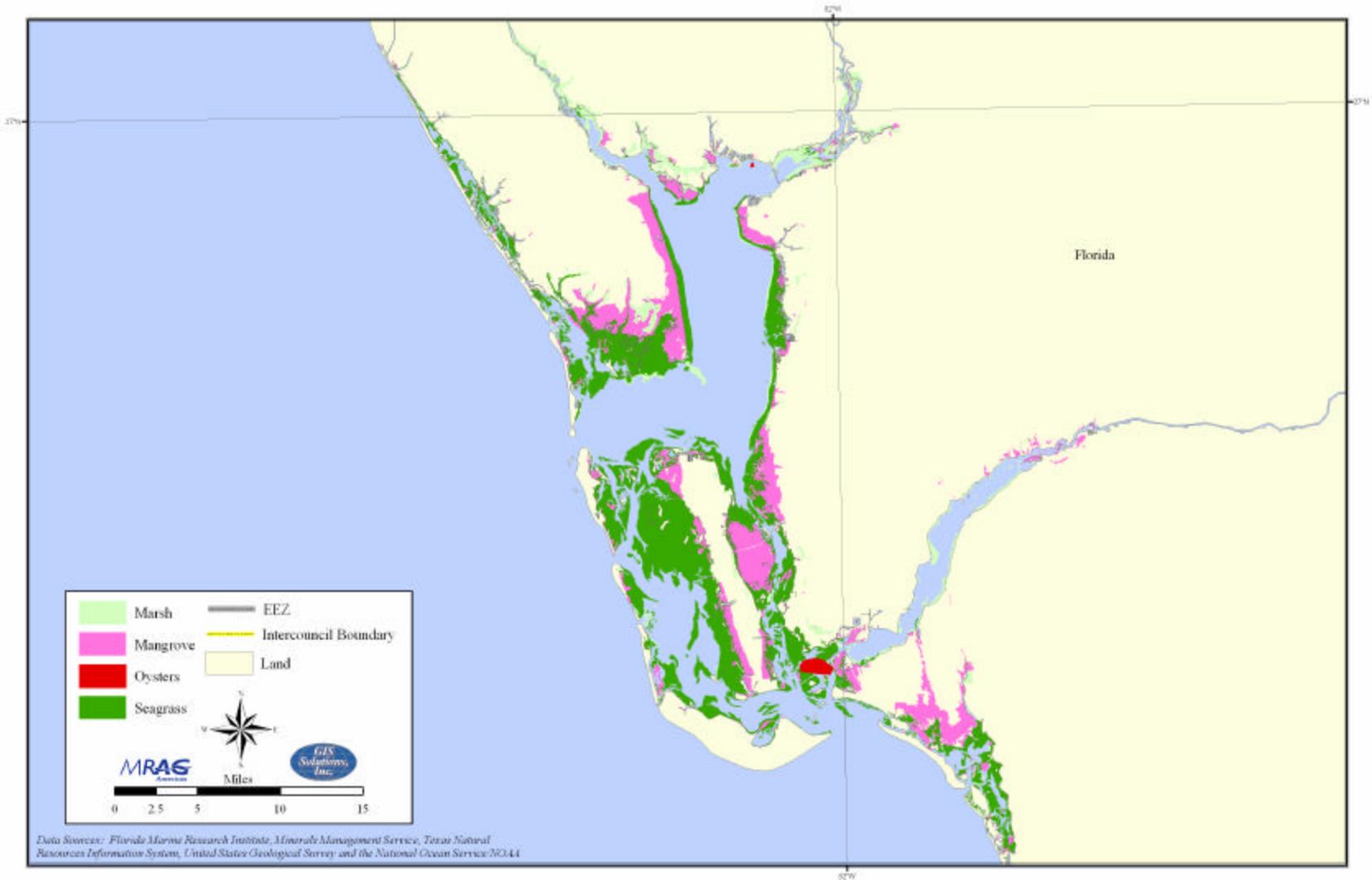


Figure 3.2.6. Distribution of mangroves, seagrasses, marsh, and oysters from Tampa Bay to Charlotte Harbor.

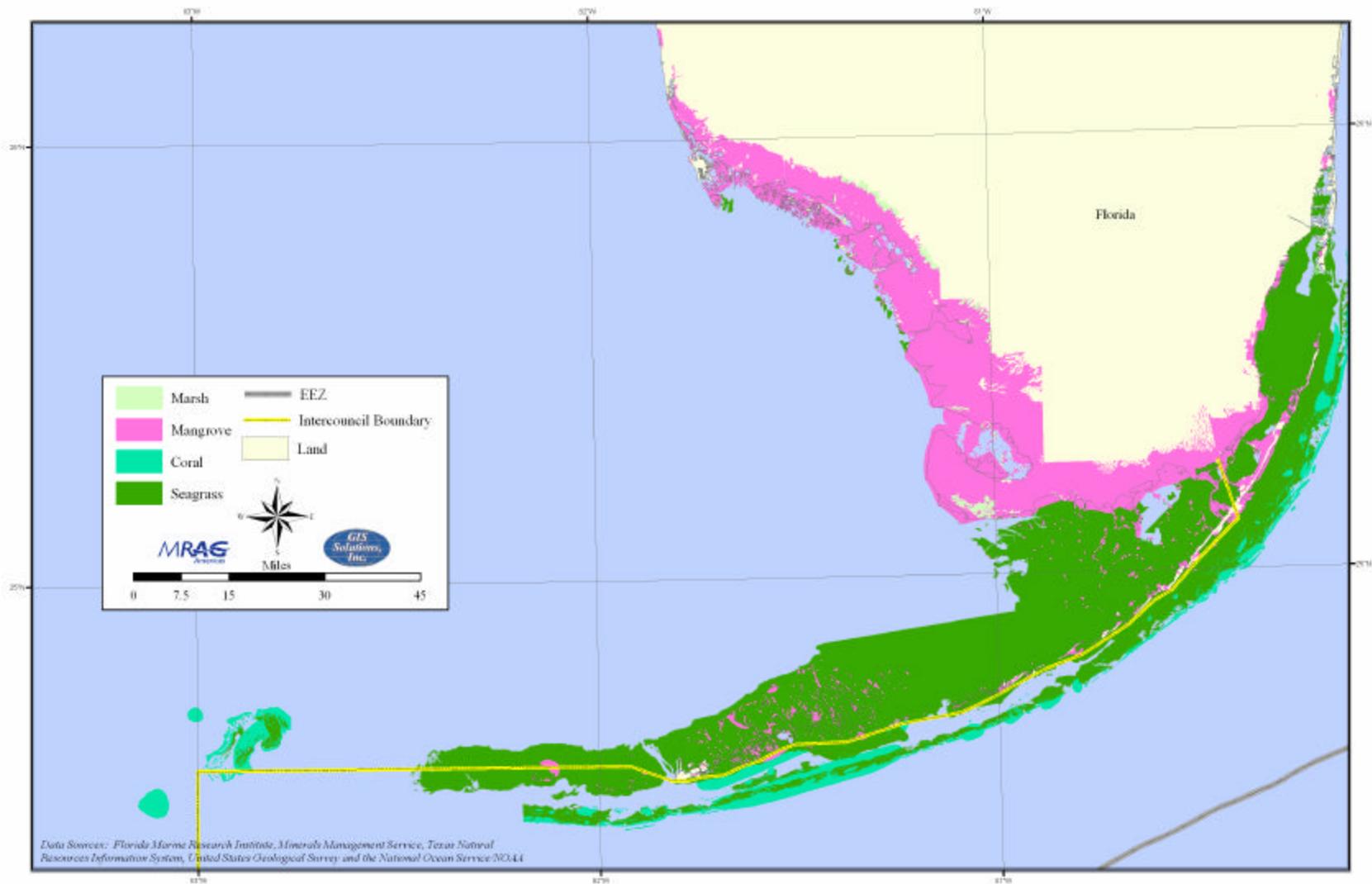


Figure 3.2.7. Distribution of mangroves, seagrasses, and coral in southern Florida.

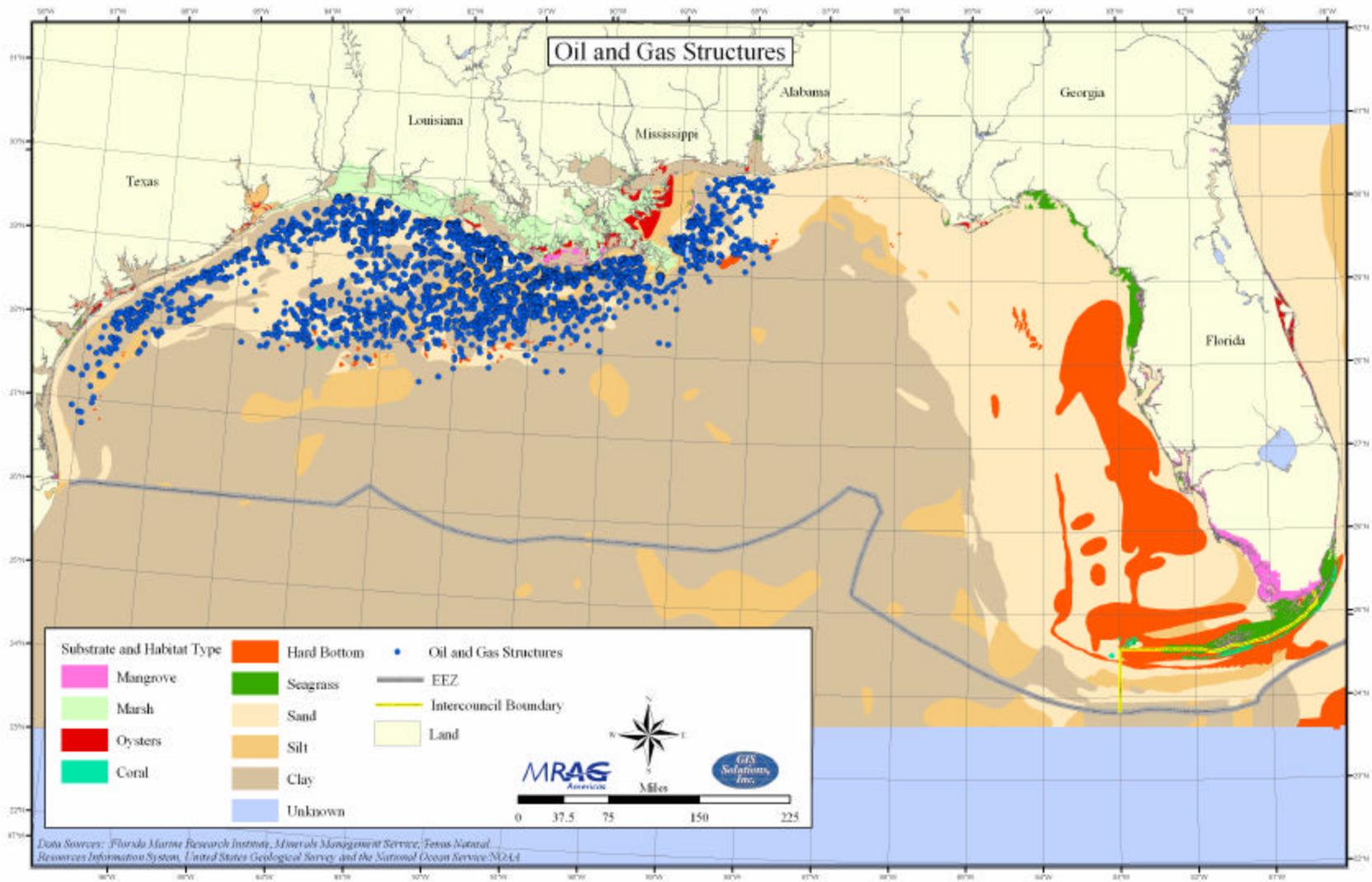


Figure 3.2.8. Distribution of oil and gas structures in the Gulf of Mexico.

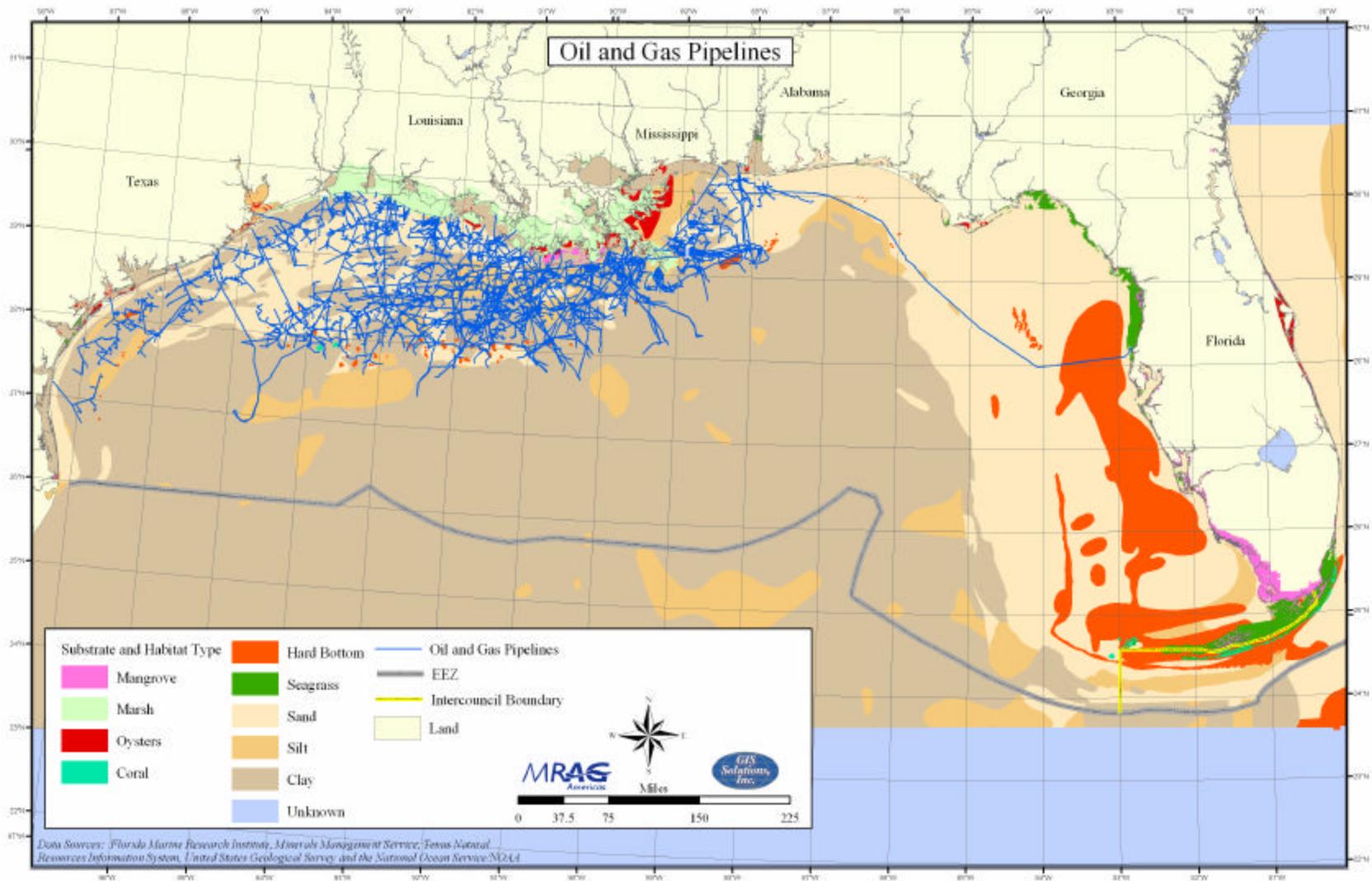


Figure 3.2.9. Distribution of oil and gas pipelines in the Gulf of Mexico.

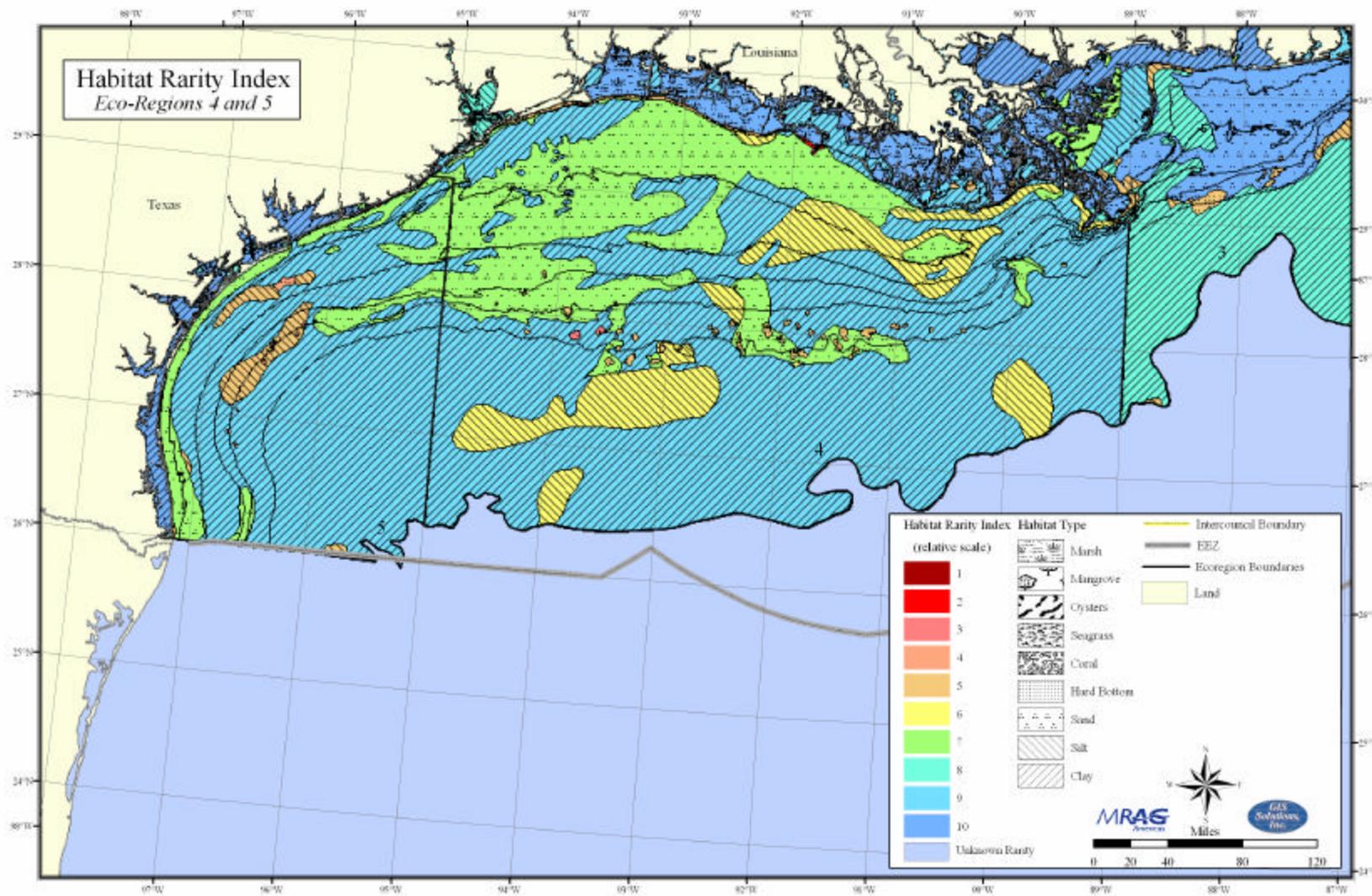


Figure 3.2.10a. Habitat rarity index for the West Gulf of Mexico.

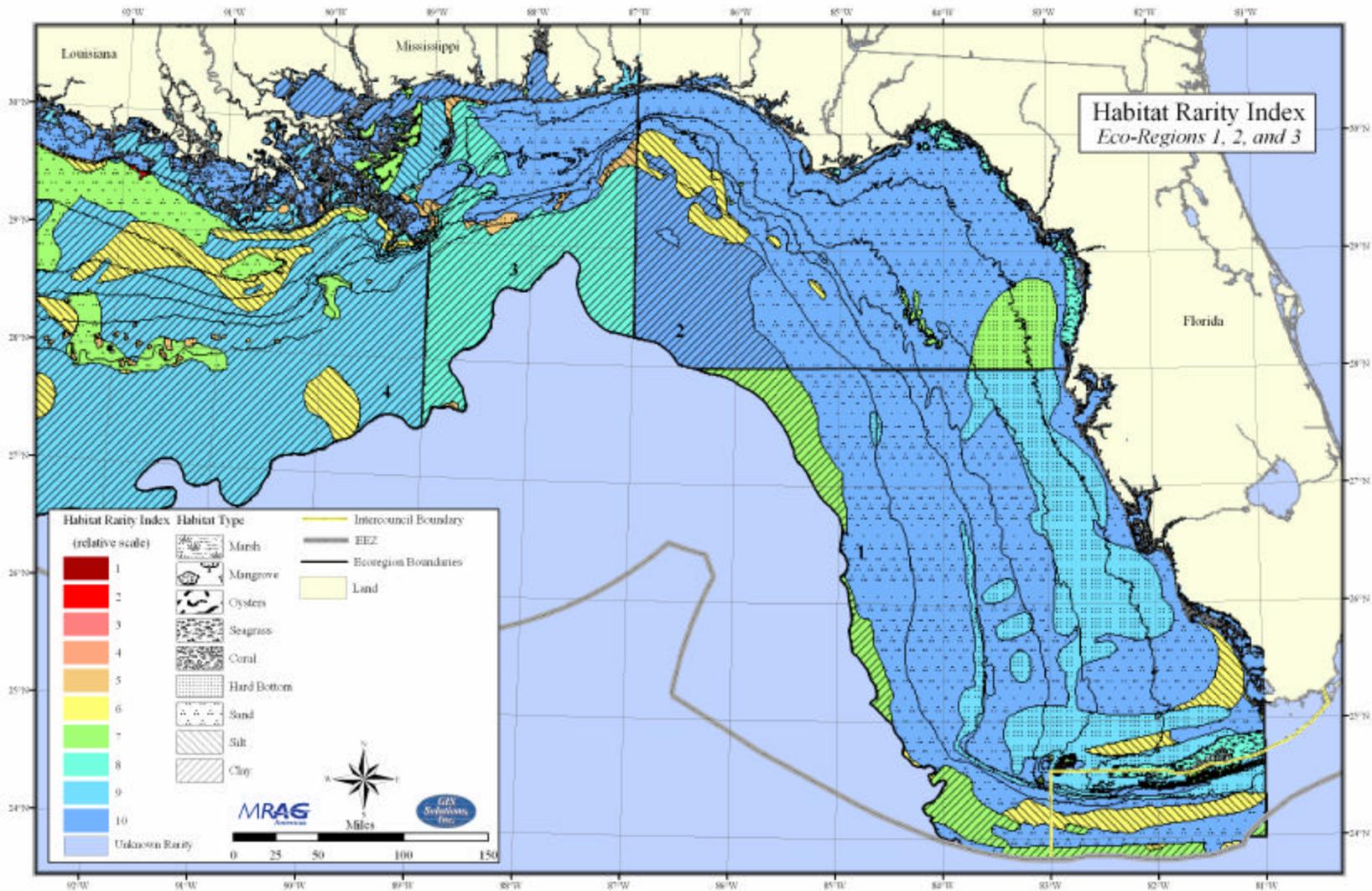


Figure 3.2.10b. Habitat rarity index for the East Gulf of Mexico.

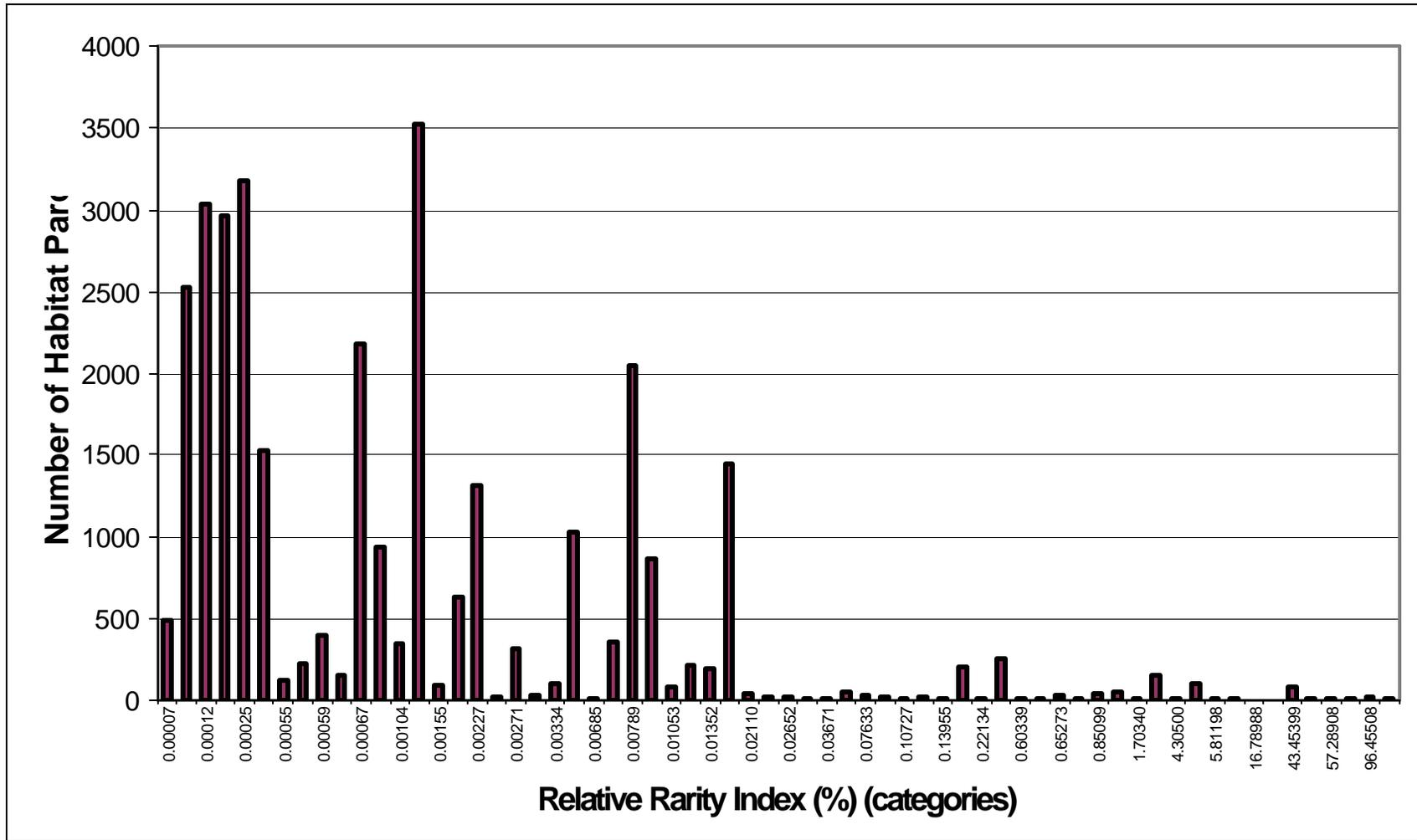


Figure 3.2.11. Frequency plot of the number of habitat parcels in each habitat rarity category (relative scale).

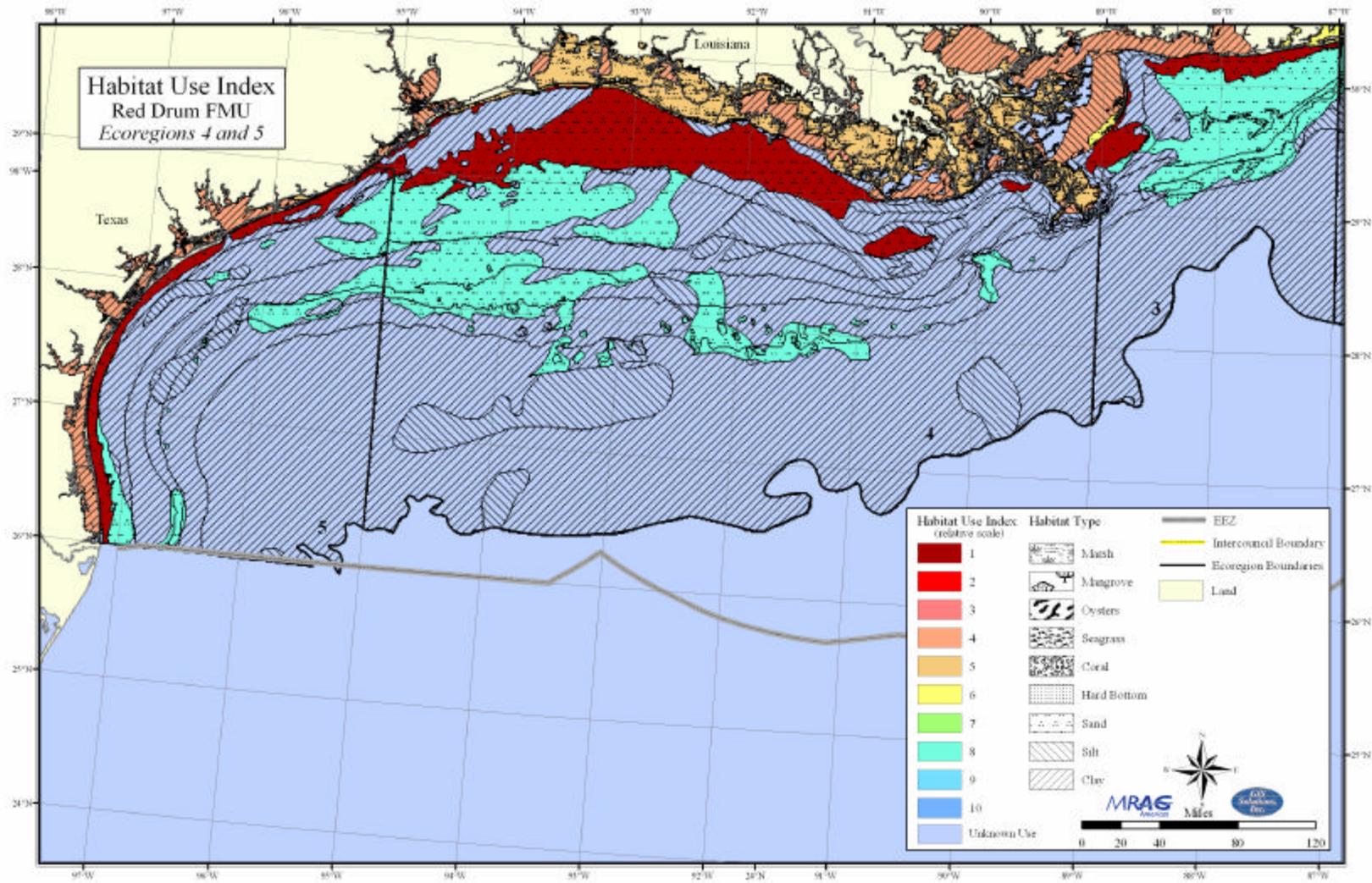


Figure 3.2.12a. Habitat use by Red Drum FMP species in the West Gulf of Mexico (low index numbers represent the high levels of habitat use).

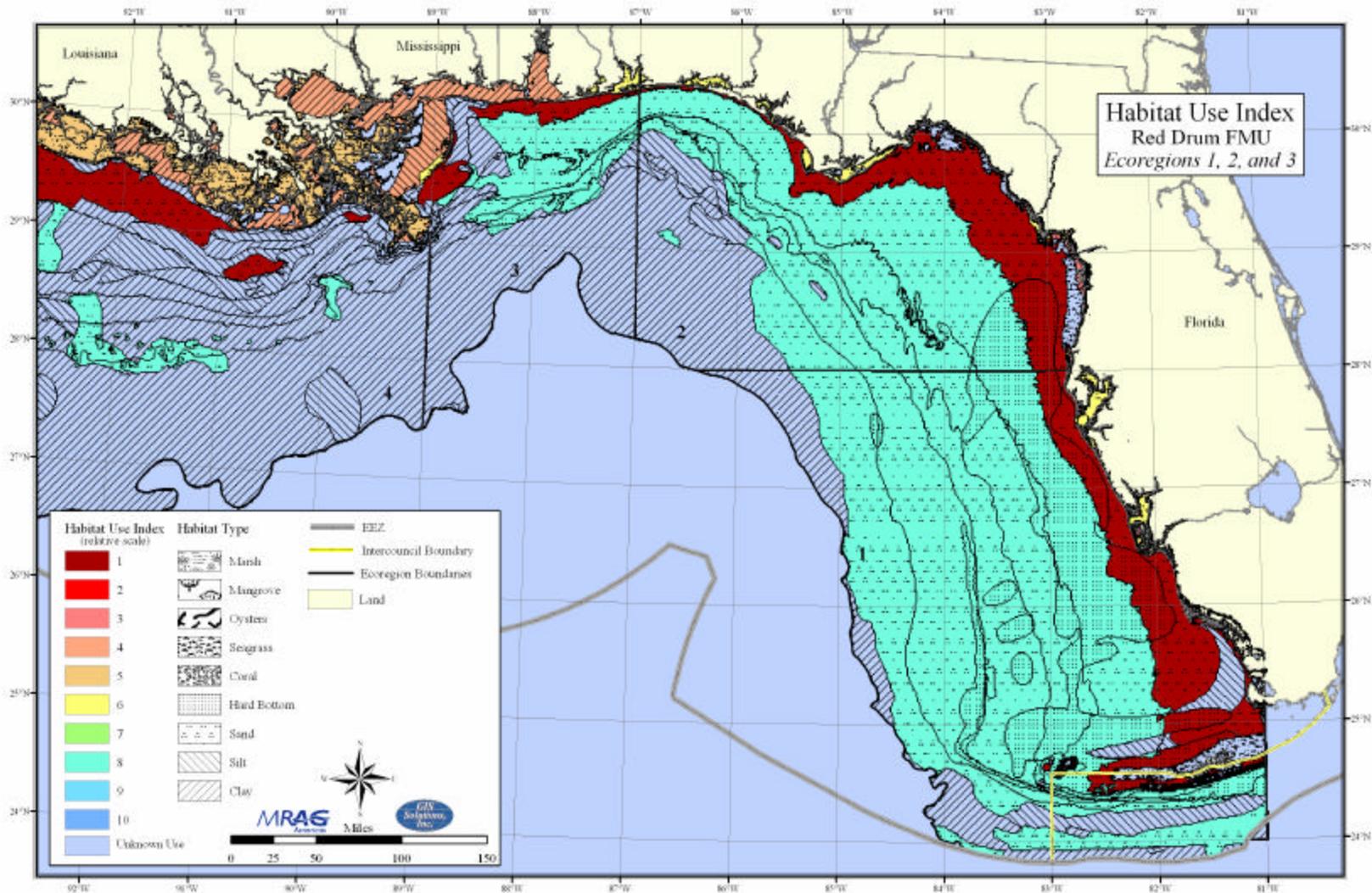


Figure 3.2.12b. Habitat use by Red Drum FMP species in the East Gulf of Mexico (low index numbers represent high levels of habitat use).

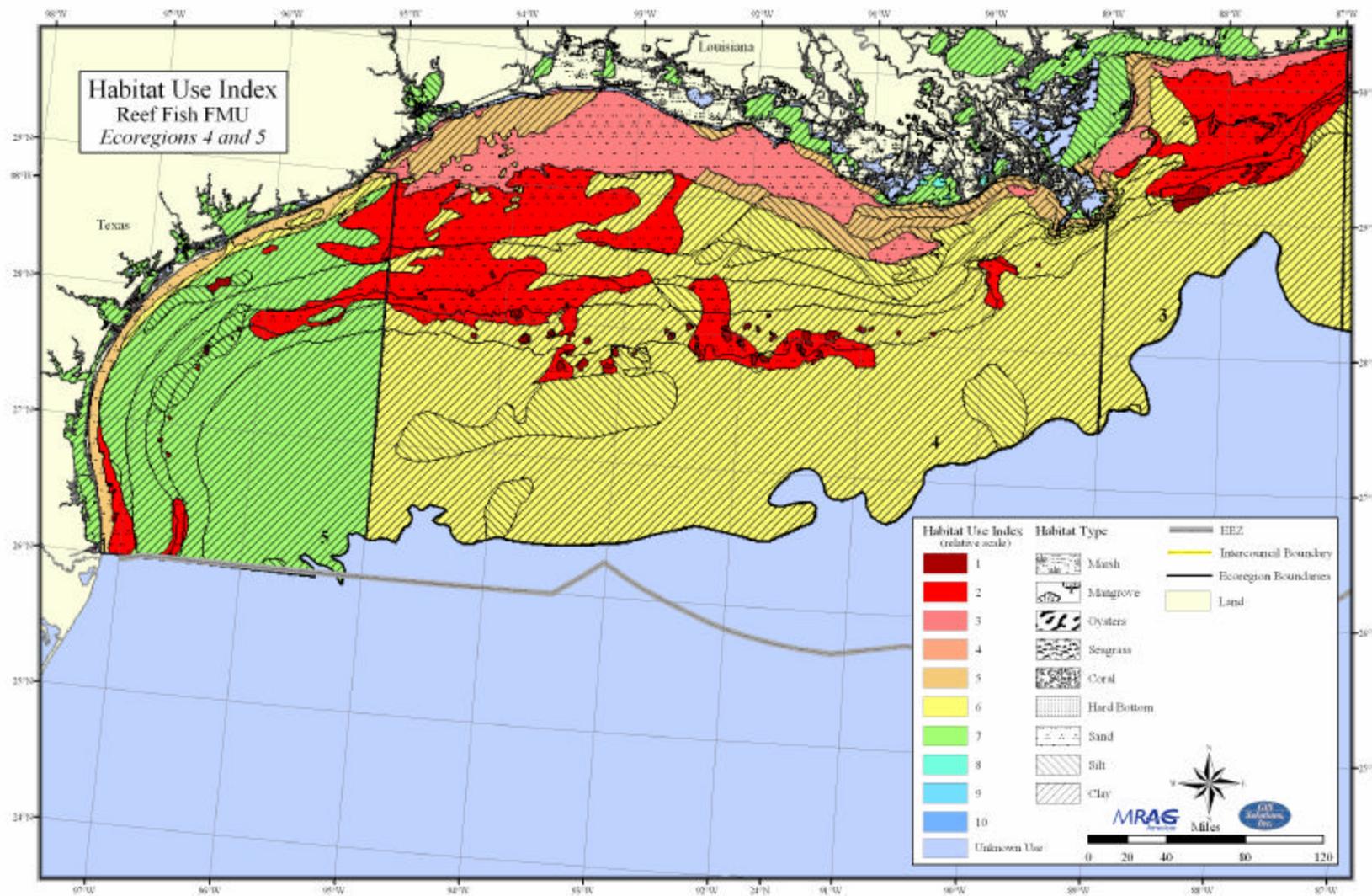


Figure 3.2.13a. Habitat use by Reef Fish FMP species in the West Gulf of Mexico (low index numbers represent high levels of habitat use).

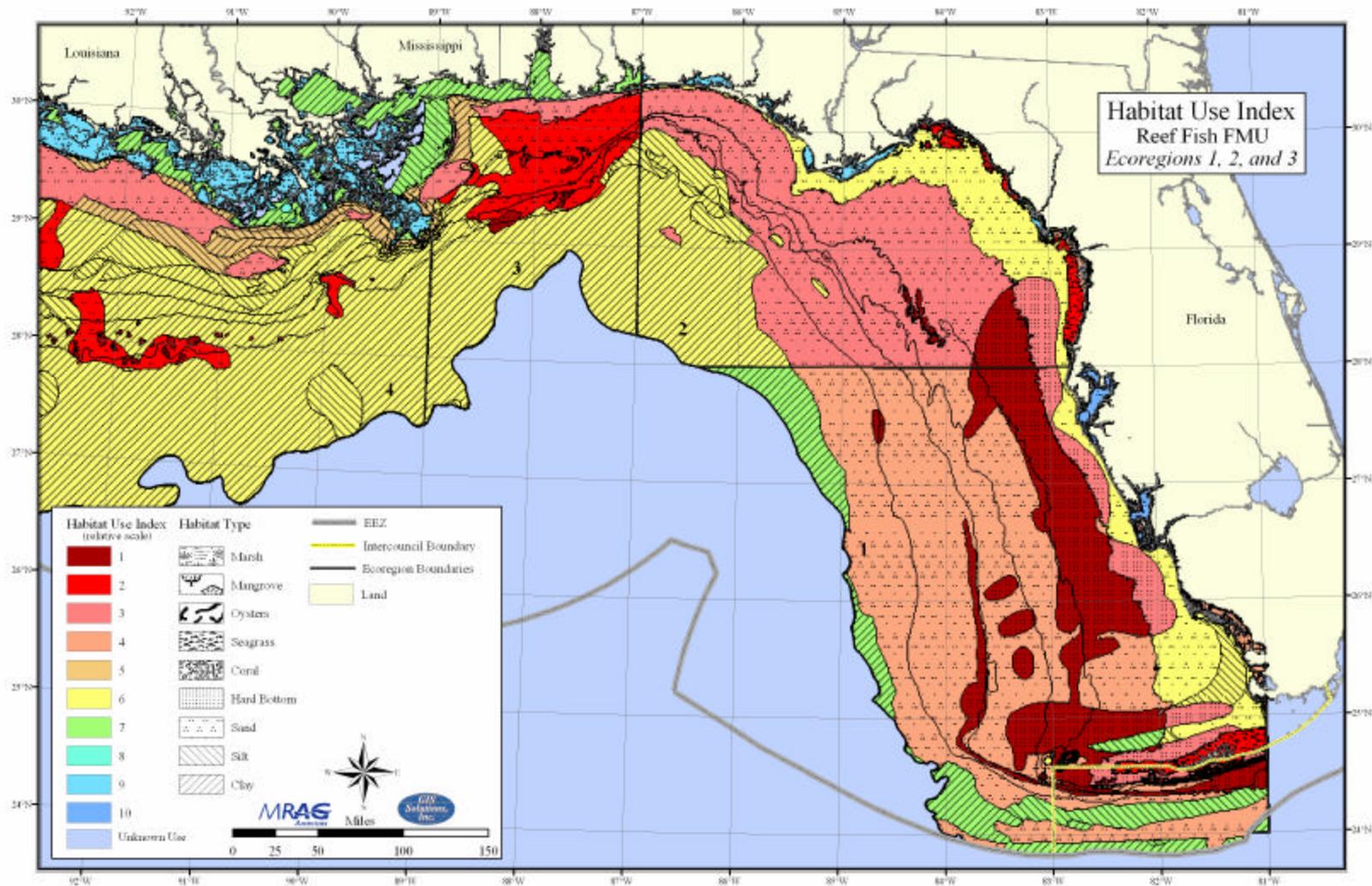


Figure 3.2.13b. Habitat use by Reef Fish FMP species in the East Gulf of Mexico (low index numbers represent high levels of habitat use). The large area designated as hard bottom offshore of Florida from approximately Crystal River south to the Keys is a mosaic of patchy hard bottom and sand/shell habitats. It has been classified as hard bottom for the purposes of mapping (see Fig. 3.1.3). Sandy patches within this area would have a habitat use index the same as other sandy areas at the same depth.

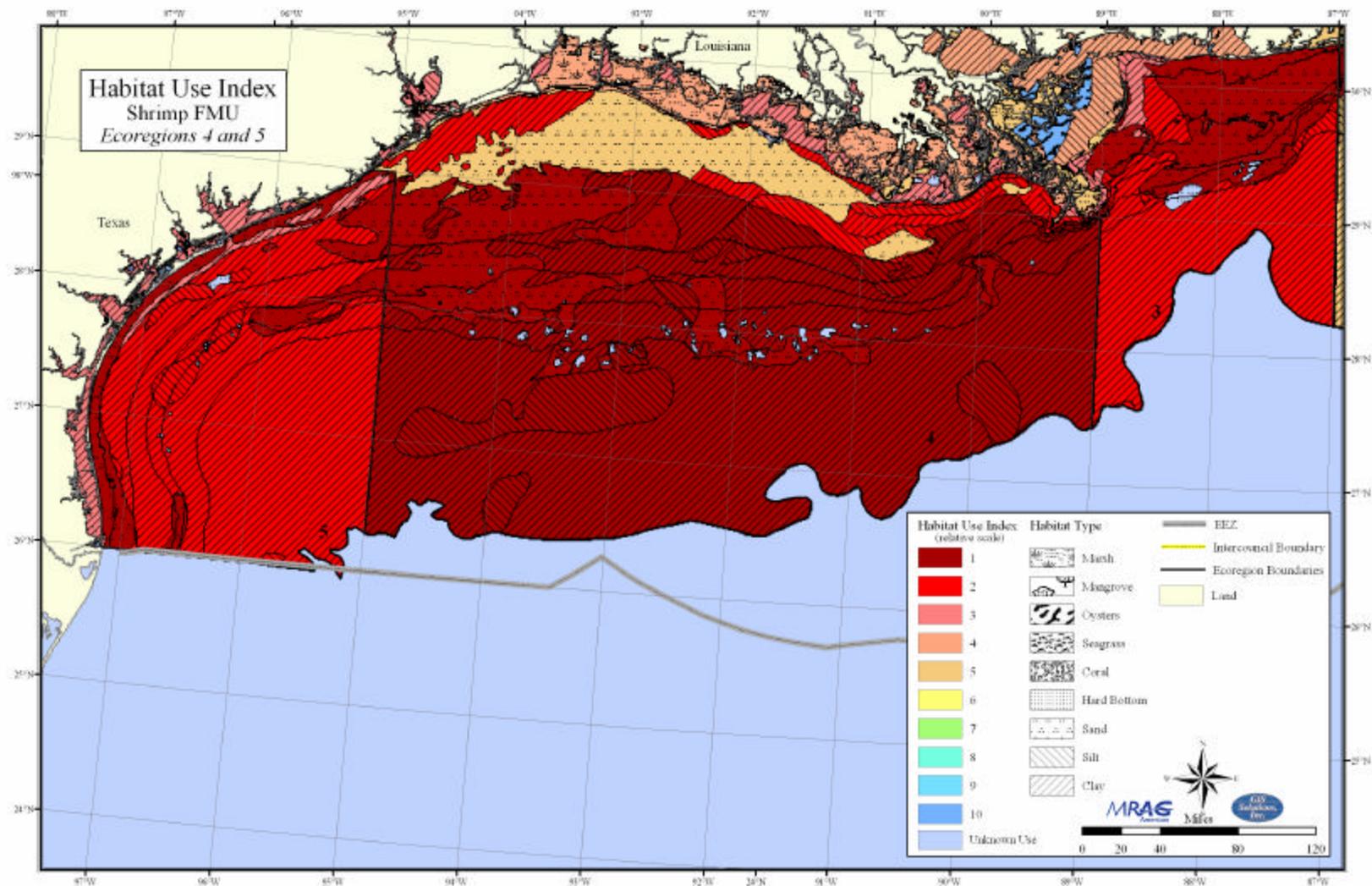


Figure 3.2.14a. Habitat use by Shrimp FMP species in the West Gulf of Mexico (low index numbers represent high levels of habitat use).

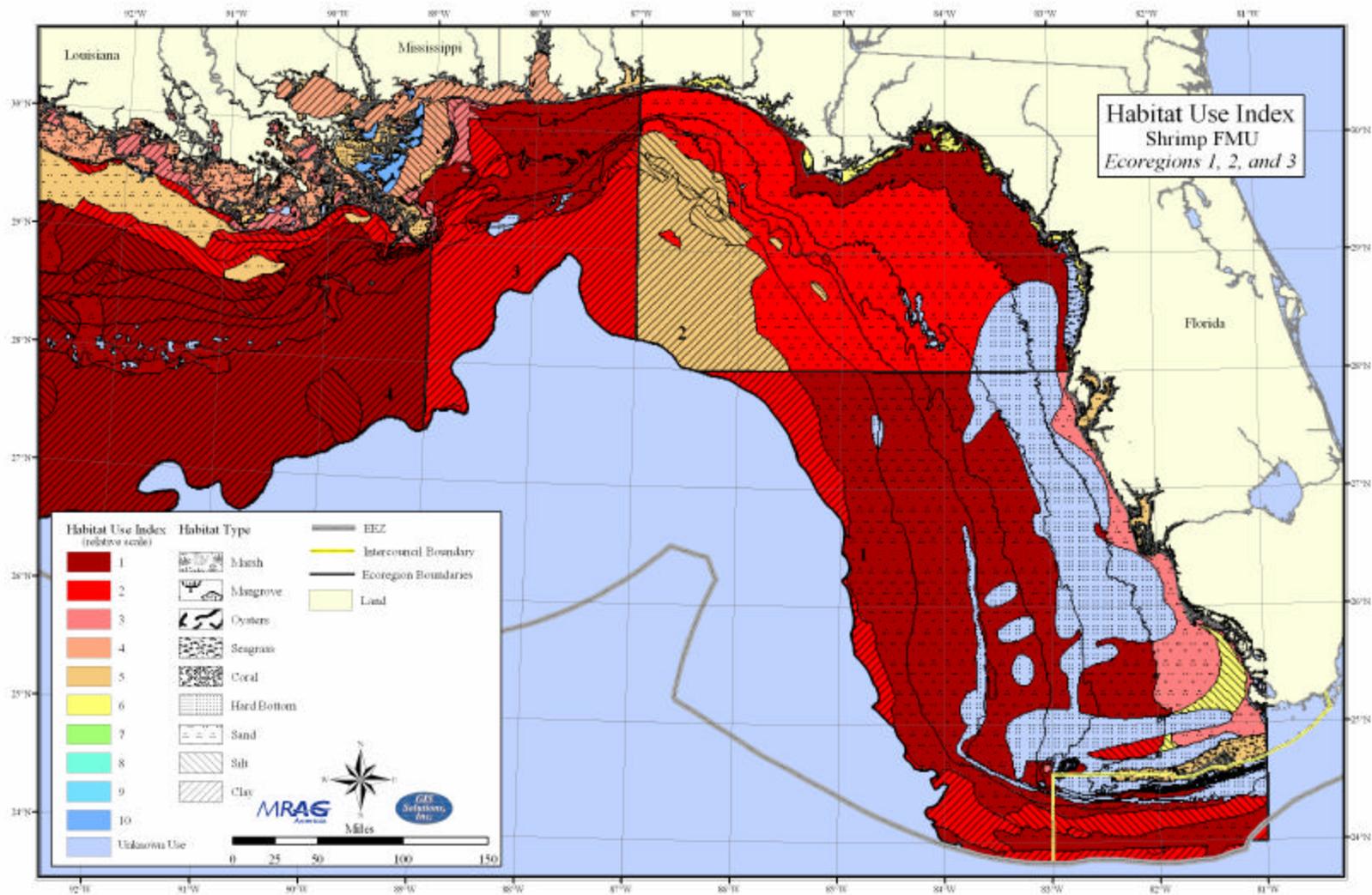


Figure 3.2.14b. Habitat use by Shrimp FMP species in the East Gulf of Mexico (low index numbers represent high levels of habitat use). The large area with “unknown use” off Florida extending from Crystal River south to the Keys is a mosaic of hard bottom and sand/shell habitat, but it has been classified as hard bottom for the purposes of mapping (see Fig. 3.1.3). Sandy patches within this area would have a habitat use index for shrimp the same as other sandy areas at the same depth.

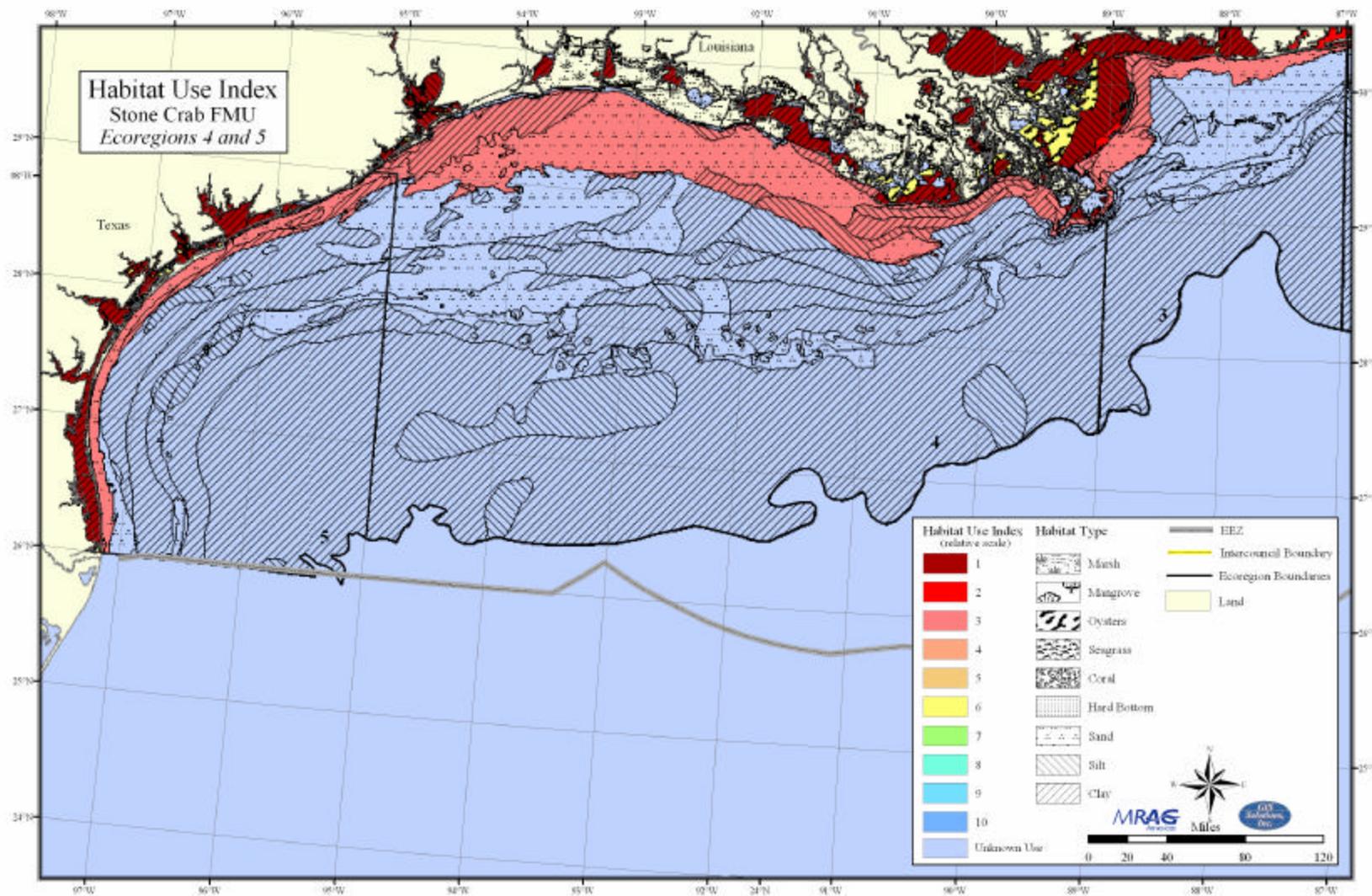


Figure 3.2.15a. Habitat use by Stone Crab FMP species in the West Gulf of Mexico (low index numbers represent high levels of habitat use).

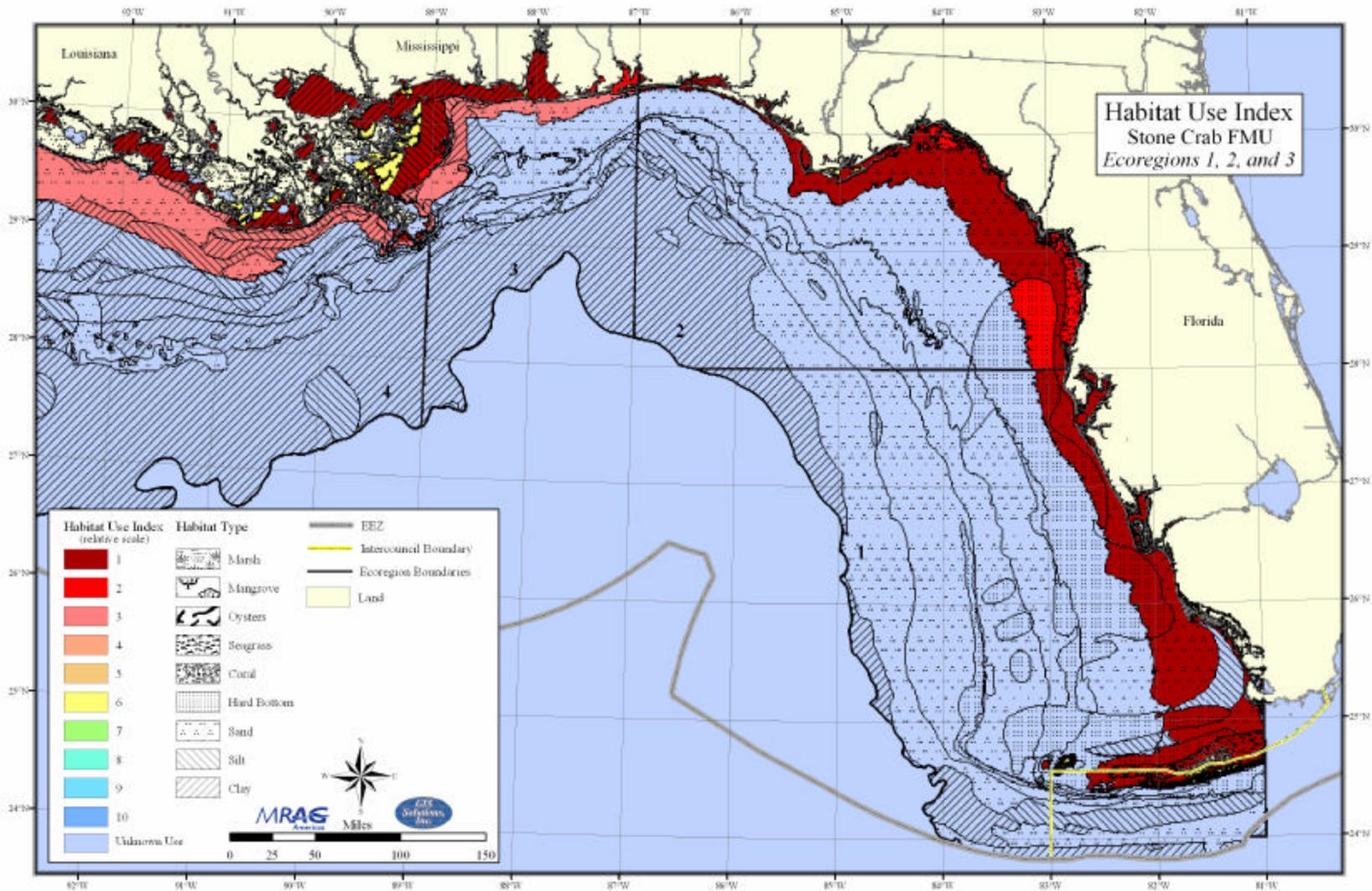


Figure 3.2.15b. Habitat use by Stone Crab FMP species in the East Gulf of Mexico (low index numbers represent high levels of habitat use).

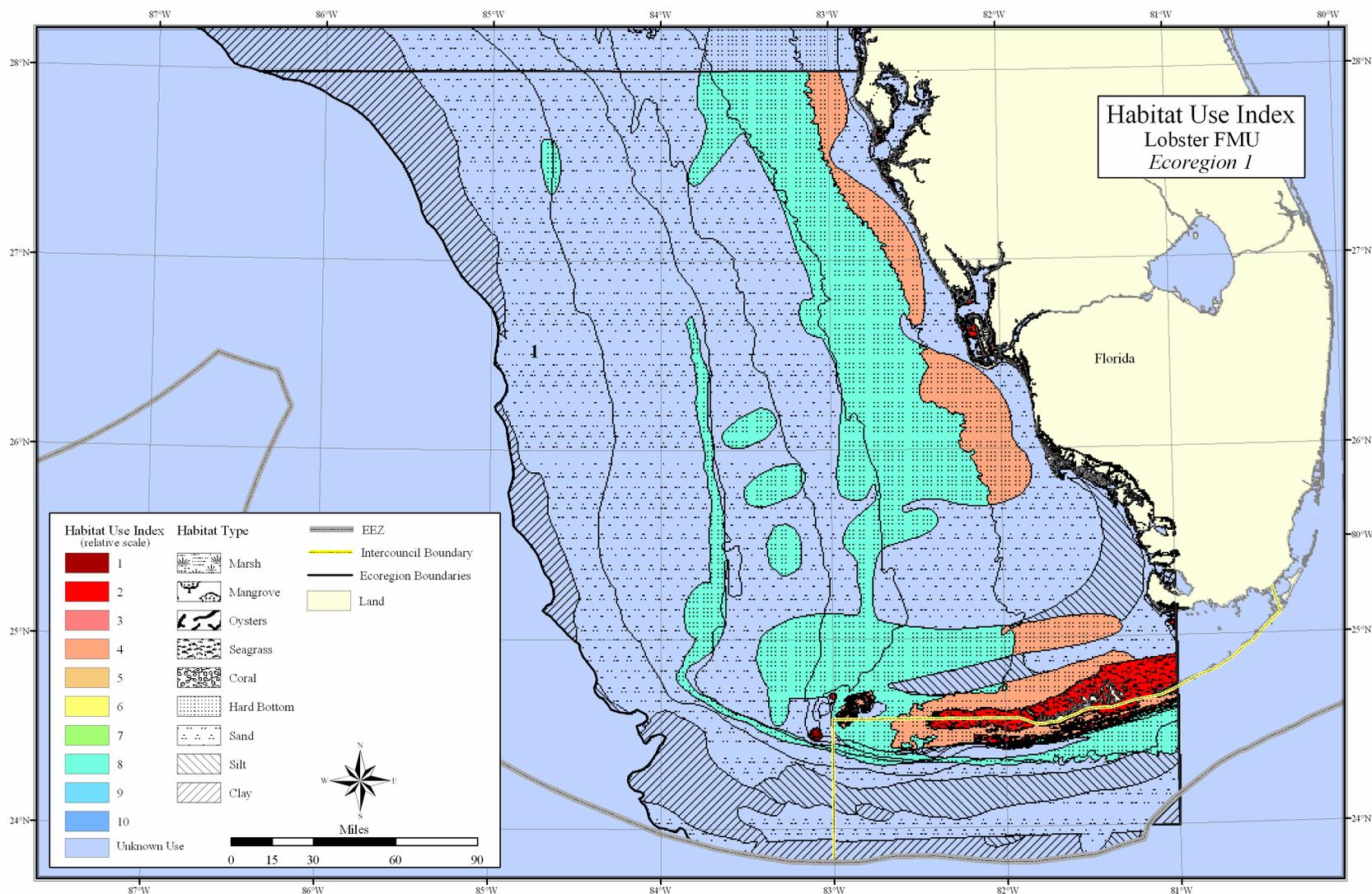


Figure 3.2.16. Habitat use by Spiny Lobster FMP species in the Gulf of Mexico (low index numbers represent high levels of habitat use). The large area designated as hard bottom extending from Crystal River south to the Keys is actually a mosaic of hard bottom and sand/shell habitat, but it has been classified as hard bottom for the purposes of mapping (see Fig. 3.1.3). Sandy patches within this area would a lower habitat use index the same as other sandy areas at the same depth.

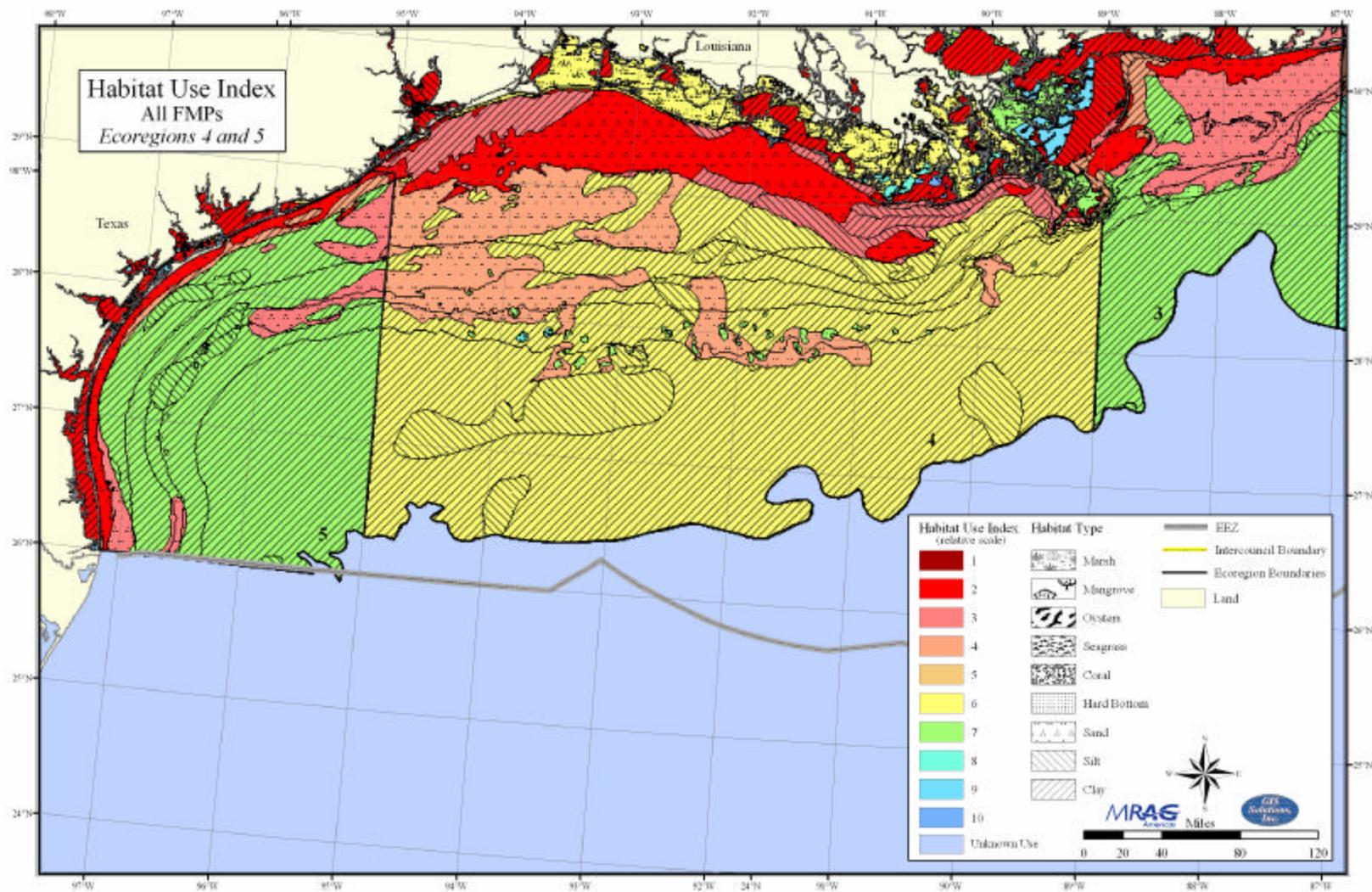


Figure 3.2.17a. Habitat use across FMPs (Red Drum, Reef Fish, Coastal Migratory Pelagics, Shrimp, Stone Crab, Spiny Lobster) in the West Gulf of Mexico. (Low index numbers represent high levels of habitat use.)

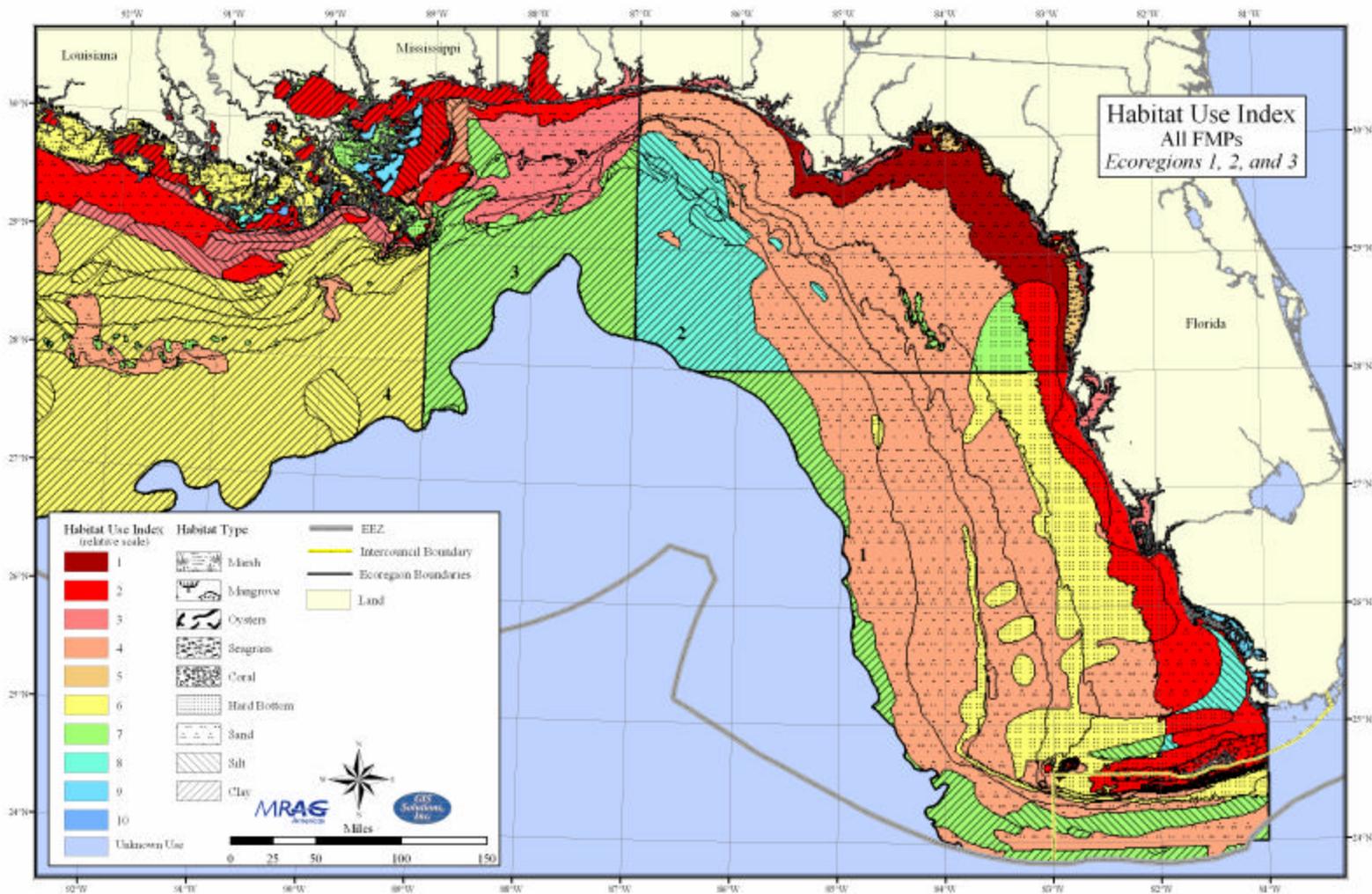


Figure 3.2.17b. Habitat use across FMPs (Red Drum, Reef Fish, Coastal Migratory Pelagics, Shrimp, Stone Crab, Spiny Lobster) in the East Gulf of Mexico. (Low index numbers represent high levels of habitat use.)

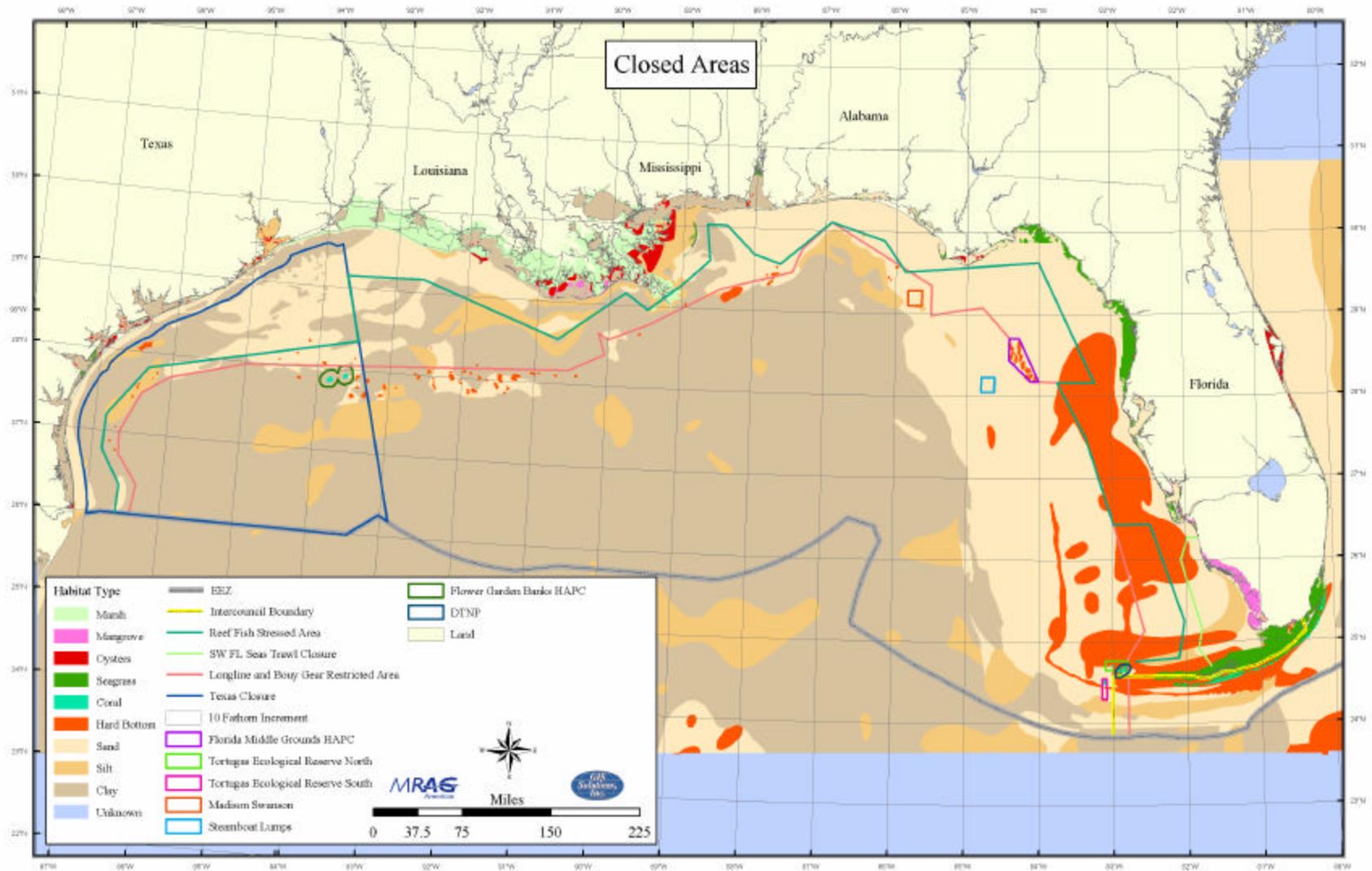


Figure 3.3.1. Map of all existing fishery management closed areas in the Gulf of Mexico as discussed in Section 3.5.1.

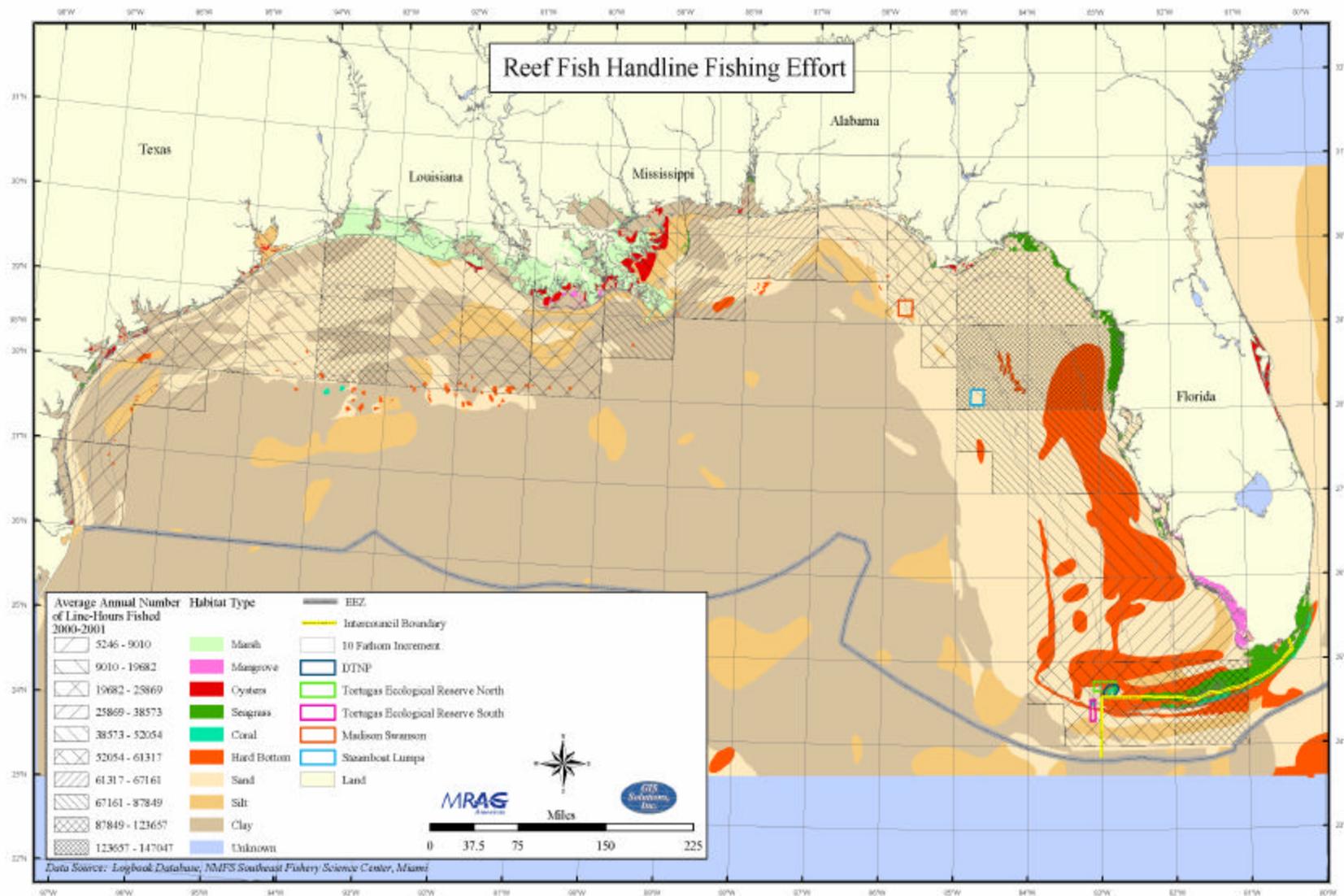


Figure 3.3.2. Reef fish handline fishing effort. Average number of line-hours fished in a year, taken from logbook data for 2000-2001.

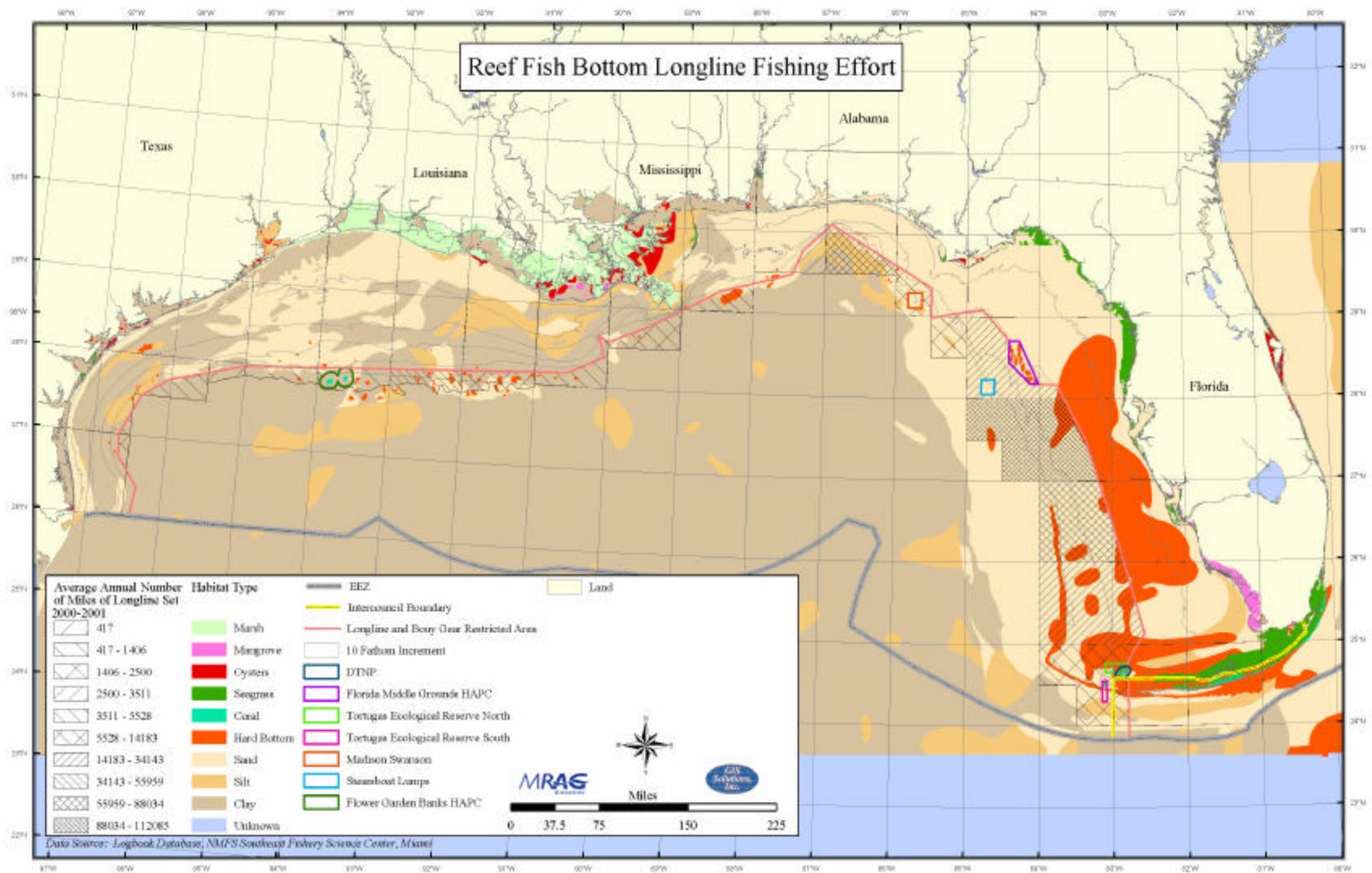


Figure 3.3.3. Reef fish bottom longline fishing effort. Average number of miles of line set in a year, taken from logbook data for 2000-2001.

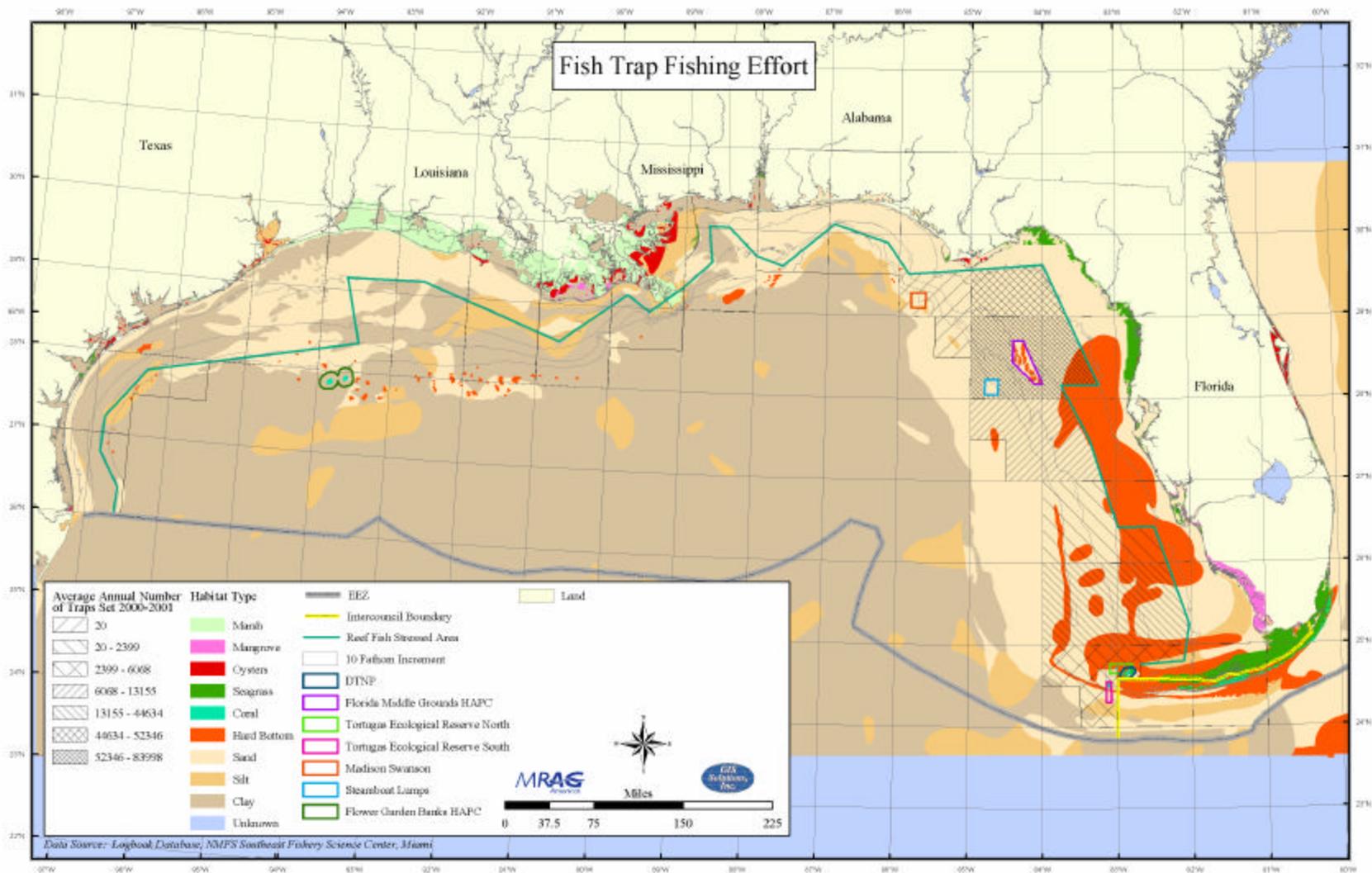


Figure 3.3.4. Fish trap fishing effort.
Average number of traps set in a year, taken from logbook data for 2000-2001.

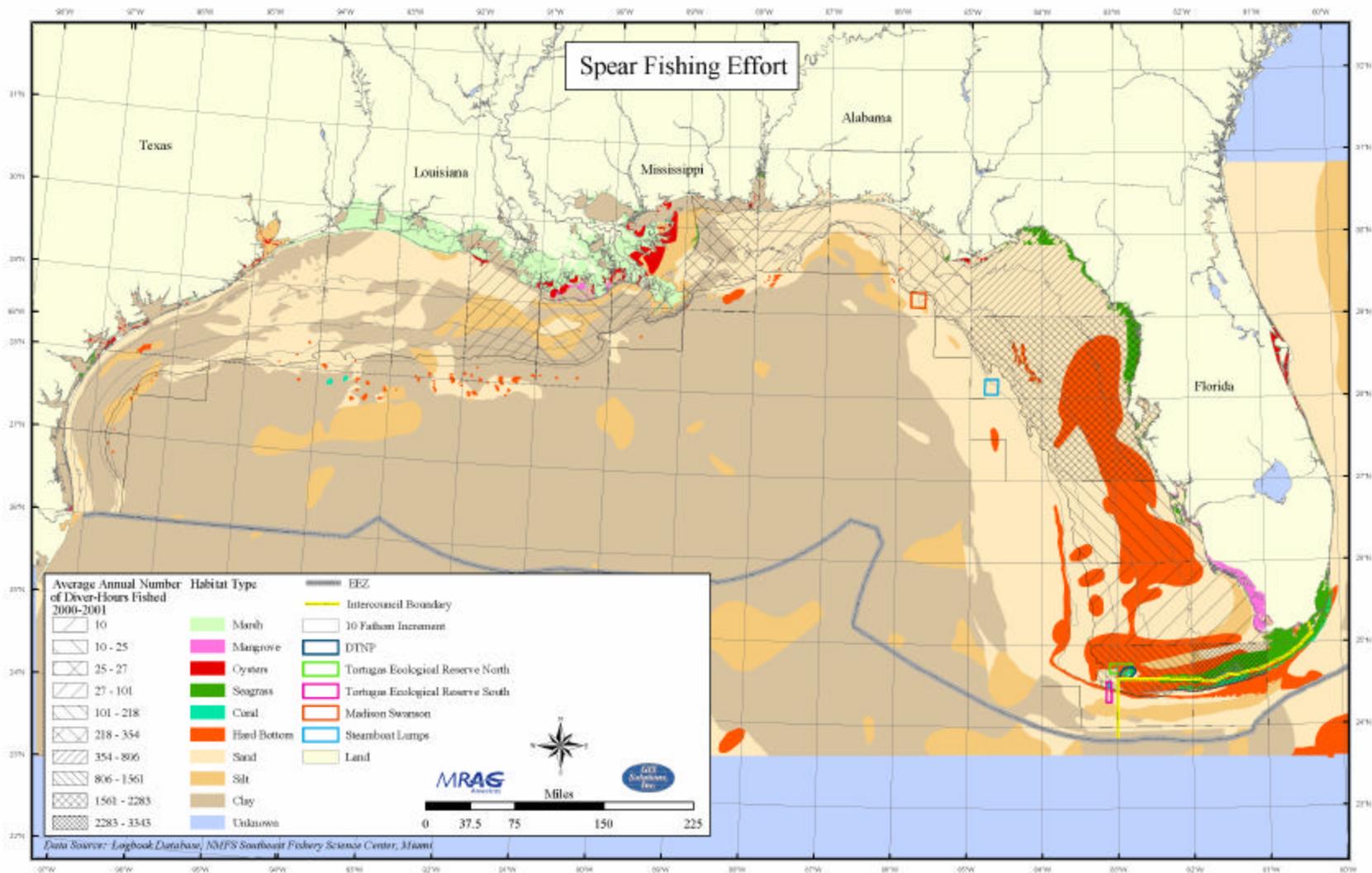


Figure 3.3.5. Spear fishing effort. Average number of dive-hours fished in a year, taken from logbook data for 2000-2001.

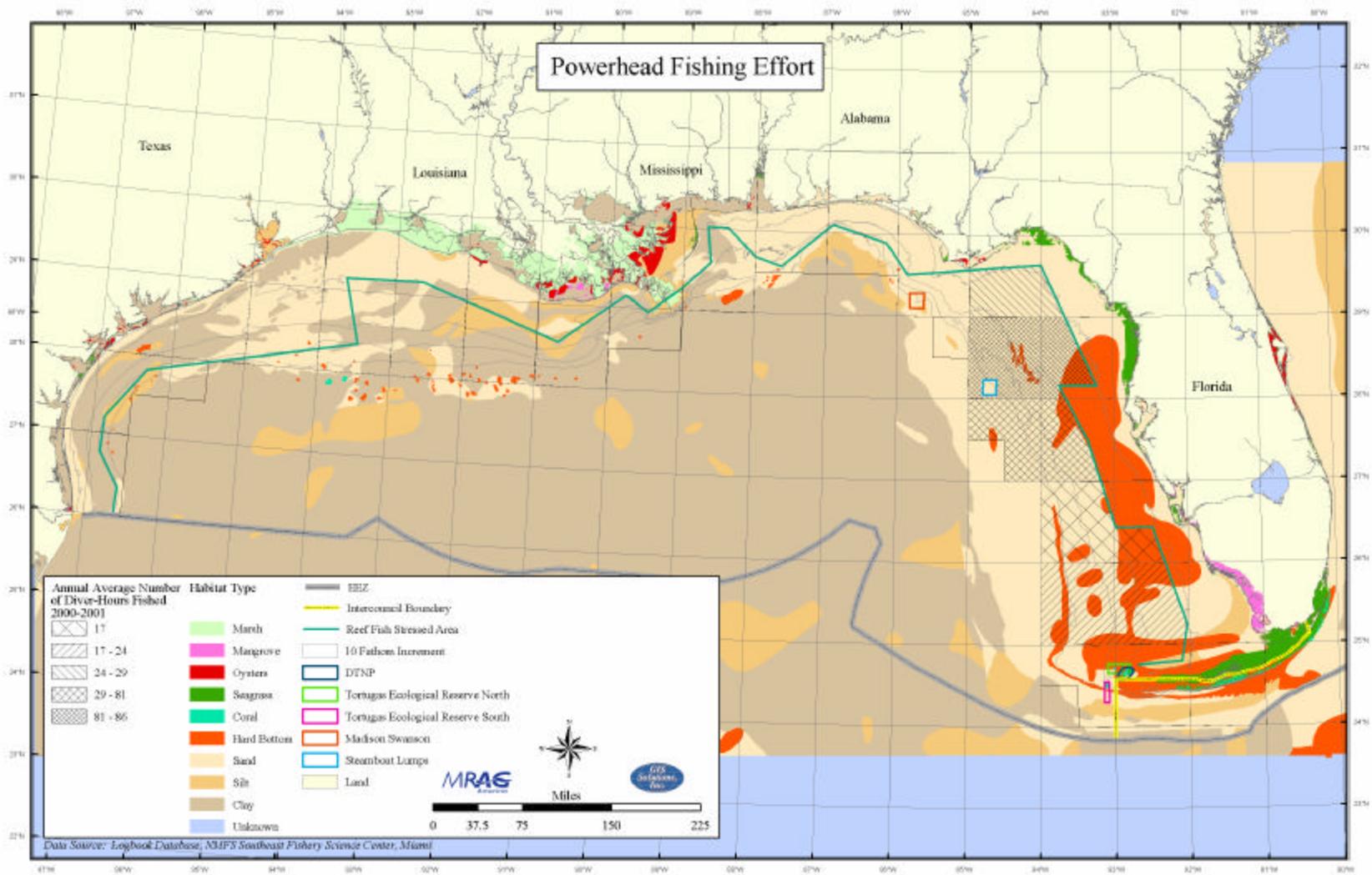


Figure 3.3.6. Powerhead fishing effort. Average number of dive-hours fished in a year, taken from logbook data for 2000-2001.

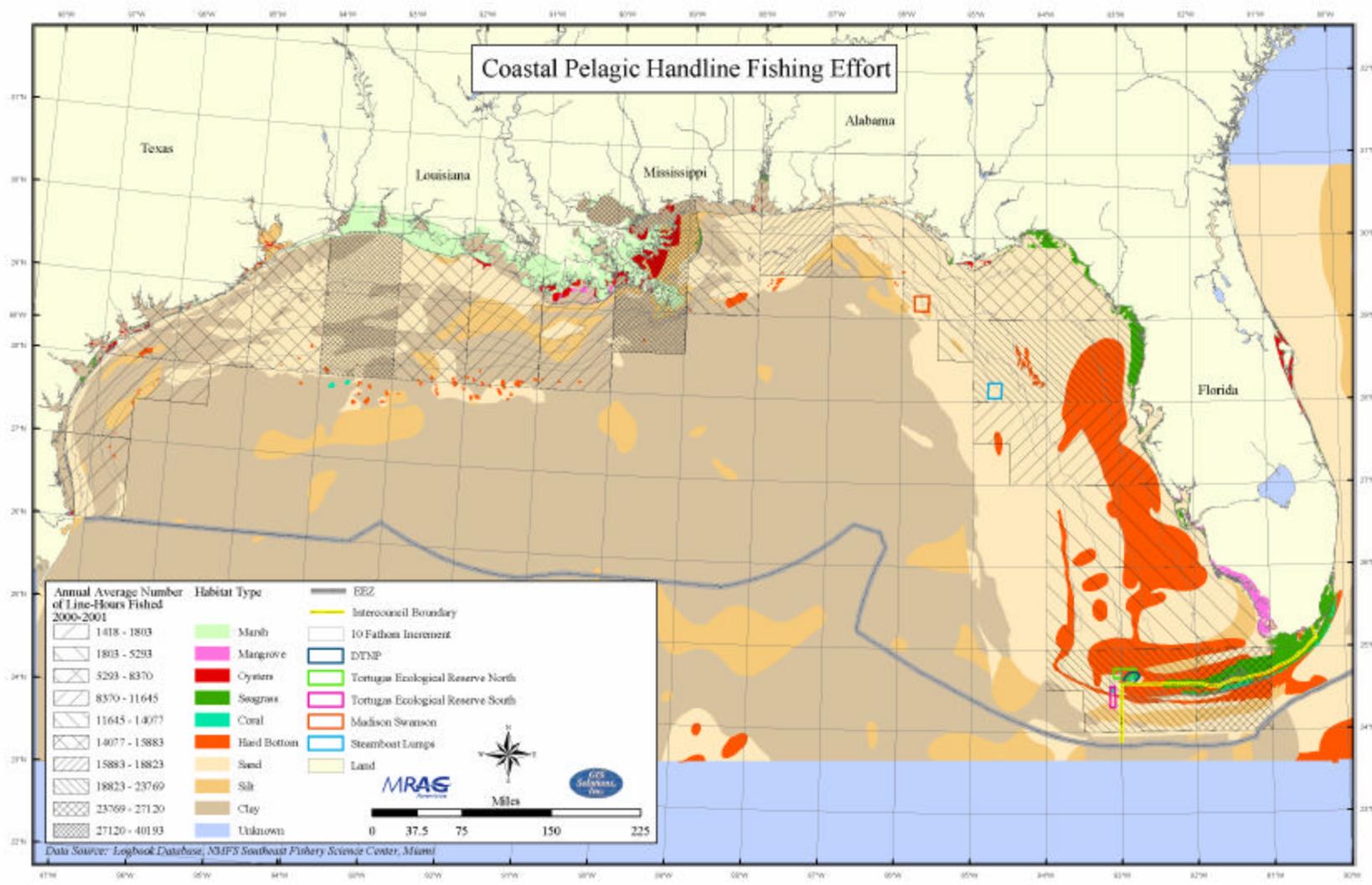


Figure 3.3.7. Coastal pelagics handline fishing effort. Average number of line-hours fished in a year, taken from logbook data for 2000-2001.

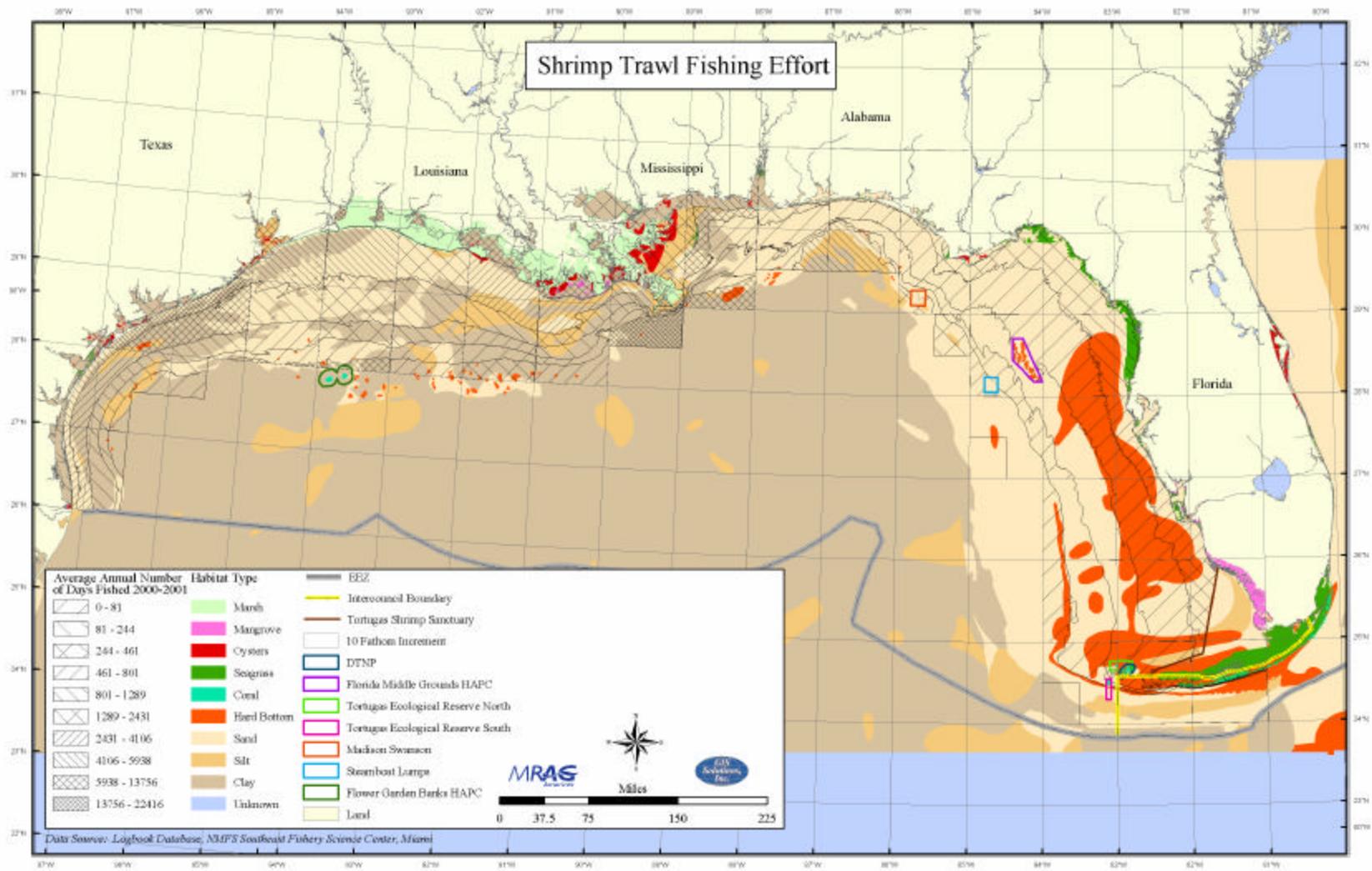


Figure 3.3.8. Shrimp trawl fishing effort. Average number of days fished in a year, taken from logbook data for 2000-2001.

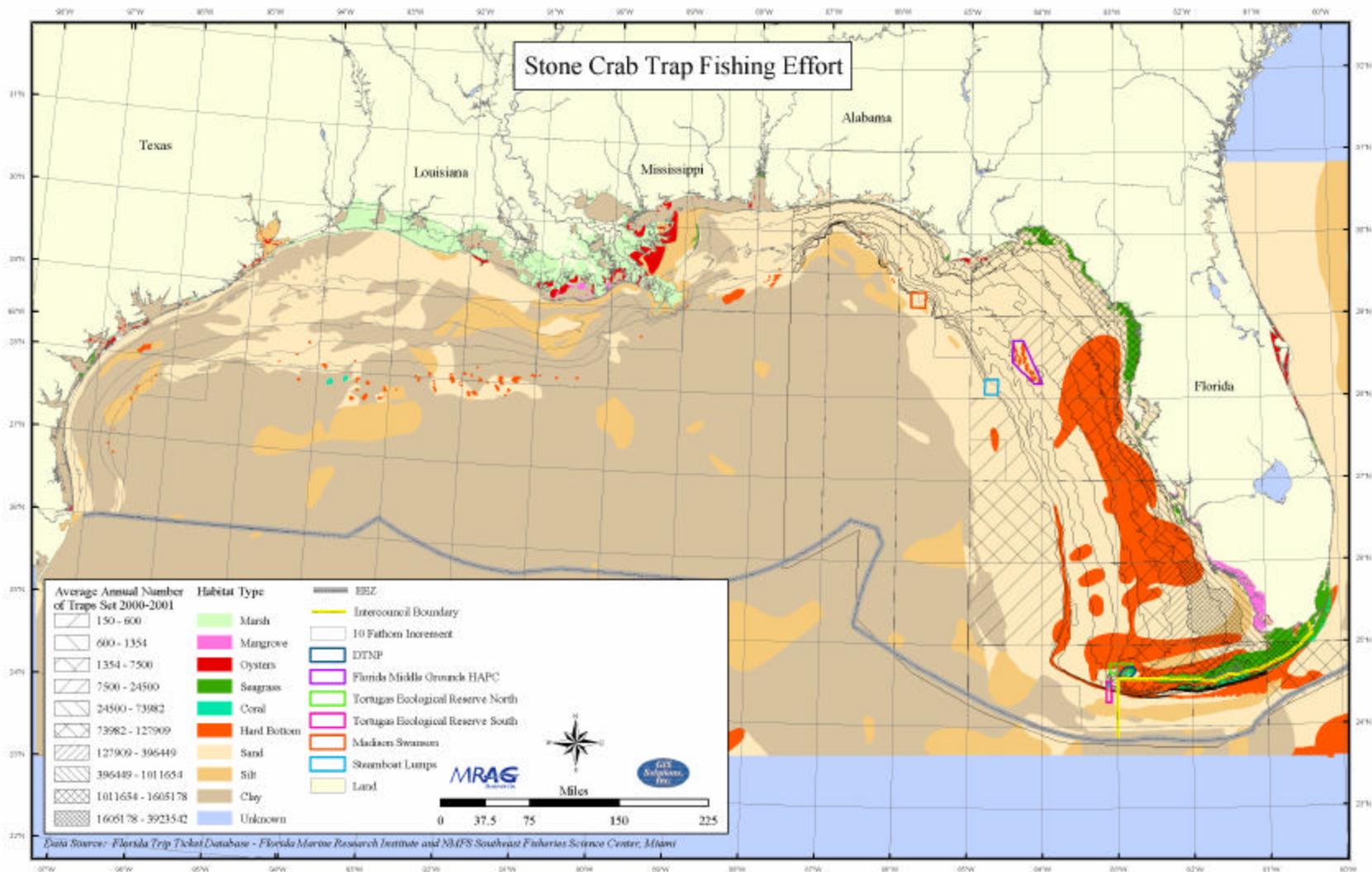


Figure 3.3.9. Stone crab trap fishing effort. Average number of traps set in a year, taken from logbook data for 2000-2001.

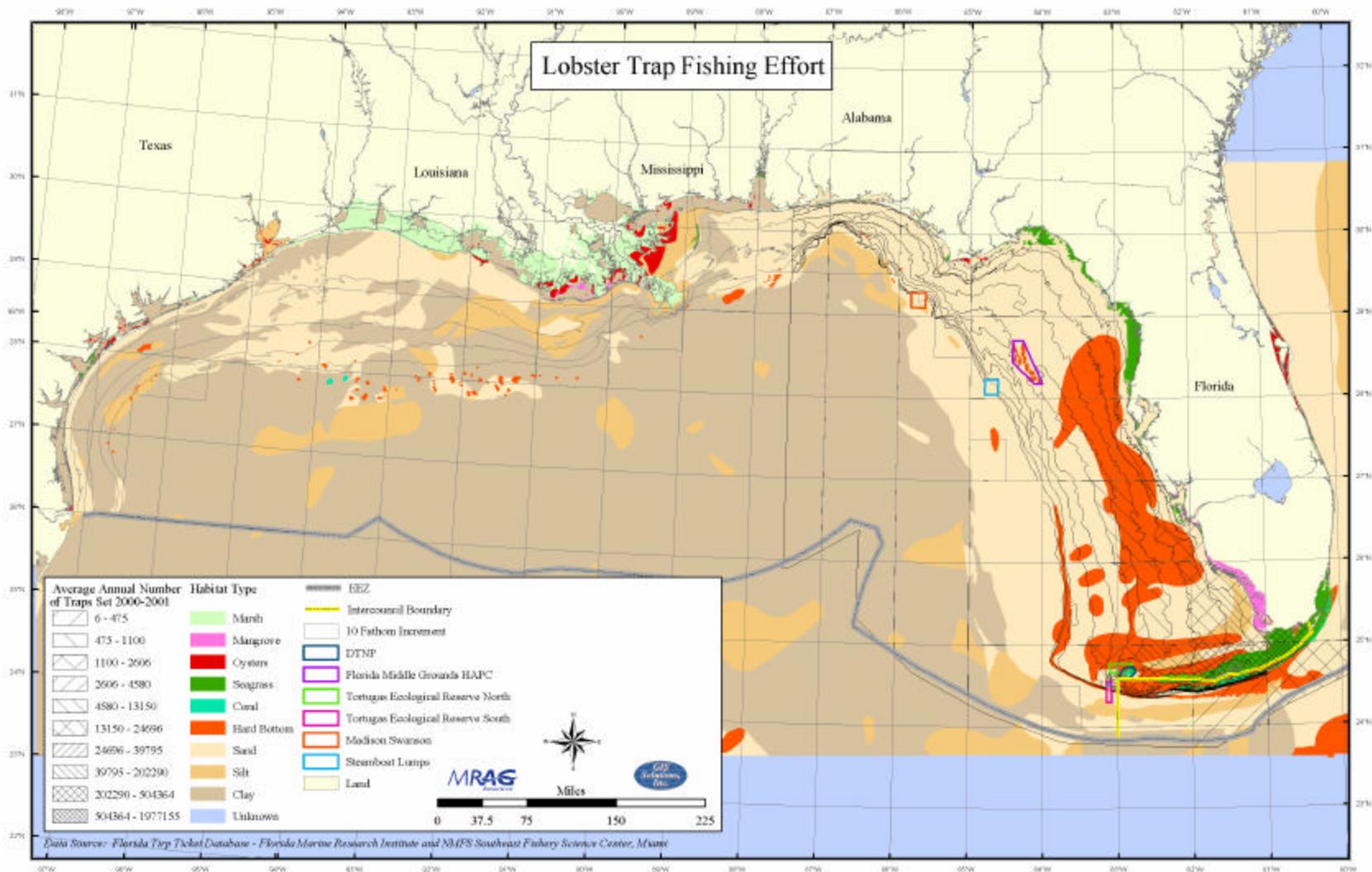


Figure 3.3.10. Lobster trap fishing effort.
Average number of traps set in a year, taken from logbook data for 2000-2001.

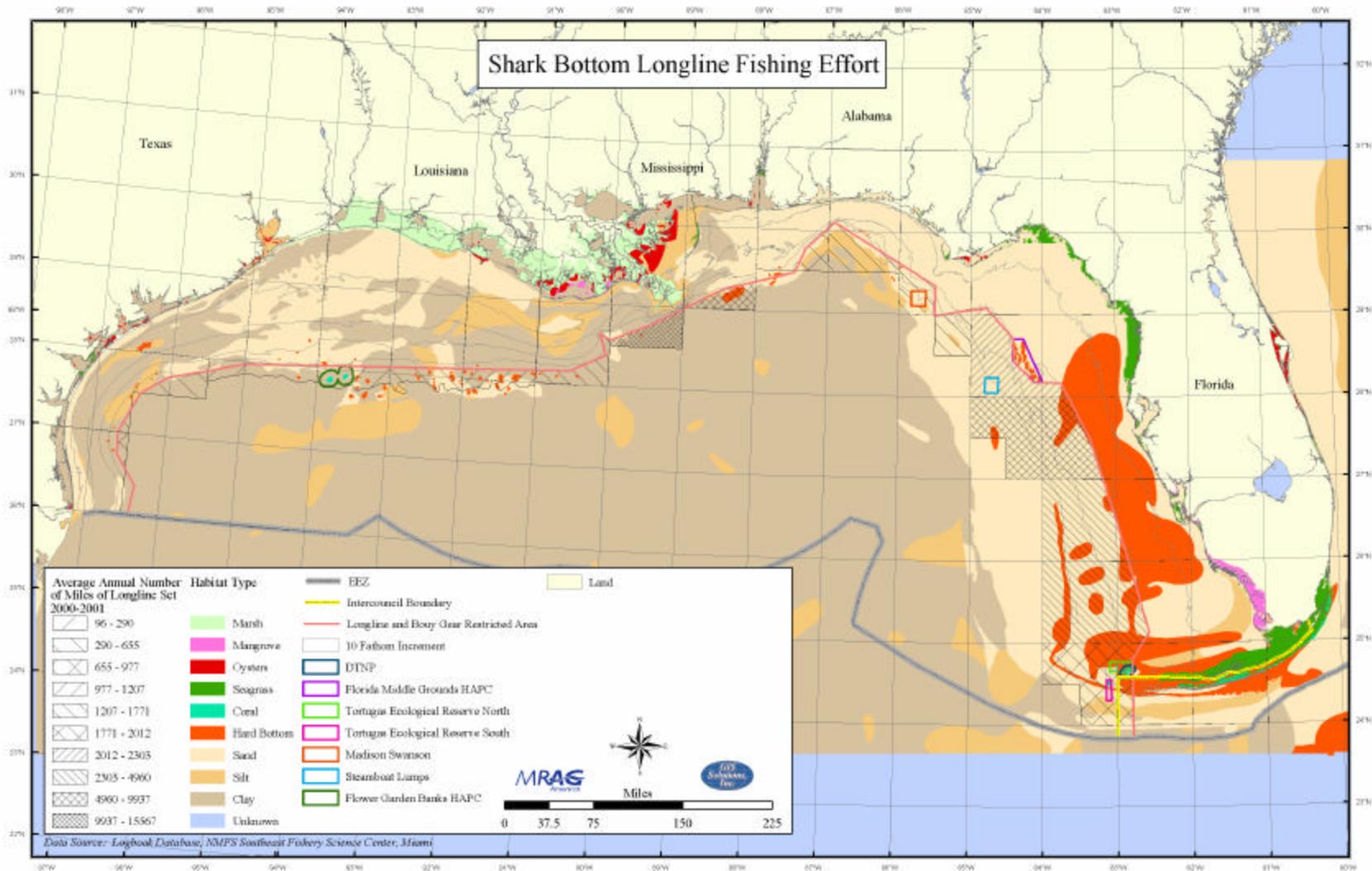


Figure 3.3.11. Shark bottom longline fishing effort. Average number of miles of line set in a year, taken from logbook data for 2000-2001.

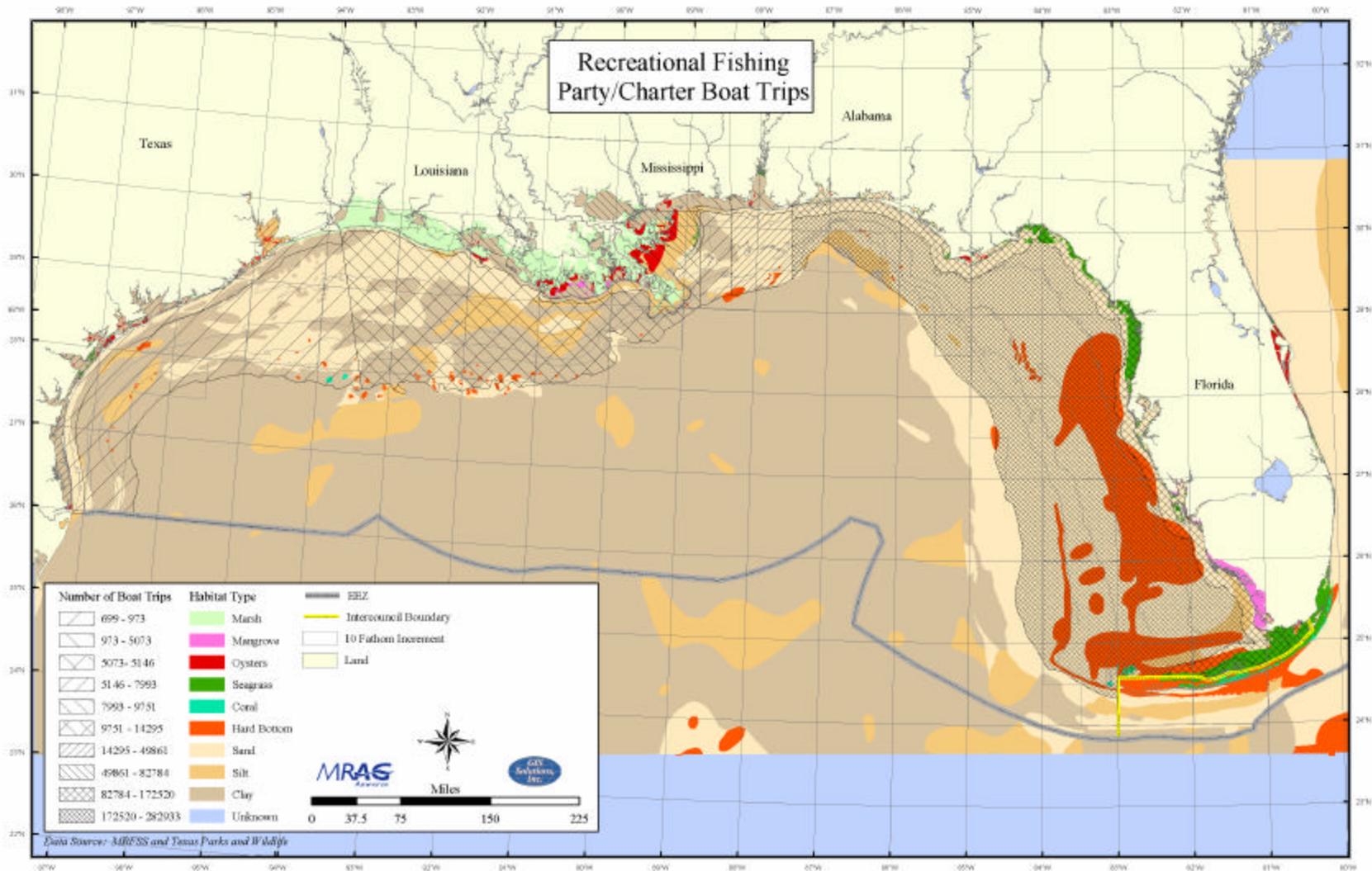


Figure 3.3.12. Recreational fishing on party/charter boats.
Average number of boat trips, from MRFSS and Texas Parks and Wildlife Department data for 2000-2001.

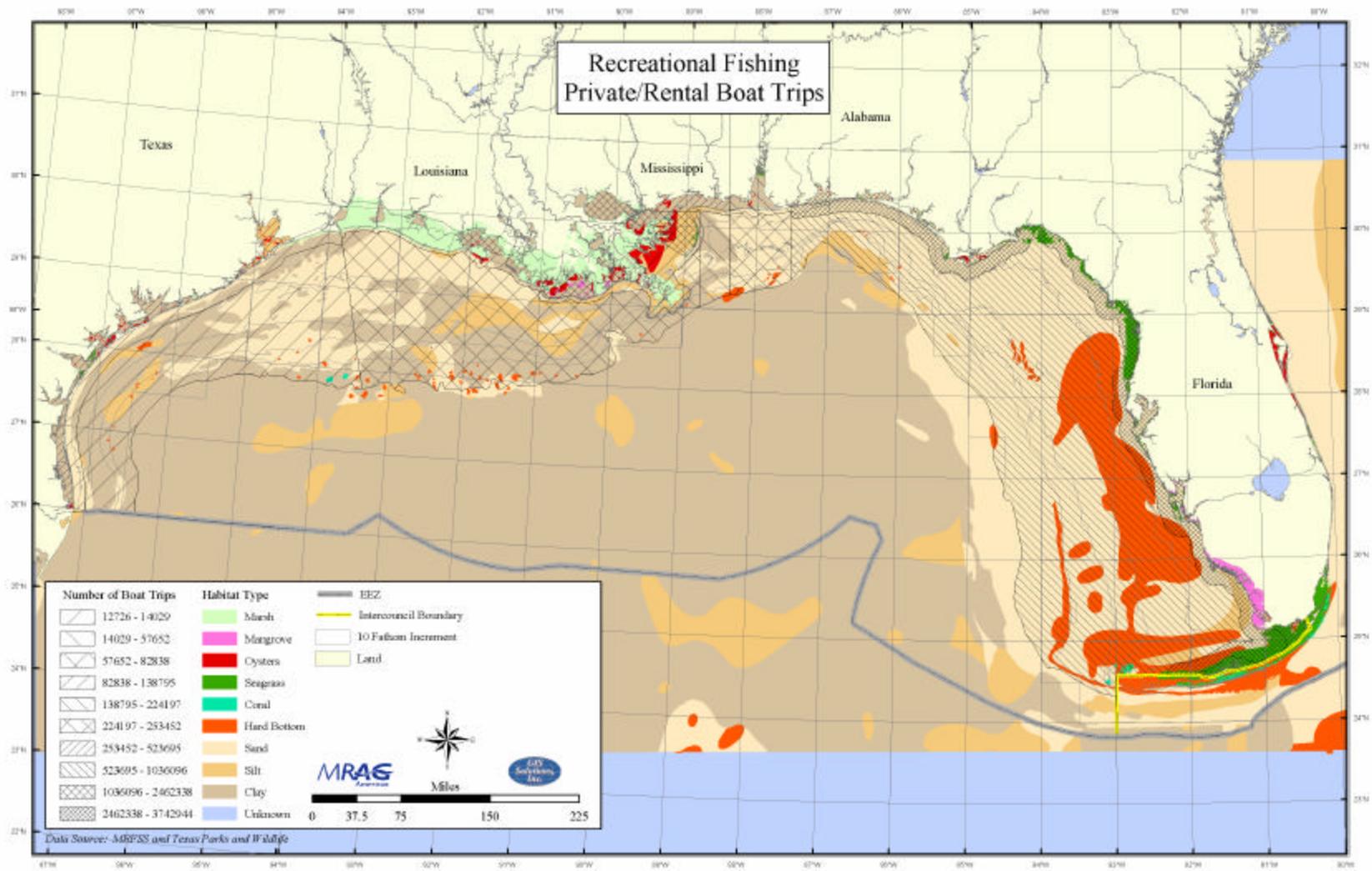


Figure 3.3.13. Recreational fishing on private/rental boats.
Average number of boat trips, from MRFSS and Texas Parks and Wildlife data for 2000-2001.

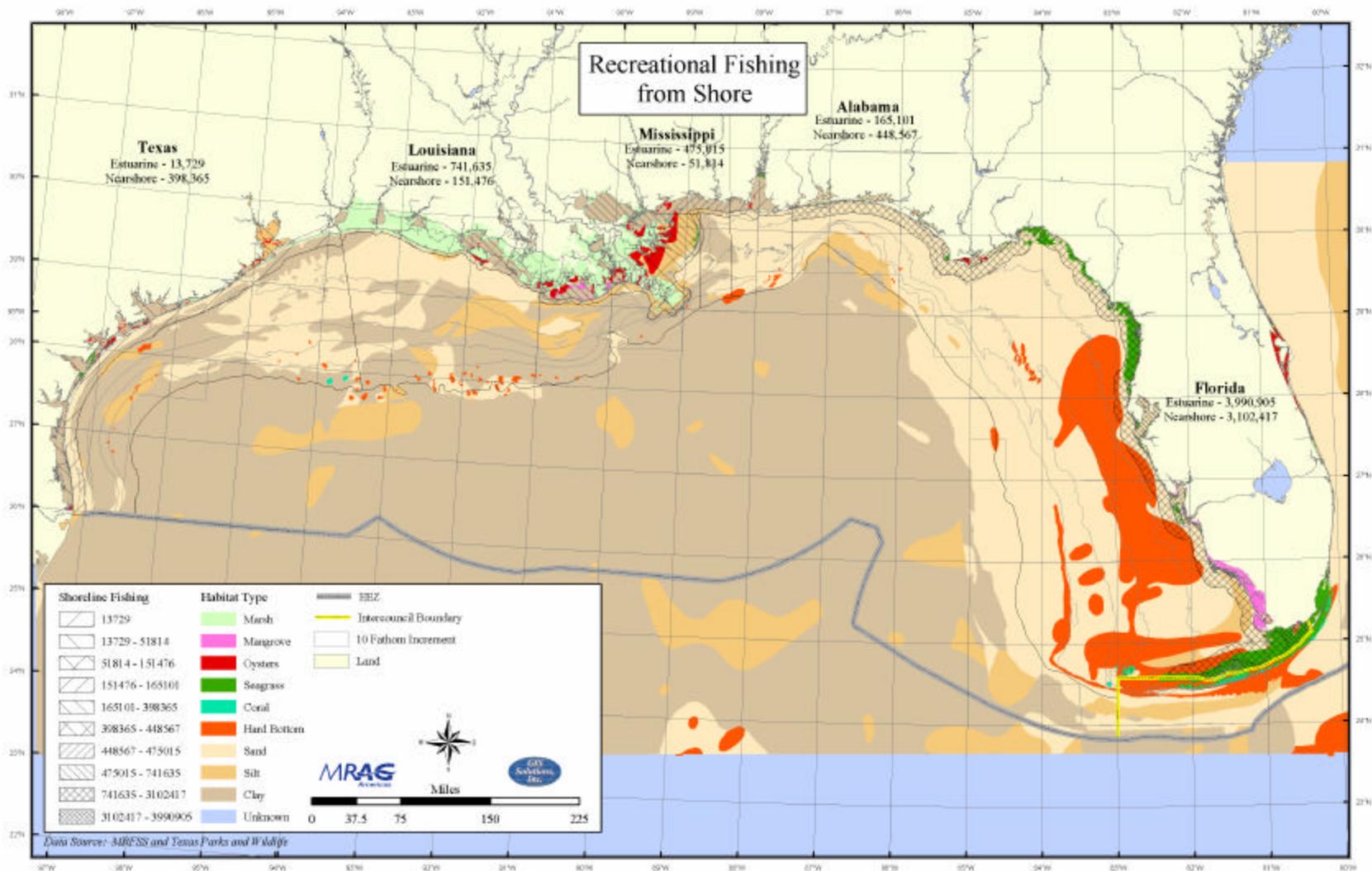


Figure 3.3.14. Recreational fishing from shore.
Average number of fishing trips, from MRFSS and Texas Parks and Wildlife data for 2000-2001.

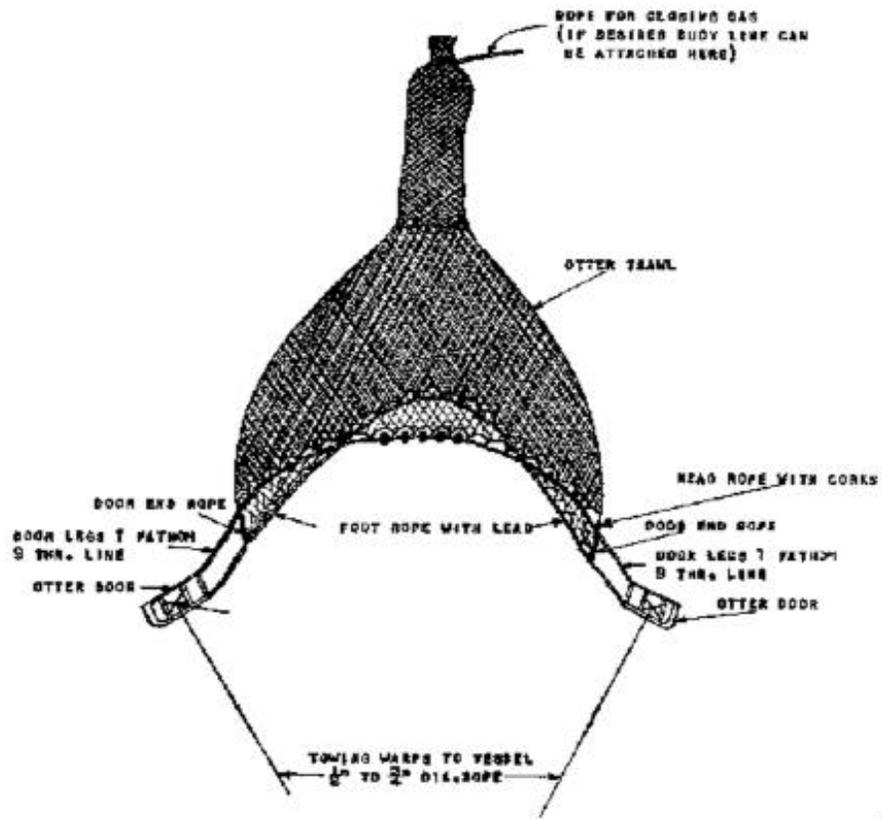


Figure 3.5.1. Schematic otter trawl gear (From Barnette 2001).

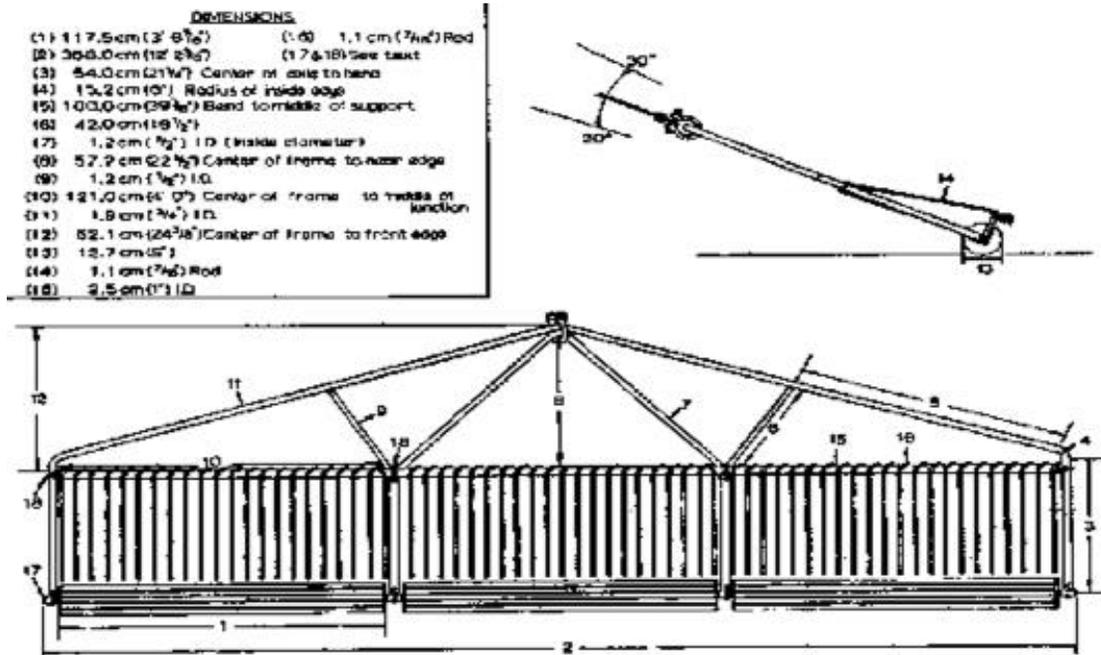
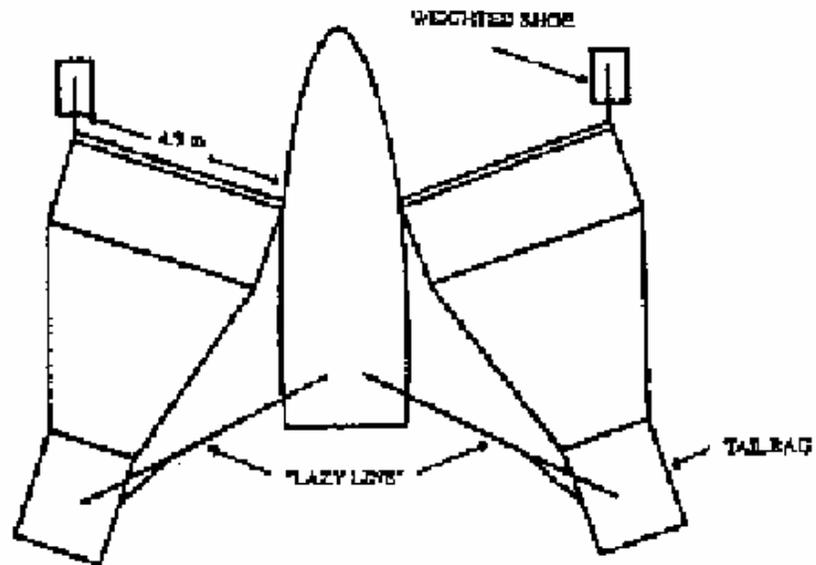
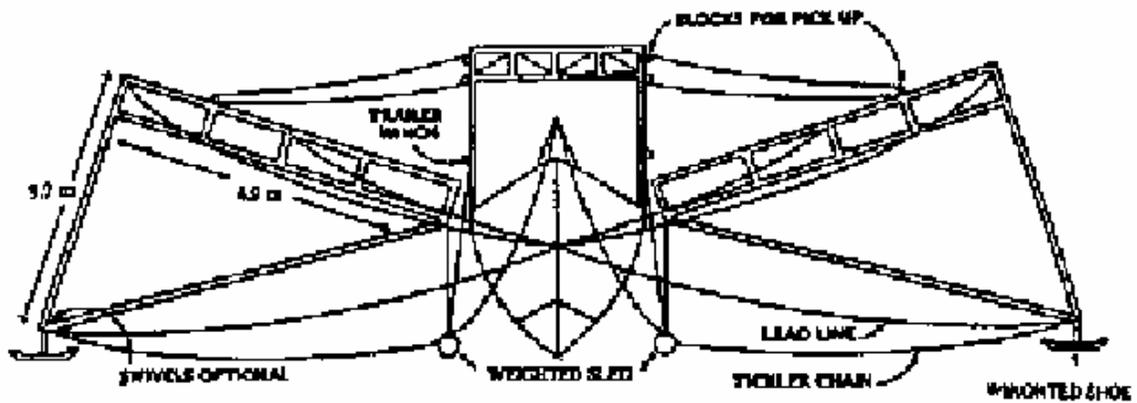


Figure 3.5.2. Schematic frame trawl gear (From Barnette 2001).

TOP VIEW



HORIZONTAL ARMS
MAY BE PERPENDICULAR
TO SIDE OF BOAT



FRONT VIEW

Figure 3.5.3. Schematic skimmer trawl gear (From Barnette 2001).

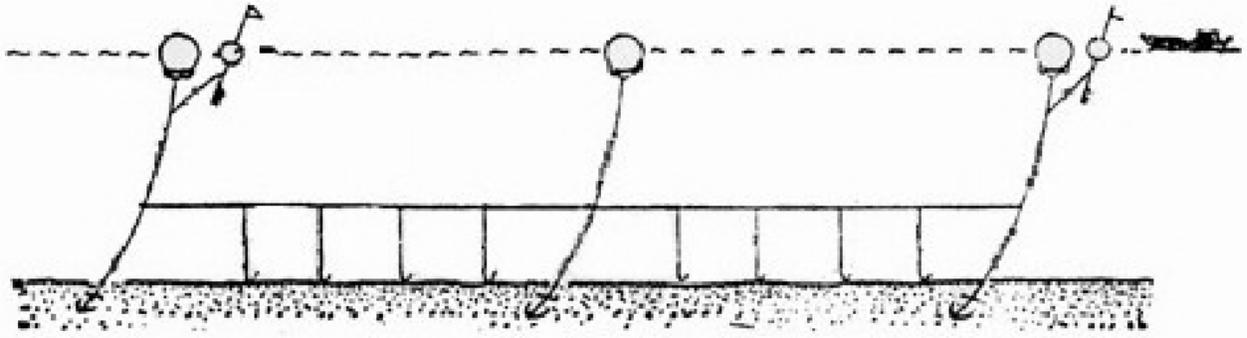


Figure 3.5.4. Schematic bottom longline gear (From Barnette 2001).

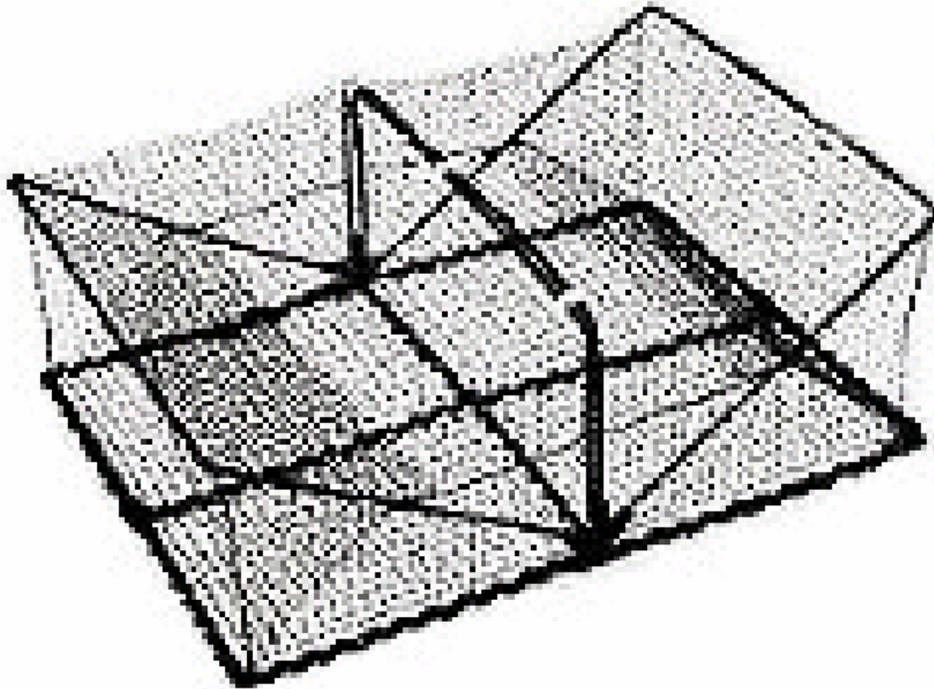


Figure 3.5.5. Schematic fish trap gear (From Barnette 2001).

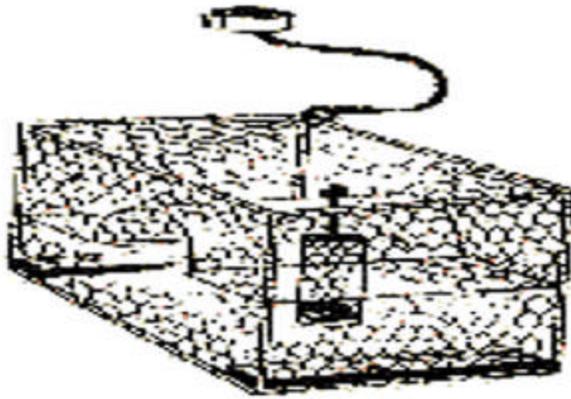


Figure 3.5.6. Schematic crab pot gear (From Barnette 2001).



Figure 3.5.7. Schematic speargun gear (From Barnette 2001).



Figure 3.5.8. Schematic slurp gun gear (From Barnette 2001).



Figure 3.5.9. Schematic oyster dredge gear (From Barnette 2001).

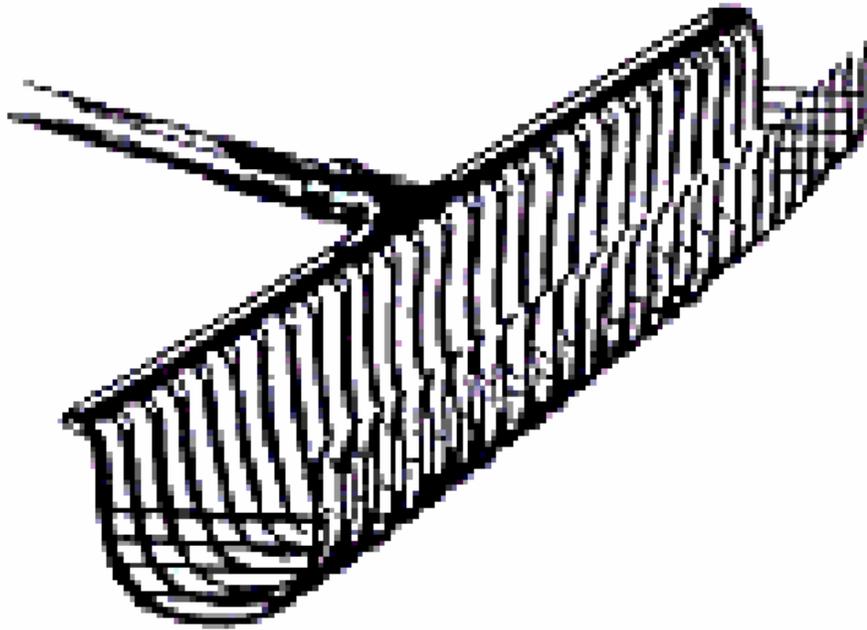


Figure 3.5.10. Schematic bull rake gear (From Barnette 2001).

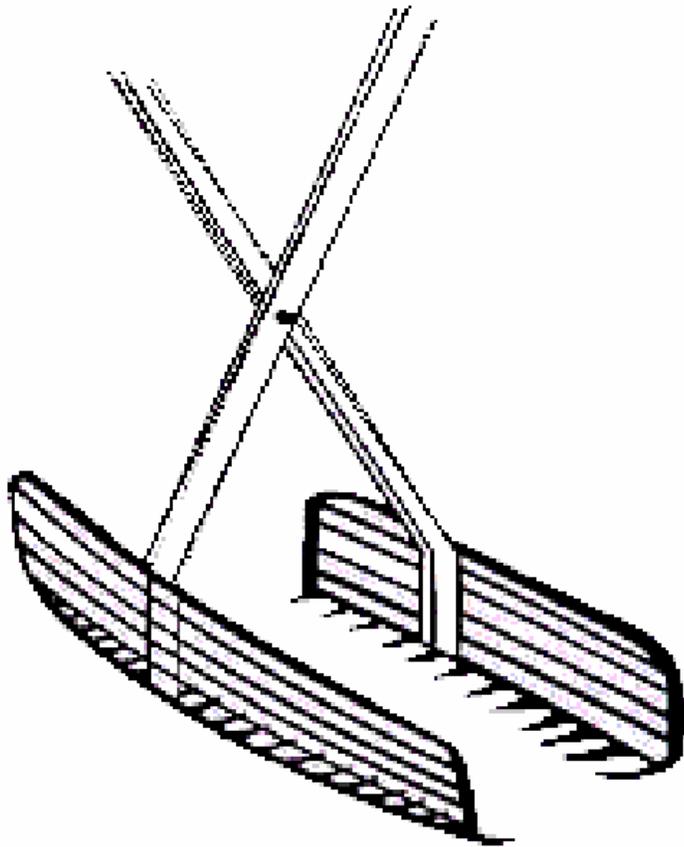


Figure 3.5.11. Schematic oyster tong gear (From Barnette 2001).



Figure 3.5.12. Schematic gillnet gear (From Barnette 2001).

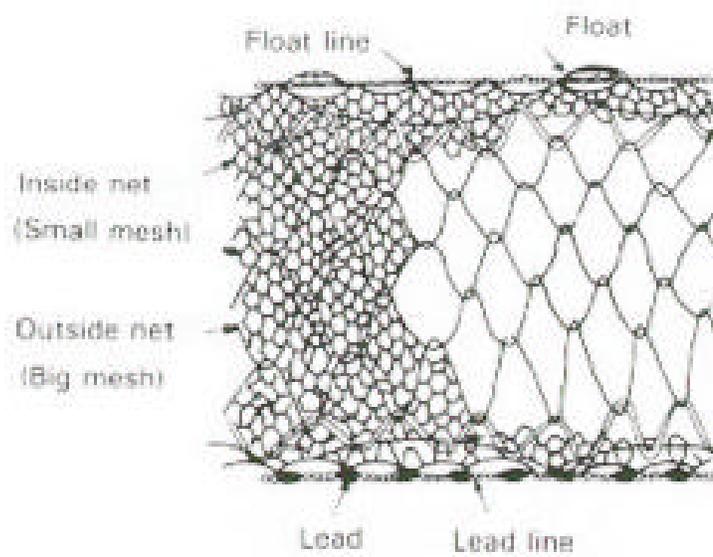


Figure 3.5.13. Schematic trammel net gear.

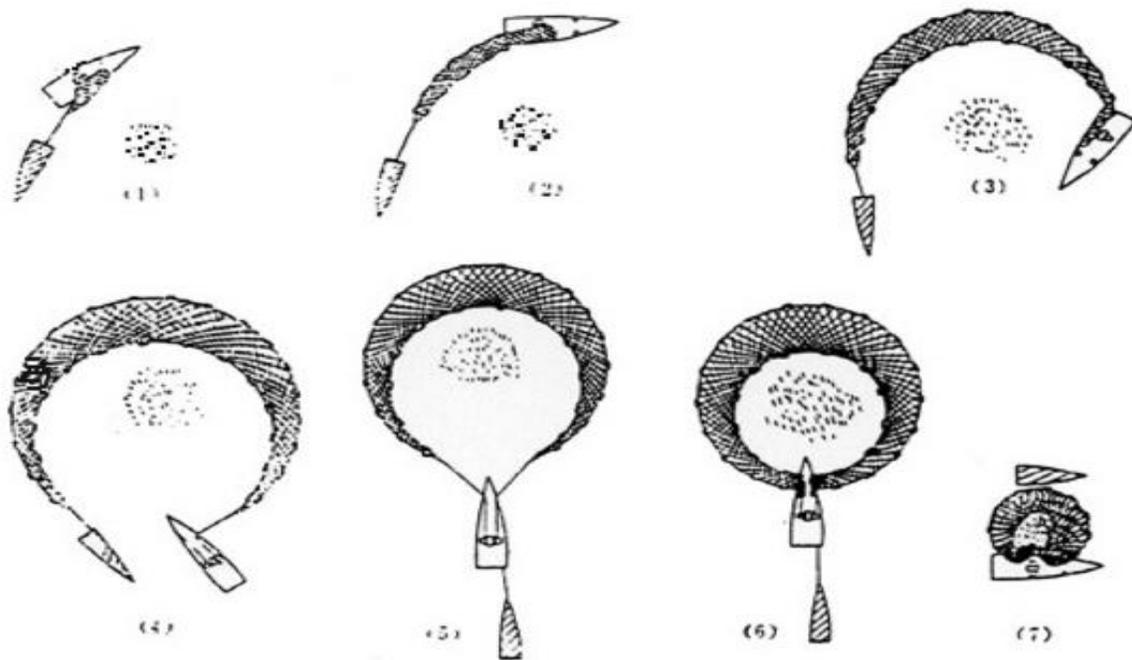


Figure 3.5.14. Schematic purse seine gear (From Barnette 2001).

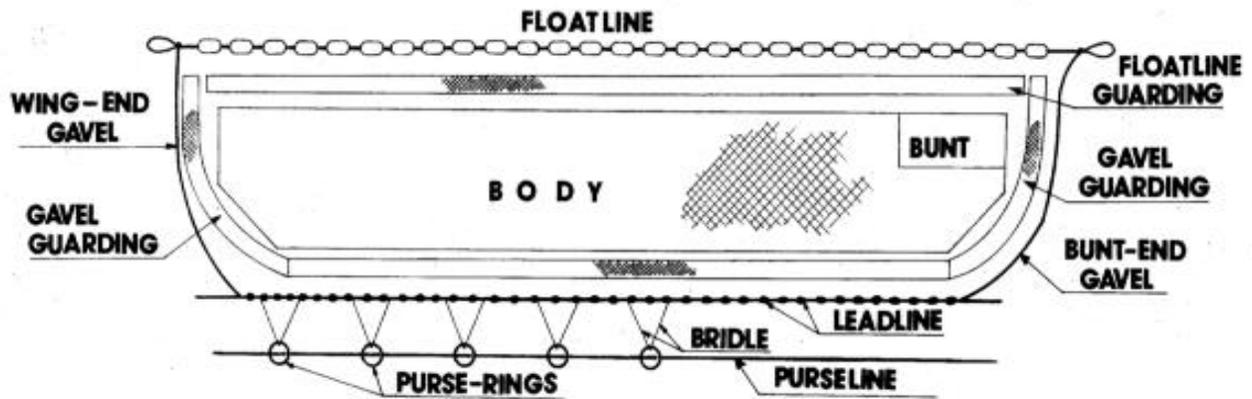


Figure 3.5.15. Schematic components of a purse seine net (From Barnette 2001).

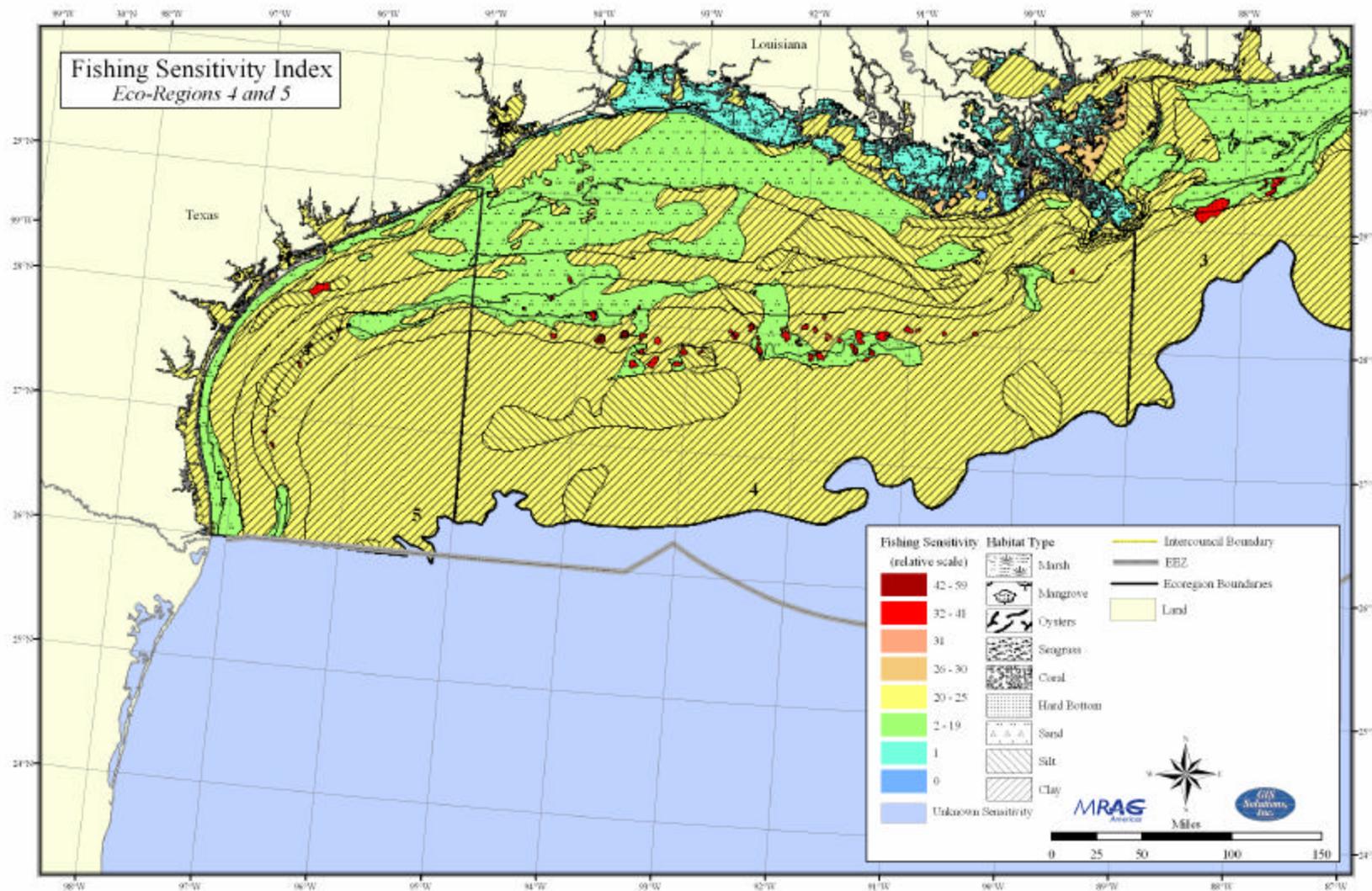


Figure 3.5.16a. Habitat sensitivity to all fishing gears in the West Gulf of Mexico. (Higher sensitivity numbers indicate greater vulnerability to overall fishing impacts)

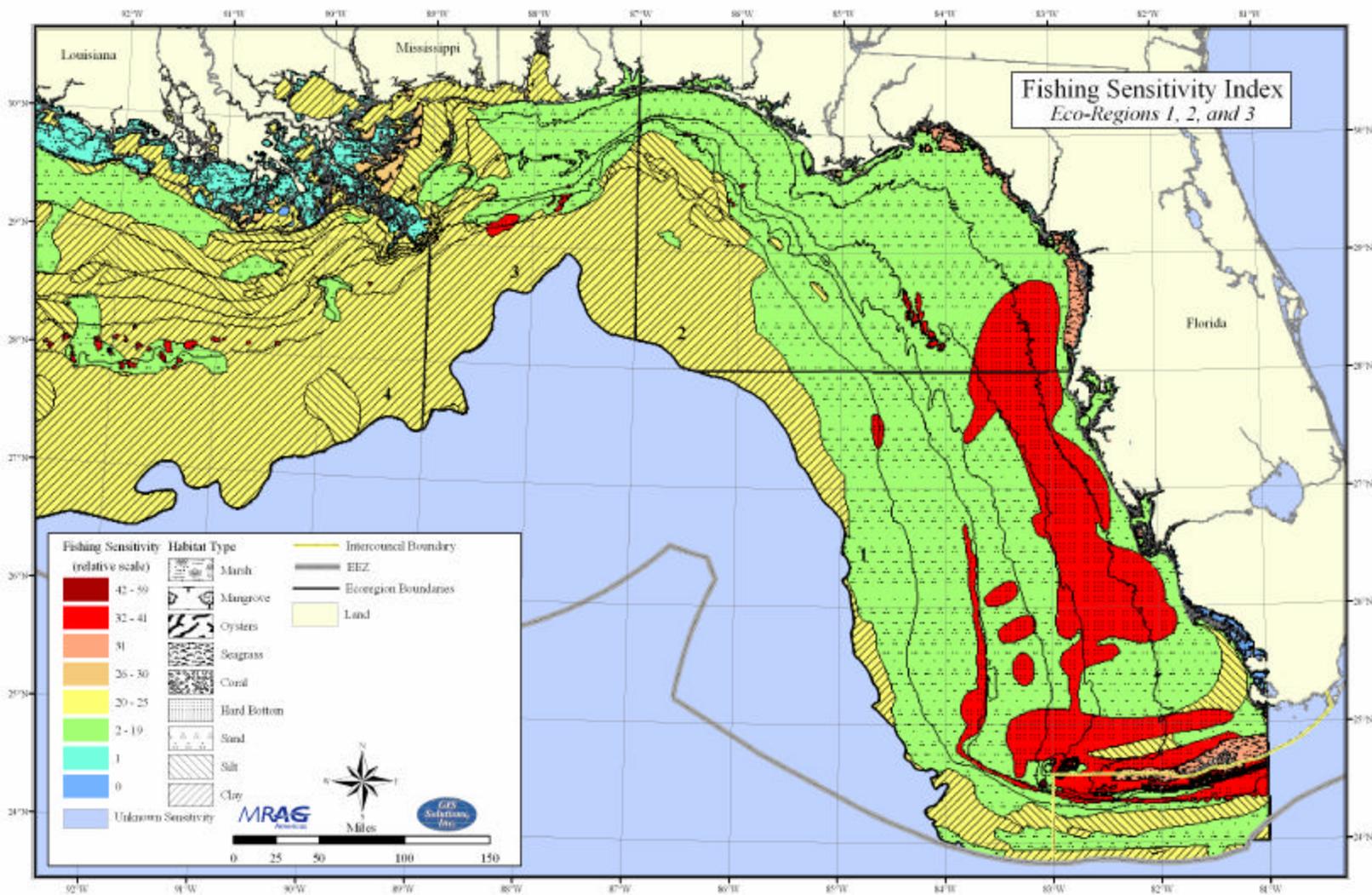


Figure 3.5.16b. Habitat sensitivity to all fishing gears in the East Gulf of Mexico (higher sensitivity numbers indicate greater vulnerability to overall fishing impacts). The large area designated as hard bottom off Florida from Crystal River south to the Keys is a mosaic of hard bottom and sand/shell habitat, but it has been classified as hard bottom for the purposes of mapping (see Fig. 3.1.3). Sandy patches within this area would have a fishing sensitivity index the same as other sandy areas at the same depth.

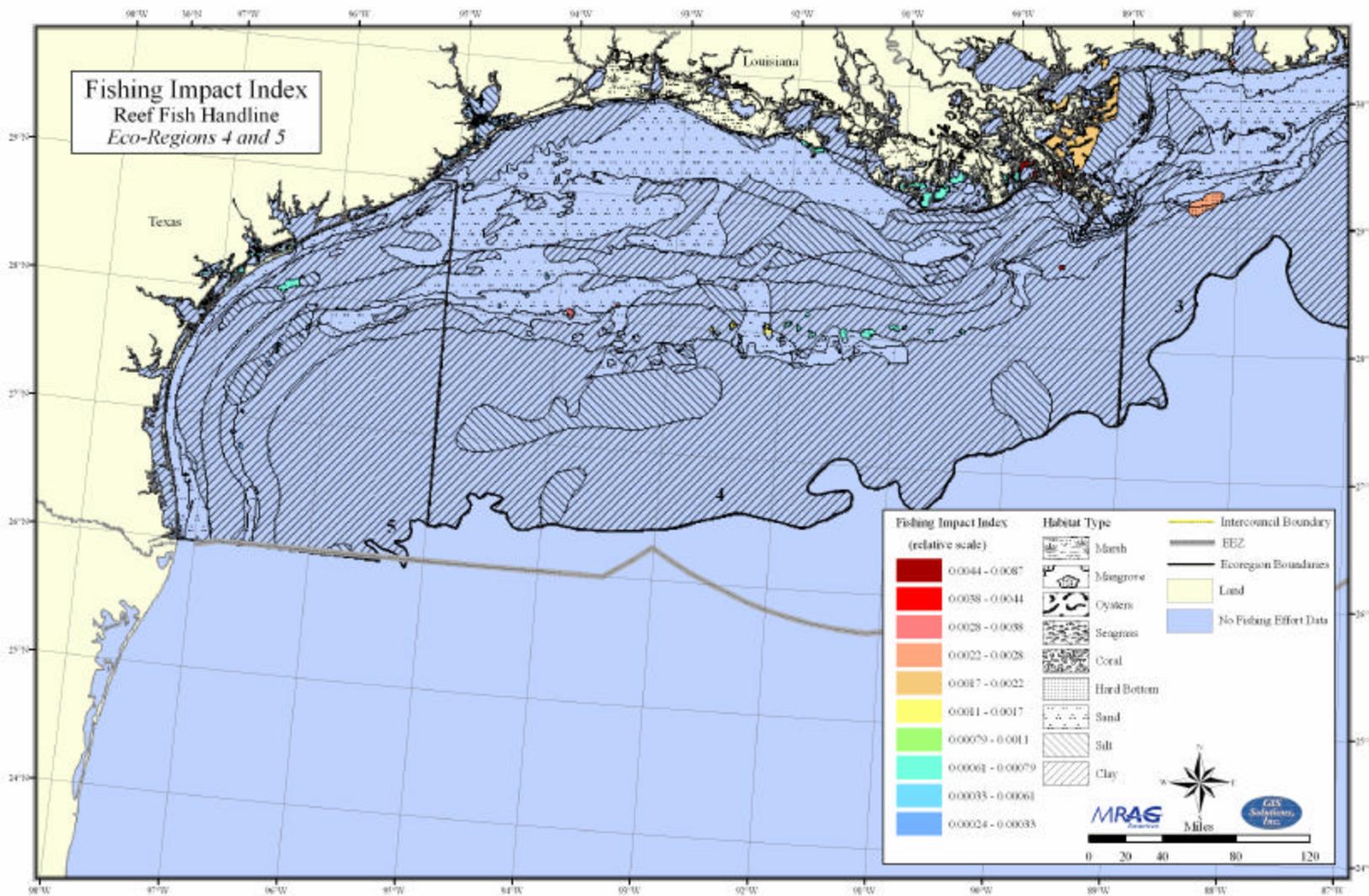


Figure 3.5.17a. Fishing impact index for reef fish handline gear in the West Gulf of Mexico. (Higher index numbers indicate a higher risk of impacts from reef fish handline fishing)

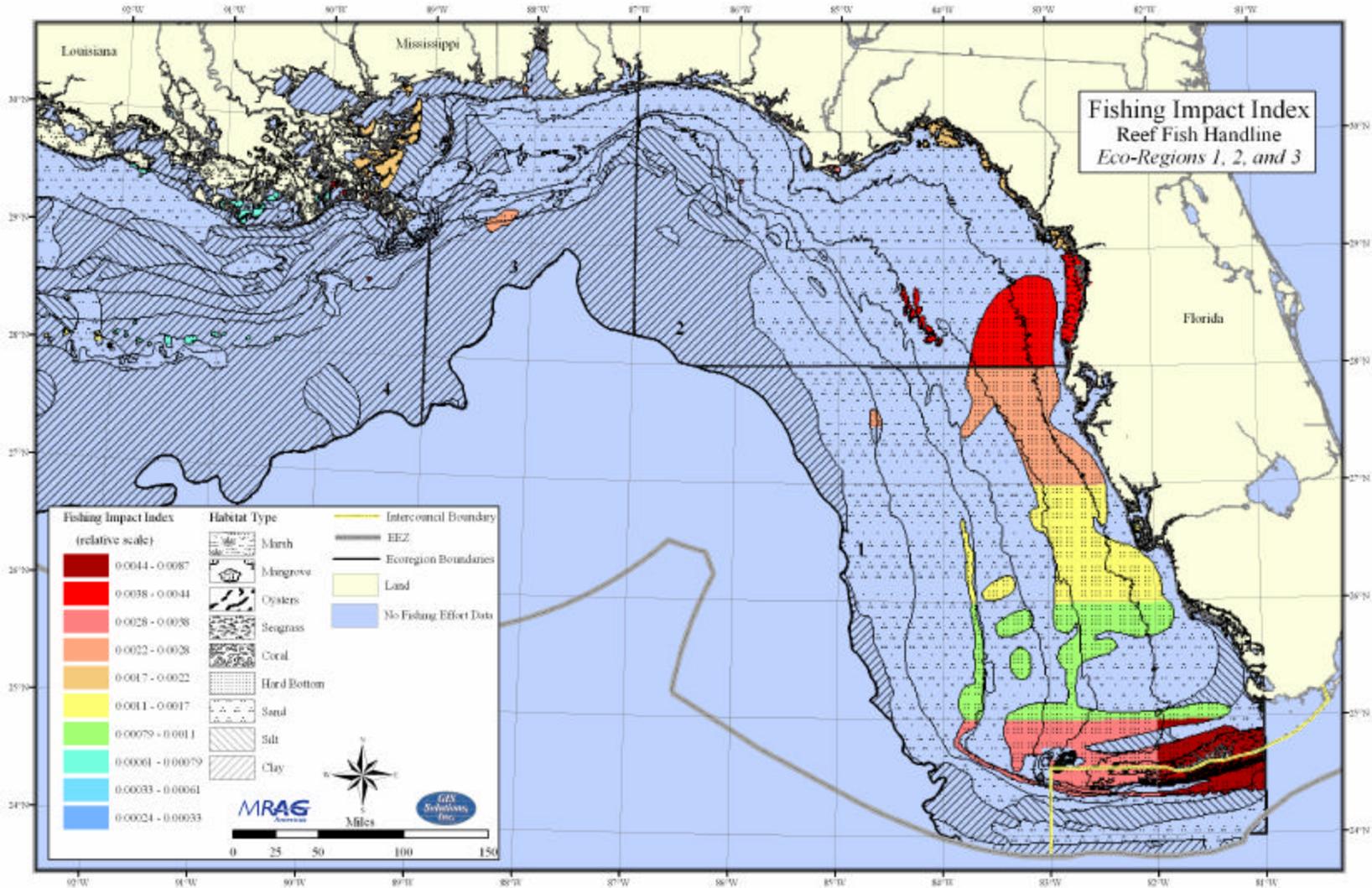


Figure 3.5.17b. Fishing impact index for reef fish handline gear in the East Gulf of Mexico (higher index numbers indicate a higher risk of impacts from reef fish handline fishing). The large area designated as hard bottom off Florida from Crystal River south to the Keys is a mosaic of hard bottom and sand/shell habitat, but it has been classified as hard bottom for the purposes of mapping (see Fig. 3.1.3). Sandy patches within this area would have a fishing impact index the same as other sandy areas within the same statistical grid.

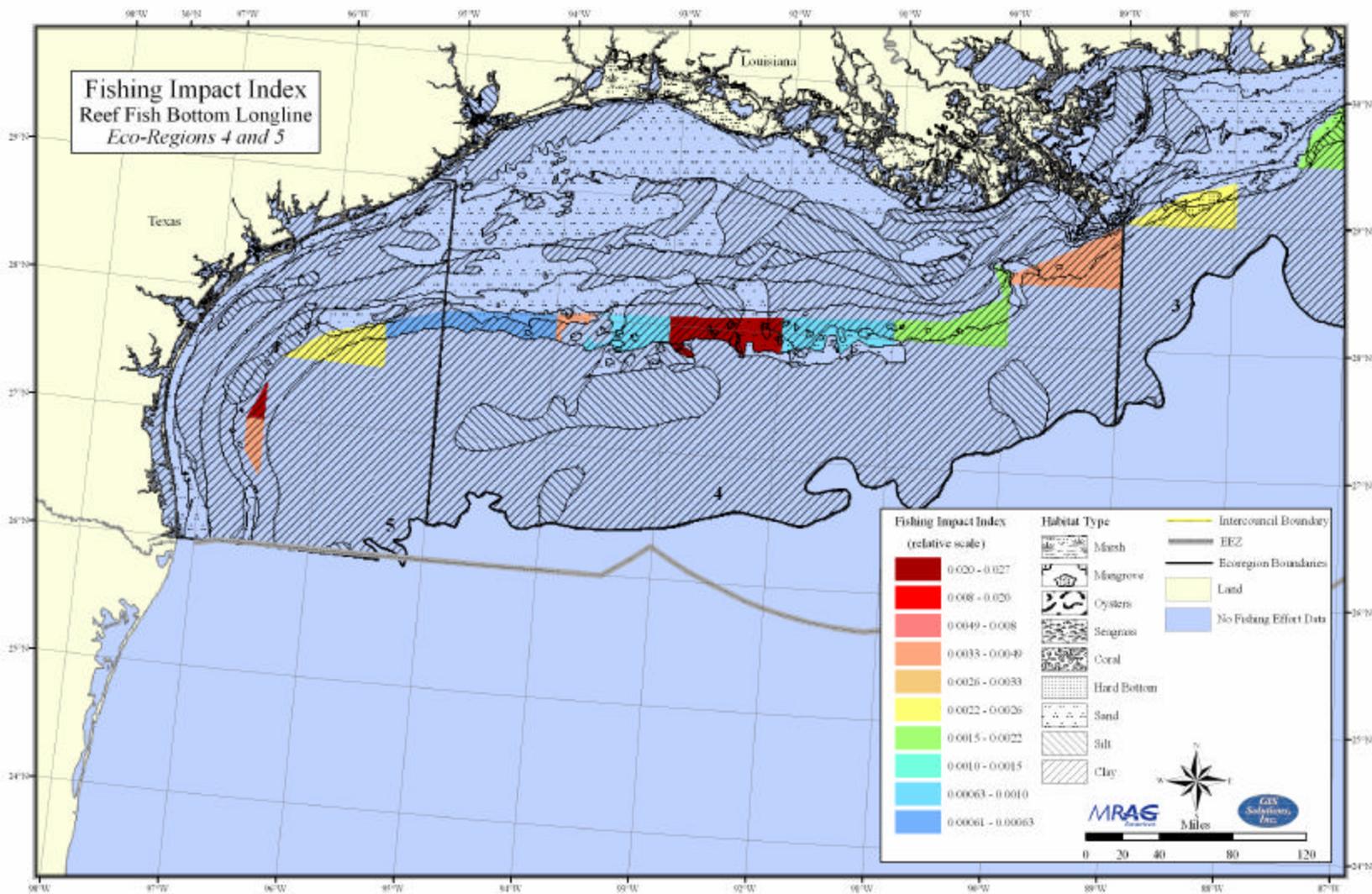


Figure 3.5.18a. Fishing impact index for reef fish bottom longline gear in the West Gulf of Mexico (higher index numbers indicate a higher risk of impacts from reef fish bottom longline fishing).

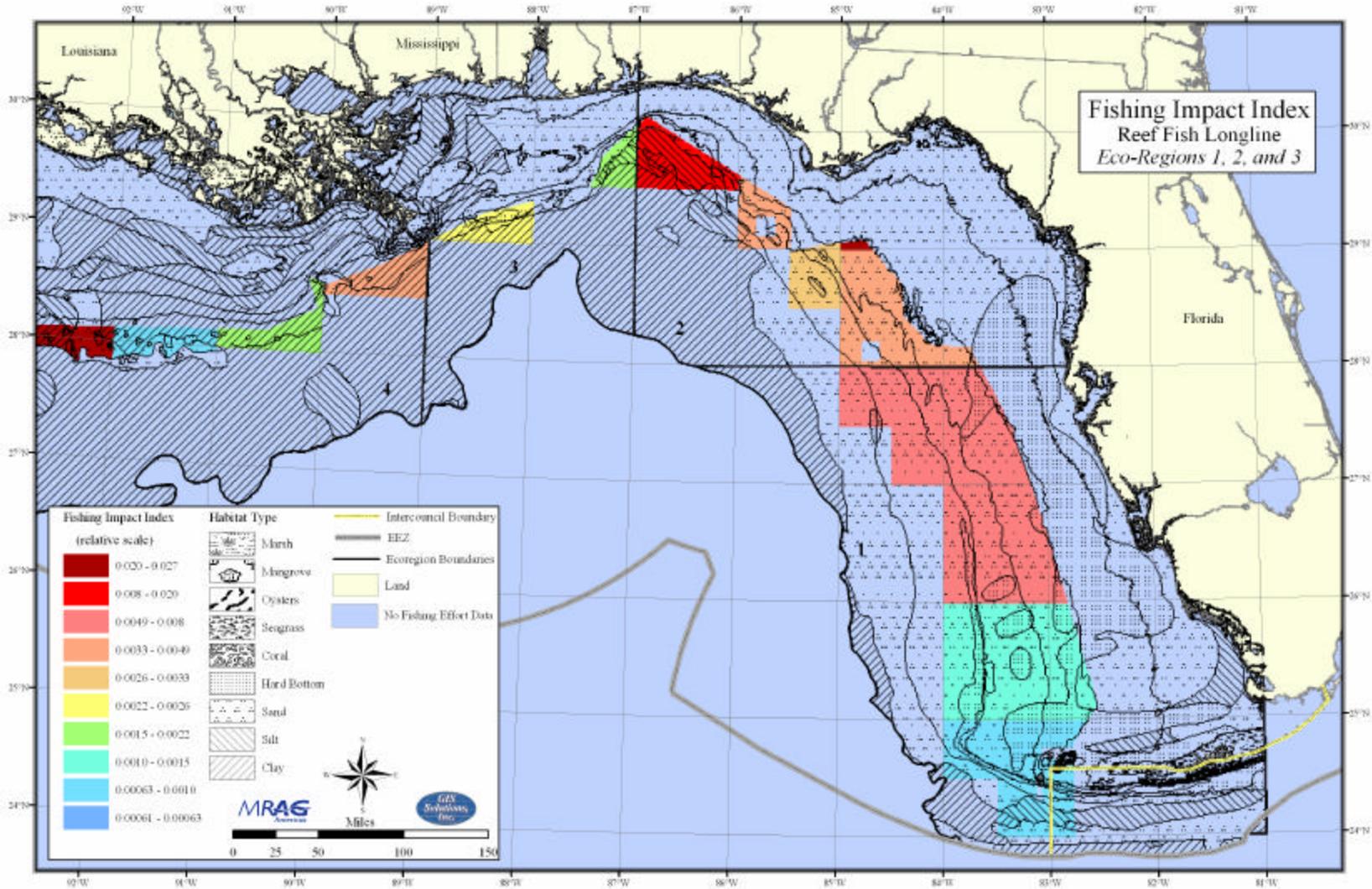


Figure 3.5.18b. Fishing impact index for reef fish bottom longline gear in the East Gulf of Mexico (higher index numbers indicate a higher risk of impacts from reef fish bottom longline fishing).

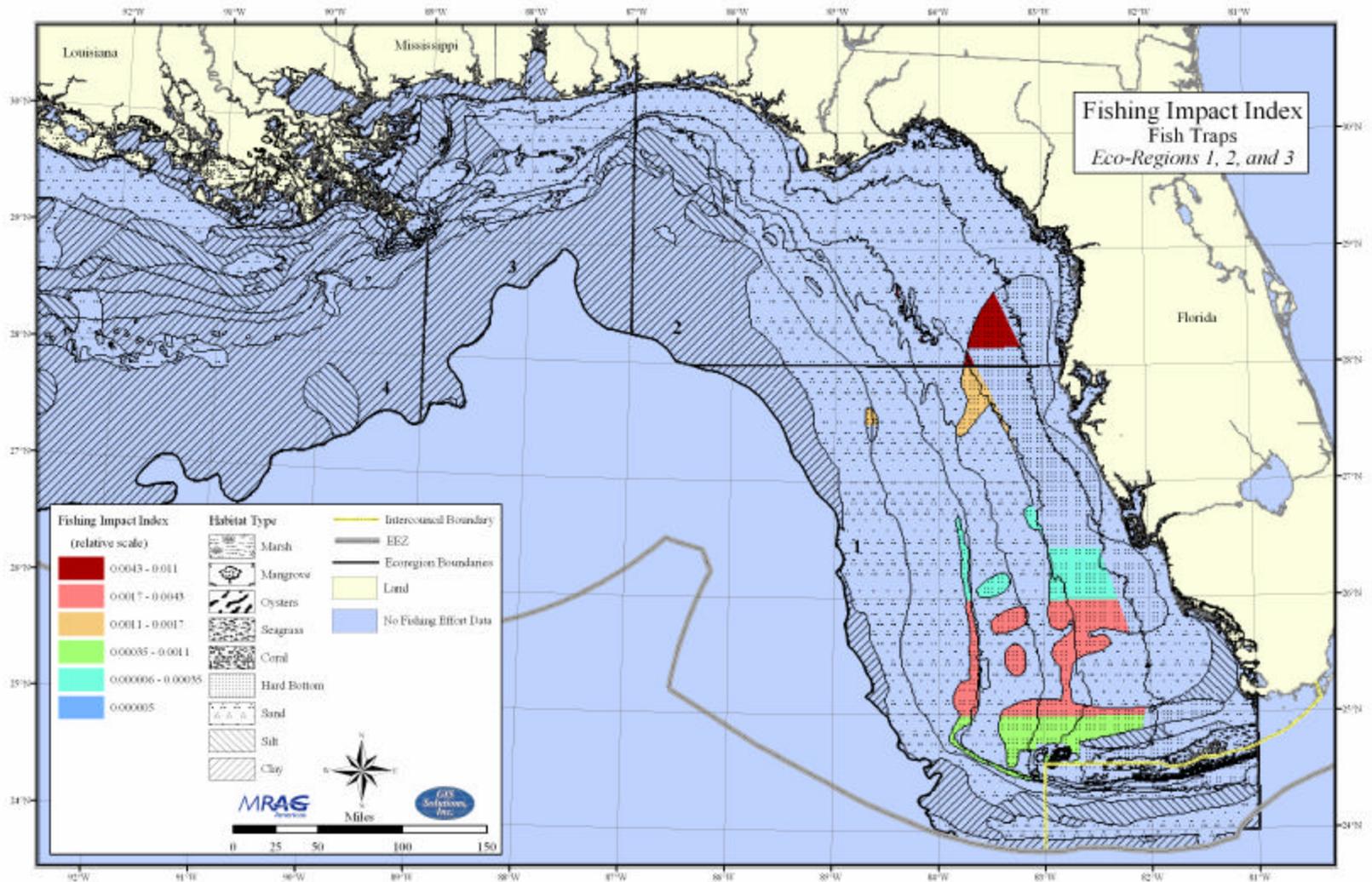


Figure 3.5.19. Fishing impact index for fish traps in the Gulf of Mexico

(higher index numbers indicate a higher risk of impacts from fish trap fishing). The large area designated as hard bottom off Florida extending from Crystal River south to the Keys is a mosaic of hard bottom and sand/shell habitat, but it has been classified as hard bottom for the purposes of mapping (see Fig. 3.1.3). Sandy patches within this area would have a fishing impact index the same as other sandy areas within the same statistical grid.

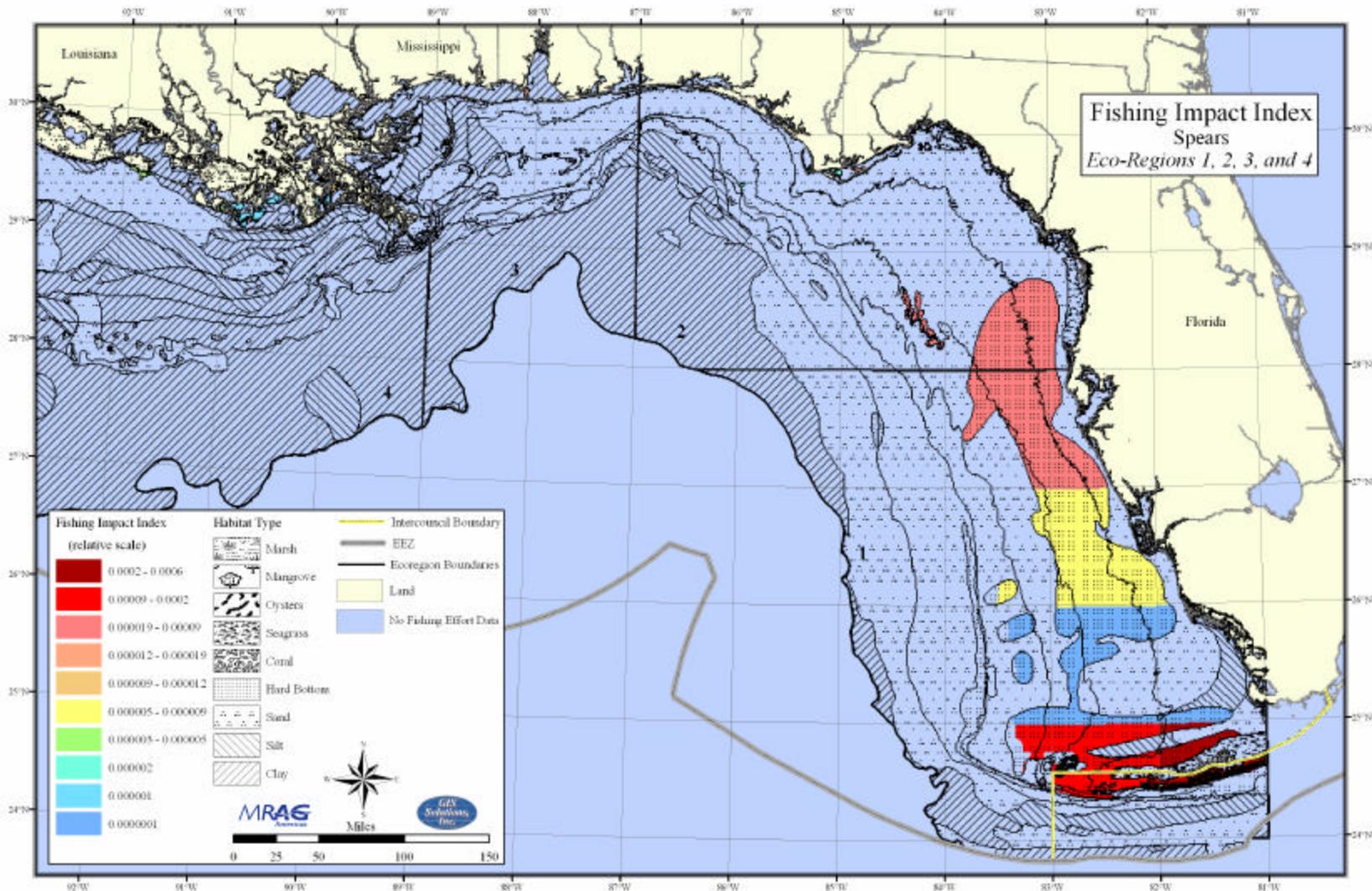


Figure 3.5.20. Fishing impact index for spear fishing gear in the Gulf of Mexico (higher index numbers indicate a higher risk of impacts from spear fishing). The large area designated as hard bottom off Florida extending from Crystal River south to the Keys is a mosaic of hard bottom and sand/shell habitat, but it has been classified as hard bottom for the purposes of mapping (see Fig. 3.1.3). Sandy patches within this area would have a fishing impacts index the same as other sandy areas within the same statistical grid.

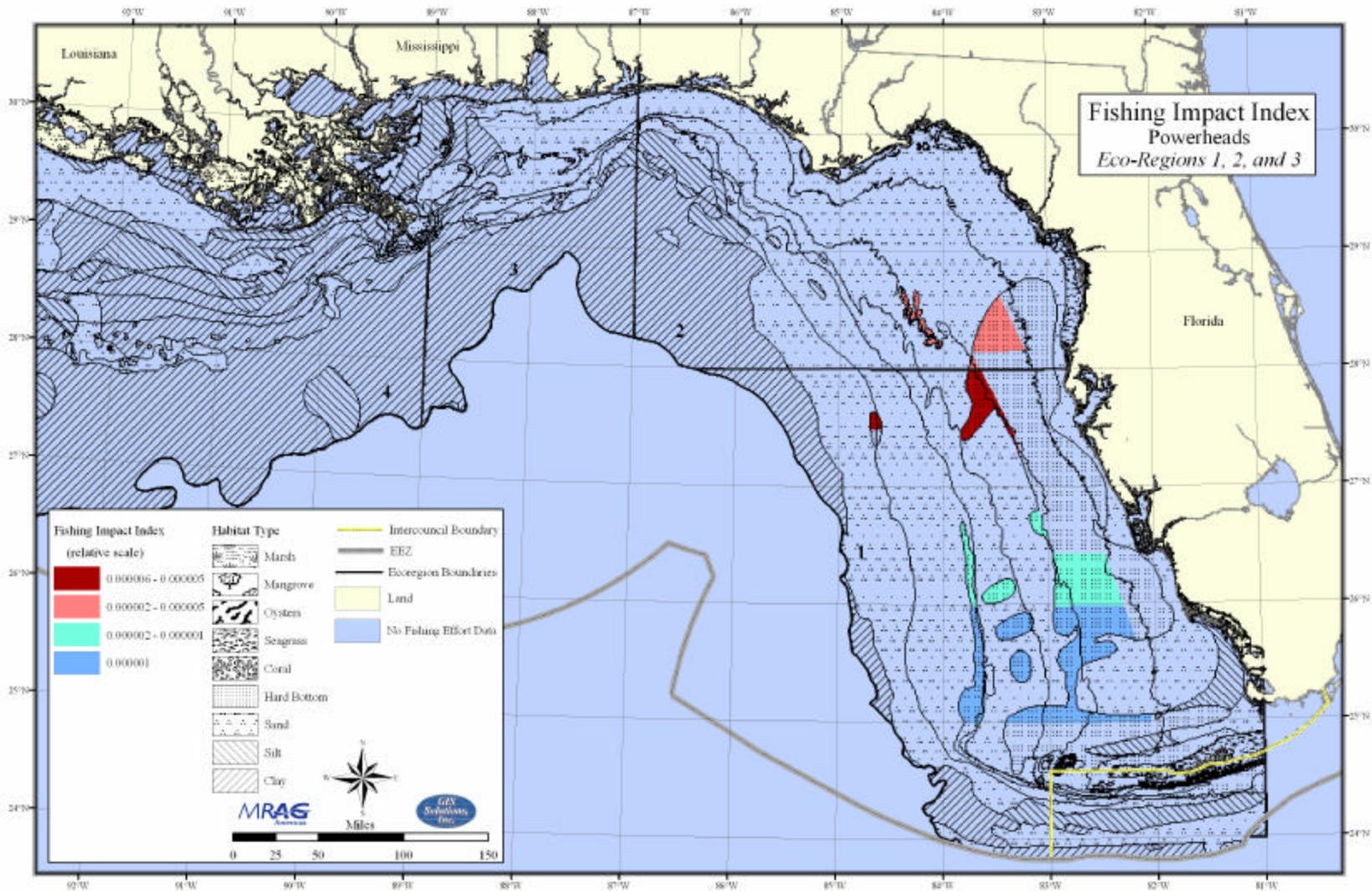


Figure 3.5.21. Fishing impact index for powerhead fishing gear in the Gulf of Mexico (higher index numbers indicate a higher risk of impacts from powerhead fishing). The large area designated as hard bottom off Florida extending from Crystal River south to the Keys is a mosaic of hard bottom and sand/shell habitat, but it has been classified as hard bottom for the purposes of mapping (see Fig. 3.1.3). Sandy patches within this area would have a fishing impacts index the same as other sandy areas within the same statistical grid.

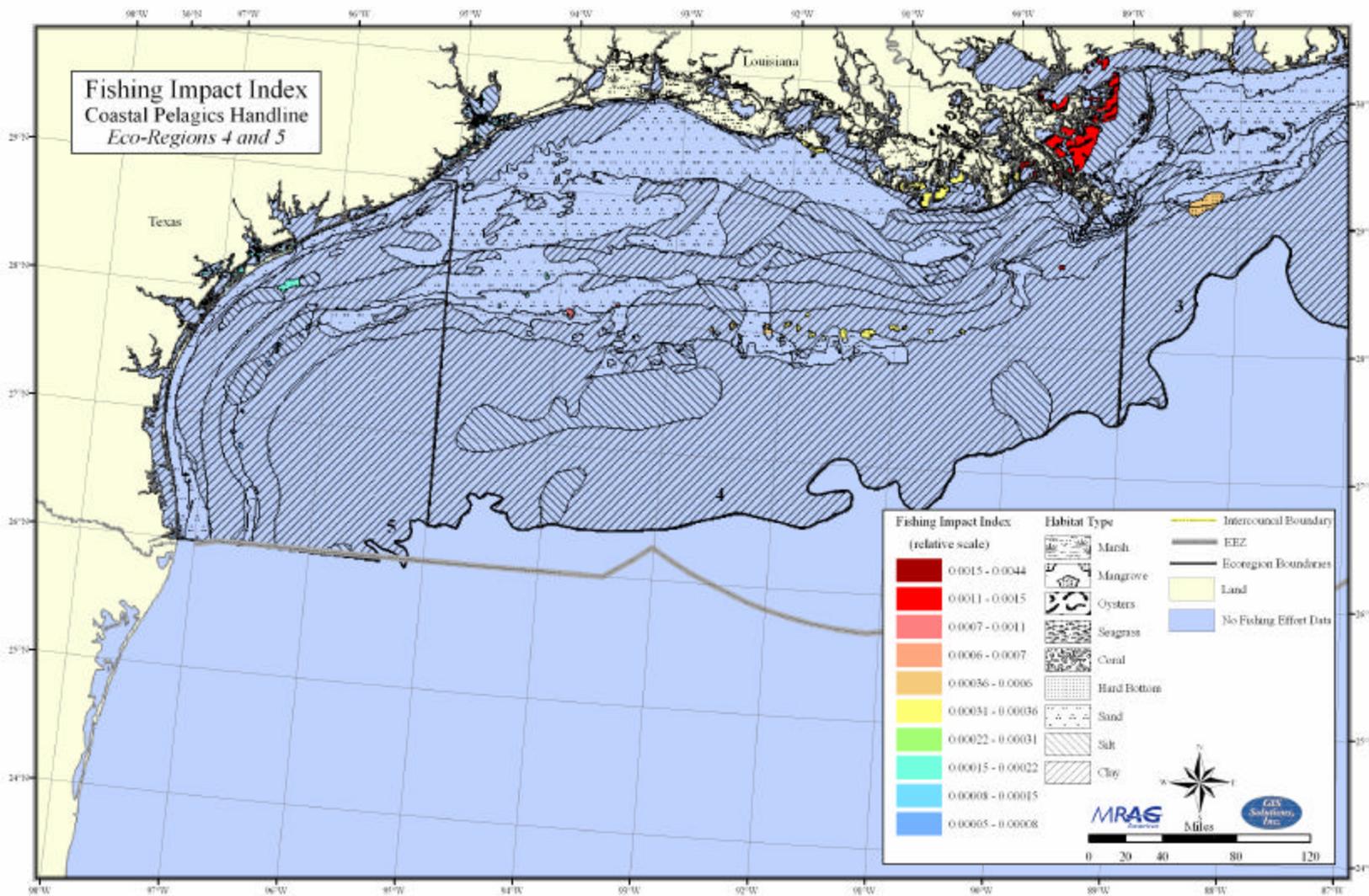


Figure 3.5.22a. Fishing impact index for coastal pelagics handline gear in the West Gulf of Mexico (higher index numbers indicate a higher risk of impacts from coastal pelagics handline fishing).

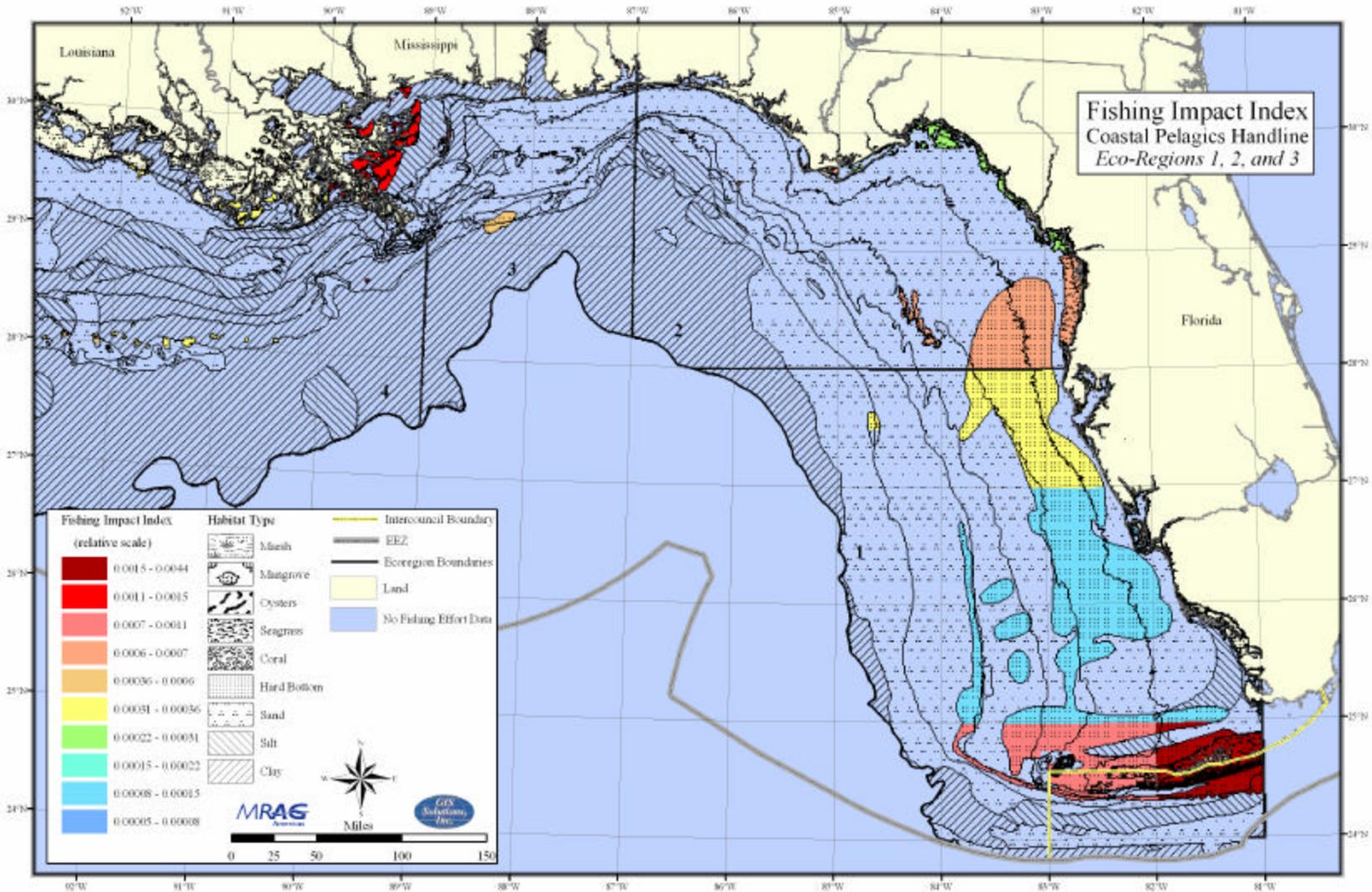


Figure 3.5.22b. Fishing impact index for coastal pelagics handline gear in the East Gulf of Mexico (higher index numbers indicate a higher risk of impacts from coastal pelagics handline fishing). The large area designated as hard bottom off Florida extending from Crystal River south to the Keys is a mosaic of hard bottom and sand/shell habitat, but it has been classified as hard bottom for the purposes of mapping (see Fig. 3.1.3). Sandy patches within this area would have a fishing impacts index the same as other sandy areas within the same statistical grid.

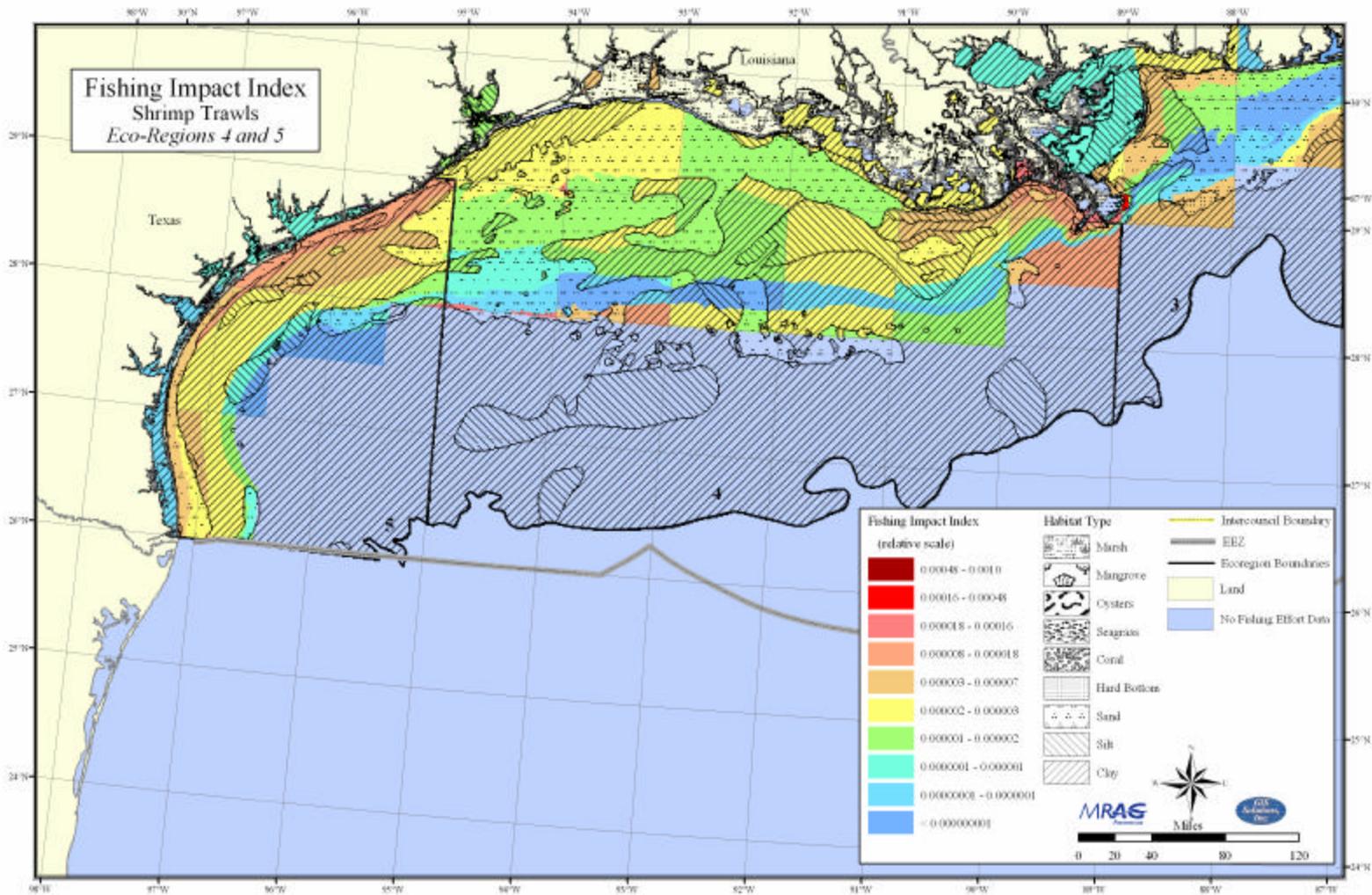


Figure 3.5.23a. Fishing impact index for shrimp trawls in the West Gulf of Mexico (higher index numbers indicate a higher risk of impacts from shrimp trawl fishing).

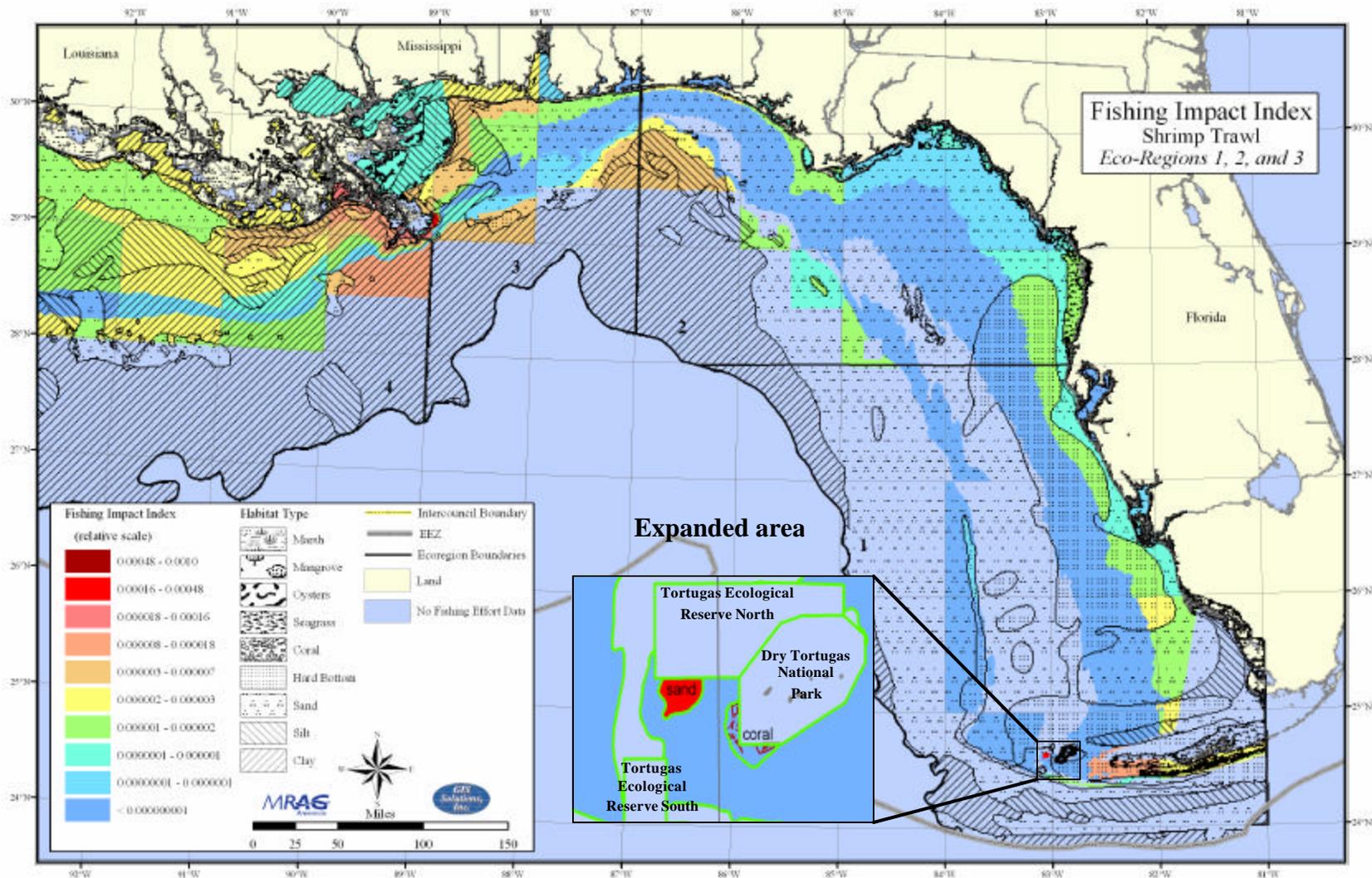


Figure 3.5.23b. Fishing impact index for shrimp trawls in the East Gulf of Mexico (higher index numbers indicate a higher risk of impacts from shrimp trawl fishing). The large area designated as hard bottom off Florida extending from Crystal River south to the Keys is a mosaic of hard bottom and sand/shell habitat, but it has been classified as hard bottom for the purposes of mapping (see Fig. 3.1.3). Sandy patches within this area would have a fishing impacts index the same as other sandy areas within the same statistical grid and at the same depth.

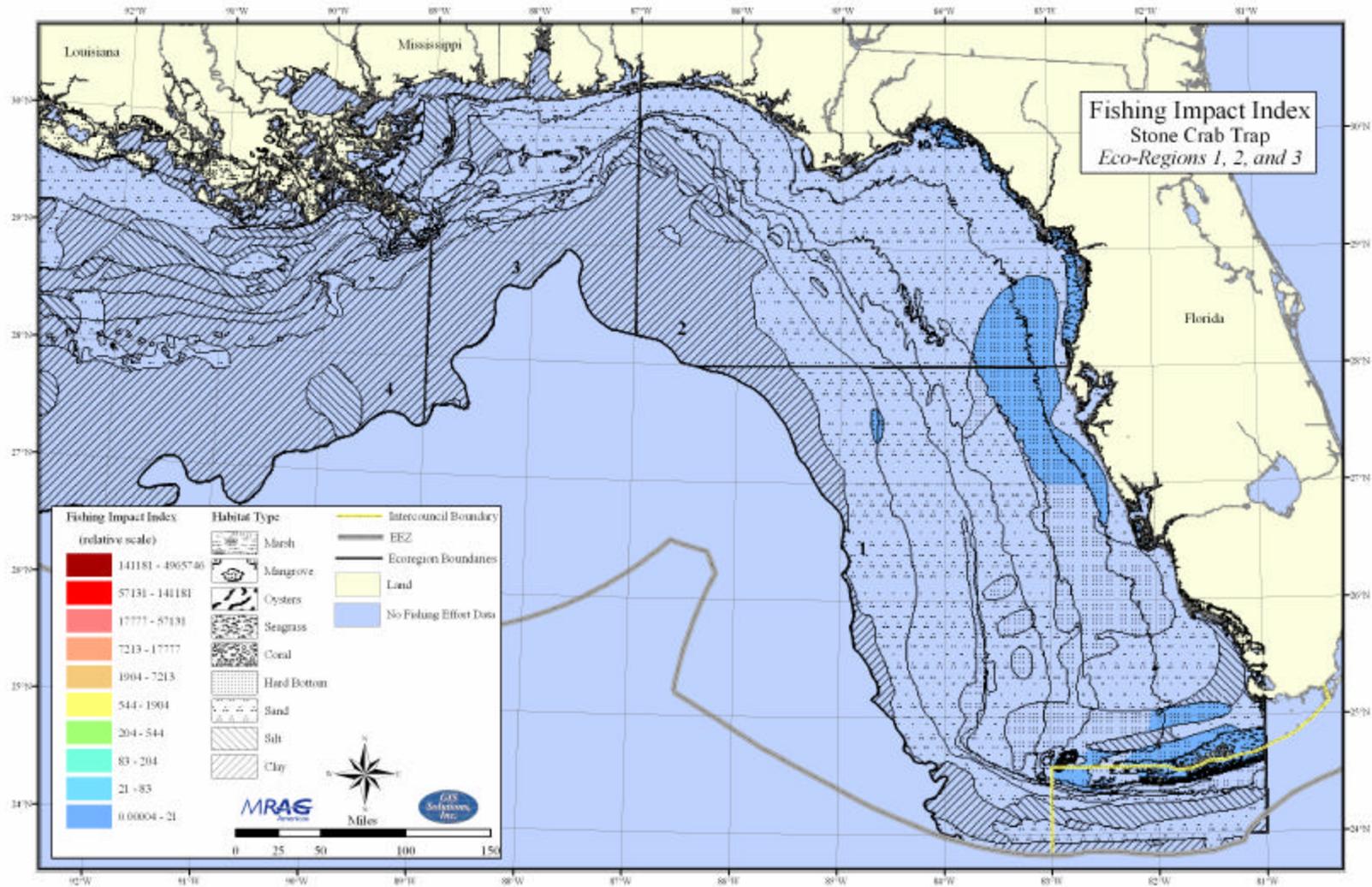


Figure 3.5.24. Fishing impact index for stone crab traps in the Gulf of Mexico (higher index numbers indicate a higher risk of impacts from stone crab trap fishing). The large area designated as hard bottom off Florida extending from Crystal River south to the Keys is a mosaic of hard bottom and sand/shell habitat, but it has been classified as hard bottom for the purposes of mapping (see Fig. 3.1.3). Sandy patches within this area would have a fishing impacts index the same as other sandy areas within the same statistical grid and at the same depth.

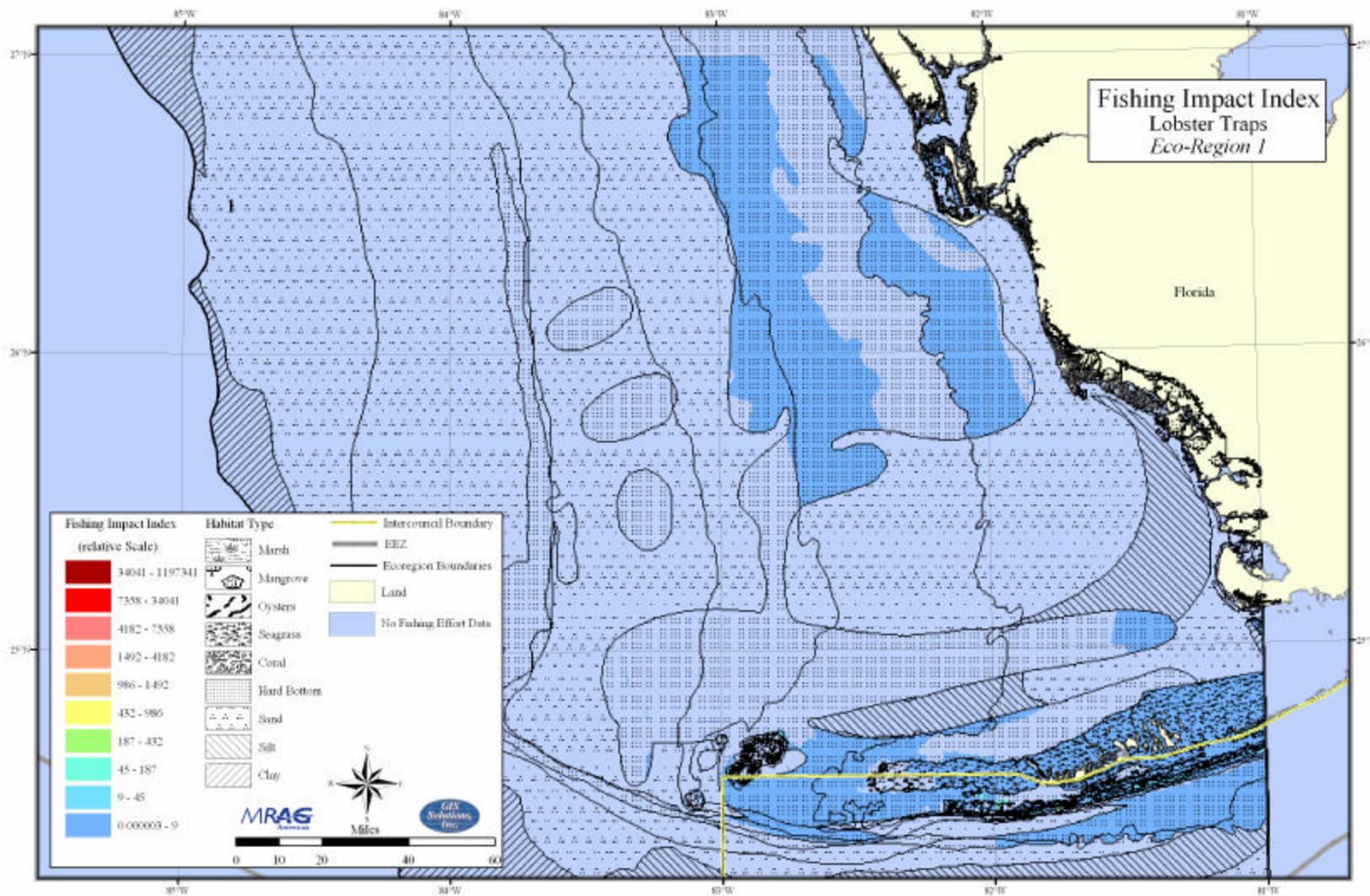


Figure 3.5.25. Fishing impact index for lobster traps in the Gulf of Mexico (higher index numbers indicate a higher risk of impacts from lobster trap fishing). The large area designated as hard bottom off Ft. Myers to the Keys is a mosaic of hard bottom and sand/shell habitat, but it has been classified as hard bottom for the purposes of mapping (see Fig. 3.1.3). Sandy patches within this area would have a fishing impacts index the same as other sandy areas within the same statistical grid and at the same depth.

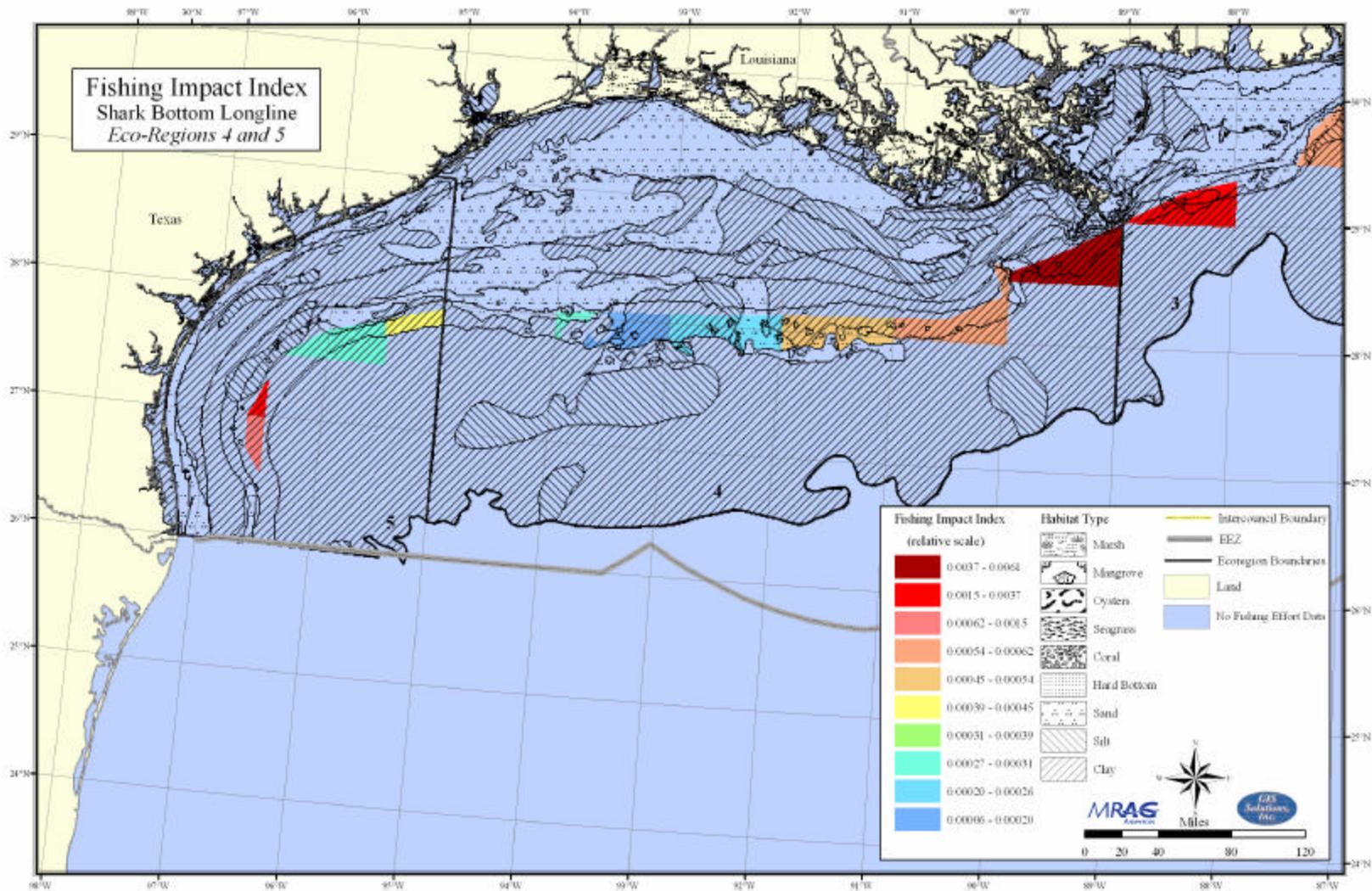


Figure 3.5.26a. Fishing impact index for shark bottom longline gear in the West Gulf of Mexico (higher index numbers indicate a higher risk of impacts from shark bottom longline fishing).

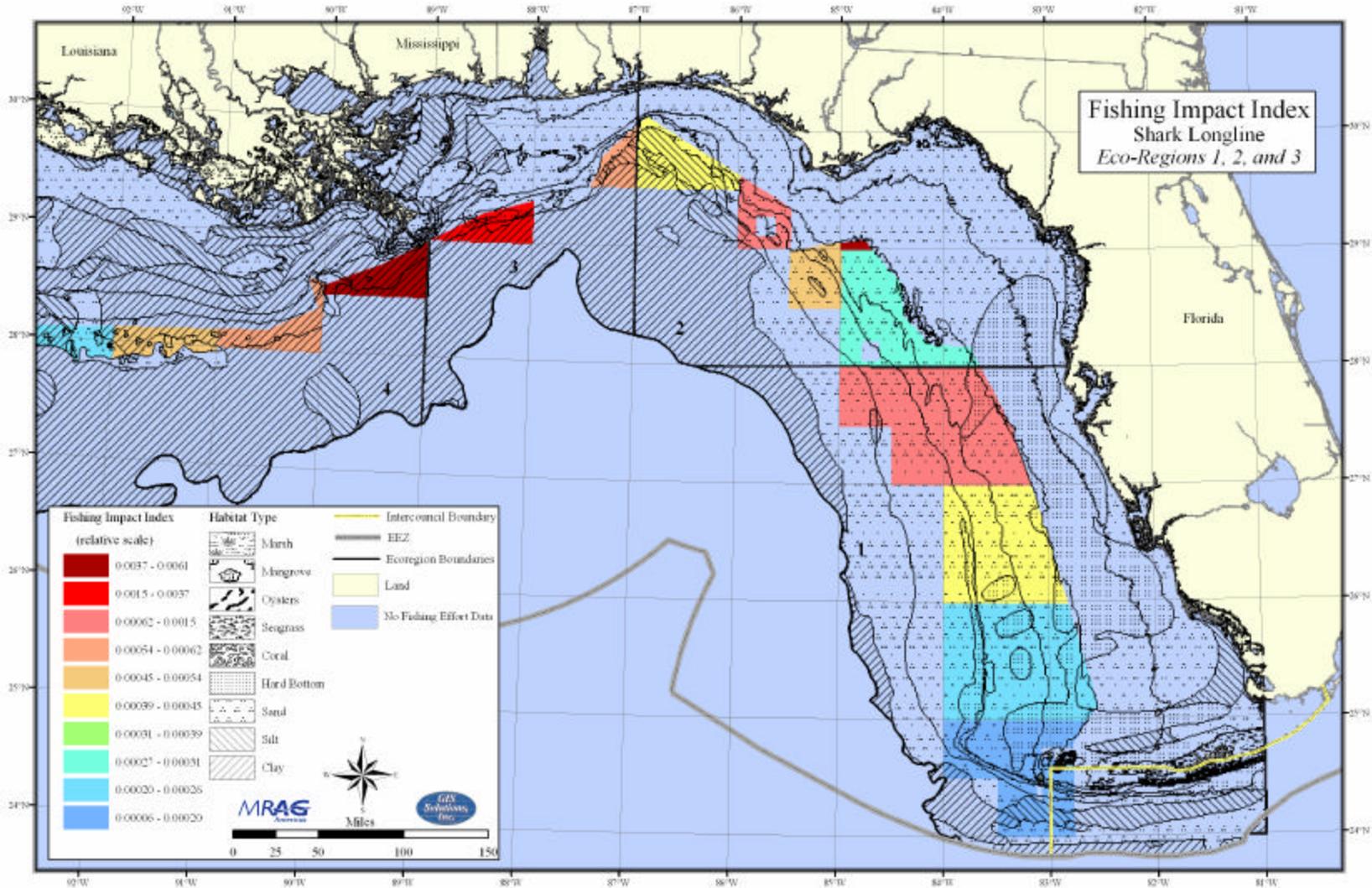


Figure 3.5.26b. Fishing impact index for shark bottom longline gear in the East Gulf of Mexico (higher index numbers indicate a higher risk of impacts from shark bottom longline fishing).

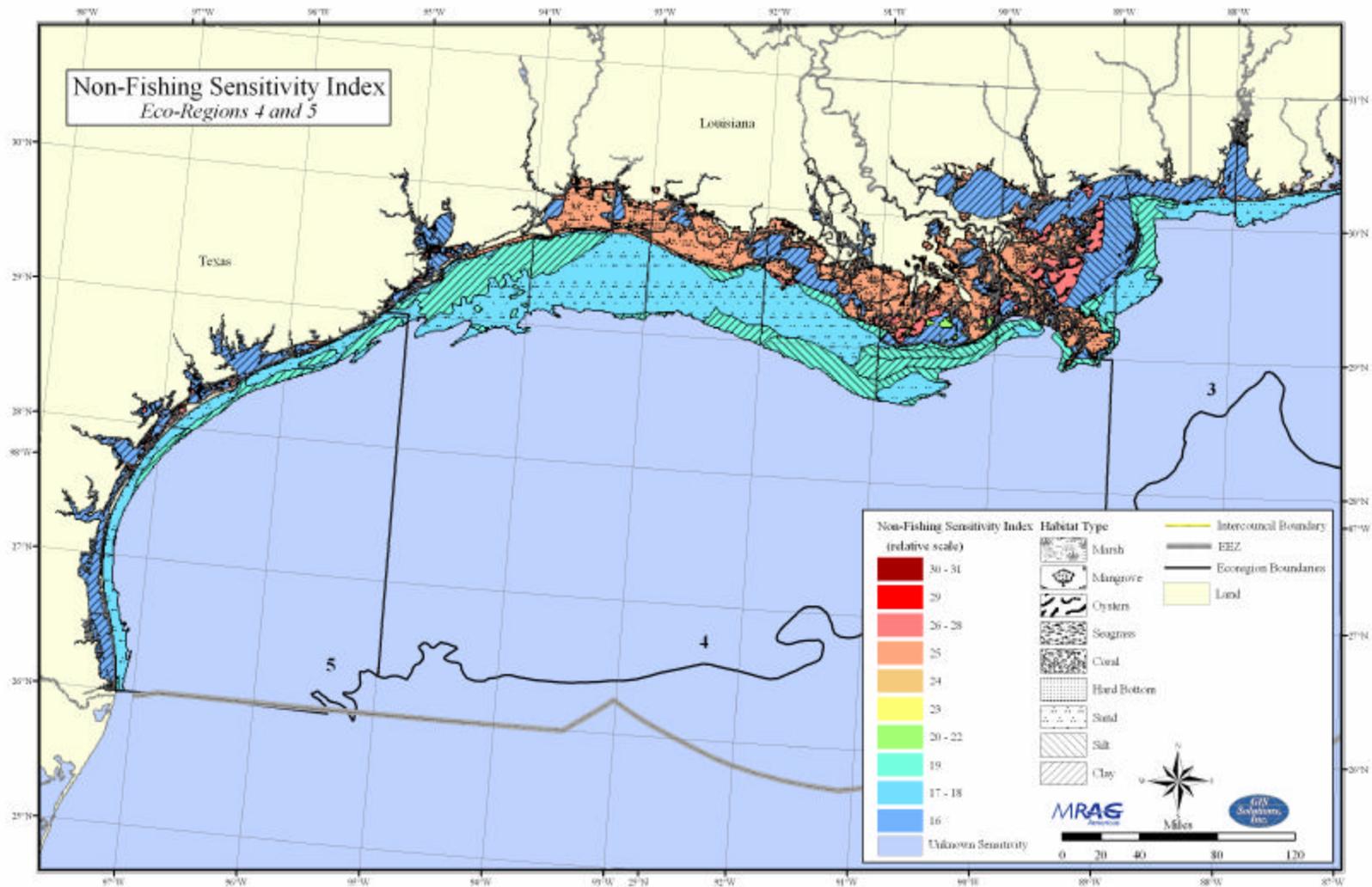


Figure 3.5.27a. Habitat sensitivities to non-fishing threats in the West Gulf of Mexico (higher index numbers indicate higher sensitivities to non-fishing activities).

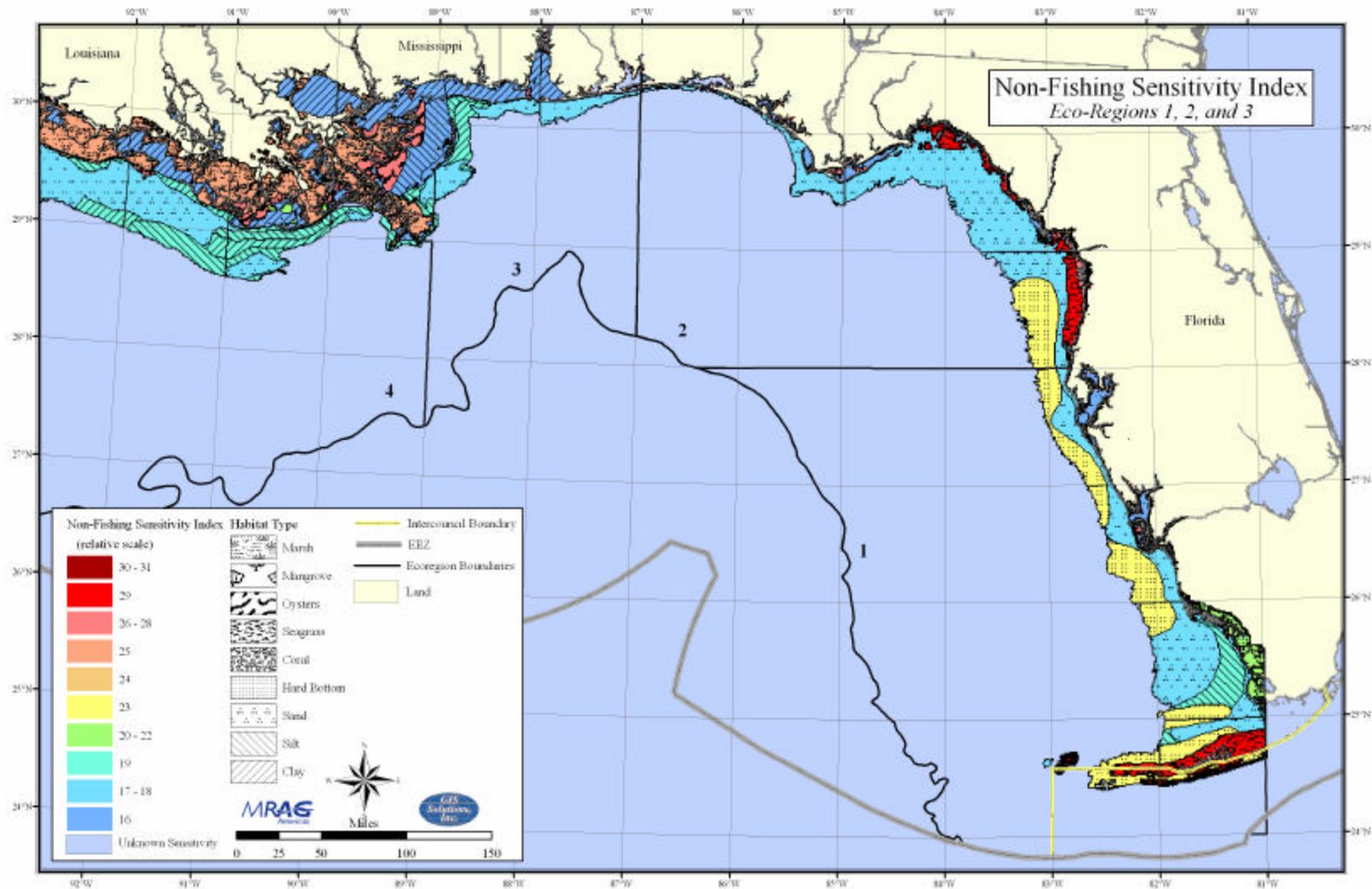


Figure 3.5.27b. Habitat sensitivities to non-fishing threats in the East Gulf of Mexico (higher index numbers indicate higher sensitivities to non-fishing activities). The areas designated as hard bottom off Florida extending from Crystal River south to Fort Myers and to the north of the Keys is a mosaic of hard bottom and sand/shell habitat, but have been classified as hard bottom for the purposes of mapping (see Fig. 3.1.3). Sandy patches within this area would have a non-fishing sensitivity index the same as adjacent sandy areas.

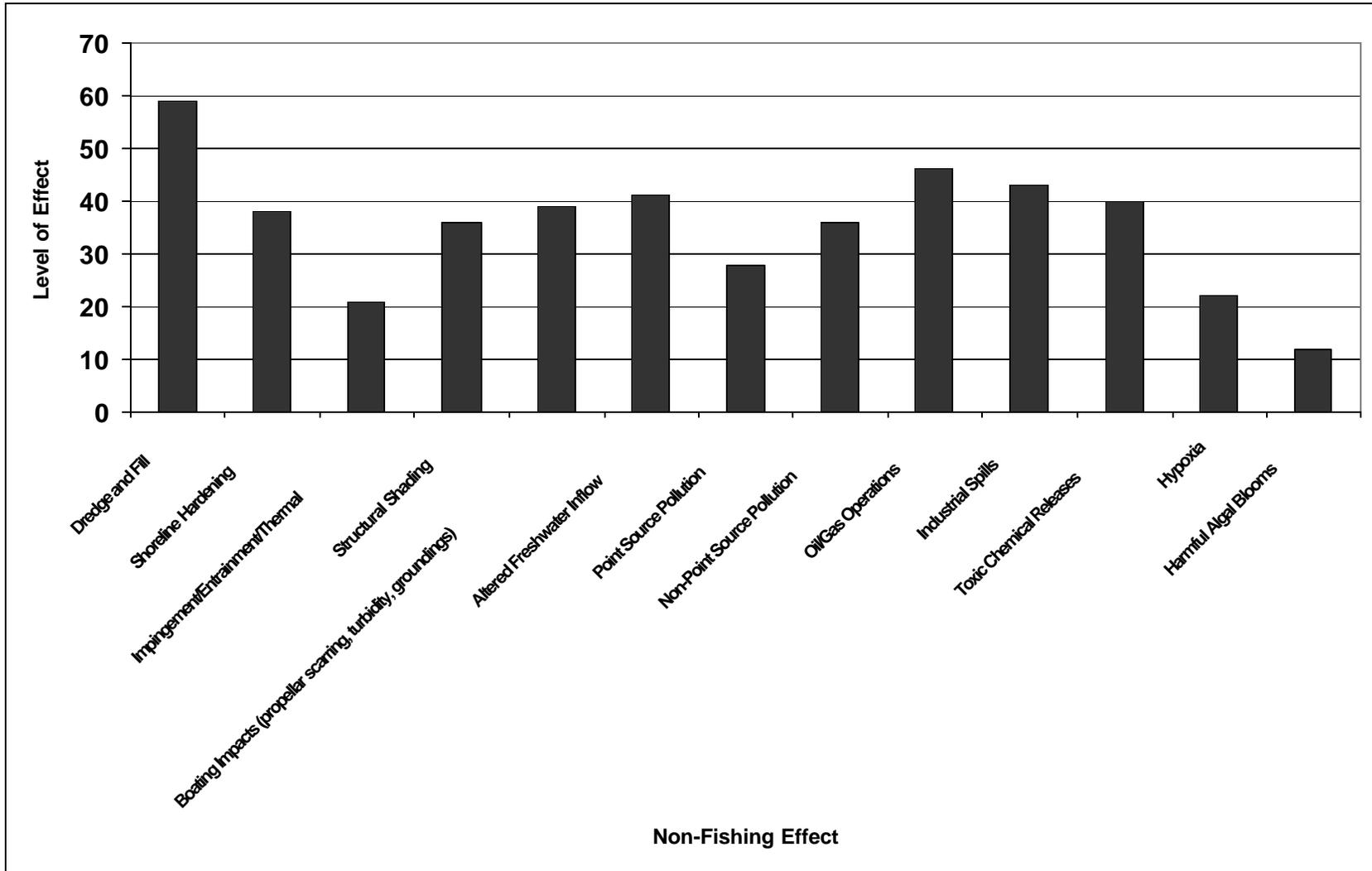


Figure 3.5.28 Sum of sensitivity indices by non-fishing activity for all habitat types.

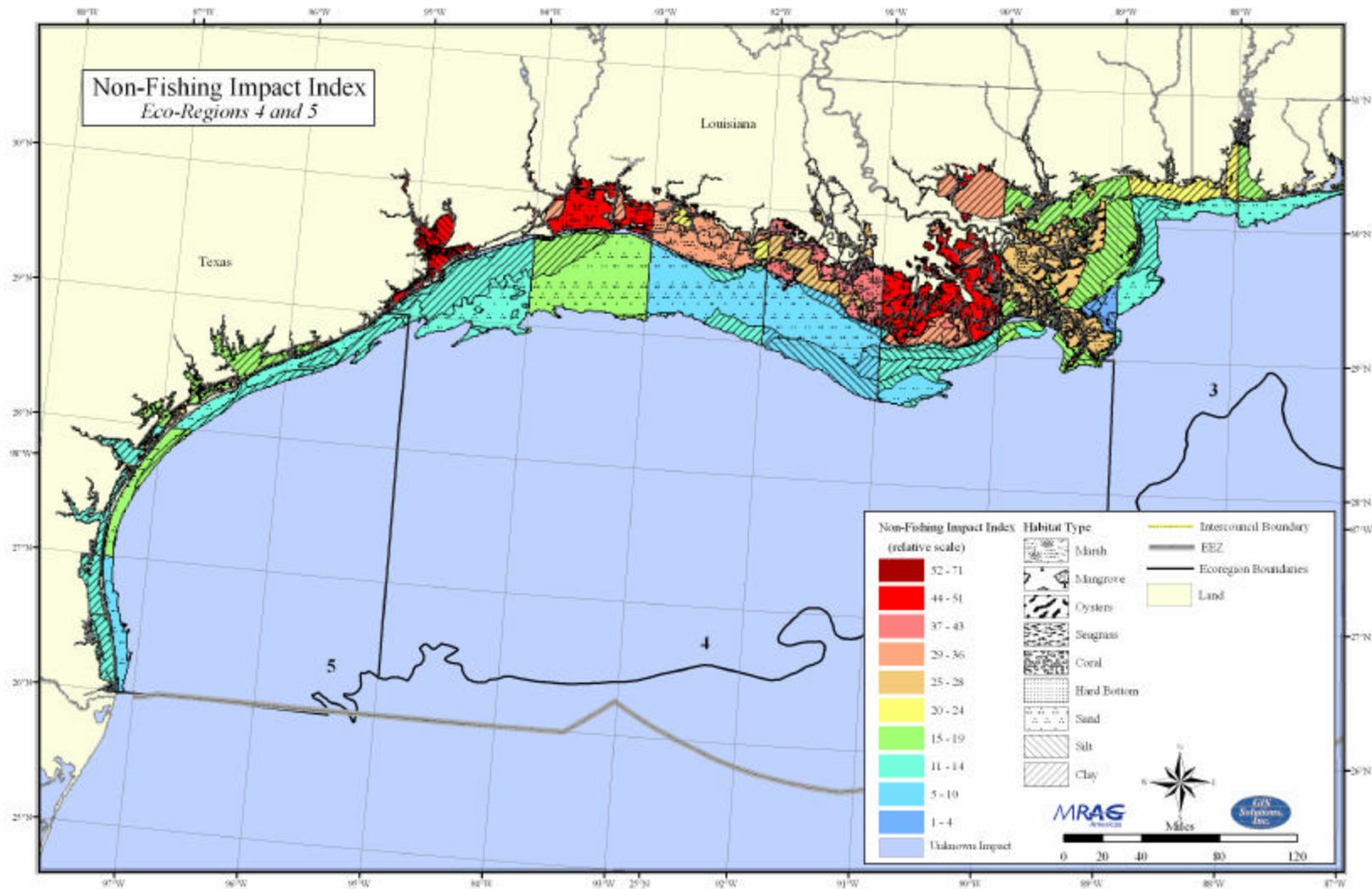


Figure 3.5.29a. Index for Non-Fishing Impacts in the West Gulf of Mexico.
(Higher index numbers indicate higher probabilities of non-fishing impacts)

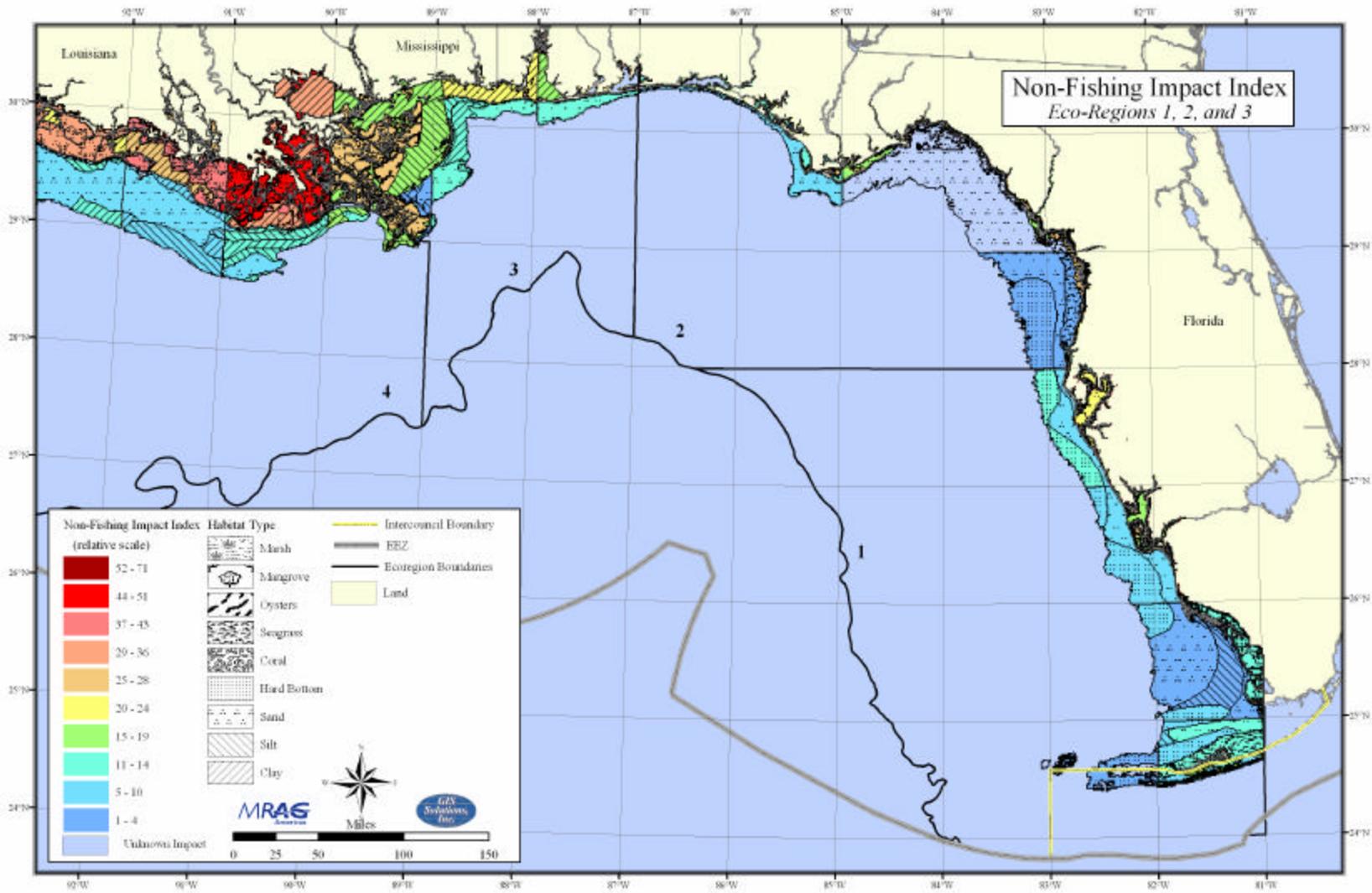


Figure 3.5.29b. Index for Non-Fishing Impacts in the East Gulf of Mexico. (Higher index numbers indicate higher probabilities of non-fishing impacts)

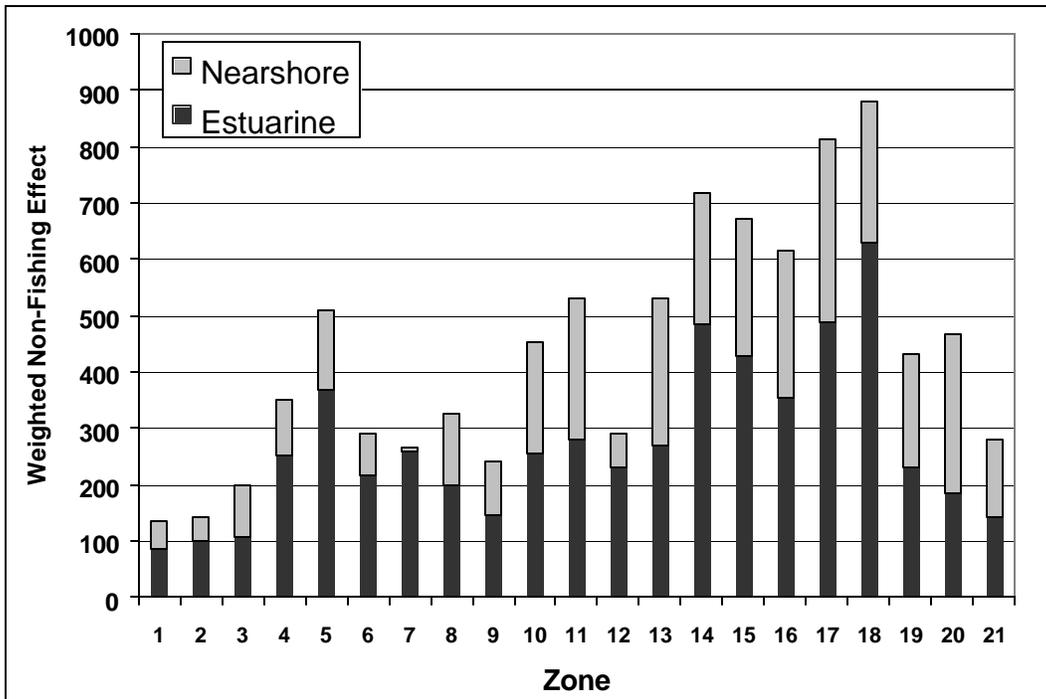


Figure 3.5.30. Non-fishing effects weighting factors for Essential Fish Habitat types in the Gulf of Mexico by NMFS Statistical Unit.

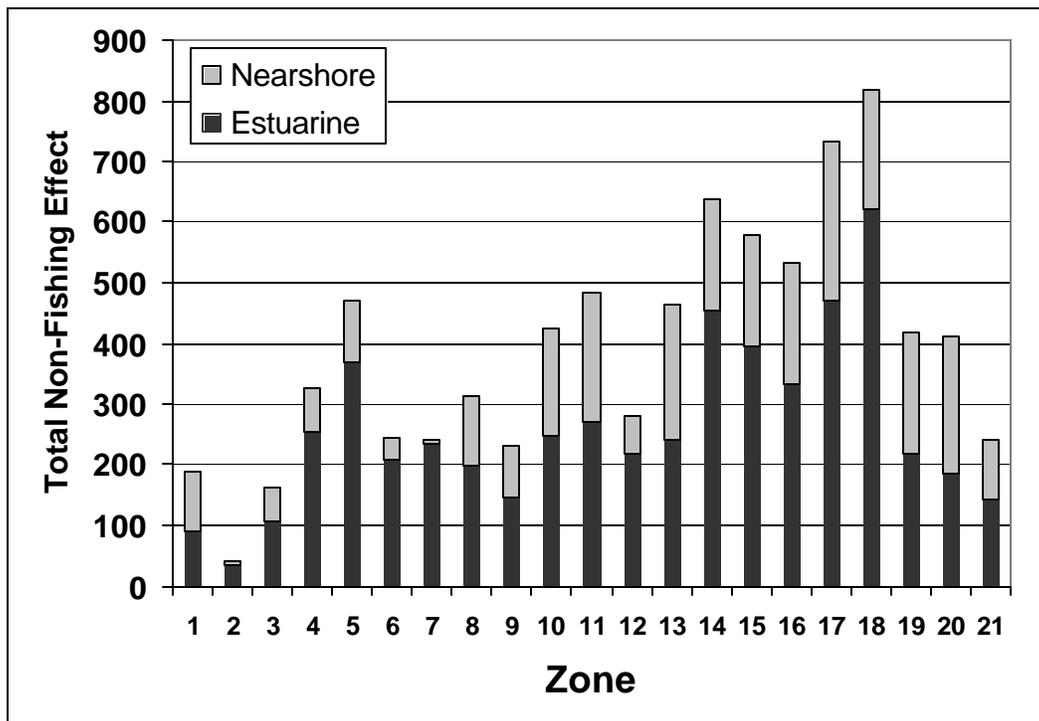


Figure 3.5.31. Total non-fishing effects scores by NMFS Statistical Unit.

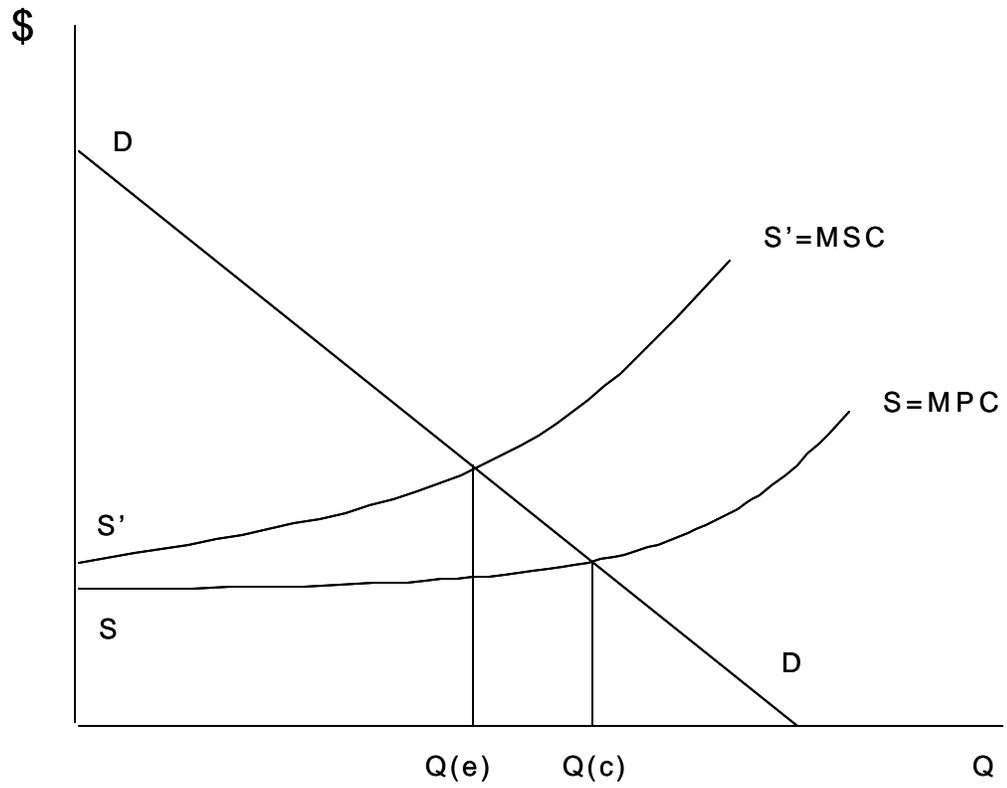


Figure 4.3.1. a

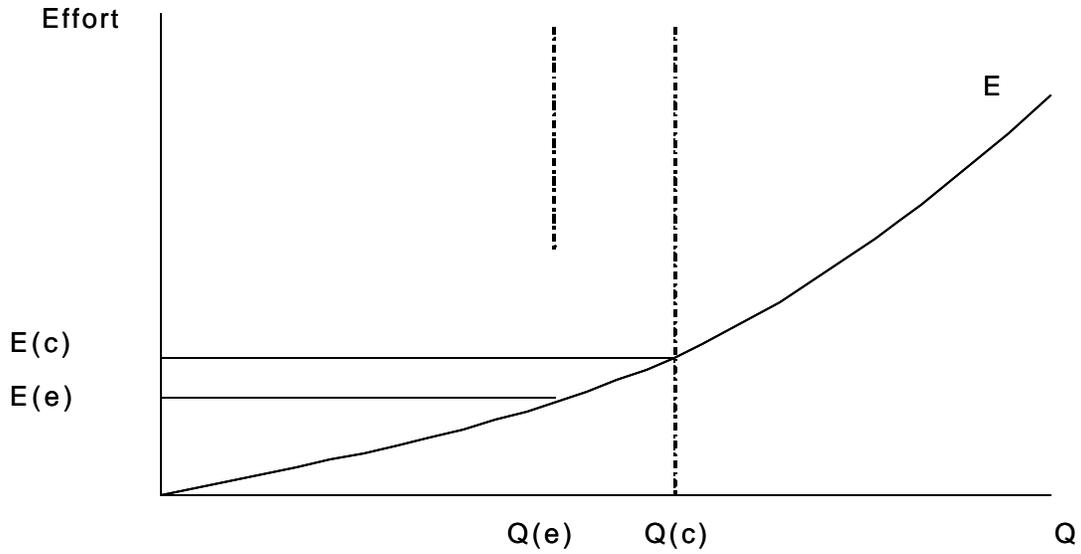


Figure 4.3. 1. b

Figure 4.3.1. Hypothetical graph of externalities associated with habitat damage.

Gulf of Mexico Cumulative Impacts on Habitats

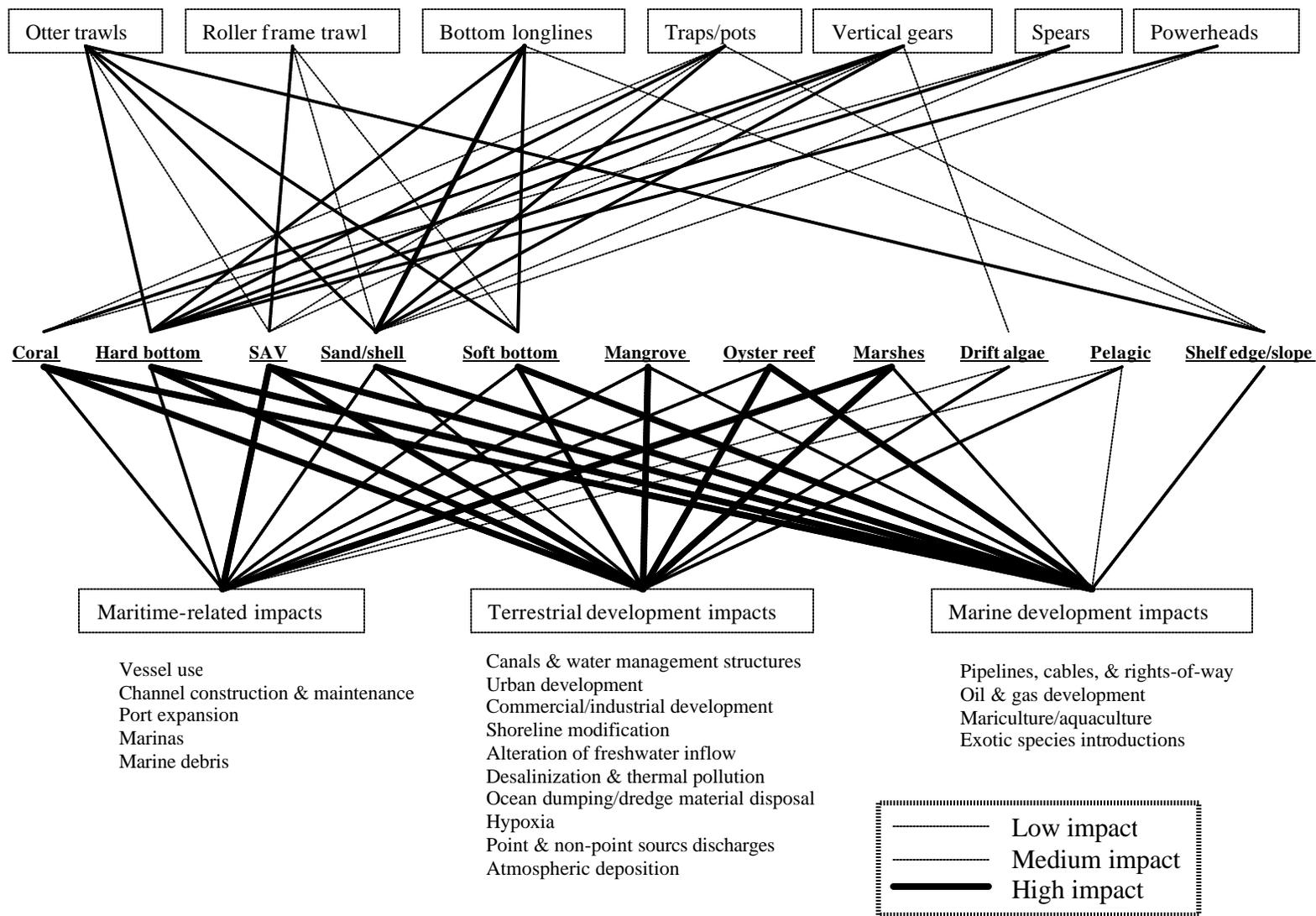


Figure 4.4.1. Chart of cumulative impacts on habitats in the Gulf of Mexico