

Generic Essential Fish Habitat Amendment



Public Hearing Draft for Generic Amendment to the Shrimp, Reef fish, Coastal Migratory Pelagics, Spiny Lobster, and Red Drum Fishery Management Plans in the Gulf.

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Type of Action

Administrative
 Draft

Legislative
 Final

ABBREVIATIONS USED IN THIS DOCUMENT

ACL	annual catch limit
AM	accountability measures
BiOp	biological opinion
BSIA	best scientific information available
CFR	code of federal regulations
CMP	coastal migratory pelagics
Council	Gulf Council
Councils	Gulf and South Atlantic Fishery Management Councils
DPS	distinct population segments
E.O.	Executive Order
EEZ	exclusive economic zone
EFH	Essential Fish Habitat
EIS	economic impact statement
EJ	environmental justice
ER	Ecological regions (eco-region)
ESA	Endangered Species Act
FEIS	Fishery Ecosystem Issues
FL	fork length
FMP	Fishery Management Plan
GMFMC	Gulf of Mexico Fishery Management Council
Gulf	Gulf of America (Formerly Gulf of Mexico)
HAPC	habitat areas of particular concern
lw	landed weight
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MD	Memorial Day
MMPA	Marine Mammals Protection Act
mp	million pounds
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
ppt	parts per thousand
Reef Fish FMP	Fishery Management Plan for the Reef Fish Resources in the Gulf
SEDAR	Southeast Data, Assessment, and Review
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
South Atlantic Council	South Atlantic Fishery Management Council
SSC	Scientific and Statistical Committee
TL	total length
TPWD	Texas Parks and Wildlife Department
ww	whole weight

TABLE OF CONTENTS

Abbreviations Used in this Document	ii
Table of Contents	iii
List of Tables	v
List of Figures	vi
Chapter 1. Introduction	1
1.1 Background	1
1.2 Purpose and Need	4
1.3 History of EFH Reviews and Management Actions	4
Chapter 2. Management Alternatives	6
2.1 Action - Modify the Gulf Essential Fish Habitat Description and Identification in the Shrimp, Reef fish, Coastal Migratory Pelagics, Spiny Lobster, and Red Drum Fishery Management Plans	6
2.1.1 Discussion	6
Chapter 3. Essential Fish Habitat (EFH) Descriptions and identification	8
3.1 Methods to Define EFH	8
3.2 EFH Descriptions	15
3.2.1 Reef Fish	15
3.2.2 Coastal Migratory Pelagics	35
3.2.3 Shrimp	37
3.2.4 Red Drum	40
3.2.5 Spiny Lobster	41
Chapter 4. Impacts of the Alternatives	42
4.1 Physical Environment	42
4.1.1 Effects on the Physical Environment	46
4.2 Biological/Ecological Environment	46
4.2.1 Effects on the Biological Environment	48
4.3 Economic and Social Environment	48
4.3.1 Effects on the Economic and Social Environment	48
4.4 Administrative Environment	49
4.4.1 Effects on the Administrative Environment	49
Chapter 5. List of Preparers	50
Chapter 6. References	51
Appendix A. Habitat Attribute Tables	57

Appendix B. Metadata 222
Appendix C. Essential Fish Habitat Maps 233

LIST OF TABLES

Table 3.1.1. Gulf eco-regions and the corresponding NOAA Statistical (Stat) Grids.	8
Table 3.1.2. Eleven habitat types used throughout the species profiles and terms related to those habitat types.	10
Table 3.1.3 A summary of sources compiled during the 2024 literature review used to inform habitat associations, by species. Updated sources are available through 2024, and include what information was updated in the Habitat Association Tables (HAT), found in Appendix A. Species without updated habitat information are indicated in grey.	12

LIST OF FIGURES

Figure 3.1.1. Map of eco-regions textually described in the table above and referenced in the habitat association tables.....	9
Figure 3.1.2. Spatial depiction of Gulf habitat zones: estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth).	9
Figure 4.1.1. Mean annual sea surface temperature derived from the Advanced Very High-Resolution Radiometer Pathfinder Version 5 sea surface temperature data set	43

CHAPTER 1. INTRODUCTION

1.1 Background

In 1996, the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) was amended to require that each fishery management plan (FMP) describe and identify essential fish habitat (EFH), minimize to the extent practicable adverse effects on that habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of that habitat. 16 U.S.C. 1853(a)(7). The Magnuson-Stevens Act defines EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” 16 U.S.C. 1802(10). The EFH guidelines require descriptions and identifications for each life stage for every species managed in the FMP. Federal agencies that authorize, fund, or undertake actions that may adversely affect EFH must consult with NMFS, and NMFS must provide conservation recommendations to federal and state agencies regarding actions that would adversely affect EFH (16 U.S.C. 1855(b)(2), (4)). Councils also have the authority to comment on federal or state agency actions that would adversely affect the habitat, including EFH, of managed species (16 U.S.C. 1855(b)(3)).

Regulations specify the EFH information that must be included in the FMP and require that the regional Councils and NMFS perform a complete review of all EFH information at least once every 5 years (50 CFR 600.815(a)(10)). The EFH 5-year review process ensures that EFH information is reviewed on a regular basis, and based on the best scientific information available. The Gulf Council’s role with respect to the EFH 5-year Review is to coordinate the systematic evaluation of all ten EFH components, as seen below, and develop a comprehensive summary report of the findings, and determine whether the updated scientific information warrants formal amendments to the FMPs.

1. EFH Descriptions and Identification;
2. Fishing activities that may adversely affect EFH;
3. Non- Magnuson-Stevens Act fishing activities that may adversely affect EFH;
4. Non-Fishing activities that may adversely affect EFH;
5. Cumulative impacts analysis;
6. EFH Conservation and Enhancement Recommendations;
7. Prey species list and any locations;
8. Habitat Areas of Particular Concern (HAPC) identification;
9. Research and Information needs; and
10. Recommendation to review EFH every 5 years.

This amendment updates the Gulf of America (Gulf) EFH descriptions and identification in the Gulf Shrimp, Reef Fish, and Red Drum FMPs, the Gulf and South Atlantic Spiny Lobster FMP, and the Gulf and Atlantic Coastal Migratory Pelagics (CMP) fishery management plan (FMP). The Coral FMP was not updated in this amendment, as such the proposed action does not contain any updates to managed species under the Coral FMP, as the Coral EFH and habitat areas of particular concern (HAPCs) were defined and identified in Coral Amendment 9 (GMFMC 2020).

The regulations provide that the Council should strive to describe and identify EFH information for all federally managed species within the FMPs at the highest level possible (50 CFR 600.815(a)(1)(iii)(B))—

- *Level 1: Distribution data are available for some or all portions of the geographic range of the species*
- *Level 2: Habitat-related densities of the species are available*
- *Level 3: Growth, reproduction, or survival rates within habitats are available*
- *Level 4: Production rates by habitat are available*

The lower characterization levels (one and two) can be satisfied using qualitative descriptions of habitat or species presence/absence data; however, upper levels (three and four) require more comprehensive data needs as these levels address functionality of habitat attributes to population dynamics. In some cases, species presence may not be available and as such cannot be used. In these cases, habitat maps along with habitat use information obtained from a primary literature review is used describe EFH. Currently, the Council uses a qualitative approach to define habitat associations for species to mapping benthic habitat features for species throughout the Gulf.

Consistent with the requirements of the Magnuson-Stevens Act, the Council completed EFH Generic Amendment 1 in 1998 (October 1998; GMFMC 1998), which amended the seven Gulf FMPs in existence at the time (shrimp, reef fish, coastal migratory pelagics, spiny lobster, coral, red drum, and stone crab¹). EFH Generic Amendment 1 included descriptions of essential habitat for each life stage of 26 representative species that constituted most of the landings from the Gulf. EFH Generic Amendment 1 also described threats to habitats, predator-prey relationships, factors resulting in EFH losses, conservation and enhancement measures for EFH, and included recommendations to minimize impacts from non-fishing threats.

EFH Generic Amendment 2 (GMFMC 2001) created two marine reserves (Tortugas Marine Reserves) and prohibited fishing. This amendment affected all seven Gulf FMPs in existence at the time. The first reserve established was a single 60 square mile area to protect a spawning aggregation site for mutton snapper within Council jurisdiction. The other (125 square miles) affected all managed species and was created in the jurisdictions of the National Park Service, Florida Keys National Marine Sanctuary, Council, and State of Florida.

In 2000, a coalition of environmental groups challenged the National Marine Fisheries Service's (NMFS) approval of the EFH FMP amendments prepared by the Gulf and other Fishery Management Councils. NMFS entered into a Joint Stipulation with the plaintiff environmental organizations that called for each affected Council to complete an Environmental Impact Statement (EIS). This resulted in the 2004 EFH Final Environmental Impact Statement (FEIS) (GMFMC 2004). The purpose of the EFH FEIS was to analyze (within each Gulf fishery) a range of alternatives to: (1) describe and identify EFH for the fishery, (2) identify other actions to encourage the conservation and enhancement of such EFH and (3) identify measures to prevent, mitigate or minimize to the extent practicable the adverse effects of fishing on such EFH.

¹ In 2011, the Council rescinded jurisdictional management of stone crab and removed the FMP. Therefore, the Council no longer considers EFH descriptions and identifications for stone crab.

The EFH final environmental impact statement (FEIS) (GMFMC 2004) led to EFH Generic Amendment 3 (GMFMC 2005), which addressed EFH requirements by comparing benthic habitat maps and species life history habitat attribute tables constructed from literature reviews. The EFH Generic Amendment 3 (GMFMC 2005) described and identified EFH as areas of higher species density, based on the National Oceanic and Atmospheric Administration (NOAA) Atlas (NOAA 1985) and functional relationships analysis for the Red Drum, Reef Fish, CMPs, Shrimp, Stone Crab¹, and Spiny Lobster FMPs; and on known distributions for the Coral FMP. The EFH generic Amendment 3 defined EFH for federally managed species in the Gulf, by broadly characterizing EFH for the entirety of the Gulf FMP species (e.g., all reef fish species contain the same EFH designation), and summarizing life history traits in habitat association tables in the FEIS (GMFMC 2004) to derive species and life stage habitat linkages.

The 2010 EFH 5-year review reviewed both the existing EFH descriptions and designations, and any new relevant information since the 2005 EFH Amendment (GMFMC 2010). The 2010 review also examined changes and new information on fishing and non-fishing impacts that could adversely affect EFH. The review also described potential new methods of designating EFH. Lastly, the review considered HAPC designations and determined if current HAPC designations are adequate or if areas need to be removed or added. The 2010 review was evaluated by the Council and NMFS and did not result in any changes to Gulf FMPs.

The 2016 EFH 5-year review (GMFMC 2016) included an extensive literature review which was conducted to determine if any new species-specific EFH information was available. Habitat attribute tables developed in the EFH FEIS (GMFMC 2004) were revised to make them more readable and to incorporate new information from the literature review. The habitat attribute tables were used to generate species profiles, that include brief synopses of pertinent literature obtained during the review, a description of habitat information by species and life stage, graphs of growth by age and recent fishing effort, a brief fishery history, and a composite map of benthic life stages for each species. For the first time, Level 1 species-specific EFH description and identification (text and maps) were produced for species by life stage (egg, larvae, post larvae, early juvenile, late juvenile, adult, and spawning adult). A literature review was also conducted of new information related to fishing and non-fishing impacts, focused particularly on the Deepwater Horizon oil spill, offshore aquaculture, and invasive species. The 2016 review did not result in any changes to Gulf FMPs; however, the NMFS Southeast Regional Office (SERO) Habitat Conservation Division sent a letter to the Council recommending that the Council amend its FMPs to incorporate new habitat life-history functional relationships into existing EFH description and identification, which will better inform the consultations on actions that may adversely affect EFH, as required by section 305(b) of the Magnuson-Stevens Act.²

During the 2010 5-year review (GMFMC 2010) several items from the EFH Generic Amendment 3 (GMFMC 2005) were found to be inconsistent with best available science as detailed below. Additionally, the Council has not acted on the 5-year review results from the 2010 or 2016 review; thus, this Generic FMP amendment addresses the following:

- Some discrepancies between textual and mapped depictions of EFH (per the EFH Final Rule, the textual description is ultimately determinative of the limits of EFH).

² <https://drive.google.com/file/d/1wuKXSXO-S-MEJqPtEiRII0dW-KMN5VLv/view?usp=sharing>

- Inconsistencies in digitization of the NOAA Atlas maps such as depicting Lake Rousseau in Florida as EFH for several FMPs, despite being a strictly freshwater lake with a lock and dam system that blocks marine fishery ingress or egress.

This Generic FMP amendment updates the EFH text descriptions and identification to dissemination EFH Level 1 information into the Gulf FMPs, as available for species at 7 life stages (egg, larvae, post larvae, early juvenile, late juvenile, adult, and spawning adult). EFH Level 1 descriptions and identifications were compiled through a thorough literature review through 2024. Literature reviewed includes: published and unpublished scientific literature/reports (gray literature), incorporation of local knowledge, and utilizing previously unavailable or inaccessible data. Updated habitat attribute tables can be found in Appendix A, updated EFH descriptions can be found in Chapter 3.1, and updated EFH maps can be found in Appendix C. This document considers methodological changes to Component 1: EFH maps and text descriptions to modify the current EFH definitions to be in accordance with the best scientific information available (BSIA), and updated habitat attribute tables (Appendix A).

1.2 Purpose and Need

The purpose is to consider new available spatial habitat information to revise the EFH text and map descriptions for the Gulf Shrimp, Reef fish, Coastal Migratory Pelagics, Spiny Lobster, and Red Drum FMPs. Updates to the EFH descriptions and identifications would allow the best scientific information available to be utilized to provide enhanced conservation benefits Gulf's resources, and establish a better understanding of species habitat requirements by life stage.

The need is to comply with the EFH provisions of the Magnuson-Stevens Act that requires a review of the EFH components of the Council's FMPs every 5 years to determine if the EFH provisions should be revised or amended, as warranted, based on the best scientific information available contributing to new information. This amendment incorporates all information required by 50 C.F.R. section 600.815(a).

1.3 History of EFH Reviews and Management Actions

EFH Generic Amendment 1 (GMFMC 1998): Amended the seven Gulf FMPs in existence at the time. Additionally, EFH descriptions and identifications are required for each life stage for every species managed within an FMP. EFH Generic Amendment 1 included descriptions of essential habitat for each life stage of 26 representative species that constituted most of the landings from the Gulf. EFH Generic Amendment 1 also described threats to habitats, predator-prey relationships, factors resulting in EFH losses, conservation and enhancement measures for EFH, and included recommendations to minimize impacts from non-fishing threats.

EFH Generic Amendment 2 (GMFMC 2001): Amended the seven Gulf FMPs in existence at the time and established two marine reserves (Tortugas Marine Reserves). These reserves allowed for research on value of no-use reserves.

EFH FEIS (GMFMC 2004): The purpose of this document was to analyze (within each Gulf fishery) a range of alternatives to: (1) describe and identify EFH for the fishery, (2) identify other

actions to encourage the conservation and enhancement of such EFH and (3) identify measures to prevent, mitigate or minimize to the extent practicable the adverse effects of fishing on such EFH.

EFH Generic Amendment 3 (GMFMC 2005): This amendment described and identified EFH based on the National Oceanic and Atmospheric Administration (NOAA) Atlas (NOAA 1985) and functional relationships analysis for the Red Drum, Reef Fish, CMPs, Shrimp, Stone Crab, and Spiny Lobster FMPs; and on known distributions for the Coral FMP.

EFH 5-year Review (GMFMC 2010): The report reviewed both the existing EFH descriptions and designations, and also any new relevant information (since the 2005 EFH Amendment, which conducted literature review thorough 2004). The 2010 review also examined changes and new information on fishing and non-fishing impacts that could adversely affect EFH. This review also identified a number of habitat description errors in EFH Amendment 3; however, no modifications to any FMPs were made at the time.

EFH 5-year Review (GMFMC 2016): The report reviewed both the existing EFH descriptions and designations, and also any new relevant information by updating habitat association tables to literature published through 2016. The review updated the habitat association tables, by species life stage and updated species to Level 1 EFH description and identification to be used in a web-tool. No modifications to any FMPs were made as a result of this information, but NMFS wrote a letter to the Council suggesting an amendment of EFH definitions take place to implement best scientific information available.

Amendment 9 to the Fishery Management Plan for Coral and Coral Reef Resources in Gulf of Mexico U.S. Waters (GMFMC 2018): Established new habitat areas of particular concern (HAPCs) within existing essential fish habitat and modified the regulations in three existing HAPCs. Thirteen of the new HAPCs included fishing regulations and eight of the new areas did not include fishing regulations. These new areas were identified as having sufficient numbers and diversity of deep-water corals to be considered HAPCs.

CHAPTER 2. MANAGEMENT ALTERNATIVES

2.1 Action - Modify the Gulf Essential Fish Habitat Description and Identification in the Shrimp, Reef fish, Coastal Migratory Pelagics, Spiny Lobster, and Red Drum Fishery Management Plans

Alternative 1: No Action – Retain current description and identification of essential fish habitat (EFH) in the Gulf of America (Gulf) as specified in EFH Generic Amendment 3 (2005) for the Shrimp, Reef Fish, Coastal Migratory Pelagics, Spiny Lobster, and Red Drum Fishery Management Plans.

Preferred Alternative 2: Update Gulf EFH description and identifications in the Shrimp, Reef fish, Coastal Migratory Pelagics, Spiny Lobster, and Red Drum Fishery Management Plans to include primary research and technical literature sources through 2024. The updated descriptions and identifications would be used for every life stage for all managed species, as data are available.

2.1.1 Discussion

Alternative 1 would retain the current description and identification of EFH in all Gulf FMPs as adopted in Generic Amendment 3 (GMFMC 2005). The method used to describe EFH associates species life history tables with maps of known benthic characteristics. Originally, benthic habitat maps were synthesized through the National Oceanic and Atmospheric Administration (NOAA) Atlas (NOAA 1985). The data used to construct the NOAA Atlas were collected in 1985 and it is highly likely that living habitat (e.g., seagrass, mangrove) characterizations in the Gulf have since changed; making the 1985 version of the NOAA Atlas outdated. At present, there are no life stage-specific EFH maps defined in the fishery management plans (FMPs) for any of the federally managed species.

Preferred Alternative 2 would retain the current methodological approach to identifying and describing EFH as discussed for **Alternative 1**, but would update the benthic spatial data sources for constructing habitat maps from the 1985 NOAA Atlas. Recently developed Level 1 EFH maps and text descriptions would be used to identify EFH for species across 7 life stages, when data are available, utilizing additional spatial data acquired state and federal agencies in 2023 and 2024 (Appendix B). Additionally, **Preferred Alternative 2** would incorporate more contemporary research, published through 2024, into species life history and habitat association tables. Updates to these tables were made during the previous 5-year reviews but are not incorporated in the various FMPs. Under **Preferred Alternative 2**, the FMPs would be updated with revised Gulf species EFH maps and text descriptions by life stage, substantially improving the scientific information available for species-specific EFH descriptions. Updated EFH text and map descriptions under **Preferred Alternative 2** would include more robust species-specific information to enhancing conservation benefits to the stock. Methods outlined in **Preferred**

Alternative 2 could be readily updated as required, and as more data became available to inform species-specific habitat preferences, and the maps could be easily refined.

Preferred Alternative 2 is limited to updating EFH information for Reef fish, Coastal Migratory Pelagic, Shrimp, Spiny lobster, and Red drum FMPs. When combined with previously analyzed past and present actions, the impacts of **Preferred Alternative 2** are not significant. The proposed revisions to the EFH description are solely to update new information. This amendment uses the best available information for species and life stage text and map descriptions. Providing more accurate EFH information could be beneficial to species as EFH is considered in the management of those species. However, this amendment does not consider any additional management measures or regulations associated with the designation of EFH.

Describing and identifying EFH using better information would help NMFS and other federal agencies determine if any actions those other agencies intend to conduct, fund, or authorize would adversely affect EFH. The refinement to the text and maps improves the identification of EFH, and any new areas identified, as detailed in Section 2.1.1, do not change the total aggregated area of EFH description and identification for all managed species. As such, this amendment is not expected to increase the number of consultations on federal agency activities that may adversely affected EFH.

CHAPTER 3. ESSENTIAL FISH HABITAT (EFH) DESCRIPTIONS AND IDENTIFICATION

As part of this amendment, species essential fish habitat (EFH) profiles were created for Shrimp, Reef fish, Coastal Migratory Pelagics, Spiny Lobster, and Red Drum Fishery Management Plans. Coral EFH descriptions were not updated in this amendment as coral EFH and habitat areas of particular concern (HAPCs) were defined and identified in coral Amendment 9 (GMFMC 2020).

3.1 Methods to Define EFH

EFH is defined as waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity. New information collected from an extensive literature review (Table 2.1.1) were added to the information collected during previous reviews (GMFMC 2010 and GMFMC 2016) in the habitat association synopsis by life stage (Appendix A) to identify species-specific EFH. Throughout the species profiles, eco-regions (ER), identified in the EFH final environmental impact statement (FEIS) (GMFMC 2004) are referenced, as described in Table 3.1.1. and visualized in Figure 3.1.1.

Table 3.1.1. Gulf eco-regions and the corresponding NOAA Statistical (Stat) Grids.

Eco-region Name	Bounds	NOAA Stat Grid
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

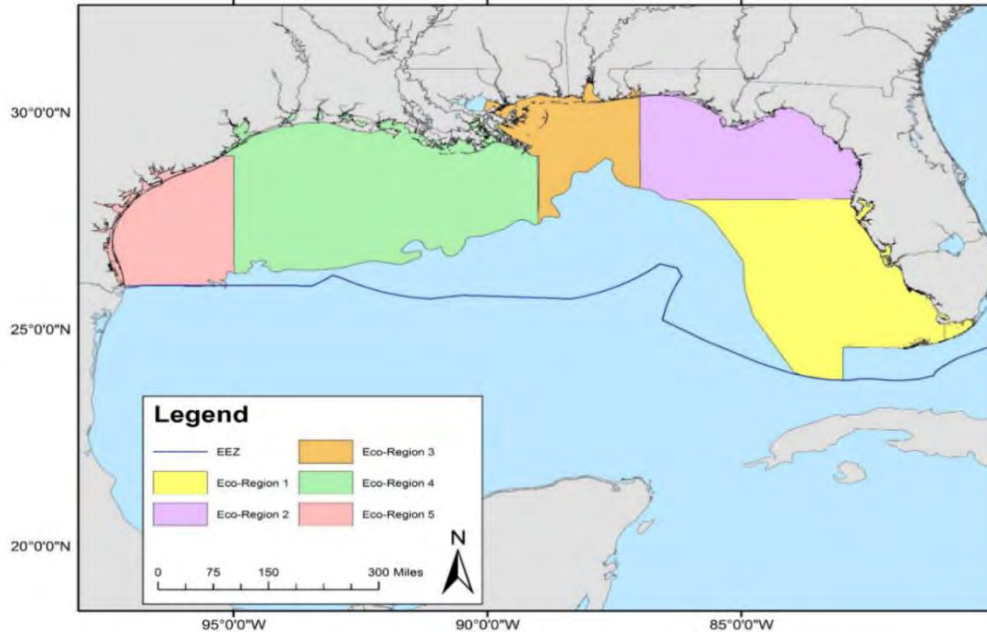


Figure 3.1.1. Map of eco-regions textually described in the table above and referenced in the habitat association tables.

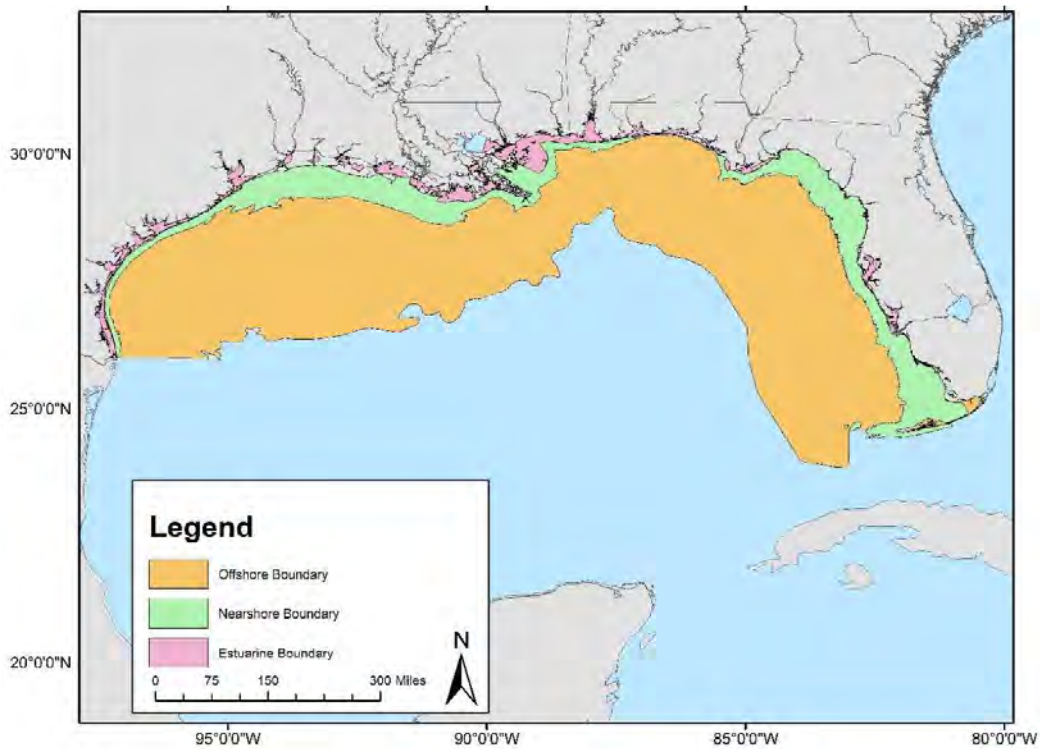


Figure 3.1.2. Spatial depiction of Gulf habitat zones: estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth).

Habitat zone is comprised of three categories: estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth);

Figure 3.1.2). Habitat type is then subdivided into 11 categories distributed amongst the three zones. Table 3.1.2 summarized the 11 habitat types used throughout species profiles and are based on a combination of substrate and biogenic structure descriptions that are considered to provide the best overall categorization of fish habitats in the Gulf, defined in the Final EFH FEIS (GMFMC 2004). In the estuarine component, EFH encompasses all estuarine waters and substrates (mud, sand, shell, rock, and associated biological communities), including the sub-tidal vegetation (seagrasses and algae) and adjacent inter-tidal vegetation (marshes and mangroves). In marine waters (nearshore and offshore), EFH encompasses all marine waters and substrates (mud, sand, shell, rock, hard bottom, and associated biological communities) from the shoreline to 100 fathoms or the seaward limit of the exclusive economic zone (EEZ).

Table 3.1.2. Eleven habitat types used throughout the species profiles and terms related to those habitat types.

Habitat Type	Related Terms
Submerged Aquatic Vegetation (SAV)	Seagrasses, benthic algae
Mangroves	N/A
Drifting algae	<i>Sargassum</i>
Emergent marshes	Tidal wetlands, salt marshes, tidal creeks, rivers/streams
Sand/shell bottoms	Sand
Soft bottoms	Mud, clay, silt
Hard bottoms/reefs ³	Hard bottoms, live hard bottoms, low-relief irregular bottoms, high-relief irregular bottoms, reefs, reef halos, patch reefs, deep reefs
Oyster reefs	N/A
Banks/shoals	N/A
Shelf edge/slope	Shelf edge, shelf slope
Water Column Associated (WCA)	Pelagic, planktonic, coastal pelagic

Currently, EFH is defined by FMP broadly (Generic Amendment 3, 2005), which included species-specific habitat association tables detailing life history traits. In Generic Amendment 3, EFH descriptions and identification are not clearly labeled for species at various life stages, but rather inferred from the habitat association tables. The current descriptions in the FMP are defined below:

Red Drum: all estuaries; Vermilion Bay, Louisiana, to the eastern edge of Mobile Bay, Alabama, out to depths of 25 fathoms (150 feet [46m]); Crystal River, Florida, to Naples, Florida, between depths of 5 and 10 fathoms (30-60 feet [9-18m]); and Cape Sable, Florida, to the boundary between the areas covered by the GMFMC and the South Atlantic Fishery Management Council between depths of 5 and 10 fathoms (30-60 feet [9-18m]).

Reef Fish and CMP FMPs: all estuaries; the US/Mexico border to the boundary between the areas covered by the Gulf and South Atlantic Councils from estuarine waters out to depths of 100 fathoms (600 feet [182]).

³ Hardbottom/reef habitat type has been combined per [October 2025 SSC recommendation](#).

Shrimp FMP: all estuaries; the US/Mexico border to Fort Walton Beach, Florida, from estuarine waters out to depths of 100 fathoms (600 feet [182m]); Grand Isle, Louisiana, to Pensacola Bay, Florida, between depths of 100 and 325 fathoms (600-1950 feet [182-594 m]); Pensacola Bay, Florida, to the boundary between the areas covered by the Gulf and South Atlantic Fishery Management Councils to depths of 35 fathoms (210 feet [64m]), with the exception of waters extending from Crystal River, Florida, to Naples, Florida, between depths of 10 and 25 fathoms (60-150 feet [18-46m]), and in Florida Bay between depths of 5 and 10 fathoms (30-60 feet [9-18m]).

Spiny Lobster FMP: from Tarpon Springs, Florida, to Naples, Florida, between depths of 5 and 10 fathoms (30-60 feet [9-18m]); and Cape Sable, Florida, to the boundary between the areas covered by the Gulf and South Atlantic Councils out to depths of 15 fathoms (90 feet [27m]).

For this amendment, EFH was qualitatively identified using literature through 2024 to depict observed linkages in habitat-usage and reliance across all life stages, as such species-specific habitat attribute tables were updated (Appendix A, Table 3.1.3). The habitat attribute tables provide insight into species' habitat reliance by 7 life stages as well as species-specific life history traits to better define the species' ecological reliance on identified habitat types, habitat zones or eco-regions. Based on the information provided in the habitat attribute tables, species EFH definitions were created by combining identified habitat associations, eco zones (estuarine, nearshore, and offshore), and eco regions to describe EFH by life stage. Similar to conclusions drawn in the EFH Generic Amendment 3 (GMFMC 2005), for those species in which an associated habitat zone, habitat type, or eco-region is described or identified in the literature for a species at a given life stage, it is considered to be identified as EFH, as the likelihood of species presence is greater than 0. Table 3.1.3 identifies updated literature used to inform species life history information to aid in updating EFH descriptions and identifications.

Subsequent EFH maps were produced using benthic spatial data files acquired during previous review cycles, combined with new metadata acquired in 2023 and 2024 (Appendix B). Level 1 EFH maps for species by life stage were produced and EFH text descriptions were defined using known associated habitat types, habitat zones, and eco-regions (Section 3.1; Appendix C). For those species life stages without information to inform an EFH description and identifications, no maps or text descriptions were defined and it was noted that "No information is available". This existing method could be updated to allow for the description and identification of EFH for all managed stocks, many of which are data poor. Since the implementation of EFH Generic Amendment 3 (GMFMC 2005), more refined spatial data, and research has been conducted to inform habitat maps for species by life stage. As such, the EFH text and map descriptions have been updated accordingly.

Table 3.1.3 A summary of sources compiled during the 2024 literature review used to inform habitat associations, by species. Updated sources are available through 2024, and include what information was updated in the Habitat Association Tables (HAT), found in Appendix A. Species without updated habitat information are indicated in grey.

Species	Author(s), Year	Title	Habitat Association Table Information Updated
Reef Fish FMP			
Almaco jack			
Banded rudderfish			
Blackfin snapper	Overly and Shervette, 2023	Caribbean deepwater snappers: Application of the bomb radiocarbon age estimation validation in understanding aspects of ecology and life history	Growth
Black grouper			
Blueline tilefish			
Cubera snapper	Gokturk et al., 2022	Loss of suitable ocean habitat and phenological shifts among grouper and snapper spawning aggregations in the Greater Caribbean under climate change	Eco-region
	Da Silva et al., 2023*	From fisher tales to scientific evidence: revealing the significance of estuarine and mangrove habitats as nursery grounds for juveniles of the largest Atlantic Ocean snapper	Habitat Zone*
	Motta et al., 2022*	Direct evidence of a spawning aggregation of cubera snapper (<i>Lutjanus cyanopterus</i>) in southeastern Brazil and its management implications	Habitat Zone*
	Biggs et al., 2021	The importance of spawning behavior in understanding the vulnerability of exploited marine fishes in the U.S. Gulf of Mexico	Eco-region
Gag grouper	Biggs et al., 2021	The importance of spawning behavior in understanding the vulnerability of exploited marine fishes in the U.S. Gulf of Mexico	Adult Eco-region, season
	Lowerre-Barbieri et al., 2020	Testing assumptions about sex change and spatial management in the protogynous gag grouper, <i>Mycteroperca microlepis</i>	Growth/Recruitment
	Fodrie et al., 2020	Determinants of the nursery role of seagrass meadows in the sub-tropical Gulf of Mexico: inshore-offshore connectivity for snapper and grouper	Juvenile Eco-region, habitat zone, habitat type
	Munnely et al., 2021	Spatial and Temporal Influences of Nearshore Hydrography on Fish Assemblages Associated with Energy Platforms in the Northern Gulf of Mexico	Juvenile Eco-region
	Alvarez, 2020	Using Video Surveys to Examine the Effect of Habitat on Gag Occurrence	Eco-region, Habitat type
Goldface tilefish			

Goliath grouper	Orth, 2023	"Fish, Fishing, and Conservation"; CH 13 Grouper and Spawning Aggregations	Spawning Adult Season
Gray snapper	Anderson et al., 2022	Distribution, Maturity, Age and Growth of Gray Snapper (<i>Lutjanus griseus</i>) in the Northwestern Gulf of Mexico	Adult Habitat Zone
Gray triggerfish			
Greater amberjack	Galloway et al., 2021	Absolute Abundance Estimates for Red Snapper, Greater Amberjack, and Other Federally Managed Fish on Offshore Petroleum Platforms in the Gulf of Mexico	Habitat Association-artificial reef
Hogfish	Faletti and Stallings, 2021	Life history through the eyes of a hogfish: trophic growth and differential juvenile habitat use from stable isotope analysis	Habitat Zone, Depth
	Towne et al., 2021	Habitat specific tradeoffs in growth and survival by hogfish <i>Lachnolaimus maximus</i> in southeast Florida	Adult Eco-region
Lane snapper	Fernandes et al., 2022*	Reproductive biology of the lane snapper, <i>Lutjanus synagris</i> (Linnaeus 1758) (Perciformes, Lutjanidae), in the Maranhão continental shelf, Northeast of Brazil	Adult and Spawning Adult growth*, Spawning Adult season
	Trejo-martinez et al., 2021	Reproductive Strategy of a Continental Shelf Lane Snapper Population from the Southern Gulf of Mexico	Spawning Adult season, eco-region, habitat zone, habitat type
Lesser amberjack			
Mutton snapper			
Queen snapper	Williams et al., 2024*	Prey diversity in the deep ocean: metabarcoding feeding ecology of the commercially important queen snapper in the US Caribbean	Adult prey*
	Overly, 2024 *	Mapping queen snapper (<i>Etelis oculatus</i>) suitable habitat in Puerto Rico using ensemble species distribution modeling	EFH*
Red grouper	2019	SEDAR 61	Mortality
Red snapper	2024	SEDAR 74	Adult growth, Spawning Adult season and depth
	Dance et al., 2021	Importance of low-relief nursery habitat for reef fishes	Early Juvenile, Late Juvenile and Adult Habitat Type,
	Schluze et al., 2020	Artificial Reefs in the Northern Gulf of Mexico: Community Ecology Amid the "Ocean Sprawl"	EFH *
Scamp	2022	SEDAR 60 OA	Adult Mortality and Growth
Silk snapper			
Snowy grouper			
Speckled hind			
Tilefish			
Vermilion snapper	2020	SEDAR 67	Adult Mortality and Growth

Warsaw grouper	Sanchez and Rooker, 2021	Age, growth, and mortality of threatened Warsaw grouper, <i>Hyporthodus nigritus</i> , in the Gulf of Mexico	Adult Mortality and Growth
Wenchman	2016	SEDAR 49	Adult Mortality
Yellowedge grouper	2023	SEDAR 85	Adult Growth, Spawning Adult season, depth and temperature
Yellowfin grouper			
Yellowmouth grouper	2021	SEDAR 68	Adult growth
Yellowtail snapper	2020	SEDAR 64	Adult Mortality and growth
Coastal Migratory Pelagics FMP			
King mackerel	Banks et al., 2024	Age, growth, and mortality of King Mackerel in the western Gulf of Mexico	Spawning Adult growth
	2014	SEDAR 38	Eco-region, Spawning Adult growth
	Huynh et al., 2019	Comparisons of mean length-based mortality estimators and age-structured models for six southeastern US stocks	Mortality
Cobia	Gallaway et al., 2021	Absolute Abundance Estimates for Red Snapper, Greater Amberjack, and Other Federally Managed Fish on Offshore Petroleum Platforms in the Gulf of Mexico	Eco-Region
Spanish mackerel	2023	SEDAR 81	Adult Mortality and Growth. Early Juvenile and Late Juvenile Habitat Type
Shrimp FMP			
Brown shrimp	Glover et al., 2023	Juvenile Brown Shrimp (<i>Farfantepenaeus aztecus</i>) Use of Salt Marsh Intertidal Creeks as Nursery Habitat	Habitat Type
	Pickens et al., 2021	Predicting the Distribution of Penaeid Shrimp Reveals Linkages Between Estuarine and Offshore Marine Habitats.	Eco-region, habitat zone
Pink shrimp	Pickens et al., 2021	Predicting the Distribution of Penaeid Shrimp Reveals Linkages Between Estuarine and Offshore Marine Habitats	Eco-region, Habitat Zone, Habitat Type
Royal red shrimp			
White shrimp	Cebrian et al., 2024	Comparing Shallow Seagrass Versus Fringing Marsh Habitat Use by Nekton Juvenile Recruits with “Incomparable” Fishing Gear in the Northern Gulf of Mexico	Habitat Type, Eco-region
Red Drum FMP			
Red drum			
Spiny Lobster FMP			
Spiny lobster			

* indicates study was conducted outside of the Gulf.

3.2 EFH Descriptions

Level 1 EFH descriptions and identifications, where distribution data are available for some or all portions of the geographic range of the species, for species by life stage were compiled using updated literature to inform habitat associations and updated metadata provided by the Gulf states (Appendix B). To create these maps, eco-region (Figure 3.1.1) and habitat zone (Figure 3.1.2) boundaries are used in conjunction with habitat type (Table 1.1.2). No spatial data currently exist to inform drifting algae and banks/shoals habitat type. As such, those habitat types were not used in creating EFH Level 1 species maps, but are included in the EFH textual definitions and habitat attribute tables. Where there was no information for the life stages for a species to inform an EFH text description and map, it is noted “No information is available”. Updated Habitat maps can be seen in Appendix C or interactively at the Gulf Council EFH 5-year Review Habitat Maps⁴.

Additionally, EFH text descriptions (Section 3.1.1) were refined using updated literature through 2024 to describe EFH by eco-region (Table 3.1.1), habitat zone (estuarine, nearshore, and offshore), and habitat type (Table 3.1.2). Should the Council select **Preferred Alternative 2**, the following EFH text descriptions and identification would be adopted into the FMP.

3.2.1 Reef Fish

Almaco jack

Almaco jack occur throughout the Gulf. Adults are benthopelagic and form small groups. Juveniles are frequently associated with floating objects, and eggs are water column associated.

Egg: Information is not available.

Larvae: Information is not available.

Post larvae: Information is not available.

Early juvenile: Gulf-wide (ER 1-5) in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column and drifting algae (*Sargassum*).

Late juvenile: Gulf-wide (ER 1-5) in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column and drifting algae (*Sargassum*).

Adult: Gulf-wide (ER 1-5) in offshore (greater than 60 feet [18m] in depth) habitats associated with the shelf edge, hard bottom/reef and banks/shoals.

⁴ https://gulfcouncilportal.shinyapps.io/EFH_5_year_Review_2025/

Spawning adult: Gulf-wide (ER 1-5) in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the shelf edge, hard bottom/reef, and banks/shoals.

Banded rudderfish

Banded rudderfish are broadly distributed in the eastern portion of the Gulf, and spawn in offshore waters of the eastern Gulf, the Yucatan Channel and Straits of Florida. Banded rudderfish are pelagic or epibenthic and confined to coastal waters over the continental shelf where they feed on fish and shrimps.

Egg: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column.

Larvae: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column.

Post larvae: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column and drifting algae (*Sargassum*).

Early juvenile: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column and drifting algae (*Sargassum*).

Late juvenile: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column and drifting algae (*Sargassum*).

Adult: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column.

Spawning adult: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column.
Spawning may occur in winter-spring and fall.

Blackfin snapper

Blackfin snapper are most concentrated in the eastern Gulf, off the West coast of Florida. Blackfin snapper tend to occupy the shelf edge habitats (130-1000 feet [40-300m]), where they feed on fish and crustaceans.

Egg: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitats associated with the water column.

Larvae: Information is not available.

Post larvae: Information is not available.

Early juvenile: ER 1 and ER 2 in in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with hard bottom/reefs.

Late juvenile: ER 1 and ER 2 in in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with hard bottom/reefs.

Adult: ER 1 and ER 2 in in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with hard bottom/reefs, shelf/slope edge, and sandy bottom.

Spawning adult: ER 1 and ER 2 in in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with hard bottom/reefs shelf/slope edge.

Black grouper

Egg: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth), most concentrated between 18-28m, and are associated with the water column.

Larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitats associated with the water column.

Post larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitats associated with the water column.

Early juvenile: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth), concentrated between 1-10m associated with submerged aquatic vegetation (SAV)

Late juvenile: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) concentrated between 10-19m associated with hard bottom/reef habitat and mangroves.

Adult: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) likely between 10-150m associated with hard bottom/reef habitat.

Spawning adult: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) likely between 18-28 associated with hard bottom/reef habitat and the shelf/slope edge.

Blueline tilefish

Blueline tilefish are distributed mainly on the eastern/southeastern Gulf and the Campeche Yucatan outer continental shelf, shelf edge and upper slope. Blueline tilefish are found over irregular bottom, including troughs and terraces, sand, mud and rubble, and shell hash, and may be associated with goldface tilefish and blackline tilefish.

Egg: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Post larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Early juvenile: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Late juvenile: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Adult: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 60-256m, and known to burrow at depths of 91-150m, and are associated with hard bottom/reefs, soft bottom, the shelf/edge, and sand/shell substrate.

Spawning adult: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the shelf/slope edge.

Cubera snapper

Cubera snapper are distributed mainly on the eastern/southeastern Gulf found in both shallow and deep reefs, wrecks (to at least 279 feet [85m] deep), and in mangroves. Two spawning sites have been recorded in the eastern Gulf: both wrecks located in 220-279 feet [67-85m] of water, off Key West and the Dry Tortugas, Florida.

Egg: ER 1 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 10-85m, associated with the water column.

Larvae: ER 1 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 33-279 feet [10-85m], associated with the water column.

Post larvae: ER 1 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 33-279 feet [10-85m], associated with the water column.

Early juvenile: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 33-279 feet [10-85m], associated with submerged aquatic vegetation, mangroves and emergent marsh.

Late juvenile: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 33-279 feet [10-85m], associated with submerged aquatic vegetation, mangroves and emergent marsh.

Adult: ER 1 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, > 279 feet [85m], associated with mangroves and hard bottom/reef habitats.

Spawning adult: ER 1 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, >279 feet [85m], associated with hard bottom/reef habitat, shelf/slope edge, and banks/shoals.

Gag grouper

Gag are demersal and most common in the eastern Gulf, especially the west Florida shelf. Adults occupy hard bottom/reefs substrates, including offshore reefs and wrecks, coral and live bottoms, and depressions and ledges. Spawning adults form aggregations in depths of 50-120m, with the densest aggregations occurring around the Big Bend area of Florida. Spawning occurs near the shelf edge break from December to May with a peak in the early spring (February-March) on the west Florida shelf. Madison-Swanson is a 298 square km (115 square mile) area, south of Panama City, Florida, containing high-relief hard bottom/reefs habitat, and is a known spawning ground for gag. Eggs are pelagic, occurring from December to April, with areas of greatest abundance offshore on the west Florida shelf. Larvae are pelagic and are most abundant in the early spring. Post-larvae and pelagic juveniles move through inlets into coastal lagoons and high salinity estuaries from April through May where they become benthic and settle into grass flats and oyster beds. Late juveniles move offshore in the fall to shallow reef habitat in depths of 0-165 feet [1-50m].

Egg: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated between 165-394 feet [50-120m], during winter and spring, and are associated with the water column.

Larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated between 165-394 feet [50-120m] during spring, and are associated with the water column.

Post larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated between 165-394 feet [50-120m], and are associated with the water column.

Early juvenile: ER 1, ER 2 and ER 3, in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats, concentrated between 0-40 feet [0-12m], associated with submerged aquatic vegetation (SAV) and mangroves.

Late juvenile: ER 1, ER 2, ER 3, and ER 4, in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats associated with submerged aquatic vegetation (SAV), hard bottom/reefs and mangroves.

Adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 43-328 feet [13-100m], associated with hard bottom/reefs.

Spawning adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 43-328 feet [13-100m], associated with the shelf/slope edge and hard bottom/reefs.

Goldface tilefish

Very little is known on habitat usage and distribution of goldface tilefish, but adults are thought to be distributed along the eastern Gulf, Florida Panhandle, and along the Alabama and Louisiana Coast.

Egg: Information is not available.

Larvae: Information is not available.

Post larvae: Information is not available.

Early juvenile: Information is not available.

Late juvenile: Information is not available.

Adult: ER 2 and ER 3 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with shelf/slope edge and soft bottom.

Spawning adult: Information is not available.

Goliath grouper

Goliath grouper are in the shallow waters of the eastern Gulf, and are most abundant on the southwest Florida. Younger adults are found inshore around docks, bridges and jetties, and reef crevices, while large adults prefer offshore ledges and wrecks. The species depth range in the Gulf is to 312 feet [95m], with the highest abundance at 6.5-180 feet [2-55m]. Early juveniles are found in bays and estuaries, inshore grass beds, canals, and mangroves. Larger juveniles are also found around ledges, reefs, and holes in shallow waters. Spawning occurs off southeast and southwest Florida, and other parts of the Gulf around offshore structures, wrecks and patch reefs (i.e. high-relief structures) at depths of 118-151 feet [36-46m] from June-December, with peaks in July and September.

Egg: ER 1 and ER 5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated between 118-151 feet [36-46m], and are associated with the water column.

Larvae: ER 1 and ER 5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated between 118-151 feet [36-46m], and are associated with the water column.

Post larvae: ER 1 and ER 5 in nearshore (60 feet [18m] or less in depth) habitat and are associated with mangroves.

Early juvenile: ER 1 and ER 5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats, and are associated with mangroves, submerged aquatic vegetation, and emergent marsh.

Late juvenile: ER 1 and ER 5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats, and are associated with mangroves, submerged aquatic vegetation, emergent marsh, and hard bottom/reef substrate.

Adult: ER 1 and ER 5 in nearshore (60 feet [18m] or less in depth) and habitats, and offshore (greater than 60 feet [18m] in depth) and are associated with hard bottom/reef substrate and banks/shoals.

Spawning adult: ER 1 and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) and are associated with hard bottom/reef substrate.

Gray snapper

Gray snapper occur in estuaries and shelf waters of the Gulf, and are particularly abundant in the Eastern Gulf off of southwest Florida. Gray snapper inhabits waters to depths of about 590 feet [180m] and are found in mangroves, sandy grass beds, hard bottom/reefs, and over sandy, muddy, and rocky bottoms.

Egg: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated between 0-590 feet [0-180m], and are associated with the water column.

Larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated between 0-590 feet [0-180m], and are associated with the water column.

Post larvae: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) habitat and are associated with submerged aquatic vegetation.

Early juvenile: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) habitat, and are associated with submerged aquatic vegetation, mangroves, and emergent marsh.

Late juvenile: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) and in nearshore (60 feet [18m] or less in depth) habitats, and are associated with submerged aquatic vegetation, mangroves, and emergent marsh.

Adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 0-590 feet [0-180m], and are associated with submerged aquatic vegetation, mangroves, emergent marsh, hard bottom/reefs, banks/shoals, and sand/shell substrate.

Spawning adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 0-590 feet [0-180m], and are associated with hard bottom/reefs and banks/shoals.

Gray triggerfish

Gray triggerfish are found Gulf-wide in all eco-regions at depths from 33-328 feet [10-100m]; they occupy habitat types including the water column, hard bottom/reefs, drifting algae(*Sargassum*).

Egg: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 33-328 feet [10-100m], and are associated with hard bottom/reefs.

Larvae: Gulf-wide ER 1-5 and are associated with offshore (greater than 60 feet [18m] in depth) habitats associated with the water column and drifting algae.

Post larvae: Gulf-wide ER 1-5 and are associated with offshore (greater than 60 feet [18m] in depth) habitats associated with the water column and drifting algae.

Early juvenile: Gulf-wide ER 1-5 and are associated with offshore (greater than 60 feet [18m] in depth) habitats associated with drifting algae.

Late juvenile: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 33-328 feet [10-100m], and are associated with hard bottom/reefs and drifting algae.

Adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 33-328 feet [10-100m], and are associated with hard bottom/reefs.

Spawning adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 33-328 feet [10-100m], and are associated with hard bottom/reefs.

Greater amberjack

Greater amberjack are found Gulf-wide, primarily offshore and have been documented in depths up to 614 feet [187 m]. All life stages can be water column associated, whereas late juveniles and adults are associated with hard bottom/reefs, and adults and spawning adults have been documented on reefs.

Egg: Gulf-wide ER 1-5 and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Post larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Early juvenile: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Late juvenile: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column and hard bottom/reefs.

Adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths < 614 feet [187m], and are associated with the water column, hard bottom/reefs, and banks/shoals.

Spawning adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column and hard bottom/reefs.

Hogfish

Hogfish are generally distributed in the Eastern Gulf along the west coast of Florida. Juveniles can be found in shallow seagrass beds in Florida Bay and adults are widely distributed on hard bottom/reefs and rocky flats.

Egg: ER 1 and ER 2 and are associated with the water column.

Larvae: ER 1 and ER 2 and are associated with the water column.

Post larvae: ER 1 and ER 2 and are associated with the water column.

Early juvenile: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) and in nearshore (60 feet [18m] or less in depth) habitats and are associated with submerged aquatic vegetation and hard bottom/reefs.

Late juvenile: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) and in nearshore (60 feet [18m] or less in depth) habitats and are associated with submerged aquatic vegetation and hard bottom/reefs.

Adult: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) and in nearshore (60 feet [18m] or less in depth) habitats and are associated with hard bottom/reefs.

Spawning adult: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) and in nearshore (60 feet [18m] or less in depth) habitats, and are associated sand and hard bottom/reefs.

Lane snapper

Lane snapper can be found Gulf-wide in most habitat zones. Juveniles and adults are found across most habitat types including submerged aquatic vegetation, sand/shell, hard bottom/reefs, soft bottom, banks/shoals, and mangroves. Adults occupy nearshore and offshore waters, at depths from 13-433 feet [4-132m] and temperature of 16-29°C.

Egg: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 13-433 feet [4-132m], and are associated with the water column.

Larvae: Gulf- wide ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Post larvae: Gulf- wide ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column and submerged aquatic vegetation habitat.

Early juvenile: Gulf- wide ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats. Associated habitat types are: submerged aquatic vegetation, sand/shell substrate, hard bottom/reefs, soft bottom, banks/shoals, and mangroves.

Late juvenile: Gulf- wide ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats. Associated habitat types are: submerged aquatic vegetation, sand/shell substrate, hard bottom/reefs, soft bottom, banks/shoals, and mangroves.

Adult: Gulf- wide ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats and are associated with sand/shell substrate and banks/shoals habitat.

Spawning adult: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with hard bottom/reefs and shelf /slope edge habitat.

Lesser amberjack

Lesser amberjack are found Gulf-wide in all eco-regions, but primarily are found in offshore waters. Depending on life stage, they occupy drifting algae, hard bottom/reef habitats, in depths of 180- 1141 feet [55-348m].

Egg: Information is not available.

Larvae: Information is not available.

Post larvae: Information is not available.

Early juvenile: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and are associate with drifting algae.

Late juvenile: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

Adult: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

Spawning adult: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

Mutton snapper

Mutton snapper occur in ER-1 and use primarily hard bottom/reef and submerged aquatic vegetation habitats depending on life stage, however spawning adults can be found on banks/shoals, hard bottom/reefs, and shelf edge/slope as well.

Egg: ER 1 and are associated with the water column.

Larvae: ER 1 and are associated with the water column.

Post larvae: ER 1 and are associated with the water column.

Early juvenile: ER 1 and are associated with the water column.

Late juvenile: ER 1 and are associated with the water column.

Adult: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth) habitats and are associated with submerged aquatic vegetation and hard bottom/reefs.

Spawning adult: ER 1 offshore (greater than 60 feet [18m] in depth) habitat, and are associated with banks/shoals, hard bottom/reefs, and shelf edge/ slope habitats.

Queen snapper

Queen snapper are found in the southeastern Gulf along the West Coast of Florida. Pre-settlement life stages are water column associated and are most prevalent from 0-328 feet [0-100 m], based on research in the Straits of Florida. Queen snapper settle to hard bottom/reefs, and data from the Caribbean suggests that adults also use shelf edge/slope habitat. Adult and spawning adult depth range is from 312-2231 feet [95-680m].

Egg: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Larvae: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Post larvae: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Early juvenile: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Late juvenile: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Adult: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with hard bottom/reefs and shelf/slope edge habitat.

Spawning adult: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Red grouper

Red grouper in the Gulf are found in the eastern portion of the Gulf, in nearshore and offshore waters from 0-328 feet [0-100m], and at temperatures from 59-86°F [15-30°C]. Early life stages are water column associated, and juveniles settle on submerged aquatic vegetation and hard bottom/reefs habitats. Red grouper move offshore with growth, and onto hard bottom/reefs. Adults have been documented spawning over hard bottom/reefs and shelf edge/slope habitats.

Egg: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 66-328 feet [20-100m], and are associated with the water column.

Larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, and are associated with the water column.

Post larvae: ER 1 and ER 2 and are associated with the water column.

Early juvenile: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) habitat and are associated with submerged aquatic vegetation and hard bottom/reefs.

Late juvenile: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, and are associated with hard bottom/reefs.

Adult: ER 1, ER 2, ER 3, and ER 4 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

Spawning adult: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with shelf /slope edge and hard bottom/reefs.

Red snapper

Red snapper occur Gulf-wide along the shelf. They are historically abundant on the Campeche Banks and are a predominate species in the northern Gulf. The species is demersal and is found over sandy and hard bottom/reefs, and artificial habitats from shallow water to 656 feet [200m], and possibly even beyond. Spawning occurs in offshore waters from May to October at depths of 59-121 feet [18-37m] over fine sand bottom. Eggs are found offshore in summer and fall. Larvae, post larvae and early juveniles are found July through December in shelf waters ranging in depth of 56-600 feet [17-183m]. Early and late juveniles are most often associated with shell and low relief structures but can be observed over barren sand and mud bottom. Late juveniles are found year-round at depths of 66-151 feet [20-46m]. Adults are concentrated off Yucatan, Texas, and Louisiana at depths of 23-479 feet [7-146] m and are most abundant at depths of 131-36 feet [40-110m]. They are commonly relying on habitat such as: submarine gullies and depressions, and over reefs, rock outcroppings, and shell/gravel bottoms.

Egg: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 59-413 feet [18-126m], and are associated with the water column.

Larvae: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 59-413 feet [18-126m], and are associated with the water column.

Post larvae: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 59-413 feet [18-126m], and are associated with the water column.

Early juvenile: Gulf- wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths between 59-413 feet [18-126m]. Associated habitat types are: hard bottom/reefs, banks/shoals, soft bottom, sand/shell substrate, shelf edge/slope.

Late juvenile: Gulf- wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths between 59-413 feet [18-126m]. Associated habitat types are: hard bottom/reefs, banks/shoals, soft bottom, sand/shell substrate, shelf edge/slope.

Adult: Gulf- wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths between 59-413 feet [18-126m]. Associated habitat types are: hard bottom/reefs, banks/shoals, and shelf edge/slope.

Spawning adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths between 59-413 feet [18-126m], and are associated with sandy/shell substrate and banks/shoals.

Scamp

Scamp widely distributed Gulf-wide ER 1-5⁵, predominately off the west coast of Florida, and are found in both nearshore and offshore waters from depths of 39-620 feet [12-189m]. Adults use hard bottom/reef habitats and spawn on the shelf edge/slope whereas early life stages are found in the water column.

Egg: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 197-620 feet [60-189m], and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 197-620 feet [60-189m], and are associated with the water column.

Post larvae: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths between 197-620 feet [60-189m], and are associated with the water column.

Early juvenile: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

⁵ Gulf-wide distribution per [October 2025 SSC recommendation](#).

Late juvenile: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

Adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths between 39-620 feet [12-189m], and are associated with hard bottom/reefs.

Spawning adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths 197-620 feet [12-189m], and are associated with the shelf /slope edge, and hard bottom/reefs.

Silk snapper

Silk Snapper are distributed along the Southeastern portion of the Gulf, along the west coast of Florida. Silk snapper is a deeper water species that occupies offshore waters and are found near the edge of continental and island shelves, usually ascending to shallower waters at night. It is common between 295-459 feet [90-140m] but can be found in waters up to 656 feet [200m]. Very little habitat information is known about life stages other than adults.

Egg: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Larvae: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Post larvae: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Early juvenile: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Late juvenile: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Adult: ER 1 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths 295-656 feet [90-200m] and are associated with the shelf edge/slope, soft bottom, and hard bottom/reefs.

Spawning adult: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Snowy grouper

Snowy grouper are found in largest numbers in deep waters off of South Florida and the northwestern coast of Cuba. Adults commonly occur on hard bottom/reefs (particularly Florida *Oculina* reefs) in waters with depths from 98-1722 feet [30-525m] and are often found with other deep-water species such as yellowedge grouper and tilefishes.

Eggs: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 98-1722 feet [30-525m], and are associated with the water column.

Larvae: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 98-1722 feet [30-525m], and are associated with the water column.

Post Larvae: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 98-1722 feet [30-525m], and are associated with the water column.

Early Juveniles: ER 1 in nearshore (60 feet [18m] or less in depth) habitat, depth <3.1 feet [1m], and are associated with hard bottom/reefs.

Late Juvenile: ER 1 in nearshore (60 feet [18m] or less in depth) habitat, depth <3.1 feet [1m], and are associated with hard bottom/reefs.

Adult: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 98-1722 feet [30-525m], and are associated with the shelf/slope edge, and hard bottom/reefs.

Spawning Adult: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 98-1722 feet [30-525m], and are associated with the shelf edge/slope and hard bottom/reefs.

Speckled hind

Speckled hind is a deep-water grouper distributed in the north and eastern Gulf on offshore hard bottom/reefs habitats, including rocky bottoms, and both high- and low-profile hard bottom/reefs. Speckled hind occur between 82-600 feet [25-183m] and are most common at 196-394 feet [60-120m] depth. Juveniles are most commonly found in the shallow portion of the depth range.

Egg: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 131-600 feet [40-183m], and are associated with the water column.

Larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 131-600 feet [40-183m], and are associated with the water column.

Post Larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 131-600 feet [40-183m], and are associated with the water column.

Early Juvenile: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 82-600 feet [25-183m], and are associated with hard bottom/reefs.

Late Juvenile: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 82-600 feet [25-183m], and are associated with hard bottom/reefs.

Adult: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 82-600 feet [25-183m], and are associated with hard bottom/reefs.

Spawning Adult: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 144-600 feet [44-183m], and are associated with the shelf/slope edge.

Tilefish

Tilefish occur throughout the deeper waters of the Gulf. The species is demersal, occurring at depths from 262-1476 feet [80-450m], but is most commonly found between depths of 820-1148 feet [250-350m]. Preferred habitats are soft bottom (particularly malleable clay), on the shelf edge/slope. Eggs and larvae are pelagic; early juveniles recruit to benthic habitats with age. Late juveniles burrow and occupy shafts in the substrate. Adults also burrow along the outer continental shelf and on flanks of submarine canyons.

Egg: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-1476 feet [80-450m], and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-1476 feet [80-450m], and are associated with the water column.

Post Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-1476 feet [80-450m], and are associated with the water column.

Early Juvenile: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-1476 feet [80-450m], and are associated with the water column.

Late Juvenile: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-1476 feet [80-450m], and are associated with shelf /slope edge, and soft bottom habitat.

Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-1476 feet [80-450m], and are associated with shelf /slope edge, and soft bottom habitat.

Spawning Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-1476 feet [80-450m], and are associated with shelf/slope edge, and soft bottom habitat.

Vermilion snapper

Vermilion snapper are found throughout the shelf areas of the Gulf. The species is demersal, occurring over hard bottom/reefs from depths of 59-328 feet [18-100m]. Spawning occurs from May to September in offshore waters.

Egg: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Post Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Early Juvenile: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 59-328 feet [18-100m], and are associated with hard bottom/reefs.

Late Juvenile: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 59-328 feet [18-100m], and are associated with hard bottom/reefs.

Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 59-328 feet [18-100m], and are associated with banks/shoals and hard bottom/reefs.

Spawning Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat.

Warsaw grouper

Warsaw grouper are a deep-water species distributed throughout the Gulf, in association with hard bottom/reefs. They occur from 131-1722 feet [40-525m], more commonly down to 250 m, and prefer rough, rocky bottoms with high profiles such as steep cliffs and rocky ledges.

Egg: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 131-1722 feet [40-525m], and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 131-1722 feet [40-525m], and are associated with the water column.

Post Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 131-1722 feet [40-525m], and are associated with the water column.

Early Juvenile: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat.

Late Juvenile: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths >656 feet [200m], and are associated with hard bottom/reefs.

Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 131-1722 feet [40-525m], and are associated with the shelf /slope edge and hard bottom/reefs.

Spawning Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 131-1722 feet [40-525m], and are associated with the shelf /slope edge and hard bottom/reefs.

Wenchman

Wenchman are distributed Gulf-wide ER 1-5⁶ and occupy hard bottom/reef habitat of the mid to outer shelf where they feed mainly on small fish; they are found at depths ranging from 62-1578 feet [19-481m], but are most abundant between 262-656 feet [80-200m].

Egg: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-656 feet [80-200m], and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-656 feet [80-200m], and are associated with the water column.

Post Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth).

Early Juvenile: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth).

Late Juvenile Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth).

Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 62-1578 feet [19-481m], and are associated with shelf edge/slope and hard bottom/reefs habitat.

Spawning Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-656 feet [80-200m], and are associated with the shelf edge/slope.

Yellowedge grouper

Yellowedge grouper are a deep water species found throughout the Gulf continental shelf, with areas of high abundance off of Texas and west Florida. On the outer continental shelf in the eastern Gulf, the species occupies high relief hard bottom/reefs, rocky out-croppings and are often found co-occurring with snowy grouper and tilefish. In the central and western Gulf, adult yellowedge grouper occupy hard bottom/reefs where available, but also burrow in soft bottom habitat. The species depth range is from 115-1214 feet [35-370m] with adults most common in waters greater than 591 feet [180m] deep. Juveniles occupy a shallower depth range of 30-361 feet [9-110m].

Egg: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 115-1214 feet [35-370m], and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 115-1214 feet [35-370m], and are associated with the water column.

⁶ Gulf-wide distribution per [October 2025 SSC recommendation](#).

Post Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 115-1214 feet [35-370m], and are associated with the water column.

Early Juvenile: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths between 30-361 feet [9-110m].

Late Juvenile: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths between 30-361 feet [9-110m], and are associated with hard bottom/reefs habitat.

Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 115-1214 feet [35-370m], and are associated with the shelf edge/slope, hard bottom/reefs, and soft bottom habitat.

Spawning Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 115-1214 feet [35-370m], and are associated with the shelf /slope edge and hard bottom/reefs.

Yellowfin grouper

Yellowfin grouper is not common in the Gulf, occurring primarily in the southeastern Gulf and West Indies. Habitat is comprised hard bottom/reefs from the shoreline to mid-shelf depths. Juveniles occupy shallow seagrass beds and move to deeper rocky bottoms with growth.

Egg: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Larvae: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Post Larvae: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Early Juvenile: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth) habitats and are associated with submerged aquatic vegetation.

Late Juvenile: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth) habitats and are associated with submerged aquatic vegetation and hard bottom/reefs.

Adult: ER 1 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

Spawning Adult: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the shelf/slope edge and hard bottom/reefs.

Yellowmouth grouper

Yellowmouth grouper occur off of the Campeche Banks, the west coast of Florida, Texas Flower Garden Banks National Marine Sanctuary, and the northwest coast of Cuba. Yellowmouth grouper occupy hard bottom/reefs, and juveniles commonly occur in mangrove-lined lagoons and move into deeper water as they grow.

Egg: ER 1 and ER 5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 66-620 feet [20-189m], and are associated with the water column.

Larvae: ER 1 and ER 5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 66-620 feet [20-189m], and are associated with the water column.

Post Larvae: ER 1 and ER 5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 66-620 feet [20-189m], and are associated with the water column.

Early Juvenile: ER 1 and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with mangrove habitat.

Late Juvenile: ER 1 and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with mangrove habitat.

Adult: ER 1, ER 2, ER 4, and ER 5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 66-620 feet [20-189m], and are associated with banks/shoals and hard bottom/reefs.

Spawning Adult: ER 1, ER 2, and ER 5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 66-620 feet [20-189m], and are associated with the water column.

Yellowtail snapper

Yellowtail snapper are distributed throughout the southeastern portion of the Gulf, along the shelf, but are most common off central and southern Florida. This species occurs over hard bottom/reefs and near the edge of shelves and banks. Juveniles are found in nearshore nursery areas over vegetated sandy substrate and in muddy shallow bays. Submerged aquatic vegetation, *Thalassia* spp. beds and mangrove roots are apparent preferred habitat for early juveniles. Late juveniles apparently select shallow reef areas as primary habitat. Adults are found from shallow waters to depths of 600 feet [183m] but generally are taken in less than 164 feet [50m] depths. Adults are considered to be semi-pelagic wanderers over reef habitat.

Egg: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Larvae: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Post Larvae: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Early Juvenile: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats and are associated with submerged aquatic vegetation and mangrove habitat.

Late Juvenile: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

Adult: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

Spawning Adult: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats.

3.2.2 Coastal Migratory Pelagics

Cobia

Cobia are found in coastal and offshore waters (from bays and inlets to the continental shelf) from depths of 1-70 m. Spawning occurs in coastal waters from April through September at temperatures ranging from 23-28 °C. Cobia migrate seasonally, similar to other coastal pelagic species in the same family. Eggs are found in the top meter of the water column, drifting with the currents. Larvae are found in surface waters of the northern Gulf, where they likely feed on zooplankton. Juveniles occur in coastal and offshore waters.

Egg: ER 2, ER 3, ER 4, and ER 5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats concentrated in depths <1m and are associated with the water column.

Larvae: ER 2, ER 3, and ER 4, and ER 5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Post Larvae: ER 3, ER 4, and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Early Juvenile: ER 3, ER 4, and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Late Juvenile: ER 3, ER 4, and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 1-70m, and are associated with the water column.

Adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 1-70m, and are associated with the water column and banks/shoals.

Spawning Adult: ER 3, ER 4, and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 1-70m, and are associated with the water column.

King mackerel

King mackerel are widespread throughout the Gulf, with centers of distribution in south Florida and Louisiana. Adults are water column associated and can be found over reefs and in coastal waters, although they rarely enter estuaries. While adults can be found at the shelf edge in depths to 200 m, they generally occur in less than 80 m, at oceanic salinities from 32-36 ppt. Adults spawn over the outer continental shelf from May to October, with the northwestern and northeastern Gulf considered important spawning areas. The pelagic eggs are found offshore over depths of 35-180 m in spring and summer. Larvae occur over the middle and outer continental shelf, principally in the north central and northwestern Gulf, and juveniles are found from inshore to the middle shelf. Migrations to the northern Gulf in the spring are thought to be temperature dependent, and the species is found in highest abundances in waters with temperatures greater than 20°C.

Egg: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 35-180m , and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 35-180m , and are associated with the water column.

Post Larvae: Information not available.

Early Juvenile: ER 3, ER 4, and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Late Juvenile: ER 3, ER 4, and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Spawning Adult: ER 3, ER 4, and ER 5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 35-180m, and are associated with the water column.

Spanish mackerel

Spanish mackerel occur throughout the coastal zones of the western Atlantic from southern New England to the Florida Keys and Gulf-wide ER 1-5⁷. Adults are found in coastal waters, and may enter estuaries in pursuit of baitfish. Migrations to the northern Gulf in the spring are

⁷ Gulf-wide distribution per [October 2025 SSC recommendation](#).

temperature dependent, and the species is found in waters greater than 20°C, and out to depths of 75 m at oceanic salinities. Adults spawn over the inner continental shelf from May to September, with the north-central and northeastern Gulf considered important spawning areas. Eggs occur over the inner continental shelf at depths less than 50 m in spring and summer. Larvae occur over the inner continental shelf, principally in the northern Gulf.

Egg: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats concentrated at depths 1-84m, and are associated with the water column.

Post Larvae: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats concentrated at depths 1-84m, and are associated with the water column.

Early Juvenile: Gulf-wide ER 1-5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats concentrated at depths 1.8-9m, and are associated with the water column and sandy bottom habitat.

Late Juvenile: Gulf-wide ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats concentrated at depths 1.8-50m, and are associated with the water column and sandy bottom habitat.

Adult: Gulf-wide ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats concentrated at depths 3-75m, and are associated with the water column.

Spawning Adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

3.2.3 Shrimp

Brown shrimp

Brown shrimp are found within estuaries to offshore depths of 110 m in the Gulf, ranging mainly from Apalachicola Bay to the Yucatan Peninsula. Brown shrimp spatial distributions are affected by hypoxia rely on wetland and marsh habitat.

Fertilized eggs: ER 3, ER 4, and ER 5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths between 18-110m, associated with soft bottom, and sand/shell substrate.

Larvae/ Pre-settlement Post larvae: ER 3, ER 4, and ER 5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet

[18m] in depth) habitats, concentrated in depths between 0-82m, associated with the water column.

Late post larvae/ Early juvenile: ER 3, ER 4, and ER 5 in estuarine (inside barrier islands and estuaries) habitats, concentrated in depths < 1m, associated with submerged aquatic vegetation, emergent marsh, oyster reef, soft bottom and sand/shell substrate.

Sub Adults (Late Juvenile): ER 3, ER 4, and ER 5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats, associated with soft bottom and sand/shell substrate.

Adults: Gulf-wide in ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths between 10-37m, associated with soft bottom, mangroves and sand/shell substrate.

Spawning adults: ER 3, ER4, and ER 5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths between 18-110m, associated with soft bottom, mangroves and sand/shell substrate.

Pink shrimp

Pink shrimp are widespread throughout the Gulf in estuaries and to depths of 110 m (most abundant less than 50 m) and are the dominant shrimp species off South Florida. Pink shrimp post larvae migrate into the estuaries at night, primarily during the spring and fall, usually on flood tides through passes or open shoreline. Post larval and juvenile pink shrimp are commonly found in seagrass habitats where they burrow into the substrate by day and emerge to feed at night. Pink shrimp densities are highest in or near seagrasses, low in mangroves, and near zero or absent in marshes. They prefer calcareous-type sediments found most commonly in Florida and sand/shell mud mixtures.

Fertilized eggs: ER 1, ER 2, ER 3 and ER 5 in offshore (greater than 60 feet [18m] in depth) habitats and are associated with soft bottom and sand/shell substrate.

Larvae/ Pre-settlement Post larvae: ER 1, ER 2, ER 3, and ER 5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths between 1-50m, associated with the water column.

Late post larvae/ Early juvenile: ER 1, ER 2, ER 3, and ER 5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats, concentrated in depths 0-3m, associated with submerged aquatic vegetation, soft bottom, mangroves, and sand/shell substrate.

Sub Adults (Late Juvenile): ER 1, ER 2, ER 3, and ER 5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 1-65m, associated with submerged aquatic vegetation, soft bottom, mangroves, oyster reefs, and sand/shell substrate.

Adults: ER 1, ER 2, ER 3, and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 1-110m, associated with submerged aquatic vegetation, mangroves, and sand/shell substrate.

Spawning adults: ER 1, ER 2, ER 3, and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 9-48m, associated with submerged aquatic vegetation, mangroves, and sand/shell substrate.

Royal red shrimp

This species spends its entire life cycle in open Gulf waters, may have up to five year classes occurring together, and lives in a relatively stable environment. In addition, no mature during year the first year (i.e., age 0). Royal red shrimp occupy habitat along the upper continental shelf at depths between 140 and 730 m. Royal red shrimp are less common in depths less than 250 m and greater than 500 m. The highest concentration has been reported in the northeastern part of the Gulf at depths between 250 and 475 m.

Fertilized eggs: ER 1 and ER 3 in offshore (greater than 60 feet [18m] in depth) habitats and are associated with the shelf/slope edge.

Larvae/ Pre-settlement Post larvae: Information not available.

Late post larvae/ Early juvenile: Information not available.

Sub Adults (Late Juvenile): Information not available.

Adults: Gulf-wide ER 1-5 offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 140-750m, associated with the shelf/slope edge, soft bottom, and sand/shell substrate.

Spawning adults: Gulf-wide ER 1-5 offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 250-550m, associated with the shelf/slope edge.

White shrimp

White shrimp are found in estuaries and out to depths of 40 m (but usually less than 27 m) from Florida's Big Bend through Texas. White shrimp spawn in depths between 9-34 m (but usually less than 27 m) from spring through fall. White shrimp post larvae enter estuaries through passes from May through November with peaks in June and September. White shrimp migration is in the upper two meters of the water column at night and at mid-depths during the day. Post larvae and juveniles inhabit mostly mud and peat bottoms with large amounts of decaying matter or vegetative cover, and they tend to be more active during the day than brown. Sub-adult white shrimp leave estuaries in late August and September on ebb tides during full moons (Whitaker 1982), and the timing appears to be related to shrimp size and environmental conditions (e.g., sharp temperature drops in fall and winter). Adult white shrimp inhabit nearshore Gulf waters to depths less than 30 m on bottoms of soft mud or silt.

Fertilized eggs: ER 2, ER 3, ER 4, and ER 5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats.

Larvae/ Pre-settlement Post larvae: ER 2, ER 3, ER 4, and ER 5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats.

Late post larvae/ Early juvenile: ER 3, ER 4, and ER 5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats, concentrated in depths <5m, associated with submerged aquatic vegetation, emergent marsh, oyster reef, soft bottom and mangrove habitat.

Sub Adults (Late Juvenile): ER 2, ER 3, ER 4, and ER 5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats and are associated with soft bottom and sand/shell substrate.

Adults: Gulf-wide in ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths between <27m, associated with soft bottom substrate.

Spawning adults: Gulf-wide in ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats and are associated with soft bottom habitat.

3.2.4 Red Drum

Red drum

Red drum are distributed throughout the Gulf. Depending on life stage, they are found from estuarine to offshore waters and occur over a variety of habitat types including submerged aquatic vegetation, soft bottom, hard bottom/reefs, emergent marsh, sand/shell, and early life stages are water column associated.

Egg: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and is associated with the water column.

Larvae: Gulf-wide ER 1-5 in estuarine (inside barrier islands and estuaries), habitat, concentrated at depths between 18-31m, and are associated with submerged aquatic vegetation, soft bottom substrate and the water column.

Post Larvae: Gulf-wide ER 1-5 in estuarine (inside barrier islands and estuaries) habitat, concentrated at depths between 18-31m, and are associated with submerged aquatic vegetation, emergent marsh, soft bottom and sand/shell substrate.

Early Juvenile: Gulf-wide ER 1-5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats and are associated with submerged aquatic vegetation, emergent marsh, and soft bottom substrate.

Late Juvenile: Gulf-wide ER 1-5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats and are associated with submerged aquatic vegetation, soft bottom, hard bottom/reefs and sand/shell substrate.

Adult: Gulf-wide ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths 1-70m, and are associated with submerged aquatic vegetation, emergent marsh, soft bottom, hard bottom/reefs and sand/shell substrate.

Spawning Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths 40-70m, and are associated with submerged aquatic vegetation, soft bottom, hard bottom/reefs and sand/shell substrate.

3.2.5 Spiny Lobster

Spiny lobster

Spiny Lobster are primarily found along the southwest coast of Florida. The principal habitats used by spiny lobster are offshore hard bottom/reefs and seagrasses to depths of 80 m or more with the South Florida Reef Tract appears to be the most important feature for spiny lobster. Areas of high relief on the continental shelf serve as spiny lobster habitat and include hard bottom/reefs, ledges and caves, sloping soft-bottom areas, and limestone outcroppings.

Phyllosome Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and is associated with the water column.

Puerulus postlarvae: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats, and are associated with submerged aquatic vegetation and the water column.

Early Juvenile: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats, and are associated with submerged aquatic vegetation and hard bottom/reefs.

Late Juvenile: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats, and are associated with submerged aquatic vegetation and hard bottom/reefs.

Adult: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats, and are associated with submerged aquatic vegetation and hard bottom/reefs.

CHAPTER 4. IMPACTS OF THE ALTERNATIVES

The essential fish habitat (EFH) Guidelines (50 CFR 600.759 Subpart J) direct the Council to define EFH with the best scientific information available, including peer-reviewed literature, unpublished scientific reports, data files of government resource agencies, fisheries landing reports, and other sources of information. For this generic amendment, the Gulf Council relied on the assessment of advisory bodies to review the data and methods used to review and, if necessary, revise descriptions of EFH in the exclusive economic zone (EEZ) of the Gulf of America (Gulf).

This amendment to the descriptions and identification of EFH included in the various FMPs would not substantively change the impacts of designation of EFH as analyzed in the 2004 EFH EIS (GMFMC 2004). While EFH text and map descriptions would be updated for the species' life stages in the five FMPs under review, other management measures would not change. The total extent of EFH proposed in this amendment is unchanged compared to previous definitions because almost all waters are identified as EFH for at least one life stage of one species. This is due to broad fish distribution patterns, diverse habitat requirements, and the large number of species managed.

The affected environment, fishing impacts, and cumulative effects analyses from the 2004 EFH EIS (GMFMC 2004) is incorporated by reference into this analysis. **Preferred Alternative 2** would result in updating and creating EFH descriptions and identifications, to incorporate more recent information and improve mapping for species. Many of which, have not been updated since existing descriptions and identifications were established in the 2004 FEIS (GMFMC 2004). **Preferred Alternative 2** is consistent with recommendations from the scientific and statistical committee (SSC)⁸, and other experts with access to the best available scientific information and other data and using peer-reviewed models and tools. None of the proposed changes would require regulatory action. No new habitat areas of particular concern are being proposed.

4.1 Physical Environment

General Description of the Physical Environment

The physical environment for the Gulf is detailed in the 2004 EFH EIS (GMFMC 2004), Generic EFH Amendment 3 (GMFMC 2005), and the Generic Annual Catch Limit/Accountability Measure (ACL/AM) Amendment (GMFMC 2011), which are incorporated by reference and summarized below.

The Gulf has a total area of approximately 600,000 square miles (1.5 million km²), including state waters (Gore 1992). It is a semi-enclosed, oceanic basin connected to the Atlantic Ocean by the Straits of Florida and to the Caribbean Sea by the Yucatan Channel (Figure 4.1.1). Oceanographic conditions are affected by the Loop Current, discharge of freshwater into the northern Gulf, and a semi-permanent, anti-cyclonic gyre in the western Gulf. The Gulf includes

⁸ [October 2025 SSC Report](#)

both temperate and tropical waters (McEachran and Fechhelm 2005). Gulf water temperatures range from 54° F to 84° F (12° C to 29° C) depending on time of year and depth of water. Mean annual sea surface temperatures ranged from 73° F through 83° F (23-28° C), including bays and bayous (Figure 4.1.1), between 1982 and 2009, according to satellite-derived measurements (NODC 2011). In general, mean sea surface temperature increases from north to south with large seasonal variations in shallow waters.

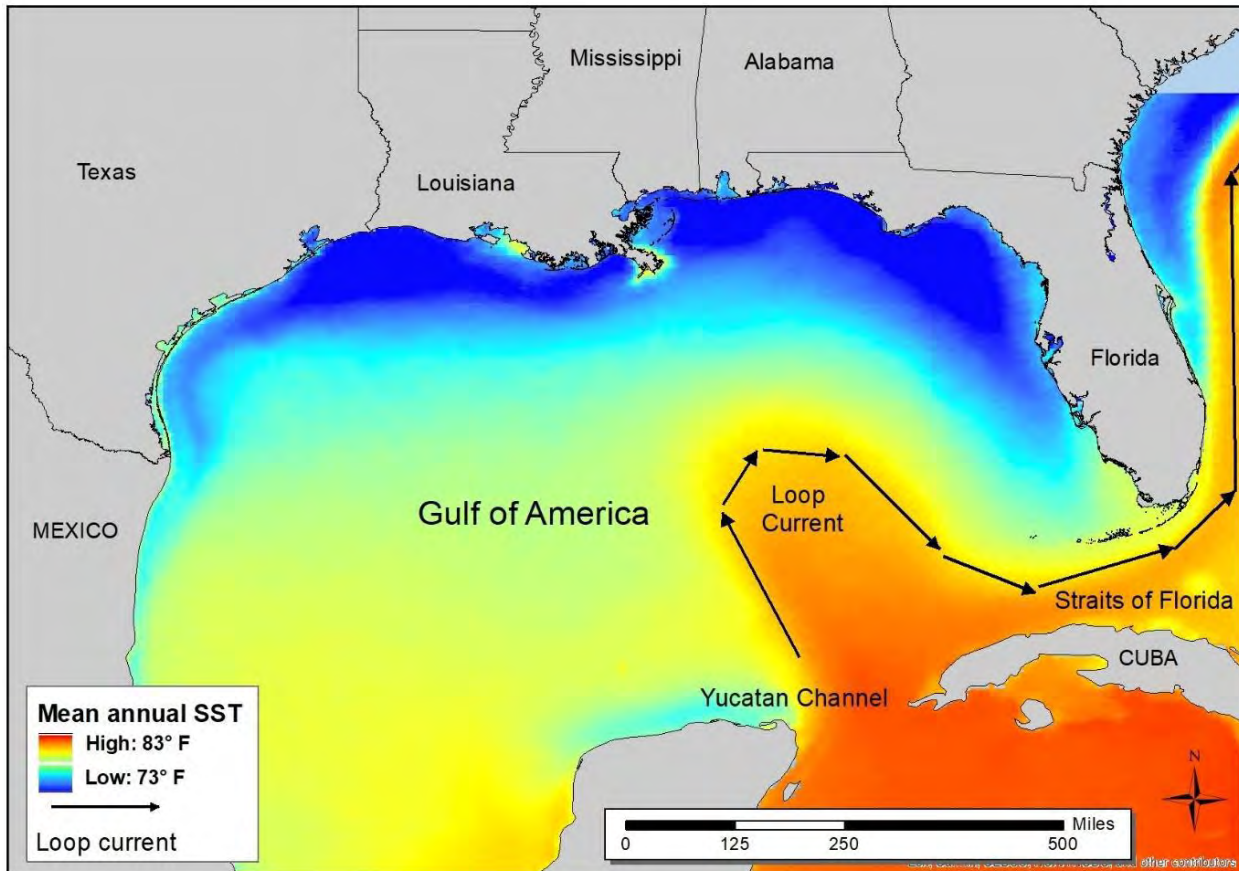


Figure 4.1.1. Mean annual sea surface temperature derived from the Advanced Very High-Resolution Radiometer Pathfinder Version 5 sea surface temperature data set⁹.

Habitat Areas of Particular Concern (HAPC) and Environmental Sites of Special Interest

Detailed information pertaining to established HAPCs is provided in Generic Amendment 3 (GMFMC 2005) and Amendment 9 to the Fishery Management Plan for the Coral and Coral Reefs of the Gulf, U.S. Waters (GMFMC 2018). There are currently several closures and marine reserves identified:

1. Longline/Buoy Gear Area Closure – A permanent reef fish closure inshore of 20 fathoms off the Florida shelf from September through May, inshore of 35 fathoms off the Florida shelf from June through August, and inshore of 50 fathoms year round for the remainder of the Gulf (72,300 square nautical miles).

⁹ <http://pathfinder.nodc.noaa.gov/>

2. Madison/Swanson and Steamboat Lumps Marine Reserves - No-take marine reserves sited on gag spawning aggregation areas where all fishing except for surface trolling during May through October is prohibited (219 square nautical miles).
3. The Edges – No-take area closure from January 1 to April 30. All commercial and recreational fishing or possession of fish managed by the Council is prohibited. The intent of the closure is to protect gag and other groupers during their respective spawning seasons. Possession is allowed when transiting the area if gear is stowed in accordance with federal regulations. The boundaries of the closed area are: Northwest corner = 28° 51'N, 85° 16'W; Northeast corner = 28° 51'N, 85° 04'W; Southwest corner = 28° 14'N, 84° 54'W; Southeast corner = 28° 14'N, 84° 42'W.
4. Tortugas North and South Marine Reserves - No-take marine reserves cooperatively implemented by the state of Florida, National Ocean Service (NOS), the Council, and the National Park Service (see jurisdiction on chart) (185 square nautical miles). In addition, Generic Amendment 3 for addressing Essential Fish Habitat requirements, Habitat Areas of Particular Concern (HAPC), and adverse effects of fishing prohibited the use of anchors in these HAPCs in the following Fishery Management Plans (FMPs) of the Gulf: Shrimp, Red Drum, Reef Fish, Stone Crab, Coral and Coral Reefs in the Gulf; and Spiny Lobster and the Coastal Migratory Pelagic resources of the Gulf and South Atlantic.
5. Stressed Areas for Reef Fish - Permanent closure Gulf-wide of the near shore waters to use of fish traps, power heads, and roller trawls (i.e., “rock hopper trawls”) (48,400 square nautical miles).
6. Alabama Special Management Zone - In the Alabama special management zone, fishing by a vessel operating as a charter vessel or head boat, a vessel that does not have a commercial permit for Gulf reef fish, or a vessel with such a permit fishing for Gulf reef fish, is limited to hook-and-line gear with no more than three hooks. Nonconforming gear is restricted to bag limits, or for reef fish without a bag limit, to 5% by weight of all fish aboard.

Individual reef areas and bank HAPCs of the northwestern Gulf include: East and West Flower Garden Banks, Stetson Bank, Sonnier Bank, MacNeil Bank, 29 Fathom, Rankin Bright Bank, Geyer Bank, McGrail Bank, Bouma Bank, Rezak Sidner Bank, Alderice Bank, and Jakkula Bank. Bottom anchoring and the use of trawling gear, bottom longlines, buoy gear, and all traps/pots on coral reefs are prohibited in the East and West Flower Garden Banks, McGrail Bank, and on the significant coral resources on Stetson Bank.

1. Florida Middle Grounds HAPC - Pristine soft coral area protected from use of any fishing gear interfacing with bottom (348 square nautical miles).
2. Pulley Ridge HAPC - A portion of the HAPC where deep-water hermatypic coral reefs are found is closed to anchoring and the use of trawling gear, bottom longlines, buoy gear, and all traps/pots (2,300 square nautical miles).

For additional detailed information pertaining to the Gulf area closures and marine reserves is provided in Amendment 32 to the Reef Fish FMP (GMFMC 2011), and Amendment 9 to the Fishery Management Plan for the Coral and Coral Reefs of the Gulf, U.S. Waters (GMFMC 2018).

Northern Gulf Hypoxic Zone

A large hypoxic zone forms every summer in the northern Gulf. It is the result of allochthonous materials and runoff from agricultural lands resulting in increasing nutrient inputs to multiple rivers. These tributaries feed into the Mississippi River, which disperses to the Gulf, and creates a temperature and salinity dependent layering of waters. The nutrient rich fresh waters from the Mississippi create seasonal, large algal blooms at the surface that eventually die, sink to the bottom, and decompose. This creates the oxygen-poor, hypoxic, bottom water layer unless front or storm events occur, which allow for mixing of the layers (Rabalais and Turner 2019). Mapping of the hypoxic zone began in 1985. For 2025, the extent of the hypoxic area was 4,402 square miles, almost double what it was in 2020 (2,116 square miles), but still less than the extent of the 2017 hypoxic area (8,776 square miles). The changes in hypoxic area can be attributed to changing amounts of river discharge and its associated nutrient load and storm events. The major factor for the reduced size in 2020 was the active storm season with Hurricane Hanna passing right over the zone, allowing for mixing of the waters. The 2021 hypoxic area was higher than the 5-year hypoxic area average (5,408 square miles) and much larger than the 1,930 square mile goal set by the Interagency Mississippi River and Gulf of America Hypoxia Task Force to be reached by 2035¹⁰.

The hypoxic conditions in the northern Gulf directly impact less mobile benthic macroinvertebrates (e.g., polychaetes) by influencing density, species richness, and community composition (Baustian and Rabalais 2009; Breitburg et al. 2018). More mobile macroinvertebrates and demersal fishes are able to detect lower dissolved oxygen levels and move away from hypoxic conditions. Thus, these organisms are indirectly affected by limited prey availability and constrained available habitat (Baustian and Rabalais 2009; Craig 2012).

Environmental Variability

Projections predict increases in sea-surface temperature and sea level; decreases in sea-ice cover; and changes in salinity, wave climate, and ocean circulation. These changes are likely to affect plankton biomass and fish larvae abundance that could adversely impact fish, marine mammals, seabirds, and ocean biodiversity. Global climate variation may affect temperature changes in coastal and marine ecosystems that can influence organism metabolism and alter ecological processes such as productivity and species interactions; change precipitation patterns and cause a rise in sea level which could change the water balance of coastal ecosystems; altering patterns of wind and water circulation in the ocean environment; and influence the productivity of critical coastal ecosystems such as wetlands, estuaries, and coral reefs (Kennedy et al. 2002, Osgood 2008). The National Oceanic and Atmospheric Association (NOAA) Climate Web Portal predicts the average sea surface temperature in the Gulf will increase by approximately 2°C for 2006-2100 compared to the average sea surface temperature from 1956-2005.

¹⁰ <http://gulfhypoxia.net>

4.1.1 Effects on the Physical Environment

Preferred Alternative 2 ensures the best scientific information is used to describe and identify EFH in the Gulf but does not impact the distribution of the fisheries, fisheries effort, or specific fishing gear types that may interact with physical habitat.

Updated habitat information under **Preferred Alternative 2** would establish better information on habitat availability and prey distribution for managed species, particularly in those environments experiencing continued exposure to hypoxic conditions. No changes to current HAPC designations are made during this review, as a result there are no impacts to HAPC sites under the proposed **Preferred Alternative 2**.

4.2 Biological/Ecological Environment

The biological environment of the Gulf is described in detail in the Generic EFH Amendment (GMFMC 2004), Generic ACL/AM Amendment (GMFMC 2011), Reef Fish Amendments 30B (GMFMC 2008), and in Reef Fish Amendment 53 (GMFMC 2021), and are incorporated here by reference and summarized below. This amendment has includes the biological and habitat associations for all species in the reef fish, coastal migratory pelagic, red drum, spiny lobster, and shrimp FMPs across 7 different life stages (Chapter 3, Appendix A, Appendix C). For those species, the proposed action would update habitat association information, including habitat preference across habitat zones (inshore, nearshore and offshore) across 10 different defined habitat types.

General Description of Protected Species

The National Marine Fisheries Services (NMFS) manages marine protected species in the Southeast region under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). A brief summary of these two laws and more information is available on NMFS Office of Protected Resources website¹¹. ESA-listed species of marine mammals, sea turtles, fish, and corals occur in the EEZ of the Gulf. There are numerous stocks of marine mammals managed within the Southeast region. All marine mammals in U.S. waters are protected under the MMPA.

There are two ESA-listed endangered whale species that regularly occur in the Gulf of Mexico: the sperm whale and the Rice's whale¹². Rice's whales are the only resident baleen whales in the Gulf. Three other endangered whale species (blue, sei, and fin whales) are considered extralimital in the Gulf and do not have established breeding, feeding, or migratory habitats in the Gulf of Mexico. Their occurrence is considered rare, unpredictable, and outside their normal geographic range. Additionally, the West Indian manatee, listed as threatened under the ESA,

¹¹ <https://www.fisheries.noaa.gov/about/office-protected-resources>

¹² The Rice's whale (*Balaenoptera ricei*) was previously classified as the Gulf Bryde's whale but was later identified as morphologically and genetically distinct from other whales under the Bryde's whale complex, warranting classification as a new species of baleen whale living in the Gulf.

occurs in coastal Gulf waters and is the only marine mammal species in this area managed by the U.S. Fish and Wildlife Service.

Sea turtles, fish, and corals that are listed as threatened or endangered under the ESA occur in the Gulf. These include the following: five species of sea turtles (Kemp's ridley, loggerhead (Northwest Atlantic Ocean distinct population segment (DPS)), green (North Atlantic DPS), leatherback, and hawksbill); five species of fish (Gulf sturgeon, smalltooth sawfish, Nassau grouper, oceanic whitetip shark, and giant manta ray); and seven¹³ species of coral (elkhorn, staghorn, lobed star, pillar coral¹⁴, mountainous star, boulder star, and rough cactus). Critical habitat designated under the ESA for smalltooth sawfish, Gulf sturgeon, the Northwest Atlantic Ocean DPS of loggerhead sea turtles, and the listed coral species occur in the Gulf, though only loggerhead and coral critical habitat occurs in federal waters. Critical habitat has been proposed in the Gulf for the North Atlantic DPS of green sea turtles ([88 FR 46572](#); (Published July 19, 2023)) and Rice's whale ([88 FR 47453](#) (Published July 24, 2023)).

The most recent biological opinion (BiOp) for the FMP was completed on September 30, 2011. The BiOp determined the operation of the Gulf reef fish fishery managed under the Reef Fish FMP is not likely to adversely affect ESA-listed marine mammals or coral and was not likely to jeopardize the continued existence of sea turtles (loggerhead, Kemp's ridley, green, hawksbill, and leatherback) or smalltooth sawfish. Since issuing the BiOp, in memoranda dated September 16, 2014, and October 7, 2014, NMFS concluded that the activities associated with the Reef Fish FMP are not likely to adversely affect critical habitat for the Northwest Atlantic Ocean loggerhead sea turtle DPS and four species of corals (lobed star, mountainous star, boulder star, and rough cactus).

On April 6, 2016, NMFS and the U.S. Fish and Wildlife Service published a final rule (81 FR 20057) removing the range-wide and breeding population ESA-listings of the green sea turtle and listing eight DPSs as threatened and three DPSs as endangered. The North Atlantic DPS of green sea turtle occurs in the Gulf and is listed as threatened. In addition, on June 29, 2016, NMFS published a final rule (81 FR 42268) listing Nassau grouper as threatened under the ESA. NMFS has reinitiated consultation on the FMP to address these listings. In a memorandum dated September 29, 2016, NMFS determined that fishing under the Reef Fish FMP during the re-initiation period is not likely to jeopardize the continued existence of the North Atlantic DPS of green sea turtles or Nassau grouper¹⁵.

¹³ While all seven ESA-listed coral species occur within the Gulf Council's jurisdiction, their distribution is geographically distinct. Three species (staghorn, pillar, and rough cactus corals) are restricted entirely to the extreme southeastern boundary of the U.S. Gulf of Mexico (Florida Keys and Dry Tortugas) and do not occur in the Northern Gulf. The remaining four species (elkhorn, lobed star, mountainous star, and boulder star corals) are the only listed coral species whose U.S. range extends into the northern/northwestern Gulf of Mexico (e.g., at the Flower Garden Banks).

¹⁴ Pillar coral is considered functionally extinct in much of its Florida range due to disease, but remain a federally endangered species

¹⁵ The memo also addressed the South Atlantic DPS of green sea turtle because at that time, NMFS thought that individuals from that DPS would be found in the Gulf based on a study that found that approximately 5% of the turtles sampled off the Atlantic coast of Florida came from the South Atlantic DPS. However, with additional research, NMFS has determined that South Atlantic juveniles are not likely to be occurring in U.S. mainland coastal waters in anything more than negligible numbers.

On January 22, 2018, NMFS published a final rule (83 FR 2916) listing the giant manta ray as threatened under the ESA. On January 30, 2018, NMFS published a final rule (83 FR 4153) listing the oceanic whitetip shark as threatened under the ESA. In a memorandum dated March 6, 2018, NMFS revised the request for re-initiation of consultation on the Reef Fish FMP to address the listings of the giant manta and oceanic whitetip. In that memorandum, NMFS also determined that fishing under the Reef Fish FMP during the extended re-initiation period will not jeopardize the continued existence of the giant manta ray, oceanic whitetip shark, Nassau grouper, or the North Atlantic and South Atlantic DPSs of green sea turtles.

NMFS published a final rule on April 15, 2019, listing the Gulf Bryde's whale (now Rice's whale, see footnote 18 above) as endangered. In a memorandum dated June 20, 2019, NMFS revised the re-initiation request to include the Gulf Bryde's whale (Rice's whale) and determined that fishing under the Reef Fish FMP during the re-initiation period will not jeopardize the continued existence of any of the newly listed species discussed above¹⁶.

4.2.1 Effects on the Biological Environment

Preferred Alternative 2 would likely have positive effects for Gulf species managed under the reef fish, coastal migratory pelagics, red drum, spiny lobster and shrimp FMPs. **Preferred Alternative 2** would result in changes to the existing EFH descriptions and identification based on more recent information and updated or new maps for species' life stages, as appropriate. This would provide better data to inform EFH consultations and determine whether future action is needed to minimize adverse effects of fishing on EFH or recommend measures to minimize effects of non-fishing activities.

Providing updated habitat mapping methodology and habitat type identification may indirectly benefit protected species under the MMPA and ESA, as a better understanding of habitat type and spatial extent of habitat in the Gulf allows for increased spatial resolution for habitat designation for ESA-listed species. Under the proposed action, there are no anticipated impacts to Coral species managed under the Coral FMP; however, improved habitat type data for hard bottom/reef habitat types may indirectly benefit Coral reef species managed under the Coral FMP to better inform conservation benefits and fishing behavior to avoid harmful reef interactions. Although the proposed changes under **Preferred Alternative 2** would not require regulatory action, they are likely to provide positive impacts to the biological environment of federally managed species across all FMPs.

4.3 Economic and Social Environment

4.3.1 Effects on the Economic and Social Environment

While the amendment focuses on updating the text, descriptions, and maps of EFH rather than imposing immediate new fishing regulations, it establishes the groundwork for future management actions that could affect commercial and recreational fishing. Changing the text and maps does not immediately alter how people fish or work in the Gulf; instead, it ensures that

¹⁶ The official change to the name has no effect on NMFS's conclusion that the activities associated with the Reef Fish FMP will not jeopardize the continued existence of the species during the revised reinitiation period.

future decisions impacting the human environment are based on the best available science. Therefore, because this amendment would not impact the human environment, no further discussion is provided.

4.4 Administrative Environment

The NMFS and regional Fishery Management Councils (Councils) must describe and identify EFH in FMPs, to minimize to the extent practicable the adverse effects of fishing on EFH, and identify other actions to encourage the conservation and enhancement of EFH ([50 CFR 600.815](#)). Federal agencies that authorize, fund, or undertake actions that may adversely affect EFH must consult with NMFS, and NMFS must provide conservation recommendations to federal and state agencies regarding actions that would adversely affect EFH. The EFH guidelines require descriptions and identifications for each life stage for every species managed in the FMP. Councils also have the authority to comment on federal or state agency actions that would adversely affect the habitat, including EFH, of managed species.

4.4.1 Effects on the Administrative Environment

Preferred Alternative 2 is not expected to significantly impact the administrative environment because it does not require regulatory action. However, under **Preferred Alternative 2**, there may be small positive impacts to the administrative environment as a result of having more detailed information during the EFH consultation process.

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SERO = Southeast Regional Office of the National Marine Fisheries Service. NOAA GC = National Oceanic and Atmospheric Administration General Counsel

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APPENDIX A. HABITAT ATTRIBUTE TABLES

A.1 Reef Fish FMP

Almaco Jack

Almaco Jack										
<i>Seriola rivoliana</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth	Prey	Predators	Mortality	Growth
Eggs	ER-1,ER-2,ER-5		WCA	spring- fall						
Larvae	ER-1,ER-2,ER-5									
post-Larvae	ER-1,ER-2,ER-5									
Early Juvenile	ER-1,ER-2,ER-3,ER-4,ER-5	nearshore, offshore	drifting algae, WCA	Aug-Jan Jul-Oct	23.3-31.7	6.7-16.8	fish, shrimp, copepods*			
Late Juveniles	ER-1,ER-2,ER-3,ER-4,ER-5	nearshore, offshore	WCA, drifting algae	Aug-Jan Jul-Oct	23.3-31.7	6.7-16.8	fish, shrimp, copepods*			
Adult	ER-1,ER-2,ER-3,ER-4,ER-5	offshore	shelf edge, hard bottom/reefs*, banks	Summer (N. Gulf), year-round (S. Gulf)		21-179* m	fish			TL=81 cm
Spawning Adult	ER-1,ER-2,ER-5 ER-3, ER-4 (A)	nearshore, offshore (A)	shelf edge, hard bottom/ reefs*, banks,	spring-fall, April-Nov						

**asterisks indicate data collected from outside the Gulf*

Bold and italicized font indicates proxy data

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Banded Rudderfish

Banded Rudderfish										
<i>Seriola zonata</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2	nearshore, offshore				<i>10-130</i>				
Larvae	ER-1, ER-2	nearshore, offshore	WCA	all months except Feb, Apr, Sep, Dec		<i>10-130</i>				
post-Larvae	ER-1, ER-2	nearshore, offshore	WCA	all months except Feb, Apr, Sep, Dec		<i>10-130</i>				
Early Juvenile	ER-1, ER-2	nearshore, offshore	WCA, drifting algae	year-round		<i>10-130</i>				
Late Juvenile	ER-1, ER-2	nearshore, offshore	WCA, drifting algae	year-round		<i>10-130</i>				
Adult	ER-1, ER-2	nearshore, offshore	WCA	year-round		10-130	fish, shrimp			
Spawning Adult	ER-1, ER-2	nearshore, offshore	WCA	winter-spring and fall		10-130				

Bold and italicized font indicates proxy data

Banded Rudderfish References

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Blackfin snapper

Blackfin Snapper										
<i>Lutjanus bucanella</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2	offshore	WCA	year-round		40-300				
Larvae	ER-1, ER-2					40-300				
post-Larvae	ER-1, ER-2					40-300				
Early Juvenile	ER-1, ER-2	nearshore, offshore	hard bottom/reef	spring*		7*-40				
Late Juvenile	ER-1, ER-2	nearshore, offshore	hard bottom/reef	spring*		7*-40				
Adult	ER-1, ER-2	offshore	shelf edge/slope, hard bottom/reef sandy bottom	year-round		40-450	fish, crustaceans		0.23	k=0.084, t ₀ =-2.896, max age= 20
Spawning Adult	ER-1, ER-2	offshore	shelf edge/slope, hard bottom/reef	year-round peak: spring, fall Feb-Nov		40-450				

*asterisks indicate data collected from outside the Gulf

Bold and italicized font indicates proxy data

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Black grouper

Black Grouper										
<i>Mycteroperca bonaci</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2	offshore	WCA			18-28				
Larvae	ER-1, ER-2	offshore	WCA			10-150				
post-Larvae	ER-1, ER-2	offshore	WCA			10-150				
Early Juvenile	ER-1, ER-2	estuarine, nearshore	SAV	year-round	31	1-10*	crustaceans, fish			
Late Juvenile	ER-1, ER-2	estuarine, nearshore, offshore	hard bottom/reef, mangrove	year-round		1*-19	crustaceans, fish			
Adult	ER-1, ER-2	nearshore, offshore	hard bottom/reef		16-28	10-150	fish	sharks, larger groupers	overfishing; $M = 0.136$	rapid first 3-4 yrs; $L_{inf} = 1334$ mm TL, $k = 0.1432$ /yr, $t_0 = -0.9028$ /yr; max. age = 33 yrs
Spawning Adult	ER-1, ER-2	offshore	hard bottom/reef, *shelf edge/slope*	Feb-Mar Jan-Apr	*24-27*	18-28			spawning aggregations vulnerable to overfishing	*females range from 57.0-123.5 cm, males from 86.0-132.0 cm; females change sex 85.5-125.0 cm*

**asterisks indicate data collected from outside the Gulf*

Bold and italicized font indicates proxy data

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Blueline tilefish

Blueline Tilefish										
<i>Caulolatilus microps</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2	offshore	WCA			<i>46-256*</i>				
Larvae	ER-1, ER-2	offshore	WCA			<i>46-256*</i>				
Post-Larvae	ER-1, ER-2	offshore	WCA			<i>46-256*</i>				
Early Juvenile	ER-1, ER-2	offshore	WCA			<i>60-256</i>				
Late Juvenile	ER-1, ER-2	offshore	WCA			<i>60-256</i>				
Adult	ER-1, ER-2	offshore	hard bottom/reef, sand/shell, soft bottom, shelf edge/slope		13.8-18	60-256, burrows at 91-150	benthic inverts, demersal fishes		<i>M = 0.1*</i>	rapid growth in first two years; $L_{inf} = 600.3$ mm FL, $k = 0.33$, $t_0 = -0.5$ yr, max. age = 43 yrs*
Spawning Adult	ER-1, ER-2	offshore	*shelf edge/slope*	*Feb-Oct, peak: Mar-Sep*	8.87-16.28*	46-256*				females mature at 42-45 cm TL, males mature at 50 cm TL

**asterisks indicate data collected from outside the Gulf*

Bold and italicized font indicates proxy data

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Cubera snapper

Cubera Snapper										
<i>Lutjanus cyanopterus</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs ₁	ER-1	nearshore, offshore	WCA	summer		<i>10-85</i>				
Larvae	ER-1	nearshore, offshore				<i>10-85</i>				
Post Larvae	ER-1	nearshore, offshore				<i>10-85</i>				
Early Juvenile	ER-1	estuarine, nearshore, offshore	SAV, mangrove, emergent marsh		24.5-31.0	<i>0-85</i>				
Late Juvenile	ER-1	estuarine, nearshore, offshore	SAV, mangrove, emergent marsh		24.5-31.0	<i>0-85</i>				
Adult	ER-1	nearshore, offshore	mangrove, hard bottom/reef	Apr-Sep		0-85			<i>M=0.150</i>	<i>K=0.160, t₀=-.300, max age= 28</i>
Spawning Adult	ER-1	nearshore, offshore	hard bottom/reef, shelf edge/slope, bank/shoal*	June-Sept, peak: Aug	> 29.0	10-85				

*asterisks indicate data collected from outside the Gulf

Bold and italicized font indicates proxy data

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Gag grouper

Gag grouper										
<i>Mycteroperca microlepis</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2	offshore	WCA	Dec-Apr		50-120				hatch in 45h at 21°C
Larvae	ER-1, ER-2	offshore	WCA	early spring		50-120				pelagic larval duration = 29-52 d TL=2.1 cm
Post Larvae	ER-1, ER-2	offshore	WCA			50-120				pelagic larval duration = 29-52 d
Early Juvenile	ER-1, ER-2, ER-3	estuarine, nearshore	SAV, mangroves	late spring-early fall	22-32	0-12	crustaceans (amphipods, copepods, grass shrimp)		minimal while in SAV	rapid during association with SAV
Late Juvenile	ER-1, ER-2, ER-3, ER-4	estuarine, nearshore, offshore	SAV, hard bottom/reef, mangroves, seawhip	recruit to reefs offshore in fall	22-32	1-50	decapod crustaceans and fish	cannibalistic, larger fishes	recreational fishery, shrimp fishery bycatch	ages 1-3
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	hard bottom/reef	year-round	14-24	13-100	fish, crustaceans, cephalopods	sharks	sudden low temps, fishing mortality; $M = 0.1342$; $M = 0.13 \pm 0.03$	$L_{inf} = 1277.95$ mm FL, $k = 0.1342$, $t_0 = -0.6687$, max. age = 31 yrs TL= 54 cm; Lmax= 145 cm

Spawning Adult	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	shelf edge/slope, hard bottom/reef	Dec-May peak: Feb-Mar Jan-Apr; Jan-April, peak Feb-March	21-30	50-120			spawning aggregations vulnerable to fishery	
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**asterisks indicate data collected from outside the Gulf*
Bold and italicized font indicates proxy data

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Goldface tilefish

Goldface Tilefish										
<i>Caulolatilus chrysops</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs			WCA							
Larvae			WCA							
Post Larvae			WCA							
Early Juvenile										
Late Juvenile										
Adult	ER-2, ER-3	offshore	shelf edge/slope, soft bottom			291 ± 54	*bivalves, urchins, worms, crabs*			
Spawning Adult				Sep*						

**asterisks indicate data collected from outside the Gulf*

Bold and italicized font indicates proxy data

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Goliath grouper

Goliath Grouper										
<i>Epinephelus itajara</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-5	offshore	WCA	late summer, early fall		36-46				
Larvae	ER-1, ER-5	offshore	WCA	late summer, early fall		36-46				pelagic larval duration: 30-80
post-Larvae	ER-1, ER-5	nearshore	mangroves							pelagic larval duration: 30-80
Early Juvenile	ER-1, ER-5	estuarine, nearshore	SAV, mangroves, emergent marsh	Nov-Jan		0-5	crustaceans			growth rate ~ 0.300 mm/d
Late Juvenile	ER-1, ER-5	estuarine, nearshore	SAV, mangroves, emergent marsh, hard bottom/reef			0-5	crustaceans			growth rate ~ 0.300 mm/d
Adult	ER-1, ER-5	nearshore, offshore	hard bottom/reef, shoals/banks		20-25	0-95; females at shallower depths until spawning, males at deeper depths	crustaceans (esp. lobster), fish, molluscs (cephalopods)		Z = 0.85, F = 0.70, M = 0.15 Vulnerable to overfishing	L _{inf} = 2221 mm TL, K = 0.0937, t ₀ = -0.6842, max. age = 37 yrs; Slow growth rate

Spawning Adult	ER-1, ER-5	offshore, nearshore (shelf edge)	hard bottom/reef	Jun-Dec peak: Jul- Sep Jun- Oct strongly influenced by lunar patterns	25-26	36-46				
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Bold and italicized font indicates proxy data

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Gray snapper

Gray Snapper										
<i>Lutjanus griseus</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2	offshore	WCA	Jun-Sep		0-180				pre-settlement duration: 25-33
Larvae	ER-1, ER-2	offshore	WCA	Apr-Nov peak: Jun-Aug	15.6-27.2	0-180	Zooplankton (lab)	carnivorous fish		pre-settlement duration: 25-33
Post Larvae	ER-1, ER-2	estuarine	SAV				copepods, amphipods	carnivorous fish		pre-settlement duration: 25-33
Early Juvenile	ER-1, ER-2	estuarine	SAV, mangrove, emergent marsh		12.8-36.0	1-3	amphipods	carnivorous fish		growth rate = 0.60-1.02 mm/d; *SAV residents ~ 8 months; settle Sep-Oct (at 7.8 cm TL)*
Late Juvenile	ER-1, ER-2	estuarine, nearshore	SAV, mangrove, emergent marsh		12.8-36.0	0-180	penaeid shrimp, crabs, fish, mollusks, polychaetes	carnivorous fish		growth rate = 0.60-1.02 mm/d; *SAV residents ~ 8 months; occupy mangroves from 10-12+ cm TL*
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	hard bottom/reef soft bottom, sand/shell, banks/shoals, emergent marsh		13.4-32.5	0-180	fish, shrimp, crabs		Z=0.17-0.22, M=0.15	recruit to fishery age 4; max. age = 28 yrs; L _{inf} = 656.4 mm TL, k = 0.22, t ₀ = 0

Spawning Adult	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	hard bottom/reef banks/shoals	year- round (S. FL), summer elsewhere		0-180				maturation at 185 mm TL for males and 200 mm TL for females
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**asterisks indicate data collected from outside the Gulf*

Bold and italicized font indicates proxy data

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Gray triggerfish

Gray triggerfish										
<i>Balistes capriscus</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	hard bottom/reef	late spring, summer		10-100		wrasses, red snapper		hatch in 48-55 hrs
Larvae	ER-1, ER-2, ER-3, ER-4, ER-5		WCA, drifting algae							spend 4-7 months in pelagic zone
post-Larvae	ER-1, ER-2, ER-3, ER-4, ER-5		WCA, drifting algae					tuna		spend 4-7 months in pelagic zone
Early Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5		drifting algae,				algae, hydroids, barnacles, polychaetes	tuna, blue marlin, dolphinfish, sailfish, sharks		spend 4-7 months in pelagic zone
Late Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	drifting algae, hard bottom/reef			10-100	algae, hydroids, barnacles, polychaetes		*Z = 0.95, M = 0.28*	*L _{inf} = 457, K = 0.33, to = -1.58*
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	hard bottom/reef			10-100	bivalves, barnacles, polychaetes, decapod crabs, gastropods, sea stars, sea cucumbers, brittle stars, sea urchins, sand dollars	greater amberjack, sharks, groupers	predation, recreational fishery (age 3), commercial fishery (age 4). *Z = 0.95, M=0.28*	rapid in year one, then slows. Relatively long lived. *L _{inf} = 457, K = 0.33, to = -1.58*

Spawning Adult	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	hard bottom/reef	late spring, summer; May-Aug Peak June-July	20.9-30.0	10-100	bivalves, barnacles, polychaetes, decapod crabs, gastropods, sea stars, sea cucumbers, brittle stars, sea urchins, sand dollars	greater amberjack, sharks, groupers.	predation, recreational fishery (age 3), commercial fishery (age 4)	rapid in year one, then slows. Relatively long lived. Males larger than females
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**asterisks indicate data collected from outside the Gulf*
Bold and italicized font indicates proxy data

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Greater amberjack

Greater Amberjack										
<i>Seriola dumerili</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2, ER-3, ER-4, ER-5		WCA							hatch in 2 days
Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	year-round						
Post Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA, drifting algae	summer						
Early Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	WCA, drifting algae	summer-fall			invertebrates		Z=0.0045	1.65-2.00 mm/d
Late Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	WCA, drifting algae, hard bottom/reef	summer-fall			invertebrates		Z=0.0045	1.65-2.00 mm/d
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	WCA, hard bottom/reef *banks/shoals, reefs*	year-round	14.25	4.6-187	fish, crustaceans, cephalopods		males (7-8 yrs) have shorter life span than females (10-15 yrs)	females usually larger than males; L _{inf} = 1436 mm FL, k = 0.175, t ₀ = -0.954, max. age = 15 yrs
Spawning Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA, hard bottom/reef*	Feb-May						50% maturity at *644 mm FL (males)*; 900 mm FL & age 4 (females)

*asterisks indicate data collected from outside the Gulf

Bold and italicized font indicates proxy data

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Hogfish

Hogfish										
<i>Lachnolaimus maximus</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2		WCA	Apr-Dec	25.5			yellowtail snapper		hatch in ~ 23hrs
Larvae	ER-1, ER-2		WCA							23 hrs-13 d
Post Larvae	ER-1, ER-2		WCA							13 d-34 d
Early Juvenile	ER-1, ER-2	estuarine, nearshore	SAV, hard bottom/reef	Dec-Apr						
Late Juvenile	ER-1, ER-2	estuarine, nearshore	SAV, hard bottom/reef	Dec-Apr						
Adult	ER-1, ER-2	nearshore, offshore	hard bottom/reef	year-round	15.7-31.2	< 30: shallow reef Adult larger than deep reef Adult	benthic inverts		<i>M/yr = 0.16-1.47 depending on estimation method</i>	max. age = 25; <i>L_{inf} = 84.90 cm FL, ER 1 L inf= 414mm TL, k = 0.106, t₀ = -1.33</i>
Spawning Adult	ER-1, ER-2	nearshore, offshore	hard bottom/reef, sand,	Dec-Jul peak: Mar-Apr Nov-Jun (A)		1-69:	sand-dwelling mollusks, sea urchins			50% maturity = 169.0 mm FL and 1.1 yrs (female), 426 mm FL and 6.5 yrs (males)

**asterisks indicate data collected from outside the Gulf
Bold and italicized font indicates proxy data*

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Lane snapper

Lane Snapper										
<i>Lutjanus synagris</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	Mar-Sep, peak: Jul-Aug		4-132				
Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	estuarine, nearshore, offshore*	WCA*	Jun-Aug*	28(lab); 28.4-30.4*	0-50*	plankton and rotifers (lab)		death by day 10 at 25°C in lab; * Z = - 0.429± 0.053(SE), subject to size-selective mortality*	*SL-age curve = 0.032, K = 0.047 ± 0.008 (SE; W. Straits of FL), K = 0.042 ± 0.008 (SE; E. Straits of FL), PLD = 25.6 d* L=1.9-6.2
Post Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	*estuarine, nearshore, offshore*	WCA*, SAV	Jun-Aug*	28.4-30.4*	0-50*			death by day 10 at 25°C in lab; * Z = - 0.429± 0.053(SE), subject to size-selective mortality*	*SL-age curve = 0.032, K = 0.047 ± 0.008 (SE; W. Straits of FL), K = 0.042 ± 0.008 (SE; E. Straits of FL), PLD = 25.6 d*
Early Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	estuarine, nearshore, offshore	SAV, sand/shell, hard bottom/reef, soft bottom,	late summer-early fall	28-29.5	0-24	copepods, grass shrimp, small inverts		subject to growth-selective mortality*, daily Z = 0.097-0.165	settle Jul-Aug, min. settle length = 15.1 mm SL, min. settle age = 25 d, growth rate = 0.9-1.3 mm/d

			banks/shoals, <i>*mangrove*</i>						
Late Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	estuarine, nearshore, offshore	SAV, hard bottom/reef, sand/shell, soft bottom, banks/shoals, <i>*mangrove*</i>	late summer- early fall	28-29.5	0-24	copepods, grass shrimp, small inverts	subject to growth- selective mortality*, daily Z = 0.097-0.165	growth rate = 0.9- 1.3 mm/d
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore,estuarine	sand/shell, banks/shoals		16-29	4-132	fish, crustaceans, annelids, mollusks, algae	Z = 0.38- 0.58; M = 0.11-0.24	max. length = 673 mm TL. Males grow faster, and larger at age than females; L _{inf} = 449 mm FL, k = 0.17, t ₀ = -2.59, max. age = 19 yrs K= 0.13, t ₀ =-4.26
Spawning Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	hard bottom/reef, shelf edge/slope*	May-Aug Mar-Sep Peak: May and July		30-70m*			50% maturity = 27.4 cm (females), 28.2 cm (males); 100% maturity > 40.0 cm TL (females), > 38.8 cm TL (males)*

**asterisks indicate data collected from outside the Gulf*
Bold and italicized font indicates proxy data

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Lesser amberjack

Lesser Amberjack										
<i>Seriola fasciata</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2, ER-3, ER-4, ER-5									
Larvae	ER-1, ER-2, ER-3, ER-4, ER-5									
Post Larvae	ER-1, ER-2, ER-3, ER-4, ER-5									
Early Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	drifting algae	late summer-fall		*55-348*				
Late Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	drifting algae, hard bottom/reef	late summer-fall		*55-348*				
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	hard bottom/reef	year-round		*55-348*	squid			females slightly larger than males (408.8 vs 396.2 mm FL)
Spawning Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	hard bottom/reef	Sep-Dec, Feb-Mar		*55-348*				

**asterisks indicate data collected from outside the Gulf*
Bold and italicized font indicates proxy data

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Mutton snapper

Mutton Snapper										
<i>Lutjanus analis</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1		WCA	Late spring-summer						
Larvae	ER-1		WCA	early summer						PLD = 31 d
Post Larvae	ER-1		WCA	early-mid summer						PLD = 31 d
Early Juvenile	ER-1		SAV	summer						
Late Juvenile	ER-1		SAV, hard bottom/reef	late summer						
Adult	ER-1	nearshore, estuarine	SAV, hard bottom/reef	year-round			crustaceans, fish, gastropods		$M = 0.17$	$L_{inf} = 861$ mm TL, $K = 0.165$, $t_0 = -1.23$, max. age = 40 TL=50cm
Spawning Adult	ER-1(A)	offshore	bank/shoals, hard bottom/reef shelf edge/slope	Mar-Jul May-Aug		25-95			heavy fishing pressure at spawning aggregations	

*asterisks indicate data collected from outside the Gulf

Bold and italicized font indicates proxy data

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Queen snapper

Queen Snapper										
<i>Etelis oculatus</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1	offshore	WCA			<i>95-680</i>				
Larvae	ER-1	offshore	WCA	*Sep-Nov*		*0-100*			Z = -0.113 ± 0.023 (SE)*	SL-age curve = 0.113, K = 0.040 ± 0.003 (SE), PLD ≤ 36 d*
Post Larvae ⁷	ER-1	offshore	*WCA*	*Sep-Nov*		*0-100*			Z = -0.113 ± 0.023 (SE)*	SL-age curve = 0.113, K = 0.040 ± 0.003 (SE), PLD ≤ 36 d*
Early Juvenile	ER-1	offshore	WCA			<i>95-680</i>	crustaceans*	Beardfish*		
Late Juvenile	ER-1	offshore				<i>95-680</i>	crustaceans*			
Adult	ER-1	offshore	hard bottom/reef,*shelf edge/slope*		16-18	95-680	squid, shrimp, deep water-fishes *		Z/K = 3.73*	Up to 100 cm TL; at least 30 yrs; L _{inf} = 90.57 cm FL, females larger than males*
Spawning Adult	ER-1	offshore		*year-round peak: Oct-Nov*		95-680				50% maturity = 310 mm FL (females), 220 mm FL (males); 100% maturity = 370 mm FL*

*asterisks indicate data collected from outside the Gulf

Bold and italicized font indicates proxy data

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Red grouper

Red Grouper										
<i>Epinephelus morio</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2	offshore	WCA	Apr-May		20-100			$M = 194.93^*$	hatch in 30 hrs at 24°C
Larvae	ER-1, ER-2	offshore	WCA	May-Jun	optimum: 27.4-28.5	20-100	zooplankton		$M = 13.03-153.10$ (depending on age)*	stage lasts 30-40 days post-hatch
Post Larvae	ER-1, ER-2		WCA	May-Jul					$M = 13.03-153.10$ (depending on age)*	stage lasts 35-50 days post-hatch, leave plankton at about 20 mm SL
Early Juvenile	ER-1, ER-2	nearshore	SAV, hard bottom/reef		16.1-31.2	0-15	demersal crustaceans	larger fishes	$M = 2.52-5.73$ (depending on age)*; low DO (3.9-4.7 mg/L) has caused mortality	
Late Juvenile	ER-1, ER-2	nearshore, offshore	hard bottom/reef			0-50	demersal crustaceans, fishes	larger demersal fishes	$M = 2.52-5.73$ (depending on age)*	influenced by food availability, population density
Adult	ER-1, ER-2, ER-3, ER-4	nearshore, offshore	hard bottom/reef		15-30	3-190	fish, crustaceans, cephalopods	larger demersal fishes, sharks	$Z = 0.39; M (> \text{age } 2) = 0.1194-0.2583$ Max age= 25 yrs	max. age 29; $L_{inf} = 829 \pm 5.50$ mm FL, $k = 0.1251 \pm 2.0 \times 10^{-3}$, $t_0 = -1.2022 \pm 3.4 \times 10^{-2}$

Spawning Adult	ER-1, ER-2	offshore	shelf edge/slope, hard bottom/reef	Feb-June peak: Apr-May	*16.97-24.08* 16-29	20-100 1-200				population density and environmental stress may influence sexual transition; 50% maturity = 2.8 yrs, 292 mm FL; 50% transition = 11.2 yrs, 707 mm FL
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**asterisks indicate data collected from outside the Gulf*
Bold and italicized font indicates proxy data

Red grouper References

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Red snapper

Red Snapper										
<i>Lutjanus campechanus</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	Apr-Oct		18-126				50% hatch in 20-27 hrs 16.4 mil ova/year
Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	Jul-Nov	17.3-29.7	18-126	algae, rotifers*			PLD = 28 d
Post Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	Jul-Nov	17.3-29.7	18-126				settle at 16-19 mm TL; PLD = 28d
Early Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	hard bottom/reef banks/shoals, soft bottom, sand/shell, shelf,, muddy bottom	Jul-Nov	17.3-29.7	17-183	zooplankton, shrimp, chaetognaths, squid, copepods		shrimp trawl bycatch; <i>M</i> (age 0) = 2.0/yr	0.817-1.01 mm/d
Late Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	hard bottom/reef banks/shoals, soft bottom, sand/shell shelf/muddy bottom habitats	year-round	20-28	18-55	fish, squid, crabs, shrimp (B)		shrimp trawl bycatch; <i>M</i> (age 1) = 1.2/yr	0.817-1.01 mm/d

Adult	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	hard bottom/reef, banks/shoals. Unstructured bottom habitats	year-round	14-30	7-146	fish, shrimp, squid, octopus, crabs	sharks	enter fishery at age 2; $M = 0.094/\text{yr}$	$L_{\text{inf}} = 85.64 \text{ cm TL}$, $K = 0.19$, $t_0 = -0.39$, max. age = 57 yrs; TL=742 mm
Spawning Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	sand/shell, banks/shoals	Apr-Oct year-round May-Sep Peak: May-Aug	15-31	18-126 Max: 200				50% mature (female) at age 3-5, 400-450 mm TL; 100% mature (female) at age 8, 700 mm TL

**asterisks indicate data collected from outside the Gulf*
Bold and italicized font indicates proxy data

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Scamp

Scamp										
<i>Mycteroperca phenax</i>										
Life stage	Eco-region ¹⁷	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	spring		<i>60-189</i>				
Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	spring		<i>60-189</i>				L=7.6mm
Post Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	spring		<i>60-189</i>				
Early Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	hard bottom/reef			12-33				
Late Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	hard bottom/reef			12-33				
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	hard bottom/reef		14-28	12-189 max: 275	fish, crustaceans, cephalopods	sharks	catch and release mortality > 44m $M=0.143$ Max age= 48, TL= 33 cm	reach maximum size slowly $K=0.126$, $t_0=-1.357$
Spawning Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	shelf edge/slope, hard bottom/reef	Jan-Jun	> 8.6	60-189			fishing pressure may reduce proportion of males in population	

*asterisks indicate data collected from outside the Gulf
Bold and italicized font indicates proxy data

¹⁷ Gulf-Wide distribution per [October 2025 SSC recommendation](#)

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Silk snapper

Silk Snapper										
<i>Lutjanus vivanus</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1	offshore		year-round		90-200				
Larvae	ER-1	offshore		year-round		90-200				
Post Larvae	ER-1	offshore		year-round		90-200				
Early Juvenile	ER-1	offshore		year-round		30-40*				
Late Juvenile	ER-1	offshore				30-40*	fishes, shrimp, crabs	sharks, grouper, barracuda		
Adult	ER-1	offshore	shelf edge/slope, soft bottom, hard bottom/reef *		13-27*	90-200	fish, shrimp, crabs, gastropods, cephalopods, tunicates, urochordates	sharks, grouper, barracuda	$M = 0.230$	$L_{inf} = 781.1$ mm TL, $K = 0.092$, $t_0 = -2.309$, max. age = 9 yrs
Spawning Adult	ER-1	offshore		Mar-Nov; peak: Jul-Aug		90-200	fishes, shrimp, crabs	sharks, grouper, barracuda		50% maturity = 50-55 cm FL (females), 38-60 cm FL (males)*

*asterisks indicate data collected from outside the Gulf

Bold and italicized font indicates proxy data

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Snowy grouper

Snowy Grouper										
<i>Epinephelus niveatus</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1	offshore	WCA			<i>30-525</i>				
Larvae	ER-1	offshore	WCA	Jun, Oct	28	<i>30-525</i>				SL= 5.5-10.2 mm
Post Larvae	ER-1	offshore	WCA	Jun, Oct	28	<i>30-525</i>				
Early Juvenile	ER-1	nearshore	hard bottom/reef			> 1				
Late Juvenile	ER-1	nearshore, offshore	hard bottom/reef		15-29*	17-60	fish, gastropods, cephalopods, other inverts		trawl bycatch	
Adult	ER-1, ER-2	offshore	hard bottom/reef, *shelf edge/slope*		12-26	30-525	fish, crabs, crustaceans, cephalopods, gastropods		vulnerable to fishing pressure; $M = 0.12^*$	recruit to fishery at age 8; $L_{inf} = 1064.62$ mm TL, $K = 0.094$, $t_0 = -2.884$, max. age = 35 yrs
Spawning Adult	ER-1, ER-2	offshore	hard bottom/reef, shelf edge/slope*	Apr-Jul (FL Keys), May-Aug (w. FL) Jan-Oct		30-525			overfishing causes sex ratio imbalance	protogynous hermaphrodites; $L_{50} = 541$ mm TL and 4.92 yrs; 40% of fish ≥ 8 yrs (70 cm) are male; transition = 6-7 yrs and 475 mm FL

*asterisks indicate data collected from outside the Gulf
 Bold and italicized font indicates proxy data

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Speckled hind

Speckled Hind										
<i>Epinephelus drummondhayi</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2	offshore	WCA			<i>44*-183</i>				
Larvae	ER-1, ER-2	offshore	WCA			<i>44*-183</i>				
Post Larvae	ER-1, ER-2	offshore	WCA			<i>44*-183</i>				
Early Juvenile	ER-1, ER-2	offshore	hard bottom/reef*			<i>25-183</i>				
Late Juvenile	ER-1, ER-2	offshore	hard bottom/reef*			<i>25-183</i>				
Adult	ER-1, ER-2	offshore	hard bottom/reef		17-24	25-183	fish, cephalopods, other inverts		overfishing; * $M=0.13$, $F=1.14$, $Z=1.27^*$	recruit to fishery at 6-7 yrs; * max. length = 973 mm TL*; $L_{inf} = 888$ mm TL, $K = 0.12$, $t_0 = -1.8$, $t_{\infty} = -0.01$ max. age = 45 yrs
Spawning Adult	ER-1, ER-2	offshore	shelf edge/slope	Apr-May, Jul-Sep April-Sep		<i>44*-183</i>			fishing affects sex ratio and spawning biomass; males rare	protogynous hermaphrodites; $L_{50} = 532$ mm TL and 6.6 yrs (females); 50% transition = 627 mm TL and 6.9 yrs*

*asterisks indicate data collected from outside the Gulf
 Bold and italicized font indicates proxy data

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Tilefish

Tilefish										
<i>Lopholatilus chamaeleonticeps</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	late spring-summer	hatched in 40 hrs at 22.0-24.6 (lab)	80-450				
Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	summer		80-450				
Post Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	summer		80-450				
Early Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA			80-450				settlement at 9.0-15.5 mm SL
Late Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	shelf edge/slope, soft bottom			80-450		larger tilefish, other fish		
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	shelf edge/slope, soft bottom		9-14.4	80-450	bivalve mollusks, squids, polychaetes, holothurians, decapod, crustaceans, elasmobranchs, and ray-finned fishes	sharks, other tilefish	mass mortality from cold water intrusion events; $M = 0.137$	max. length = 1000 mm SL; males grow faster, reach larger size; $L_{inf} = 830$ mm TL, $k = 0.13$, $t_0 = -2.14$, max. age = 40 years

Spawning Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	shelf edge/slope, soft bottom	Jan-Jun peak: Apr		80-450				maturity < 1 yr and 150 mm FL (male); 2.5 yrs and 331 mm FL (female); protogynous hermaphrodites
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**asterisks indicate data collected from outside the Gulf*
Bold and italicized font indicates proxy data

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Vermilion snapper

Vermilion Snapper										
<i>Rhomboplites aurorubens</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA			<i>18-100</i>				
Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	Jun-Nov*		30-40*				
Post Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	Jun-Nov*		30-40*				
Early Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	hard bottom/reef			<i>18-100</i>	copepods, nematodes*	lionfish		
Late Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	hard bottom/reef			<i>18-100</i>	fish scales, copepods, small pelagic crustacean, cephalopods*	lionfish		
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	bank/shoal, hard bottom/reef	year-round*	16.4-26.2*	18-100	benthic tunicates, amphipods, juvenile vermilion (rare), cephalopods*		Z = 0.39 ± 0.05 M = .25	L _{inf} = 34.4 cm FL, k = 0.3254, t ₀ = -0.7953, max. age = 26 yrs TL=208-565 mm
Spawning Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore		May-Sep Apr-Sep		<i>18-100</i>				

*asterisks indicate data collected from outside the Gulf
Bold and italicized font indicates proxy data

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Warsaw grouper

Warsaw Grouper										
<i>Epinephelus nigritus</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA			<i>40-525</i>				
Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA			<i>40-525</i>				SL=9.1 mm
Post Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA			<i>40-525</i>				
Early Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	offshore				<i>20-30</i>				
Late Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	hard bottom/reef			20-30 >200m				
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	Shelf edge/slope, hard bottom/reef		12-25	40-525	crabs, shrimp, lobsters, fish		M=0.069 ; M differed in different regions; western Gulf =0.17, eastern Gulf=0.08; Z=0.09-0.18	*L _{inf} = 2394 mm L _{inf} =1,850 mm; TL, K = 0.034, t ₀ = -3.616; max. age =91 yrs, max. length = 188.8cm TL* Max age: 91
Spawning Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	shelf edge/slope, hard bottom/reef	late summer Apr-Nov		40-525				protogynous hermaphrodite; mature at 9 yrs

*asterisks indicate data collected from outside the Gulf

Bold and italicized font indicates proxy data

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Wenchman

Wenchman										
<i>Pristopomoides aquilonaris</i>										
Life stage	Eco-region ¹⁸	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	summer	20	<i>80-200</i>				
Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	summer		<i>80-200</i>				
Post Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore		summer		<i>80-200</i>				
Early Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	offshore				<i>19-481</i>				
Late Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	offshore				<i>19-481</i>				
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	hard bottom/reef, shelf edge/slope	year-round	9.1-28.7	19-481	small fish		M=0.44	$L_{inf} = 240$ mm FL, $K = 0.18$, $t_0 = -4.75$, max. age (# otolith increments) = 14
Spawning Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	shelf edge/slope	summer	20	80-200				

*asterisks indicate data collected from outside the Gulf
Bold and italicized font indicates proxy data

¹⁸ Gulf-Wide distribution per [October 2025 SSC Recommendation](#).

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Yellowedge grouper

Yellowedge grouper										
<i>Hyporthodus flavolimbatus</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA			35-370				
Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA			35-370				
Post Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	Jul-Oct*		35-370				
Early Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore				9-110				
Late Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	hard bottom/reef			9-110				
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	hard bottom/reef, soft bottom, *shelf edge/slope*		10.7-27.0	35-370	brachyuran crabs, fish, other inverts		Z = 0.128, M = 0.073, F = 0.038-0.080	max. age = 85 yrs,; L _{inf} = 1005 mm TL, K = 0.059, t ₀ = -4.75 max length= 54.88 cm TL
Spawning Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	shelf edge/slope, hard bottom/reef *	May-Sep; Feb-Nov	14.47* 11-21	35-370 75-350 (D)				Protogynous hermaphrodites; L50 = 547 mm TL and 8 yrs (females), 50% transition = 815 mm TL and 22 yrs

*asterisks indicate data collected from outside the Gulf
Bold and italicized font indicates proxy data

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Yellowfin grouper

Yellowfin grouper										
<i>Mycteroperca venenosa</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1	offshore				<i>25-30*</i>				
Larvae	ER-1	offshore				<i>25-30*</i>				
Post Larvae	ER-1	offshore				<i>25-30*</i>				
Early Juvenile	ER-1	estuarine, nearshore	SAV			2-4				
Late Juvenile	ER-1		SAV, hard bottom/reef				fish, squid, shrimp*			
Adult	ER-1	nearshore, offshore	hard bottom/reef		15-26	2-214	fish, squid, shrimp*	sharks	<i>M=0.18</i>	max. length = 90 cm TL, *max. age = 13 yrs, $L_{inf} = 977$ mm TL, $K = 0.14$, $t_0 = -1.50$ * Max age= 67
Spawning Adult	ER-1	offshore	shelf edge/slope, hard bottom/reef, banks/shoals*	Jan-Aug		<i>*25-30*</i>			fishing may affect sex ratios	protogynous; smallest males found at 54 cm TL; *50% maturity = 561 mm TL and 4.66 yrs (female); 50% transition = 716-871 mm TL and 8-9 yrs*

**asterisks indicate data collected from outside the Gulf
 Bold and italicized font indicates proxy data*

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Yellowmouth grouper

Yellowmouth grouper										
<i>Mycteroperca interstitialis</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-5	offshore	WCA			<i>20-189</i>				
Larvae	ER-1, ER-5	offshore	WCA			<i>20-189</i>				
Post Larvae	ER-1, ER-5	offshore	WCA			<i>20-189</i>				
Early Juveniles	ER-1, ER-5		mangrove							
Late Juvenile	ER-1, ER-5		mangrove				fish*			
Adult	ER-1, ER-2, ER-4, ER-5	offshore	hard bottom/reef, banks/shoals		19-24	20-189	fish, crustaceans, other inverts	sharks, large fish	Z = 0.25-0.28; *M = 0.14*	long-lived, slow growing, fastest growth in first two year; maximum age/length = 28 yrs/83 cm TL; L _{inf} = 828 mm TL, K = 0.076, t ₀ = -7.5 Max age= 36 (A); L50= 3.41 yrs/ 363.7mm TL
Spawning Adult	ER-1, ER-2, ER-5	offshore		year-round peak: Apr-May (in FL)		20-189				protogynous; females mature at 400-450 mm TL (age 2-4); transition to males at 505-643 mm TL (age 5-14)

*asterisks indicate data collected from outside the Gulf
 Bold and italicized font indicates proxy data

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Yellowtail snapper

Yellowtail Snapper										
<i>Ocyurus chrysurus</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2	nearshore, offshore	WCA	Feb-Oct		<i>1-183</i>				
Larvae	ER-1, ER-2	nearshore, offshore	WCA			<i>1-183</i>				* $K = 0.048 \pm 0.007$ (west Straits of FL), $K = 0.041 \pm 0.007$ (east Straits of FL)*; avg. PLD = 25.3 d
Post Larvae	ER-1, ER-2	nearshore, offshore	WCA			<i>1-183</i>				* $K = 0.048 \pm 0.007$ (west Straits of FL), $K = 0.041 \pm 0.007$ (east Straits of FL)*; avg. PLD = 25.3 d
Early Juvenile	ER-1, ER-2	estuarine, nearshore	SAV, mangrove	fall	24-30	0.3-1.2 *	zooplankton			
Late Juvenile	ER-1, ER-2	estuarine, nearshore, offshore	hard bottom/reef *		24-30	<i>1-183</i>	zooplankton			
Adult	ER-1, ER-2	nearshore, offshore	hard bottom/reef		18-34	1-183	benthic and pelagic reef fish, crustaceans, mollusks		$M = 0.194$; natural mortality 0.385-0.147	max. age = 28 years; $L_{inf} = 618.0$ mm TL, $K = 0.133$, $t_0 = -3.132$;
Spawning Adult	ER-1, ER-2	nearshore, offshore		Apr-Aug		<i>1-183</i>				$L_{50} = 232$ mm TL and 1.7 yrs

											(female), 19.4 cm FL (male)*
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**asterisks indicate data collected from outside the Gulf*

Bold and italicized font indicates proxy data

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A.2 Coastal Migratory Pelagic FMP

Cobia

Cobia										
<i>Rachycentron canadum</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-2, ER-3, ER-4, ER-5	estuarine, nearshore	WCA	summer	28.1-29.7	top meter of water column				hatch within 36 hrs
Larvae	ER-2, ER-3, ER-4, ER-5	estuarine, nearshore, offshore	WCA	May-Sep	24.2-32	3.1-300, in surface waters	zooplankton, primarily copepods (lab)			22 mm SL in 22 days (lab)
post-Larvae	ER-3, ER-4, ER-5	nearshore, offshore	WCA	May-Jul	25.9-30.3	11-53 * in or near surface waters*	zooplankton, primarily copepods (lab)			25 mm SL in 25 days (lab)
Early Juvenile	ER-3, ER-4, ER-5	nearshore, offshore	WCA	Apr-Jul	16.8-25.2*	5-300 * in or near surface waters*	<i>Gambusia</i> , shrimp and fish parts (lab)			~ 55 mm SL by 50 days (lab)
Late Juvenile	ER-3, ER-4, ER-5	nearshore, offshore	WCA	May-Oct		<i>1-70</i>	fish, shrimp, squid	Mahi-mahi		231 mm SL by 130 days (lab)
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	WCA, banks/shoals	Mar-Oct (n. Gulf), Nov-Mar (s. Gulf, s. FL)	23.0-28.0	1-70	crustaceans and fish		$M = 0.38/\text{yr}$	rapid growth for first two yrs; $L_{\text{inf}} = 1281.5 \text{ mm FL}$, $k = 0.42$, $t_0 = -0.53$, max. age = 11 yrs
Spawning Adult	ER-3, ER-4, ER-5	nearshore, offshore	WCA	Apr-Sep (n. Gulf)	23.0-28.0	<i>1-70</i>				50% maturity at age 2

*asterisks indicate data collected from outside the Gulf
 Bold and italicized font indicates proxy data

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King mackerel

King Mackerel										
<i>Scomberomorus cavalla</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	spring, summer	hatch = 18-21 hrs at 27	35-180				1.3 to 38 mm BL
Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	May-Oct	20-31	35-180	larval fish (carangids, clupeids, engraulids)	young pelagics (tuna, dolphin)	predation, starvation	enhanced in northeast Gulf and northwest Gulf, associated with MS River plume
post-Larvae	ER-1, ER-2, ER-3, ER-4, ER-5									
Early Juvenile	ER-3, ER-4, ER-5	nearshore, offshore	WCA	May-Oct peak: Jul, Oct		≤ 9	fish, some squid	larger pelagic fish	bycatch (shrimp fishery), sport fishery	enhanced in northeast Gulf and northwest Gulf, associated with MS River plume
Late Juvenile	ER-3, ER-4, ER-5	nearshore, offshore	WCA				estuarine-dependent fish, some squid	larger pelagic fish	bycatch (shrimp fishery), commercial and recreational fisheries	enhanced in northeast Gulf and northwest Gulf, associated with MS River plume

Adult	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	WCA		> 20	0-200	fish, squid, shrimp; feeding sometimes associated with <i>Sargassum</i>	larger fish, sharks, dolphin, tuna	fishing mortality, $M = 0.174$	highest growth occurs in eastern Gulf; $L_{inf} =$ 128.1 cm FL, $k =$ 0.12, $t_0 = -$ 2.60; max. age = 24 yrs; western Gulf $L_{inf} = 147.2,$ $k = 0.021^*$
Spawning Adult	ER-3, ER-4, ER-5	offshore	WCA	May-Oct Peak: Jun- Sep	> 20	35-180				

**asterisks indicate data collected from outside the Gulf*
Bold and italicized font indicates proxy data

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Spanish mackerel

Spanish Mackerel										
<i>Scomberomorus maculatus</i>										
Life stage	Eco-region ¹⁹	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	WCA	spring, summer	hatch in 25 hours at 26	< 50				
Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	WCA	May-Oct	20-32	9-84	larval fish, some crustaceans	dolphin, tuna		
post-Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	WCA	May-Oct	20-33	9-84	larval fish, some crustaceans	dolphin, tuna		
Early Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	estuarine, nearshore	WCA, sandy bottom (B)	Mar-Nov	15.5-34.0	1.8-9.0	mostly fish, some crustaceans, gastropods, shrimp	pelagic fishes	bycatch in shrimp trawl fishery	
Late Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	estuarine, nearshore, offshore	WCA, sandy bottom (B)	Mar-Nov	15.5-34.0	1.8-50	fish, squid	pelagic fishes	bycatch in shrimp trawl fishery,	
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	estuarine, nearshore, offshore	WCA	n. Gulf in spring, s. Florida and Mexico in fall	15.5-34.0	3-75	fish, crustaceans, squid	larger pelagics	fishing mortality, impacted by baitfish harvest; $M = 0.38/\text{yr}$	females grow faster, live longer than males; $t_0 = -0.5$, $k = 0.61$, $L_{50} = 31.41$ cm FL; $L_{\text{inf}} = 560$ mm FL; max. age = 11 yrs
Spawning Adult	ER-1, ER-2, ER-3, ER-4, ER-5	nearshore, offshore	WCA	May-Sep Apr-Oct	> 25	< 50 (B)				

*asterisks indicate data collected from outside the Gulf

Bold and italicized font indicates proxy data

¹⁹ Gulf-Wide distribution per [October 2025 SSC Recommendation](#).

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A.3 Shrimp FMP

Brown shrimp

Brown Shrimp										
<i>Penaeus aztecus</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
fertilized eggs (0.26 mm diameter)	ER-3, ER-4, ER-5	offshore	soft bottom, sand/shell	fall and spring	>24	18-110				hatch 24 hrs after spawning
Larvae, pre-settlement Post Larvae (< 14 mm)	ER-3, ER-4, ER-5	estuarine, nearshore, offshore	WCA	year-round, peak: spring	28-30	0-82	phytoplankton and zooplankton	fish, some zooplankton		
late Post Larvae, juveniles (14-80 mm)	ER-3, ER-4, ER-5	estuarine	SAV, emergent marsh, intertidal creek estuaries, oyster reef, soft bottom, sand/shell	spring-fall Feb-Apr	7-35	< 1	benthic algae, polychaete worms, peracarid crustaceans	fish (southern flounder, spotted seatrout, red drum, Atlantic croaker, pinfish, sea catfish)	predation is major cause of mortality, cold temperatures in shallow water	Higher growth rates in salt marsh than soft bottom and with carnivorous feeding; reduced growth in low salinity due to increased metabolic costs and decreased food resources; 0.9 mm/day
sub-adult	ER-3, ER-4, ER-5	estuarine, nearshore	soft bottom, sand/shell	spring-fall	18-28	1-18	Polychaetes, amphipods, other benthic inverts	fish (southern flounder, spotted seatrout, red drum, Atlantic croaker, pinfish, sea catfish)	cold fronts, hypoxia	

non-Spawning Adult (females > 140 mm TL)	ER-3, ER-4, ER-5 ER-1, ER-2	offshore	soft bottom, mud substrate, sand/shell mangroves (A)	summer and fall Highest Density in October	10-37	14-110	omnivorous, feed at night	larger fish		
Spawning Adult	ER-3, ER-4, ER-5	offshore	soft bottom, mud substrate, sand/shell mangroves (A)	fall and spring, year-round in depths > 64 m Sep-May, Spawn at night (B)		18-110	omnivorous, feed at night	larger fish		

**asterisks indicate data collected from outside the Gulf*

Bold and italicized font indicates proxy data

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Pink shrimp

Pink Shrimp										
<i>Penaeus duorarum</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
fertilized eggs (0.31-0.33 mm diameter)	ER-1, ER-2, ER-3, ER-5	offshore	sand/shell	year-round	> 27	9-48				
Larvae, pre-settlement Post Larvae (< 15 mm)	ER-1, ER-2, ER-3, ER-5	estuarine, nearshore, offshore	WCA	year-round	15-35	1-50	phytoplankton, zooplankton	fish, inverts	mortality is higher at 35°C	
late Post Larvae, juveniles (> 15 mm)	ER-1, ER-2, ER-3, ER-5	estuarine, nearshore	SAV, soft bottom, sand/shell, mangroves (low densities)	year-round (W. FL); Fall-Spring (TX)	6-38	0-3	seagrass, annelids, small crustaceans, shrimp, bivalves	fish (spotted seatrout, red drum, toadfish, others)	no recorded kills from cold fronts	0.05-2.08 mm CL/week*
sub-Adult	ER-1, ER-2, ER-3, ER-	estuarine, nearshore, offshore	SAV, soft bottom, sand/shell, mangroves (low densities), *oyster reefs*	year-round (W. FL); Fall-Spring (TX)	6-38	1-65	annelids, small crustaceans, shrimp, bivalves	fish (spotted seatrout, sand seatrout, gray snapper, mackerels, red drum, grouper)	avoid cold by migrating to deeper water; low predation offshore	0.05-2.08 mm CL/week*
non-Spawning Adult (> 75 mm TL)	ER-1, ER-2, ER-3, ER-5 Eastern Gulf	nearshore, offshore	sand/shell Mangroves, soft substrates, Calcareous Muds, seagrass and shoal grass	year-round highest density: Aug-Dec	16-31	1-110 1-64	carnivores	larger fish, sharks	low predation offshore	Female TL= 280 mm, Male TL= 269 mm

Spawning Adult (capable at 65-75 mm TL)	ER-1, ER-2, ER-3, ER-5 Eastern Gulf	nearshore, offshore	sand/shell Mangroves, soft substrates, Calcareous Muds, seagrass and shoal grass	year-round (W. FL), spring-fall (TX) Apr- Sep	16-31	9-48 4-48	carnivores	larger fish, sharks	low predation offshore	
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**asterisks indicate data collected from outside the Gulf*
Bold and italicized font indicates proxy data

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Royal red shrimp

Royal Red Shrimp										
<i>Pleoticus robustus</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-3	offshore	shelf edge/slope	year-round	9-12	250-550				
Larvae	ER-1, ER-3					<i>250-550</i>				
Post Larvae	ER-1, ER-3					<i>250-550</i>				
Early Juvenile	ER-1, ER-3					<i>250-550</i>				
Late Juvenile	ER-1, ER-3					<i>250-550</i>				
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	shelf edge/slope, soft bottom, sand/shell	year-round	5-15	140-750	small benthic organisms			*max. length = 184 mm (male), 229 mm (female); can live up to 5 years*
Spawning Adult	ER-1, ER-2 ER-3, ER-4, ER-5	offshore	shelf edge/slope	year-round		250-550				*maturity = 125 mm TL (male), 155 mm TL (female)*

**asterisks indicate data collected from outside the Gulf*

Bold and italicized font indicates proxy data

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White shrimp

White Shrimp										
<i>Penaeus setiferus</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
fertilized Eggs	ER-2, ER-3, ER-4, ER-5	estuarine, nearshore, offshore		spring-fall		9-34			daily Z = 0.373	demersal eggs, hatch 10-12 hrs after spawning; egg/larval stage lasts 16 days
Larvae/ pre-settlement Post Larvae ₁ ,	ER-2, ER-3, ER-4, ER-5	estuarine, nearshore, offshore		spring-fall	17.0-28.5	0-82	phytoplankton and zooplankton	fish, some zooplankton		egg/larval stage lasts 16 days
late Post Larvae/ juveniles	ER-2, ER-3, ER-4, ER-5	estuarine, nearshore	emergent marsh, SAV, oyster reefs, soft bottom, mangrove	late spring-fall Jun-Sep; May-Aug	Post Larvae 13-31; juveniles 9-33	< 15m (B)	omnivorous; detritus, annelid worms, pericarid crustaceans, caridean shrimp, diatoms	fish	predation; daily Z = 0.014-0.126	growth rates increase with temps 18-32.5°C, but decrease at 35°C; grow slowly at < 18°C; 0.3-1.2 mm/ day; stage duration = 79 days
sub-Adult	ER-2, ER-3, ER-4, ER-5	estuarine, nearshore, offshore	soft bottom, sand/shell	summer-fall	* > 6 *	1-30	omnivorous, scavengers; annelids, insects, detritus, gastropods, copepods, bryozoans, sponges, corals, fish, filamentous algae,	fish	daily Z = 0.023-0.048	stage duration = 33 days; 0.4-1.5 mm/day

							vascular plant stems and roots			
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	estuarine, nearshore, offshore	soft bottom	late summer and fall	7-38	< 27	omnivorous	larger fish	daily Z = 0.004-0.034	adult/spawning adult stage duration is about 237 days; 0.4-1.0 mm/day
Spawning Adult	ER-2, ER-3, ER-4, ER-5	offshore	Soft bottom	spring-late fall peak: Jun-Jul		9-34	omnivorous	larger fish		adult/spawning adult stage duration is about 237 days; 0.4-1.0 mm/day

**asterisks indicate data collected from outside the Gulf*

Bold and italicized font indicates proxy data

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A.4 Red Drum FMP

Red Drum

Red Drum										
<i>Sciaenops ocellatus</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
Eggs	ER-1, ER-2, ER-3, ER-4, ER-5		WCA	summer, fall	20-30	20-30			high early in spawning	
Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	estuarine	SAV, soft bottom, WCA	late summer, fall	18.3-31		copepods	larger piscivorous fish	Higher at 20-24°C than 25-30°C	0.5 mm/day. Faster at 25-30°C. 3-6 mm at 2 weeks. peak settlement from 6-8 mm TL
Post Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	estuarine	SAV, emergent marsh, soft bottom, sand/shell	late summer, fall	18.3-31.0		copepods	larger piscivorous fish		Increased with increasing salinity (up to 30 ppt)
Early Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	estuarine, nearshore	SAV, soft bottom, emergent marsh	Sep-Dec	> 5-32.2	0-3	copepods, mysids, amphipods, shrimp, polychaetes, insects, fish, isopods, bivalves, decapod crabs	larger piscivorous fish	rapid decline in water temp. can cause mortality	higher in backwater than seagrass beds. 15-20 mm/month

Late Juvenile	ER-1, ER-2, ER-3, ER-4, ER-5	estuarine, nearshore	SAV, soft bottom, hard bottom/reef, sand/shell	fall	> 5-30	0-5	mysids, amphipods, shrimp, polychaetes, insects, crabs, fish	amberjack, sharks, larger piscivorous fish	changes in environment, disease, parasites, rapid decline in water temp.	15-20 mm/month
Adult	ER-1, ER-2, ER-3, ER-4, ER-5	estuarine, nearshore, offshore	SAV, emergent marsh, soft bottom, hard bottom/reef, sand/shell, WCA		2-33	1-70	crabs, shrimp, fish	sharks	<i>M</i> (age-constant) = 0.07-0.13	$L_{inf} = 881$ mm FL, $k = 0.32$, $t_0 = -1.29$, max. age = 42 yrs TL= 68 cm (A)
Spawning Adult	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	SAV, soft bottom, hard bottom/reef, sand/shell	mid Aug - Oct Aug-Sep (C)	20-30	40-70		sharks		L_{50} (male) = 529 mm FL, L_{50} (female) = 825-900 mm FL

**asterisks indicate data collected from outside the Gulf*

Bold and italicized font indicates proxy data

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A.5 Spiny Lobster FMP

Spiny lobster

Spiny Lobster										
<i>Panulirus argus</i>										
Life stage	Eco-region	Habitat Zone	Habitat Type	Season	Temp (°C)	Depth (m)	Prey	Predators	Mortality	Growth
phyllosome Larvae	ER-1, ER-2, ER-3, ER-4, ER-5	offshore	WCA	year-round (FL Keys; SE FL), Jun-Nov (NE Gulf)	> 24	<i>1-100</i>	plankton	pelagic fish		~11 molts over 9-12 month larval cycle. Size: 0.5-12 mm carapace length
puerulus Post Larvae	ER-1	estuarine, nearshore, offshore	WCA, SAV	year-round, peak: spring, secondary peak: fall	18-33	<i>1-100</i>	non-feeding	nocturnally active, water column feeding fish	predation, physiological stress from temp and salinity extremes	metamorphose into first K5th instar 7-21 d post-settlement
juveniles	ER-1	estuarine, nearshore, offshore	SAV, hard bottom/reef	year-round		<i>1-100</i>	inverts (esp. mollusks, crustaceans)	elasmobranchs, boney fish, octopods, portunid crabs	mortality ~ 95% primarily via predation, commercial fishery	3-4 mm CL/month during first year, influenced by temp, diet, and injuries
Adult	ER-1	estuarine, nearshore, offshore	hard bottom/reef, SAV	year-round		1-100	mollusks, arthropods	elasmobranchs, boney fish, dolphins, loggerhead turtles	fishery exploitation, estimated to be 90%	S.FL = 0.6 mm CL/month, affected by temp and injuries max length= 1 m

**asterisks indicate data collected from outside the Gulf*

Bold and italicized font indicates proxy data

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APPENDIX B. METADATA

Habitat Type Metadata

Contemporary benthic habitat spatial layers were used to construct EFH maps for all federally managed shrimp and finfish species (**Preferred Alternative 2**). Habitat shapefiles from the 2016 EFH 5-year review were combined with updated spatial files provided during 2023/24 Council contracted work using the ‘Merge’ feature class tool in ArcMap to create a uniform polygon layer to describe presence of that habitat Gulf-wide. In some cases, multiple data sources for individual habitat characterization were obtained. To combine the multiple habitat data layers in these instances, the ‘Merge’ feature class tool in ArcMap was used. Then, combined features were dissolved using the ‘Dissolve’ tool in ArcMap to create a uniform polygon layer to describe presence of that habitat throughout the Gulf. The extent of the layers was also cropped to the EEZ boundary of the Gulf, and Eco-region boundary using ‘Clip’ tool in ArcMap when the extents of combined layers were larger. For hard bottom/reef habitat type, only polygons with an area >10km² were retained for mapping purposes. It is important to note, that although hard bottom/reef habitat <10km² may not be visually depicted on the maps, all hard bottom/reef habitat is considered Essential Fish Habitat, as defined in the EFH textual definitions. No spatial data currently exist to inform drifting algae and banks/shoals habitat type. As such, those habitat types were not used in creating EFH Level 1 species maps, but are included in the EFH textual definitions and Habitat attribute tables.

A summary of the metadata provided during the Council-led 2023/24 contracted work, by habitat type is provided below. Additionally, please find below the link to the Google Drive, Gulf Council, which includes all spatial data and metadata collected during the 2023/24 contracted work. The drive is organized into folders per Gulf State, and within each state folder, there are subfolders containing all shapefiles for each habitat type and associated metadata. The Google Sheet named 'Contact Log' lists everyone contacted during the project and the outcomes, while the sheet titled 'Email Contacts and Shapefiles of Used Data' is a running list of all data collected and their sources.

Google Drive Link: <https://drive.google.com/drive/folders/1qx9lop8Wgq2YAcRRIYJ-kR-YH9KWSdtF?usp=sharing>

Submerged Aquatic Vegetation (SAV)

Florida

Title: Salt Marshes in Florida

Creator: Florida Fish and Wildlife Conservation Commission

Time series: 1999-2020, updated 2023

Eco-region: 1-3

Data Source: Florida Fish and Wildlife Conservation Commission GIS Librarian

Texas

Title: 2018 Seagrass

Creator: University of Texas Marine Science Institute (Dunton, K., 2018)

Time series: 2018

Eco-region: 5

Data Source: The HARTE Research Institute - Texas A&M Corpus Christi

Title: 2017 Seagrass

Creator: University of Texas Marine Science Institute (Dunton, K., 2017)

Time series: 2017

Eco-region: 5

Data Source: The HARTE Research Institute - Texas A&M Corpus Christi

Title: 2015 Seagrass

Creator: University of Texas Marine Science Institute (Dunton, K., 2015)

Time series: 2015

Eco-region: 5

Data Source: The HARTE Research Institute - Texas A&M Corpus Christi

Title: 2014 Seagrass

Creator: University of Texas Marine Science Institute (Dunton, K., 2014)

Time series: 2014

Eco-region: 5

Data Source: The HARTE Research Institute - Texas A&M Corpus Christi

Title: 2013 Seagrass

Creator: University of Texas Marine Science Institute (Dunton, K., 2013)

Time series: 2013

Eco-region: 5

Data Source: The HARTE Research Institute - Texas A&M Corpus Christi

Title: 2012 Seagrass

Creator: University of Texas Marine Science Institute (Dunton, K., 2012)

Time series: 2012

Eco-region: 5

Data Source: The HARTE Research Institute - Texas A&M Corpus Christi

Title: 2011 Seagrass

Creator: University of Texas Marine Science Institute (Dunton, K., 2011)

Time series: 2011

Eco-region: 5

Data Source: The HARTE Research Institute - Texas A&M Corpus Christi

Title: TPWD Christmas Bay and West Galveston Bay 2015

Creator: Texas Parks and Wildlife Department Coastal Fisheries Division Habitat Assessment Team

Time series: 2015

Eco-region: 5

Data Source: Texas Parks and Wildlife Department Coastal Fisheries Division Habitat

Title: TPWD Seagrass 2000-2005

Creator: Texas Parks and Wildlife Department

Time series: 2000-2005
Eco-region: 5
Data Source: Texas Parks and Wildlife Department

Title: TPWD Seagrass 2012
Creator: Texas Parks and Wildlife Department
Time series: 2012
Eco-region: 5
Data Source: Texas Parks and Wildlife Department

Title: NOAA Seagrass 2012
Creator: National Oceanic and Atmospheric Administration
Time series: 2012
Eco-region: 5
Data Source: Houston Advanced Research Center

Louisiana

Title: Coastal Information Management System Vegetation
Creator: U.S. Geological Survey, Geographer, S. Hartley
Time series: created 2022
Eco-region: 3,4
Data Source: U.S. Geological Survey.
<https://cims.coastal.louisiana.gov/Viewer/GISDownload.aspx>

Title: Louisiana and Lower Mississippi River 2014 ESI BENTHIC Polygons
Creator: NOAA Office of Response and Restoration
Time series: created 2013
Eco-region: 3,4
Data Source: https://response.restoration.noaa.gov/esi_download#Louisiana

Title: Louisiana and Lower Mississippi River 2014 ESIL (Environmental Sensitivity Index - Lines)
Creator: NOAA Office of Response and Restoration
Time series: created 2014
Eco-region: 3,4
Data Source: https://response.restoration.noaa.gov/esi_download#Louisiana

Title: Louisiana and Lower Mississippi River 2014 ESI HABITAT Polygons
Creator: NOAA Office of Response and Restoration
Time series: created 2013
Eco-region: 3,4
Data Source: https://response.restoration.noaa.gov/esi_download#Louisiana

Title: Submerged aquatic vegetation and environmental data for coastal areas from Texas through Alabama, 2013-2015

Creator: U.S. Geological Survey; La Peyre, M., DeMarco, K., Hillmann, E.
Time series: 2013-2015, created 2017
Eco-region: 3-5
Data Source: U.S. Geological Survey data release;
<https://www.sciencebase.gov/catalog/item/588605dde4b0496b79d7945a>

Alabama

Title: Seagrass_AL_FL_MS_TX (Seagrass_ALFLMSTX)
Creator: NOAA/ NESDIS/ NODC/ NCDDC (National Coastal Data Development Center)
Time series: 1987-1999, created 2004
Eco-region: 3
Data Source: USGS, NOAA, NESDIS, NODC, NCDCC

Mangroves

Florida

Title: Mangrove Habitat in Florida
Creator: Florida Fish and Wildlife Conservation Commission
Time series: 1999-2020, updated 2023
Eco-region: 1,2
Data Source: Florida Fish and Wildlife Conservation Commission GIS Librarian

Mississippi

Title: Mangrove distribution in the southeastern United States in 2021
Creator: University of Michigan (Bardou, R.)
Time series: created 2022
Eco-region: 1-5
Data Source: . <https://www.sciencebase.gov/catalog/item/61eb07ddd34e8b818ada4948>
U.S. Geological Survey – ScienceBase

Title: Global Distribution of Mangroves USGS
Creator: The UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC)
Time series: 1997-2000, updated 2023
Eco-region: 1-5
Data Source: UNEP -WCMC

Louisiana

Title: Louisiana Barrier Island Comprehensive Monitoring Program – habitat mapping
Creator: U.S. Geological Survey; Enwright, N.M., SooHoo, W.M., Dugas, J.L., Lee, D.M., Borrok, P.S.
Time series: 2008-2016, updated 2018
Eco-region: 3,4
Data Source: U.S. Geological Survey;
<https://data.usgs.gov/datacatalog/data/USGS:5ced8c28e4b02eb068de9459>

Title: Louisiana and Lower Mississippi River 2014 ESIP (Environmental Sensitivity Index - Polygons)
Creator: NOAA Office of Response and Restoration
Time series: created 2014
Eco-region: 3,4
Data Source: https://response.restoration.noaa.gov/esi_download#Louisiana

Drifting algae

No spatial information available.

Emergent marshes

Mississippi

Title: Global Distribution of Salt Marshes USGS
Creator: The UN Environment Programme World Conservation Monitoring Centre (UNEP-WCMC)
Time series: 1973-2015, updated 2023
Eco-region: 1-5
Data Source: UNEP -WCMC

Louisiana

Title: Louisiana Barrier Island Comprehensive Monitoring Program – habitat mapping
Creator: U.S. Geological Survey; Enwright, N.M., SooHoo, W.M., Dugas, J.L., Lee, D.M., Borrok, P.S.
Time series: 2008-2016, updated 2018
Eco-region: 3,4
Data Source: U.S. Geological Survey;
<https://data.usgs.gov/datacatalog/data/USGS:5ced8c28e4b02eb068de9459>

Title: Louisiana and Lower Mississippi River 2014 ESIL (Environmental Sensitivity Index - Lines)
Creator: NOAA Office of Response and Restoration
Time series: created 2014
Eco-region: 3,4
Data Source: https://response.restoration.noaa.gov/esi_download#Louisiana

Title: Louisiana and Lower Mississippi River 2014 ESIP (Environmental Sensitivity Index - Polygons)
Creator: NOAA Office of Response and Restoration
Time series: created 2014
Eco-region: 3,4
Data Source: https://response.restoration.noaa.gov/esi_download#Louisiana

Title: Vegetation types in coastal Louisiana in 2013

Creator: Wetland and Aquatic Research Center' Sasser, C.E., Visser, J.M., Mouton, E., Linscombe, J., Hartley, S.B.

Time series: created 2013

Eco-region: 3,4

Data Source: <https://www.usgs.gov/maps/vegetation-types-coastal-louisiana-2013>;
<https://pubs.usgs.gov/publication/sim3290>; <https://pubs.usgs.gov/sim/3290/downloads/>

Title: Vegetation types in coastal Louisiana in 2021

Creator: U.S. Geological Survey

Time series: created 2022

Eco-region: 3,4

Data Source: <https://www.sciencebase.gov/catalog/item/6217a23fd34ec739b2dd245e>

Title: National Wetlands Inventory - Louisiana

Creator: U.S. Fish and Wildlife Service

Time series: created 2023

Eco-region: 3,4

Data Source: <https://www.fws.gov/program/national-wetlands-inventory/download-state-wetlands-data>

Alabama

Title: al1849_1867

Creator: USGS

Time series: created 2004

Eco-region: 3

Data Source: USGS

Title: al1918_1957

Creator: USGS

Time series: created 2004

Eco-region: 3

Data Source: USGS

Title: al1978_1981

Creator: USGS

Time series: created 2004

Eco-region: 3

Data Source: USGS

Title: al2001

Creator: USGS

Time series: created 2004

Eco-region: 3

Data Source: USGS

Sand/shell bottoms

Texas

Title: Shell Compano Bay
Creator: Houston Advanced Research Center
Time series: N/A
Eco-region: 5
Data Source: Houston Advanced Research Center

Title: Sand Compano Bay
Creator: Houston Advanced Research Center
Time series: N/A
Eco-region: 5
Data Source: Houston Advanced Research Center

Mississippi

Title: Seafloor Substrate Griddings, Gulf of Mexico
Creator: INSTAAR, University of Colorado (Jenkins, C.J.)
Time series: created 2011
Eco-region: 1-5
Data Source: <https://www.ncei.noaa.gov/maps/gulf-data-atlas/atlas.htm?plate=Bottom%20Sediments%20-%20Types>

Louisiana

Title: Louisiana and Lower Mississippi River 2014 ESIL (Environmental Sensitivity Index - Lines)
Creator: NOAA Office of Response and Restoration
Time series: created 2014
Eco-region: 3,4
Data Source: https://response.restoration.noaa.gov/esi_download#Louisiana

Title: Louisiana and Lower Mississippi River 2014 ESIP (Environmental Sensitivity Index - Polygons)
Creator: NOAA Office of Response and Restoration
Time series: created 2014
Eco-region: 3,4
Data Source: https://response.restoration.noaa.gov/esi_download#Louisiana

Soft bottoms

Texas

Title: Mud Compano Bay
Creator: Houston Advanced Research Center
Time series: N/A
Eco-region: 4,5
Data Source: Houston Advanced Research Center

Mississippi

Title: Seafloor Substrate Griddings, Gulf of Mexico

Creator: INSTAAR, University of Colorado (Jenkins, C.J.)
Time series: created 2011
Eco-region: 1-5
Data Source: <https://www.ncei.noaa.gov/maps/gulf-data-atlas/atlas.htm?plate=Bottom%20Sediments%20-%20Types>

Louisiana

Title: Louisiana and Lower Mississippi River 2014 ESIL (Environmental Sensitivity Index - Lines)

Creator: NOAA Office of Response and Restoration

Time series: created 2014

Eco-region: 3,4

Data Source: https://response.restoration.noaa.gov/esi_download#Louisiana

Title: Louisiana and Lower Mississippi River 2014 ESIP (Environmental Sensitivity Index - Polygons)

Creator: NOAA Office of Response and Restoration

Time series: created 2014

Eco-region: 3,4

Data Source: https://response.restoration.noaa.gov/esi_download#Louisiana

Title: Vegetation types in coastal Louisiana in 2013

Creator: U.S. Geological Survey, Geographer, S. Hartley

Time series: created 2014

Eco-region: 3,4

Data Source: U.S. Geological Survey. <https://www.usgs.gov/maps/vegetation-types-coastal-louisiana-2013>; <https://pubs.usgs.gov/publication/sim3290>; <https://pubs.usgs.gov/sim/3290/downloads/>.

Hard bottoms/Reef

Florida

Title: Coral and Hard Bottom Habitats in Florida

Creator: Florida Fish and Wildlife Conservation Commission

Time series: 1970s-2011

Eco-region: 1-5

Data Source: Florida Fish and Wildlife Conservation Commission GIS Librarian

Texas

Title: Shellfish Harvest Area

Creator: Houston Advanced Research Center

Time series: N/A

Eco-region: 4

Data Source: Houston Advanced Research Center

Mississippi:

Title: Seafloor Substrate Griddings, Gulf of Mexico

Creator: INSTAAR, University of Colorado (Jenkins, C.J.)
Time series: created 2011
Eco-region: 1-5
Data Source: <https://www.ncei.noaa.gov/maps/gulf-data-atlas/atlas.htm?plate=Bottom%20Sediments%20-%20Types>

Louisiana

Title: Louisiana and Lower Mississippi River 2014 ESIL (Environmental Sensitivity Index - Lines)

Creator: NOAA Office of Response and Restoration

Time series: created 2014

Eco-region: 3,4

Data Source: https://response.restoration.noaa.gov/esi_download#Louisiana

Title: Louisiana and Lower Mississippi River 2014 ESI BENTHIC Polygons

Creator: NOAA Office of Response and Restoration

Time series: created 2013

Eco-region: 3,4

Data Source: https://response.restoration.noaa.gov/esi_download#Louisiana

Alabama

Title: 0-9 Mile Reef Coordinates

Creator: Coastal Conservation Association of Alabama, Alabama Charter Fishing Association, and Alabama Wildlife Federation; Powers, S., Szedlmayer, S.

Time series: 1975-2021, created 2021

Eco-region: 3

Data Source: Alabama Department of Conservation and National Resources Marine Resources Division

Title: Alpublicreefs (Master_List_AL_Public_Reefs)

Creator: Coastal Conservation Association of Alabama, Alabama Charter Fishing Association, and Alabama Wildlife Federation; Powers, S., Szedlmayer, S.

Time series: 1973-2023, created 2023

Eco-region: 3

Data Source: Alabama Department of Conservation and National Resources Marine Resources Division

Title: Deepseacorals (deep_sea_corals_6cb7_510e_0a83)

Creator: NCEI/NOAA

Time series: created 2016

Eco-region: 1-5

Data Source: <https://gulfatlas.noaa.gov/>

Oyster reefs

Florida

Title: Oyster Beds in Florida

Creator: Florida Fish and Wildlife Conservation Commission
Time series: data from 2001, 2009-2016, 2022
Eco-region: 1-3
Data Source: Florida Fish and Wildlife Conservation Commission GIS Librarian

Texas

Title: Compano Bay Oyster
Creator: Texas Parks and Wildlife Department
Time series: N/A
Eco-region: 5
Data Source: Texas Parks and Wildlife Department

Louisiana

Title: Louisiana and Lower Mississippi River 2014 ESI BENTHIC Polygons
Creator: NOAA Office of Response and Restoration
Time series: created 2013
Eco-region: 3,4
Data Source: https://response.restoration.noaa.gov/esi_download#Louisiana

Title: Louisiana Department of Wildlife and Fisheries Oyster Leases, Public Seed Grounds, and Clutch Plants
Creator: Louisiana Department of Wildlife and Fisheries; Temento, L.
Time series: created 2023
Eco-region: No information available
Data Source: Louisiana Department of Wildlife and Fisheries

Title: Louisiana and Lower Mississippi River 2014 ESI BENTHIC Polygons
Creator: NOAA Office of Response and Restoration
Time series: created 2013
Eco-region: 3,4
Data Source: https://response.restoration.noaa.gov/esi_download#Louisiana

Alabama

Title: Nearsubreefs (physical_data_oyster_reef_2015_2016)
Creator: Dauphin Island Sea Lab; Schrand, M., Powers, S., Szedlmayer, S.
Time series: created 2017
Eco-region: 3
Data Source: Dauphin Island Sea Lab

Title: Alabama_Public_Oyster_Reefs
Creator: Alabama Marine Resources Division
Time series: 1968, 1996, and 2001
Eco-region: 3
Data Source: Alabama Department of Marine Resources. Inaccessible to public (file was sent in a private folder)

Title: Alabama_Oyster_Plantings
Creator: Alabama Marine Resources Division
Time series: 2007-2016
Eco-region: 3
Data Source: Alabama Department of Marine Resources. Inaccessible to public (file was sent in a private folder)

Title: Alabama_Coastal_Waters_AMRD_revised_generalize
Creator: Alabama Marine Resources Division
Time series: 2007-2016
Eco-region: 3
Data Source: Alabama Department of Marine Resources. Inaccessible to public (file was sent in a private folder)

Banks/shoals:

No spatial information available

Shelf edge/slope

No new spatial information was acquired.

Water Column Associated (WCA)

Florida

Title: West Florida Shelf Benthic Habitats
Creator: Florida Fish and Wildlife Conservation Commission
Time series: Unknown, updated 2017
Eco-region: 1,2
Data Source: Florida Fish and Wildlife Conservation Commission GIS Librarian

Louisiana

Title: Louisiana and Lower Mississippi River 2014 ESI INVERTEBRATE Polygons
Creator: NOAA Office of Response and Restoration
Time series: created 2014
Eco-region: 3,4
Data Source: InPort (NOAA Fisheries and National Ocean Service).
https://response.restoration.noaa.gov/esi_download#Louisiana

Title: Louisiana and Lower Mississippi River 2014 ESI FISH Polygons
Creator: NOAA Office of Response and Restoration
Time series: created 2014
Eco-region: 3,4
Data Source: InPort (NOAA Fisheries and National Ocean Service).
https://response.restoration.noaa.gov/esi_download#Louisiana

APPENDIX C. ESSENTIAL FISH HABITAT MAPS

The following essential fish habitat (EFH) maps were to describe and identify species-specific EFH. EFH is defined as waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity. For those species life stages that lack data to inform EFH, “Information is not available” will be detailed. To view interactive EFH maps, habitat types, habitat zones, and species life-stage identifications, please visit the interactive EFH portal:

https://gulfcouncilportal.shinyapps.io/EFH_5_year_Review_2025/

TABLE OF CONTENTS

Table of Contents	236
List of Figures	238
C.1. Reef Fish	244
Almaco jack	244
Banded rudderfish.....	247
Blackfin snapper	251
Black grouper.....	255
Blueline tilefish.....	259
Cubera snapper.....	263
Gag grouper	268
Goldface tilefish.....	272
Goliath grouper	273
Gray snapper	278
Gray triggerfish.....	282
Greater amberjack.....	286
Hogfish.....	291
Lane snapper	295
Lesser amberjack	299
Mutton snapper	301
Queen snapper.....	306
Red grouper.....	310
Red snapper.....	314
Scamp.....	319
Silk snapper.....	323
Snowy grouper	324
Speckled hind.....	329
Tilefish	333
Vermilion snapper.....	338
Warsaw grouper	342
Wenchman	346
Yellowedge grouper.....	349
Yellowfin grouper.....	353
Yellowmouth grouper	355

Yellowtail snapper	359
C. 2. Coastal Migratory Pelagics	363
Cobia.....	363
King mackerel.....	367
Spanish mackerel	371
C.3. Shrimp.....	376
Brown shrimp.....	376
Pink shrimp	380
Royal red shrimp.....	385
White shrimp.....	387
C.4. Red Drum	390
Red drum.....	390
C.5. Spiny Lobster	395
Spiny lobster	395

LIST OF FIGURES

Figure C.1.1. Almaco jack early juvenile EFH map.....	245
Figure C.1.2. Almaco jack late juvenile EFH map.....	245
Figure C.1.3. Almaco jack adult EFH map.....	246
Figure C.1.4. Almaco jack adult EFH map.....	246
Figure C.1.5. Banded rudderfish egg EFH map.	248
Figure C.1.6. Banded rudderfish larvae EFH map.	248
Figure C.1.7. Banded rudderfish post larvae EFH map.....	249
Figure C.1.8. Banded rudderfish early juvenile EFH map.	249
Figure C.1.9. Banded rudderfish late juvenile EFH map.....	250
Figure C.1.10. Banded rudderfish adult EFH map.	250
Figure C.1.11. Banded rudderfish spawning adult EFH map.....	251
Figure C.1.12. Blackfin snapper egg EFH map.	252
Figure C.1.13. Blackfin snapper early juvenile EFH map.....	253
Figure C.1.14. Blackfin snapper late juvenile EFH map.	253
Figure C.1.15. Blackfin snapper adult EFH map.....	254
Figure C.1.16. Blackfin snapper spawning adult EFH map.	254
Figure C.1.17. Black grouper egg EFH map.	255
Figure C.1.18. Black grouper larvae EFH map.	256
Figure C.1.19. Black grouper post larvae EFH map.....	256
Figure C.1.20. Black grouper early juvenile EFH map.	257
Figure C.1.21. Black grouper late juvenile EFH map.	257
Figure C.1.22. Black grouper adult EFH map.	258
Figure C.1.23. Black grouper spawning adult EFH map.....	258
Figure C.1.24. Blueline tilefish egg EFH map.	260
Figure C.1.25. Blueline tilefish larvae EFH map.	260
Figure C.1.26. Blueline tilefish post larvae EFH map.....	261
Figure C.1.27. Blueline tilefish early juvenile EFH map.	261
Figure C.1.28. Blueline tilefish late juvenile EFH map.....	262
Figure C.1.29. Blueline tilefish adult EFH map.	262
Figure C.1.30. Blueline tilefish spawning adult EFH map.....	263
Figure C.1.31. Cubera snapper egg EFH map.	264
Figure C.1.32. Cubera snapper larvae EFH map.	265
Figure C.1.33. Cubera snapper post larvae EFH map.	265
Figure C.1.34. Cubera snapper early juvenile EFH map.	266
Figure C.1.35. Cubera snapper late juvenile EFH map.	266
Figure C.1.36. Cubera snapper adult EFH map.....	267
Figure C.1.37. Cubera snapper spawning adult EFH map.....	267
Figure C.1.38. Gag grouper egg EFH map.	269
Figure C.1.39. Gag grouper larvae EFH map.	269
Figure C.1.40. Gag grouper post larvae EFH map.	270
Figure C.1.41. Gag grouper early juvenile EFH map.....	270
Figure C.1.42. Gag grouper late juvenile EFH map.	271
Figure C.1.43. Gag grouper adult EFH map.....	271

Figure C.1.44. Gag grouper spawning adult EFH map.	272
Figure C.1.45. Goldface tilefish adult EFH map.	273
Figure C.1.46. Goliath grouper egg EFH map.	274
Figure C.1.47. Goliath grouper larvae EFH map.	275
Figure C.1.48. Goliath grouper post larvae EFH map.	275
Figure C.1.49. Goliath grouper early juvenile EFH map.	276
Figure C.1.50. Goliath grouper late juvenile EFH map.	276
Figure C.1.51. Goliath grouper adult EFH map.	277
Figure C.1.52. Goliath grouper spawning adult EFH map.	277
Figure C.1.53. Gray snapper egg EFH map.	279
Figure C.1.54. Gray snapper larvae EFH map.	279
Figure C.1.55. Gray snapper post larvae EFH map.	280
Figure C.1.56. Gray snapper early juvenile EFH map.	280
Figure C.1.57. Gray snapper late juvenile EFH map.	281
Figure C.1.58. Gray snapper adult EFH map.	281
Figure C.1.59. Gray snapper spawning adult EFH map.	282
Figure C.1.60. Gray triggerfish egg EFH map.	283
Figure C.1.61. Gray triggerfish larvae EFH map.	284
Figure C.1.62. Gray triggerfish post larvae EFH map.	284
Figure C.1.63. Gray triggerfish late juvenile EFH map.	285
Figure C.1.64. Gray triggerfish adult EFH map.	285
Figure C.1.65. Gray triggerfish spawning adult EFH map.	286
Figure C.1.66. Greater amberjack egg EFH map.	287
Figure C.1.67. Greater amberjack larvae EFH map.	288
Figure C.1.68. Greater amberjack post larvae EFH map.	288
Figure C.1.69. Greater amberjack early juvenile EFH map.	289
Figure C.1.70. Greater amberjack late juvenile EFH map.	289
Figure C.1.71. Greater amberjack adult EFH map.	290
Figure C.1.72. Greater amberjack spawning adult EFH map.	290
Figure C.1.73. Hogfish egg EFH map.	292
Figure C.1.74. Hogfish larvae EFH map.	292
Figure C.1.75. Hogfish post larvae EFH map.	292
Figure C.1.76. Hogfish early juvenile EFH map.	293
Figure C.1.77. Hogfish late juvenile EFH map.	293
Figure C.1.78. Hogfish adult EFH map.	294
Figure C.1.79. Hogfish spawning adult EFH map.	294
Figure C.1.80. Lane snapper egg EFH map.	296
Figure C.1.81. Lane snapper larvae EFH map.	296
Figure C.1.82. Lane snapper post larvae EFH map.	297
Figure C.1.83. Lane snapper early juvenile EFH map.	297
Figure C.1.84. Lane snapper late juvenile EFH map.	298
Figure C.1.85. Lane snapper adult EFH map.	298
Figure C.1.86. Lane snapper spawning adult EFH map.	299
Figure C.1.87. Lesser amberjack late juvenile EFH map.	300
Figure C.1.88. Lesser amberjack adult EFH map.	301
Figure C.1.89. Lesser amberjack spawning adult EFH map.	301

Figure C.1.90. Mutton snapper egg EFH map.....	302
Figure C.1.91. Mutton snapper larvae EFH map.....	303
Figure C.1.92. Mutton snapper post larvae EFH map.....	303
Figure C.1.93. Mutton snapper early juvenile EFH map.....	303
Figure C.1.94. Mutton snapper late juvenile EFH map.....	304
Figure C.1.95. Mutton snapper adult EFH map.....	305
Figure C.1.96. Mutton snapper spawning adult EFH map.....	305
Figure C.1.97. Queen snapper egg EFH map.....	307
Figure C.1.98. Queen snapper larvae EFH map.....	307
Figure C.1.99. Queen snapper post larvae EFH map.....	308
Figure C.1.100. Queen snapper early juvenile EFH map.....	308
Figure C.1.101. Queen snapper late juvenile EFH map.....	309
Figure C.1.102. Queen snapper adult EFH map.....	309
Figure C.1.103. Queen snapper spawning adult EFH map.....	310
Figure C.1.104. Red grouper egg EFH map.....	311
Figure C.1.105. Red grouper larvae EFH map.....	312
Figure C.1.106. Red grouper post larvae EFH map.....	312
Figure C.1.107. Red grouper early juvenile EFH map.....	312
Figure C.1.108. Red grouper late juvenile EFH map.....	313
Figure C.1.109. Red grouper adult EFH map.....	313
Figure C.1.110. Red grouper spawning adult EFH map.....	314
Figure C.1.111. Red snapper egg EFH map.....	315
Figure C.1.112. Red snapper larvae EFH map.....	316
Figure C.1.113. Red snapper post larvae EFH map.....	316
Figure C.1.114. Red snapper early juvenile EFH map.....	317
Figure C.1.115. Red snapper late juvenile EFH map.....	317
Figure C.1.116. Red snapper adult EFH map.....	318
Figure C.1.117. Red snapper spawning adult EFH map.....	318
Figure C.1.118. Scamp egg EFH map.....	320
Figure C.1.119. Scamp larvae EFH map.....	320
Figure C.1.120. Scamp post larvae EFH map.....	321
Figure C.1.121. Scamp early juvenile EFH map.....	321
Figure C.1.122. Scamp late juvenile EFH map.....	322
Figure C.1.123. Scamp adult EFH map.....	322
Figure C.1.124. Scamp spawning adult EFH map.....	323
Figure C.1.125. Silk snapper adult EFH map.....	324
Figure C.1.126. Snowy grouper egg EFH map.....	325
Figure C.1.128. Snowy grouper post larvae EFH map.....	326
Figure C.1.129. Snowy grouper early juvenile EFH map.....	327
Figure C.1.130. Snowy grouper late juvenile EFH map.....	327
Figure C.1.131. Snowy Grouper adult EFH map.....	328
Figure C.1.132. Snowy grouper spawning adult EFH map.....	328
Figure C.1.133. Speckled hind egg EFH map.....	330
Figure C.1.134. Speckled hind larvae EFH map.....	330
Figure C.1.135. Speckled hind post larvae EFH map.....	331
Figure C.1.136. Speckled hind early juvenile EFH map.....	331

Figure C.1.137. Speckled hind late juvenile EFH map.	332
Figure C.1.138. Speckled hind adult EFH map.	332
Figure C.1.139. Speckled hind spawning adult EFH map.	333
Figure C.1.140. Tilefish egg EFH map.	334
Figure C.1.141. Tilefish larvae EFH map.	335
Figure C.1.142. Tilefish post larvae EFH map.	335
Figure C.1.143. Tilefish early juvenile EFH map.	336
Figure C.1.144. Tilefish late juvenile EFH map.	336
Figure C.1.145. Tilefish adult EFH map.	337
Figure C.1.146. Tilefish spawning adult EFH map.	337
Figure C.1.147. Vermillion snapper egg EFH map.	339
Figure C.1.148. Vermillion snapper larvae EFH map.	339
Figure C.1.149. Vermillion snapper post larvae EFH map.	340
Figure C.1.150. Vermillion snapper early juvenile EFH map.	340
Figure C.1.151. Vermillion snapper late juvenile EFH map.	341
Figure C.1.152. Vermillion snapper adult EFH map.	341
Figure C.1.153. Warsaw grouper egg EFH map.	343
Figure C.1.154. Warsaw grouper larvae EFH map.	343
Figure C.1.155. Black grouper post larvae EFH map.	344
Figure C.1.156. Black grouper late juvenile EFH map.	344
Figure C.1.157. Black Grouper adult EFH map.	345
Figure C.1.158. Black grouper spawning adult EFH map.	345
Figure C.1.159. Wenchman egg EFH map.	347
Figure C.1.160. Wenchman larvae EFH map.	347
Figure C.1.161. Wenchman adult EFH map.	348
Figure C.1.162. Wenchman spawning adult EFH map.	348
Figure C.1.163. Yellowedge grouper egg EFH map.	350
Figure C.1.164. Yellowedge grouper larvae EFH map.	350
Figure C.1.165. Yellowedge grouper post larvae EFH map.	351
Figure C.1.166. Yellowedge grouper late juvenile EFH map.	351
Figure C.1.167. Yellowedge grouper adult EFH map.	352
Figure C.1.168. Yellowedge grouper spawning adult EFH map.	352
Figure C.1.169. Yellowfin grouper early juvenile EFH map.	354
Figure C.1.170. Yellowfin grouper late juvenile EFH map.	354
Figure C.1.171. Yellowfin grouper adult EFH map.	354
Figure C.1.172. Yellowfin grouper spawning adult EFH map.	355
Figure C.1.173. Yellowmouth grouper egg EFH map.	356
Figure C.1.174. Yellowmouth grouper larvae EFH map.	357
Figure C.1.175. Yellowmouth grouper post larvae EFH map.	357
Figure C.1.176. Yellowmouth grouper adult EFH map.	358
Figure C.1.177. Yellowmouth grouper spawning adult EFH map.	358
Figure C.1.178. Yellowtail snapper egg EFH map.	360
Figure C.1.179. Yellowtail snapper larvae EFH map.	360
Figure C.1.180. Yellowtail snapper post larvae EFH map.	361
Figure C.1.181. Yellowtail snapper early juvenile EFH map.	361
Figure C.1.182. Yellowtail snapper late juvenile EFH map.	362

Figure C.1.183. Yellowtail snapper adult EFH map.....	362
Figure C.2.1. Cobia egg EFH map.....	364
Figure C.2.2 Cobia larvae EFH map.....	364
Figure C.2.3. Cobia post larvae EFH map.....	365
Figure C.2.4 Cobia early juvenile EFH map.	365
Figure C.2.5 Cobia late juvenile EFH map.....	366
Figure C.2.6. Cobia adult EFH map.	366
Figure C.2.7 Cobia spawning adult EFH map.	367
Figure C.2.8. King mackerel egg EFH map.	368
Figure C.2.9. King mackerel larvae EFH map.	369
Figure C.2.10. King mackerel early juvenile EFH map.	369
Figure C.2.11. King mackerel late juvenile EFH map.....	370
Figure C.2.12. King mackerel adult EFH map.	370
Figure C.2.13. King mackerel spawning adult EFH map.....	371
Figure C.2.14. Spanish mackerel egg EFH map.....	372
Figure C.2.15. Spanish mackerel larvae EFH map.....	373
Figure C.2.16. Spanish mackerel post larvae EFH map.	373
Figure C.2.17. Spanish mackerel early juvenile EFH map.....	374
Figure C.2.18. Spanish mackerel late juvenile EFH map.....	374
Figure C.2.19. Spanish mackerel adult EFH map.....	375
Figure C.2.20. Spanish mackerel spawning adult EFH map.	375
Figure C.3.1. Brown shrimp egg EFH map.	377
Figure C.3.2. Brown shrimp larvae EFH map.	377
Figure C.3.3. Brown shrimp post larvae EFH map.	378
Figure C.3.4. Brown shrimp early juvenile EFH map.	378
Figure C.3.5. Brown shrimp late juvenile EFH map.	379
Figure C.3.6. Brown shrimp adult EFH map.....	379
Figure C.3.7. Brown shrimp spawning adult EFH map.....	380
Figure C.3.8. Pink shrimp egg EFH map.....	381
Figure C.3.9. Pink shrimp larvae EFH map.....	382
Figure C.3.10. Pink shrimp post larvae EFH map.	382
Figure C.3.11. Pink shrimp early juvenile EFH map.....	383
Figure C.3.12. Pink shrimp late juvenile EFH map.....	383
Figure C.3.13. Pink shrimp adult EFH map.	384
Figure C.3.14. Pink shrimp spawning adult EFH map.	384
Figure C.3.15. Royal red shrimp egg EFH map.	386
Figure C.3.16. Royal red shrimp adult EFH map.	386
Figure C.3.17. Royal red shrimp spawning adult EFH map.....	387
Figure C.3.18. White shrimp early juvenile EFH map.	388
Figure C.3.19. White shrimp late juvenile EFH map.	389
Figure C.3.20. White shrimp adult EFH map.	389
Figure C.3.21. White shrimp spawning adult EFH map.....	390
Figure C.4.1. Red drum egg EFH map.	391
Figure C.4.2. Red drum larvae EFH map.	392
Figure C.4.3. Red drum post larvae EFH map.....	392
Figure C.4.4. Red drum per early juvenile EFH map.....	393

Figure C.4.5. Red drum per late juvenile EFH map.	393
Figure C.4.6. Red drum adult EFH map.	394
Figure C.4.7. Red drum spawning adult EFH map.	394
Figure C.5.1. Spiny lobster larvae EFH map.	396
Figure C.5.2. Spiny lobster post larvae EFH map.	396
Figure C.5.3. Spiny lobster early juvenile EFH map.	397
Figure C.5.4. Spiny lobster late juvenile EFH map.	397
Figure C.5.5. Spiny lobster adult EFH map.	398

C.1. Reef Fish

Almaco jack

Almaco jack occur throughout the Gulf. Adults are benthopelagic and form small groups. Juveniles are frequently associated with floating objects, and eggs are water column associated.

Egg: Information is not available.

Larvae: Information is not available.

Post larvae: Information is not available.

Early juvenile: Gulf-wide (ER 1-5) in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column and drifting algae (*Sargassum*).

Late juvenile: Gulf-wide (ER 1-5) in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column and drifting algae (*Sargassum*).

Adult: Gulf-wide (ER 1-5) in offshore (greater than 60 feet [18m] in depth) habitats associated with the shelf edge, hard bottom/reef and banks/shoals.

Spawning adult: Gulf-wide (ER 1-5) in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the shelf edge, hard bottom/reef, and banks/shoals.

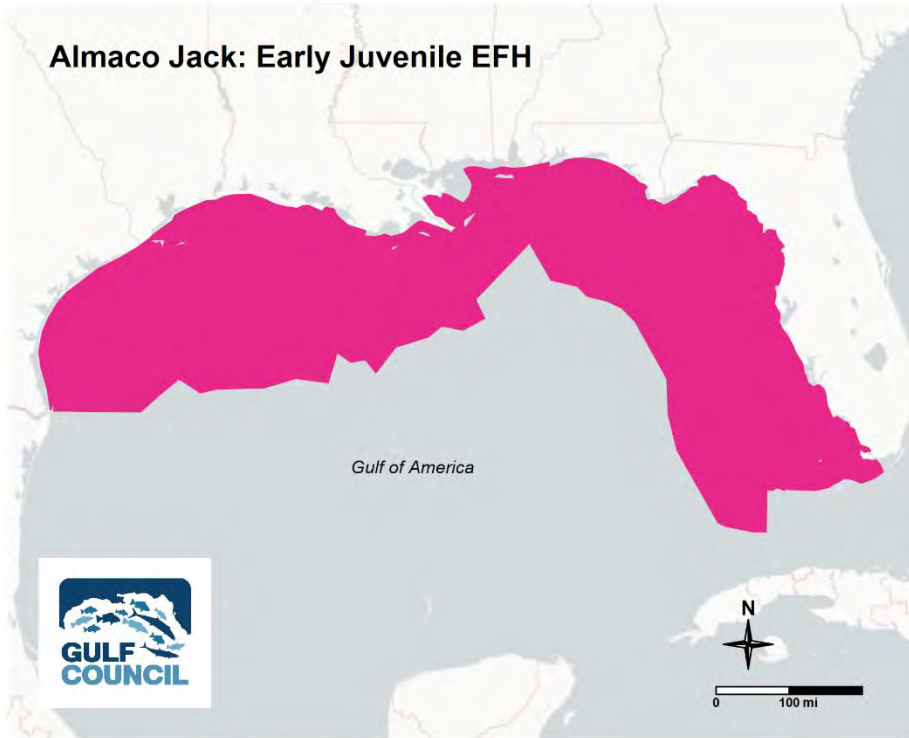


Figure C.1.1. Almaco jack early juvenile EFH map.

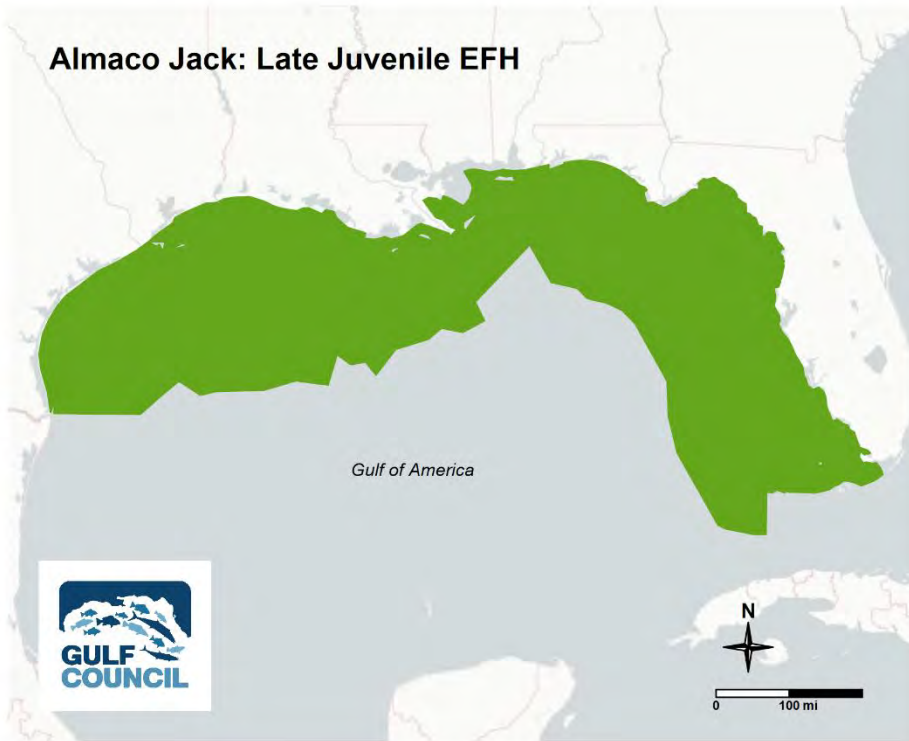


Figure C.1.2. Almaco jack late juvenile EFH map.

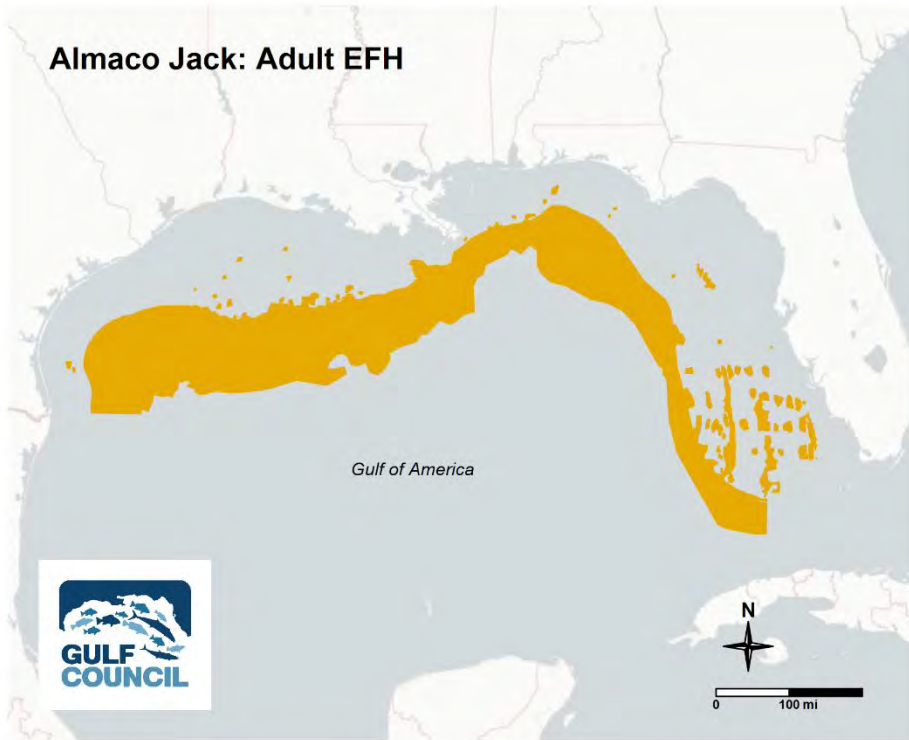


Figure C.1.3. Almaco jack adult EFH map.

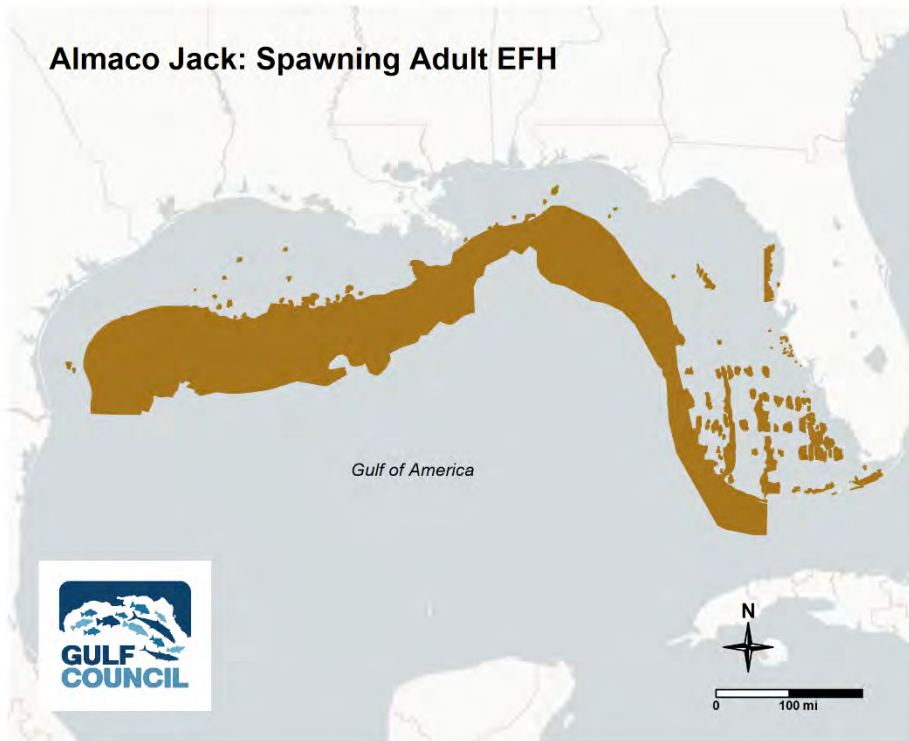


Figure C.1.4. Almaco jack adult EFH map.

Banded rudderfish

Banded rudderfish are broadly distributed in the eastern portion of the Gulf, and spawn in offshore waters of the eastern Gulf, the Yucatan Channel and Straits of Florida. Banded rudderfish are pelagic or epibenthic and confined to coastal waters over the continental shelf where they feed on fish and shrimps.

Egg: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column.

Larvae: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column.

Post larvae: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column and drifting algae (*Sargassum*).

Early juvenile: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column and drifting algae (*Sargassum*).

Late juvenile: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column and drifting algae (*Sargassum*).

Adult: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column.

Spawning adult: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with the water column. Spawning may occur in winter-spring and fall.

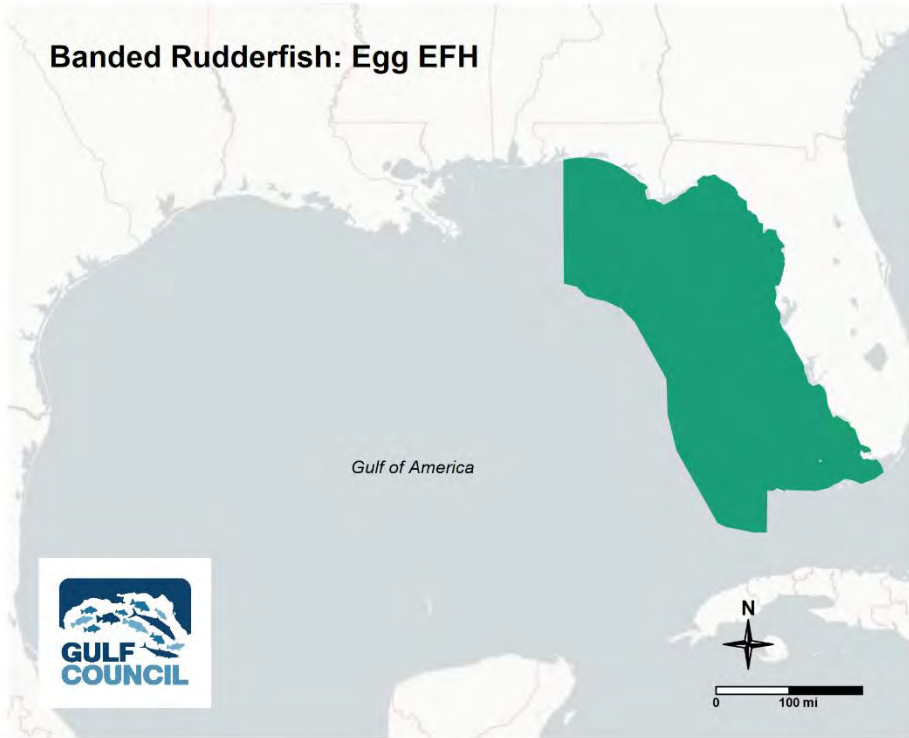


Figure C.1.5. Banded rudderfish egg EFH map.

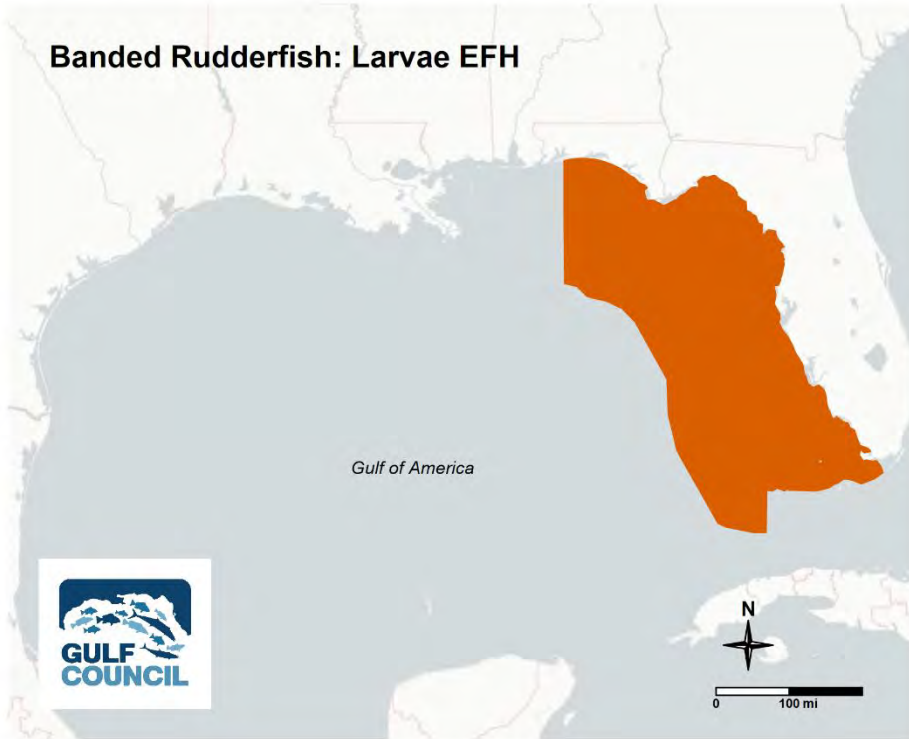


Figure C.1.6. Banded rudderfish larvae EFH map.

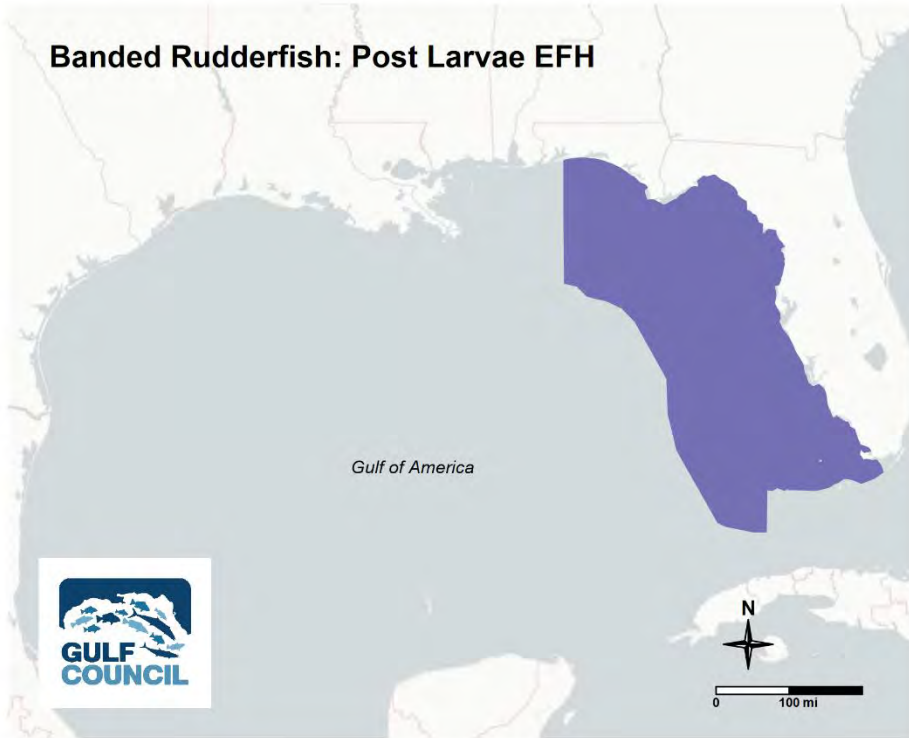


Figure C.1.7. Banded rudderfish post larvae EFH map.

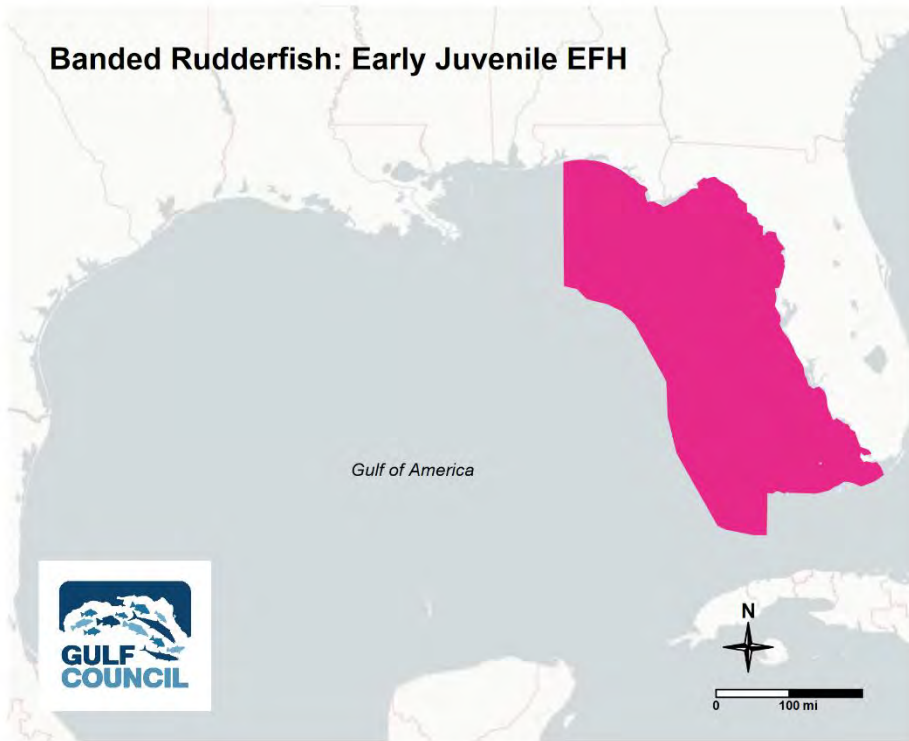


Figure C.1.8. Banded rudderfish early juvenile EFH map.

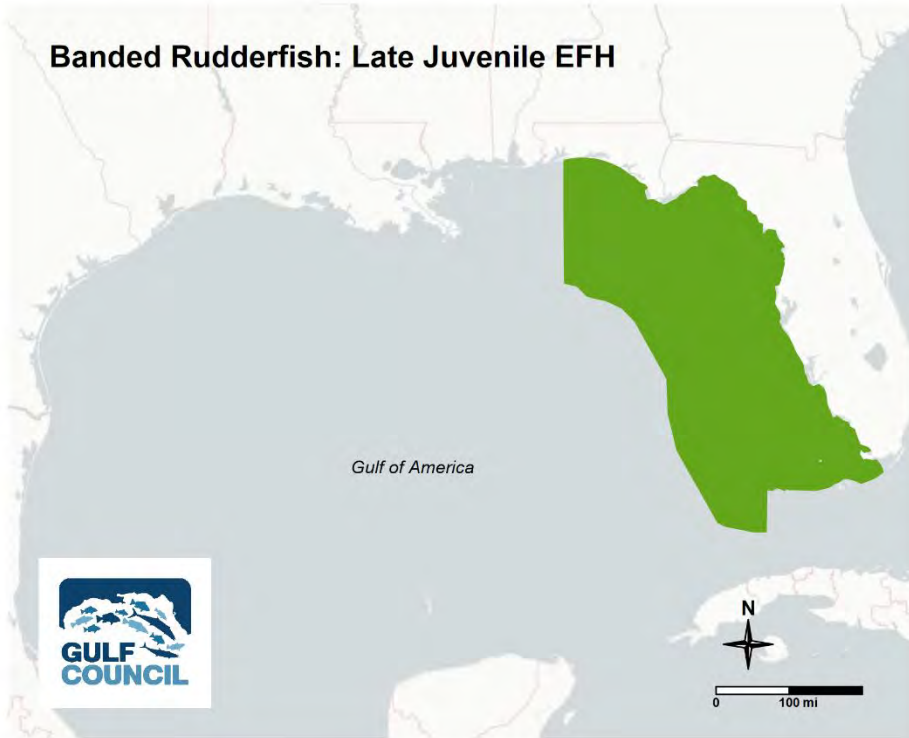


Figure C.1.9. Banded rudderfish late juvenile EFH map.

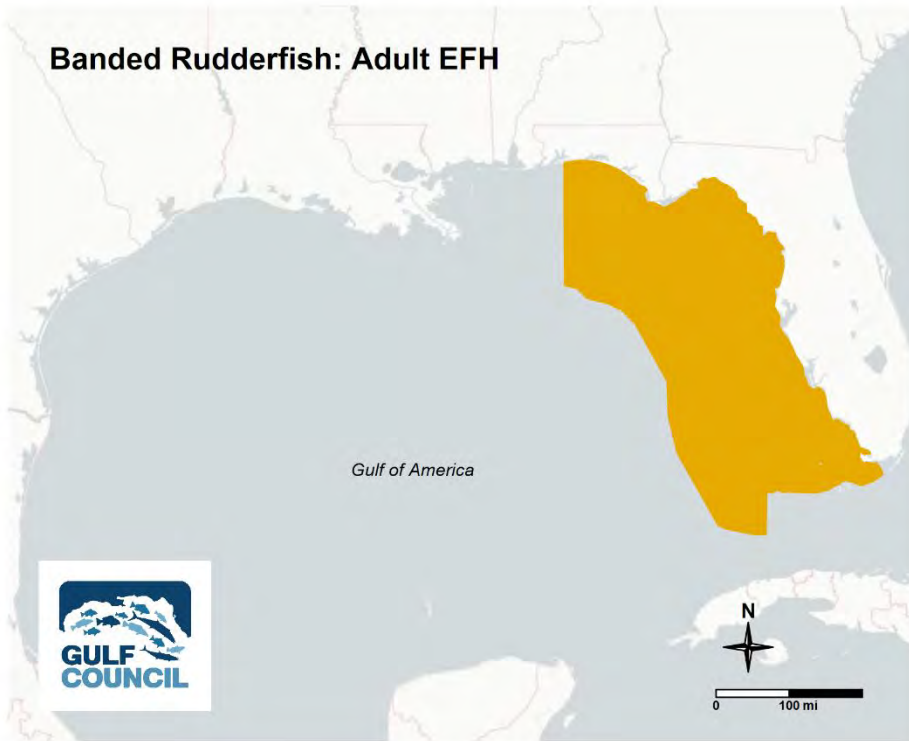


Figure C.1.10. Banded rudderfish adult EFH map.

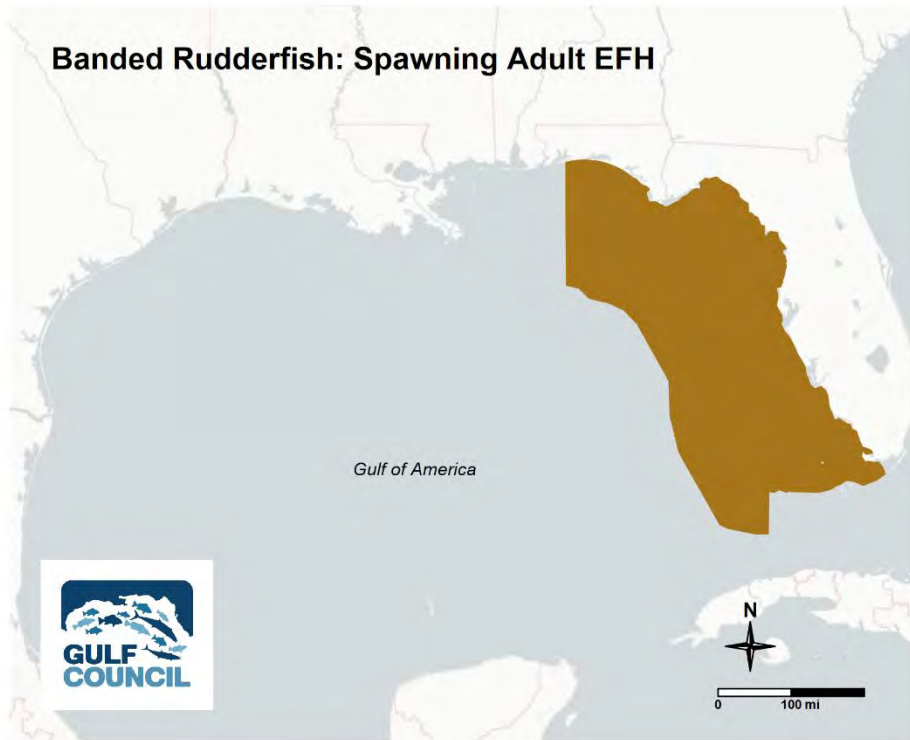


Figure C.1.11. Banded rudderfish spawning adult EFH map.

Blackfin snapper

Blackfin snapper are most concentrated in the eastern Gulf, off the West coast of Florida. Blackfin snapper tend to occupy the shelf edge habitats (130-1000 feet [40-300m]), where they feed on fish and crustaceans.

Egg: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitats associated with the water column.

Larvae: Information is not available.

Post larvae: Information is not available.

Early juvenile: ER 1 and ER 2 in in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with hard bottom/reefs.

Late juvenile: ER 1 and ER 2 in in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with hard bottom/reefs.

Adult: ER 1 and ER 2 in in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with hard bottom/reefs, shelf/slope edge, and sandy bottom.

Spawning adult: ER 1 and ER 2 in in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with hard bottom/reefs shelf/slope edge.

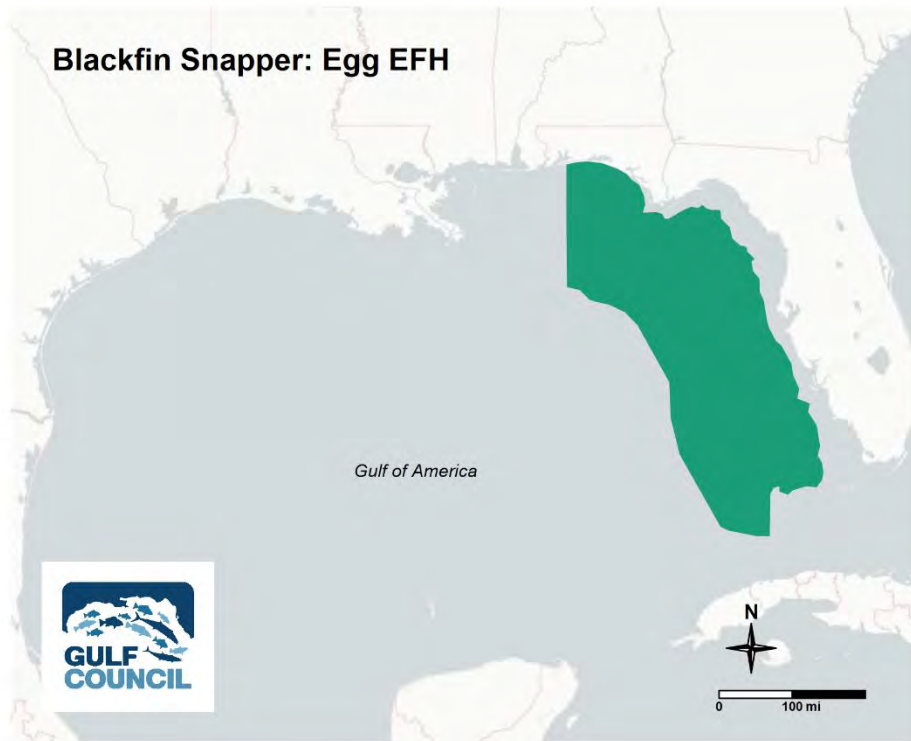


Figure C.1.12. Blackfin snapper egg EFH map.

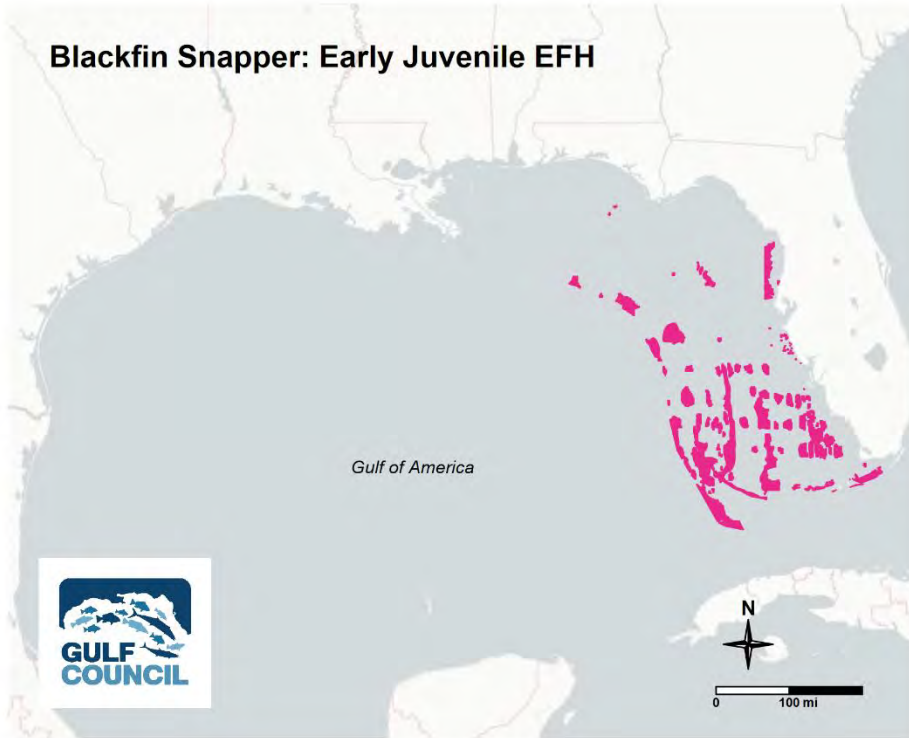


Figure C.1.13. Blackfin snapper early juvenile EFH map.

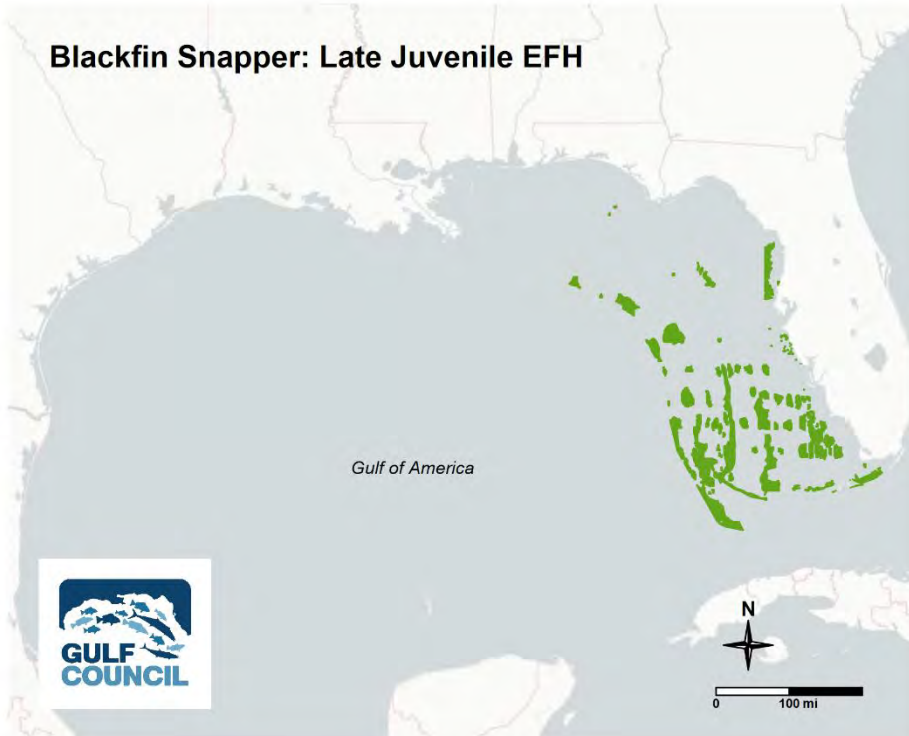


Figure C.1.14. Blackfin snapper late juvenile EFH map.

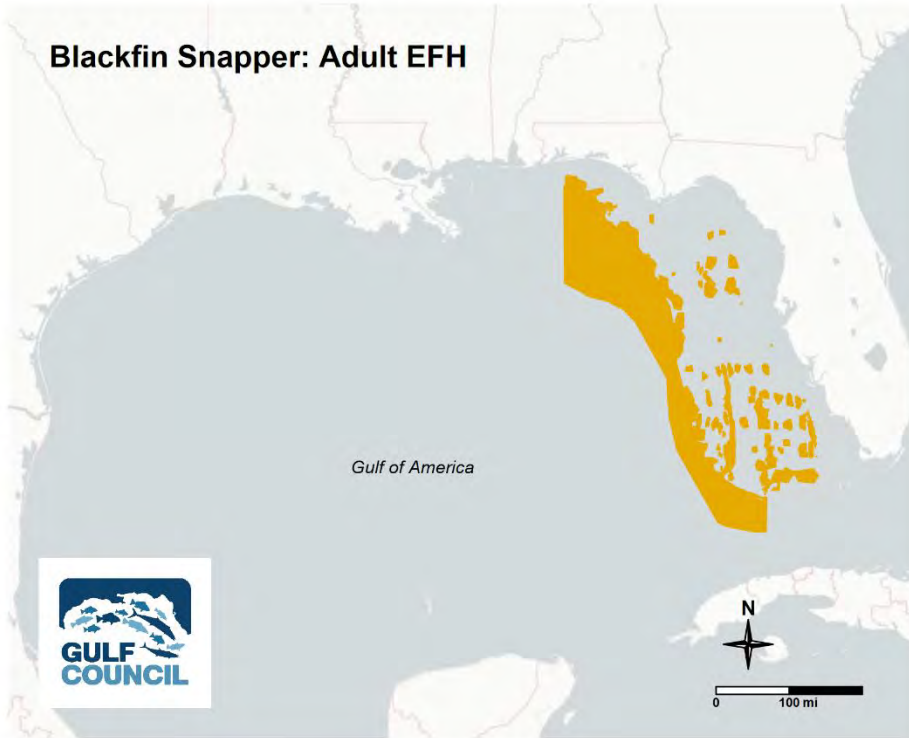


Figure C.1.15. Blackfin snapper adult EFH map.

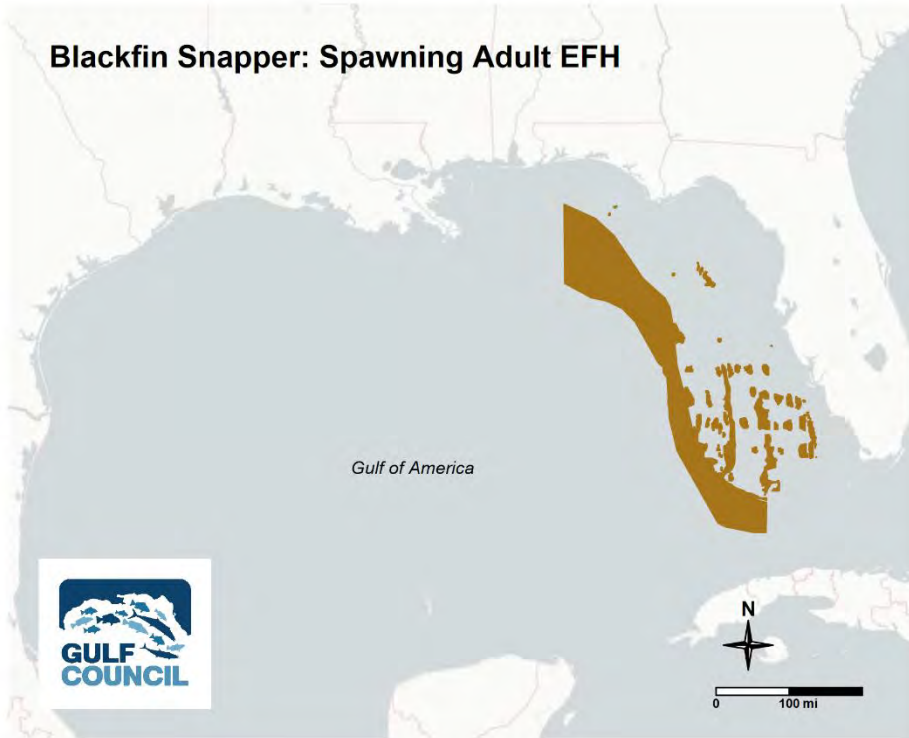


Figure C.1.16. Blackfin snapper spawning adult EFH map.

Black grouper

Egg: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth), most concentrated between 18-28m, and are associated with the water column.

Larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitats associated with the water column.

Post larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitats associated with the water column.

Early juvenile: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth), concentrated between 1-10m associated with submerged aquatic vegetation (SAV)

Late juvenile: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) concentrated between 10-19m associated with hard bottom/reef habitat and mangroves.

Adult: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) likely between 10-150m associated with hard bottom/reef habitat.

Spawning adult: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) likely between 18-28 associated with hard bottom/reef habitat and the shelf/slope edge.

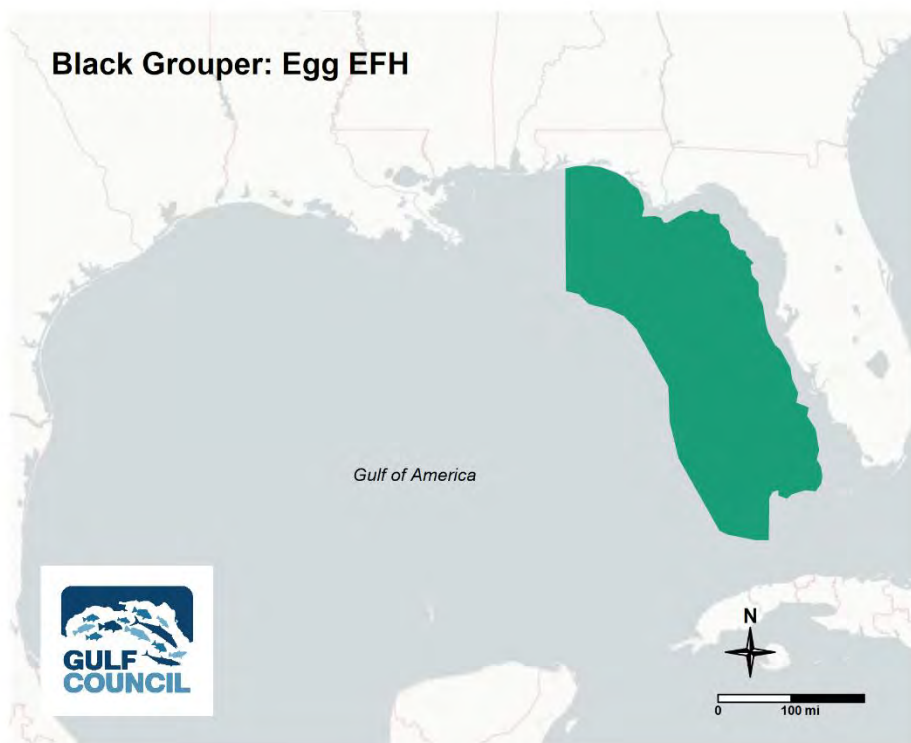


Figure C.1.17. Black grouper egg EFH map.

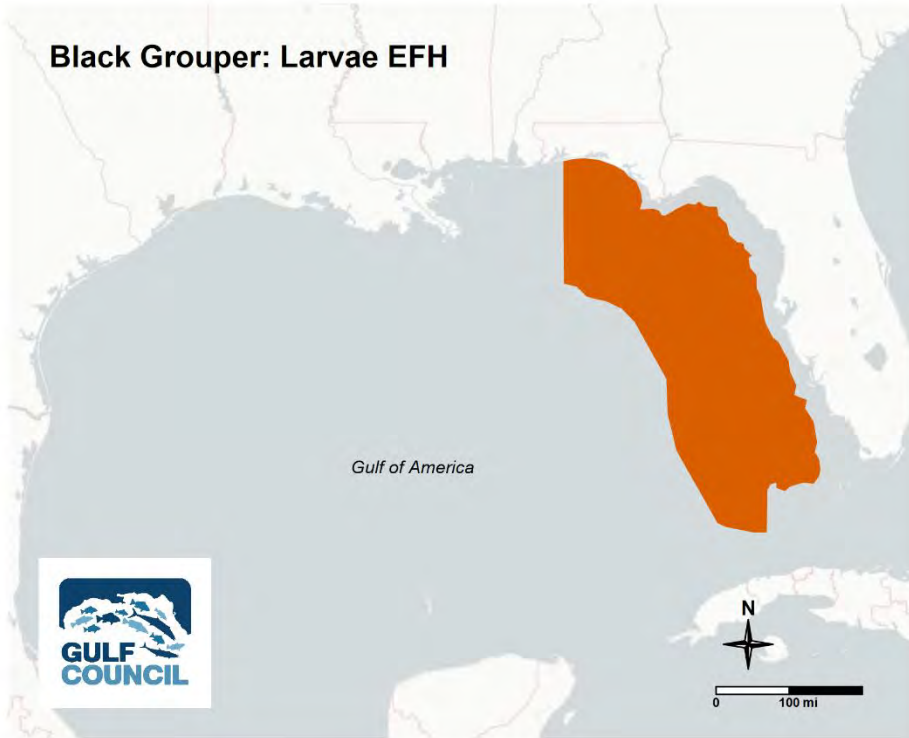


Figure C.1.18. Black grouper larvae EFH map.

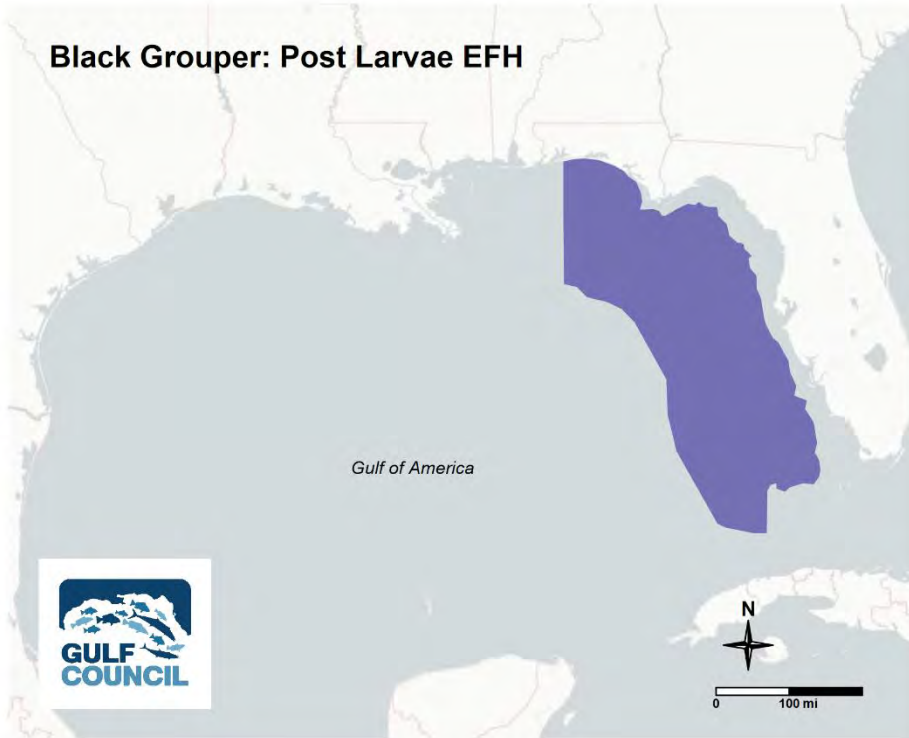


Figure C.1.19. Black grouper post larvae EFH map.

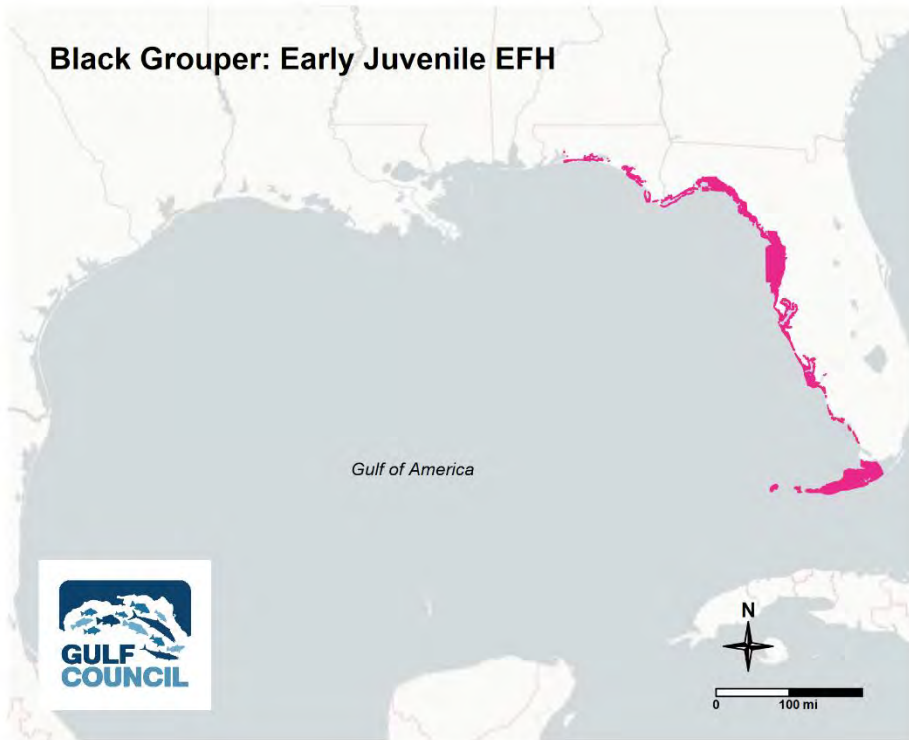


Figure C.1.20. Black grouper early juvenile EFH map.

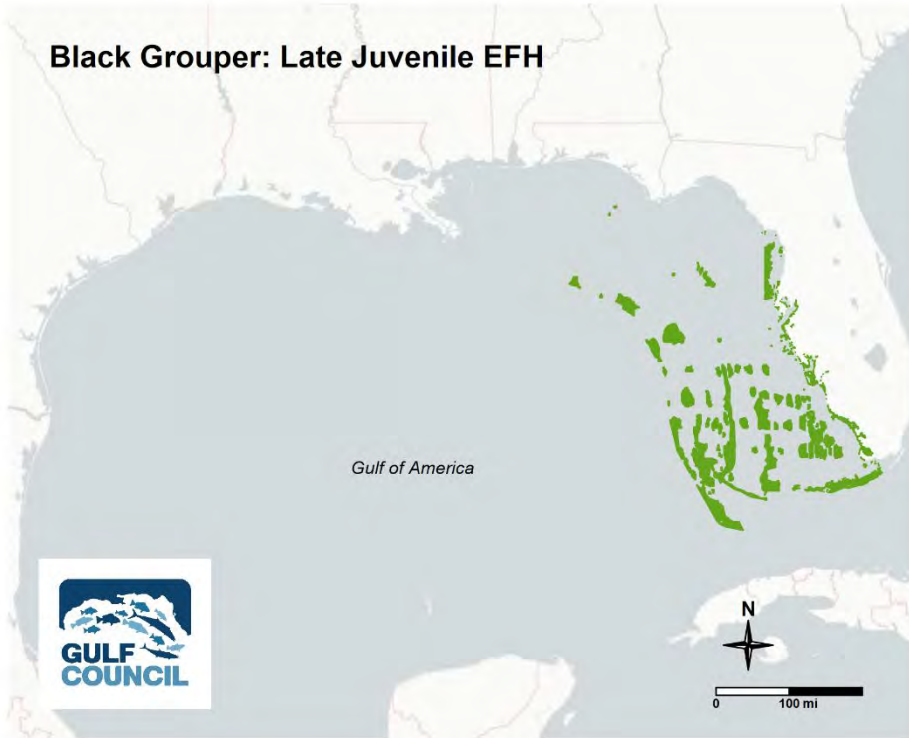


Figure C.1.21. Black grouper late juvenile EFH map.

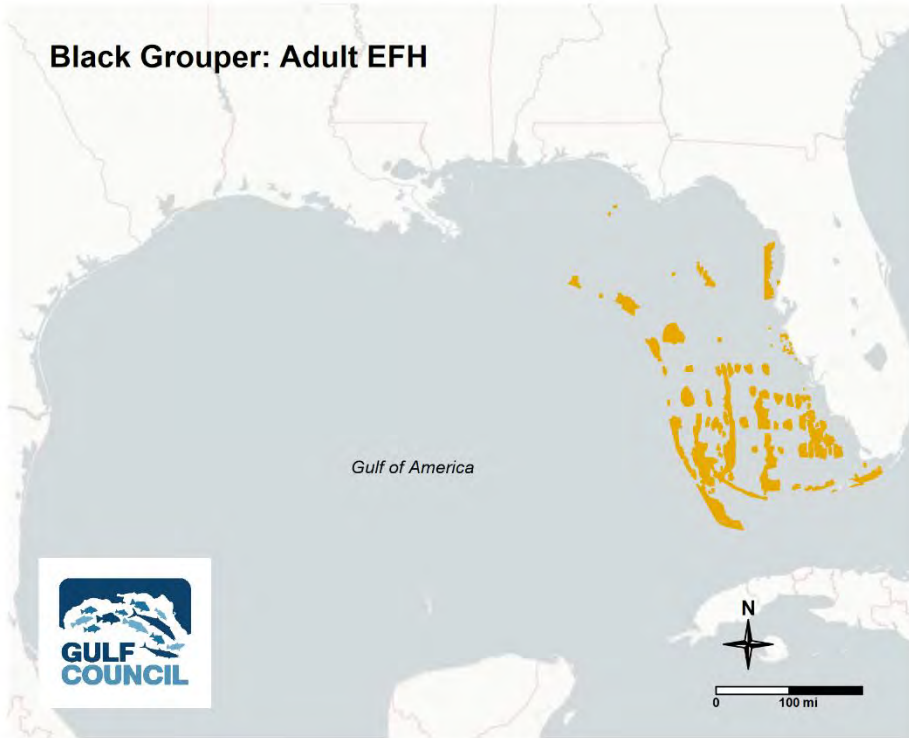


Figure C.1.22. Black grouper adult EFH map.

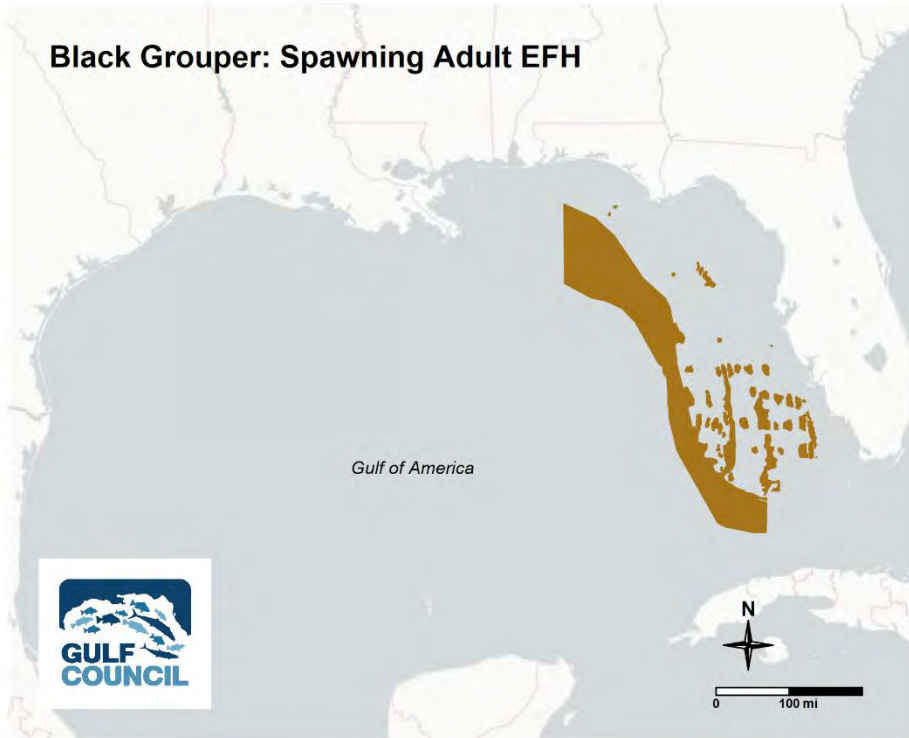


Figure C.1.23. Black grouper spawning adult EFH map.

Blueline tilefish

Blueline tilefish are distributed mainly on the eastern/southeastern Gulf and the Campeche Yucatan outer continental shelf, shelf edge and upper slope. Blueline tilefish are found over irregular bottom, including troughs and terraces, sand, mud and rubble, and shell hash, and may be associated with goldface tilefish and blackline tilefish.

Egg: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Post larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Early juvenile: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Late juvenile: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Adult: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 60-256m, and known to burrow at depths of 91-150m, and are associated with hard bottom/reefs, soft bottom, the shelf/edge, and sand/shell substrate.

Spawning adult: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the shelf/slope edge.

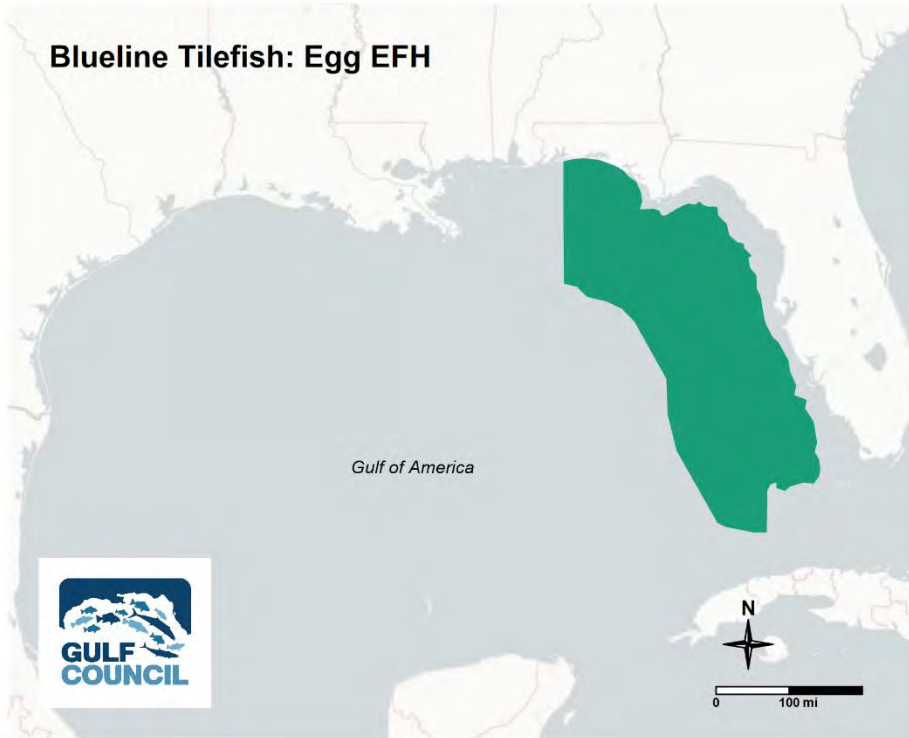


Figure C.1.24. Blueline tilefish egg EFH map.

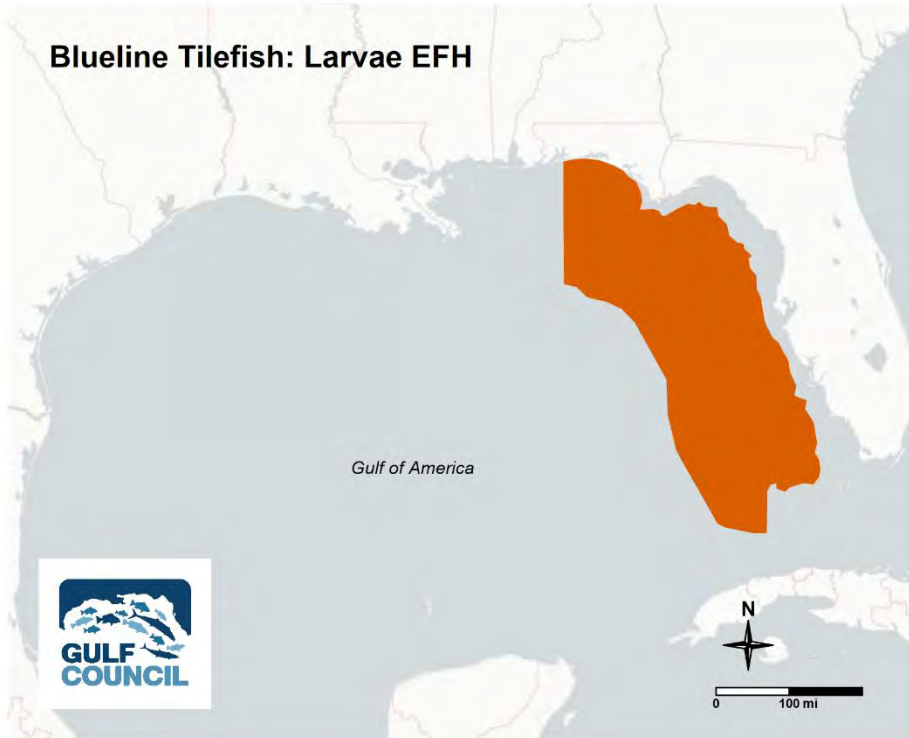


Figure C.1.25. Blueline tilefish larvae EFH map.

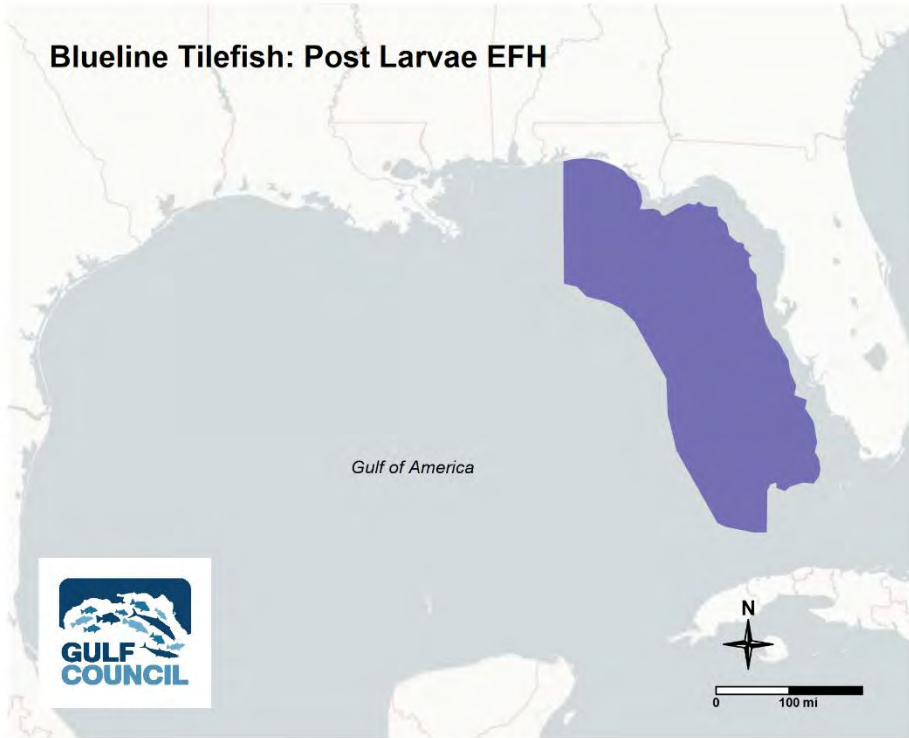


Figure C.1.26. Blueline tilefish post larvae EFH map.

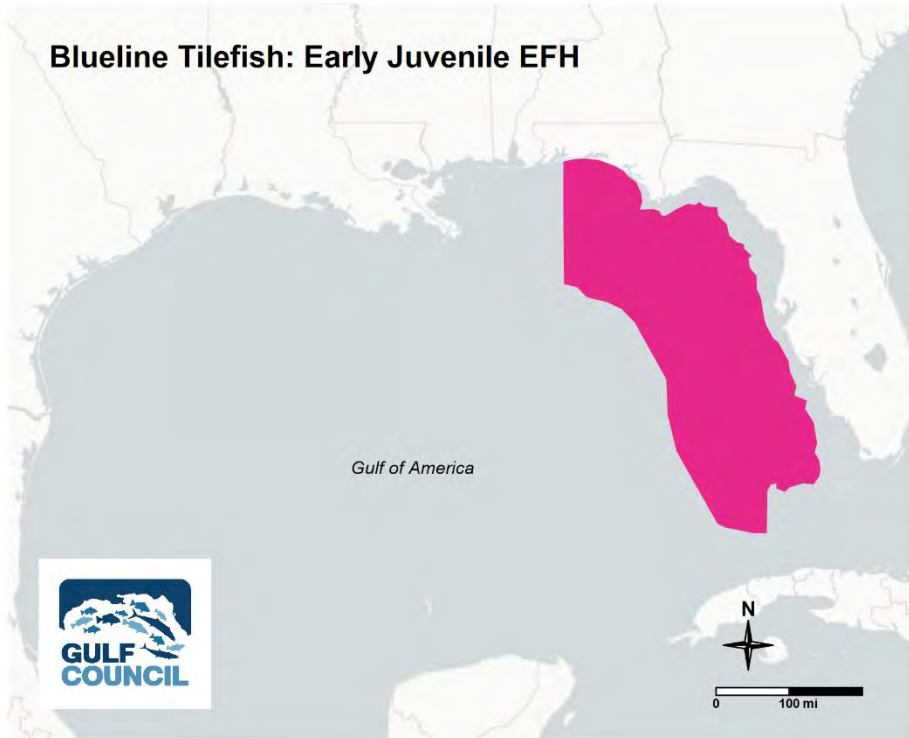


Figure C.1.27. Blueline tilefish early juvenile EFH map.

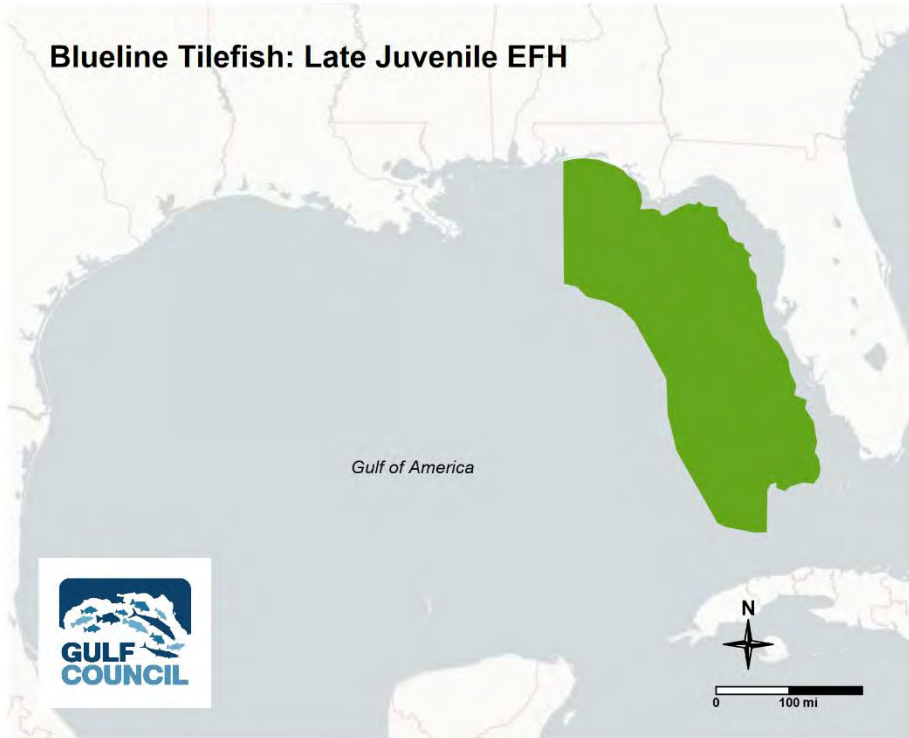


Figure C.1.28. Blueline tilefish late juvenile EFH map.

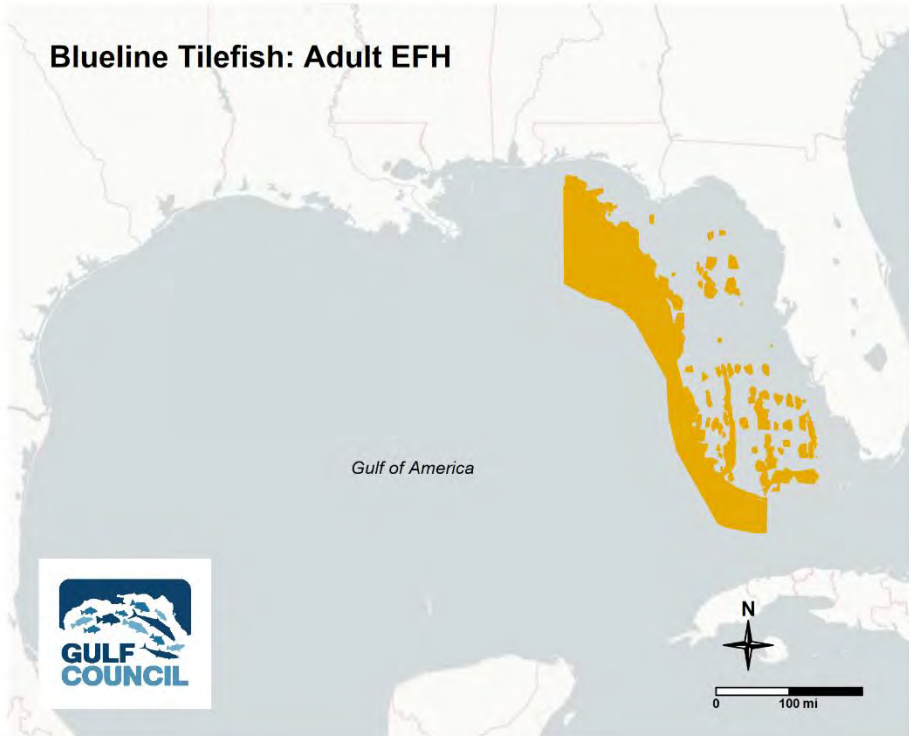


Figure C.1.29. Blueline tilefish adult EFH map.

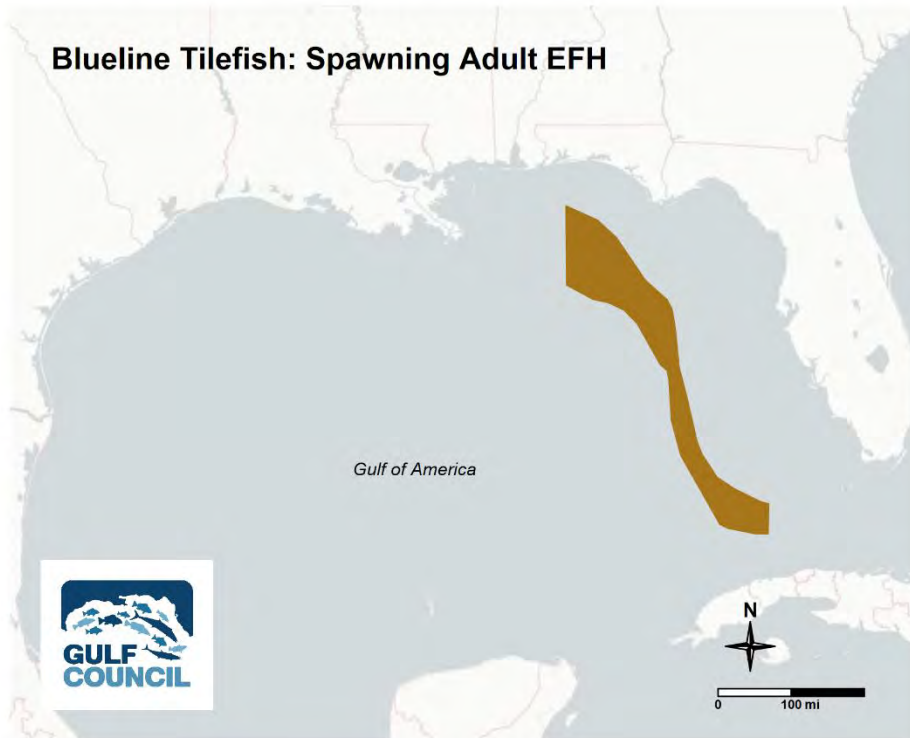


Figure C.1.30. Blueline tilefish spawning adult EFH map.

Cubera snapper

Cubera snapper are distributed mainly on the eastern/southeastern Gulf found in both shallow and deep reefs, wrecks (to at least 279 feet [85m] deep), and in mangroves. Two spawning sites have been recorded in the eastern Gulf: both wrecks located in 220-279 feet [67-85m] of water, off Key West and the Dry Tortugas, Florida.

Egg: ER 1 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 10-85m, associated with the water column.

Larvae: ER 1 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 33-279 feet [10-85m], associated with the water column.

Post larvae: ER 1 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 33-279 feet [10-85m], associated with the water column.

Early juvenile: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 33-279 feet [10-85m], associated with submerged aquatic vegetation, mangroves and emergent marsh.

Late juvenile: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated

between 33-279 feet [10-85m], associated with submerged aquatic vegetation, mangroves and emergent marsh.

Adult: ER 1 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, > 279 feet [85m], associated with mangroves and hard bottom/reef habitats.

Spawning adult: ER 1 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, >279 feet [85m], associated with hard bottom/reef habitat, shelf/slope edge, and banks/shoals.

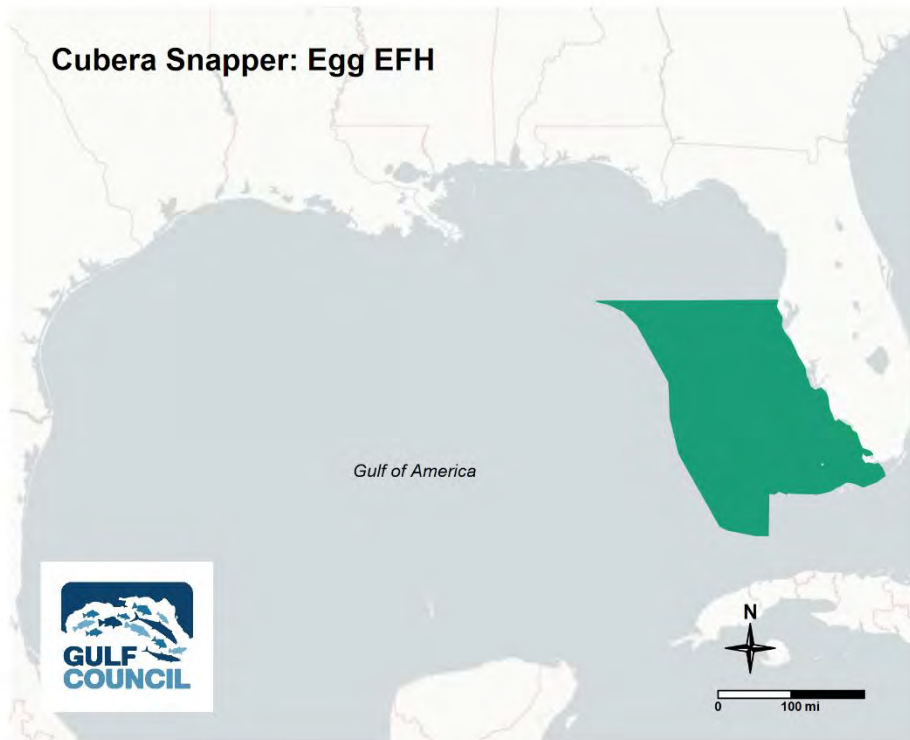


Figure C.1.31. Cubera snapper egg EFH map.

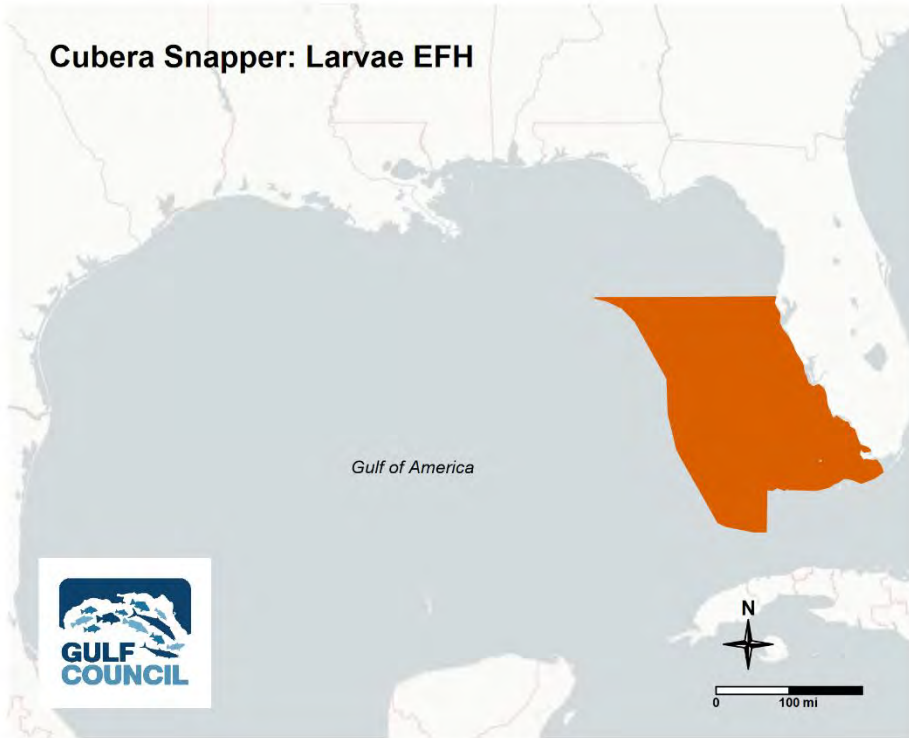


Figure C.1.32. Cubera snapper larvae EFH map.

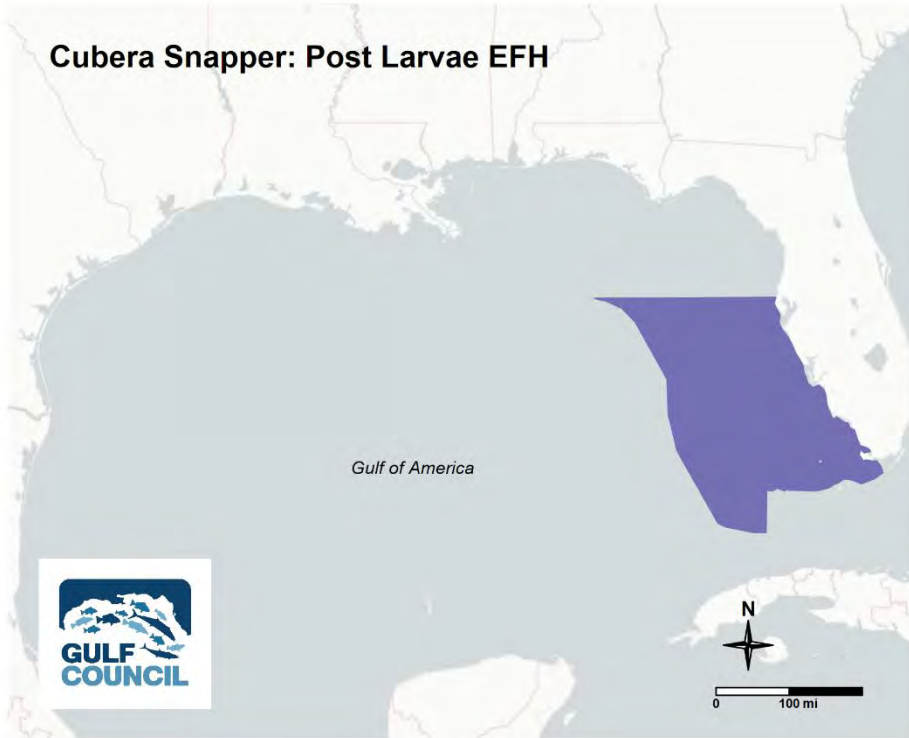


Figure C.1.33. Cubera snapper post larvae EFH map.

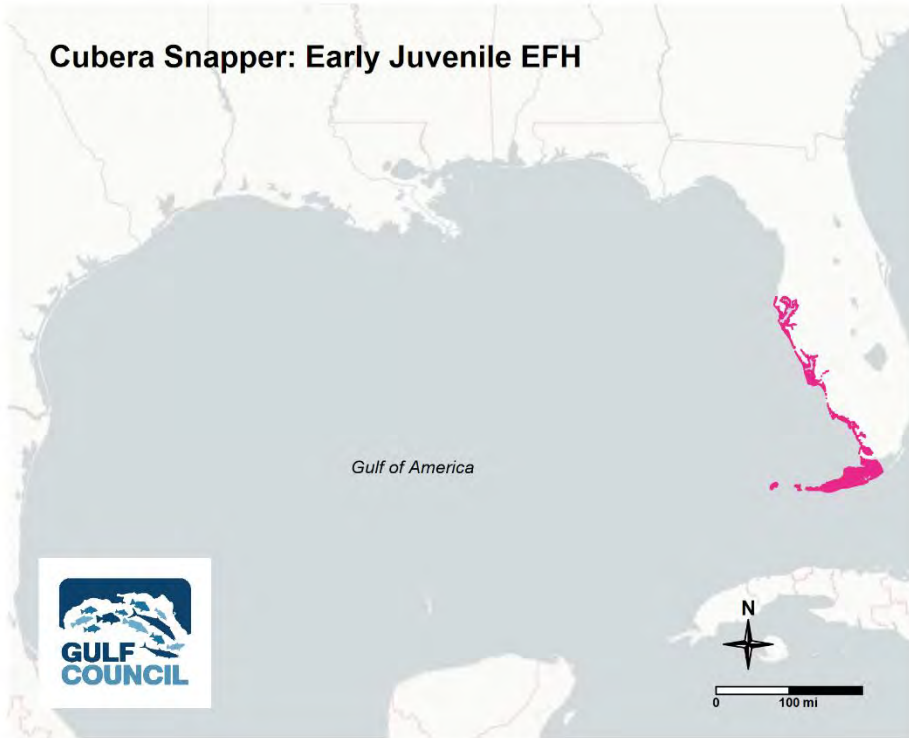


Figure C.1.34. Cubera snapper early juvenile EFH map.

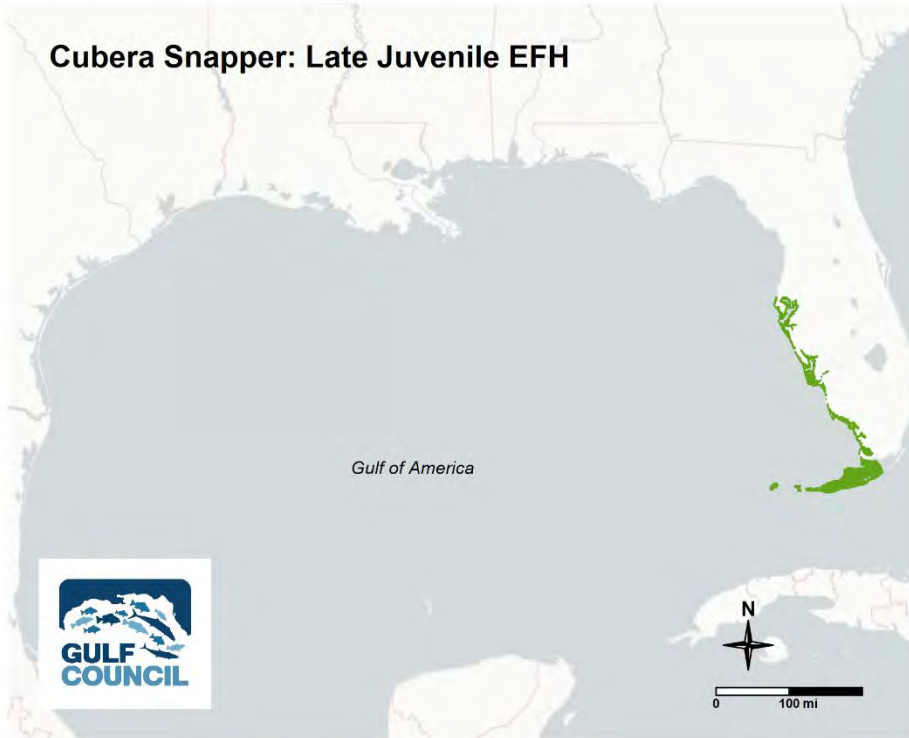


Figure C.1.35. Cubera snapper late juvenile EFH map.

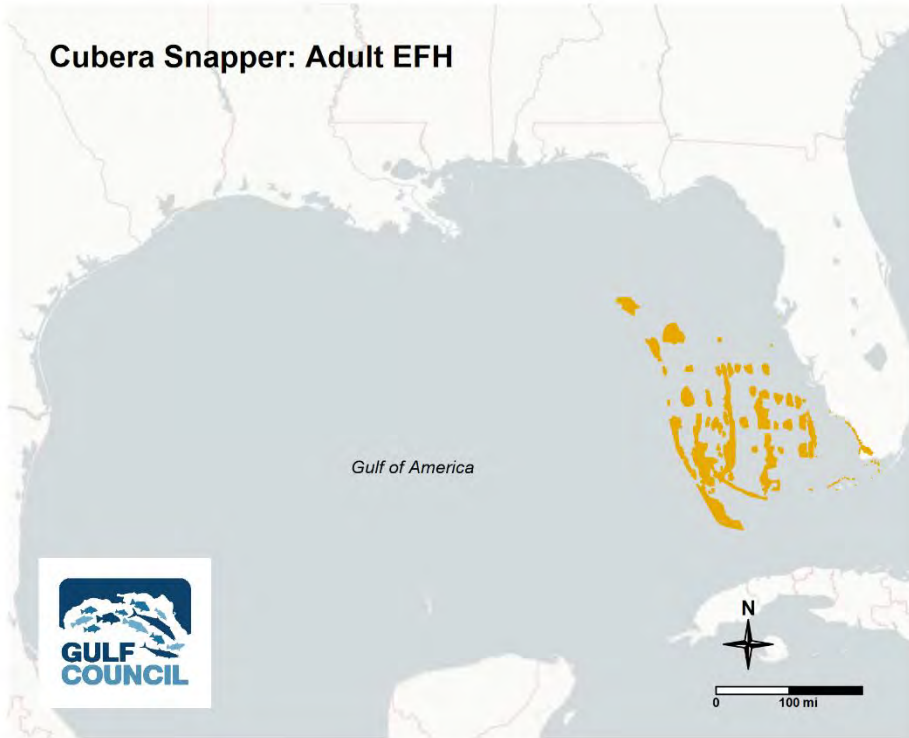


Figure C.1.36. Cubera snapper adult EFH map.

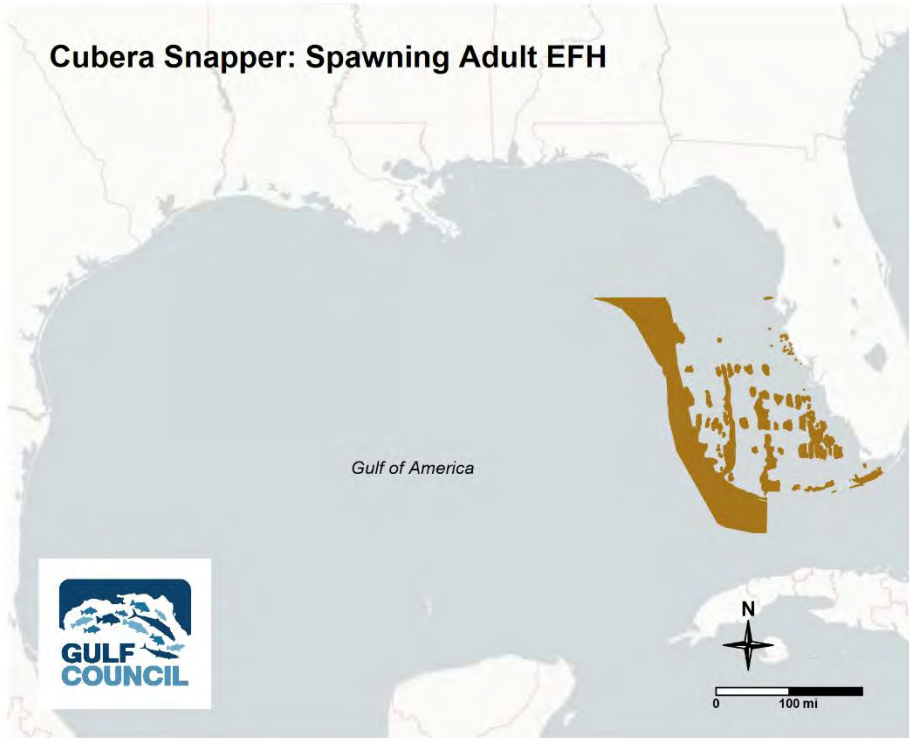


Figure C.1.37. Cubera snapper spawning adult EFH map.

Gag grouper

Gag are demersal and most common in the eastern Gulf, especially the west Florida shelf. Adults occupy hard bottom/reefs substrates, including offshore reefs and wrecks, coral and live bottoms, and depressions and ledges. Spawning adults form aggregations in depths of 50-120m, with the densest aggregations occurring around the Big Bend area of Florida. Spawning occurs near the shelf edge break from December to May with a peak in the early spring (February-March) on the west Florida shelf. Madison-Swanson is a 298 square km (115 square mile) area, south of Panama City, Florida, containing high-relief hard bottom/reefs habitat, and is a known spawning ground for gag. Eggs are pelagic, occurring from December to April, with areas of greatest abundance offshore on the west Florida shelf. Larvae are pelagic and are most abundant in the early spring. Post-larvae and pelagic juveniles move through inlets into coastal lagoons and high salinity estuaries from April through May where they become benthic and settle into grass flats and oyster beds. Late juveniles move offshore in the fall to shallow reef habitat in depths of 0-165 feet [1-50m].

Egg: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated between 165-394 feet [50-120m], during winter and spring, and are associated with the water column.

Larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated between 165-394 feet [50-120m] during spring, and are associated with the water column.

Post larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated between 165-394 feet [50-120m], and are associated with the water column.

Early juvenile: ER 1, ER 2 and ER 3, in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats, concentrated between 0-40 feet [0-12m], associated with submerged aquatic vegetation (SAV) and mangroves.

Late juvenile: ER 1, ER 2, ER 3, and ER 4, in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats associated with submerged aquatic vegetation (SAV), hard bottom/reefs and mangroves.

Adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 43-328 feet [13-100m], associated with hard bottom/reefs.

Spawning adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 43-328 feet [13-100m], associated with the shelf/slope edge and hard bottom/reefs.

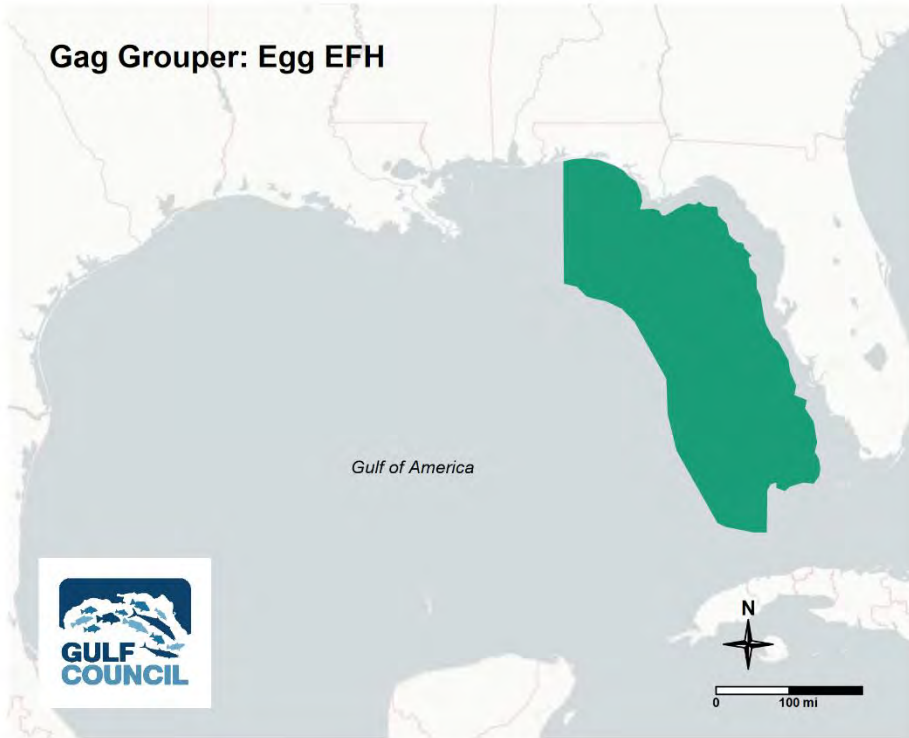


Figure C.1.38. Gag grouper egg EFH map.

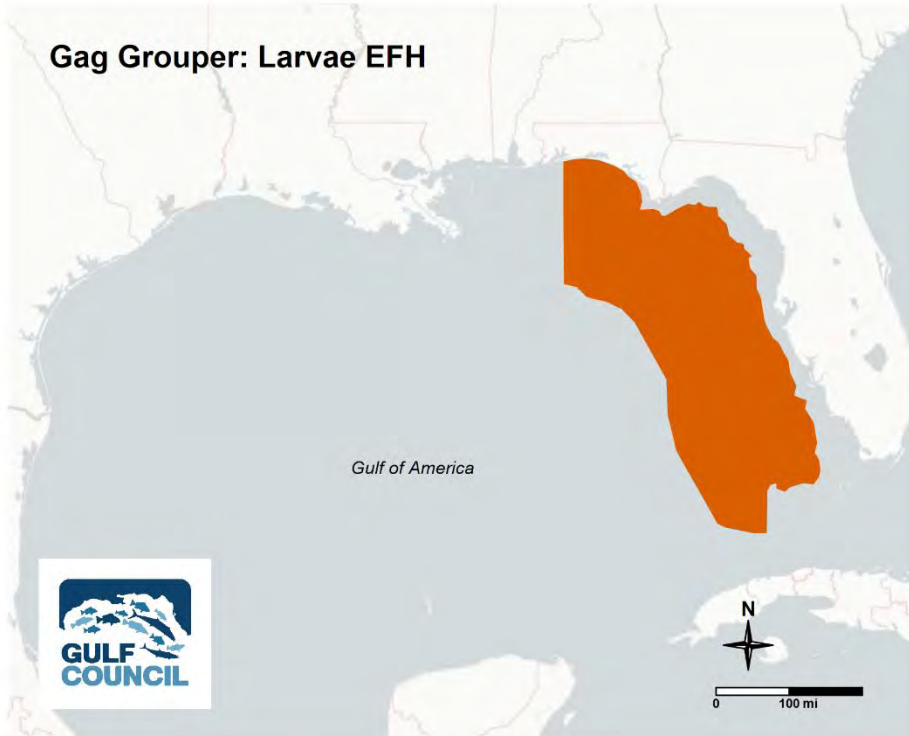


Figure C.1.39. Gag grouper larvae EFH map.

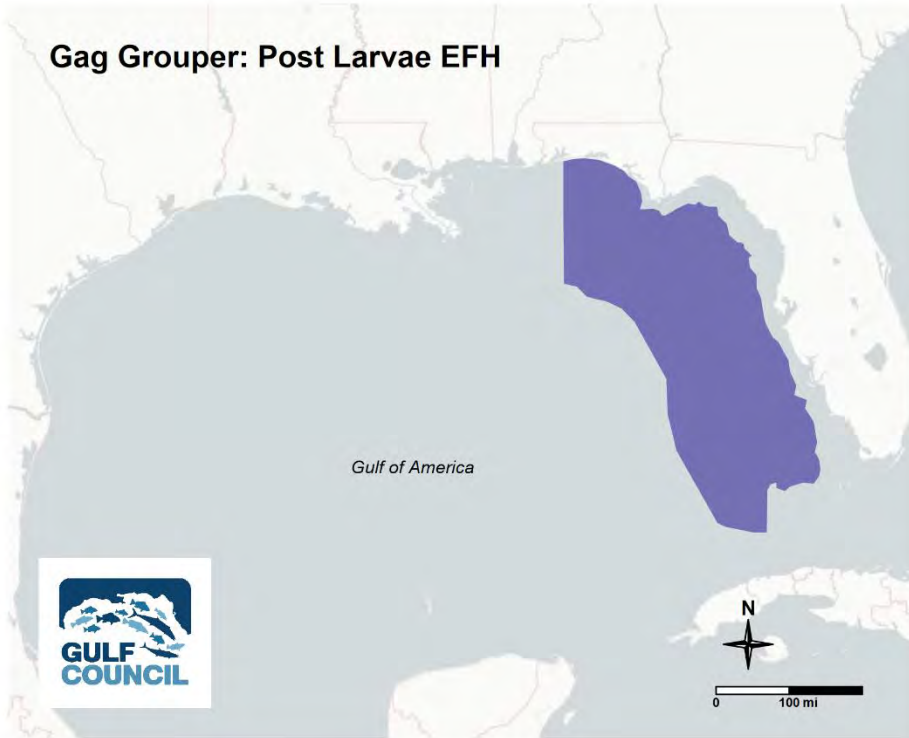


Figure C.1.40. Gag grouper post larvae EFH map.

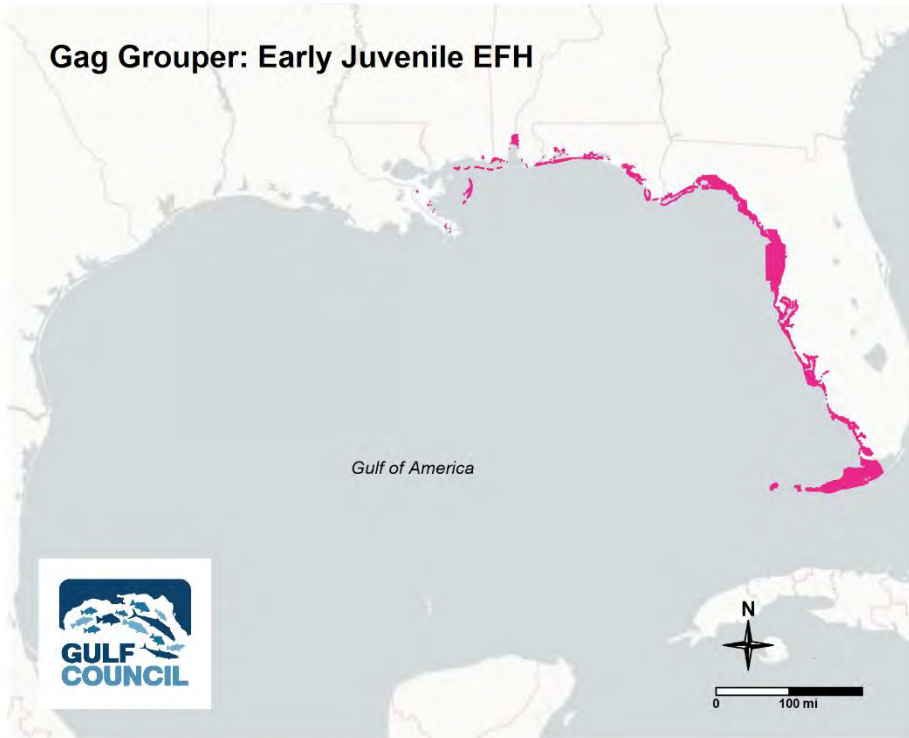


Figure C.1.41. Gag grouper early juvenile EFH map.

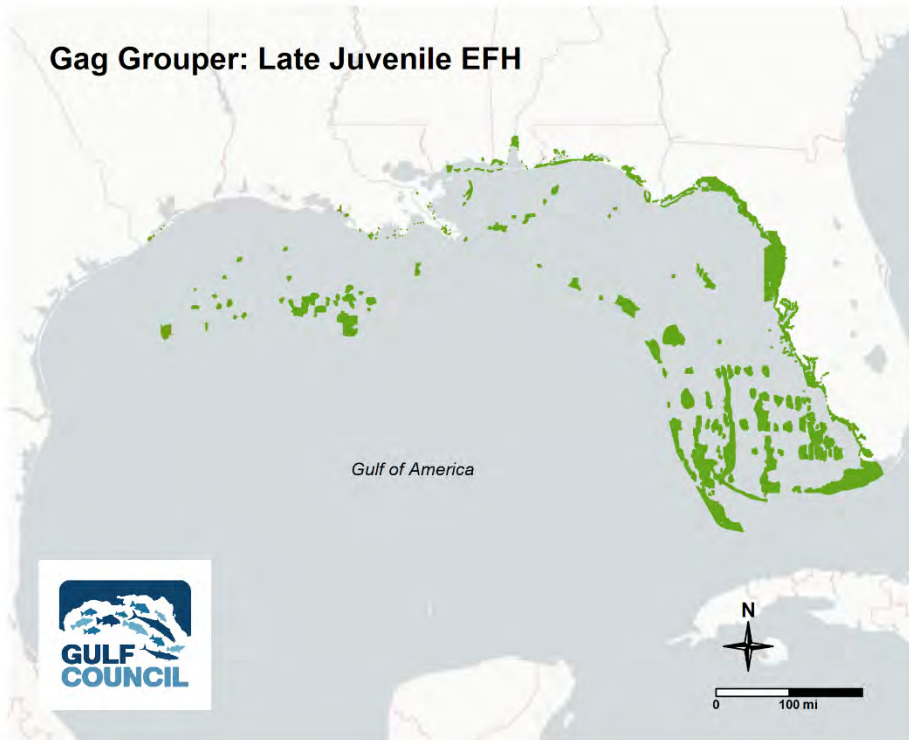


Figure C.1.42. Gag grouper late juvenile EFH map.

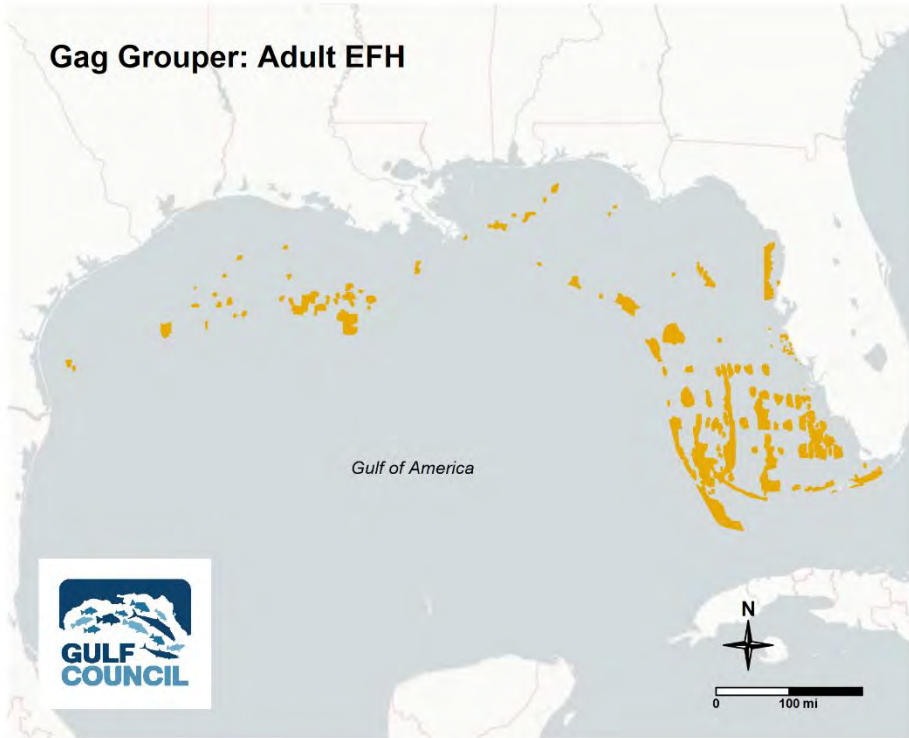


Figure C.1.43. Gag grouper adult EFH map.

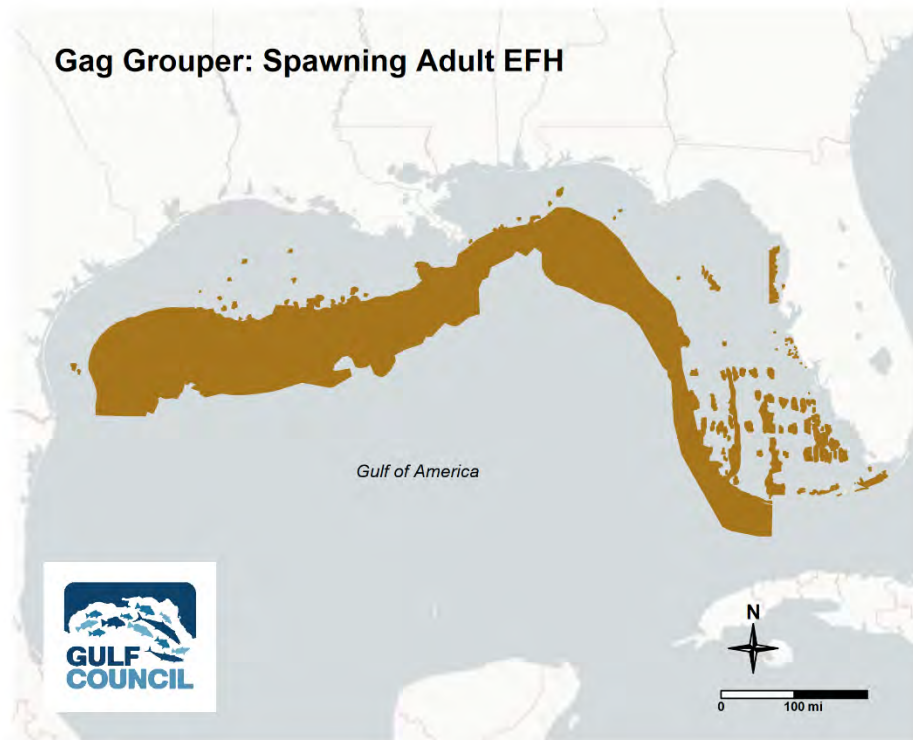


Figure C.1.44. Gag grouper spawning adult EFH map.

Goldface tilefish

Very little is known on habitat usage and distribution of goldface tilefish, but adults are thought to be distributed along the eastern Gulf, Florida Panhandle, and along the Alabama and Louisiana Coast.

Egg: Information is not available.

Larvae: Information is not available.

Post larvae: Information is not available.

Early juvenile: Information is not available.

Late juvenile: Information is not available.

Adult: ER 2 and ER 3 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with shelf/slope edge and soft bottom.

Spawning adult: Information is not available.

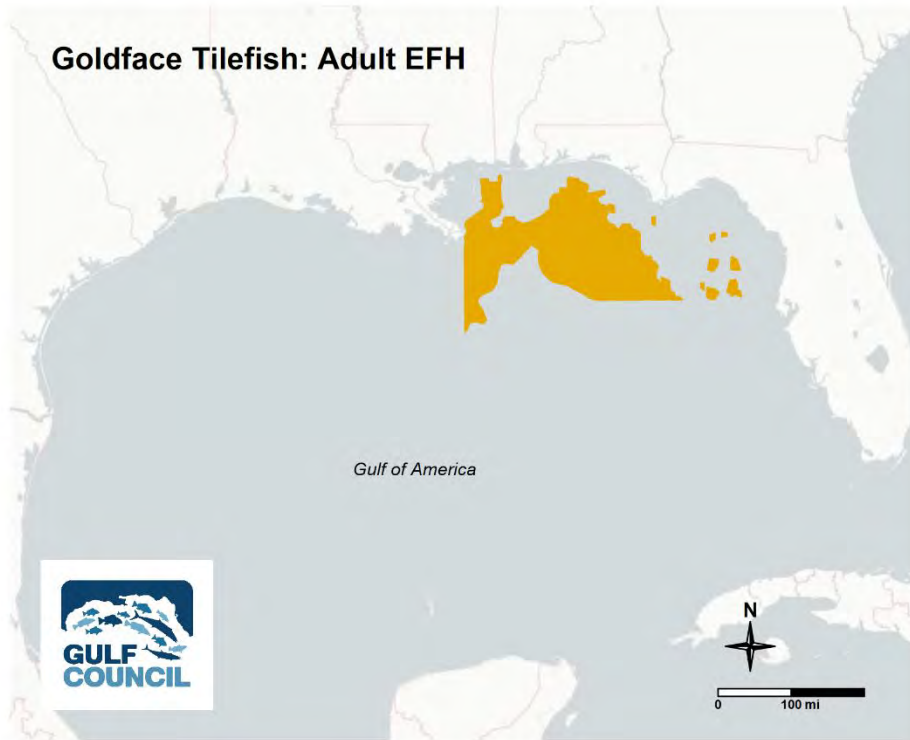


Figure C.1.45. Goldface tilefish adult EFH map.

Goliath grouper

Goliath grouper are in the shallow waters of the eastern Gulf, and are most abundant on the southwest Florida. Younger adults are found inshore around docks, bridges and jetties, and reef crevices, while large adults prefer offshore ledges and wrecks. The species depth range in the Gulf is to 312 feet [95m], with the highest abundance at 6.5-180 feet [2-55m]. Early juveniles are found in bays and estuaries, inshore grass beds, canals, and mangroves. Larger juveniles are also found around ledges, reefs, and holes in shallow waters. Spawning occurs off southeast and southwest Florida, and other parts of the Gulf around offshore structures, wrecks and patch reefs (i.e. high-relief structures) at depths of 118-151 feet [36-46m] from June-December, with peaks in July and September.

Egg: ER 1 and ER 5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated between 118-151 feet [36-46m], and are associated with the water column.

Larvae: ER 1 and ER 5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated between 118-151 feet [36-46m], and are associated with the water column.

Post larvae: ER 1 and ER 5 in nearshore (60 feet [18m] or less in depth) habitat and are associated with mangroves.

Early juvenile: ER 1 and ER 5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats, and are associated with mangroves, submerged aquatic vegetation, and emergent marsh.

Late juvenile: ER 1 and ER 5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats, and are associated with mangroves, submerged aquatic vegetation, emergent marsh, and hard bottom/reef substrate.

Adult: ER 1 and ER 5 in nearshore (60 feet [18m] or less in depth) and habitats, and offshore (greater than 60 feet [18m] in depth) and are associated with hard bottom/reef substrate and banks/shoals.

Spawning adult: ER 1 and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) and are associated with hard bottom/reef substrate.

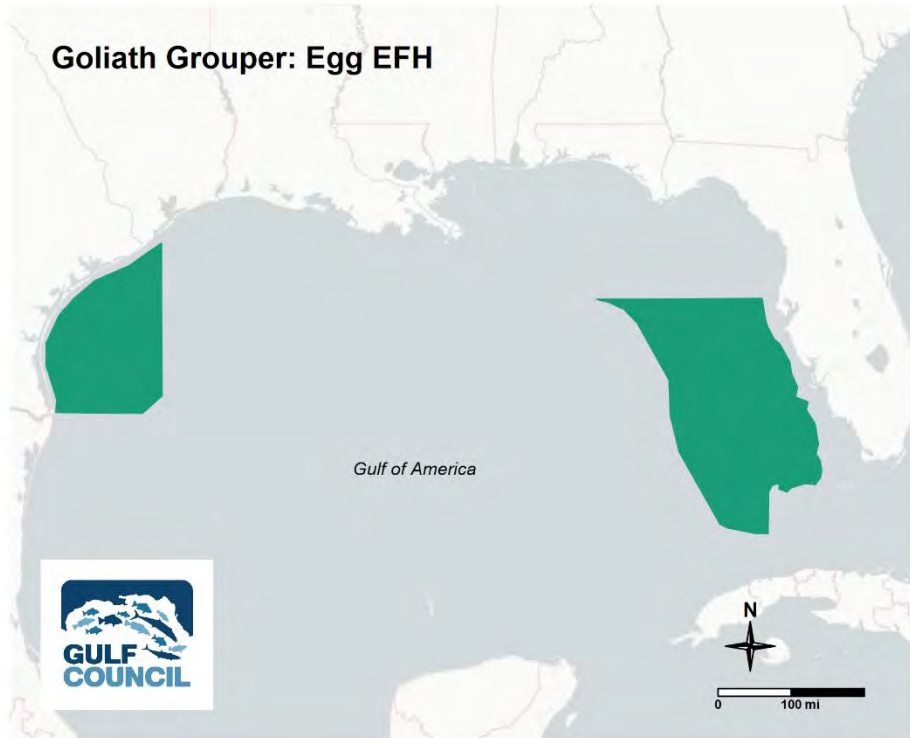


Figure C.1.46. Goliath grouper egg EFH map.

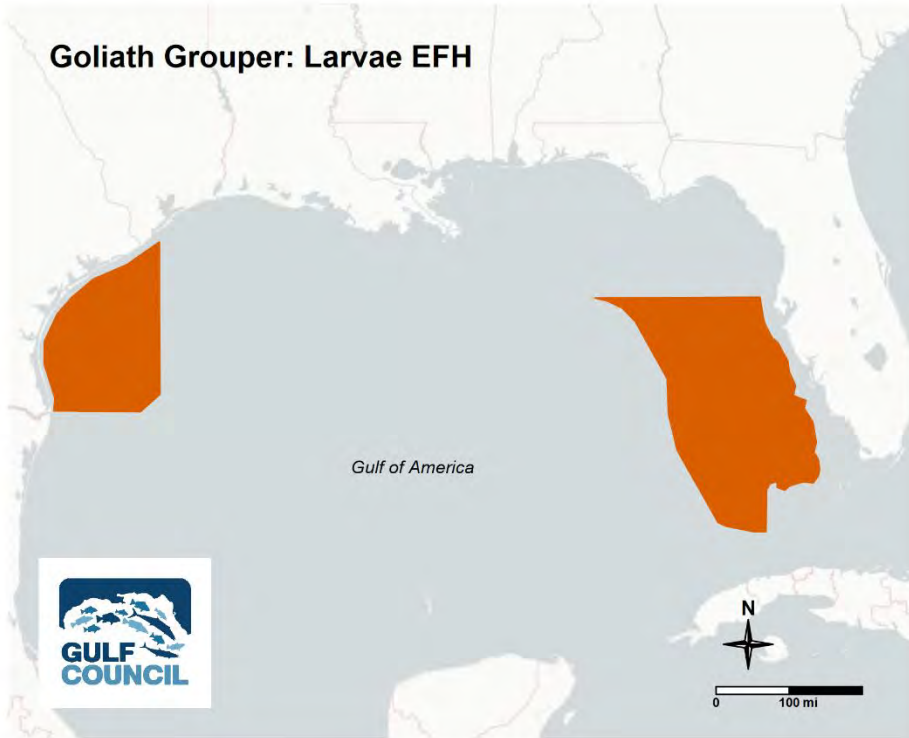


Figure C.1.47. Goliath grouper larvae EFH map.

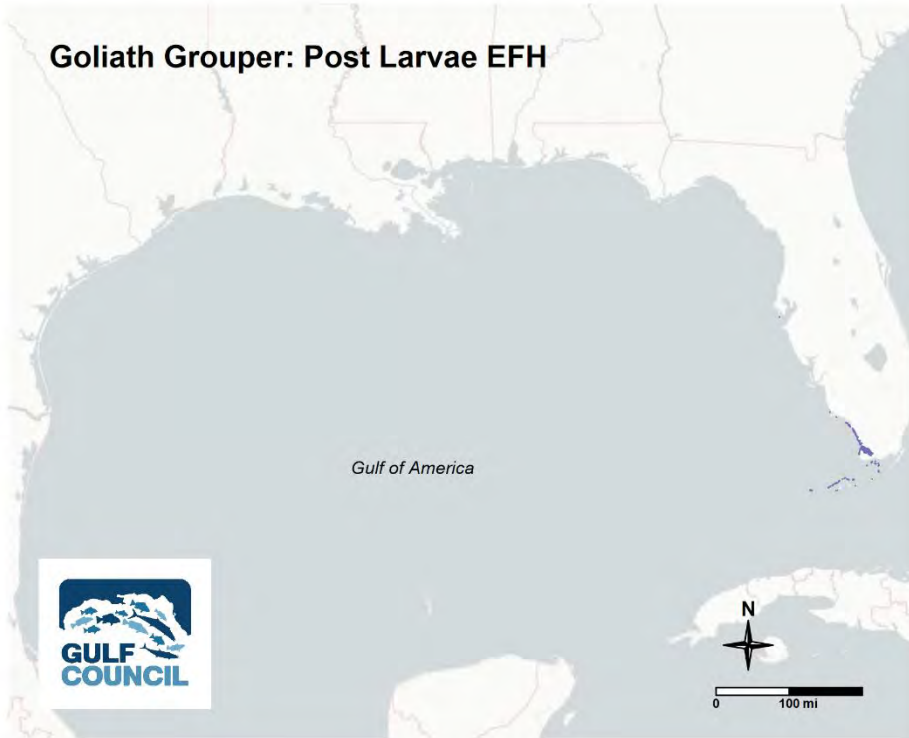


Figure C.1.48. Goliath grouper post larvae EFH map.

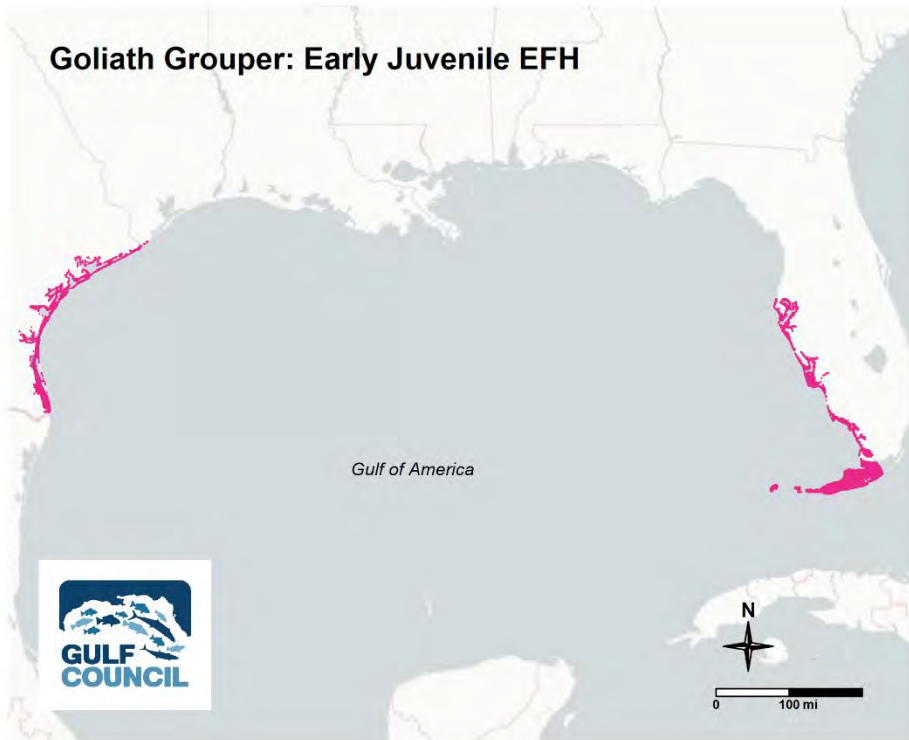


Figure C.1.49. Goliath grouper early juvenile EFH map.

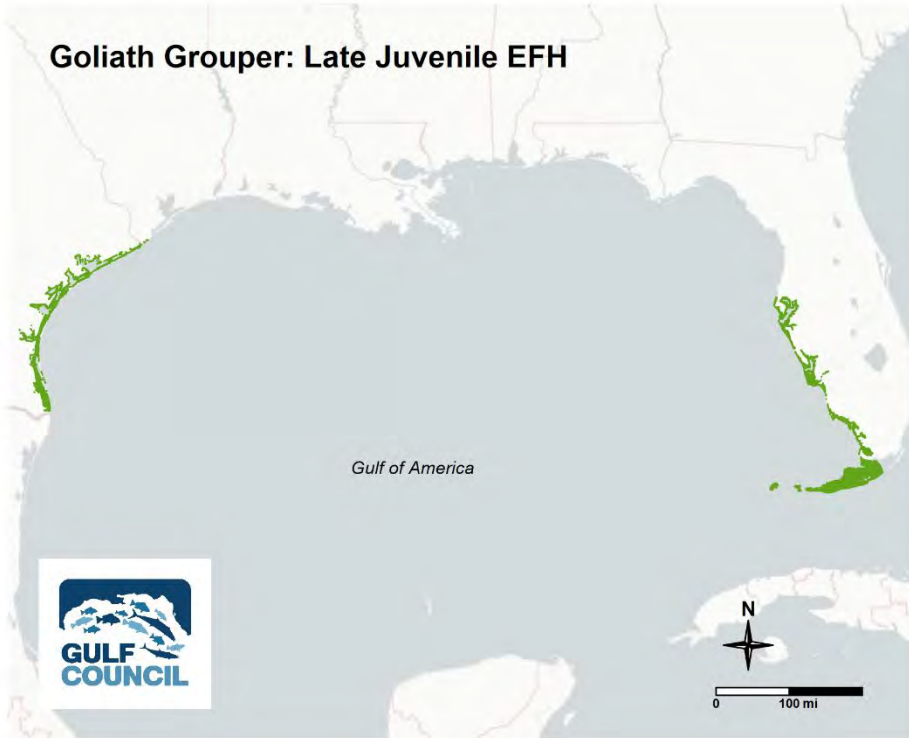


Figure C.1.50. Goliath grouper late juvenile EFH map.

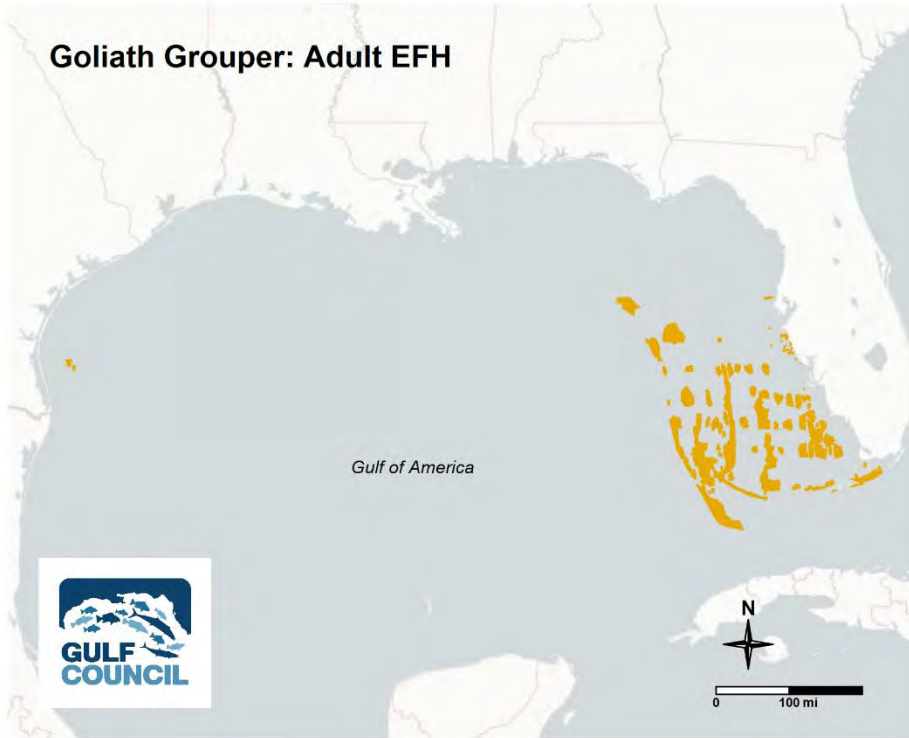


Figure C.1.51. Goliath grouper adult EFH map.

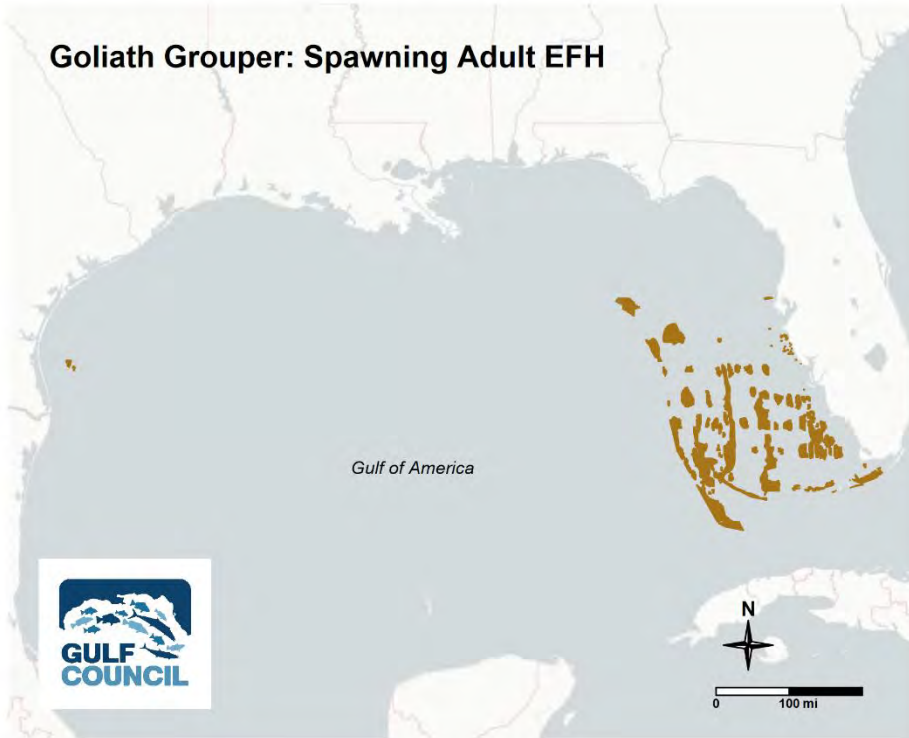


Figure C.1.52. Goliath grouper spawning adult EFH map.

Gray snapper

Gray snapper occur in estuaries and shelf waters of the Gulf, and are particularly abundant in the Eastern Gulf off of southwest Florida. Gray snapper inhabits waters to depths of about 590 feet [180m] and are found in mangroves, sandy grass beds, hard bottom/reefs, and over sandy, muddy, and rocky bottoms.

Egg: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated between 0-590 feet [0-180m], and are associated with the water column.

Larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated between 0-590 feet [0-180m], and are associated with the water column.

Post larvae: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) habitat and are associated with submerged aquatic vegetation.

Early juvenile: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) habitat, and are associated with submerged aquatic vegetation, mangroves, and emergent marsh.

Late juvenile: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) and in nearshore (60 feet [18m] or less in depth) habitats, and are associated with submerged aquatic vegetation, mangroves, and emergent marsh.

Adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 0-590 feet [0-180m], and are associated with submerged aquatic vegetation, mangroves, emergent marsh, hard bottom/reefs, banks/shoals, and sand/shell substrate.

Spawning adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 0-590 feet [0-180m], and are associated with hard bottom/reefs and banks/shoals.

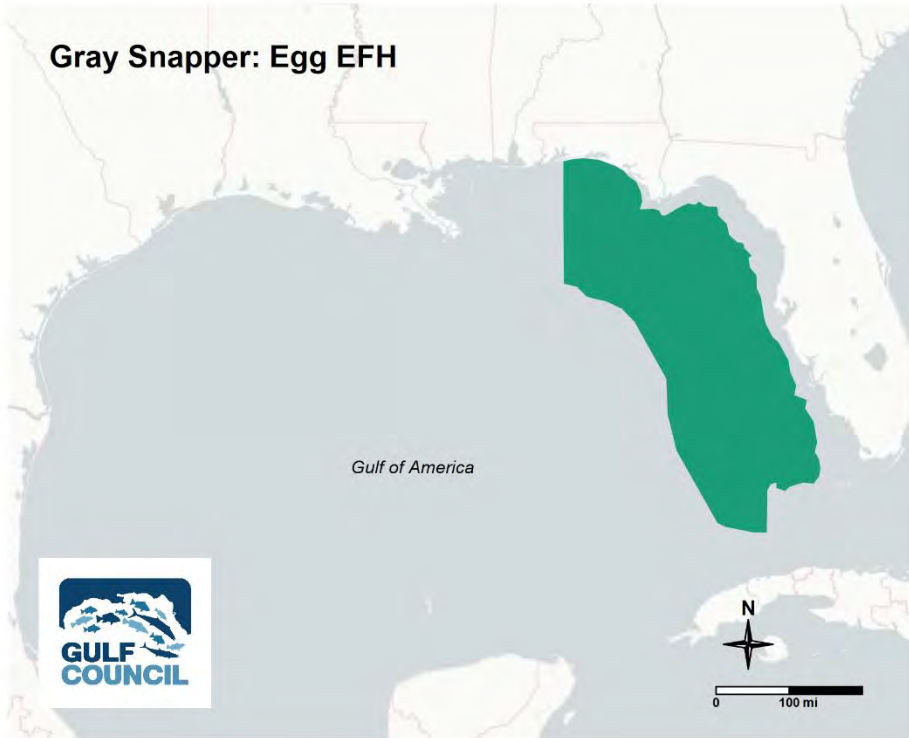


Figure C.1.53. Gray snapper egg EFH map.

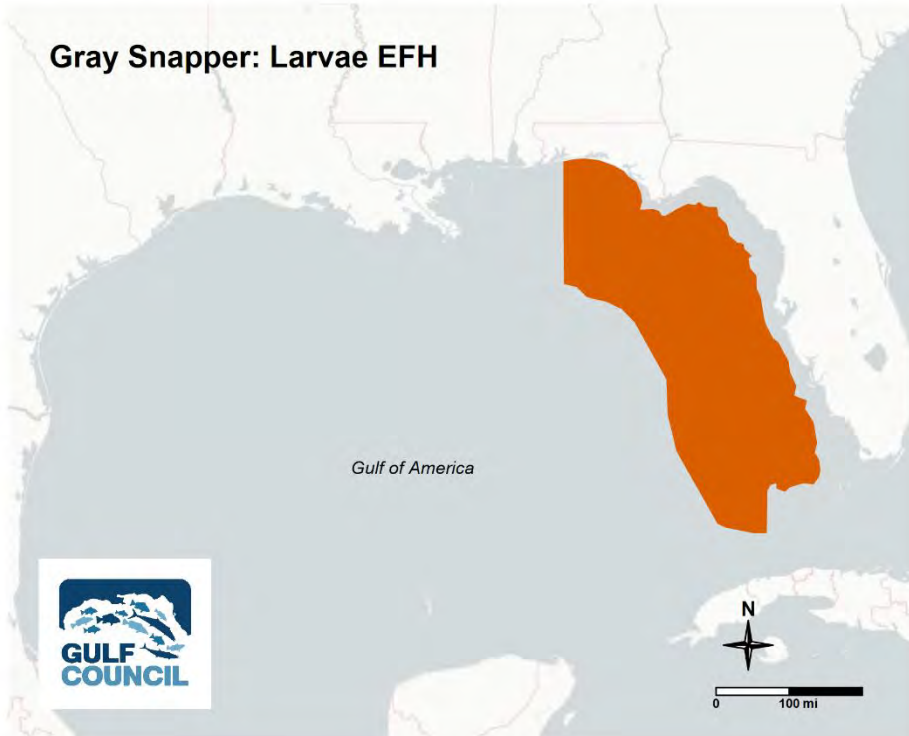


Figure C.1.54. Gray snapper larvae EFH map.

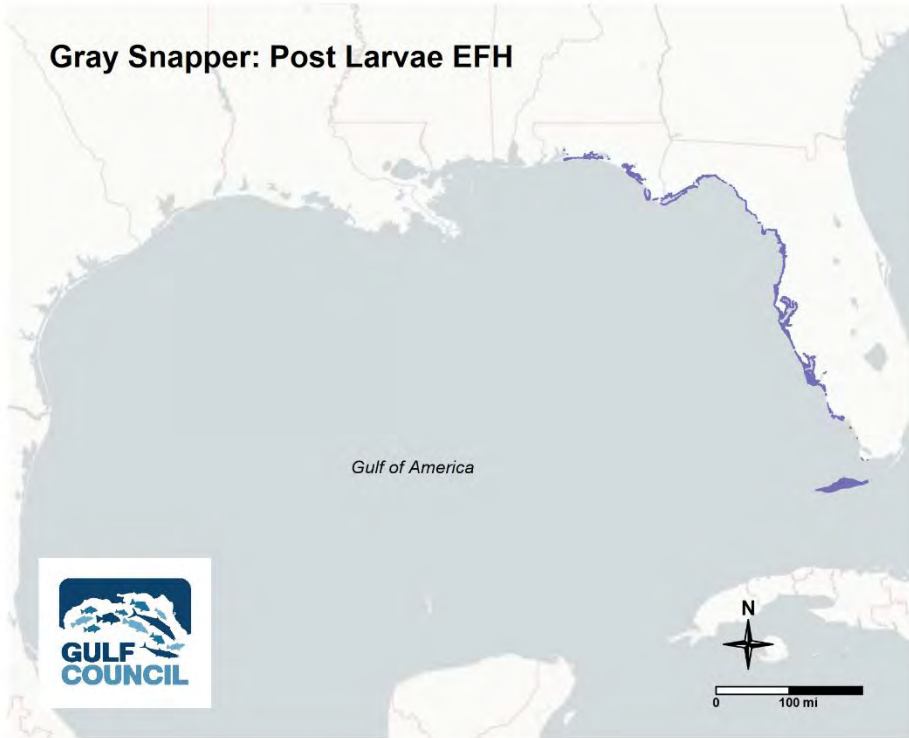


Figure C.1.55. Gray snapper post larvae EFH map.

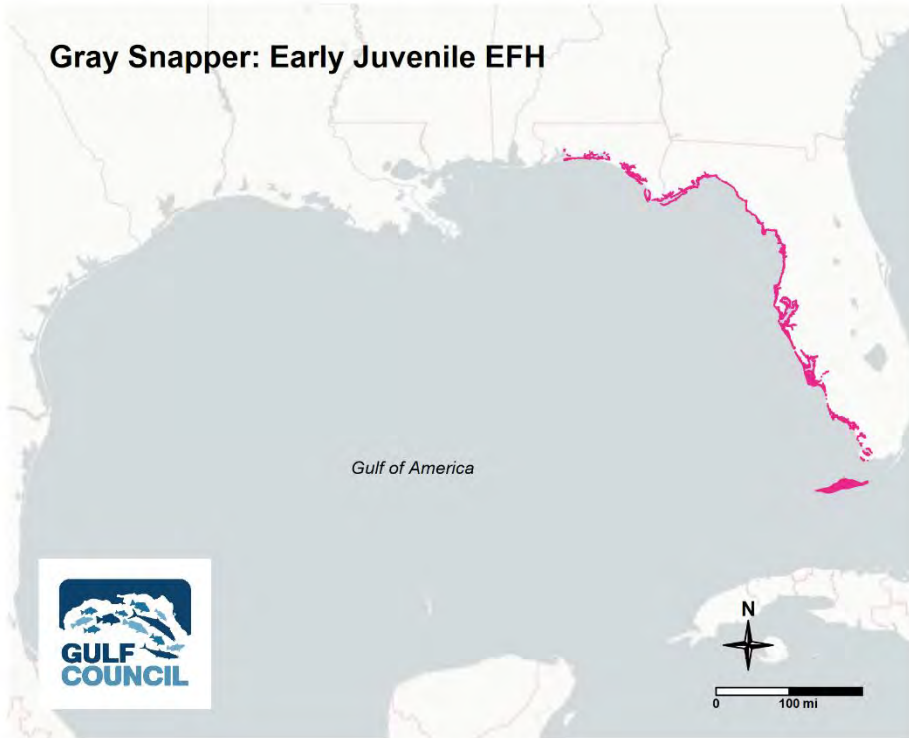


Figure C.1.56. Gray snapper early juvenile EFH map.

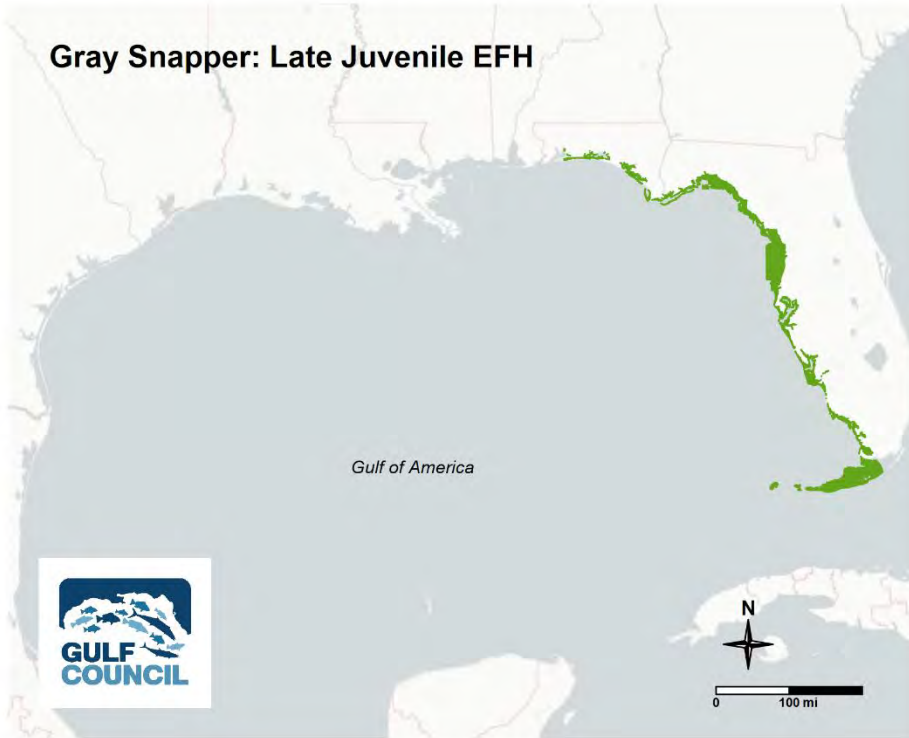


Figure C.1.57. Gray snapper late juvenile EFH map.

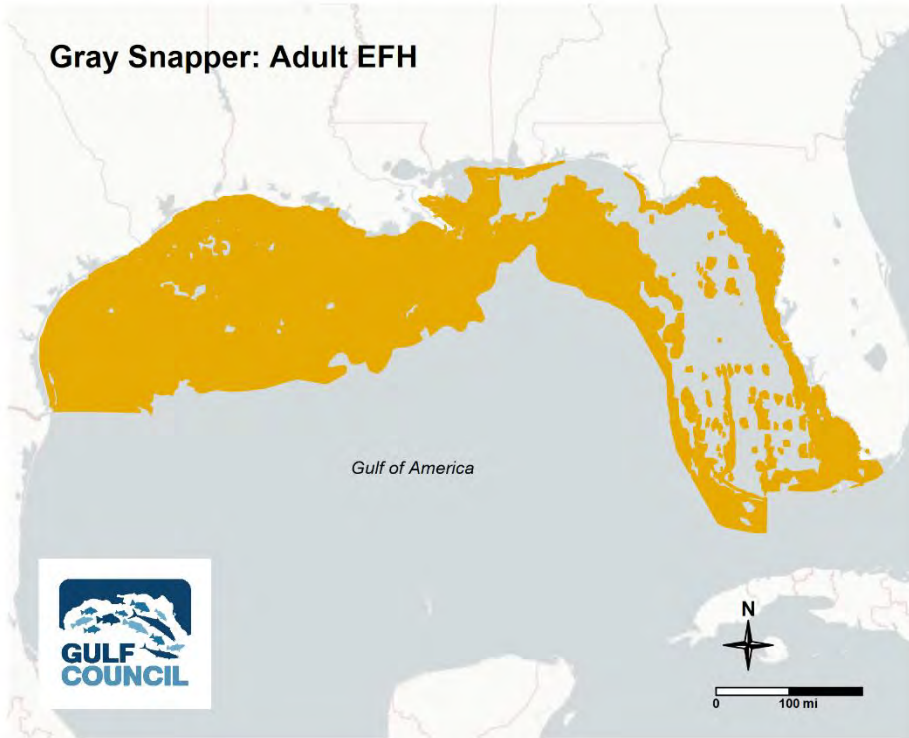


Figure C.1.58. Gray snapper adult EFH map.

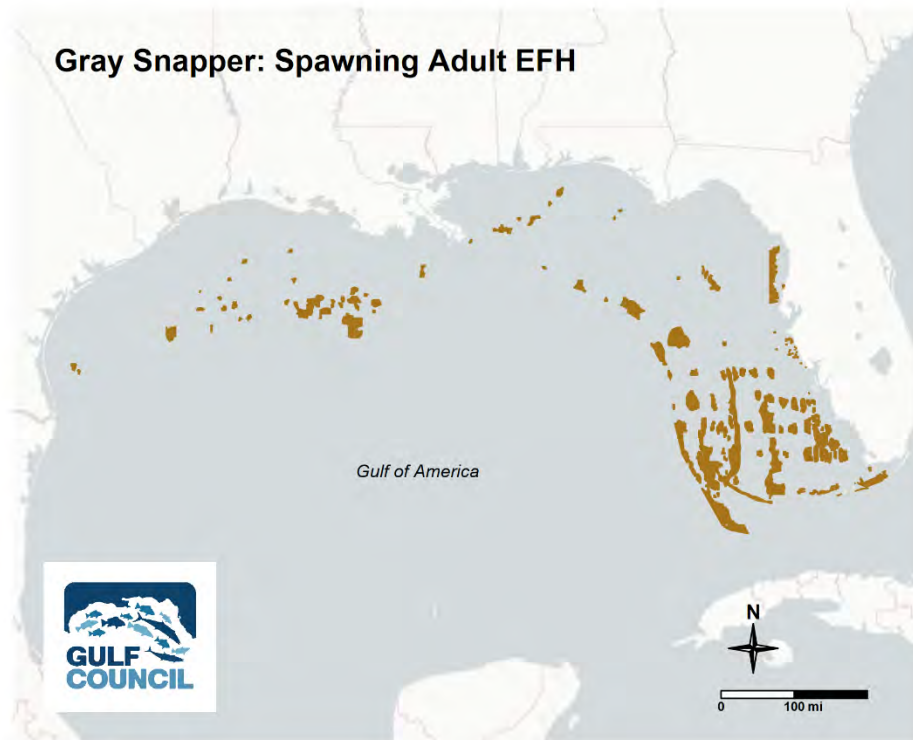


Figure C.1.59. Gray snapper spawning adult EFH map.

Gray triggerfish

Gray triggerfish are found Gulf-wide in all eco-regions at depths from 33-328 feet [10-100m]; they occupy habitat types including the water column, hard bottom/reefs, drifting algae(*Sargassum*).

Egg: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 33-328 feet [10-100m], and are associated with hard bottom/reefs.

Larvae: Gulf-wide ER 1-5 and are associated with offshore (greater than 60 feet [18m] in depth) habitats associated with the water column and drifting algae.

Post larvae: Gulf-wide ER 1-5 and are associated with offshore (greater than 60 feet [18m] in depth) habitats associated with the water column and drifting algae.

*Early juvenile*¹: Gulf-wide ER 1-5 and are associated with offshore (greater than 60 feet [18m] in depth) habitats associated with drifting algae.

Late juvenile: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 33-328 feet [10-100m], and are associated with hard bottom/reefs and drifting algae.

¹ There is no associated habitat map for drifting algae. As such, there is no information to inform a habitat map.

Adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 33-328 feet [10-100m], and are associated with hard bottom/reefs.

Spawning adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated between 33-328 feet [10-100m], and are associated with hard bottom/reefs.

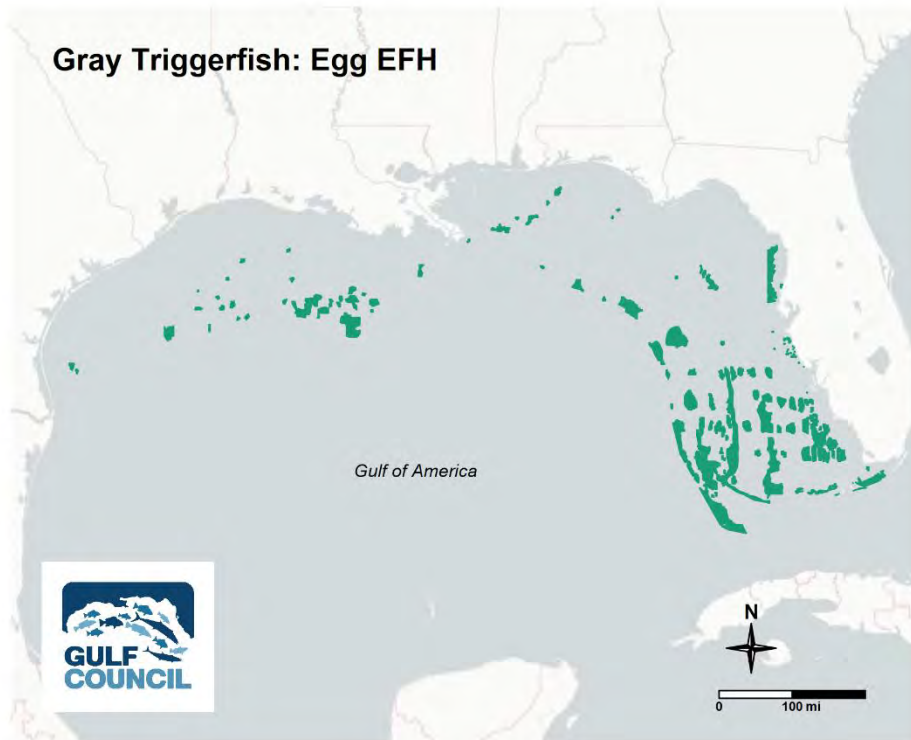


Figure C.1.60. Gray triggerfish egg EFH map.

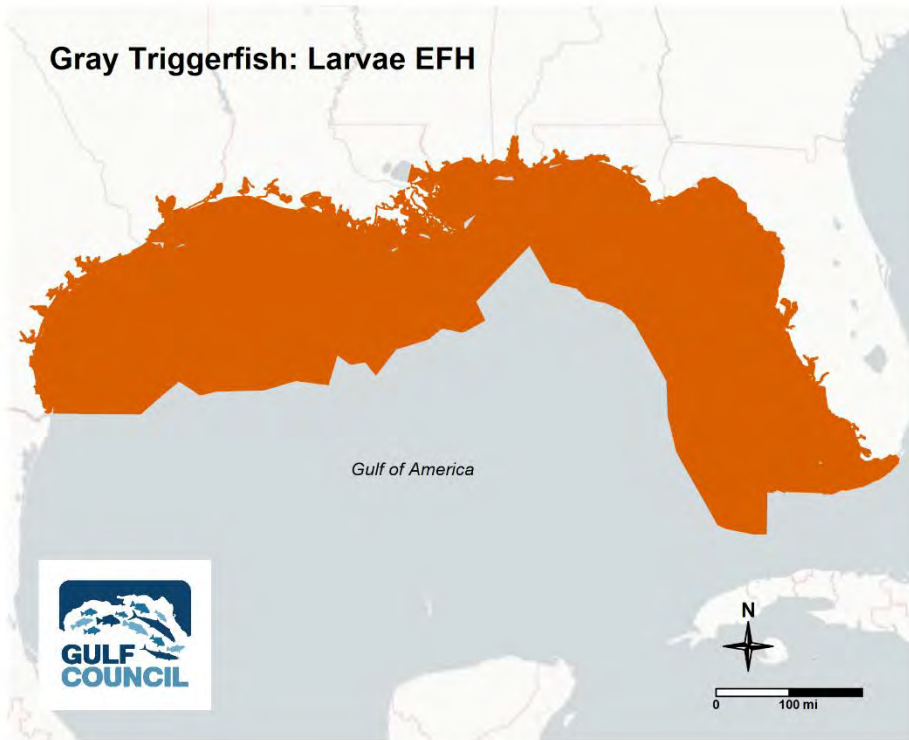


Figure C.1.61. Gray triggerfish larvae EFH map.

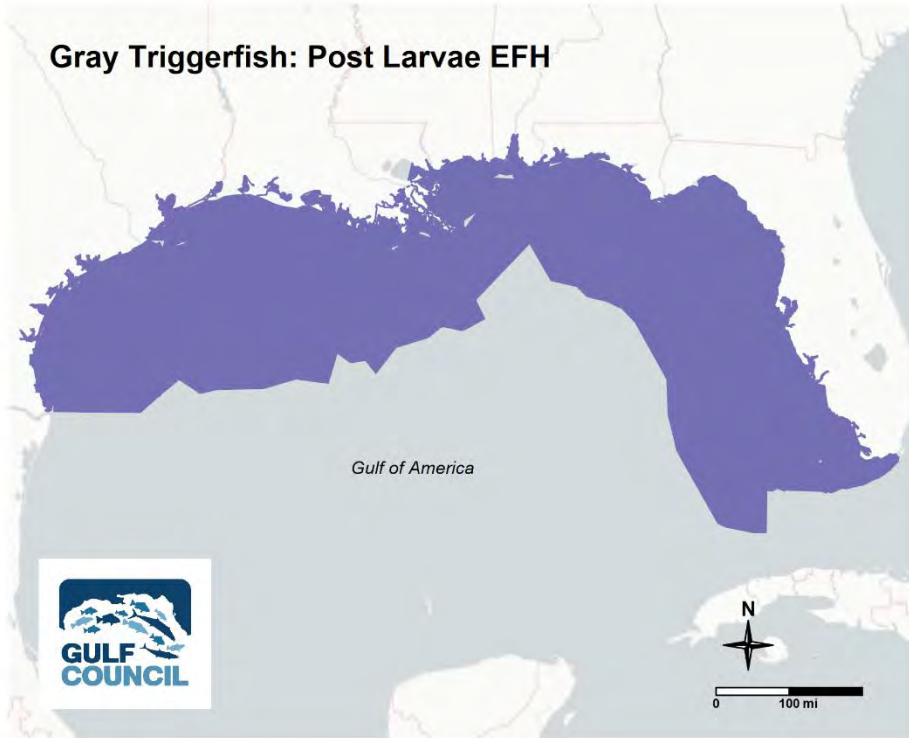


Figure C.1.62. Gray triggerfish post larvae EFH map.

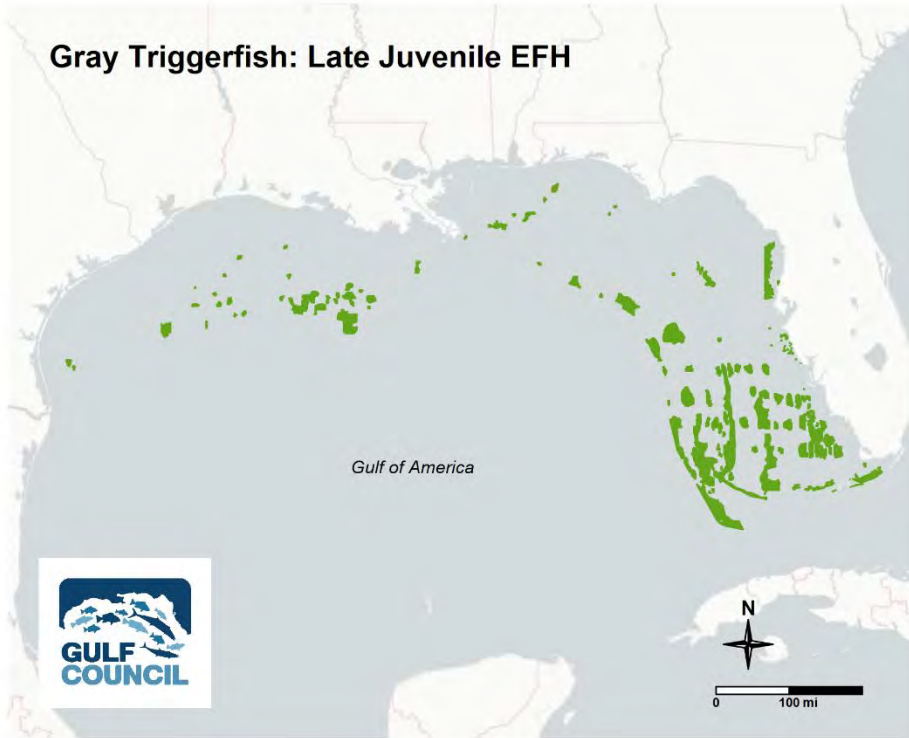


Figure C.1.63. Gray triggerfish late juvenile EFH map.

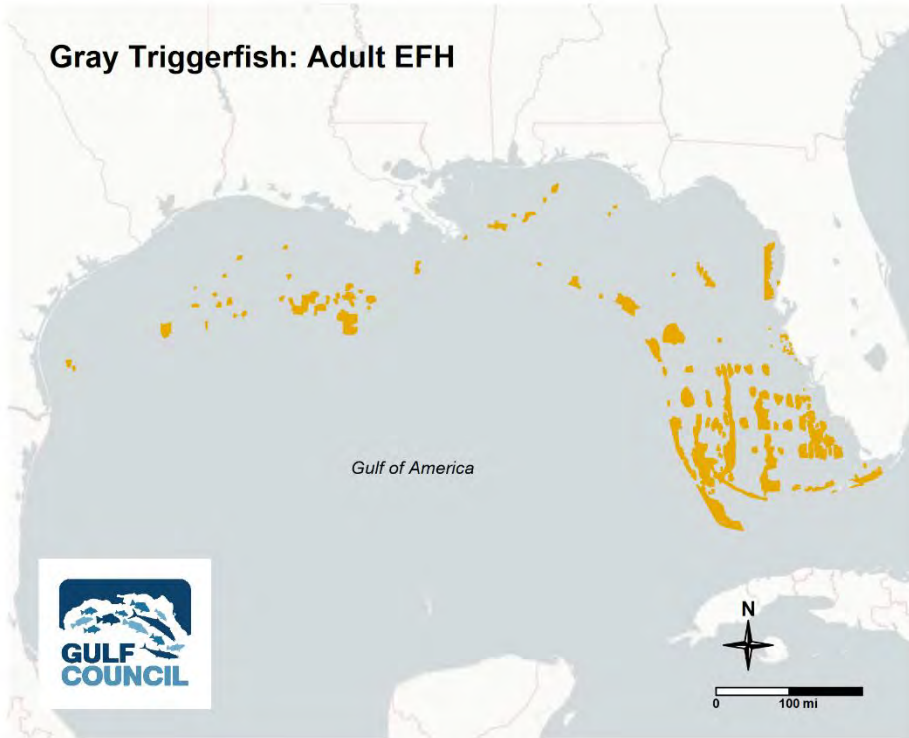


Figure C.1.64. Gray triggerfish adult EFH map.

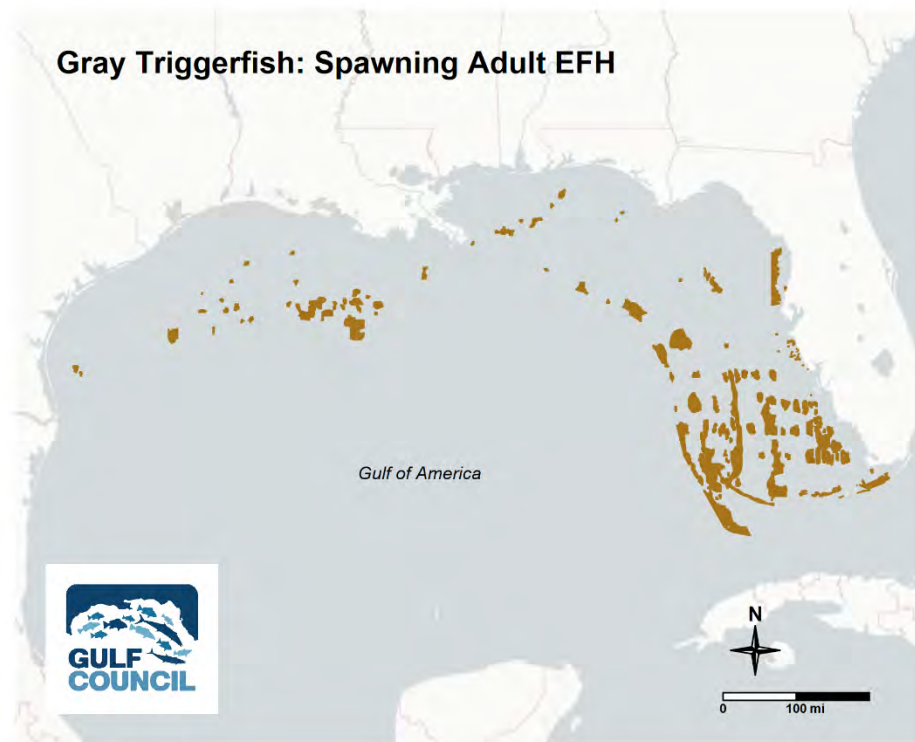


Figure C.1.65. Gray triggerfish spawning adult EFH map.

Greater amberjack

Greater amberjack are found Gulf-wide, primarily offshore and have been documented in depths up to 614 feet [187 m]. All life stages can be water column associated, whereas late juveniles and adults are associated with hard bottom/reefs, and adults and spawning adults have been documented on reefs.

Egg: Gulf-wide ER 1-5 and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Post larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Early juvenile: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Late juvenile: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column and hard bottom/reefs.

Adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths < 614 feet [187m], and are associated with the water column, hard bottom/reefs, and banks/shoals.

Spawning adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column and hard bottom/reefs.

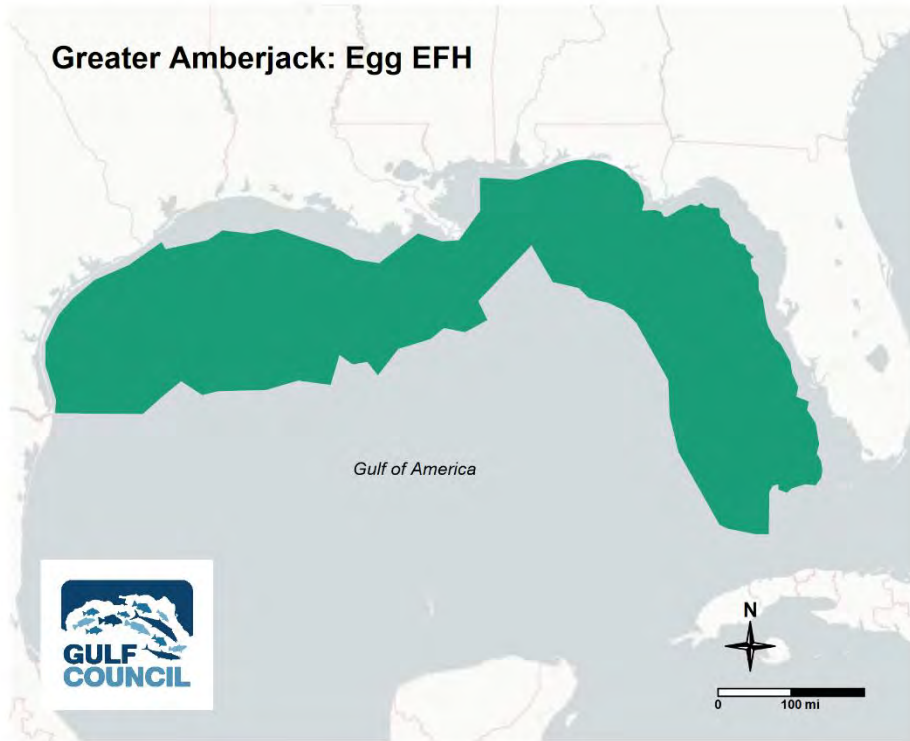


Figure C.1.66. Greater amberjack egg EFH map.

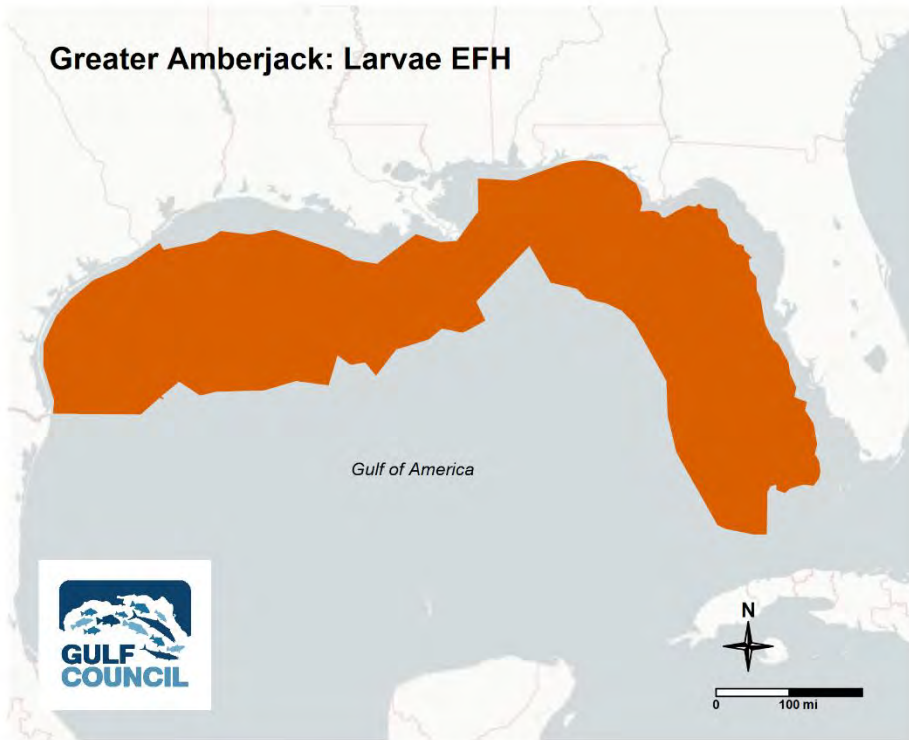


Figure C.1.67. Greater amberjack larvae EFH map.

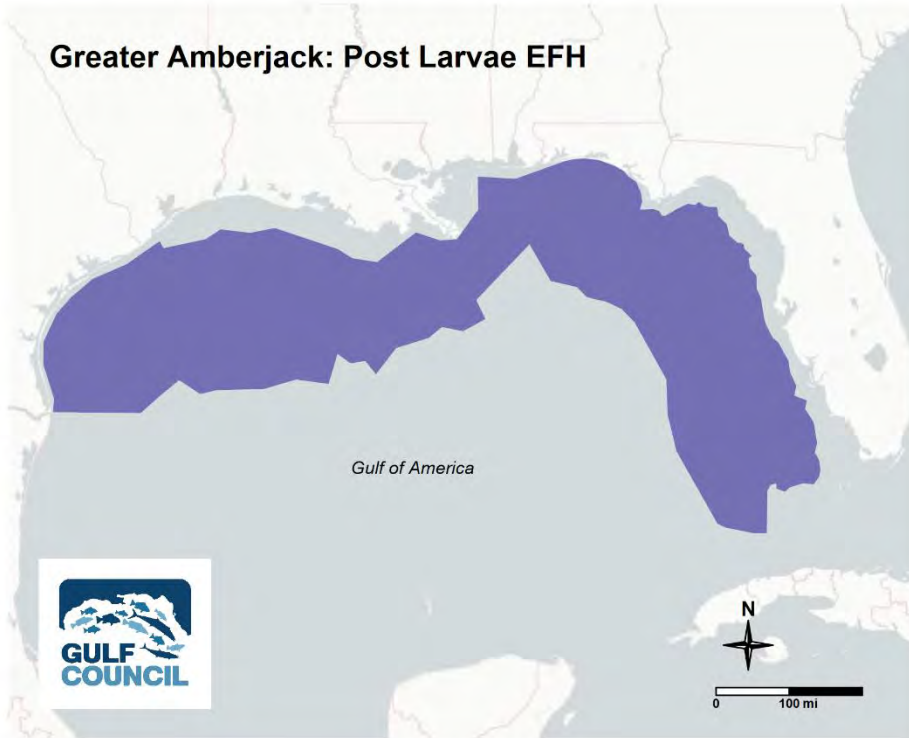


Figure C.1.68. Greater amberjack post larvae EFH map.

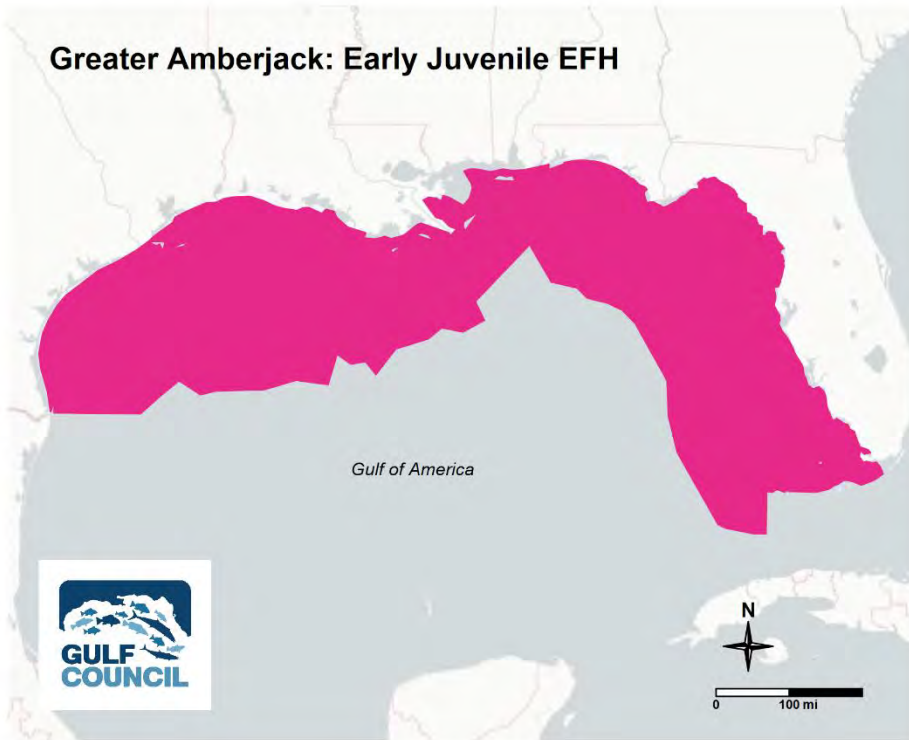


Figure C.1.69. Greater amberjack early juvenile EFH map.

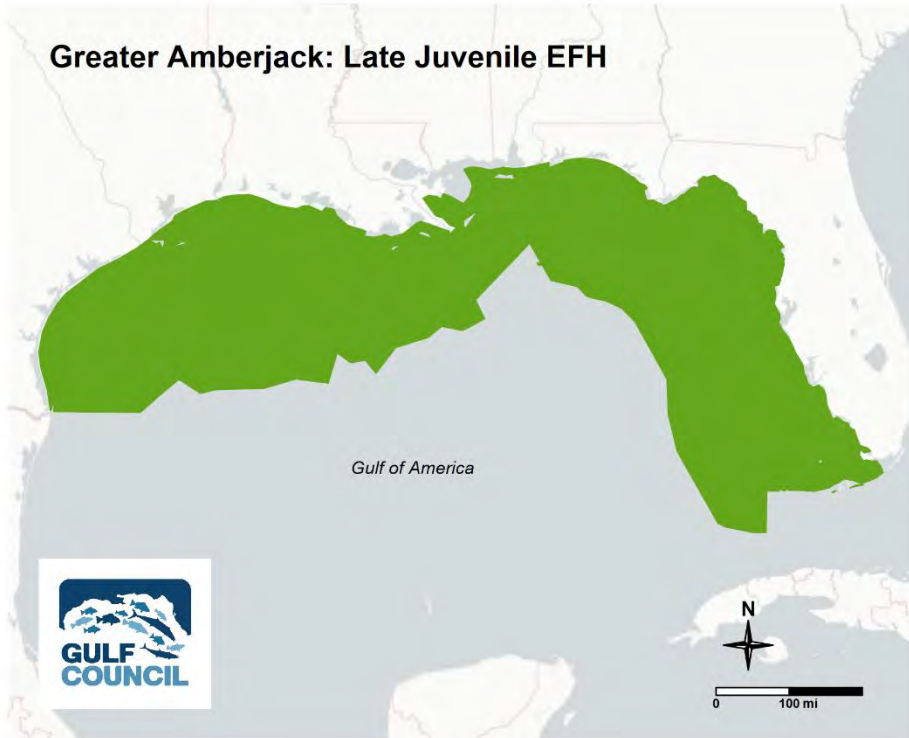


Figure C.1.70. Greater amberjack late juvenile EFH map.

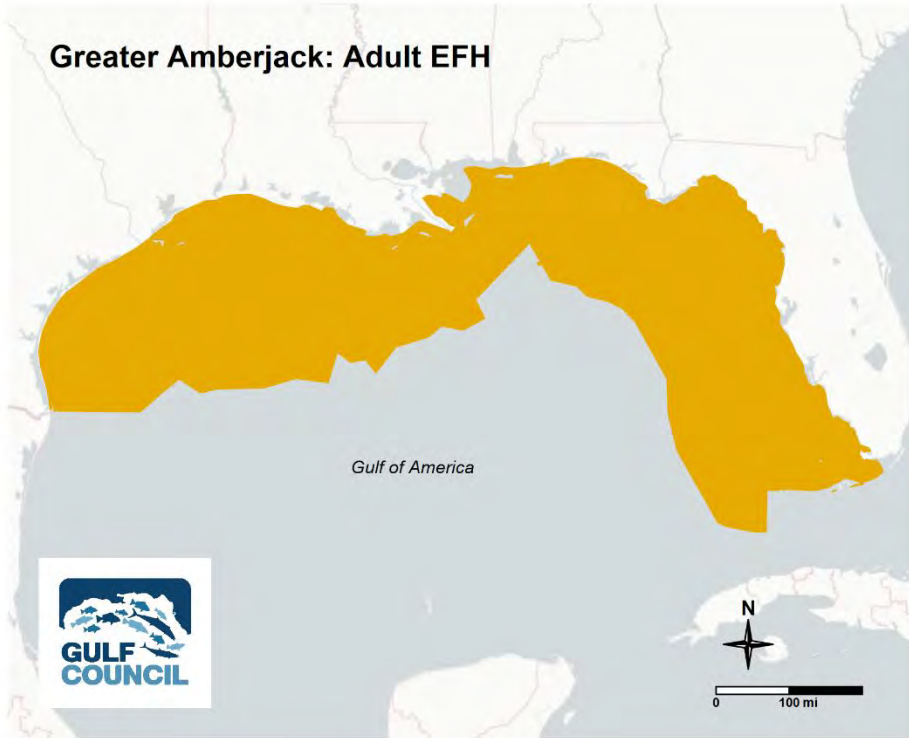


Figure C.1.71. Greater amberjack adult EFH map.

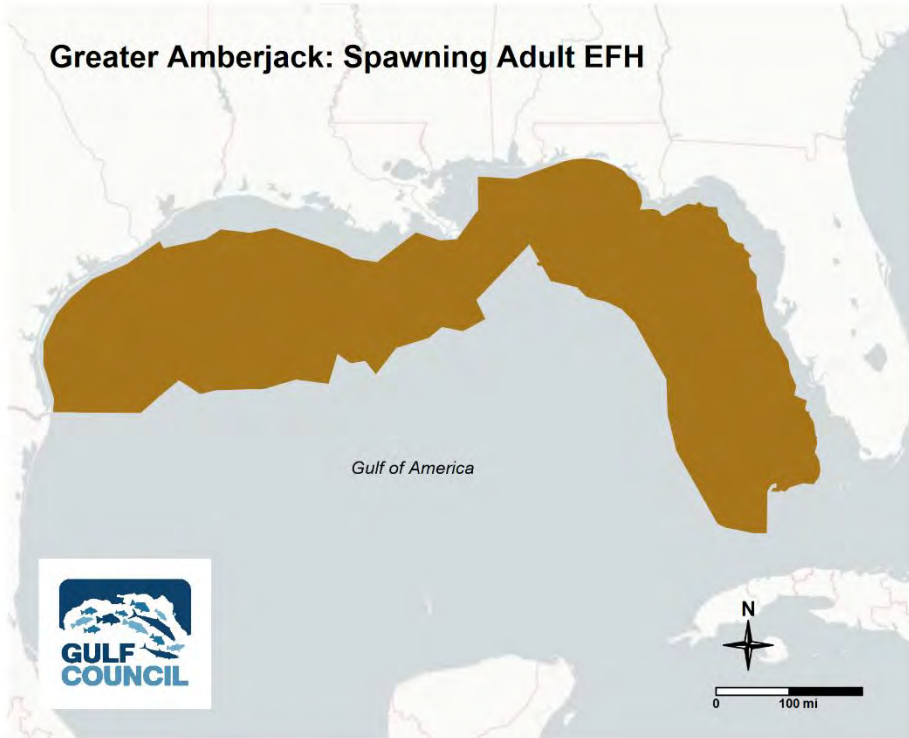


Figure C.1.72. Greater amberjack spawning adult EFH map.

Hogfish

Hogfish are generally distributed in the Eastern Gulf along the west coast of Florida. Juveniles can be found in shallow seagrass beds in Florida Bay and adults are widely distributed on hard bottom/reefs and rocky flats.

Egg: ER 1 and ER 2 and are associated with the water column.

Larvae: ER 1 and ER 2 and are associated with the water column.

Post larvae: ER 1 and ER 2 and are associated with the water column.

Early juvenile: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) and in nearshore (60 feet [18m] or less in depth) habitats and are associated with submerged aquatic vegetation and hard bottom/reefs.

Late juvenile: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) and in nearshore (60 feet [18m] or less in depth) habitats and are associated with submerged aquatic vegetation and hard bottom/reefs.

Adult: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) and in nearshore (60 feet [18m] or less in depth) habitats and are associated with hard bottom/reefs.

Spawning adult: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) and in nearshore (60 feet [18m] or less in depth) habitats, and are associated sand and hard bottom/reefs.

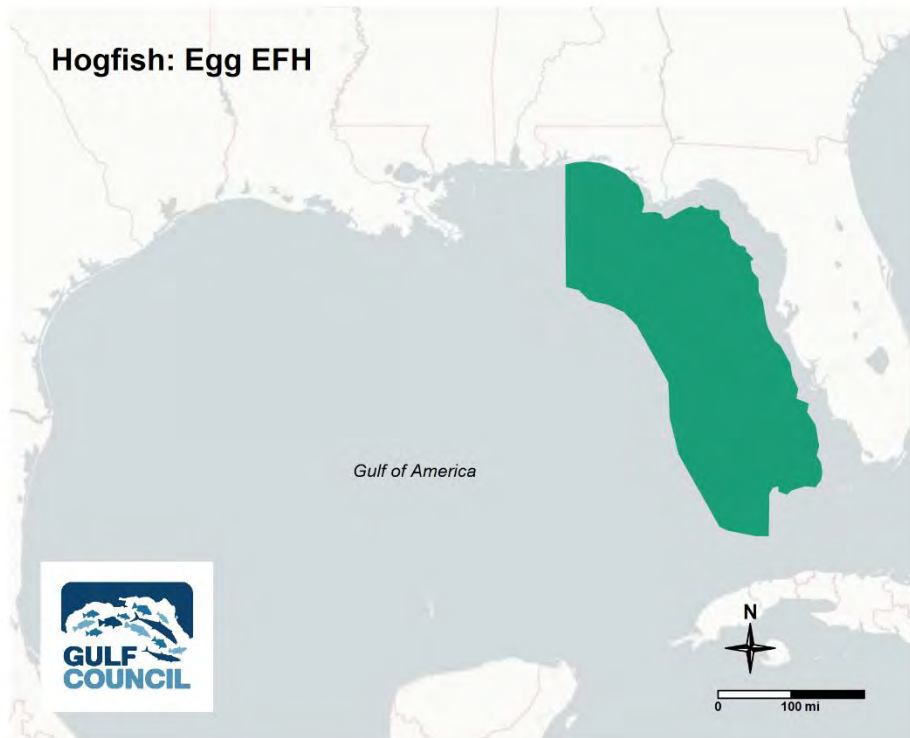


Figure C.1.73. Hogfish egg EFH map.

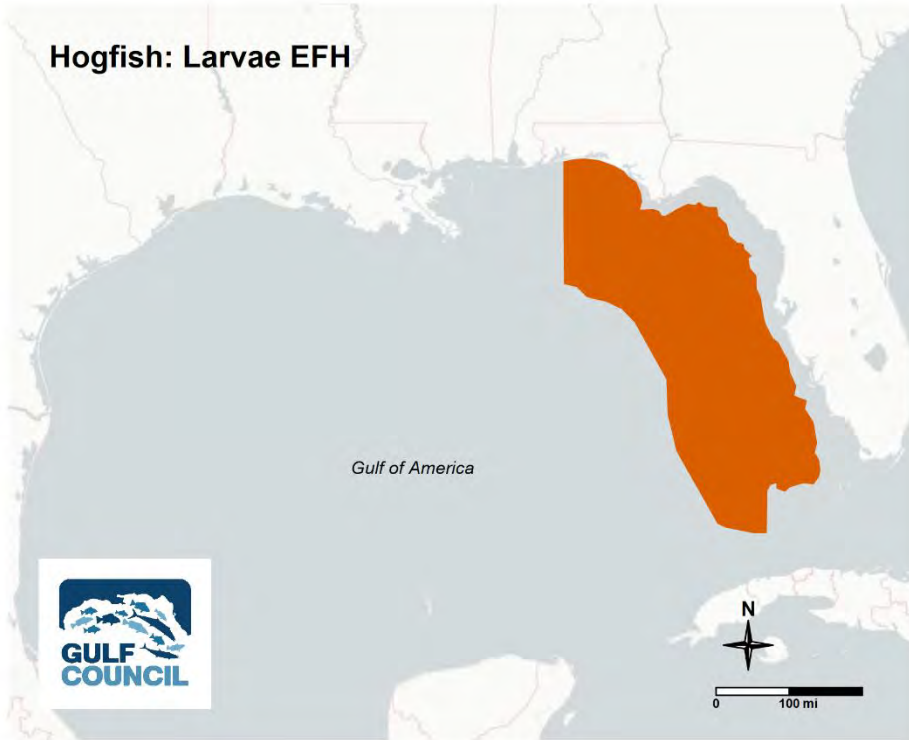


Figure C.1.74. Hogfish larvae EFH map.

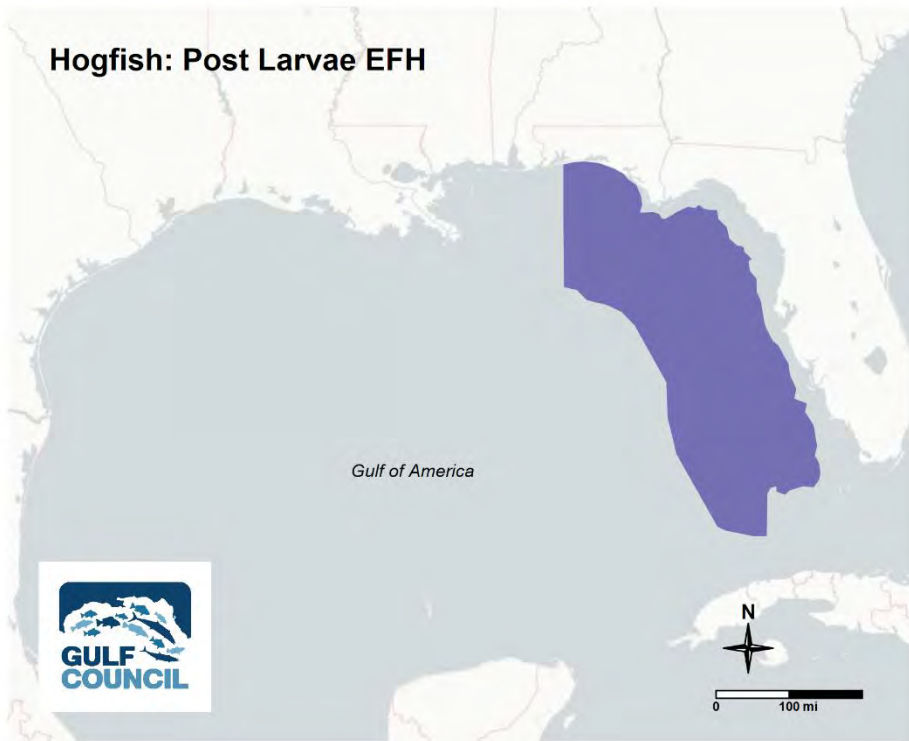


Figure C.1.75. Hogfish post larvae EFH map.

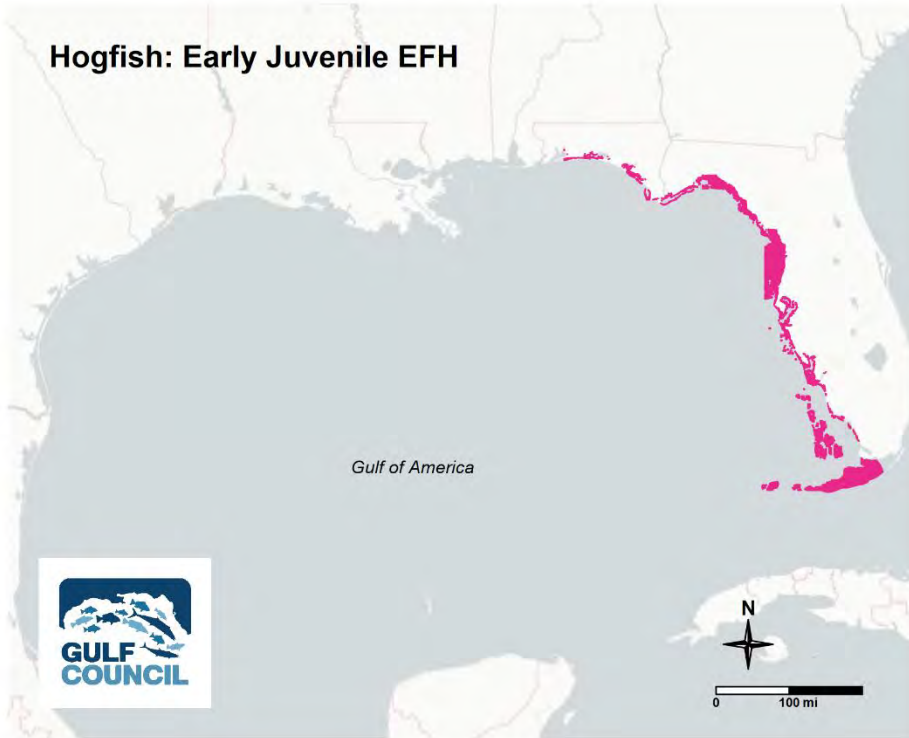


Figure C.1.76. Hogfish early juvenile EFH map.

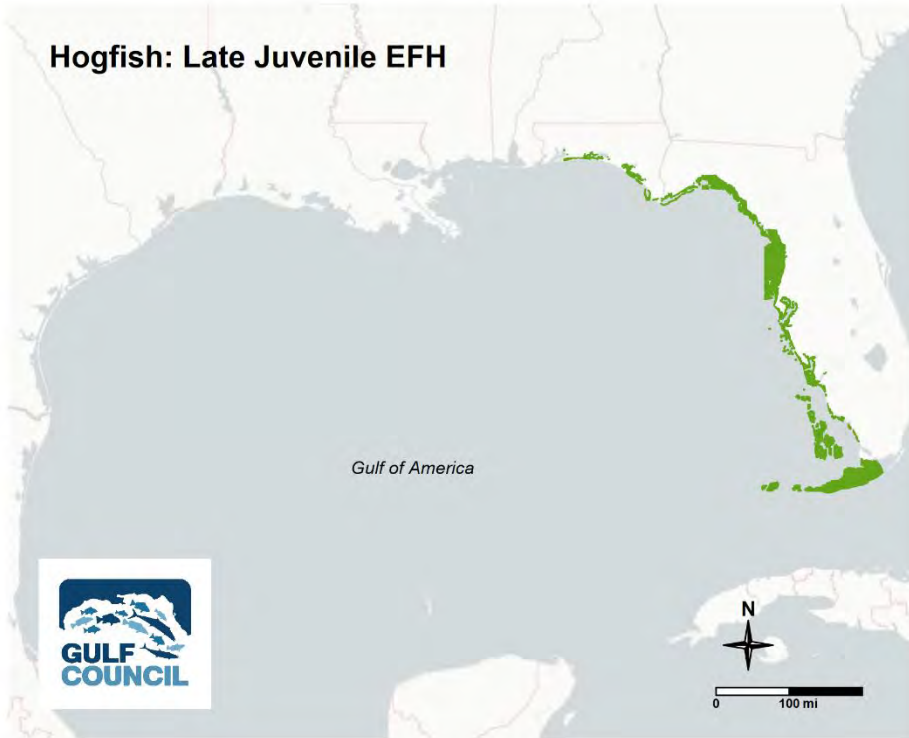


Figure C.1.77. Hogfish late juvenile EFH map.

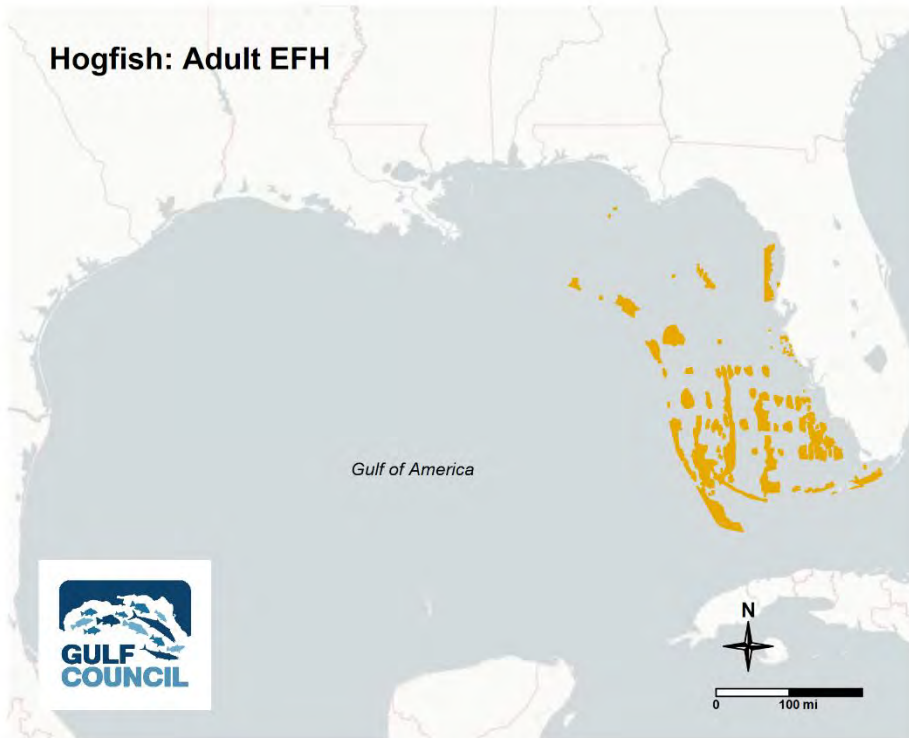


Figure C.1.78. Hogfish adult EFH map.

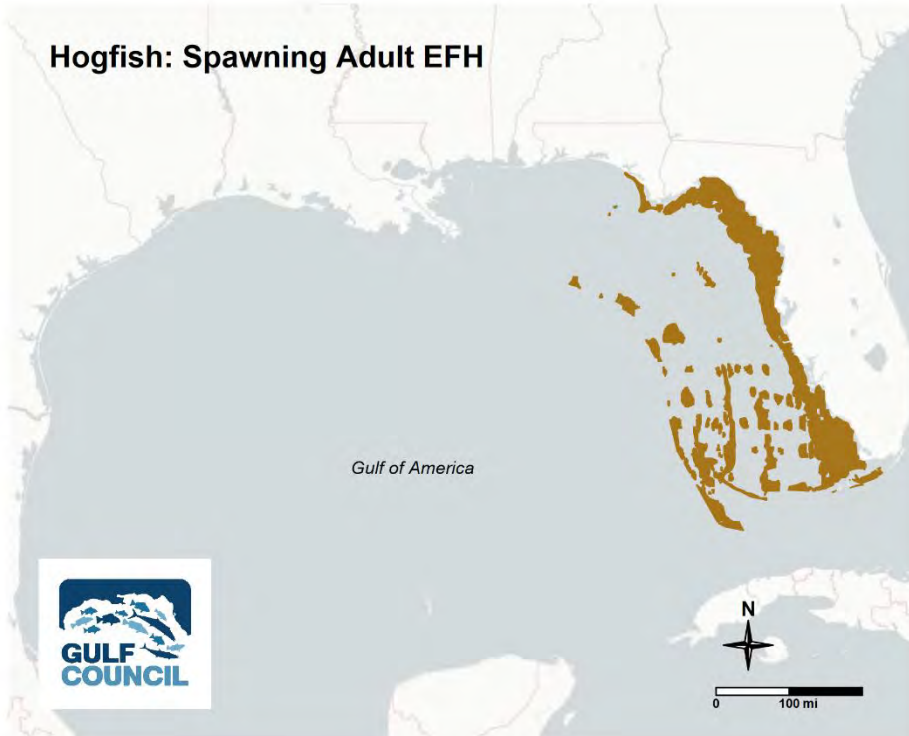


Figure C.1.79. Hogfish spawning adult EFH map.

Lane snapper

Lane snapper can be found Gulf-wide in most habitat zones. Juveniles and adults are found across most habitat types including submerged aquatic vegetation, sand/shell, hard bottom/reefs, soft bottom, banks/shoals, and mangroves. Adults occupy nearshore and offshore waters, at depths from 13-433 feet [4-132m] and temperature of 16-29°C.

Egg: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 13-433 feet [4-132m], and are associated with the water column.

Larvae: Gulf- wide ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Post larvae: Gulf- wide ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column and submerged aquatic vegetation habitat.

Early juvenile: Gulf- wide ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats. Associated habitat types are: submerged aquatic vegetation, sand/shell substrate, hard bottom/reefs, soft bottom, banks/shoals, and mangroves.

Late juvenile: Gulf- wide ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats. Associated habitat types are: submerged aquatic vegetation, sand/shell substrate, hard bottom/reefs, soft bottom, banks/shoals, and mangroves.

Adult: Gulf- wide ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats and are associated with sand/shell substrate and banks/shoals habitat.

Spawning adult: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with hard bottom/reefs and shelf /slope edge habitat.

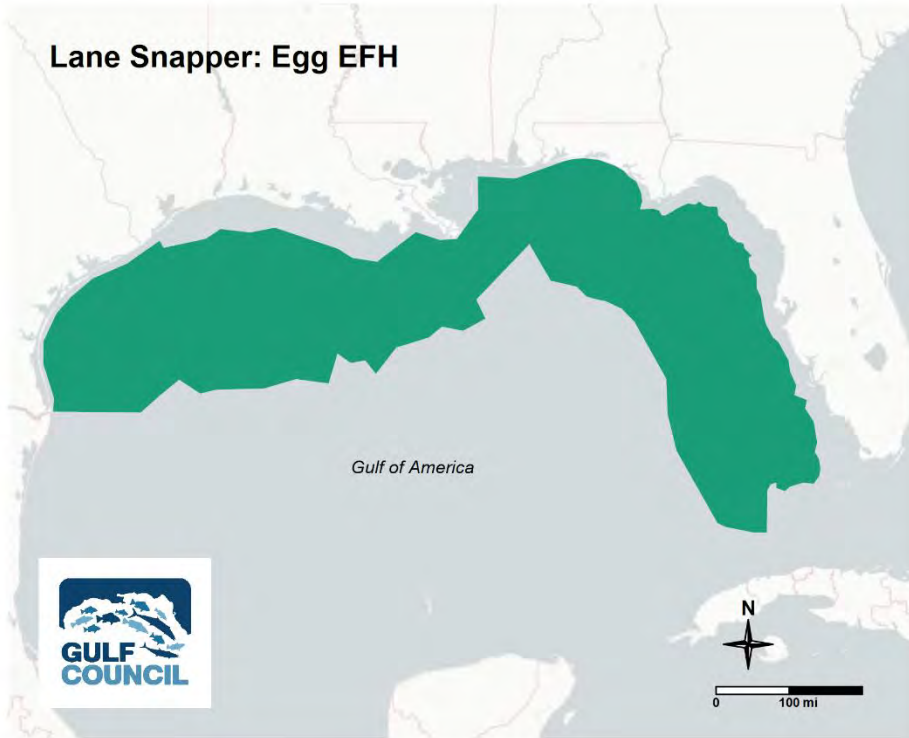


Figure C.1.80. Lane snapper egg EFH map.

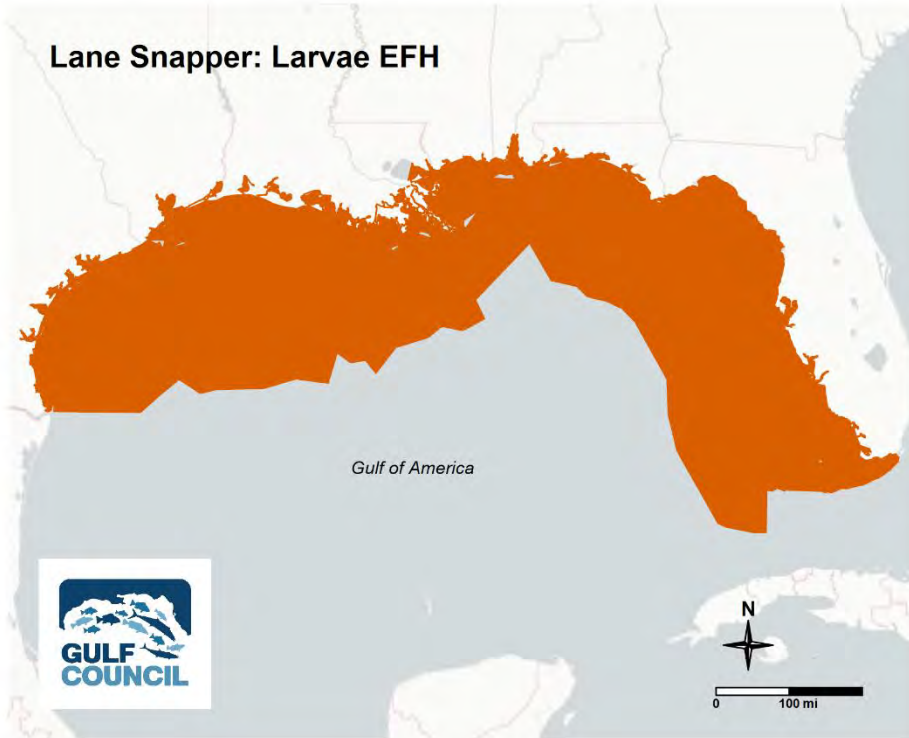


Figure C.1.81. Lane snapper larvae EFH map.

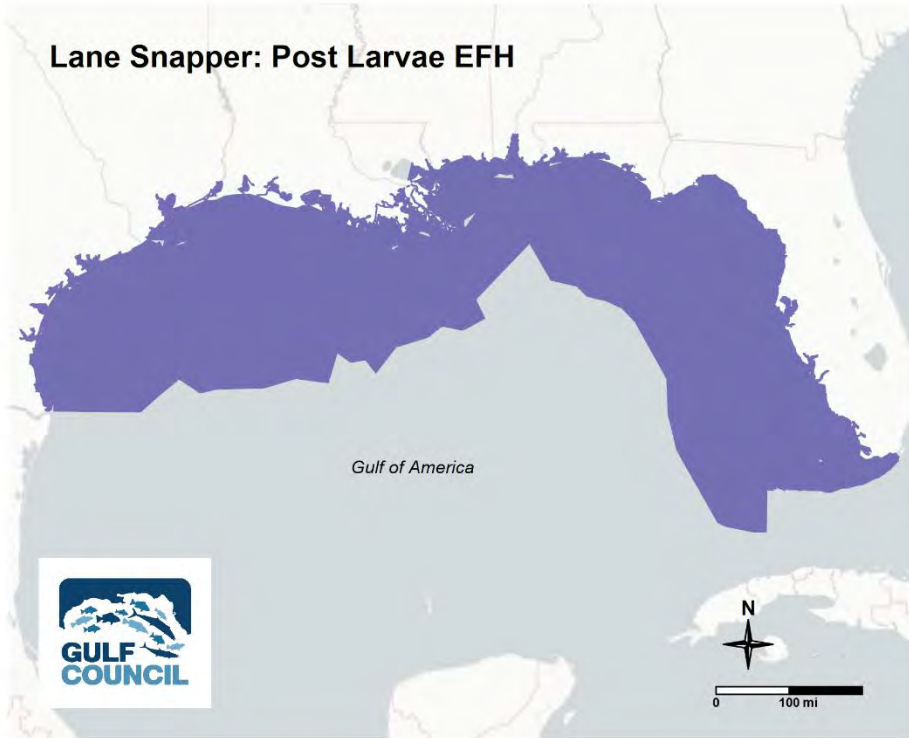


Figure C.1.82. Lane snapper post larvae EFH map.

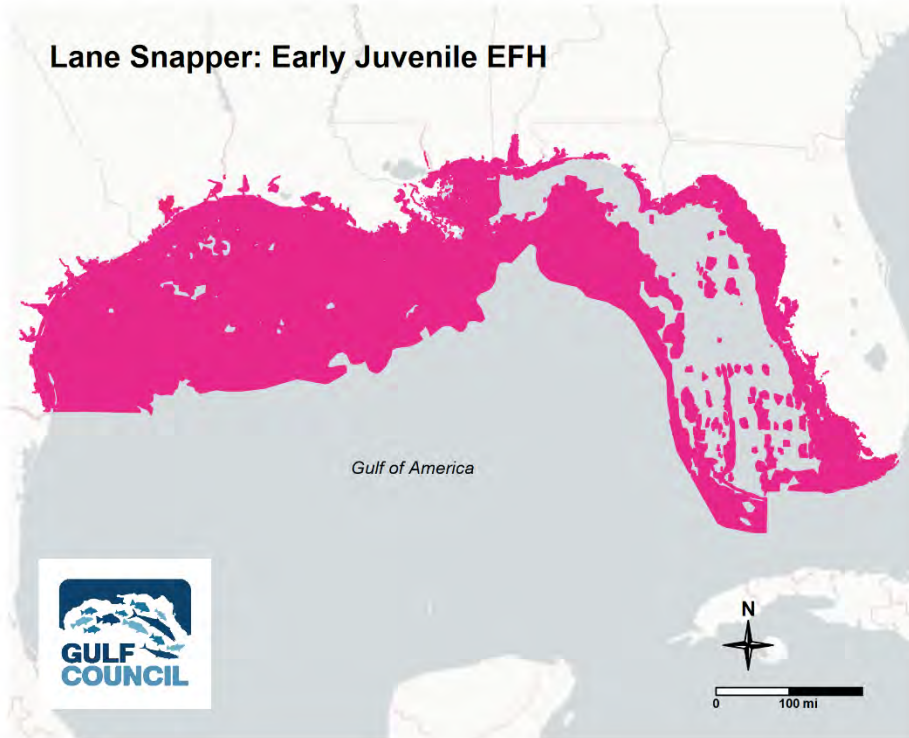


Figure C.1.83. Lane snapper early juvenile EFH map.

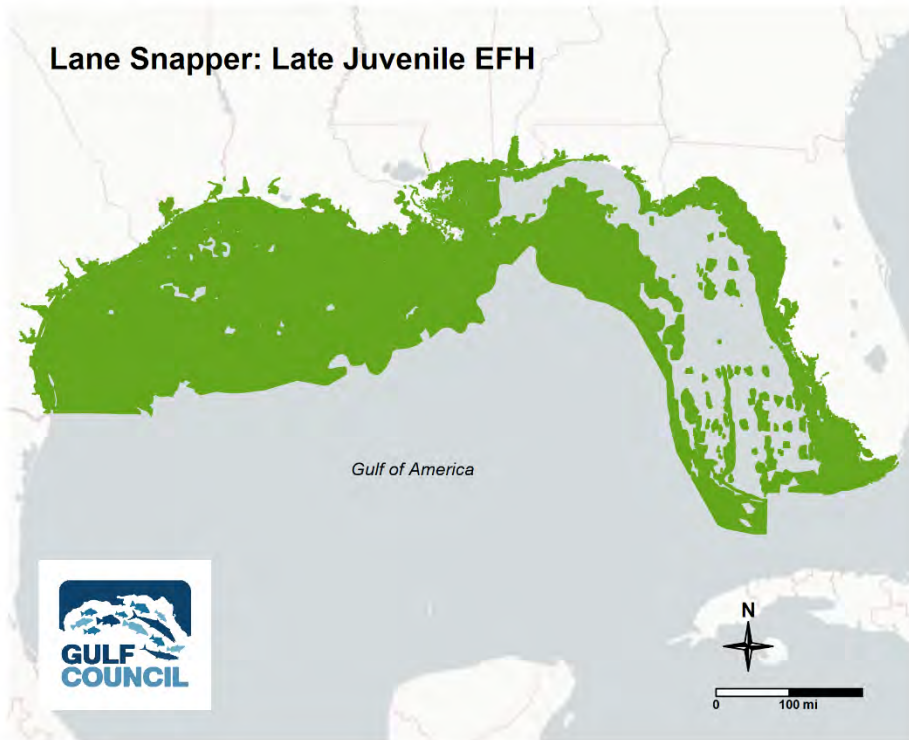


Figure C.1.84. Lane snapper late juvenile EFH map.

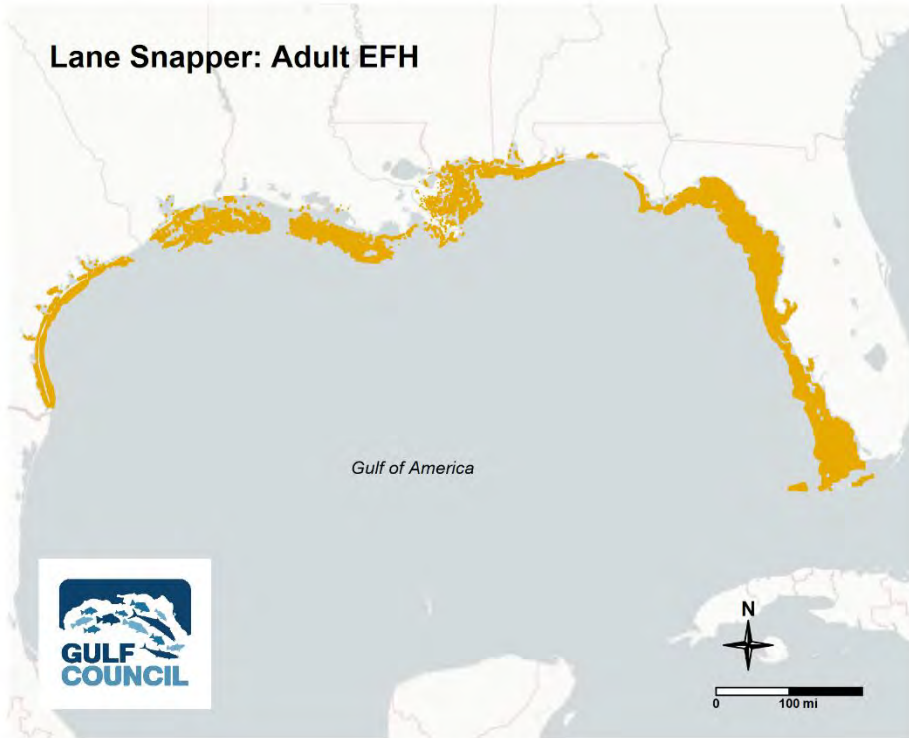


Figure C.1.85. Lane snapper adult EFH map.

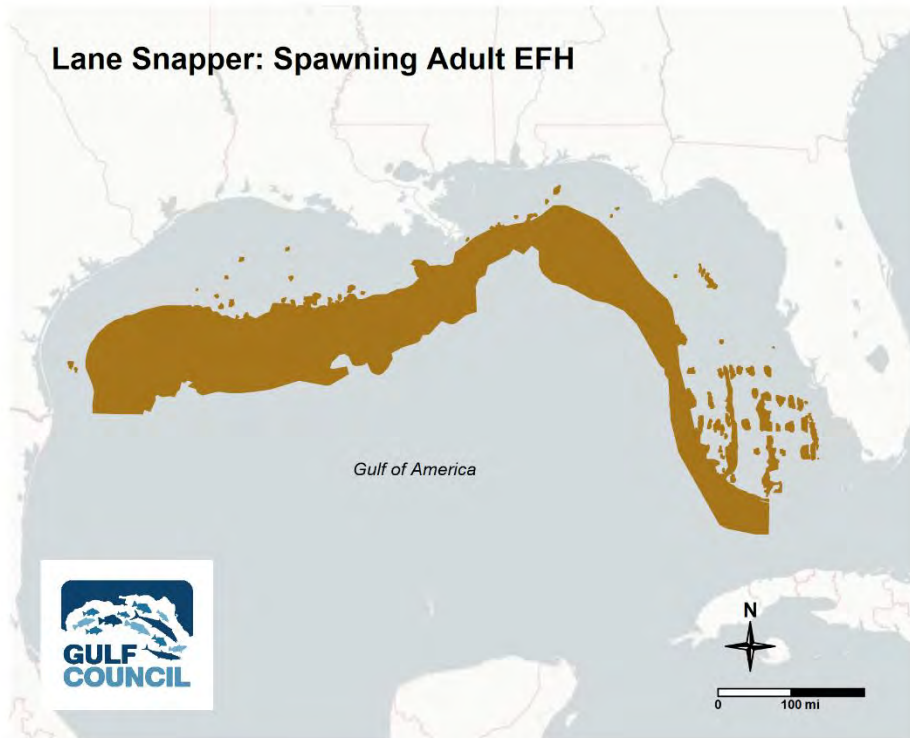


Figure C.1.86. Lane snapper spawning adult EFH map.

Lesser amberjack

Lesser amberjack are found Gulf-wide in all eco-regions, but primarily are found in offshore waters. Depending on life stage, they occupy drifting algae, hard bottom/reef habitats, in depths of 180- 1141 feet [55-348m].

Egg: Information is not available.

Larvae: Information is not available.

Post larvae: Information is not available.

*Early juvenile*²: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and are associate with drifting algae.

Late juvenile: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

Adult: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

² There is no associated habitat map for drifting algae. As such, there is no information to inform a habitat map.

Spawning adult: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

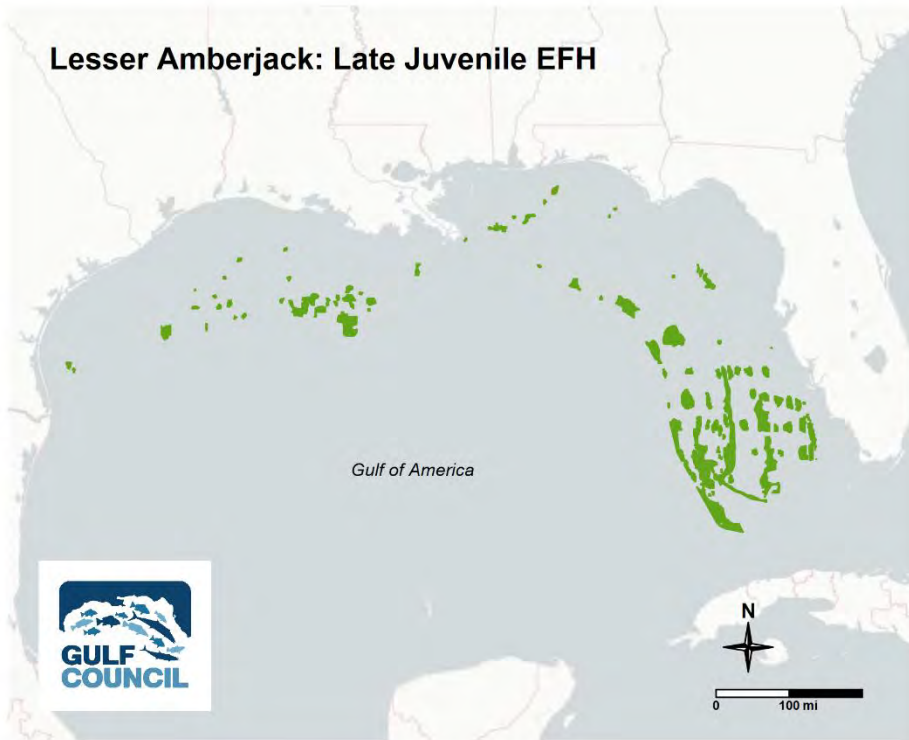


Figure C.1.87. Lesser amberjack late juvenile EFH map.

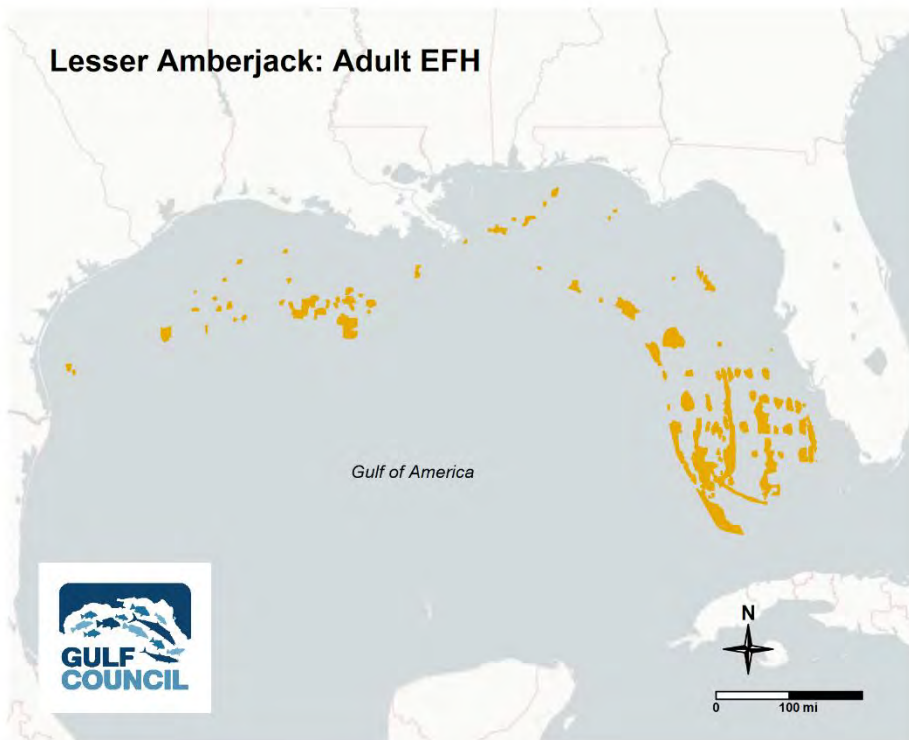


Figure C.1.88. Lesser amberjack adult EFH map.

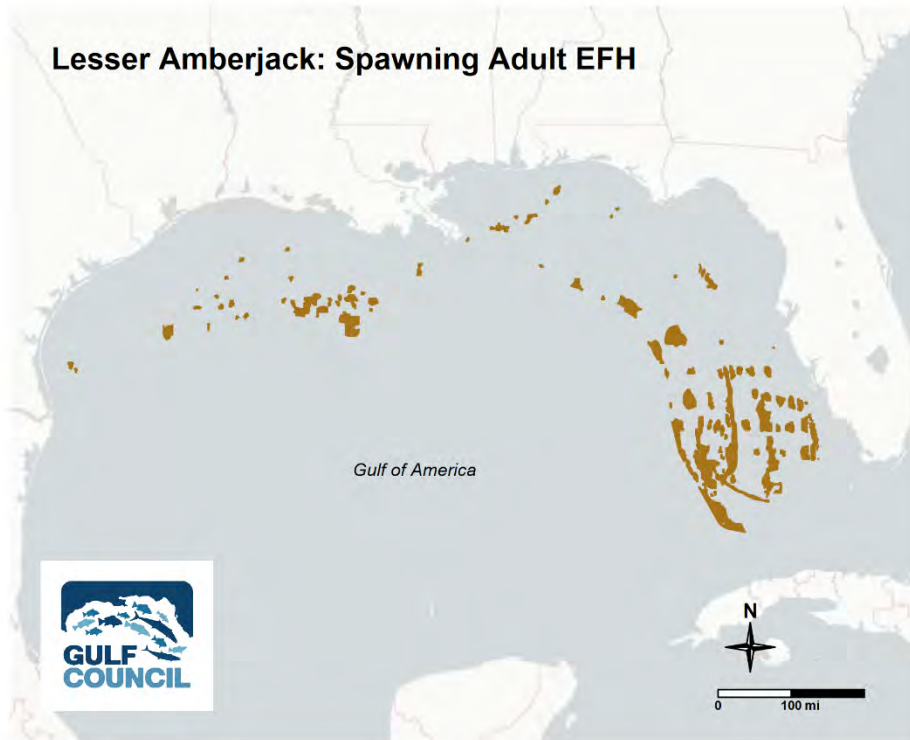


Figure C.1.89. Lesser amberjack spawning adult EFH map.

Mutton snapper

Mutton snapper occur in ER-1 and use primarily hard bottom/reef and submerged aquatic vegetation habitats depending on life stage, however spawning adults can be found on banks/shoals, hard bottom/reefs, and shelf edge/slope as well.

Egg: ER 1 and are associated with the water column.

Larvae: ER 1 and are associated with the water column.

Post larvae: ER 1 and are associated with the water column.

Early juvenile: ER 1 and are associated with the water column.

Late juvenile: ER 1 and are associated with the water column.

Adult: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth) habitats and are associated with submerged aquatic vegetation and hard bottom/reefs.

Spawning adult: ER 1 offshore (greater than 60 feet [18m] in depth) habitat, and are associated with banks/shoals, hard bottom/reefs, and shelf edge/ slope habitats.

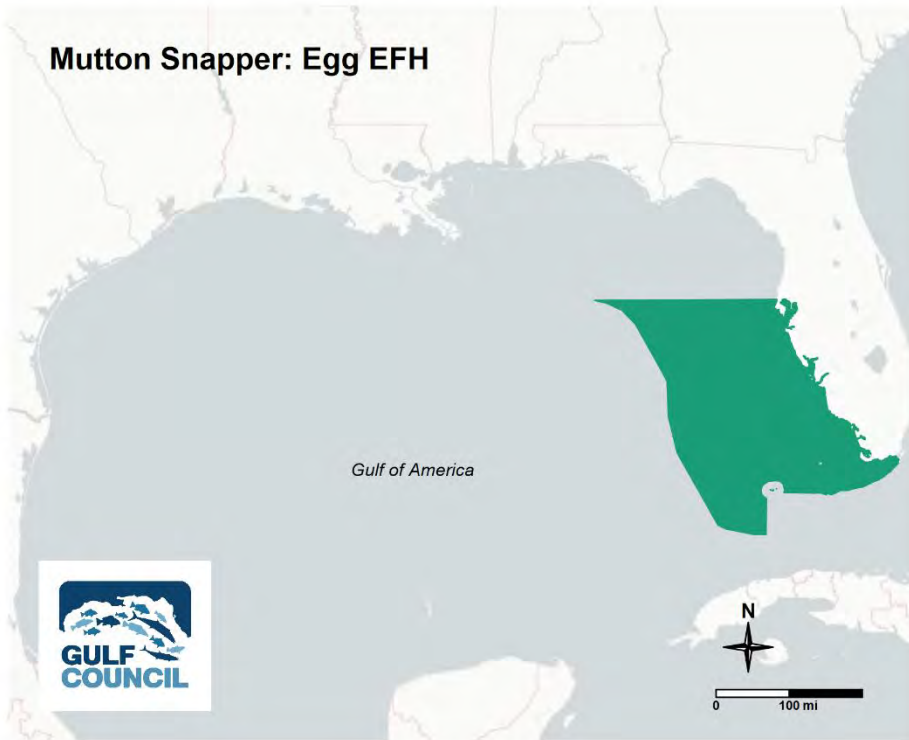


Figure C.1.90. Mutton snapper egg EFH map.

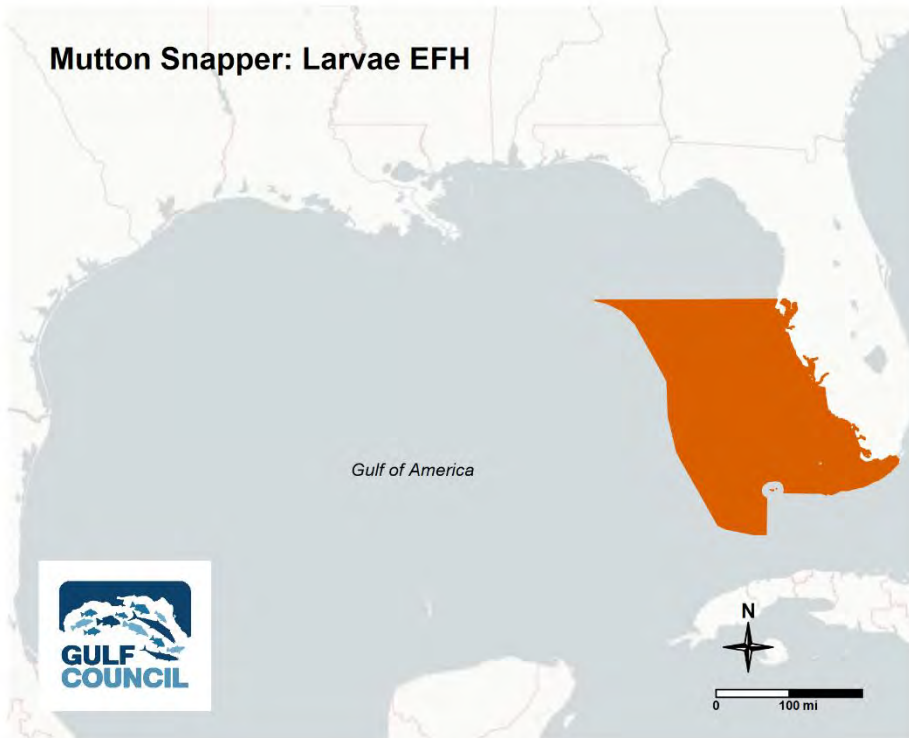


Figure C.1.91. Mutton snapper larvae EFH map.

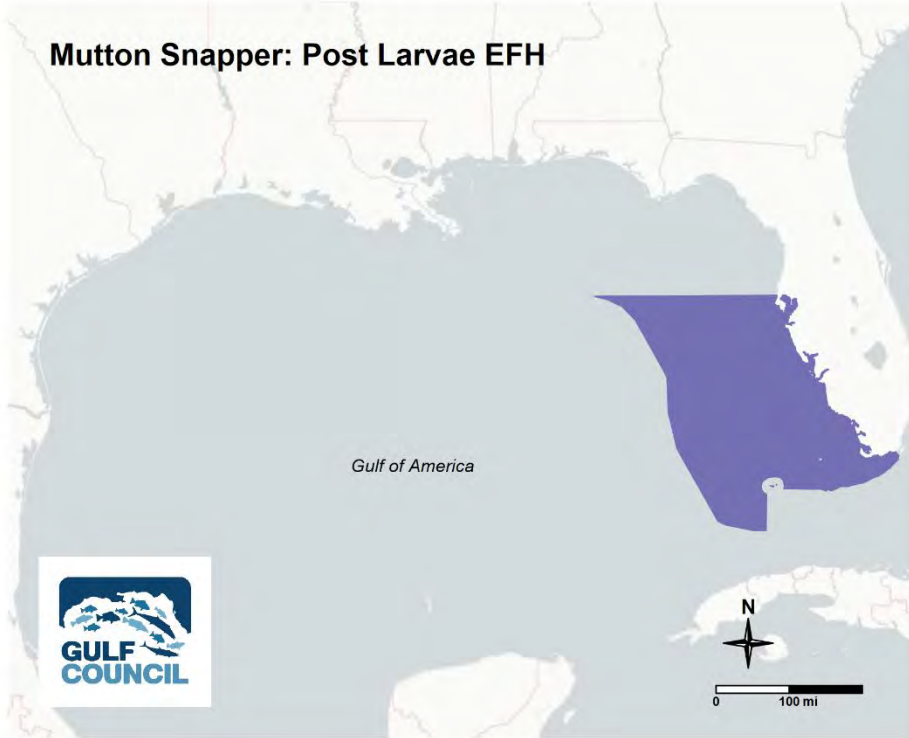


Figure C.1.92. Mutton snapper post larvae EFH map.

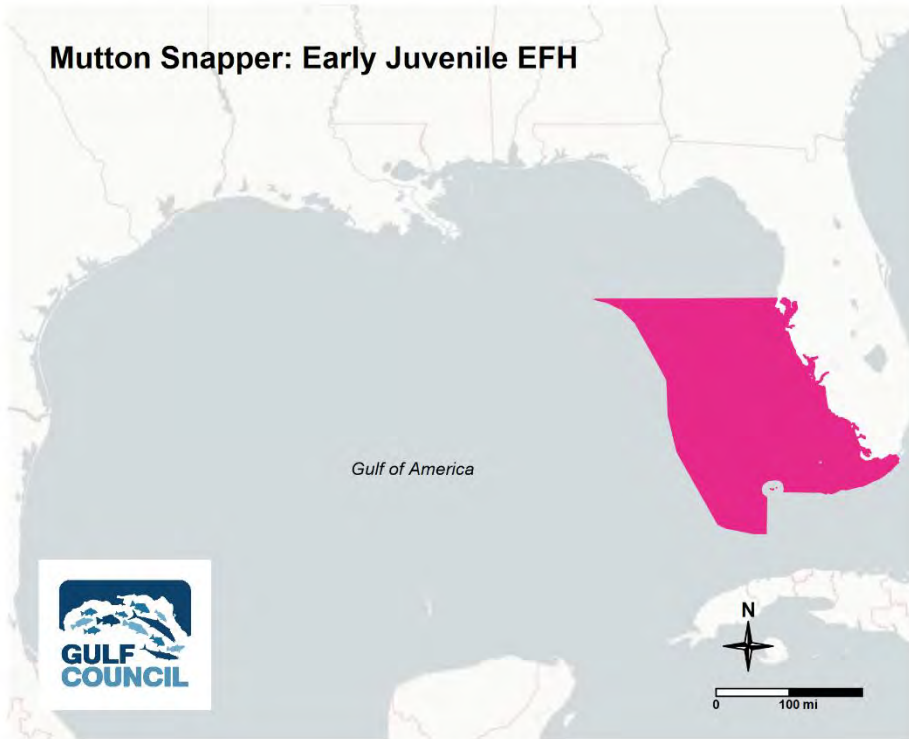


Figure C.1.93. Mutton snapper early juvenile EFH map.

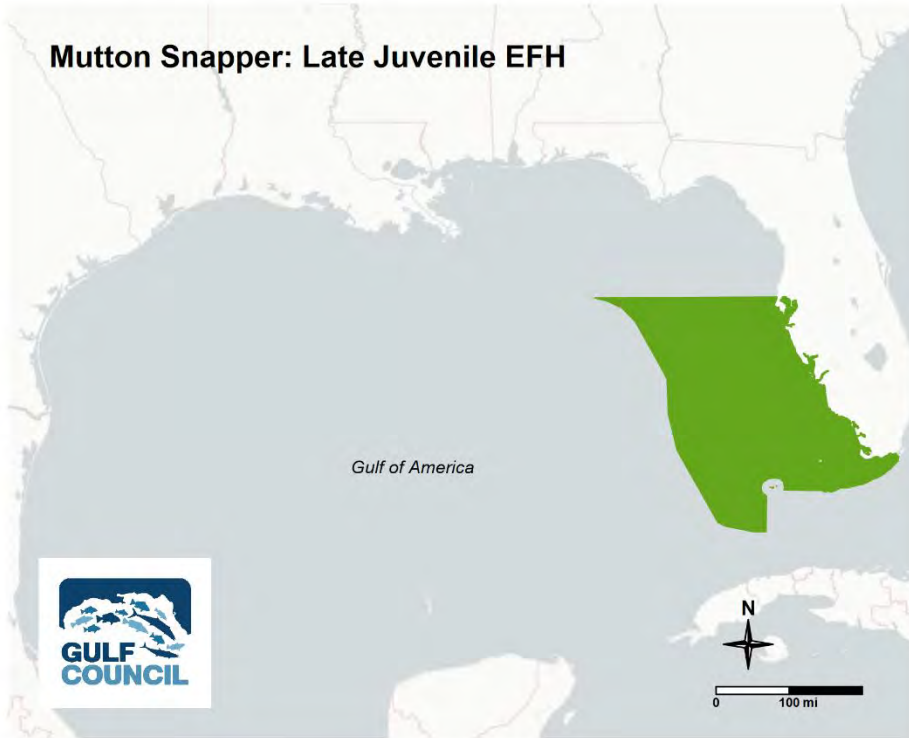


Figure C.1.94. Mutton snapper late juvenile EFH map.

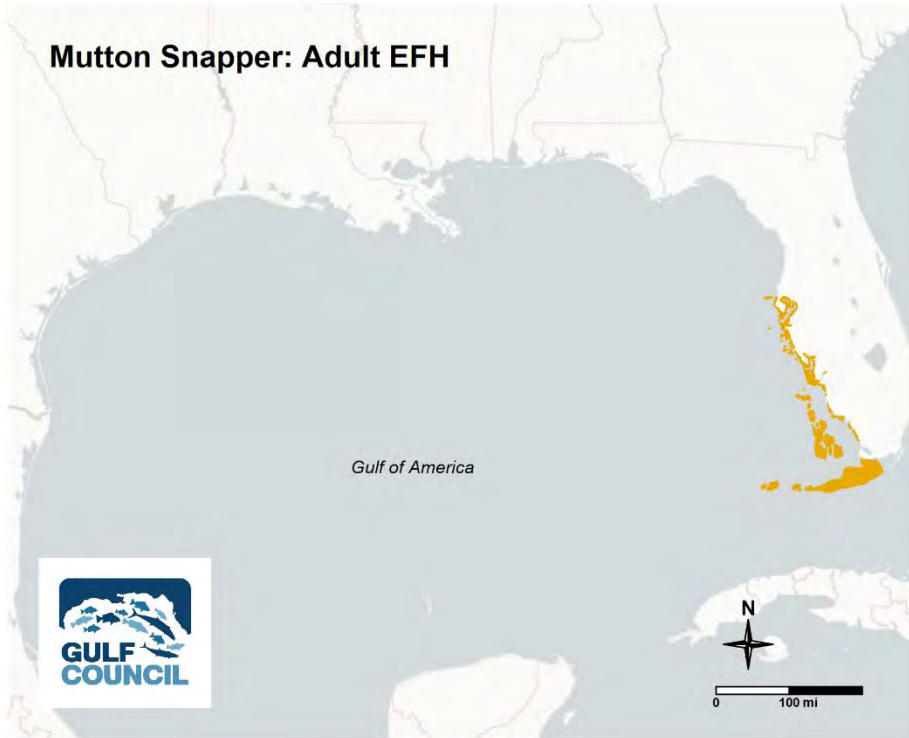


Figure C.1.95. Mutton snapper adult EFH map.

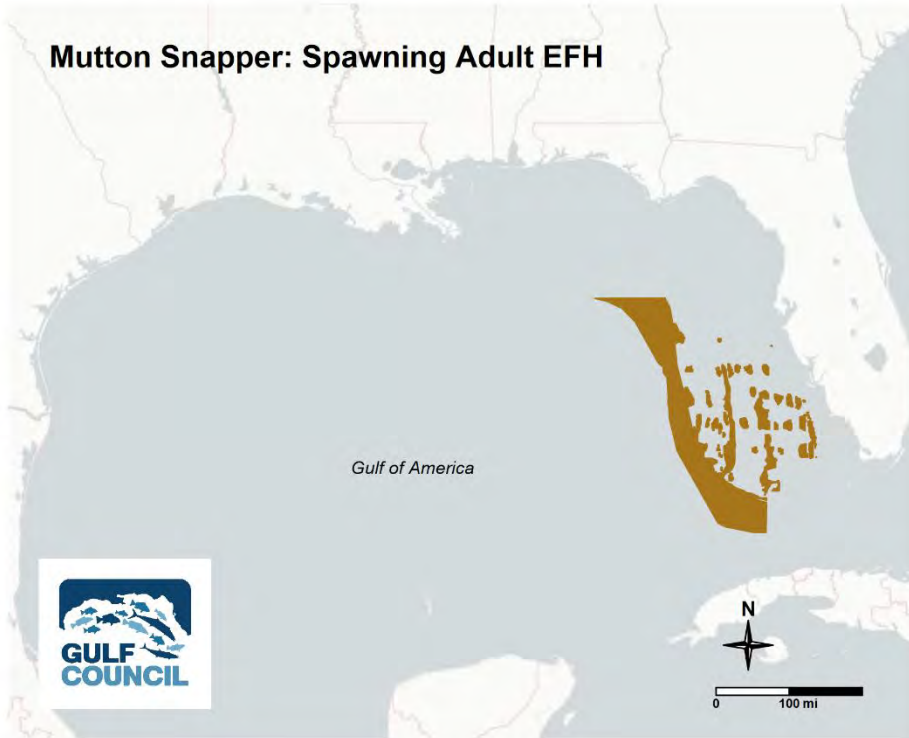


Figure C.1.96. Mutton snapper spawning adult EFH map.

Queen snapper

Queen snapper are found in the southeastern Gulf along the West Coast of Florida. Pre-settlement life stages are water column associated and are most prevalent from 0-328 feet [0-100 m], based on research in the Straits of Florida. Queen snapper settle to hard bottom/reefs, and data from the Caribbean suggests that adults also use shelf edge/slope habitat. Adult and spawning adult depth range is from 312-2231 feet [95-680m].

Egg: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Larvae: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Post larvae: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Early juvenile: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Late juvenile: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Adult: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with hard bottom/reefs and shelf/slope edge habitat.

Spawning adult: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

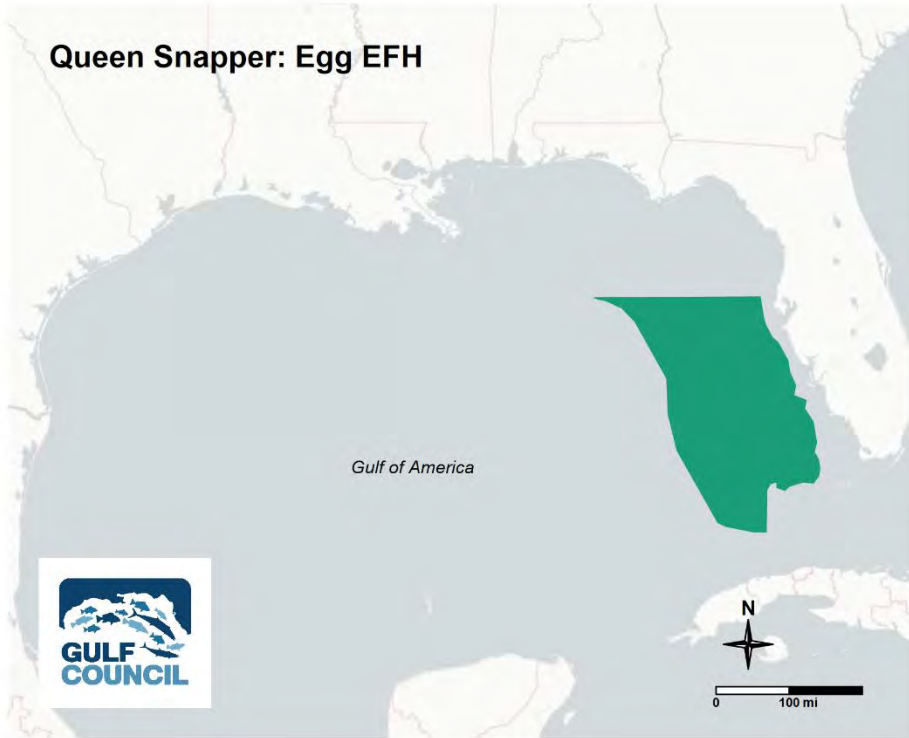


Figure C.1.97. Queen snapper egg EFH map.

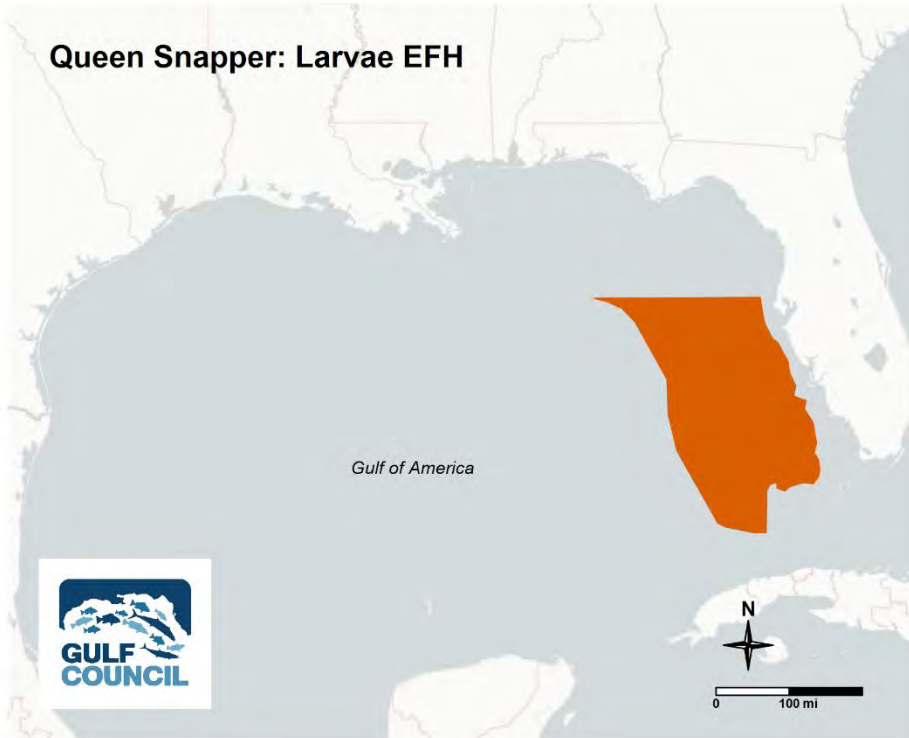


Figure C.1.98. Queen snapper larvae EFH map.

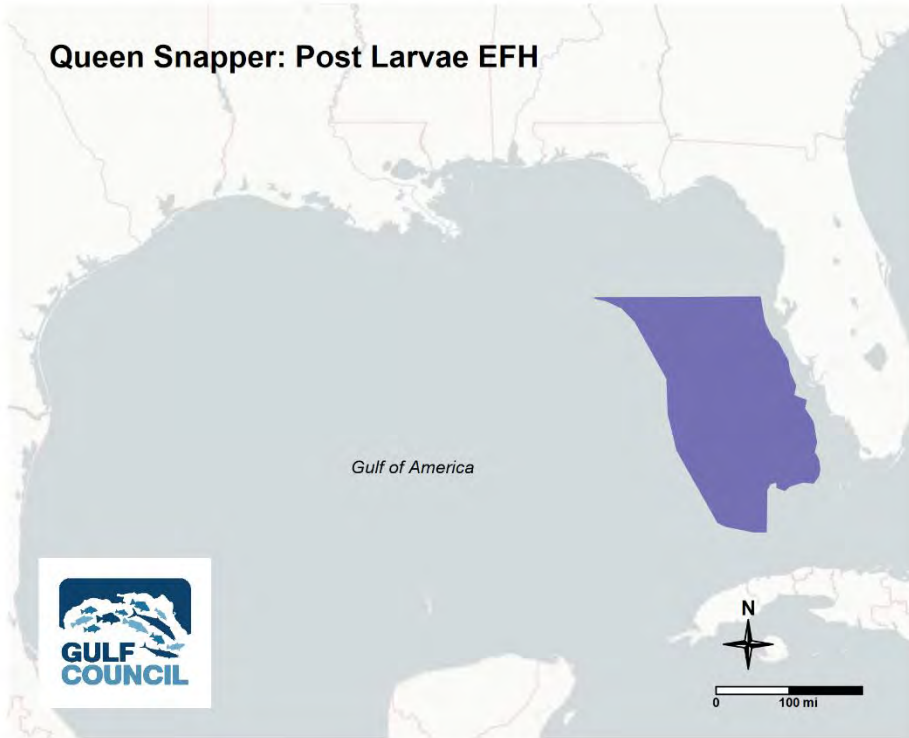


Figure C.1.99. Queen snapper post larvae EFH map.

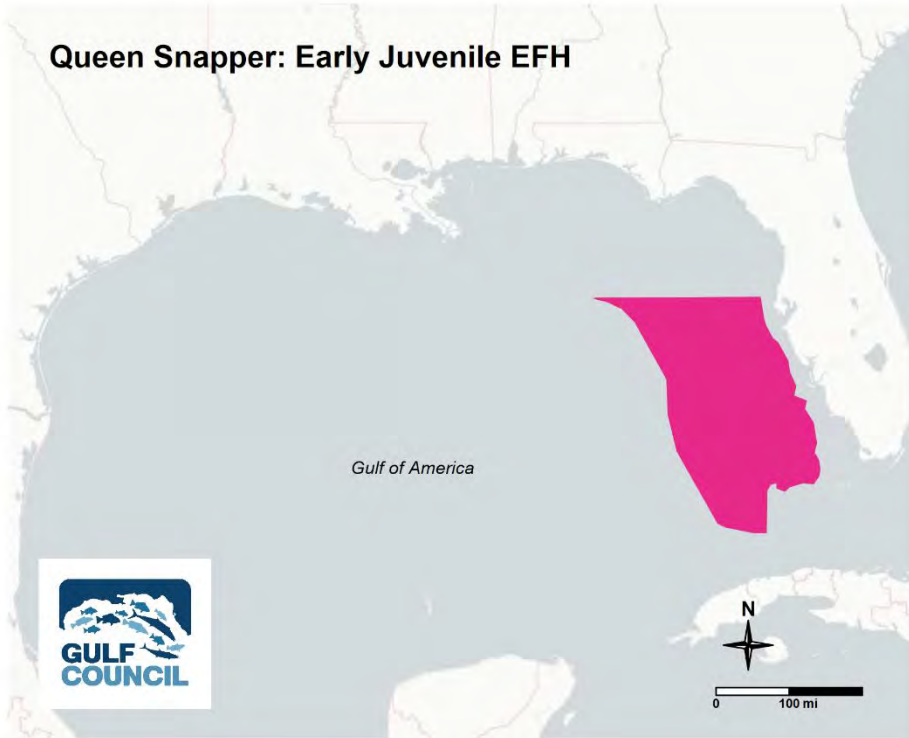


Figure C.1.100. Queen snapper early juvenile EFH map.

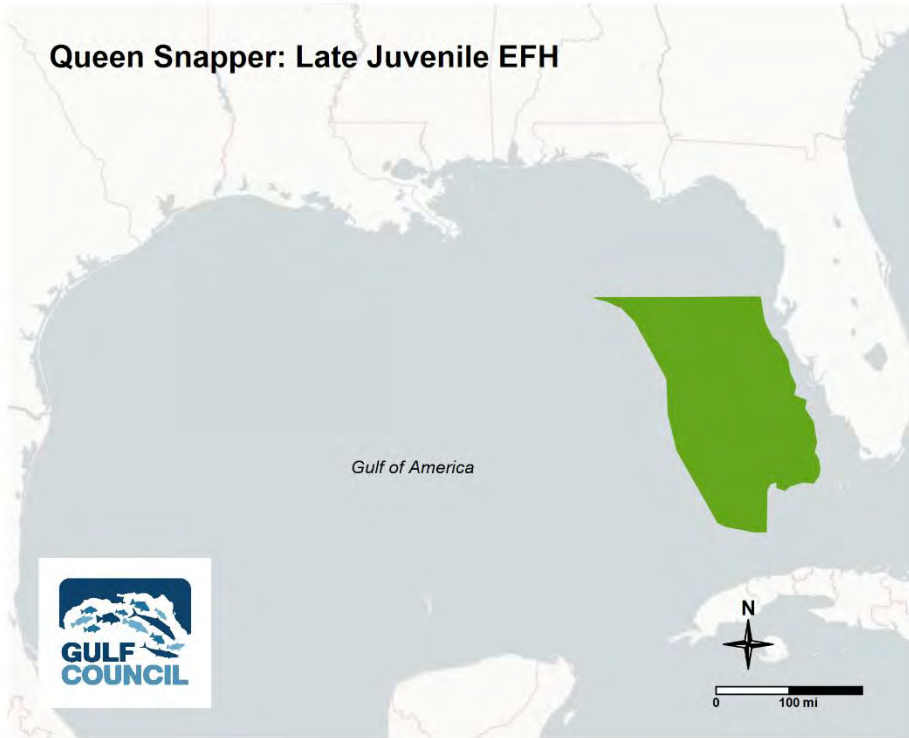


Figure C.1.101. Queen snapper late juvenile EFH map.

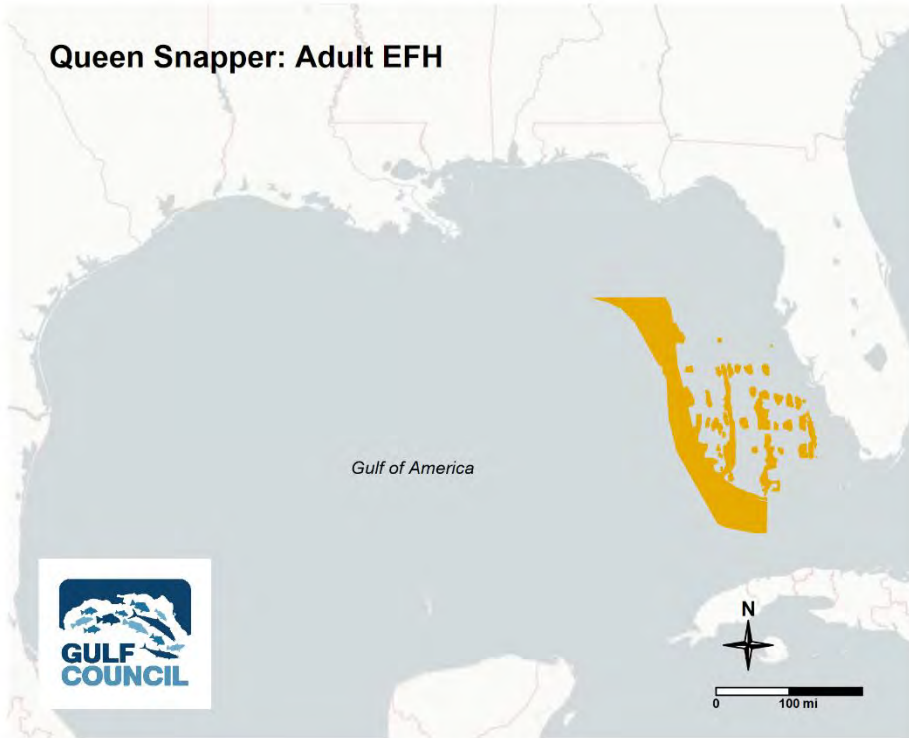


Figure C.1.102. Queen snapper adult EFH map.

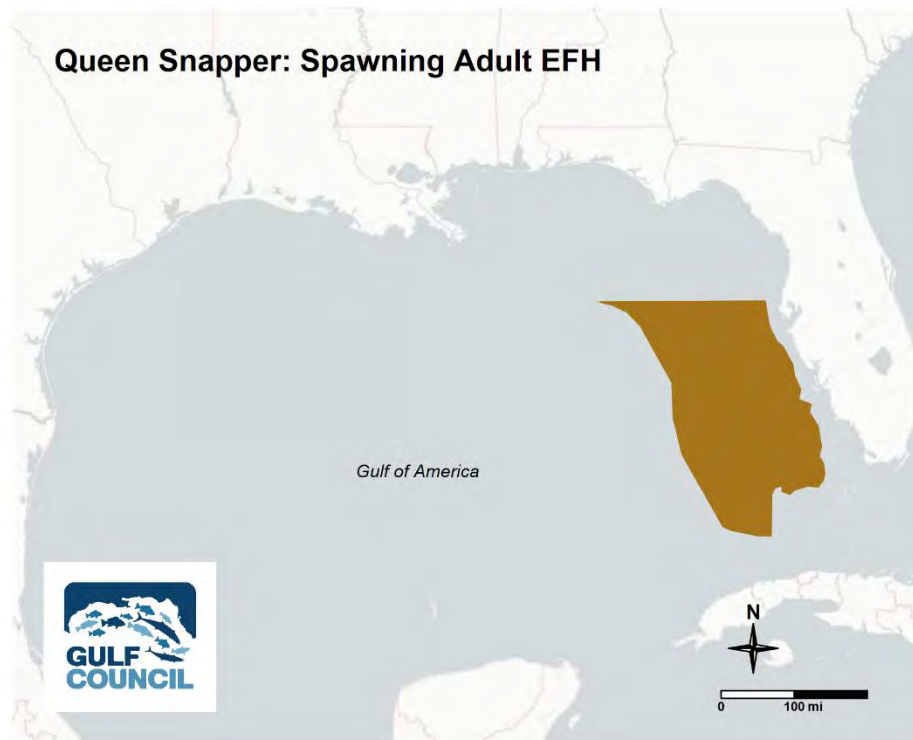


Figure C.1.103. Queen snapper spawning adult EFH map.

Red grouper

Red grouper in the Gulf are found in the eastern portion of the Gulf, in nearshore and offshore waters from 0-328 feet [0-100m], and at temperatures from 59-86°F [15-30°C]. Early life stages are water column associated, and juveniles settle on submerged aquatic vegetation and hard bottom/reefs habitats. Red grouper move offshore with growth, and onto hard bottom/reefs. Adults have been documented spawning over hard bottom/reefs and shelf edge/slope habitats.

Egg: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 66-328 feet [20-100m], and are associated with the water column.

Larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, and are associated with the water column.

Post larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, and are associated with the water column.

Early juvenile: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) habitat and are associated with submerged aquatic vegetation and hard bottom/reefs.

Late juvenile: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, and are associated with hard bottom/reefs.

Adult: ER 1, ER 2, ER 3, and ER 4 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

Spawning adult: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with shelf /slope edge and hard bottom/reefs.

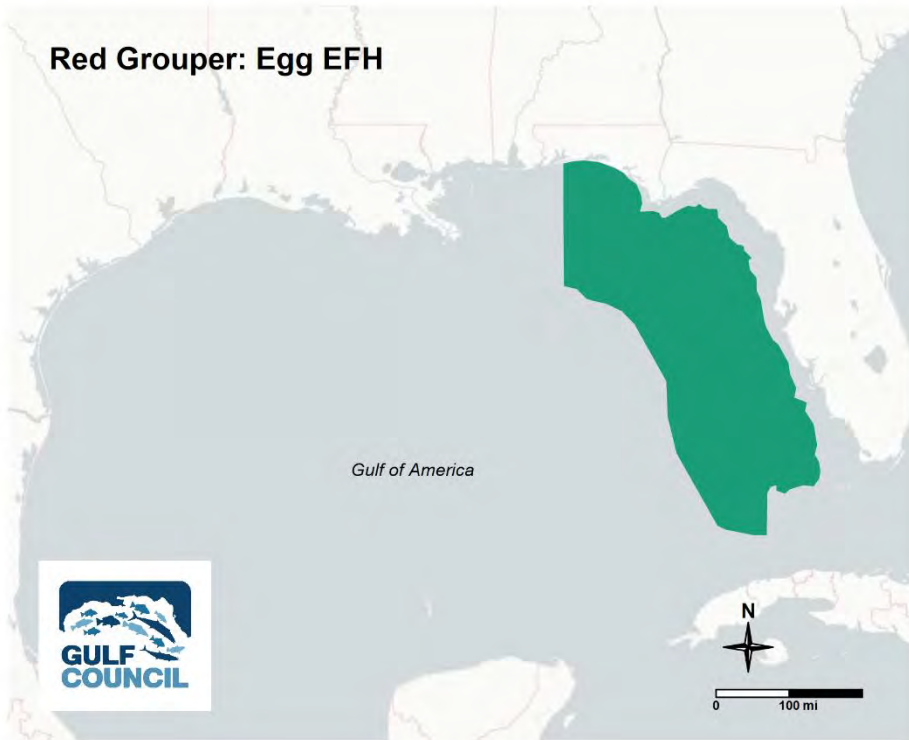


Figure C.1.104. Red grouper egg EFH map.

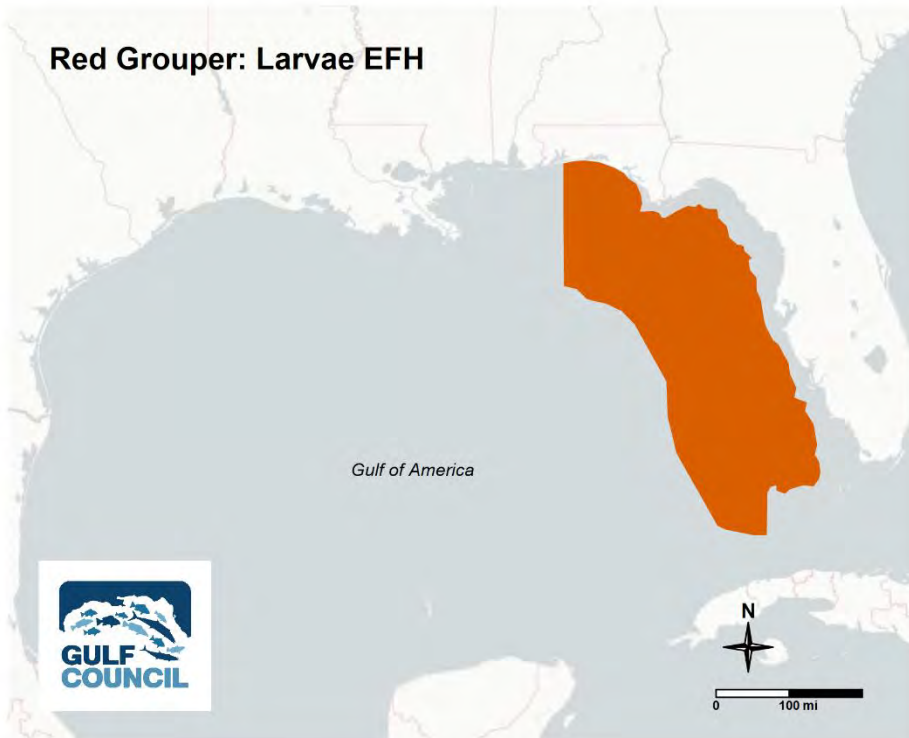


Figure C.1.105. Red grouper larvae EFH map.

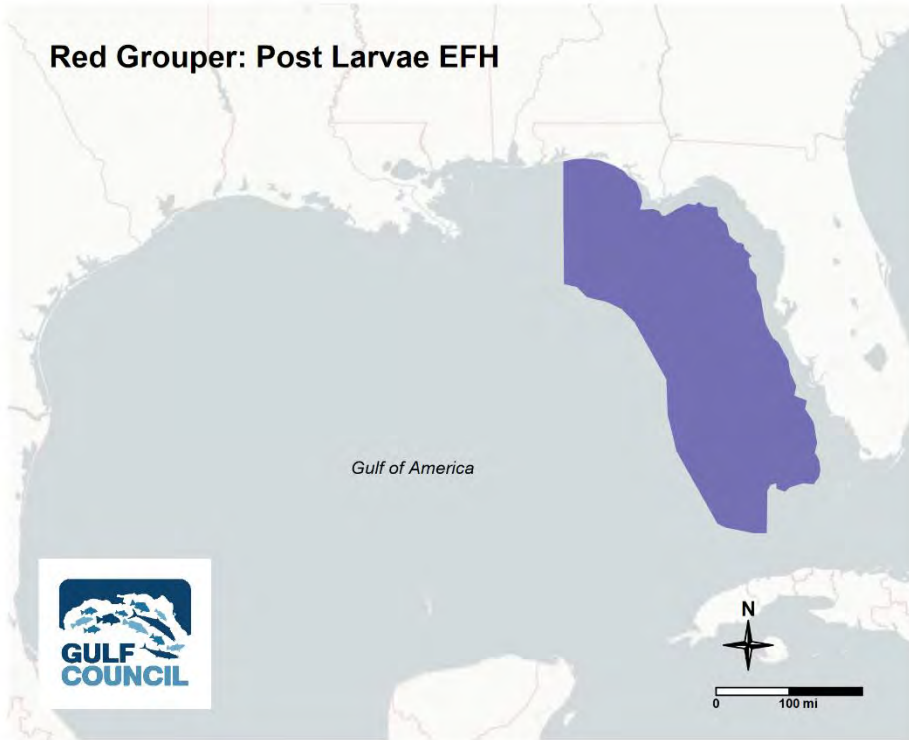


Figure C.1.106 Red grouper post larvae EFH map.

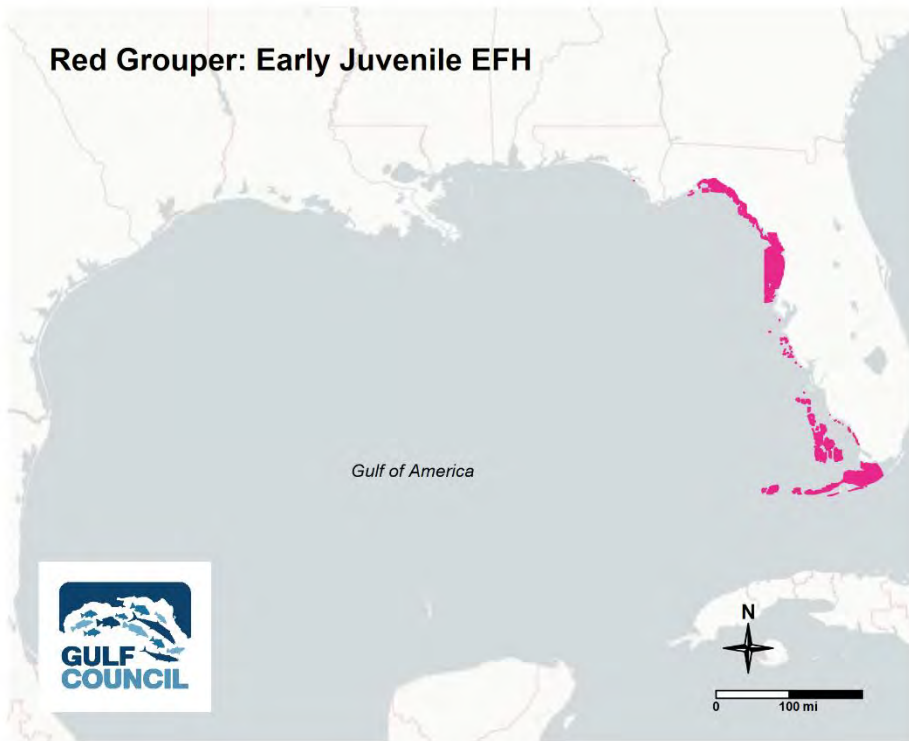


Figure C.1.107. Red grouper early juvenile EFH map.

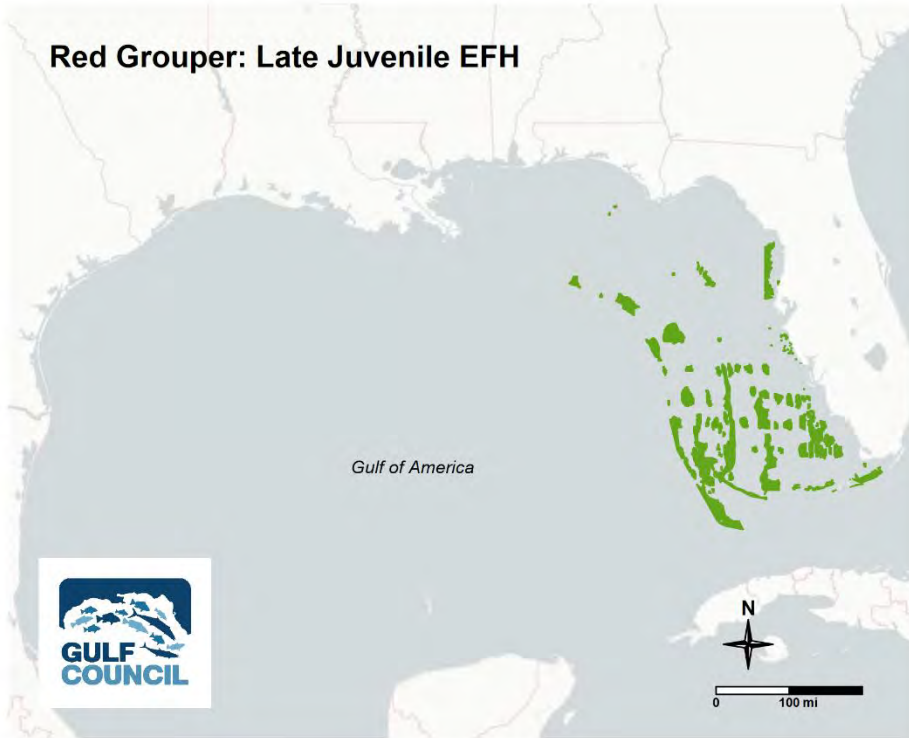


Figure C.1.108. Red grouper late juvenile EFH map.

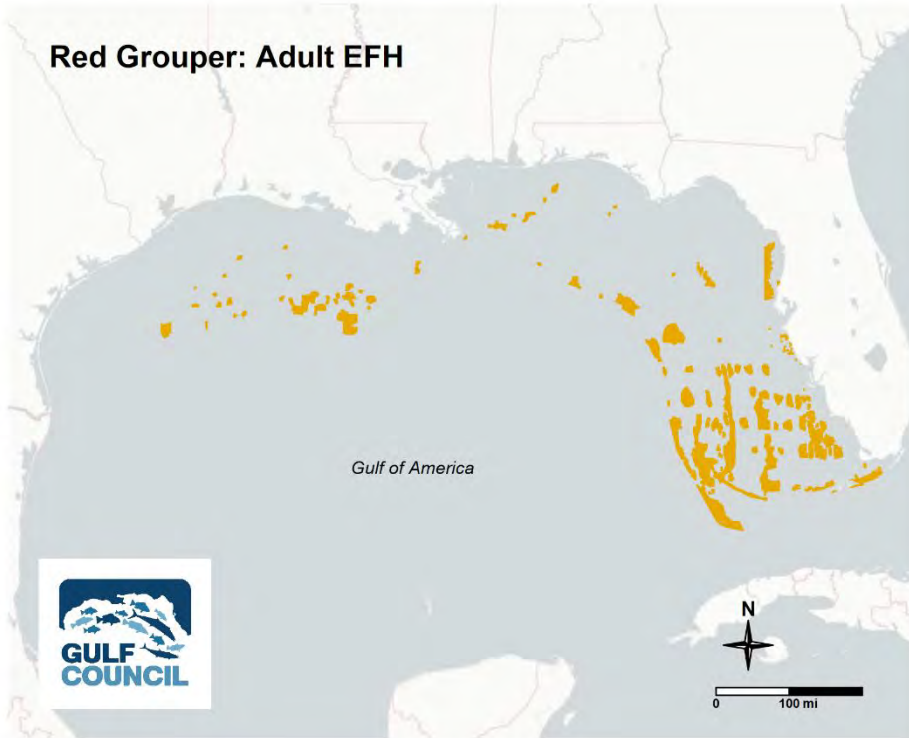


Figure C.1.109. Red grouper adult EFH map.

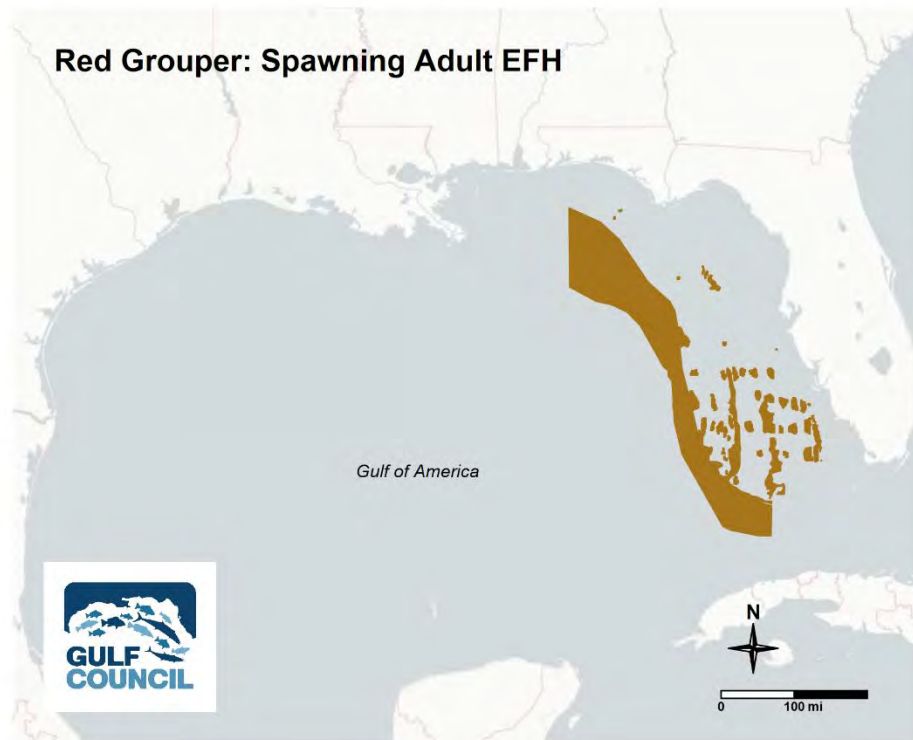


Figure C.1.110. Red grouper spawning adult EFH map.

Red snapper

Red snapper occur Gulf-wide along the shelf. They are historically abundant on the Campeche Banks and are a predominate species in the northern Gulf. The species is demersal and is found over sandy and hard bottom/reefs, and artificial habitats from shallow water to 656 feet [200m], and possibly even beyond. Spawning occurs in offshore waters from May to October at depths of 59-121 feet [18-37m] over fine sand bottom. Eggs are found offshore in summer and fall. Larvae, post larvae and early juveniles are found July through December in shelf waters ranging in depth of 56-600 feet [17-183m]. Early and late juveniles are most often associated with shell and low relief structures but can be observed over barren sand and mud bottom. Late juveniles are found year-round at depths of 66-151 feet [20-46m]. Adults are concentrated off Yucatan, Texas, and Louisiana at depths of 23-479 feet [7-146] m and are most abundant at depths of 131-36 feet [40-110m]. They are commonly relying on habitat such as: submarine gullies and depressions, and over reefs, rock outcroppings, and shell/gravel bottoms.

Egg: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 59-413 feet [18-126m], and are associated with the water column.

Larvae: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 59-413 feet [18-126m], and are associated with the water column.

Post larvae: Gulf- wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 59-413 feet [18-126m], and are associated with the water column.

Early juvenile: Gulf- wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths between 59-413 feet [18-126m]. Associated habitat types are: hard bottom/reefs, banks/shoals, soft bottom, sand/shell substrate, shelf edge/slope.

Late juvenile: Gulf- wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths between 59-413 feet [18-126m]. Associated habitat types are: hard bottom/reefs, banks/shoals, soft bottom, sand/shell substrate, shelf edge/slope.

Adult: Gulf- wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths between 59-413 feet [18-126m]. Associated habitat types are: hard bottom/reefs, banks/shoals, and shelf edge/slope.

Spawning adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths between 59-413 feet [18-126m], and are associated with sandy/shell substrate and banks/shoals.

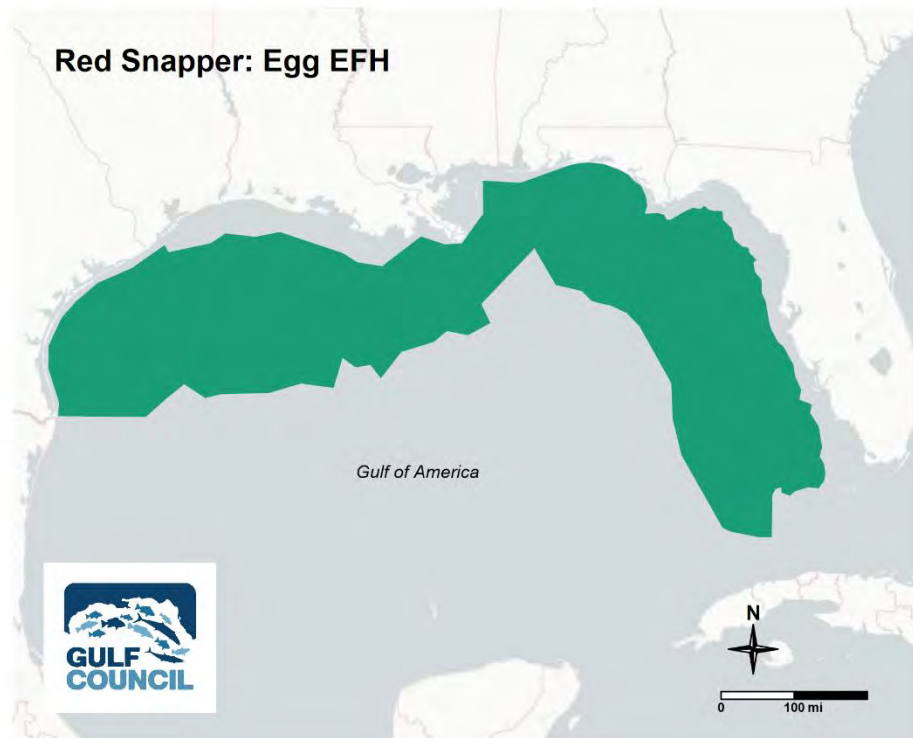


Figure C.1.111. Red snapper egg EFH map.

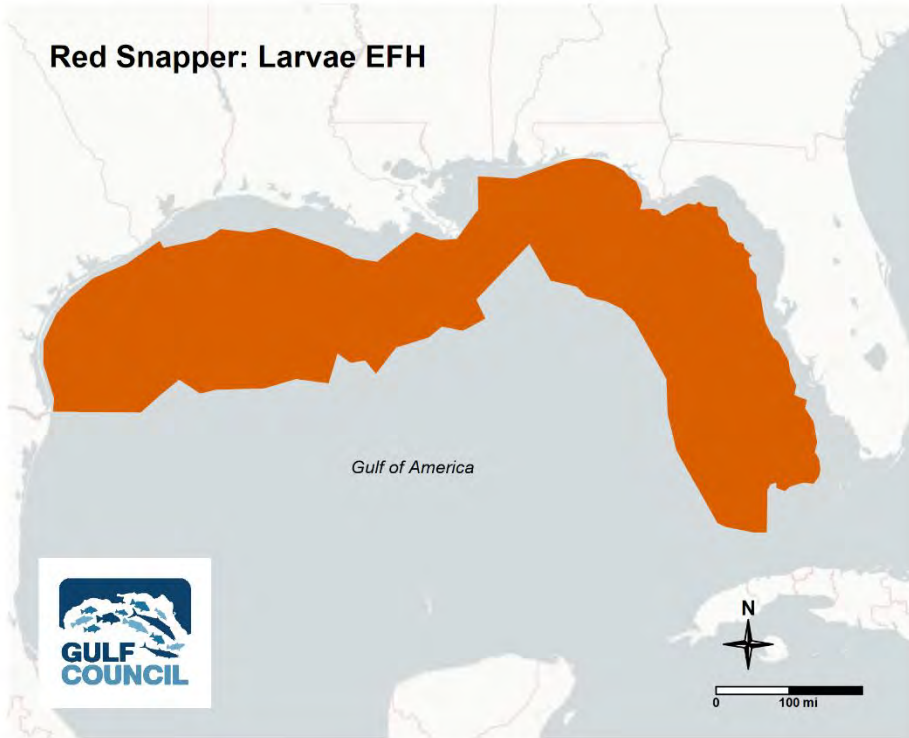


Figure C.1.112. Red snapper larvae EFH map.

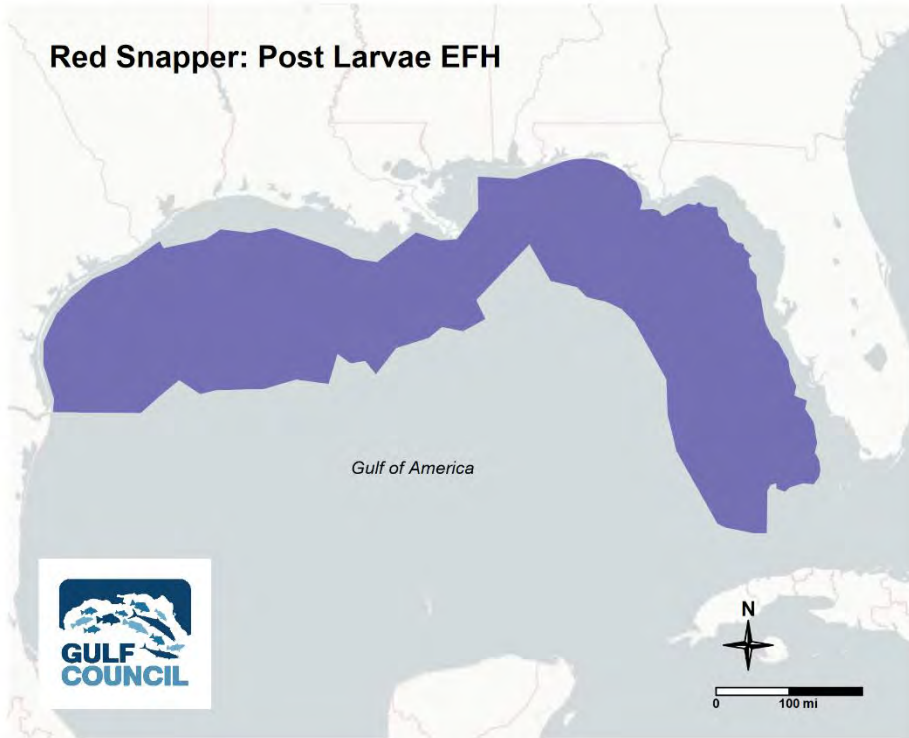


Figure C.1.113. Red snapper post larvae EFH map.

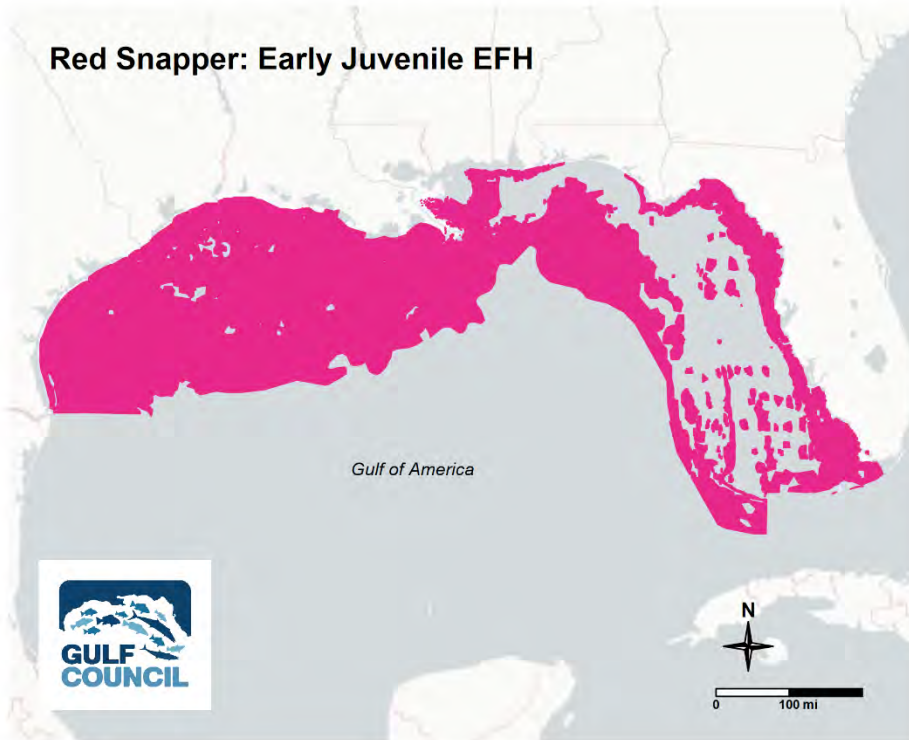


Figure C.1.114. Red snapper early juvenile EFH map.

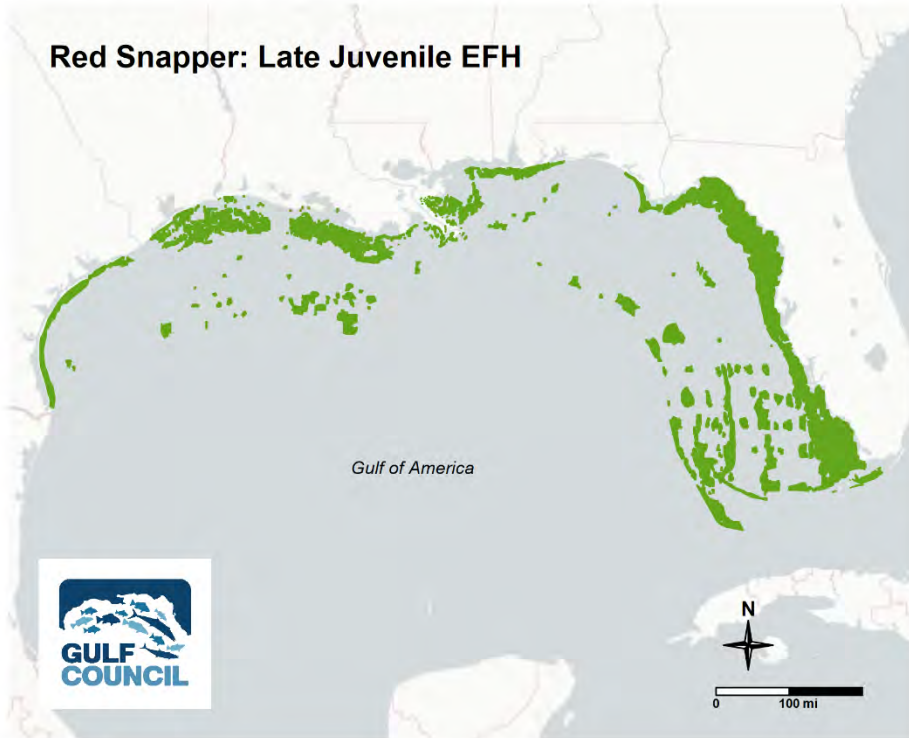


Figure C.1.115. Red snapper late juvenile EFH map.

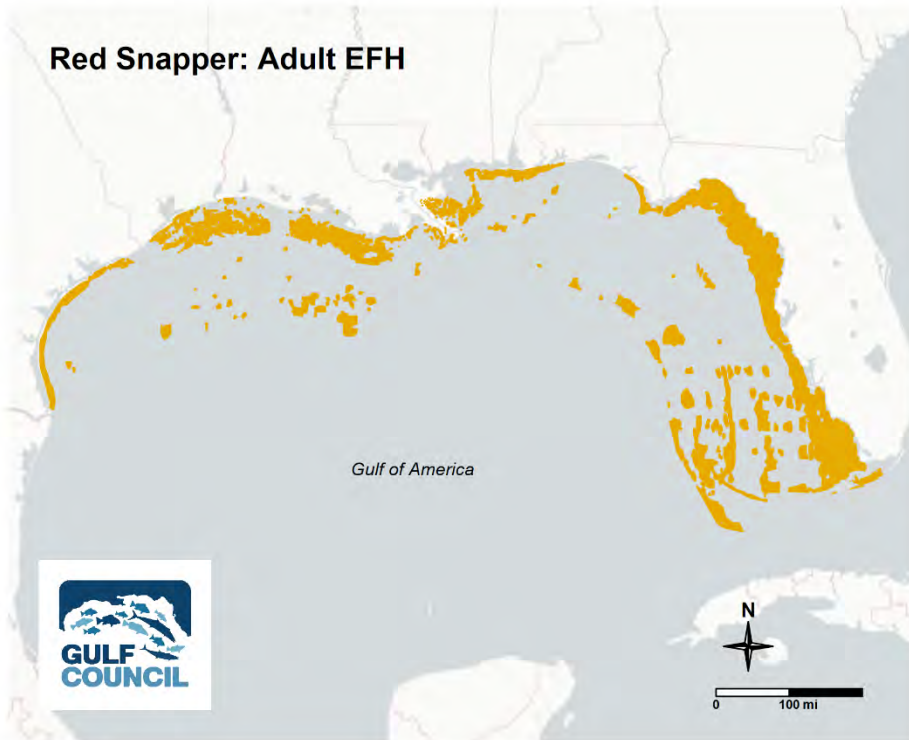


Figure C.1.116. Red snapper adult EFH map.

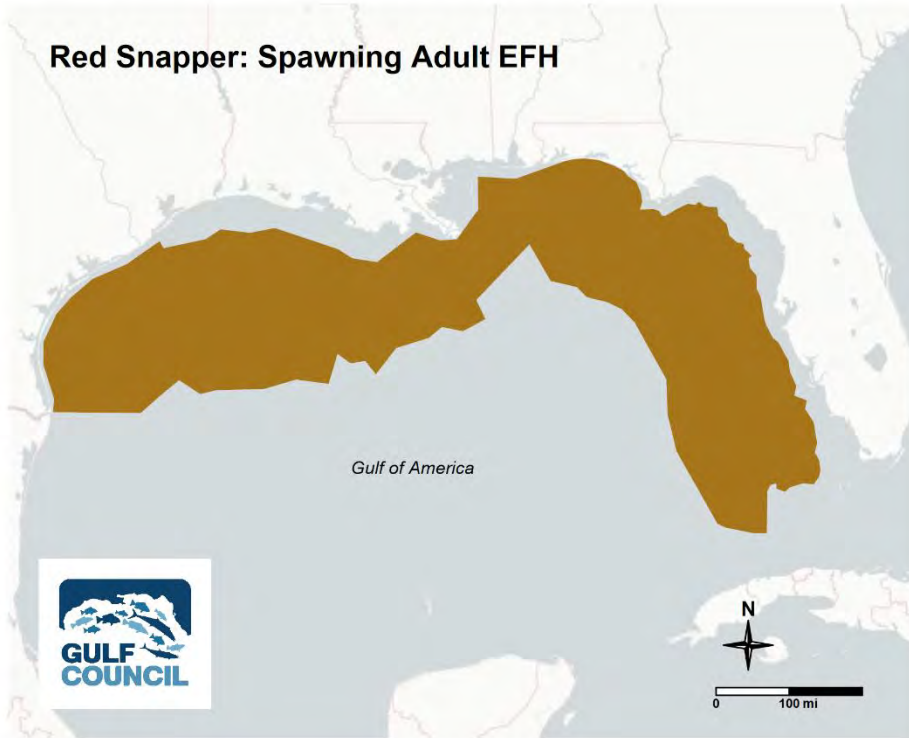


Figure C.1.117. Red snapper spawning adult EFH map.

Scamp

Scamp widely distributed Gulf-wide ER 1-5³, predominately off the west coast of Florida, and are found in both nearshore and offshore waters from depths of 39-620 feet [12-189m]. Adults use hard bottom/reef habitats and spawn on the shelf edge/slope whereas early life stages are found in the water column.

Egg: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 197-620 feet [60-189m], and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 197-620 feet [60-189m], and are associated with the water column.

Post larvae: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths between 197-620 feet [60-189m], and are associated with the water column.

Early juvenile: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

Late juvenile: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

Adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths between 39-620 feet [12-189m], and are associated with hard bottom/reefs.

Spawning adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths 197-620 feet [12-189m], and are associated with the shelf /slope edge, and hard bottom/reefs.

³ Gulf-wide distribution per [October 2025 SSC recommendation](#).

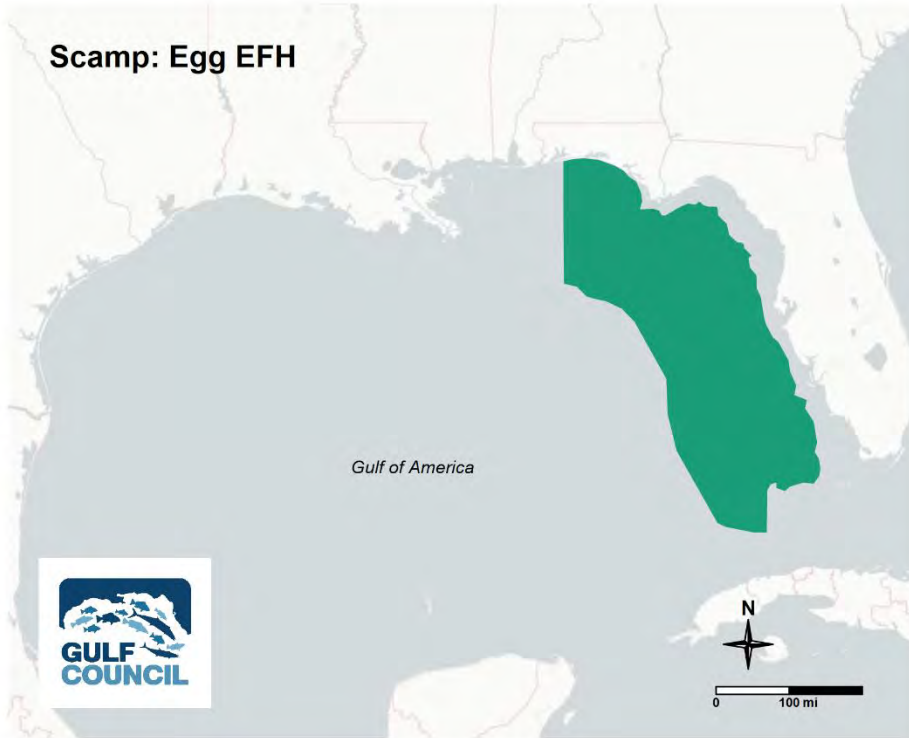


Figure C.1.118. Scamp egg EFH map.

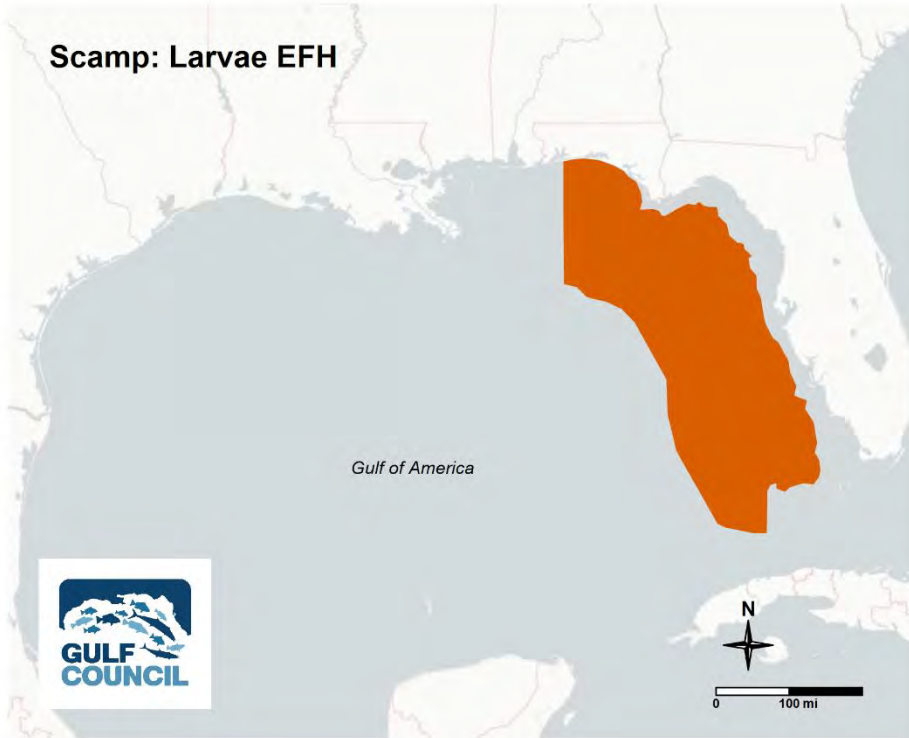


Figure C.1.119. Scamp larvae EFH map.

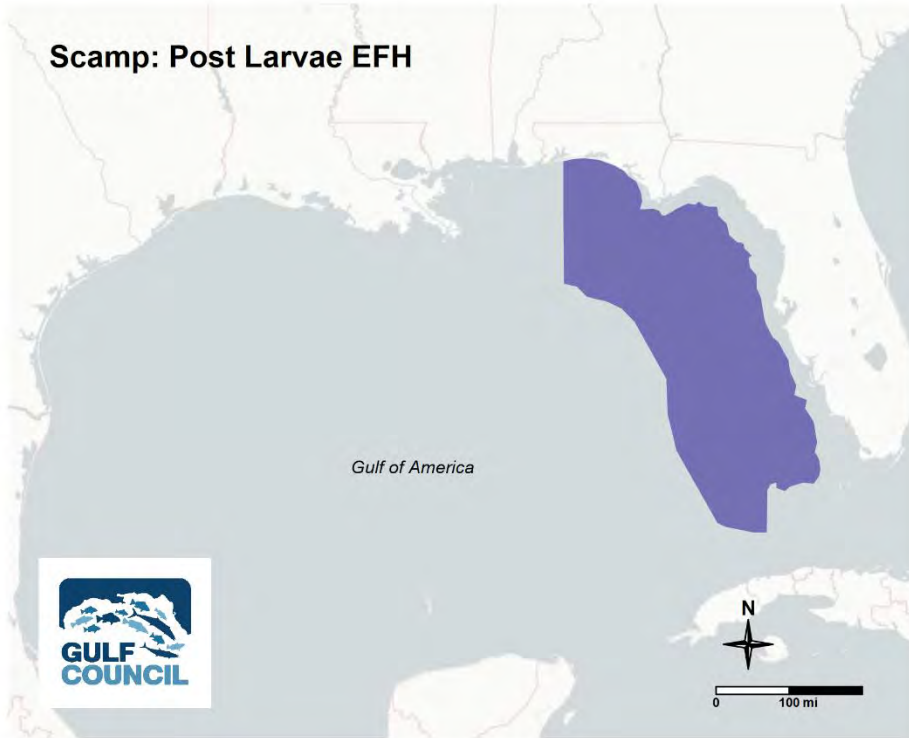


Figure C.1.120. Scamp post larvae EFH map.

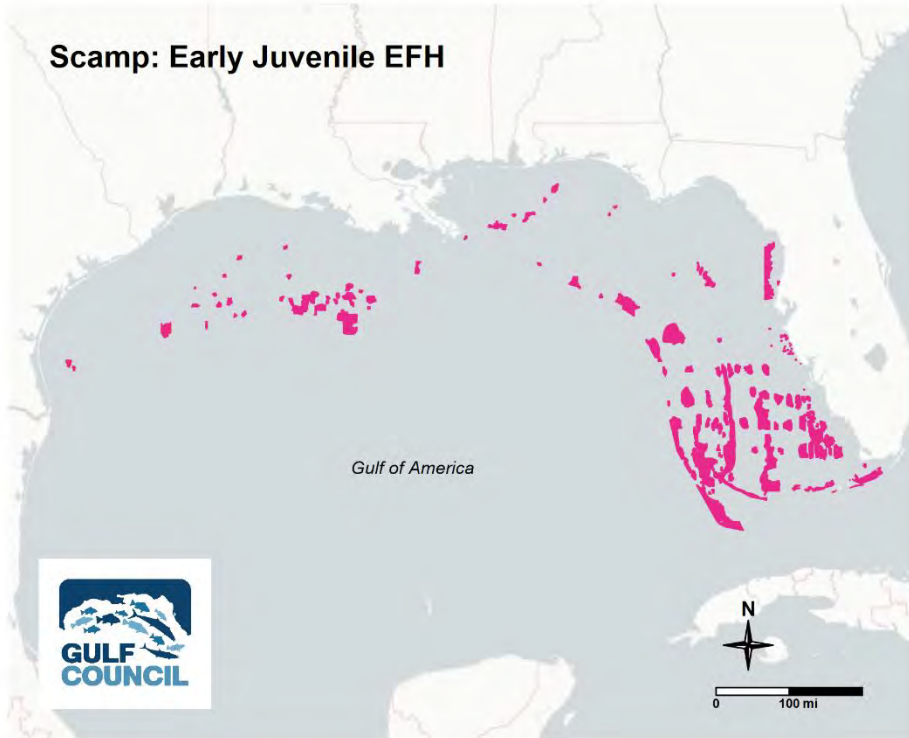


Figure C.1.121. Scamp early juvenile EFH map.

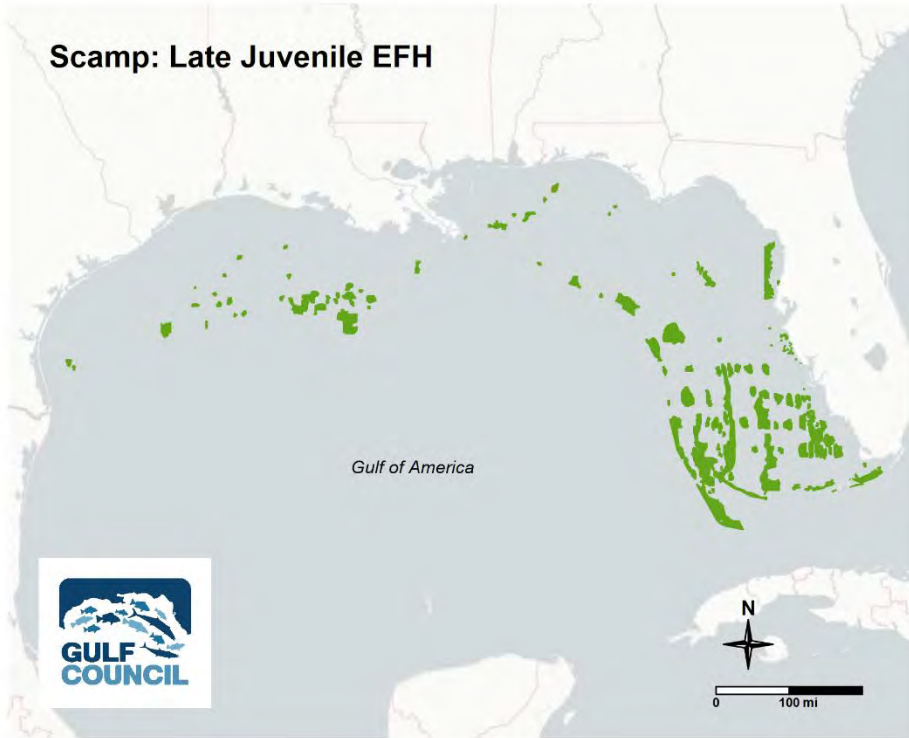


Figure C.1.122. Scamp late juvenile EFH map.

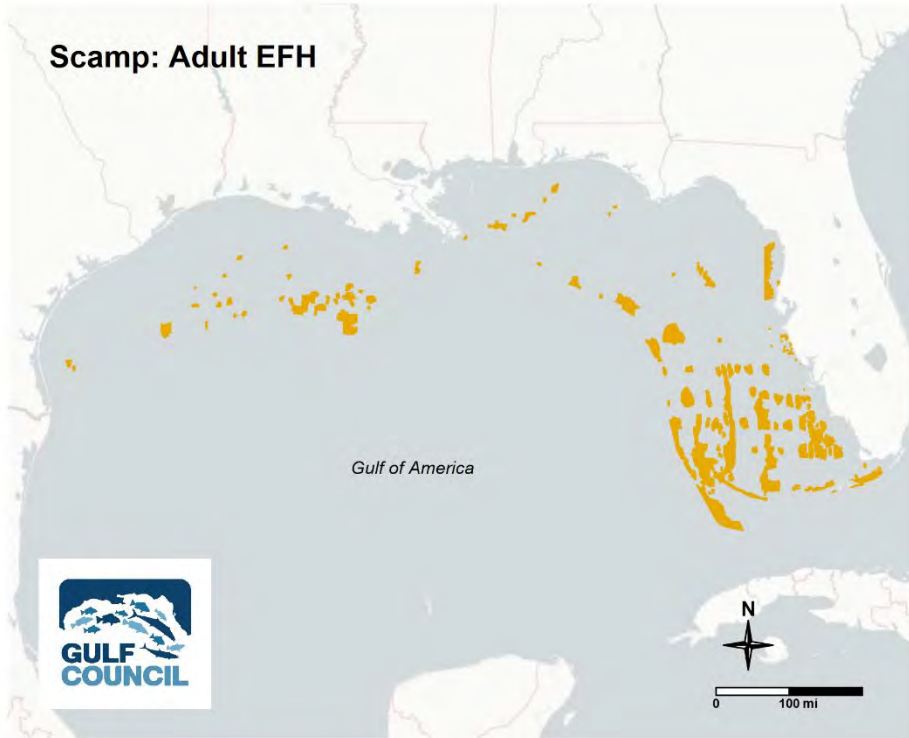


Figure C.1.123. Scamp adult EFH map.

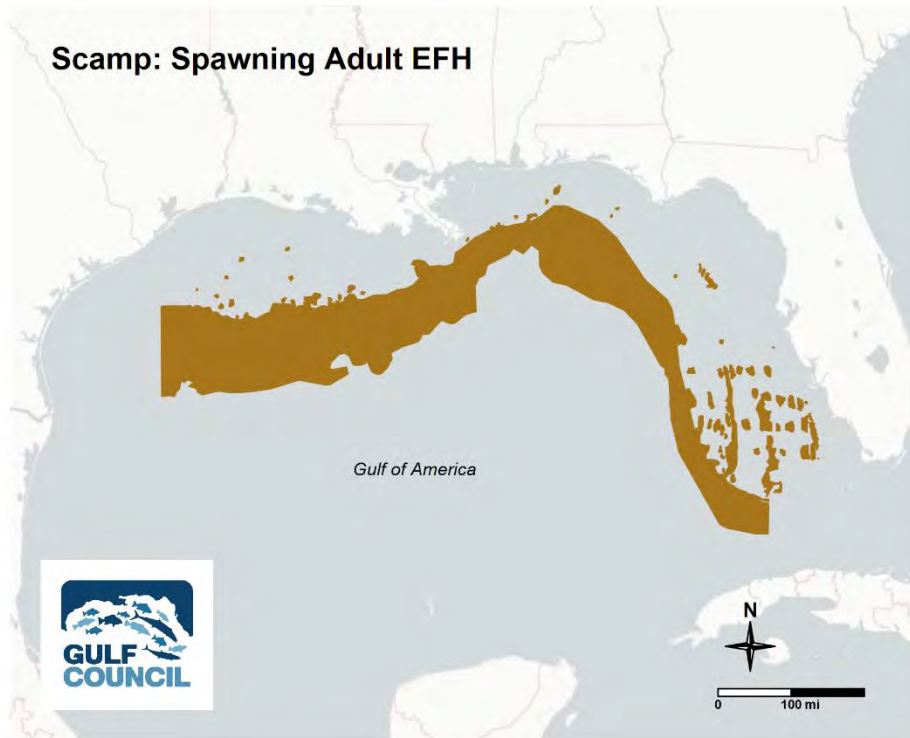


Figure C.1.124. Scamp spawning adult EFH map.

Silk snapper

Silk Snapper are distributed along the Southeastern portion of the Gulf, along the west coast of Florida. Silk snapper is a deeper water species that occupies offshore waters and are found near the edge of continental and island shelves, usually ascending to shallower waters at night. It is common between 295-459 feet [90-140m] but can be found in waters up to 656 feet [200m]. Very little habitat information is known about life stages other than adults.

Egg: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Larvae: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Post larvae: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Early juvenile: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Late juvenile: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Adult: ER 1 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths 295-656 feet [90-200m] and are associated with the shelf edge/slope, soft bottom, and hard bottom/reefs.

Spawning adult: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

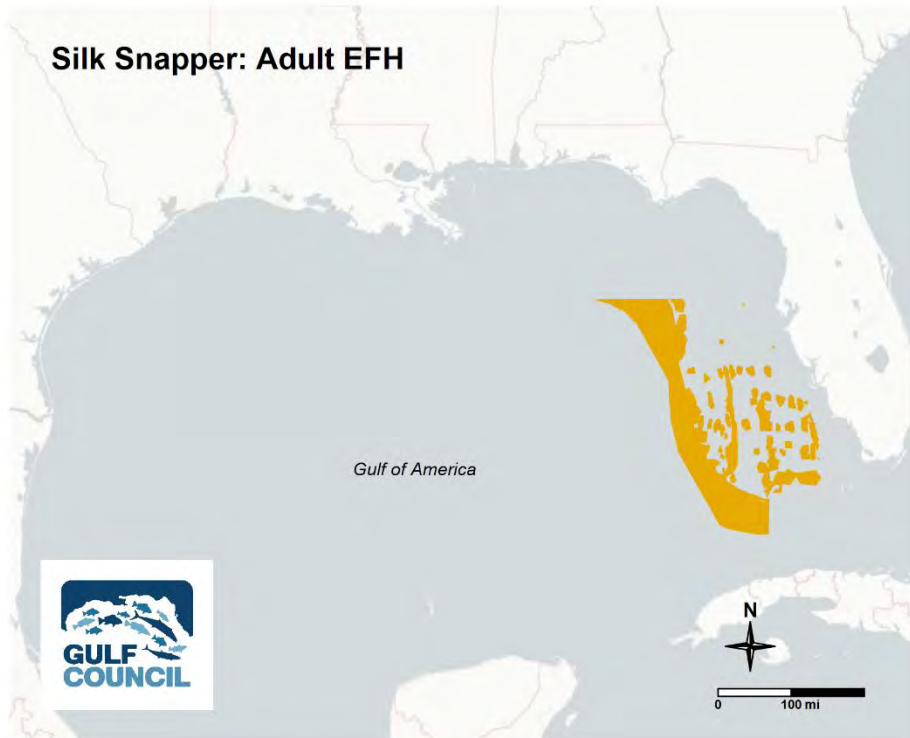


Figure C.1.125. Silk snapper adult EFH map.

Snowy grouper

Snowy grouper are found in largest numbers in deep waters off of South Florida and the northwestern coast of Cuba. Adults commonly occur on hard bottom/reefs (particularly Florida *Oculina* reefs) in waters with depths from 98-1722 feet [30-525m] and are often found with other deep-water species such as yellowedge grouper and tilefishes.

Eggs: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 98-1722 feet [30-525m], and are associated with the water column.

Larvae: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 98-1722 feet [30-525m], and are associated with the water column.

Post Larvae: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 98-1722 feet [30-525m], and are associated with the water column.

Early Juveniles: ER 1 in nearshore (60 feet [18m] or less in depth) habitat, depth <3.1 feet [1m], and are associated with hard bottom/reefs.

Late Juvenile: ER 1 in nearshore (60 feet [18m] or less in depth) habitat, depth <3.1 feet [1m], and are associated with hard bottom/reefs.

Adult: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 98-1722 feet [30-525m], and are associated with the shelf/slope edge, and hard bottom/reefs.

Spawning Adult: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 98-1722 feet [30-525m], and are associated with the shelf edge/slope and hard bottom/reefs.

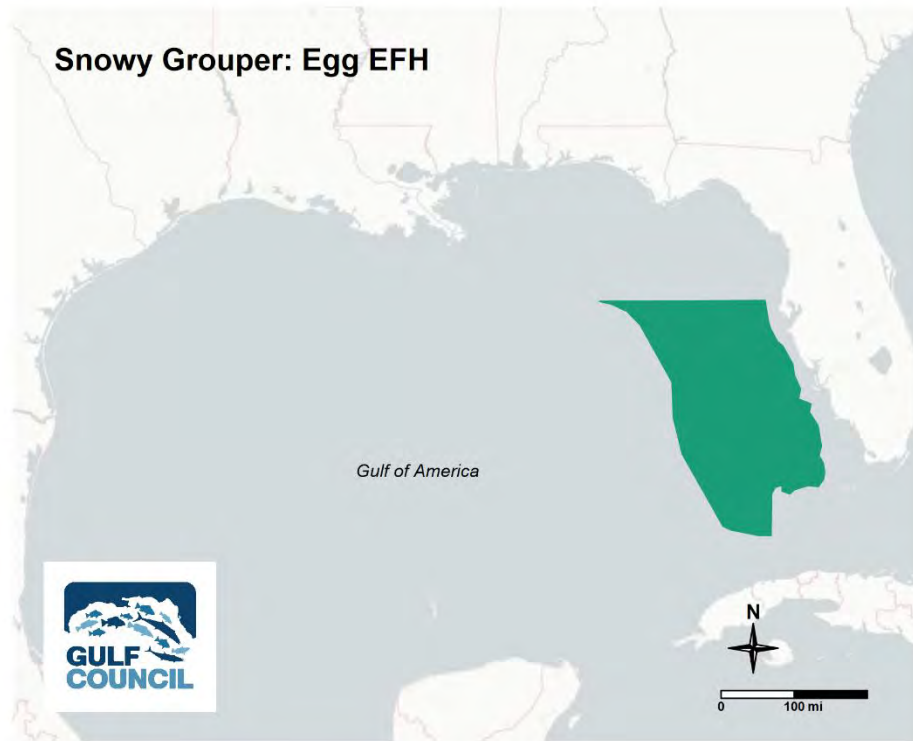


Figure C.1.126. Snowy grouper egg EFH map.

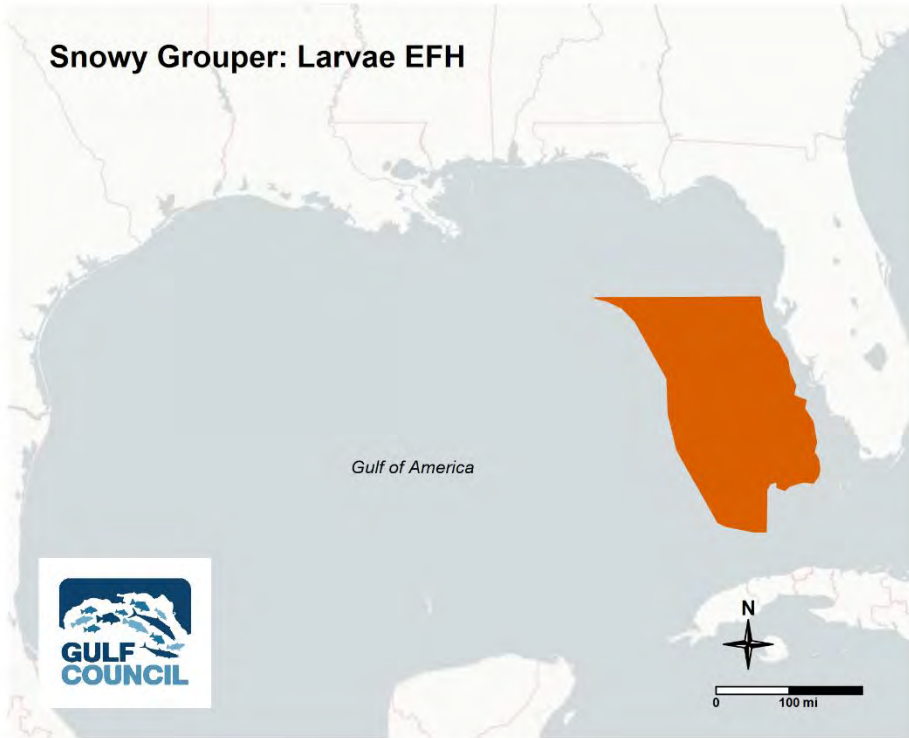


Figure C.1.127. Snowy grouper larvae EFH map.

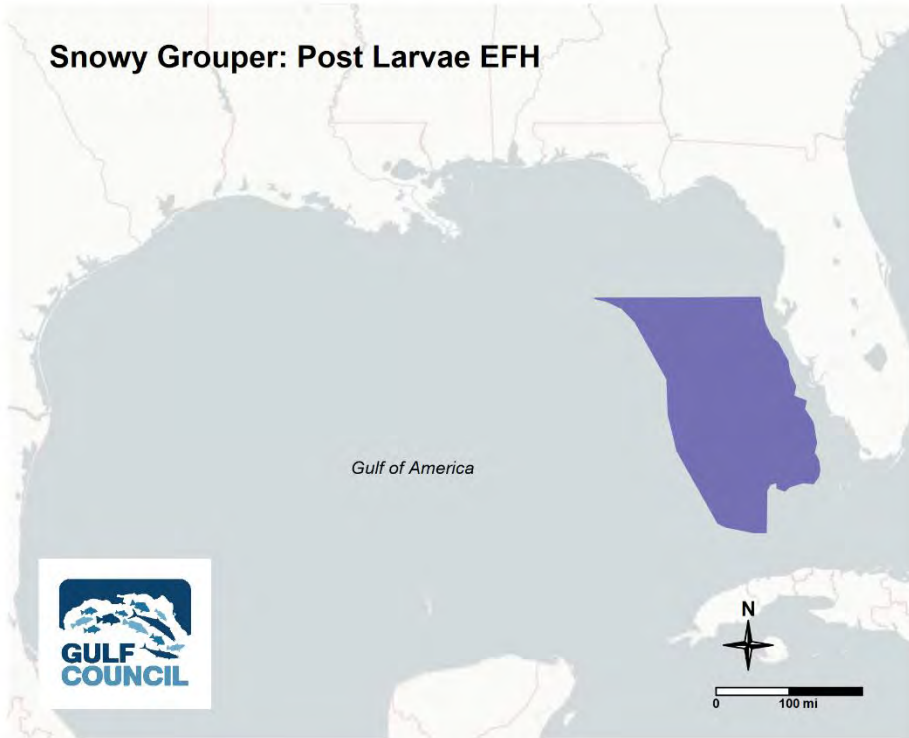


Figure C.1.128. Snowy grouper post larvae EFH map.

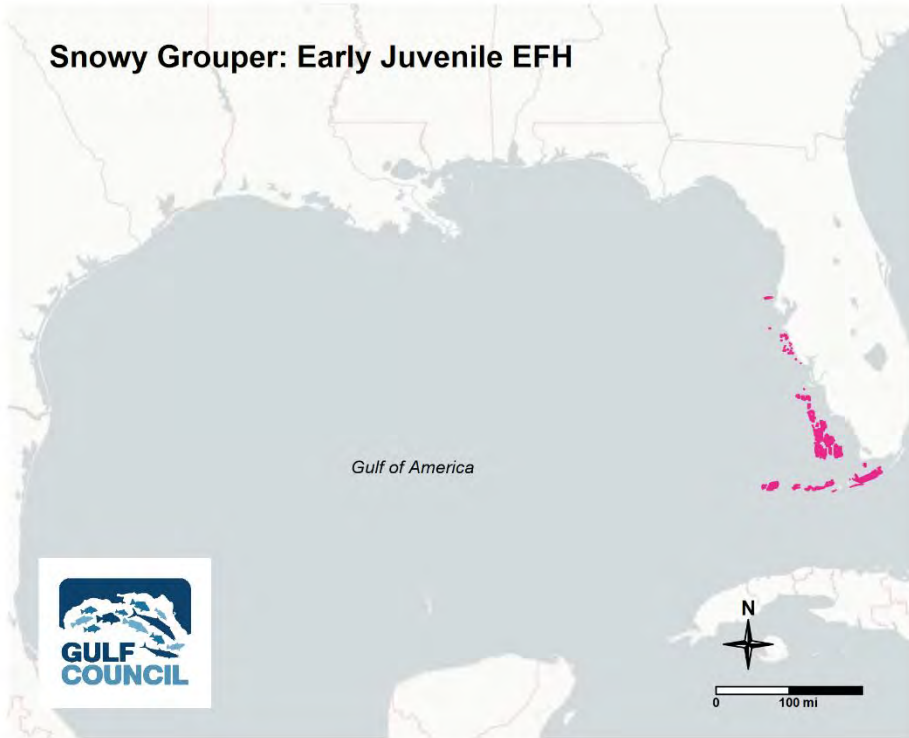


Figure C.1.129. Snowy grouper early juvenile EFH map.

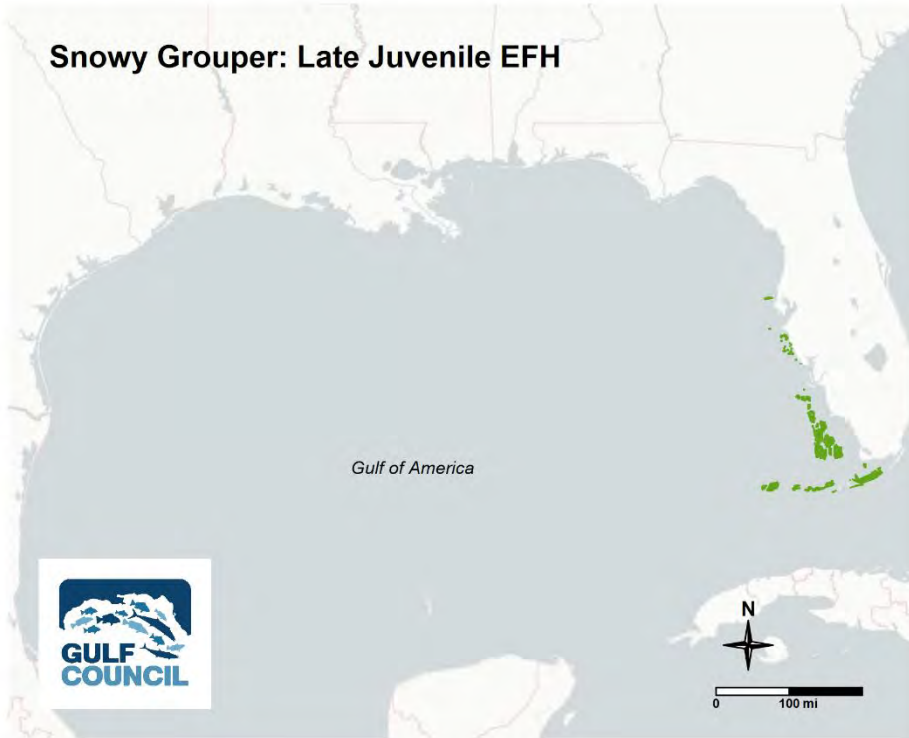


Figure C.1.130. Snowy grouper late juvenile EFH map.

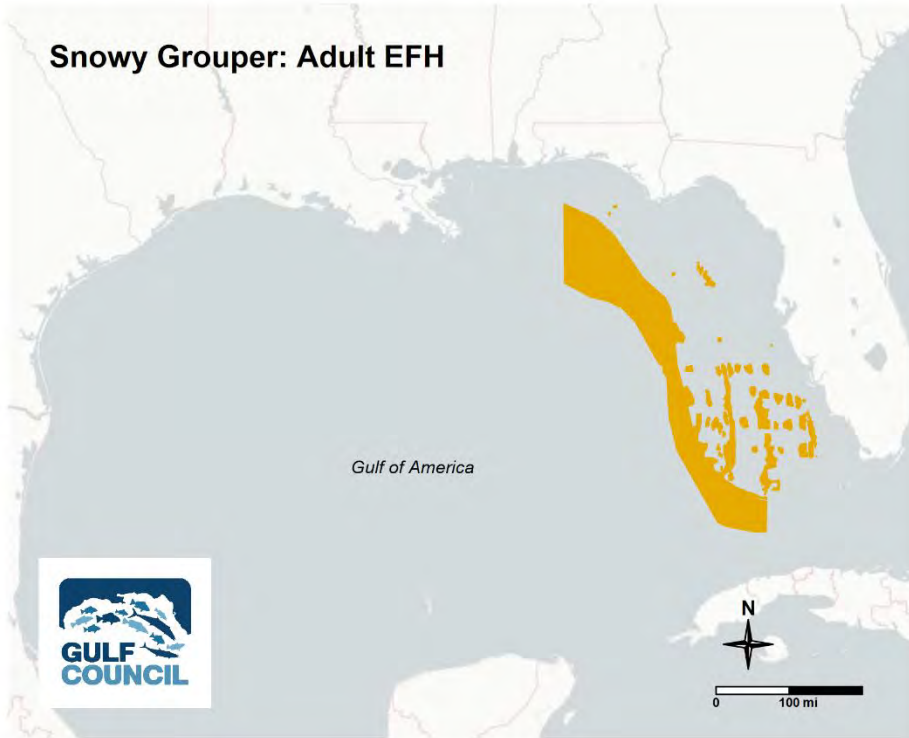


Figure C.1.131. Snowy Grouper adult EFH map.

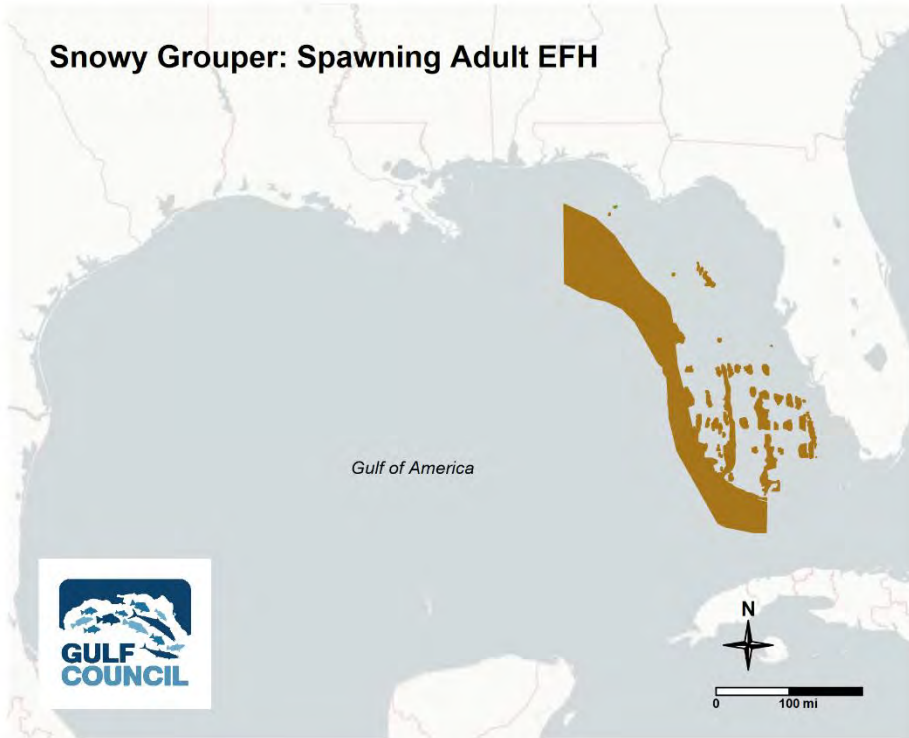


Figure C.1.132. Snowy grouper spawning adult EFH map.

Speckled hind

Speckled hind is a deep-water grouper distributed in the north and eastern Gulf on offshore hard bottom/reefs habitats, including rocky bottoms, and both high- and low-profile hard bottom/reefs. Speckled hind occur between 82-600 feet [25-183m] and are most common at 196-394 feet [60-120m] depth. Juveniles are most commonly found in the shallow portion of the depth range.

Egg: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 131-600 feet [40-183m], and are associated with the water column.

Larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 131-600 feet [40-183m], and are associated with the water column.

Post Larvae: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 131-600 feet [40-183m], and are associated with the water column.

Early Juvenile: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 82-600 feet [25-183m], and are associated with hard bottom/reefs.

Late Juvenile: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 82-600 feet [25-183m], and are associated with hard bottom/reefs.

Adult: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 82-600 feet [25-183m], and are associated with hard bottom/reefs.

Spawning Adult: ER 1 and ER 2 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 144-600 feet [44-183m], and are associated with the shelf/slope edge.

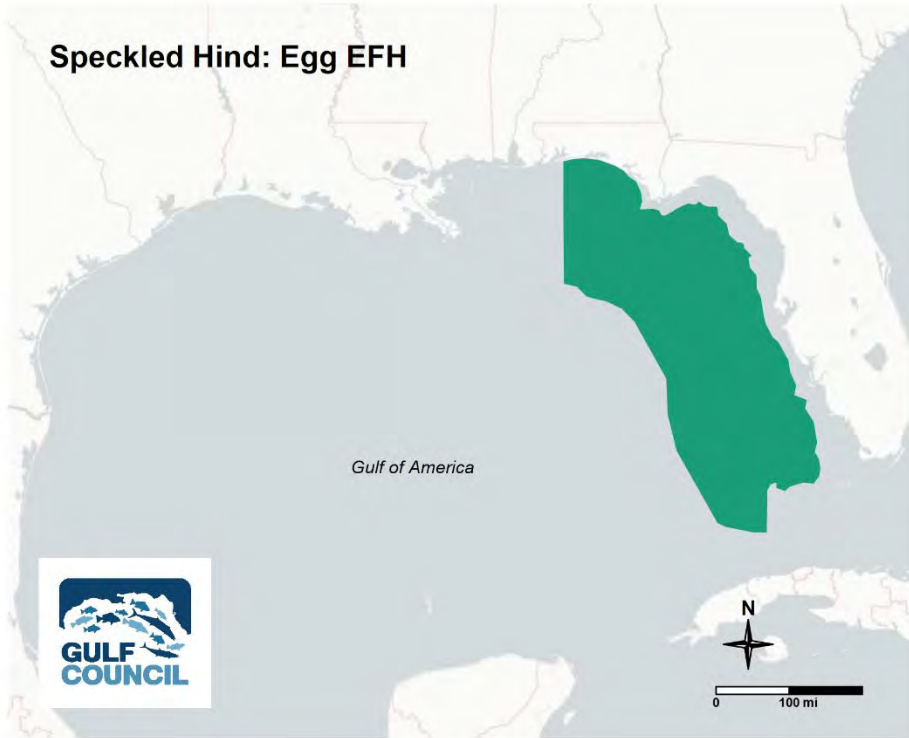


Figure C.1.133. Speckled hind egg EFH map.

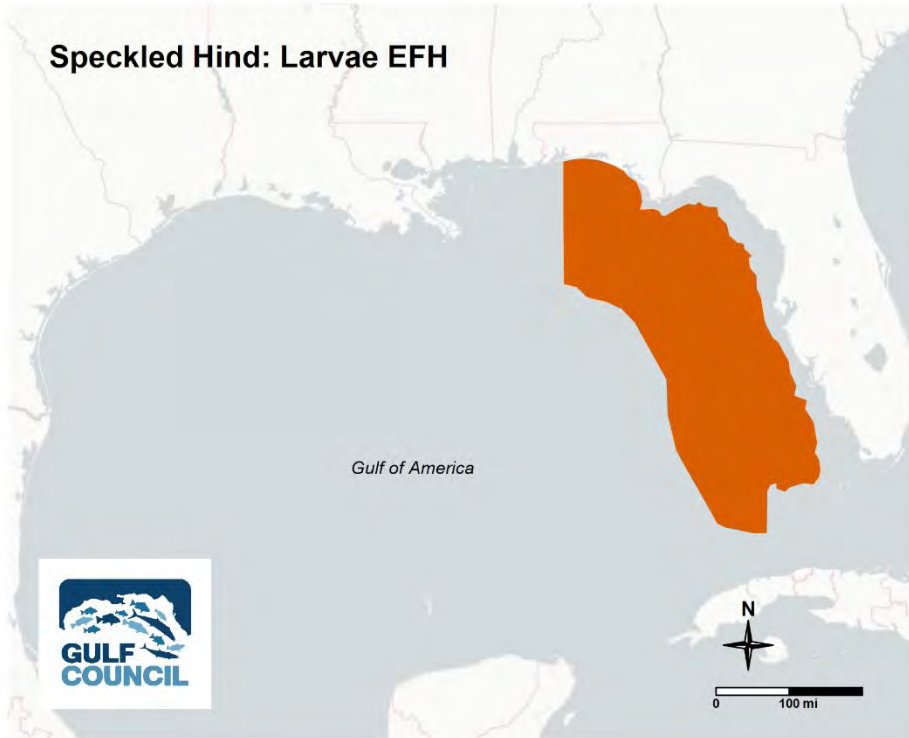


Figure C.1.134. Speckled hind larvae EFH map.

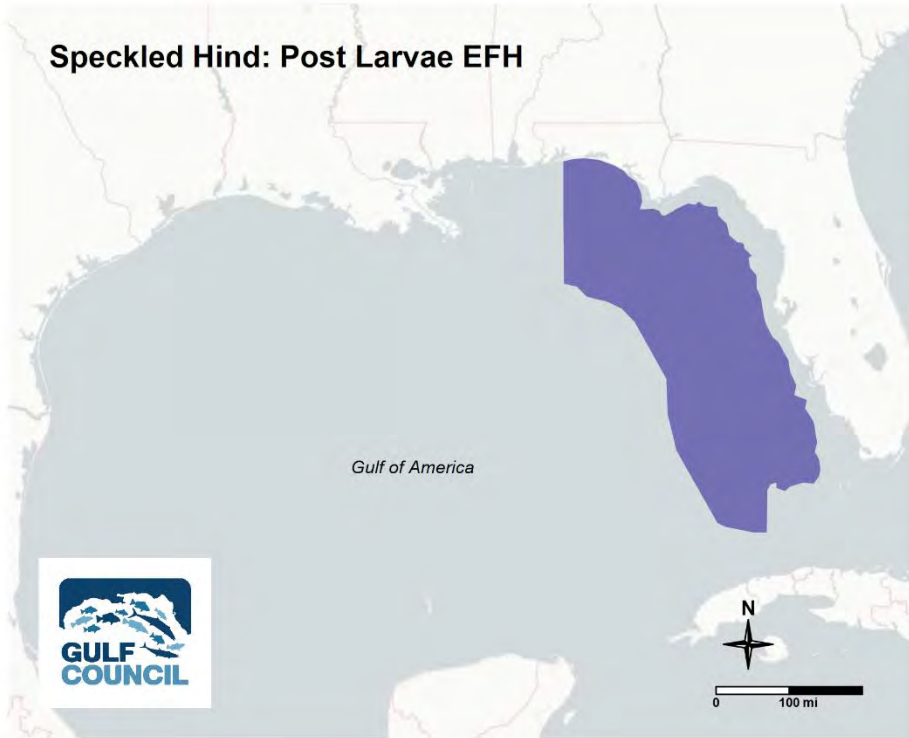


Figure C.1.135. Speckled hind post larvae EFH map.

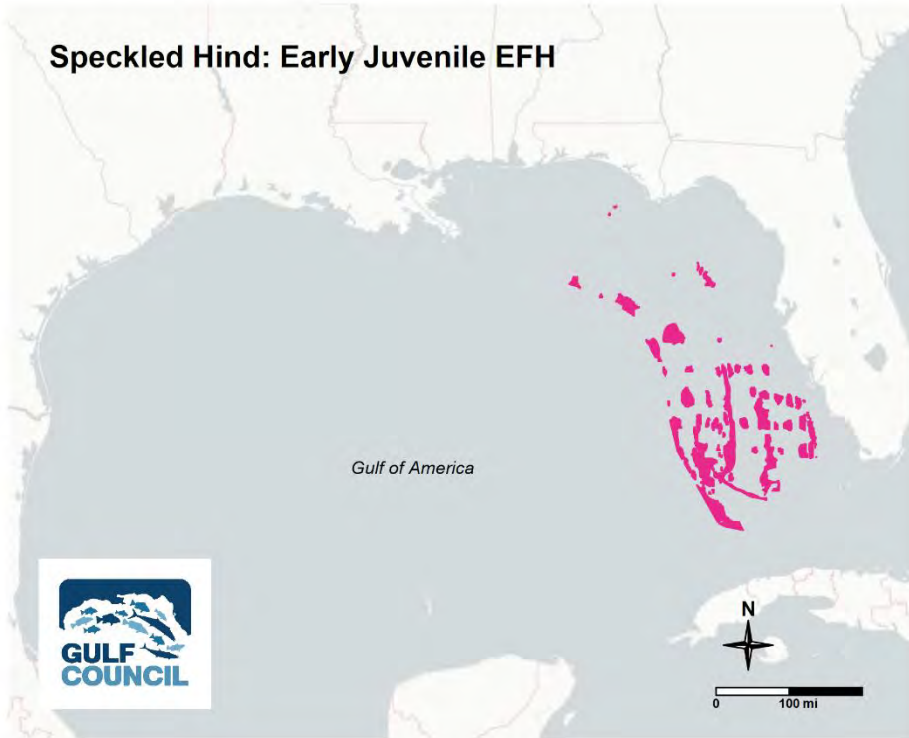


Figure C.1.136. Speckled hind early juvenile EFH map.

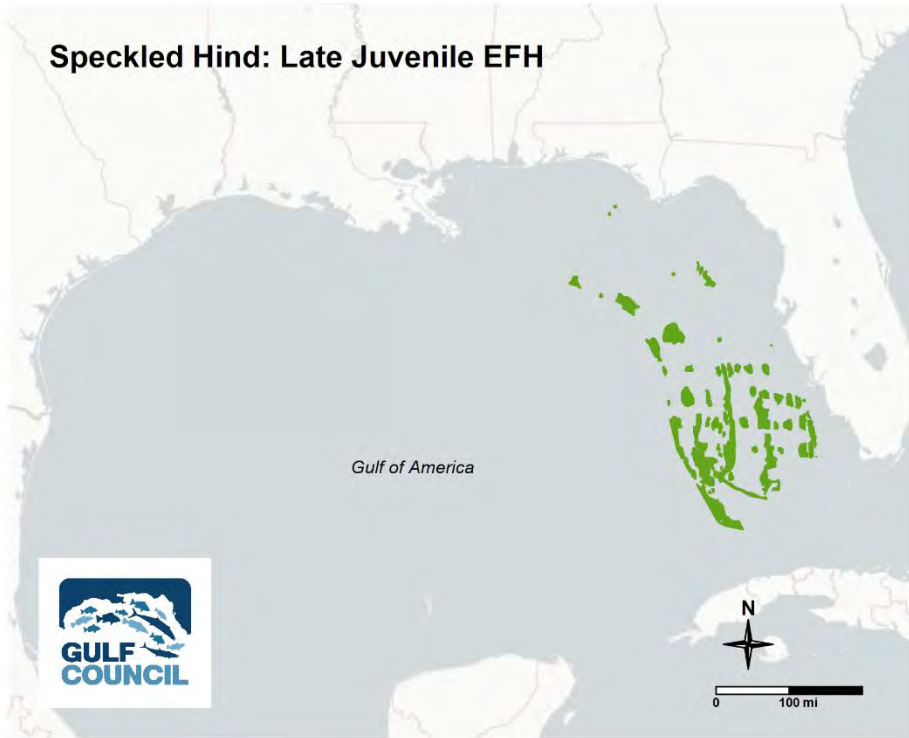


Figure C.1.137. Speckled hind late juvenile EFH map.

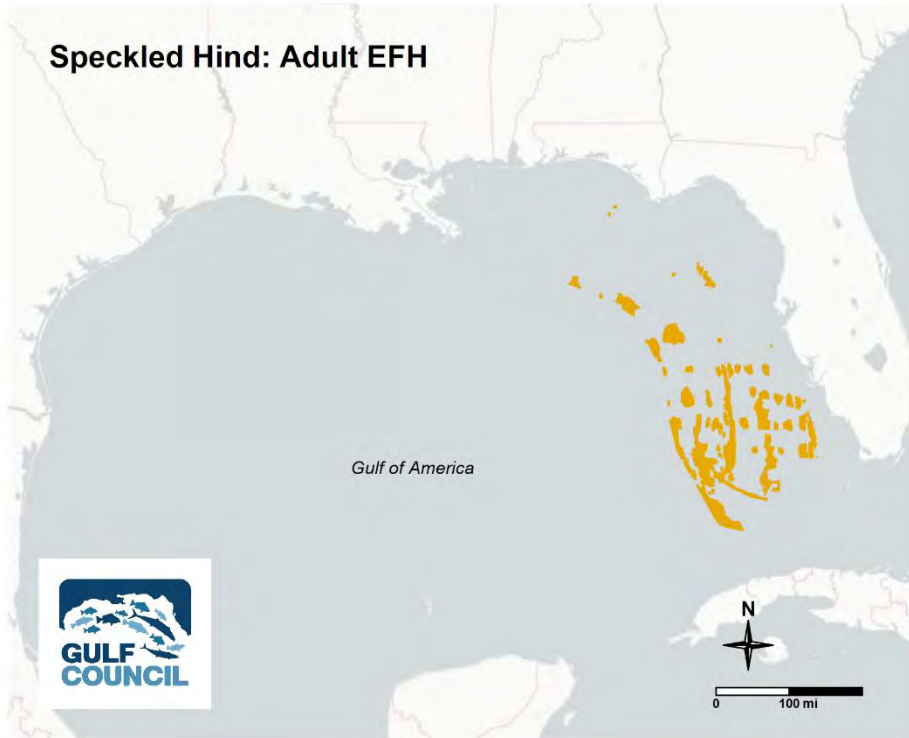


Figure C.1.138. Speckled hind adult EFH map.

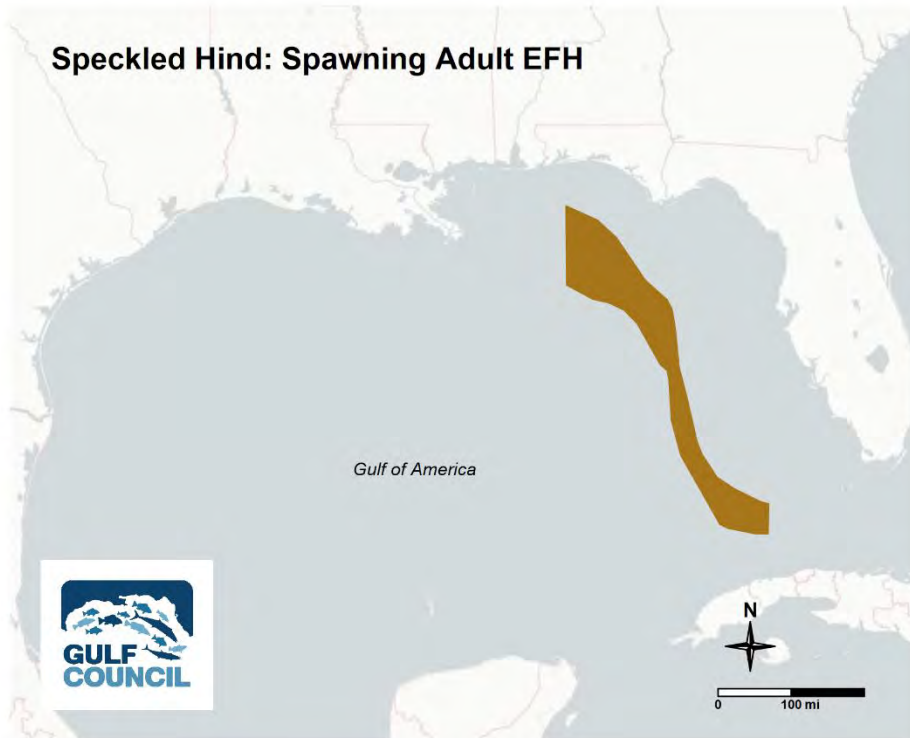


Figure C.1.139. Speckled hind spawning adult EFH map.

Tilefish

Tilefish occur throughout the deeper waters of the Gulf. The species is demersal, occurring at depths from 262-1476 feet [80-450m], but is most commonly found between depths of 820-1148 feet [250-350m]. Preferred habitats are soft bottom (particularly malleable clay), on the shelf edge/slope. Eggs and larvae are pelagic; early juveniles recruit to benthic habitats with age. Late juveniles burrow and occupy shafts in the substrate. Adults also burrow along the outer continental shelf and on flanks of submarine canyons.

Egg: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-1476 feet [80-450m], and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-1476 feet [80-450m], and are associated with the water column.

Post Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-1476 feet [80-450m], and are associated with the water column.

Early Juvenile: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-1476 feet [80-450m], and are associated with the water column.

Late Juvenile: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-1476 feet [80-450m], and are associated with shelf /slope edge, and soft bottom habitat.

Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-1476 feet [80-450m], and are associated with shelf /slope edge, and soft bottom habitat.

Spawning Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-1476 feet [80-450m], and are associated with shelf/slope edge, and soft bottom habitat.

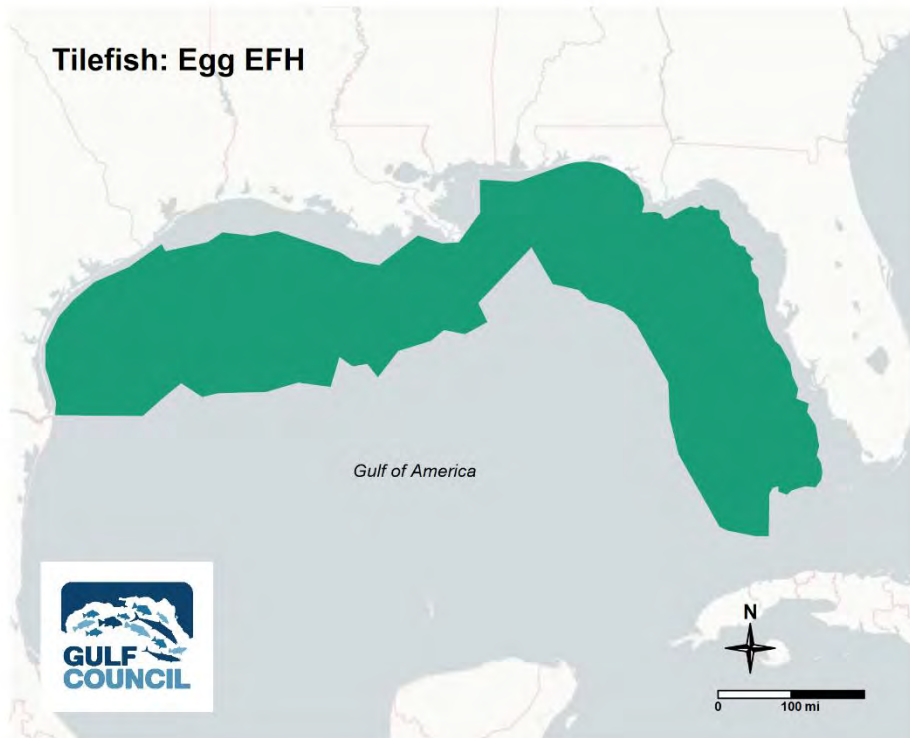


Figure C.1.140. Tilefish egg EFH map.

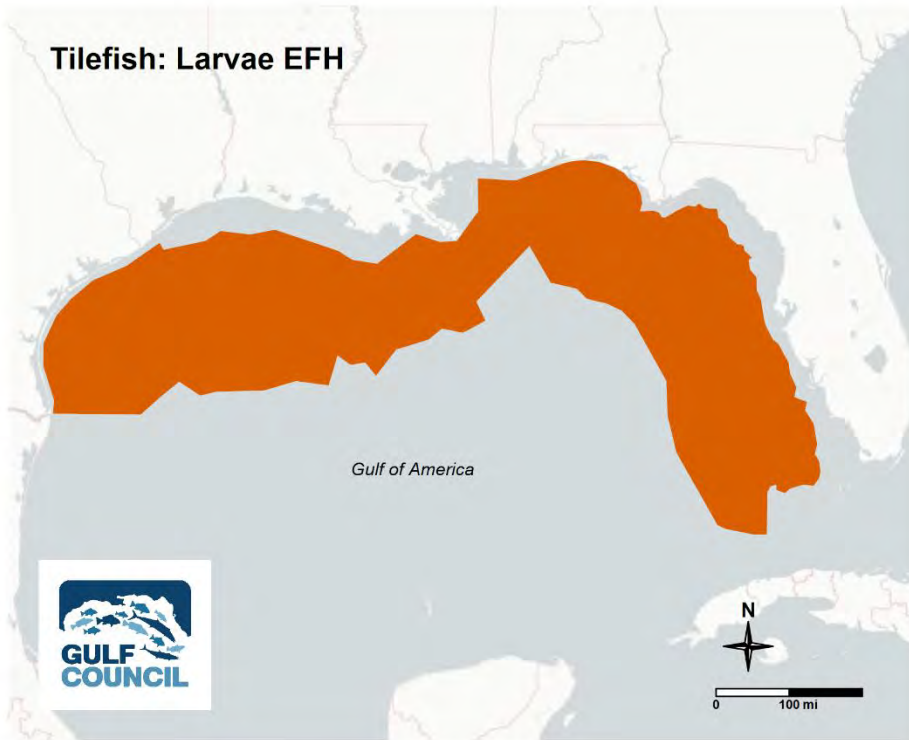


Figure C.1.141. Tilefish larvae EFH map.

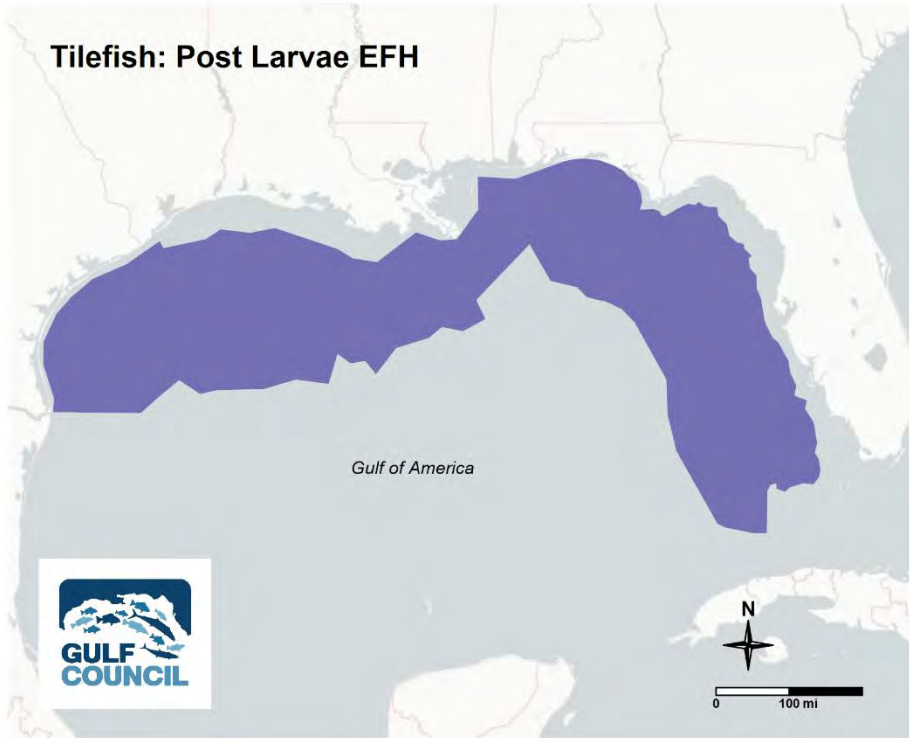


Figure C.1.142. Tilefish post larvae EFH map.

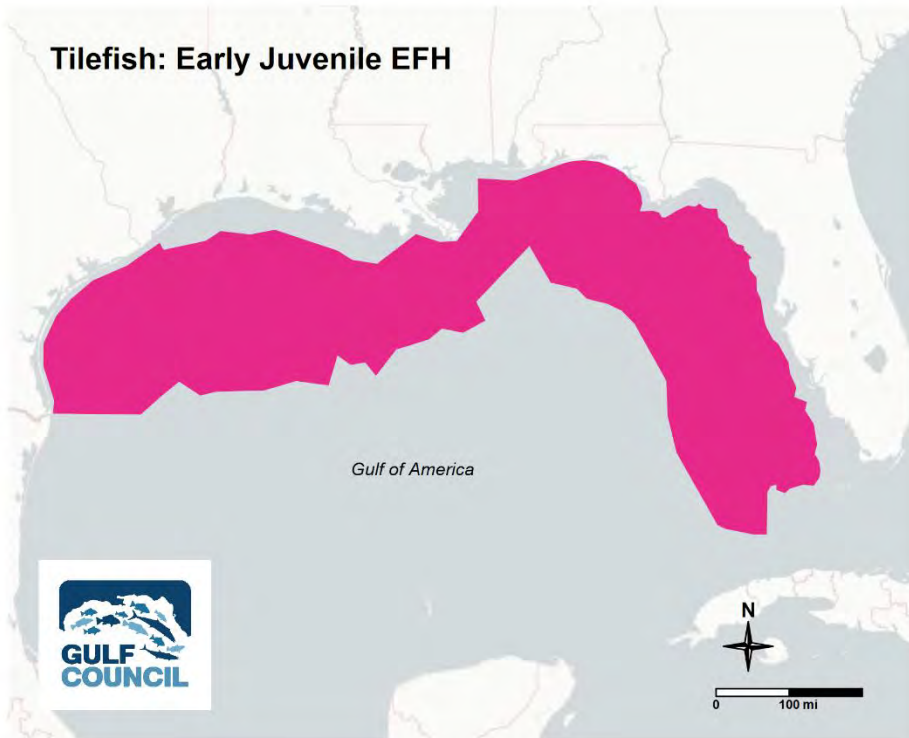


Figure C.1.143. Tilefish early juvenile EFH map.

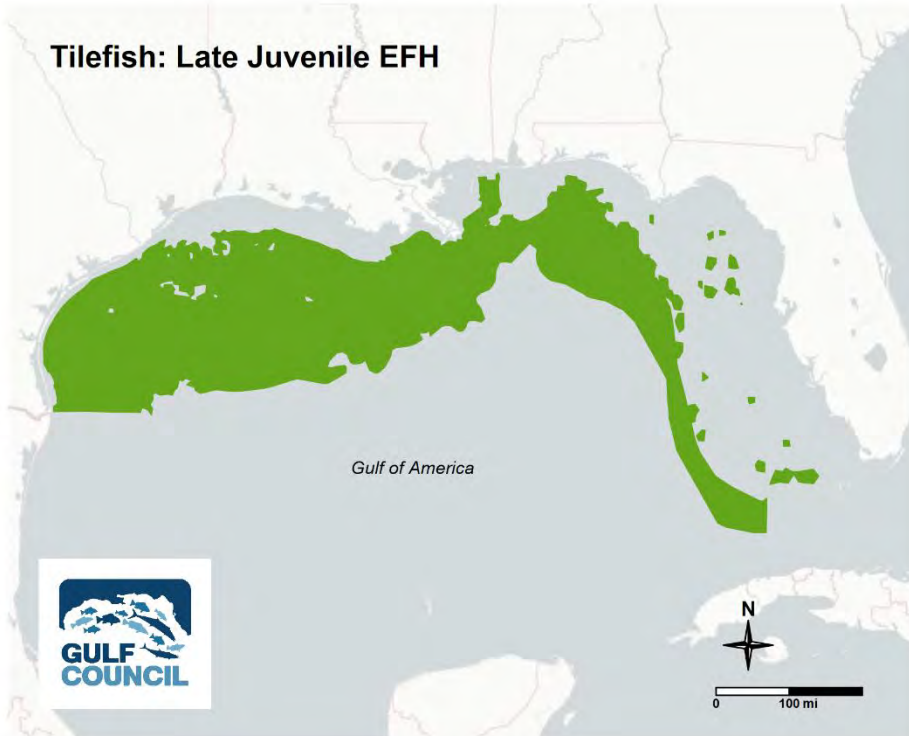


Figure C.1.144. Tilefish late juvenile EFH map.

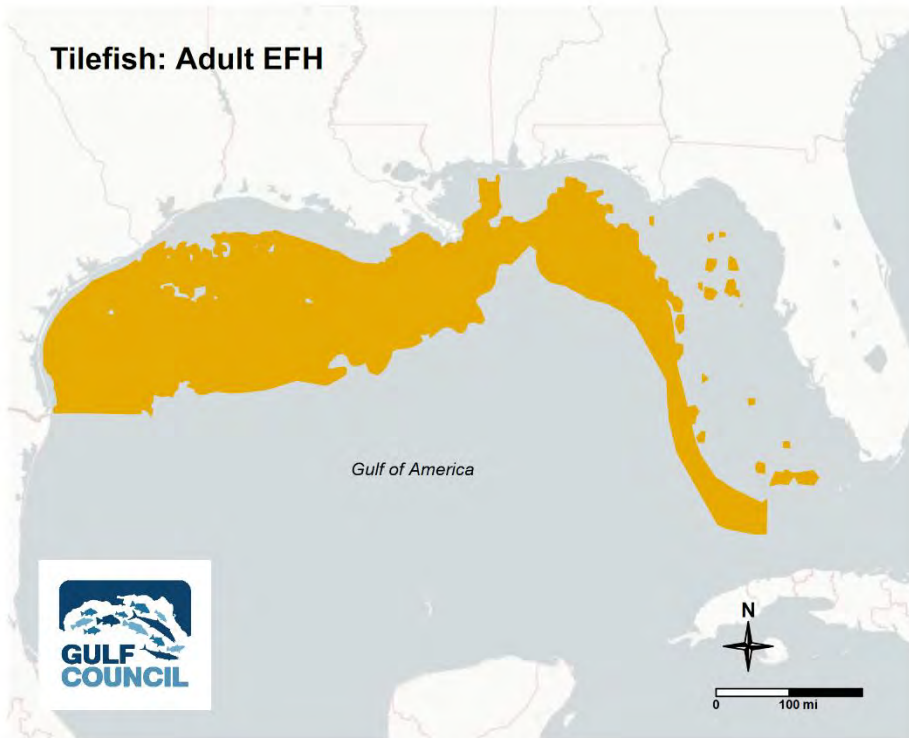


Figure C.1.145. Tilefish adult EFH map.

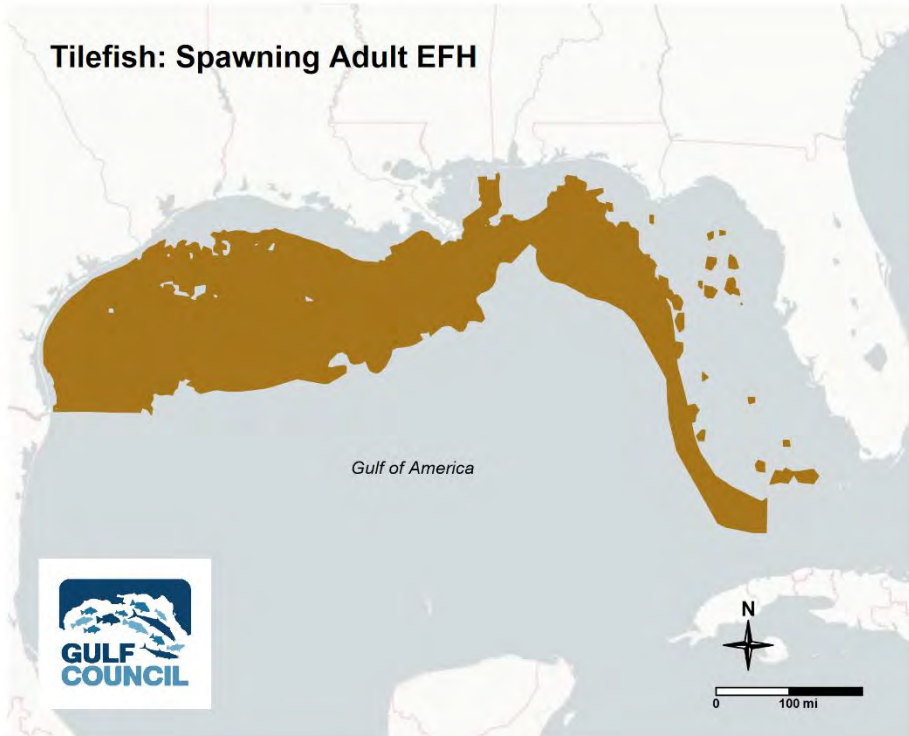


Figure C.1.146. Tilefish spawning adult EFH map.

Vermilion snapper

Vermilion snapper are found throughout the shelf areas of the Gulf. The species is demersal, occurring over hard bottom/reefs from depths of 59-328 feet [18-100m]. Spawning occurs from May to September in offshore waters.

Egg: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Post Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the water column.

Early Juvenile: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 59-328 feet [18-100m], and are associated with hard bottom/reefs.

Late Juvenile: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 59-328 feet [18-100m], and are associated with hard bottom/reefs.

Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 59-328 feet [18-100m], and are associated with banks/shoals and hard bottom/reefs.

Spawning Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat.

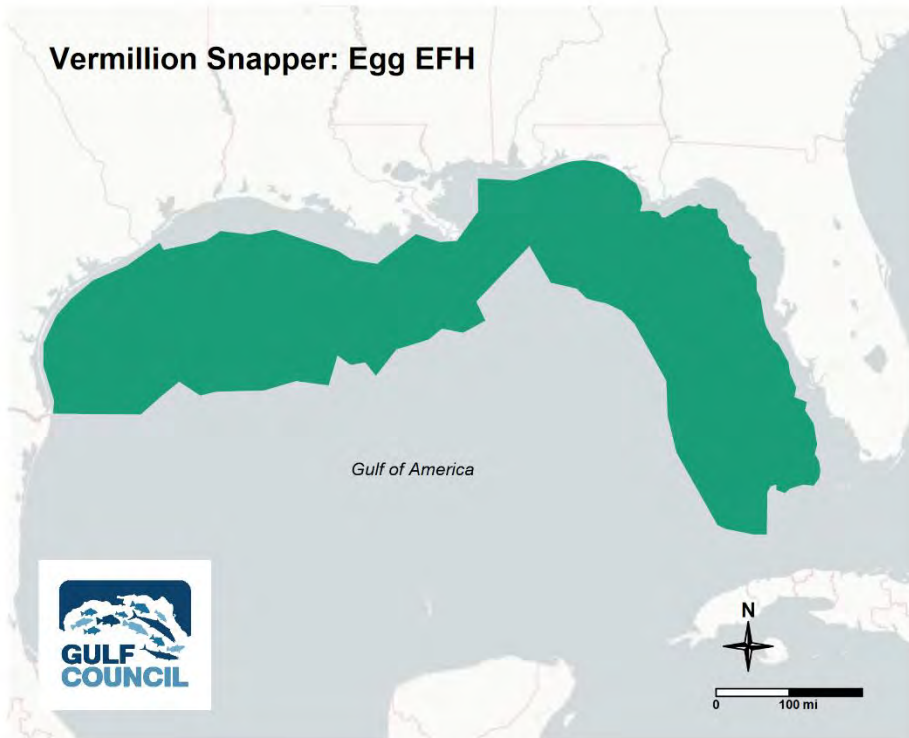


Figure C.1.147. Vermillion snapper egg EFH map.

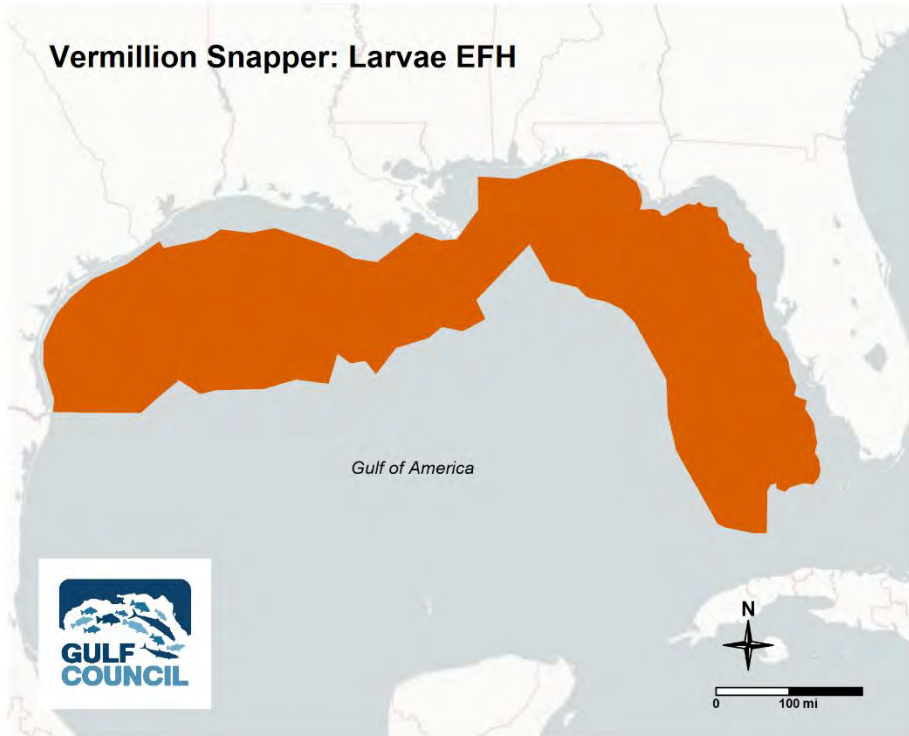


Figure C.1.148. Vermillion snapper larvae EFH map.

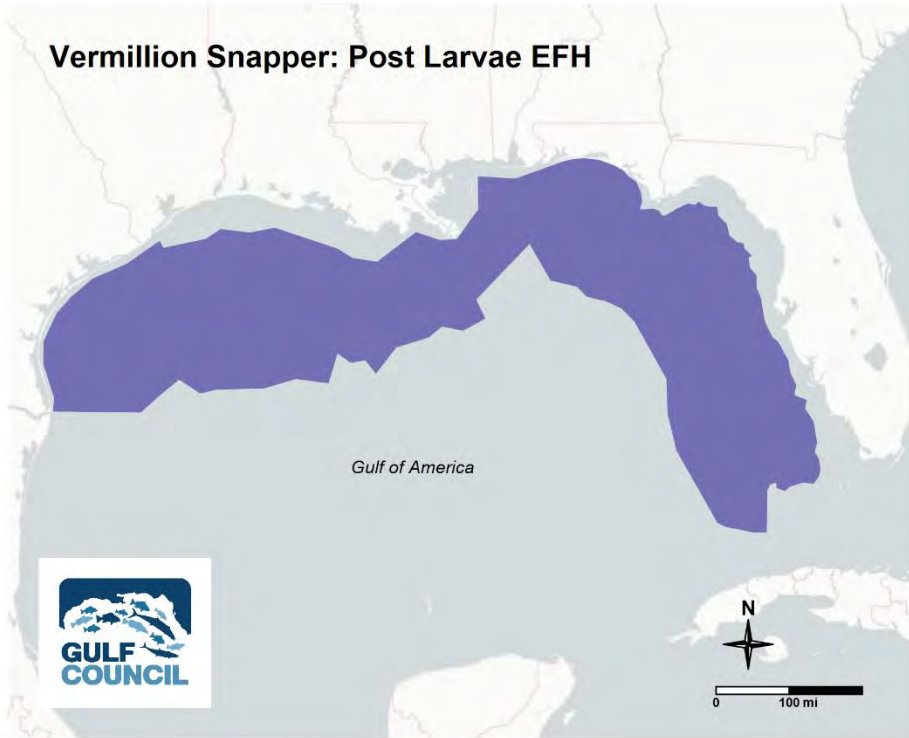


Figure C.1.149. Vermillion snapper post larvae EFH map.

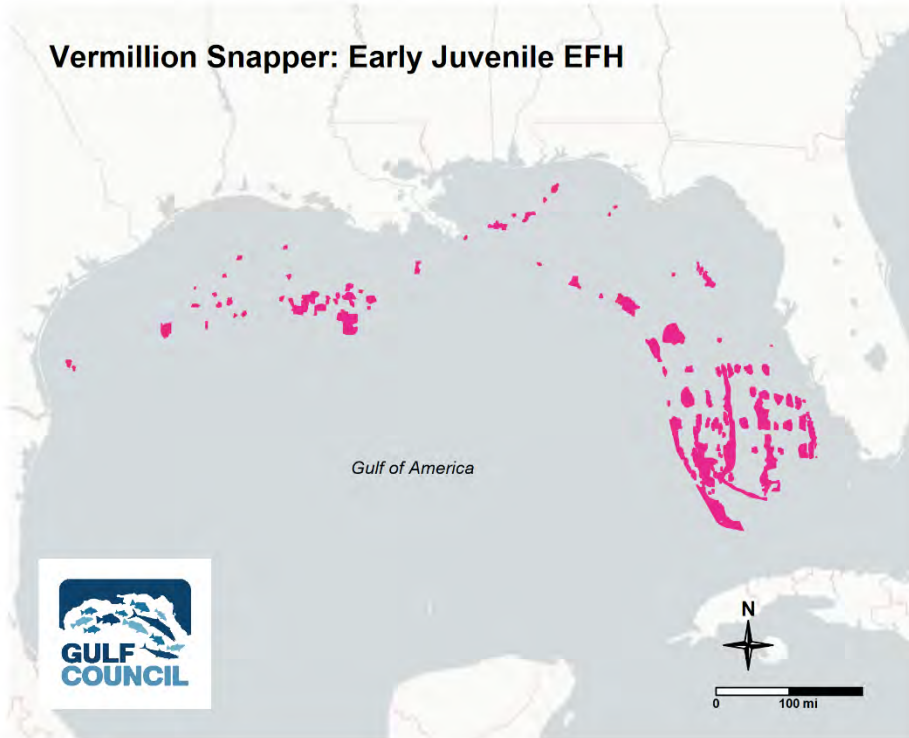


Figure C.1.150. Vermillion snapper early juvenile EFH map.

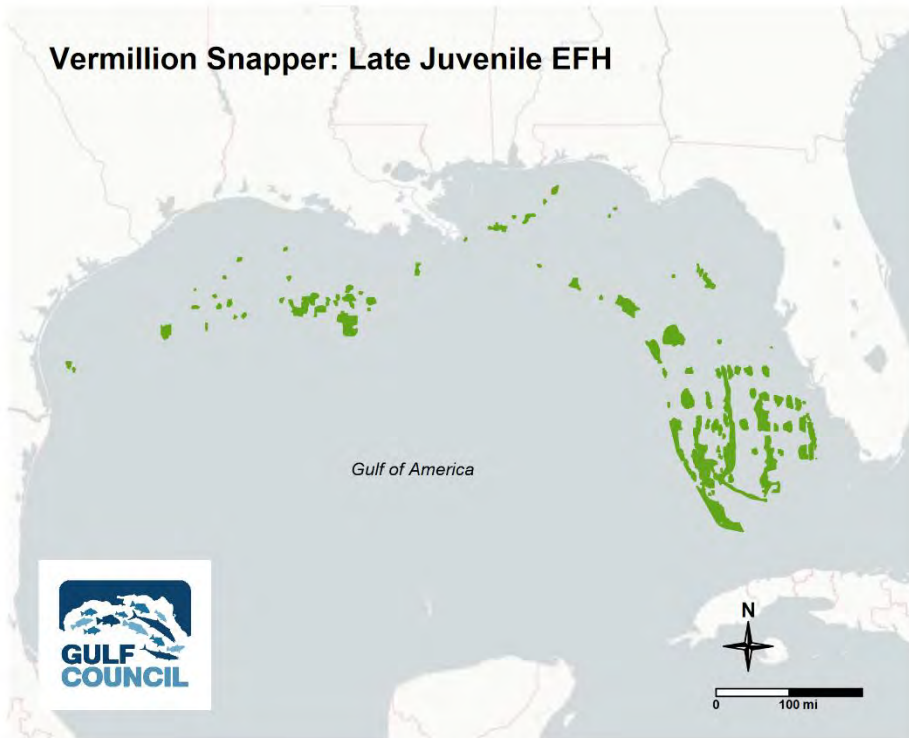


Figure C.1.151. Vermillion snapper late juvenile EFH map.

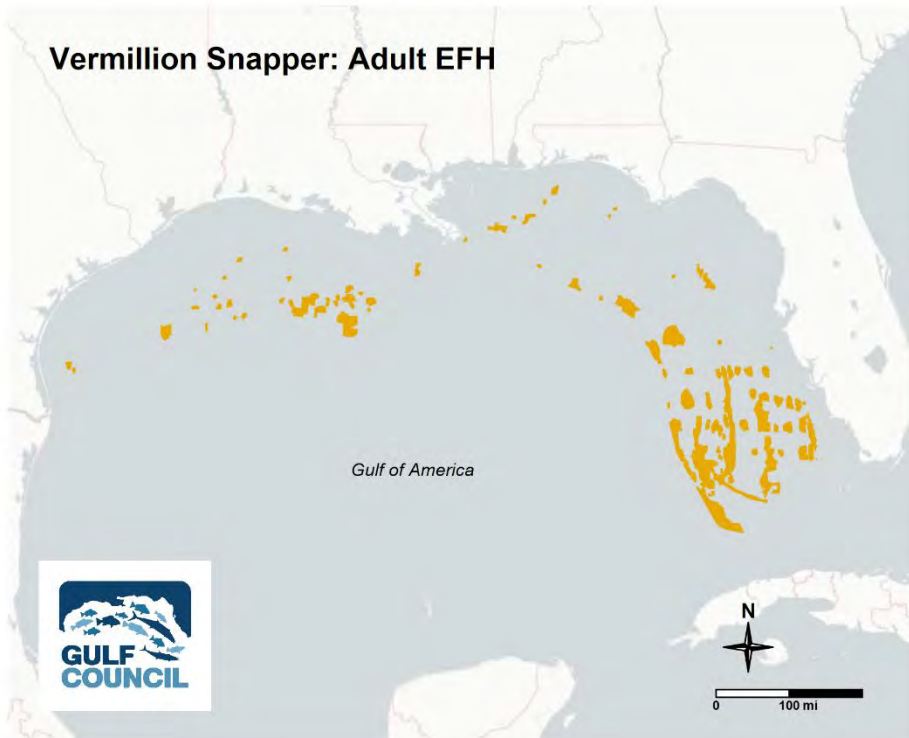


Figure C.1.152. Vermillion snapper adult EFH map.

Warsaw grouper

Warsaw grouper are a deep-water species distributed throughout the Gulf, in association with hard bottom/reefs. They occur from 131-1722 feet [40-525m], more commonly down to 250 m, and prefer rough, rocky bottoms with high profiles such as steep cliffs and rocky ledges.

Egg: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 131-1722 feet [40-525m], and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 131-1722 feet [40-525m], and are associated with the water column.

Post Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 131-1722 feet [40-525m], and are associated with the water column.

Early Juvenile: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat.

Late Juvenile: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths >656 feet [200m], and are associated with hard bottom/reefs.

Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 131-1722 feet [40-525m], and are associated with the shelf /slope edge and hard bottom/reefs.

Spawning Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 131-1722 feet [40-525m], and are associated with the shelf /slope edge and hard bottom/reefs.

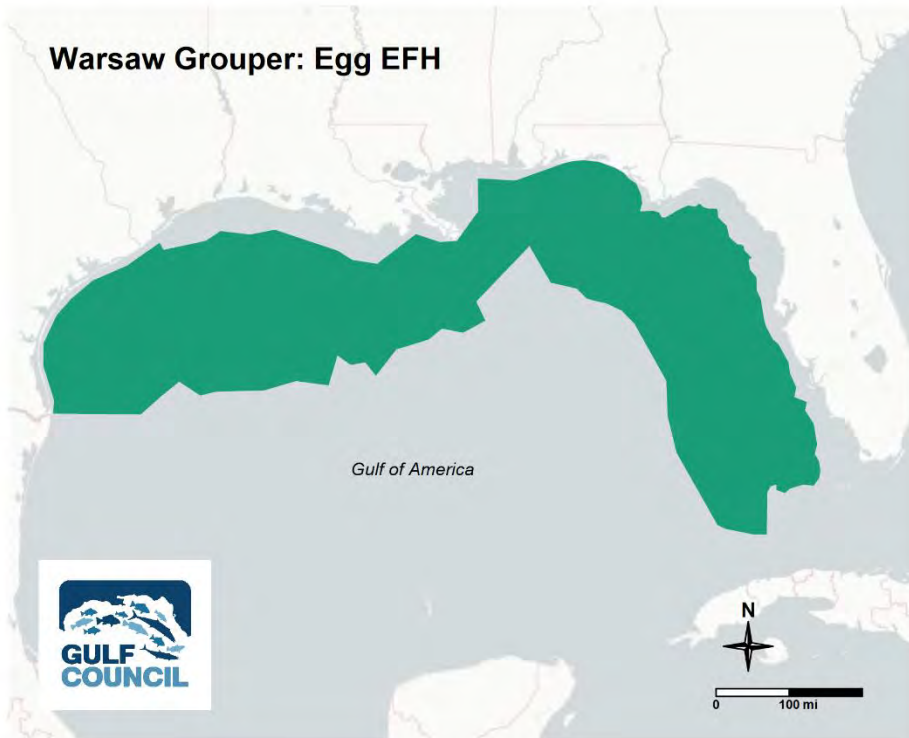


Figure C.1.153. Warsaw grouper egg EFH map.

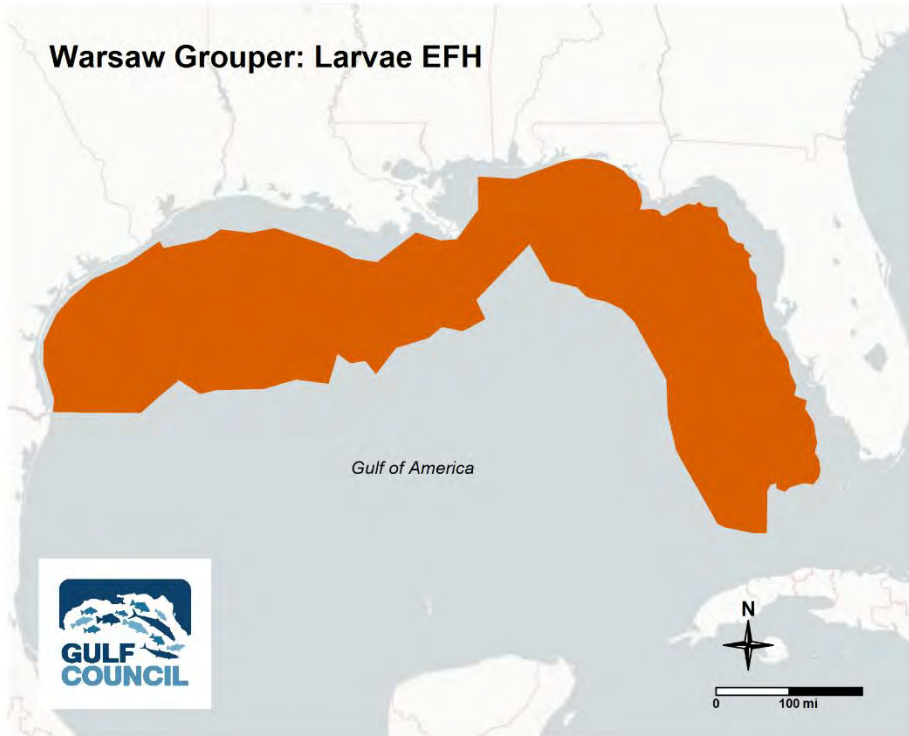


Figure C.1.154. Warsaw grouper larvae EFH map.

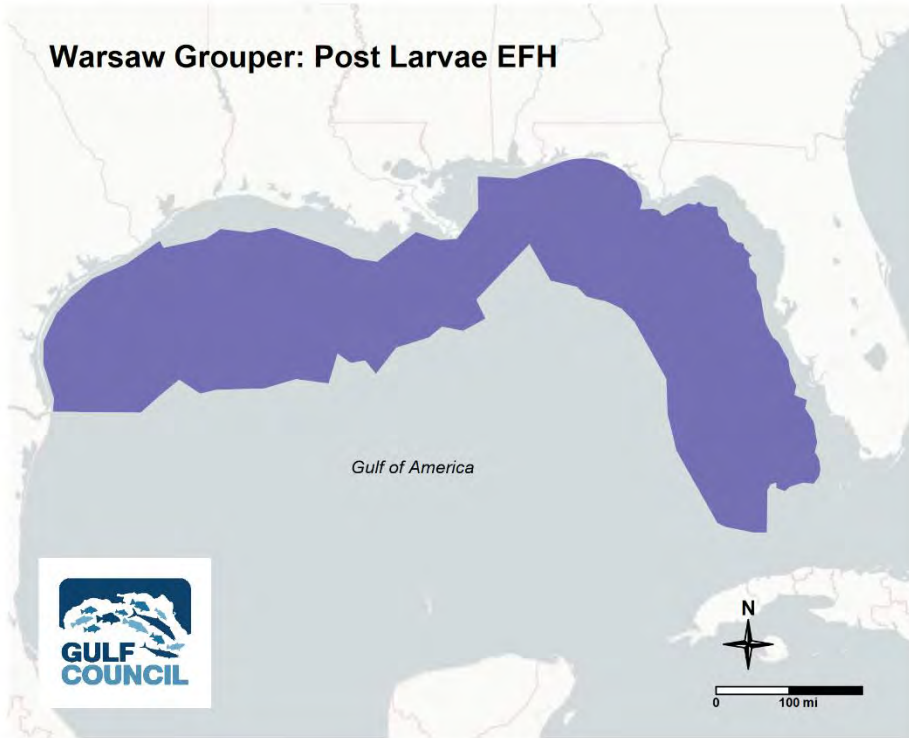


Figure C.1.155. Black grouper post larvae EFH map.

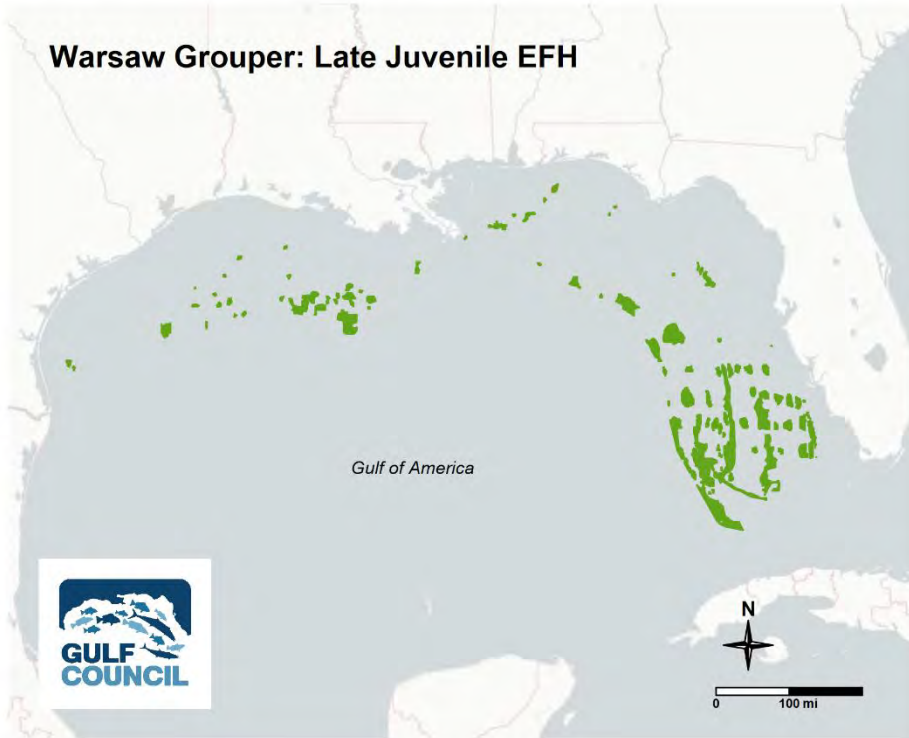


Figure C.1.156. Black grouper late juvenile EFH map.

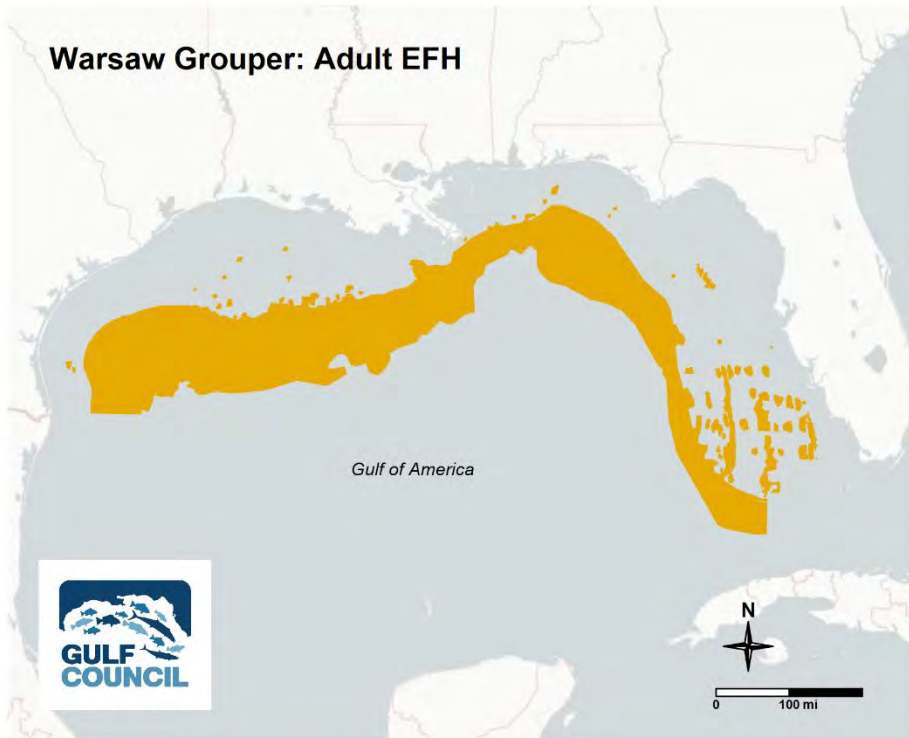


Figure C.1.157. Black Grouper adult EFH map.

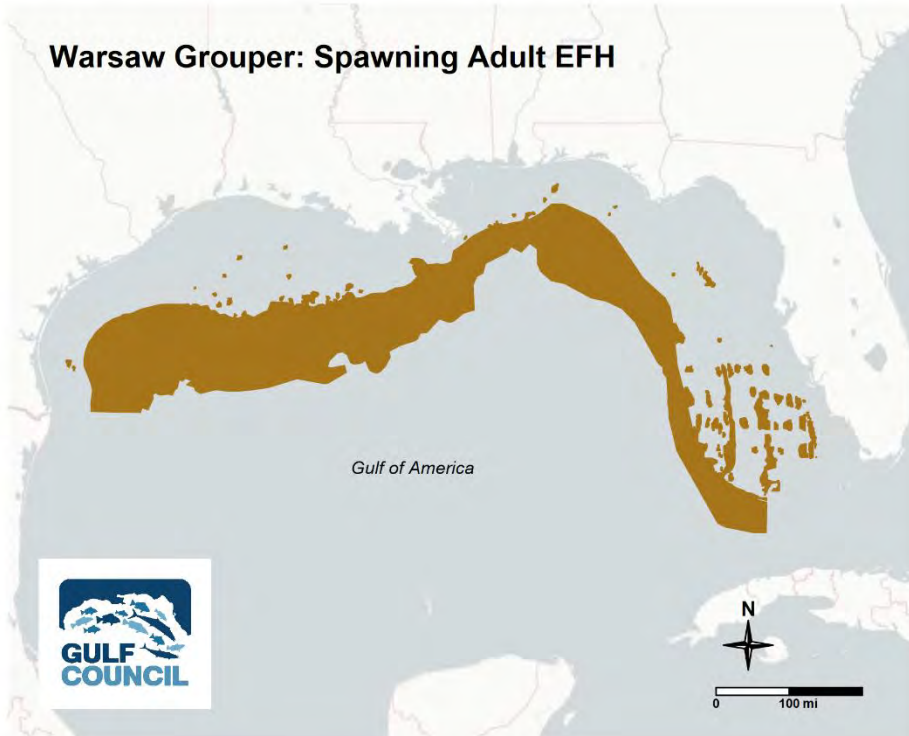


Figure C.1.158. Black grouper spawning adult EFH map.

Wenchman

Wenchman are distributed Gulf-wide ER 1-5⁴ and occupy hard bottom/reef habitat of the mid to outer shelf where they feed mainly on small fish; they are found at depths ranging from 62-1578 feet [19-481m], but are most abundant between 262-656 feet [80-200m].

Egg: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-656 feet [80-200m], and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-656 feet [80-200m], and are associated with the water column.

Post Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth).

Early Juvenile: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth).

Late Juvenile Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth).

Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 62-1578 feet [19-481m], and are associated with shelf edge/slope and hard bottom/reefs habitat.

Spawning Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 262-656 feet [80-200m], and are associated with the shelf edge/slope.

⁴ Gulf-wide distribution per [October 2025 SSC recommendation](#).

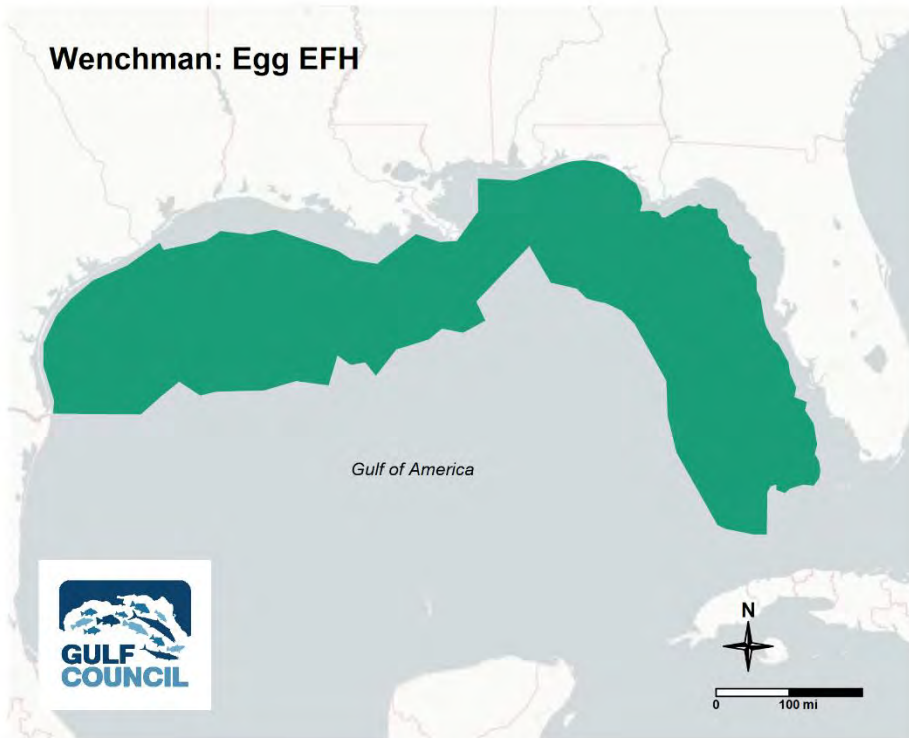


Figure C.1.159. Wenchman egg EFH map.

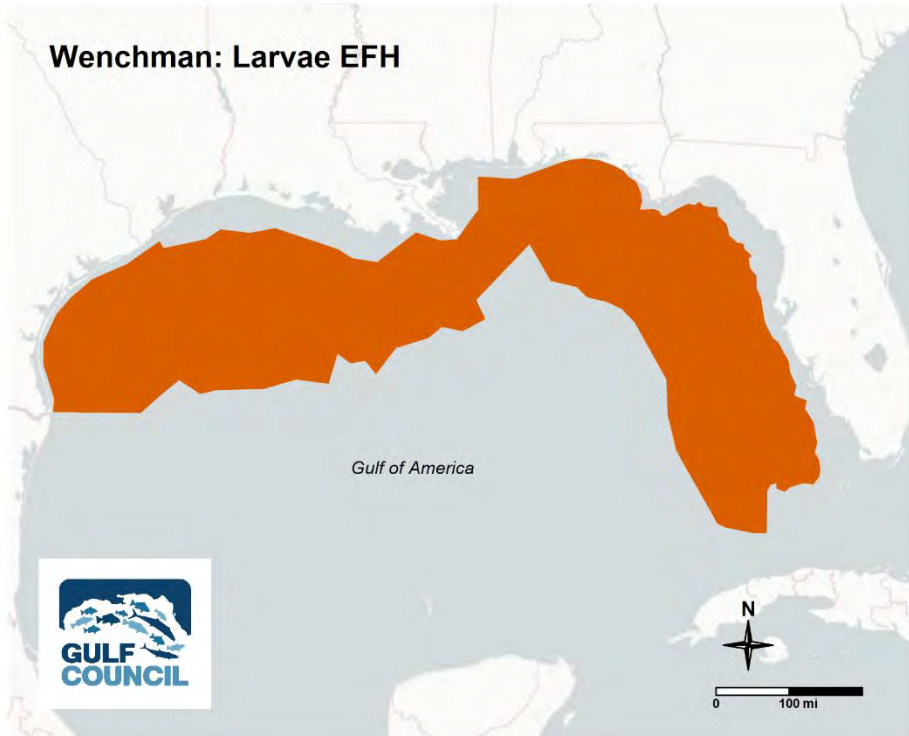


Figure C.1.160. Wenchman larvae EFH map.

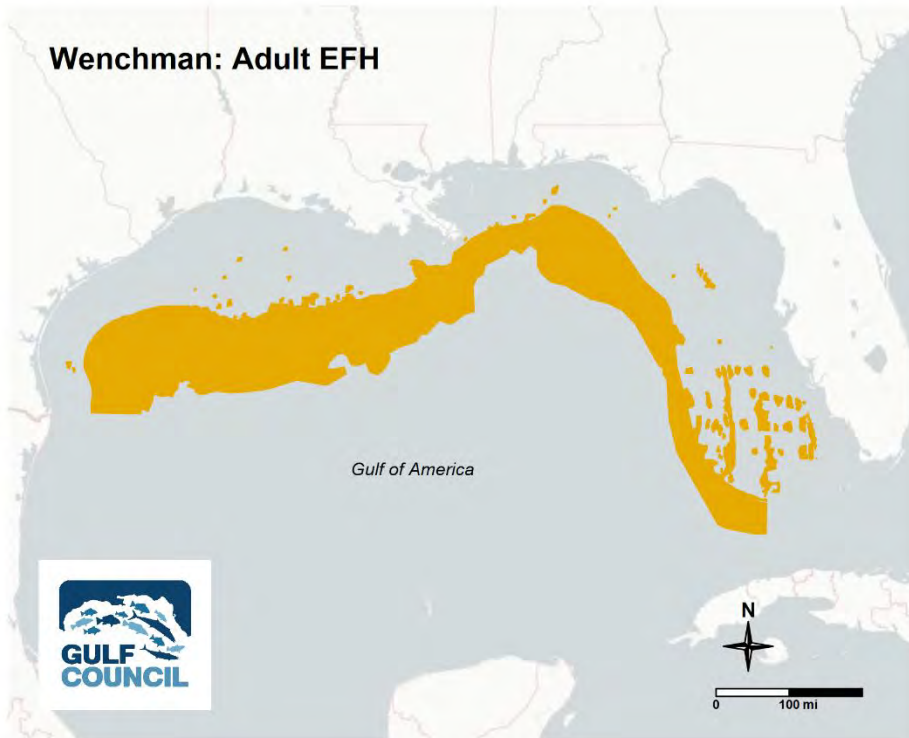


Figure C.1.161. Wenchman adult EFH map.

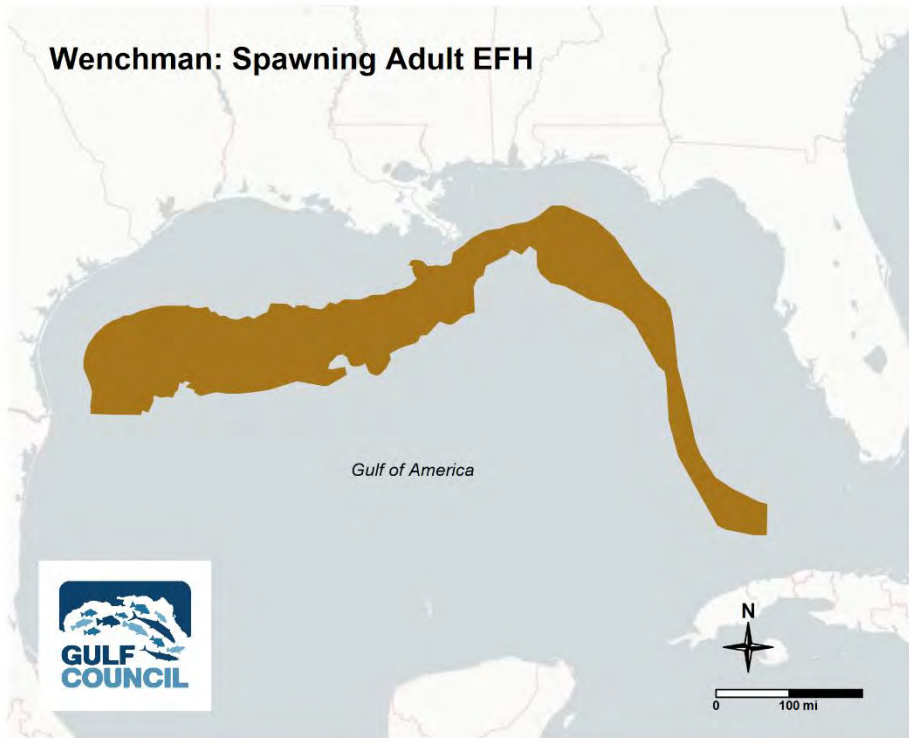


Figure C.1.162. Wenchman spawning adult EFH map.

Yellowedge grouper

Yellowedge grouper are a deep water species found throughout the Gulf continental shelf, with areas of high abundance off of Texas and west Florida. On the outer continental shelf in the eastern Gulf, the species occupies high relief hard bottom/reefs, rocky out-croppings and are often found co-occurring with snowy grouper and tilefish. In the central and western Gulf, adult yellowedge grouper occupy hard bottom/reefs where available, but also burrow in soft bottom habitat. The species depth range is from 115-1214 feet [35-370m] with adults most common in waters greater than 591 feet [180m] deep. Juveniles occupy a shallower depth range of 30-361 feet [9-110m].

Egg: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 115-1214 feet [35-370m], and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 115-1214 feet [35-370m], and are associated with the water column.

Post Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 115-1214 feet [35-370m], and are associated with the water column.

Early Juvenile: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths between 30-361 feet [9-110m].

Late Juvenile: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths between 30-361 feet [9-110m], and are associated with hard bottom/reefs habitat.

Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 115-1214 feet [35-370m], and are associated with the shelf edge/slope, hard bottom/reefs, and soft bottom habitat.

Spawning Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 115-1214 feet [35-370m], and are associated with the shelf /slope edge and hard bottom/reefs.

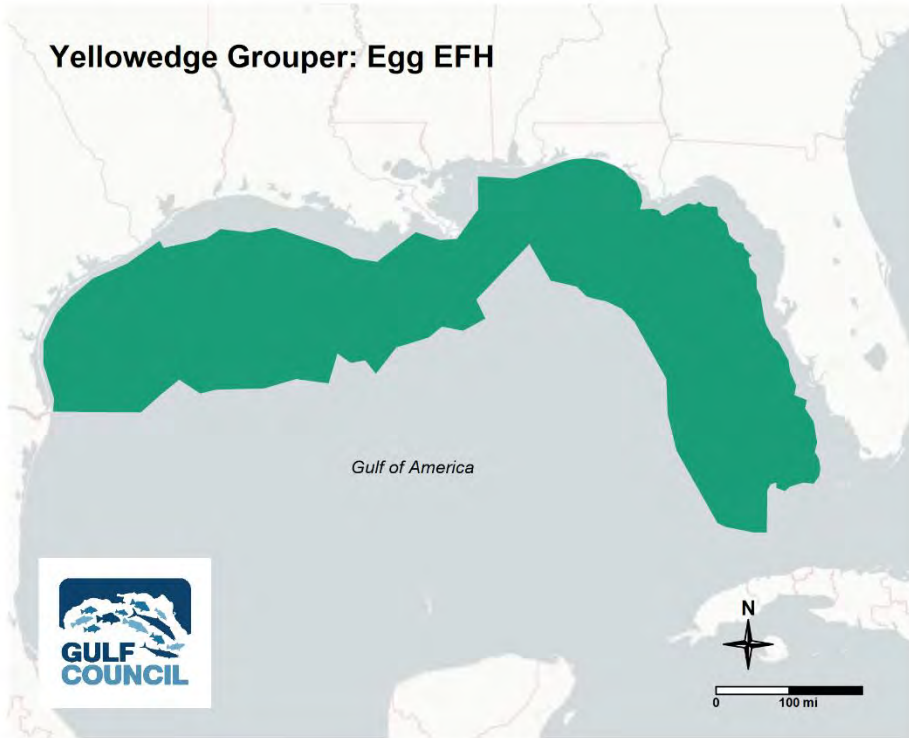


Figure C.1.163. Yellowedge grouper egg EFH map.

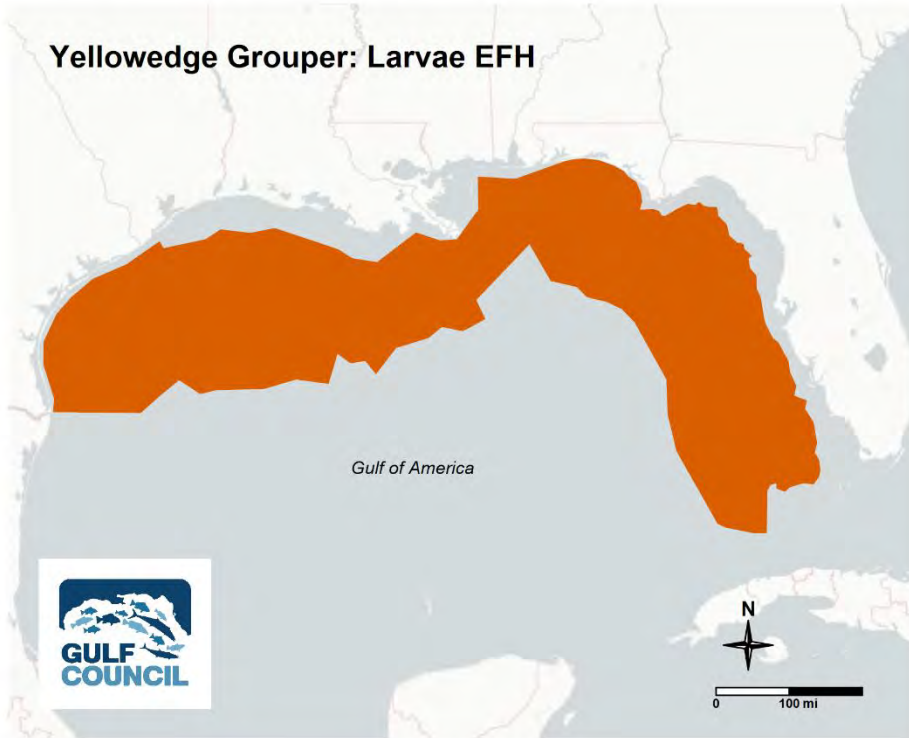


Figure C.1.164. Yellowedge grouper larvae EFH map.

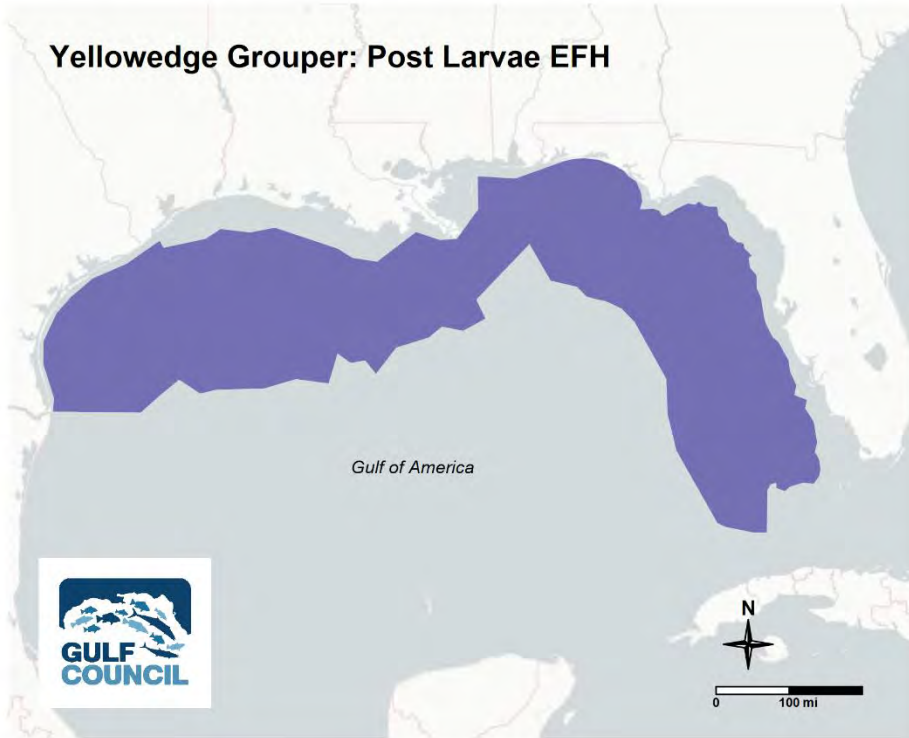


Figure C.1.165. Yellowedge grouper post larvae EFH map.

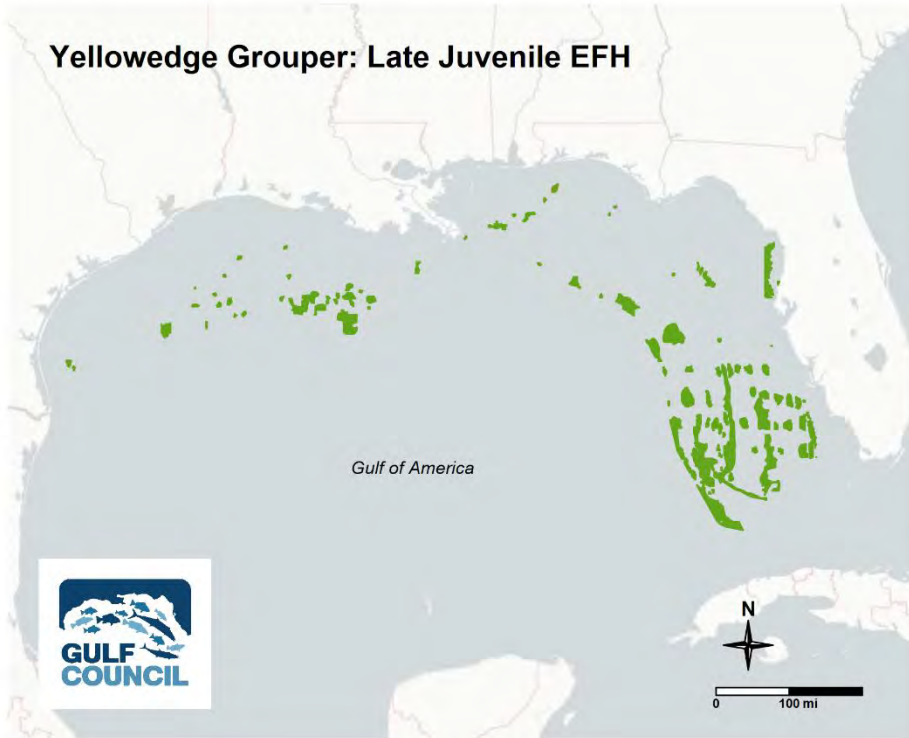


Figure C.1.166. Yellowedge grouper late juvenile EFH map.

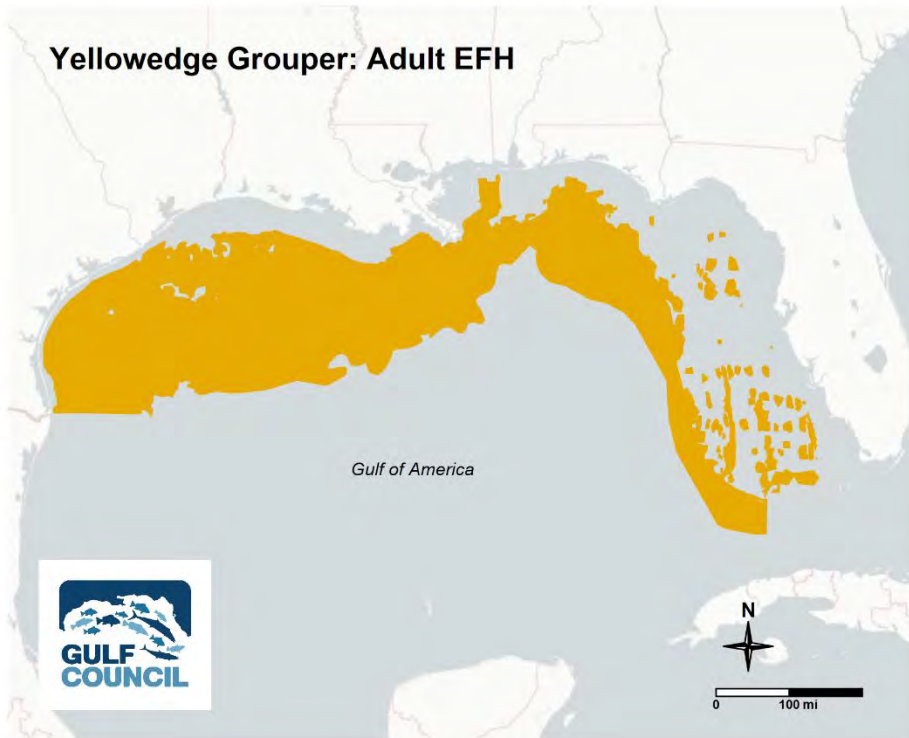


Figure C.1.167. Yellowedge grouper adult EFH map.

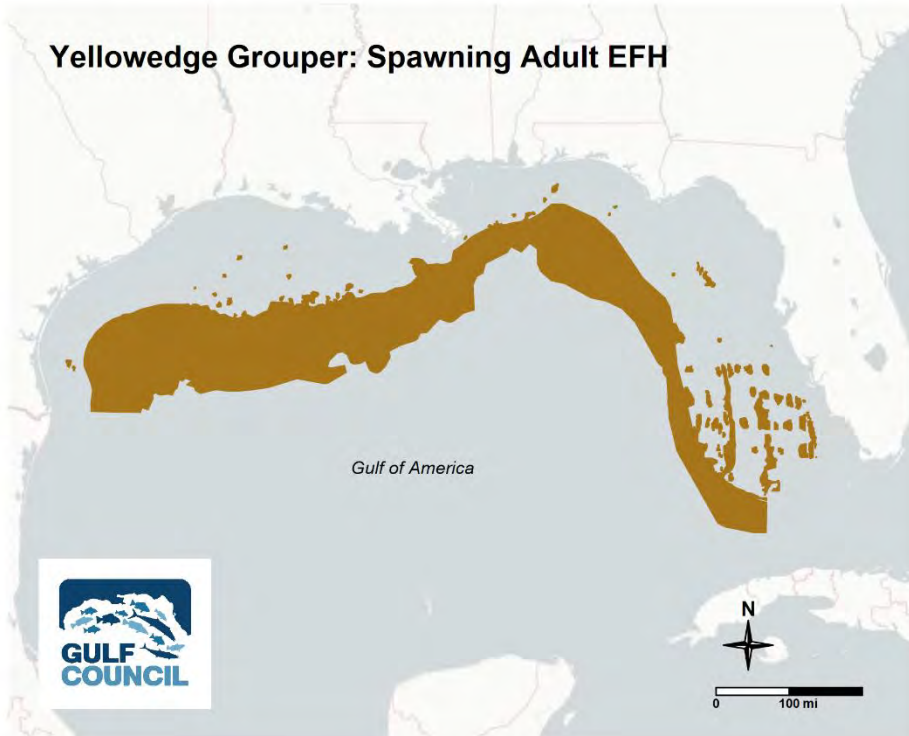


Figure C.1.168. Yellowedge grouper spawning adult EFH map.

Yellowfin grouper

Yellowfin grouper is not common in the Gulf, occurring primarily in the southeastern Gulf and West Indies. Habitat is comprised hard bottom/reefs from the shoreline to mid-shelf depths. Juveniles occupy shallow seagrass beds and move to deeper rocky bottoms with growth.

Egg: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Larvae: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Post Larvae: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat.

Early Juvenile: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth) habitats and are associated with submerged aquatic vegetation.

Late Juvenile: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth) habitats and are associated with submerged aquatic vegetation and hard bottom/reefs.

Adult: ER 1 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

Spawning Adult: ER 1 in offshore (greater than 60 feet [18m] in depth) habitat and are associated with the shelf/slope edge and hard bottom/reefs.

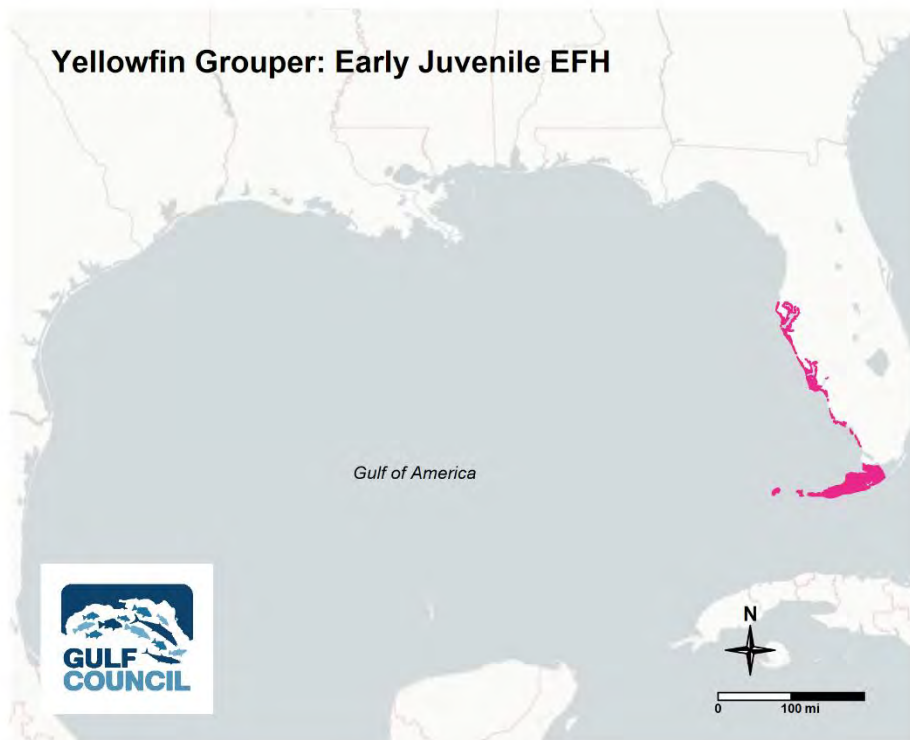


Figure C.1.169. Yellowfin grouper early juvenile EFH map.

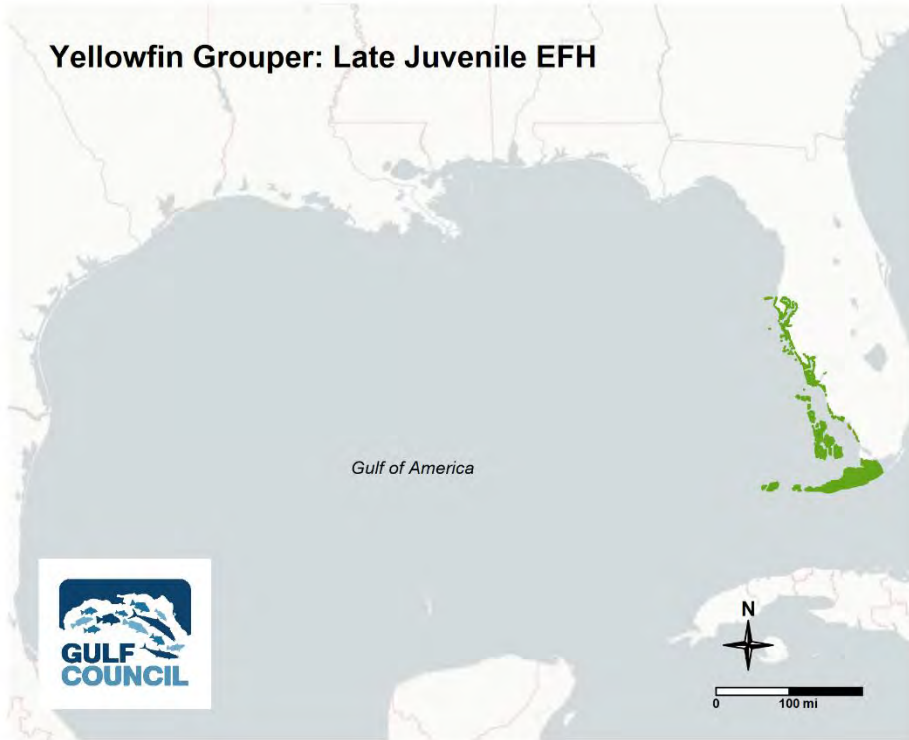


Figure C.1.170. Yellowfin grouper late juvenile EFH map.

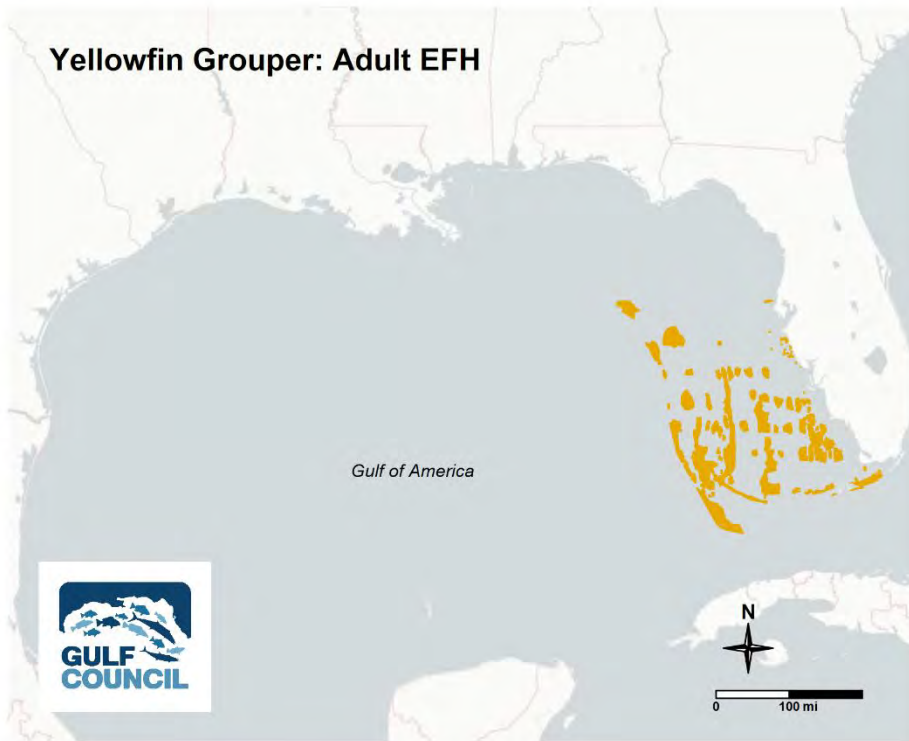


Figure C.1.171. Yellowfin grouper adult EFH map.

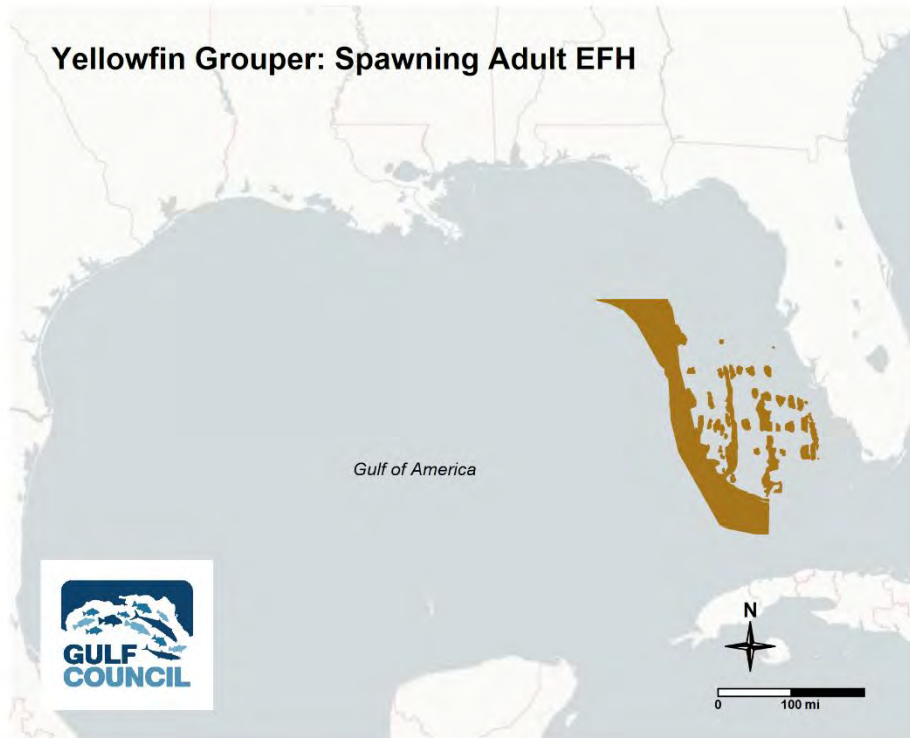


Figure C.1.172. Yellowfin grouper spawning adult EFH map.

Yellowmouth grouper

Yellowmouth grouper occur off of the Campeche Banks, the west coast of Florida, Texas Flower Garden Banks National Marine Sanctuary, and the northwest coast of Cuba. Yellowmouth grouper occupy hard bottom/reefs, and juveniles commonly occur in mangrove-lined lagoons and move into deeper water as they grow.

Egg: ER 1 and ER 5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 66-620 feet [20-189m], and are associated with the water column.

Larvae: ER 1 and ER 5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 66-620 feet [20-189m], and are associated with the water column.

Post Larvae: ER 1 and ER 5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 66-620 feet [20-189m], and are associated with the water column.

Early Juvenile: ER 1 and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with mangrove habitat.

Late Juvenile: ER 1 and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats associated with mangrove habitat.

Adult: ER 1, ER 2, ER 4, and ER 5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 66-620 feet [20-189m], and are associated with banks/shoals and hard bottom/reefs.

Spawning Adult: ER 1, ER 2, and ER 5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths between 66-620 feet [20-189m], and are associated with the water column.

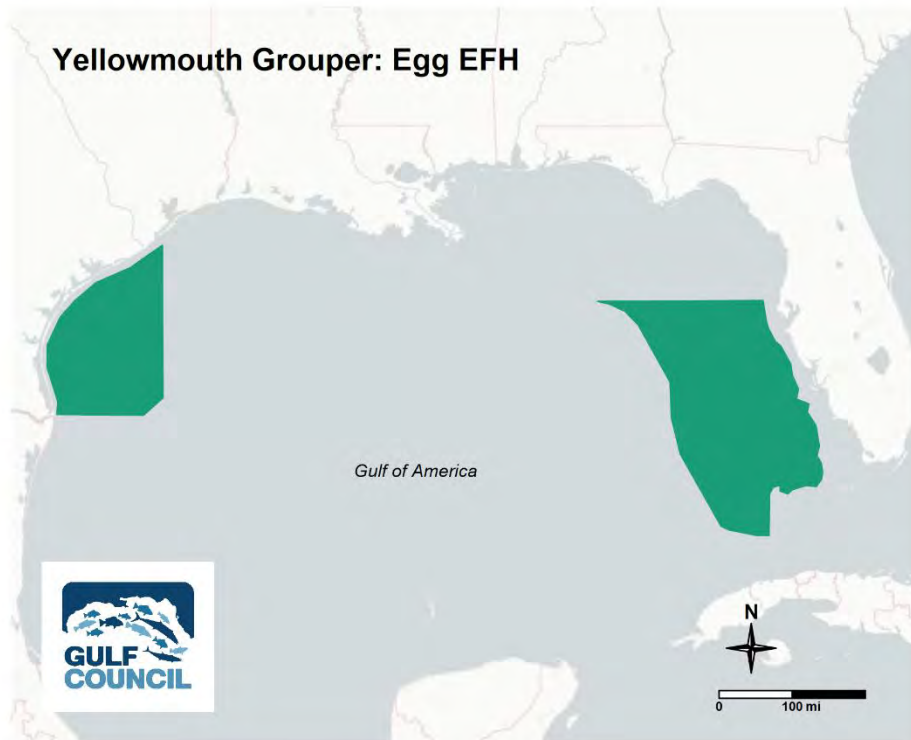


Figure C.1.173. Yellowmouth grouper egg EFH map.

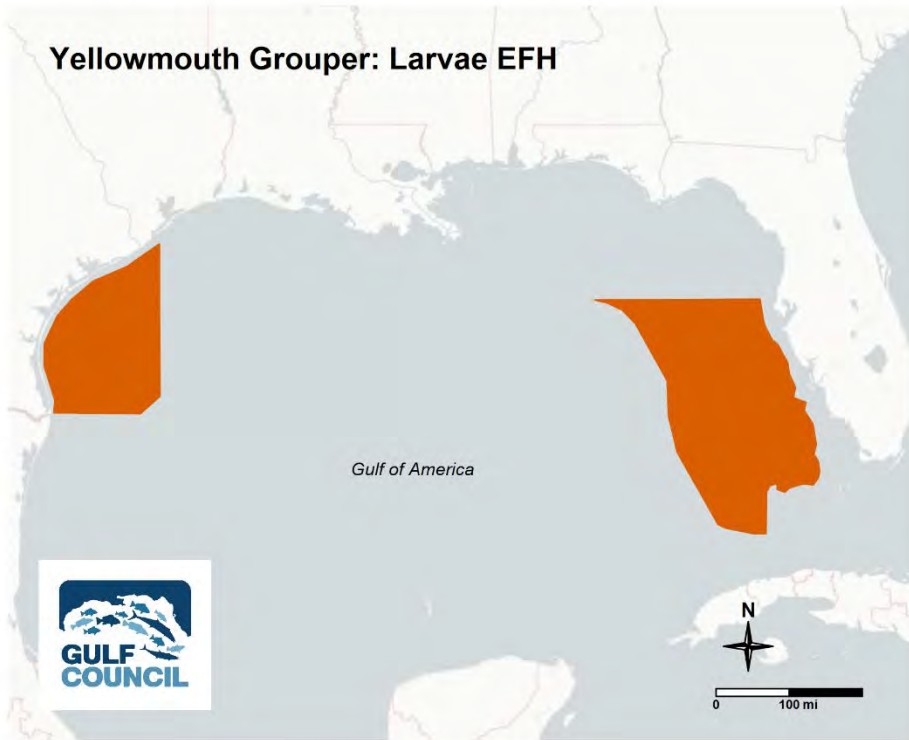


Figure C.1.174. Yellowmouth grouper larvae EFH map.

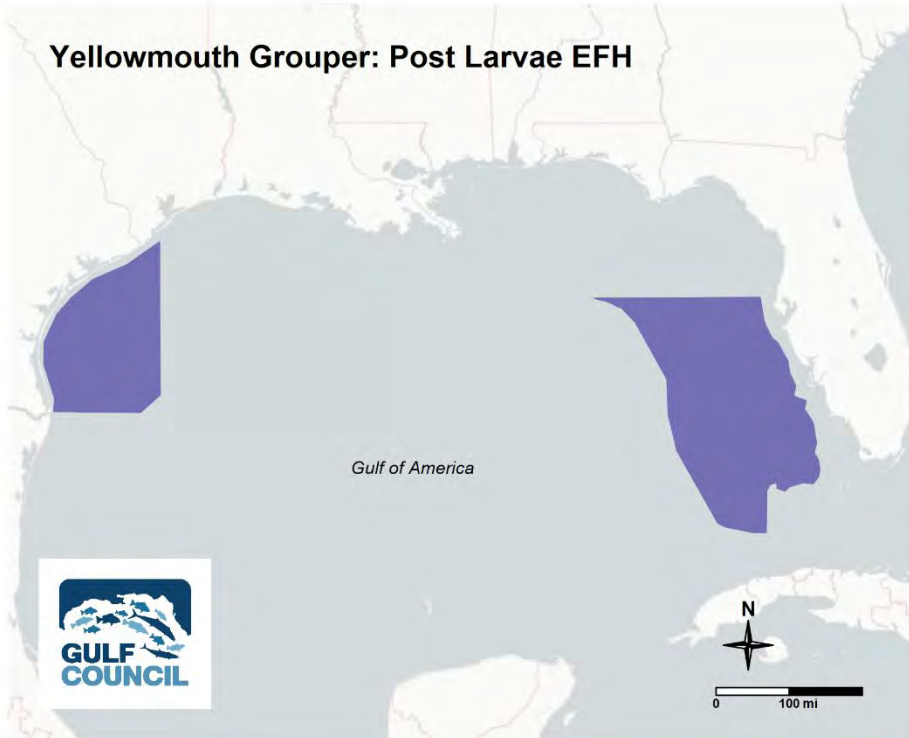


Figure C.1.175. Yellowmouth grouper post larvae EFH map.

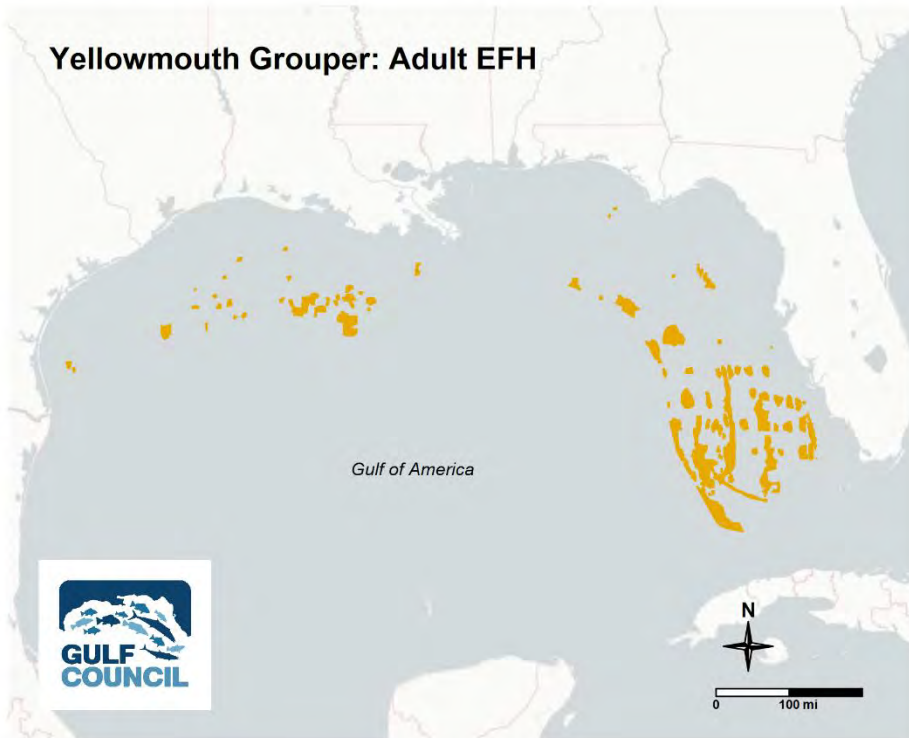


Figure C.1.176. Yellowmouth grouper adult EFH map.

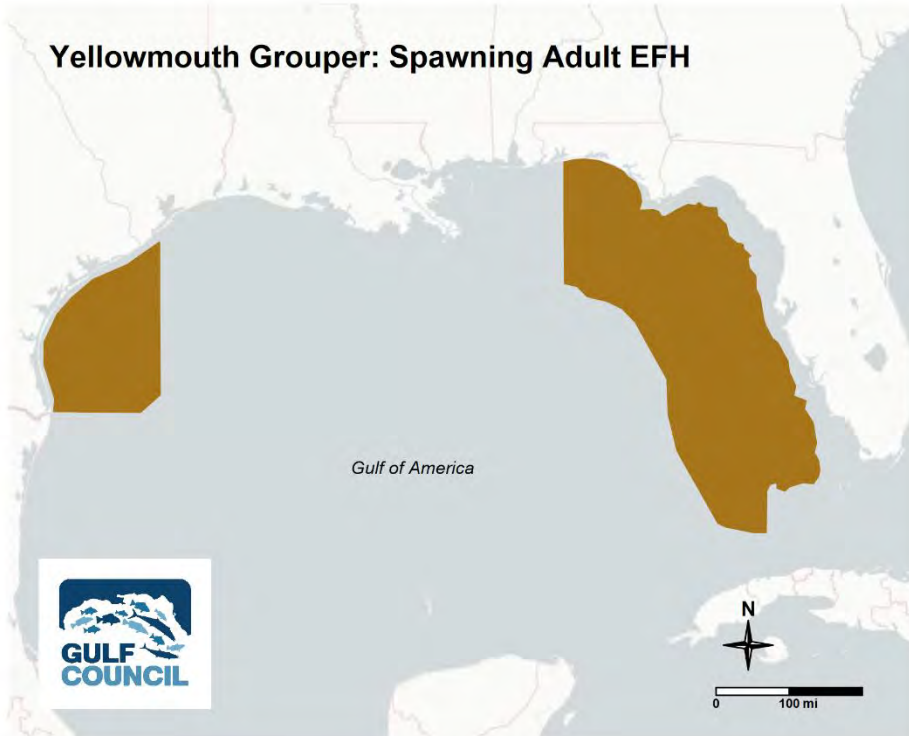


Figure C.1.177. Yellowmouth grouper spawning adult EFH map.

Yellowtail snapper

Yellowtail snapper are distributed throughout the southeastern portion of the Gulf, along the shelf, but are most common off central and southern Florida. This species occurs over hard bottom/reefs and near the edge of shelves and banks. Juveniles are found in nearshore nursery areas over vegetated sandy substrate and in muddy shallow bays. Submerged aquatic vegetation, *Thalassia* spp. beds and mangrove roots are apparent preferred habitat for early juveniles. Late juveniles apparently select shallow reef areas as primary habitat. Adults are found from shallow waters to depths of 600 feet [183m] but generally are taken in less than 164 feet [50m] depths. Adults are considered to be semi-pelagic wanderers over reef habitat.

Egg: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Larvae: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Post Larvae: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Early Juvenile: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats and are associated with submerged aquatic vegetation and mangrove habitat.

Late Juvenile: ER 1 and ER 2 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

Adult: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with hard bottom/reefs.

Spawning Adult: ER 1 and ER 2 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats.

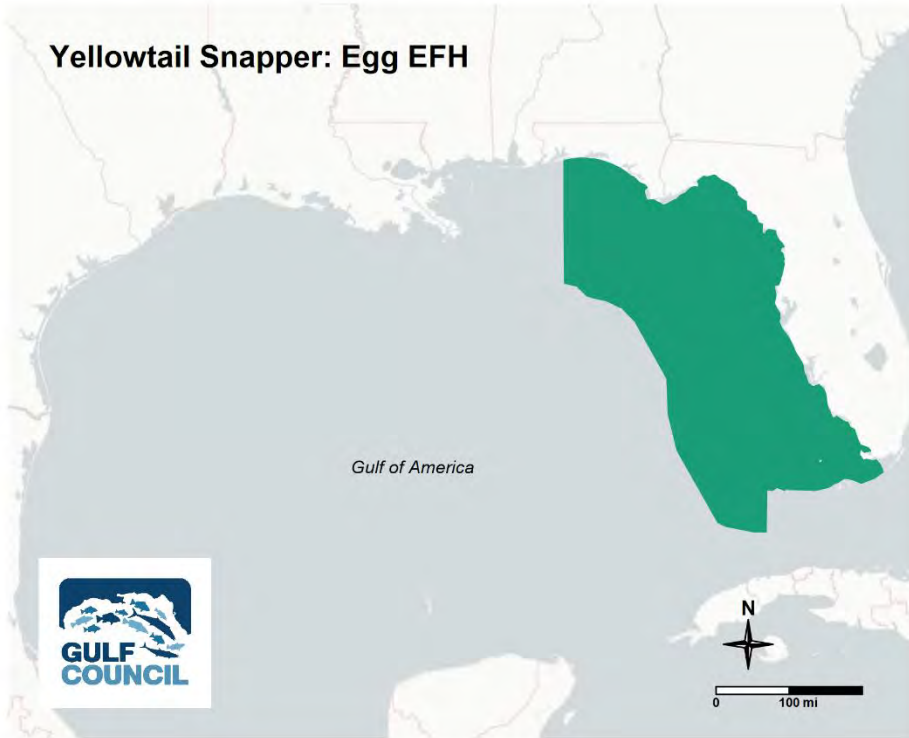


Figure C.1.178. Yellowtail snapper egg EFH map.

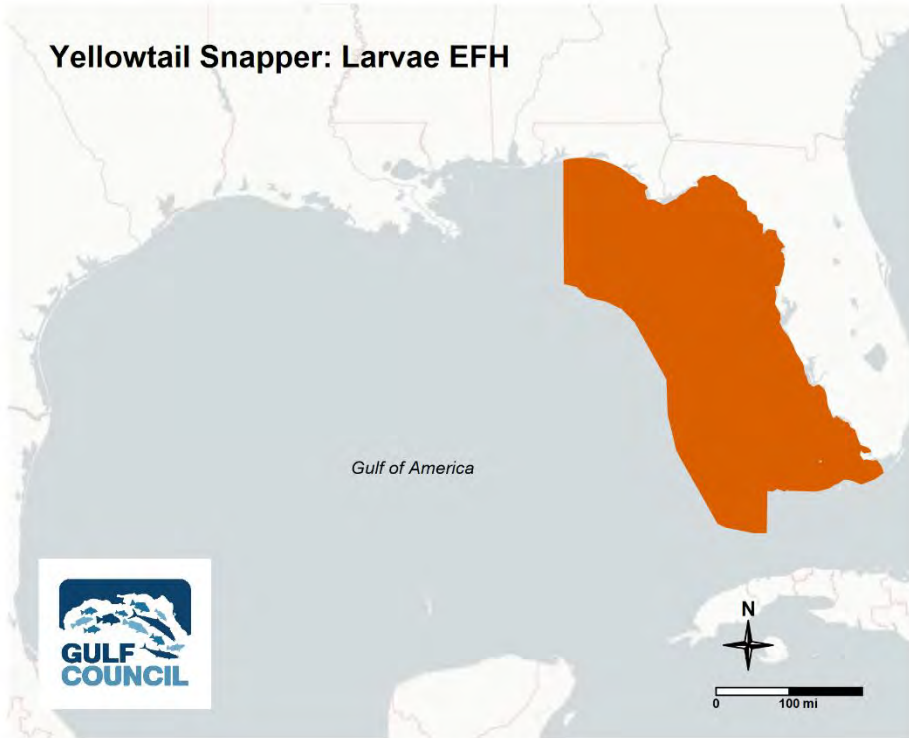


Figure C.1.179. Yellowtail snapper larvae EFH map.

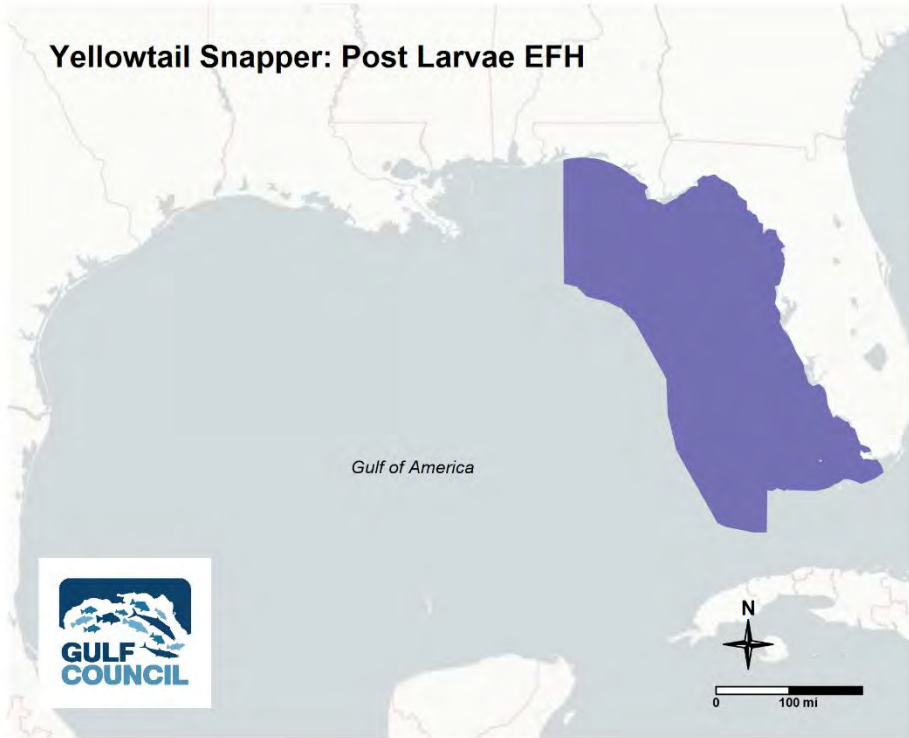


Figure C.1.180. Yellowtail snapper post larvae EFH map.

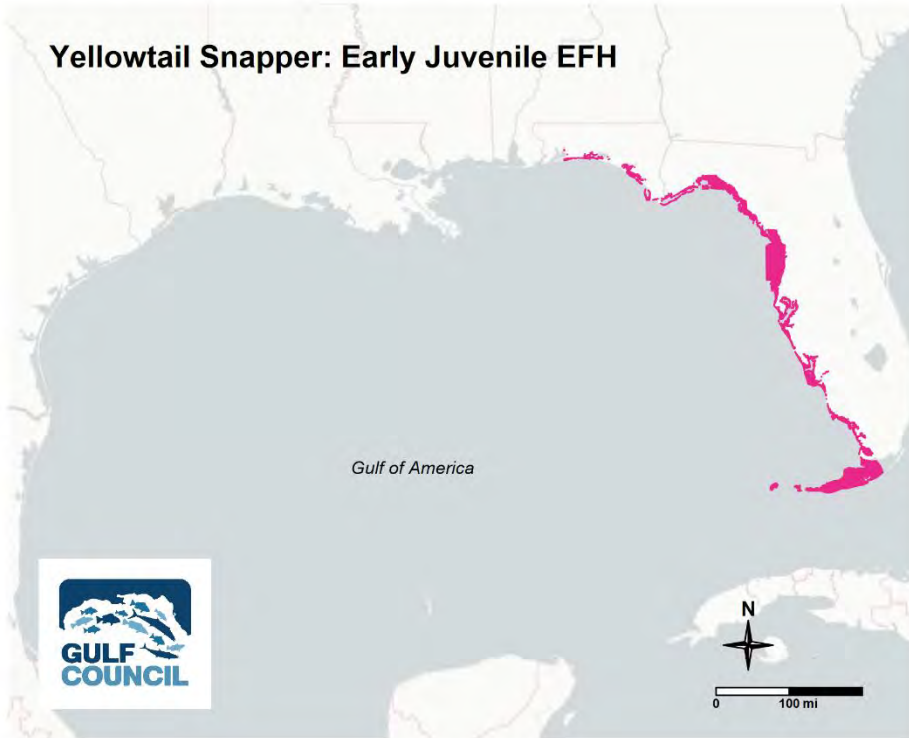


Figure C.1.181. Yellowtail snapper early juvenile EFH map.

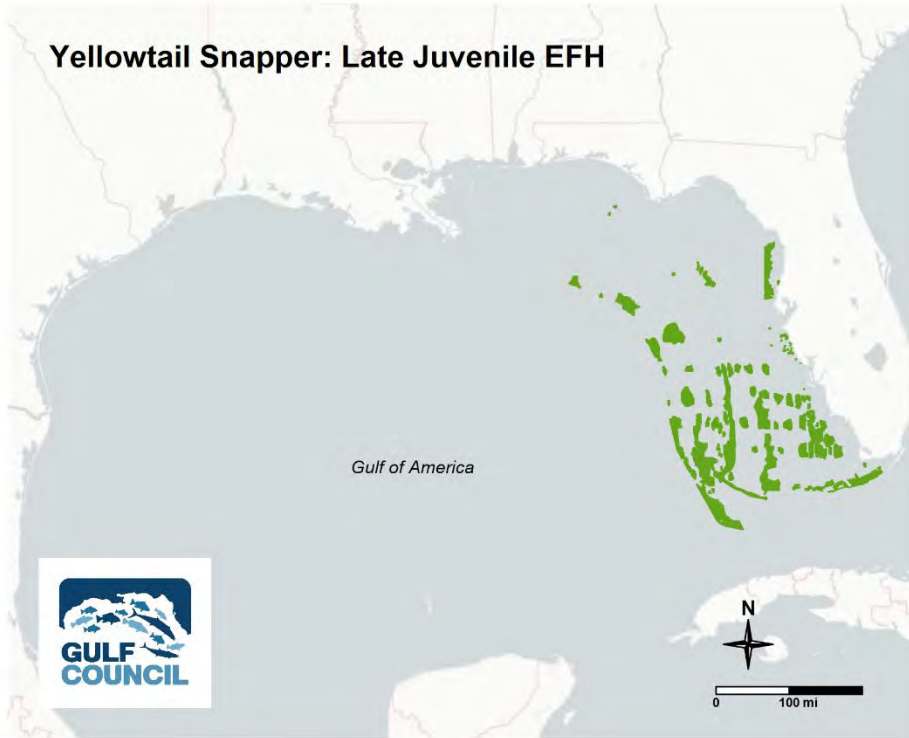


Figure C.1.182. Yellowtail snapper late juvenile EFH map.

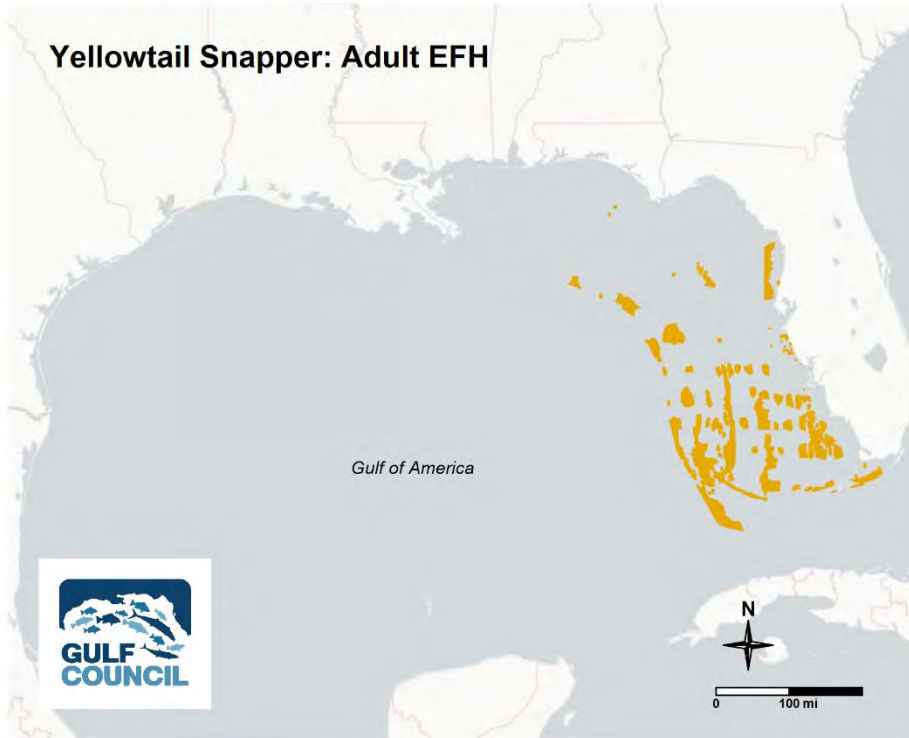


Figure C.1.183. Yellowtail snapper adult EFH map.

C. 2. Coastal Migratory Pelagics

Cobia

Cobia are found in coastal and offshore waters (from bays and inlets to the continental shelf) from depths of 1-70 m. Spawning occurs in coastal waters from April through September at temperatures ranging from 23-28 °C. Cobia migrate seasonally, similar to other coastal pelagic species in the same family. Eggs are found in the top meter of the water column, drifting with the currents. Larvae are found in surface waters of the northern Gulf, where they likely feed on zooplankton. Juveniles occur in coastal and offshore waters.

Egg: ER 2, ER 3, ER 4, and ER 5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats concentrated in depths <1m and are associated with the water column.

Larvae: ER 2, ER 3, and ER 4, and ER 5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Post Larvae: ER 3, ER 4, and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Early Juvenile: ER 3, ER 4, and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Late Juvenile: ER 3, ER 4, and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 1-70m, and are associated with the water column.

Adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 1-70m, and are associated with the water column and banks/shoals.

Spawning Adult: ER 3, ER 4, and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 1-70m, and are associated with the water column.

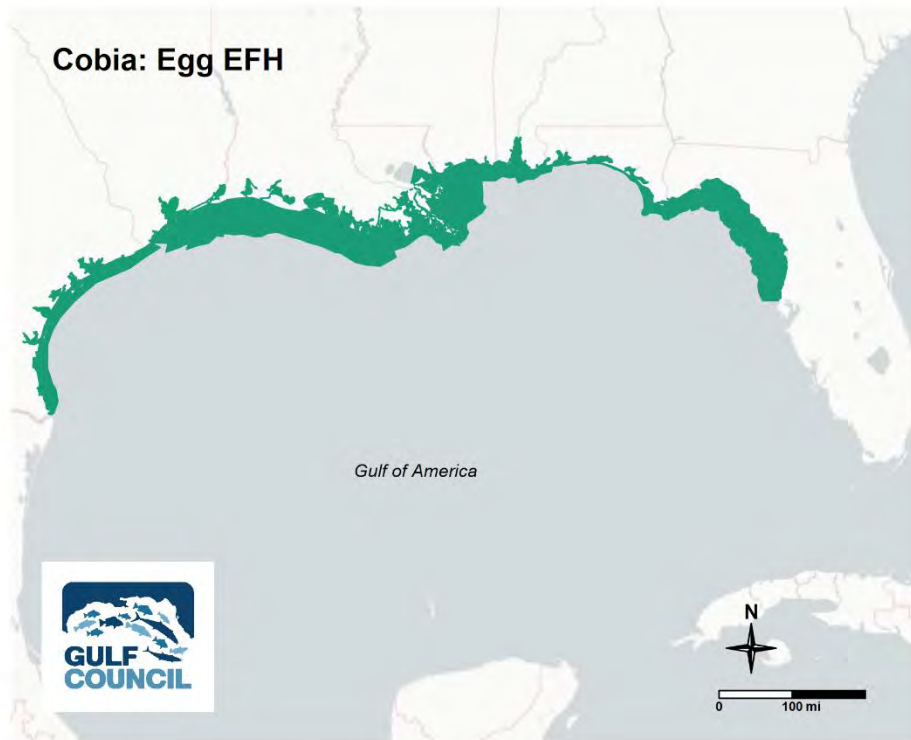


Figure C.2.1. Cobia egg EFH map.

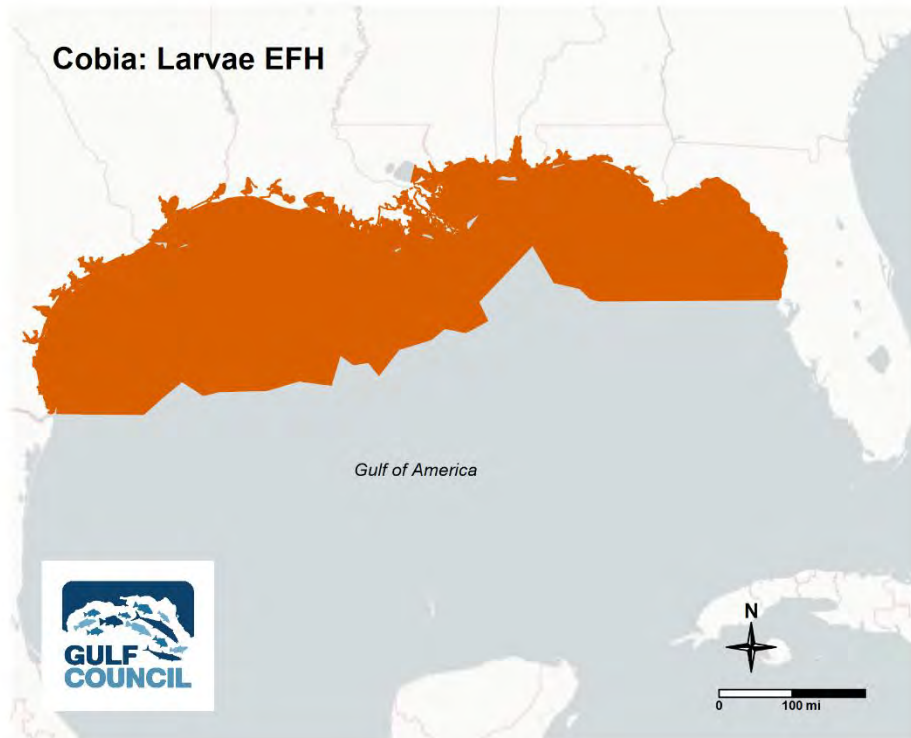


Figure C.2.2 Cobia larvae EFH map.

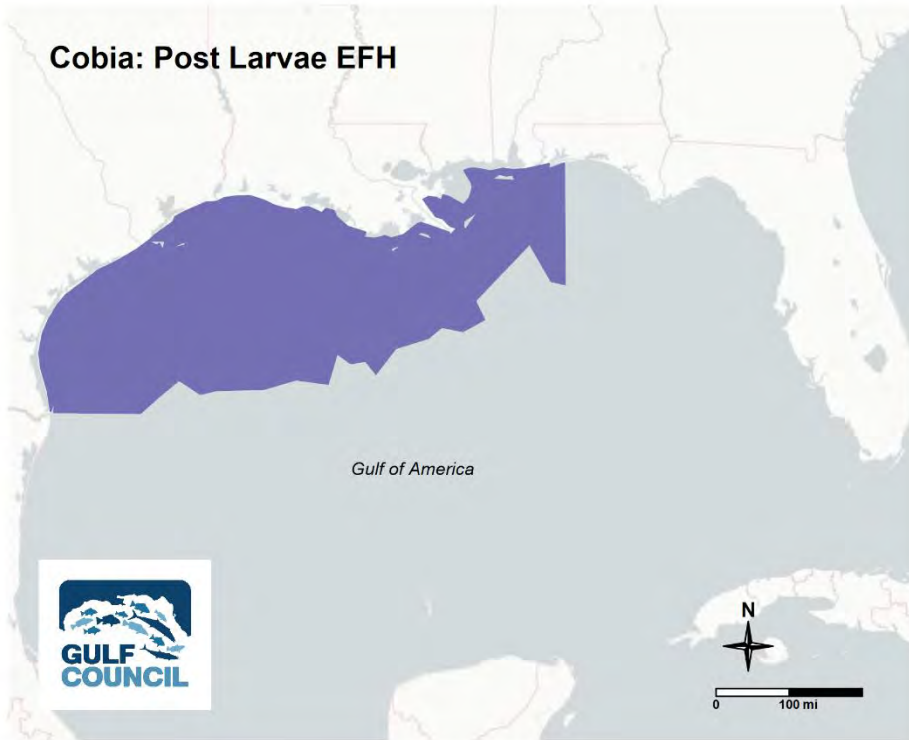


Figure C.2.3. Cobia post larvae EFH map.

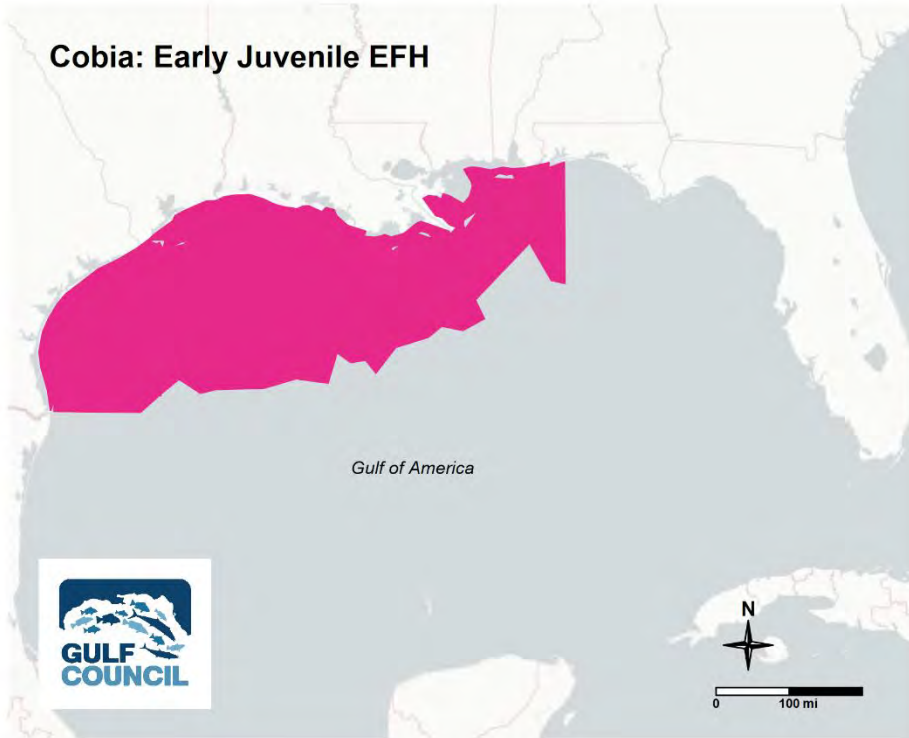


Figure C.2.4 Cobia early juvenile EFH map.

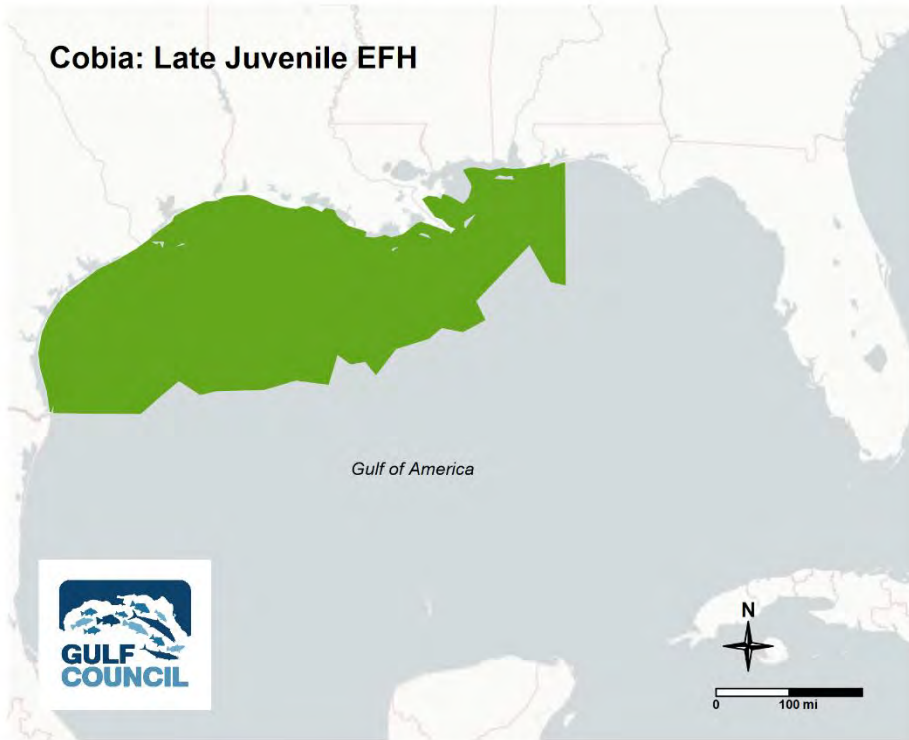


Figure C.2.5 Cobia late juvenile EFH map.

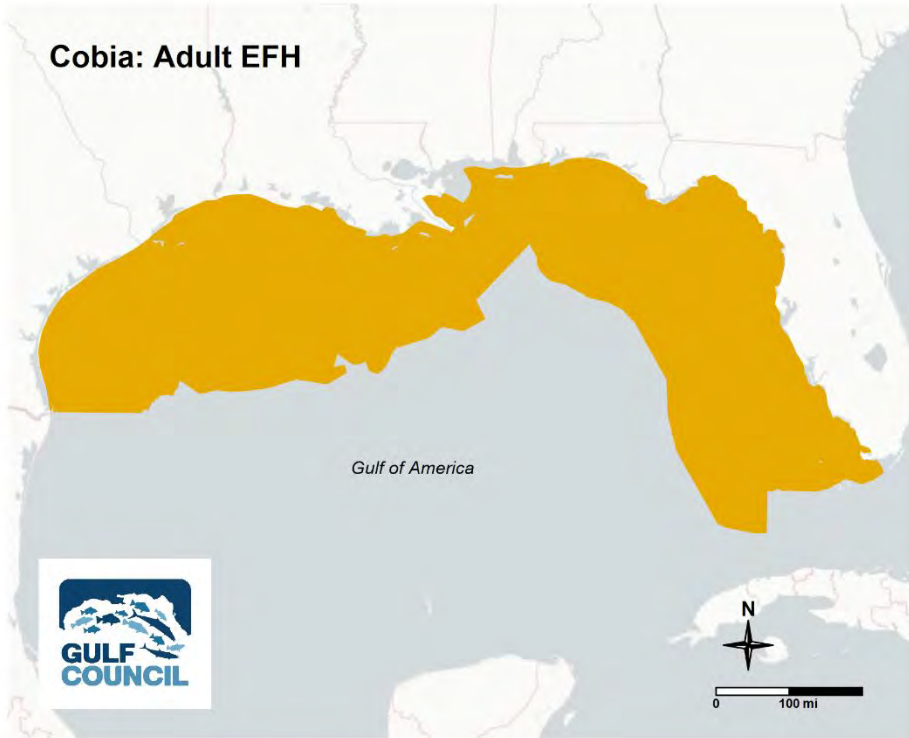


Figure C.2.6. Cobia adult EFH map.

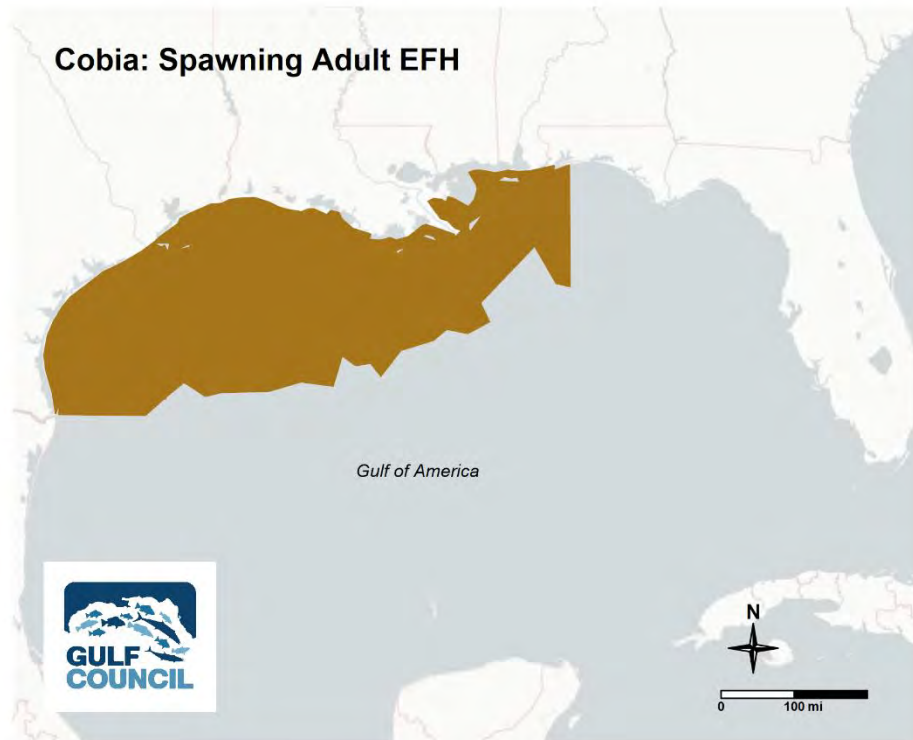


Figure C.2.7 Cobia spawning adult EFH map.

King mackerel

King mackerel are widespread throughout the Gulf, with centers of distribution in south Florida and Louisiana. Adults are water column associated and can be found over reefs and in coastal waters, although they rarely enter estuaries. While adults can be found at the shelf edge in depths to 200 m, they generally occur in less than 80 m, at oceanic salinities from 32-36 ppt. Adults spawn over the outer continental shelf from May to October, with the northwestern and northeastern Gulf considered important spawning areas. The pelagic eggs are found offshore over depths of 35-180 m in spring and summer. Larvae occur over the middle and outer continental shelf, principally in the north central and northwestern Gulf, and juveniles are found from inshore to the middle shelf. Migrations to the northern Gulf in the spring are thought to be temperature dependent, and the species is found in highest abundances in waters with temperatures greater than 20°C.

Egg: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 35-180m, and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 35-180m, and are associated with the water column.

Post Larvae: Information not available.

Early Juvenile: ER 3, ER 4, and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Late Juvenile: ER 3, ER 4, and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Spawning Adult: ER 3, ER 4, and ER 5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 35-180m, and are associated with the water column.

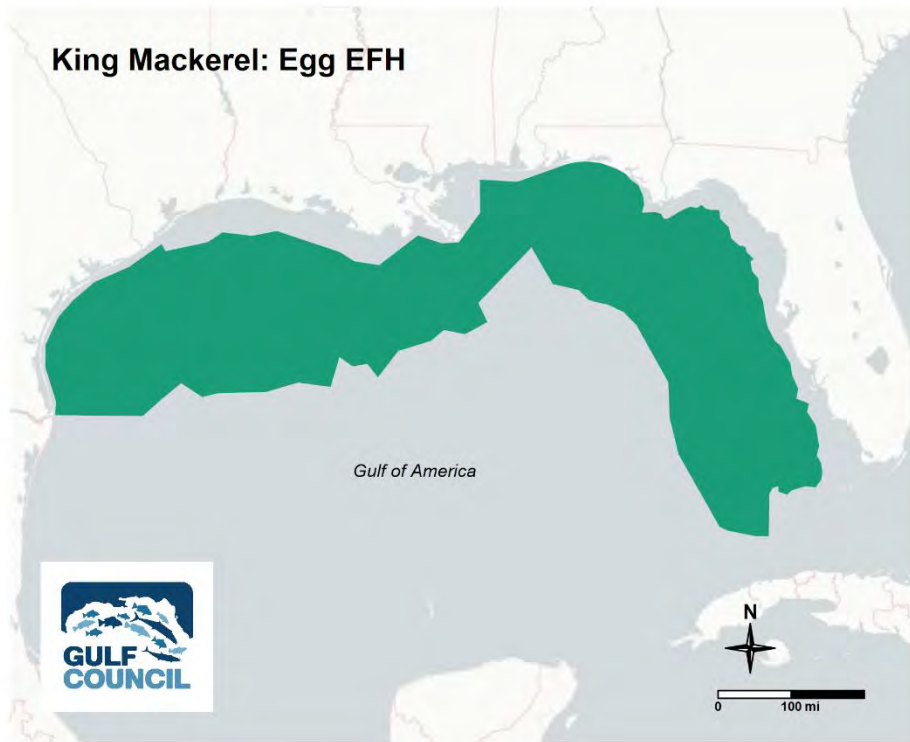


Figure C.2.8. King mackerel egg EFH map.

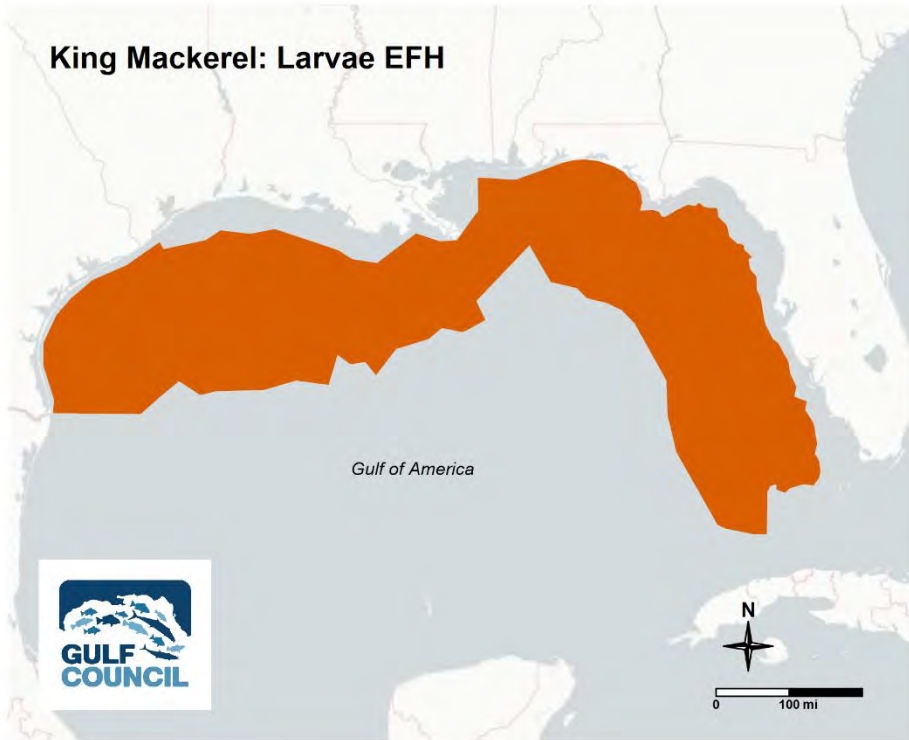


Figure C.2.9. King mackerel larvae EFH map.

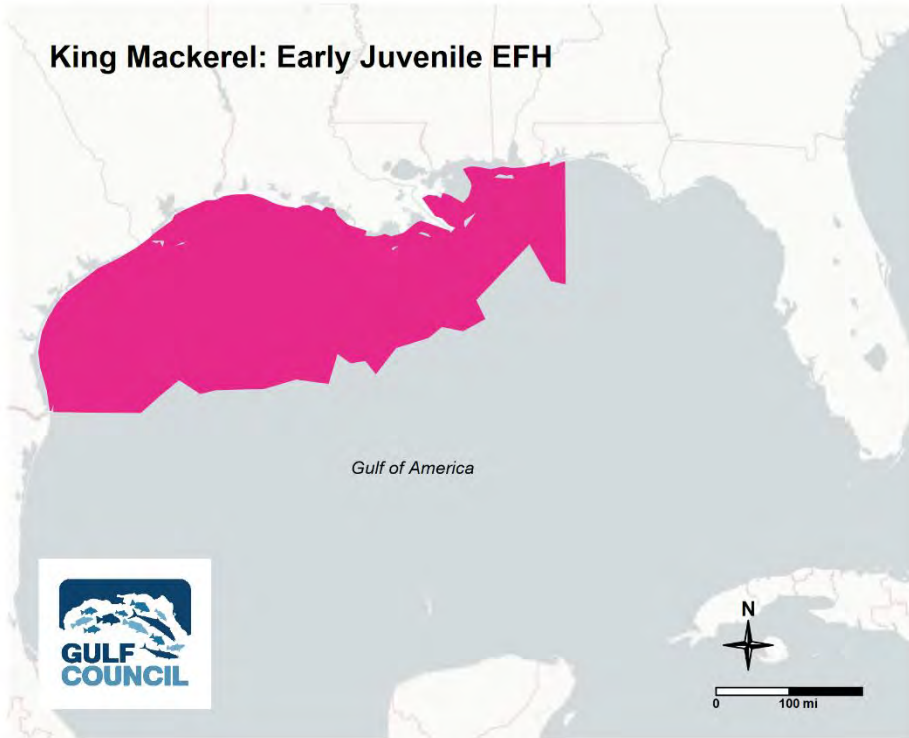


Figure C.2.10. King mackerel early juvenile EFH map.

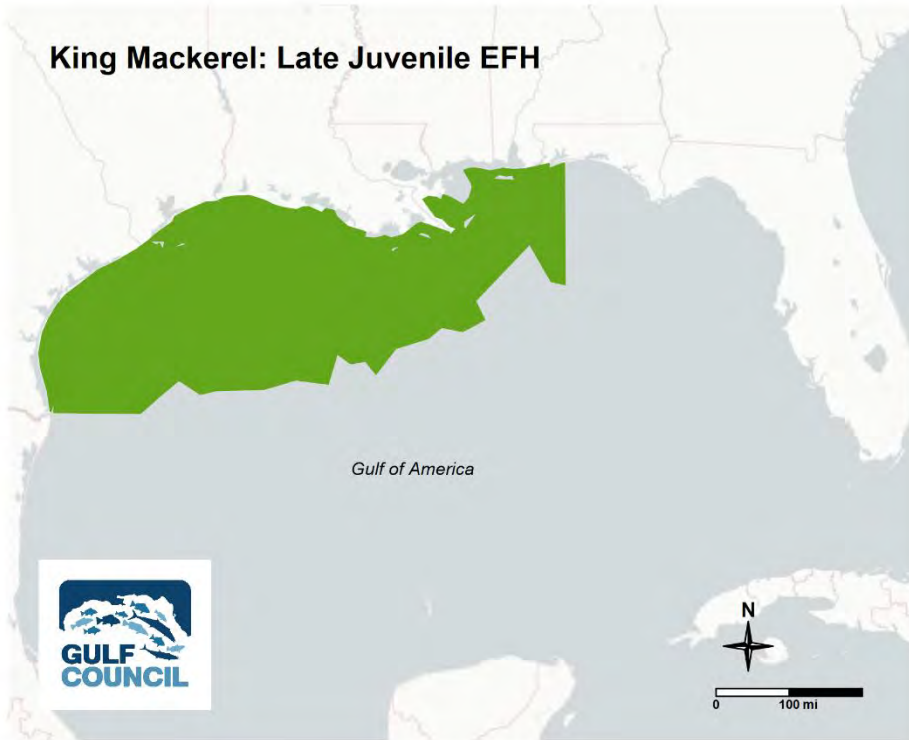


Figure C.2.11. King mackerel late juvenile EFH map.

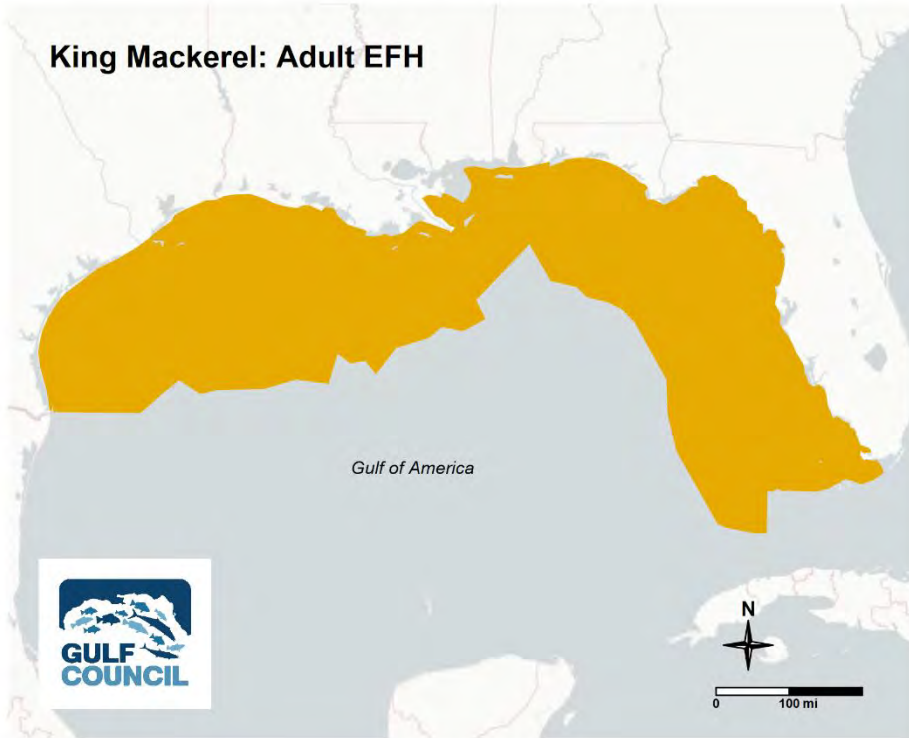


Figure C.2.12. King mackerel adult EFH map.

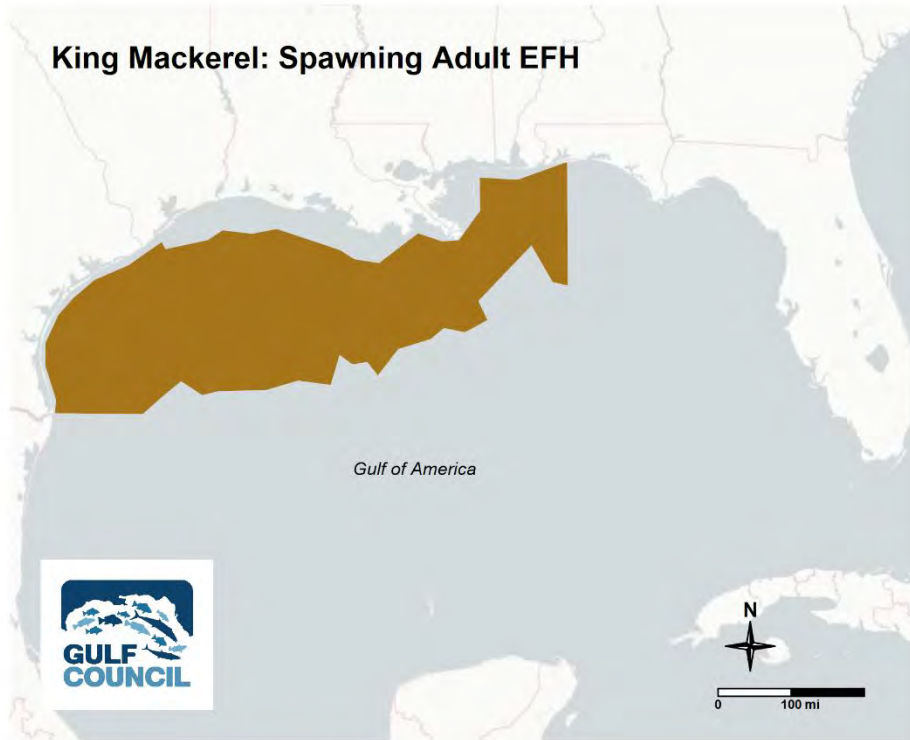


Figure C.2.13. King mackerel spawning adult EFH map.

Spanish mackerel

Spanish mackerel occur throughout the coastal zones of the western Atlantic from southern New England to the Florida Keys and Gulf-wide ER 1-5⁵. Adults are found in coastal waters, and may enter estuaries in pursuit of baitfish. Migrations to the northern Gulf in the spring are temperature dependent, and the species is found in waters greater than 20°C, and out to depths of 75 m at oceanic salinities. Adults spawn over the inner continental shelf from May to September, with the north-central and northeastern Gulf considered important spawning areas. Eggs occur over the inner continental shelf at depths less than 50 m in spring and summer. Larvae occur over the inner continental shelf, principally in the northern Gulf.

Egg: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

Larvae: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats concentrated at depths 1-84m, and are associated with the water column.

Post Larvae: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats concentrated at depths 1-84m, and are associated with the water column.

⁵ Gulf-wide distribution per [October 2025 SSC recommendation](#).

Early Juvenile: Gulf-wide ER 1-5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats concentrated at depths 1.8-9m, and are associated with the water column and sandy bottom habitat.

Late Juvenile: Gulf-wide ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats concentrated at depths 1.8-50m, and are associated with the water column and sandy bottom habitat.

Adult: Gulf-wide ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats concentrated at depths 3-75m, and are associated with the water column.

Spawning Adult: Gulf-wide ER 1-5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats and are associated with the water column.

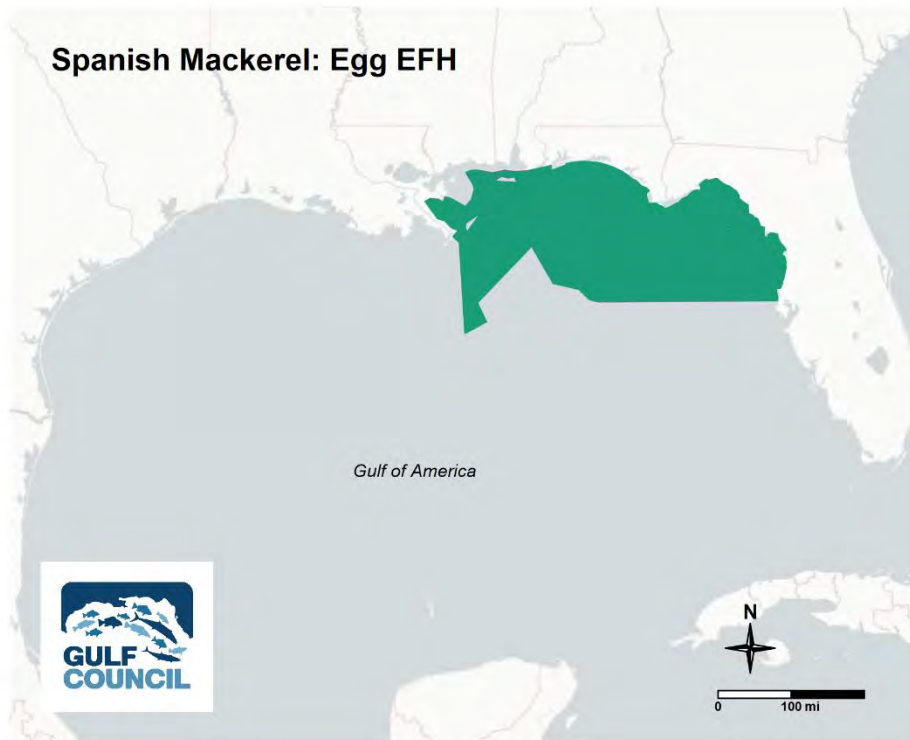


Figure C.2.14. Spanish mackerel egg EFH map.

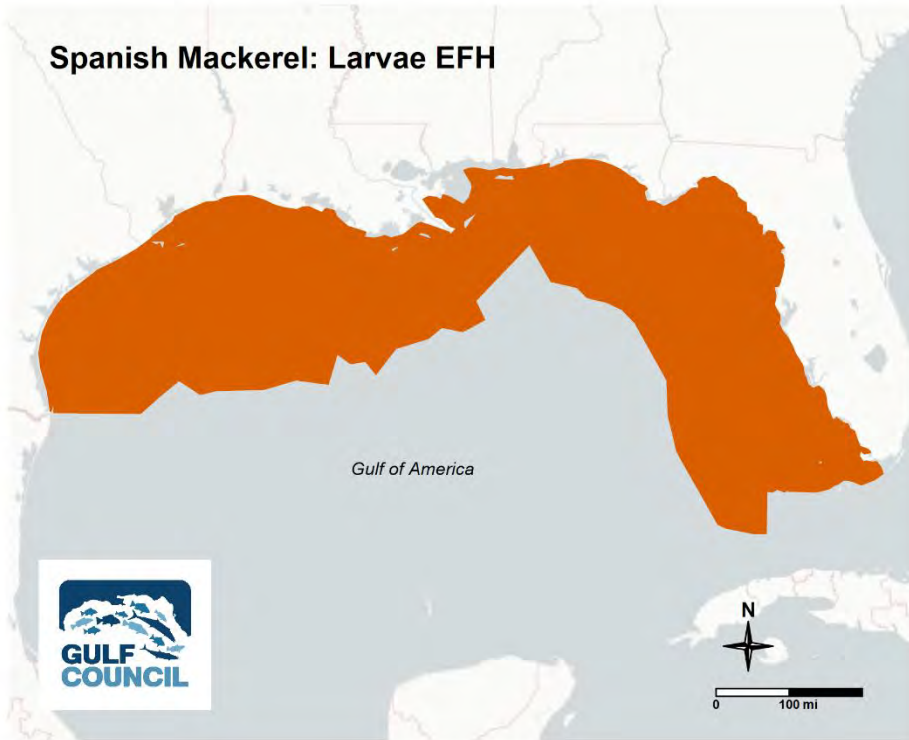


Figure C.2.15. Spanish mackerel larvae EFH map.

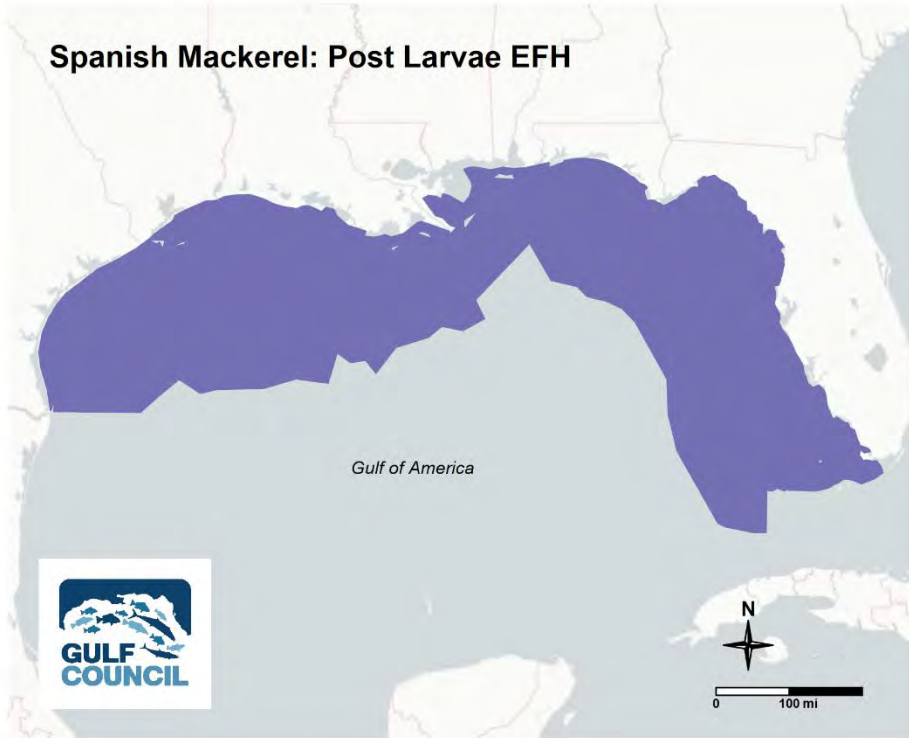


Figure C.2.16. Spanish mackerel post larvae EFH map.

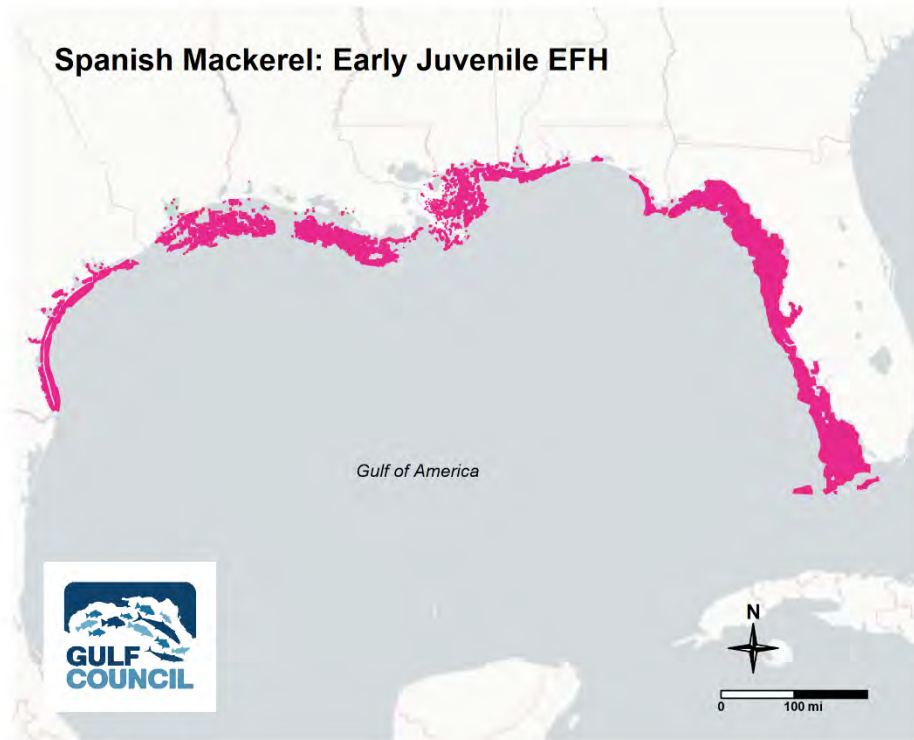


Figure C.2.17. Spanish mackerel early juvenile EFH map.

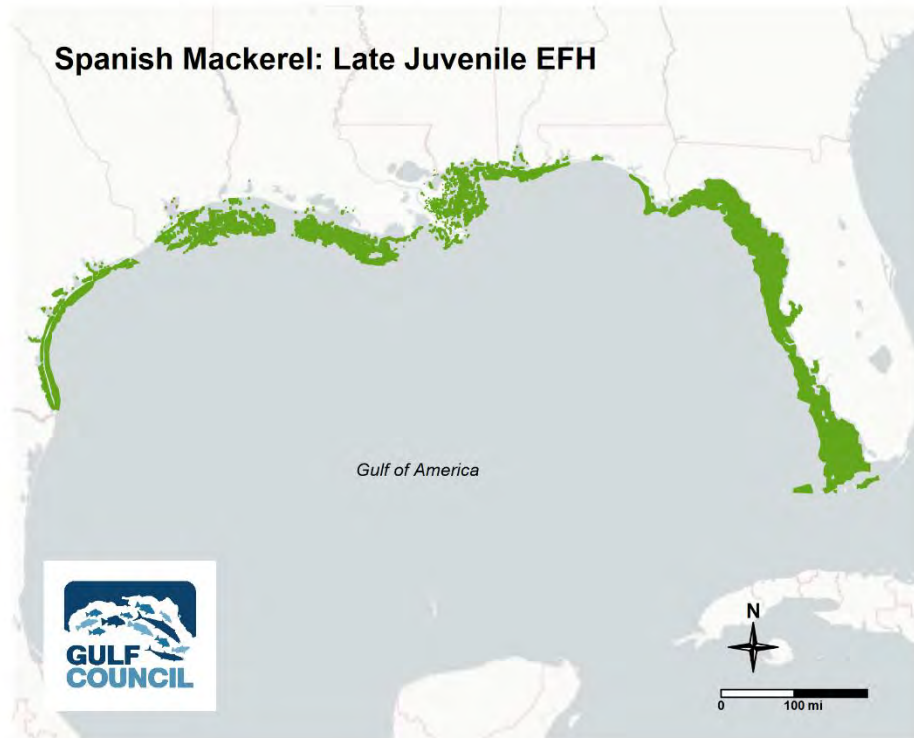


Figure C.2.18. Spanish mackerel late juvenile EFH map.

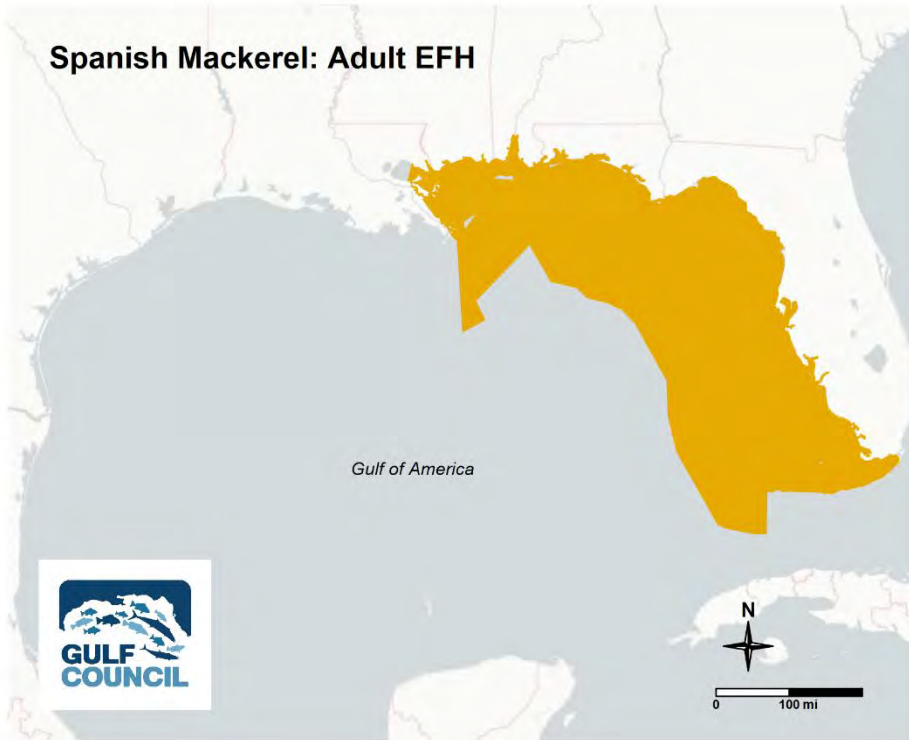


Figure C.2.19. Spanish mackerel adult EFH map.

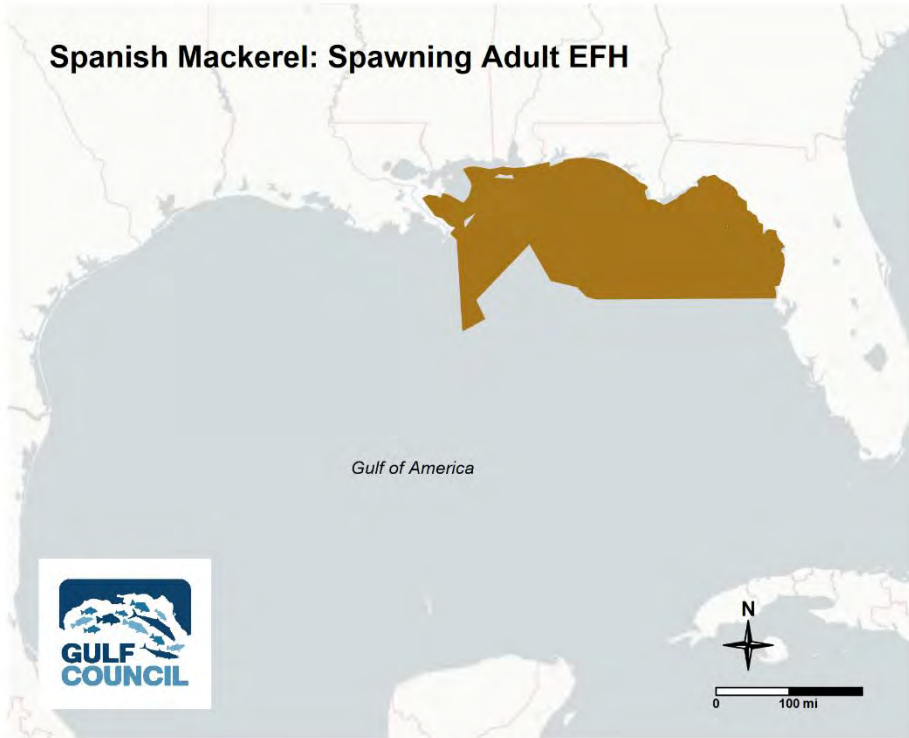


Figure C.2.20. Spanish mackerel spawning adult EFH map.

C.3. Shrimp

Brown shrimp

Brown shrimp are found within estuaries to offshore depths of 110 m in the Gulf, ranging mainly from Apalachicola Bay to the Yucatan Peninsula. Brown shrimp spatial distributions are affected by hypoxia rely on wetland and marsh habitat.

Fertilized eggs: ER 3, ER 4, and ER 5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths between 18-110m, associated with soft bottom, and sand/shell substrate.

Larvae/ Pre-settlement Post larvae: ER 3, ER 4, and ER 5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths between 0-82m, associated with the water column.

Late post larvae/ Early juvenile: ER 3, ER 4, and ER 5 in estuarine (inside barrier islands and estuaries) habitats, concentrated in depths < 1m, associated with submerged aquatic vegetation, emergent marsh, oyster reef, soft bottom and sand/shell substrate.

Sub Adults (Late Juvenile): ER 3, ER 4, and ER 5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats, associated with soft bottom and sand/shell substrate.

Adults: Gulf-wide in ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths between 10-37m, associated with soft bottom, mangroves and sand/shell substrate.

Spawning adults: ER 3, ER4, and ER 5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths between 18-110m, associated with soft bottom, mangroves and sand/shell substrate.

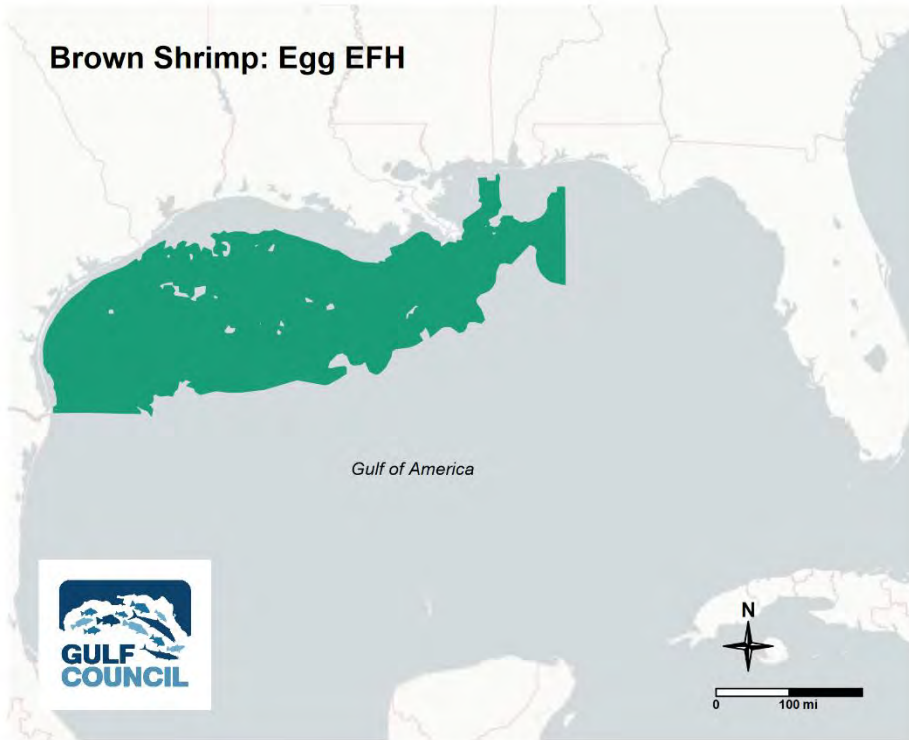


Figure C.3.1. Brown shrimp egg EFH map.

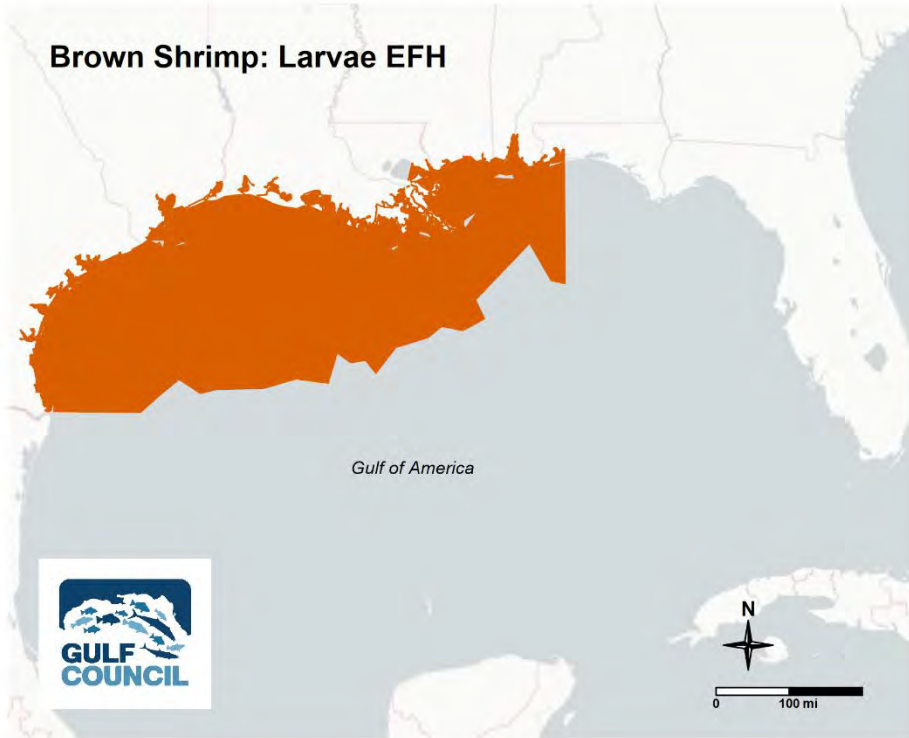


Figure C.3.2. Brown shrimp larvae EFH map.

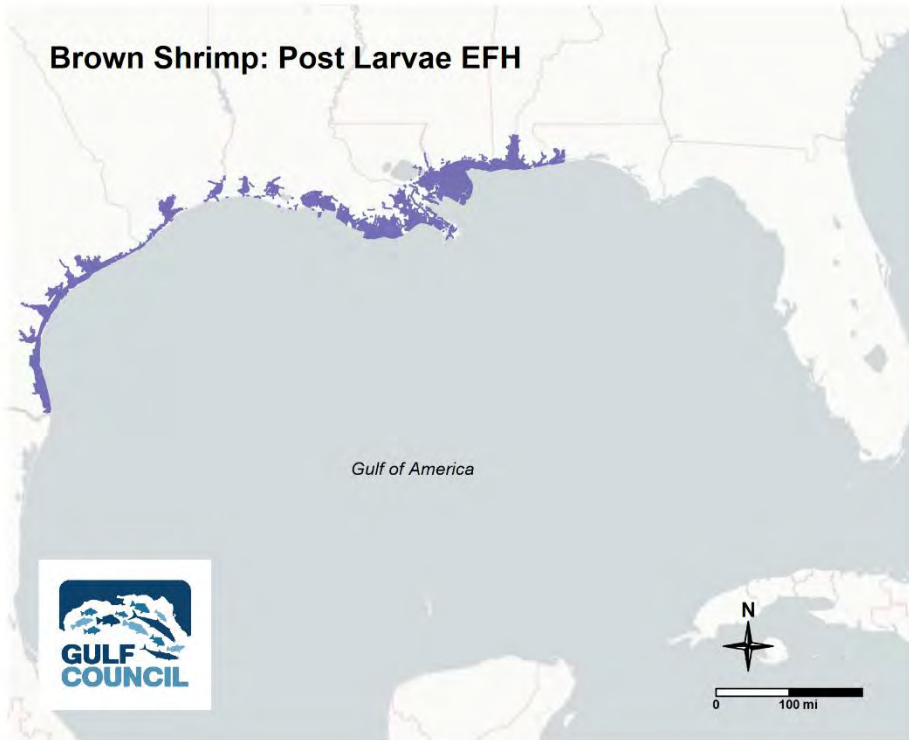


Figure C.3.3. Brown shrimp post larvae EFH map.

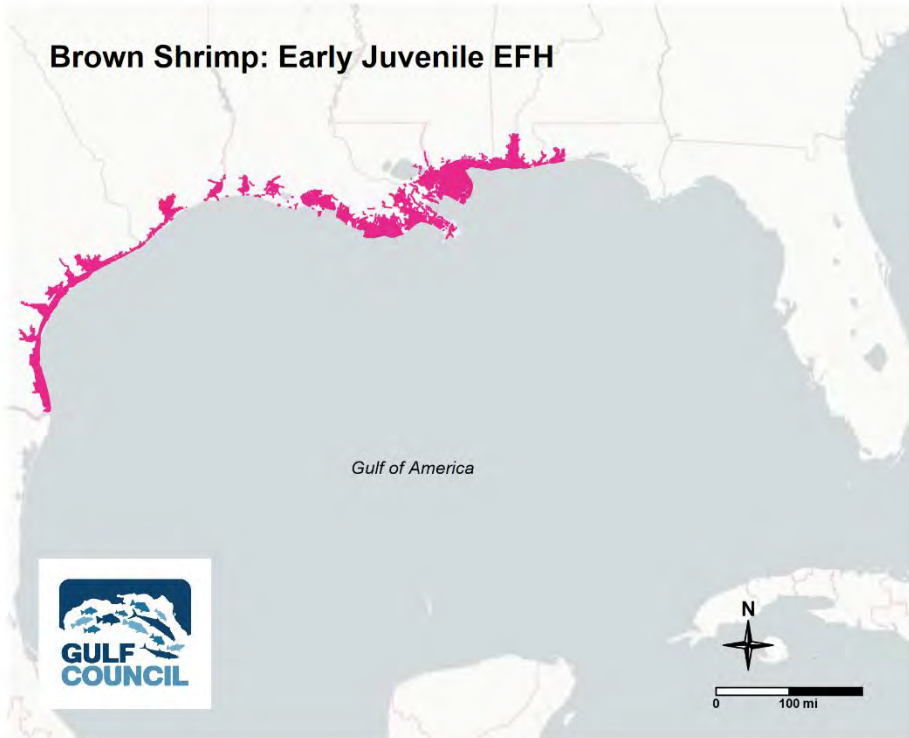


Figure C.3.4. Brown shrimp early juvenile EFH map.

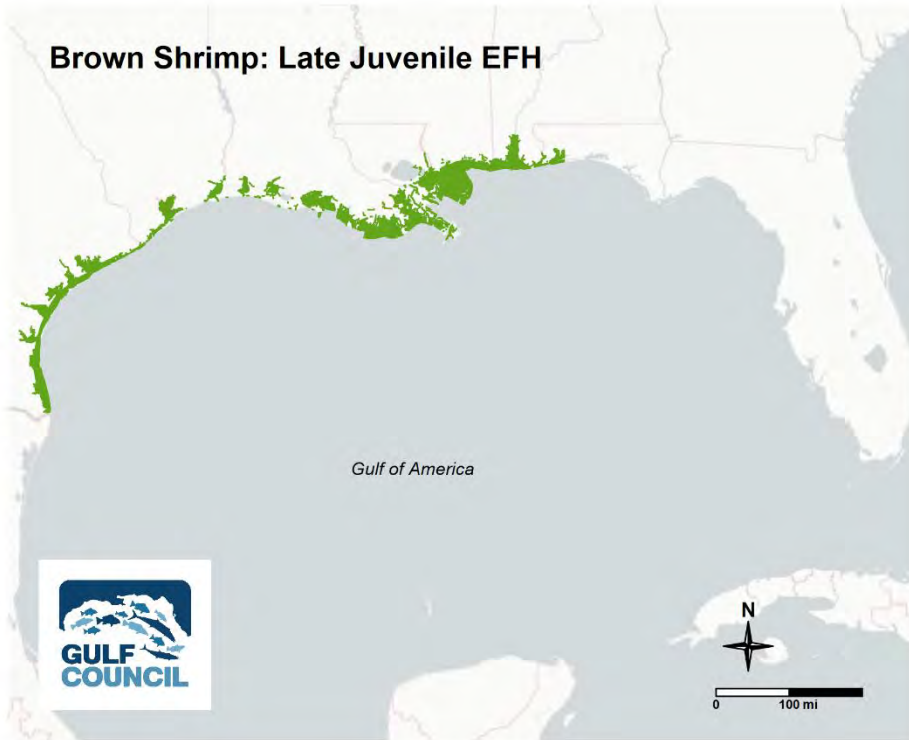


Figure C.3.5. Brown shrimp late juvenile EFH map.

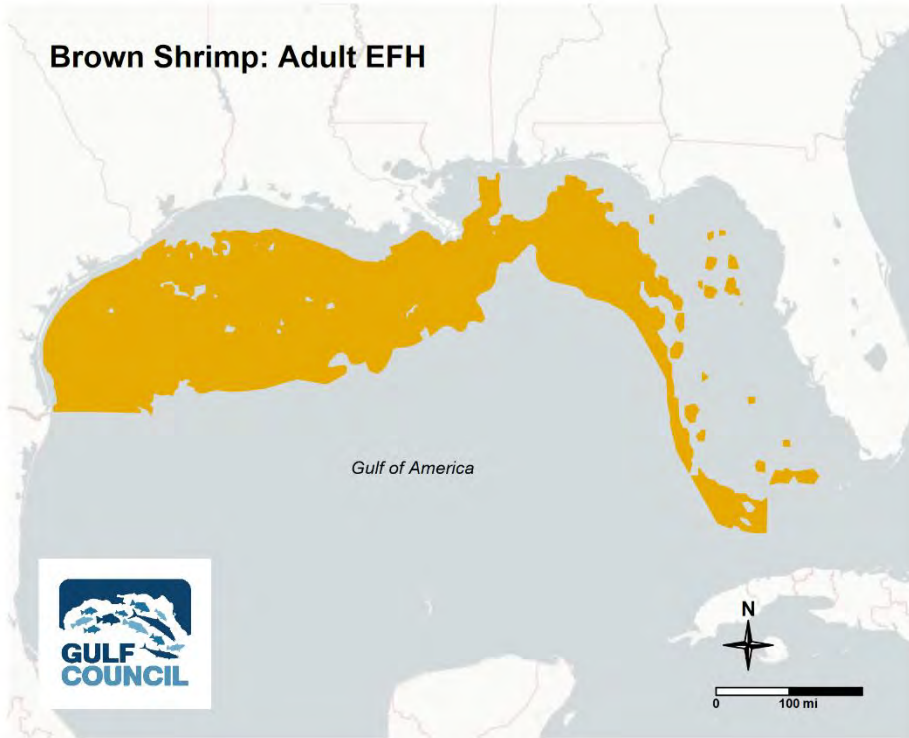


Figure C.3.6. Brown shrimp adult EFH map.

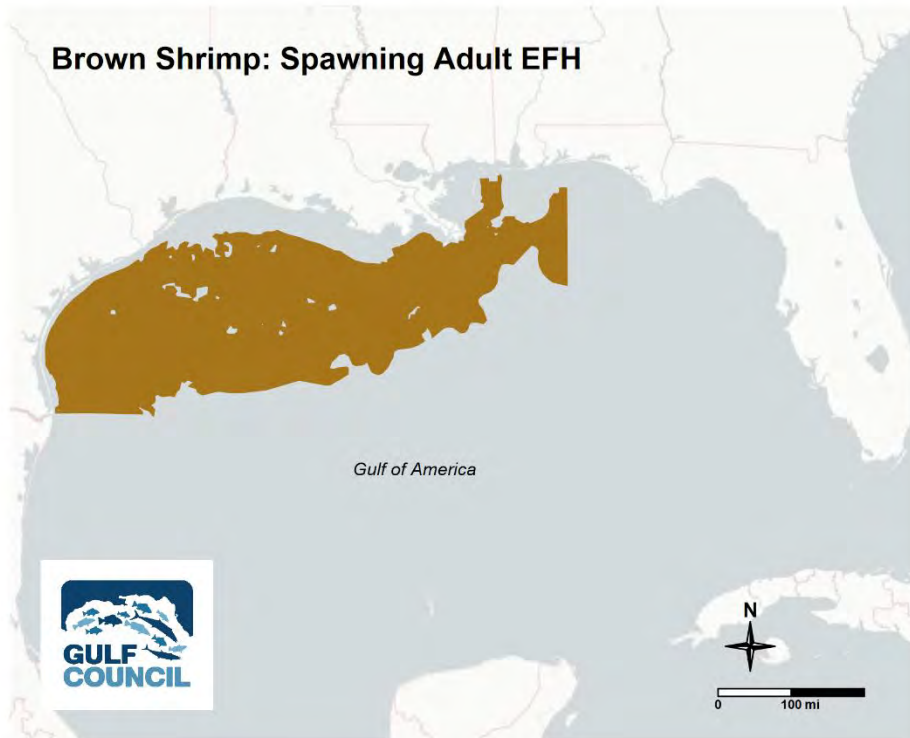


Figure C.3.7. Brown shrimp spawning adult EFH map.

Pink shrimp

Pink shrimp are widespread throughout the Gulf in estuaries and to depths of 110 m (most abundant less than 50 m) and are the dominant shrimp species off South Florida. Pink shrimp post larvae migrate into the estuaries at night, primarily during the spring and fall, usually on flood tides through passes or open shoreline. Post larval and juvenile pink shrimp are commonly found in seagrass habitats where they burrow into the substrate by day and emerge to feed at night. Pink shrimp densities are highest in or near seagrasses, low in mangroves, and near zero or absent in marshes. They prefer calcareous-type sediments found most commonly in Florida and sand/shell mud mixtures.

Fertilized eggs: ER 1, ER 2, ER 3 and ER 5 in offshore (greater than 60 feet [18m] in depth) habitats and are associated with soft bottom and sand/shell substrate.

Larvae/ Pre-settlement Post larvae: ER 1, ER 2, ER 3, and ER 5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths between 1-50m, associated with the water column.

Late post larvae/ Early juvenile: ER 1, ER 2, ER 3, and ER 5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats, concentrated in depths 0-3m, associated with submerged aquatic vegetation, soft bottom, mangroves, and sand/shell substrate.

Sub Adults (Late Juvenile): ER 1, ER 2, ER 3, and ER 5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 1-65m, associated with submerged aquatic vegetation, soft bottom, mangroves, oyster reefs, and sand/shell substrate.

Adults: ER 1, ER 2, ER 3, and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 1-110m, associated with submerged aquatic vegetation, mangroves, and sand/shell substrate.

Spawning adults: ER 1, ER 2, ER 3, and ER 5 in nearshore (60 feet [18m] or less in depth) and offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 9-48m, associated with submerged aquatic vegetation, mangroves, and sand/shell substrate.

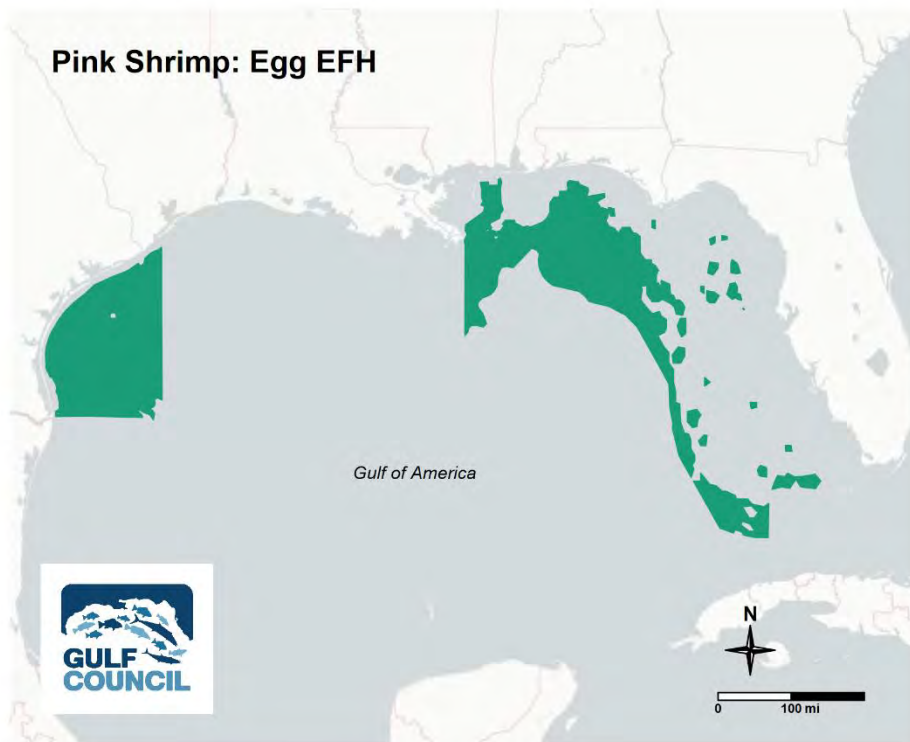


Figure C.3.8. Pink shrimp egg EFH map.

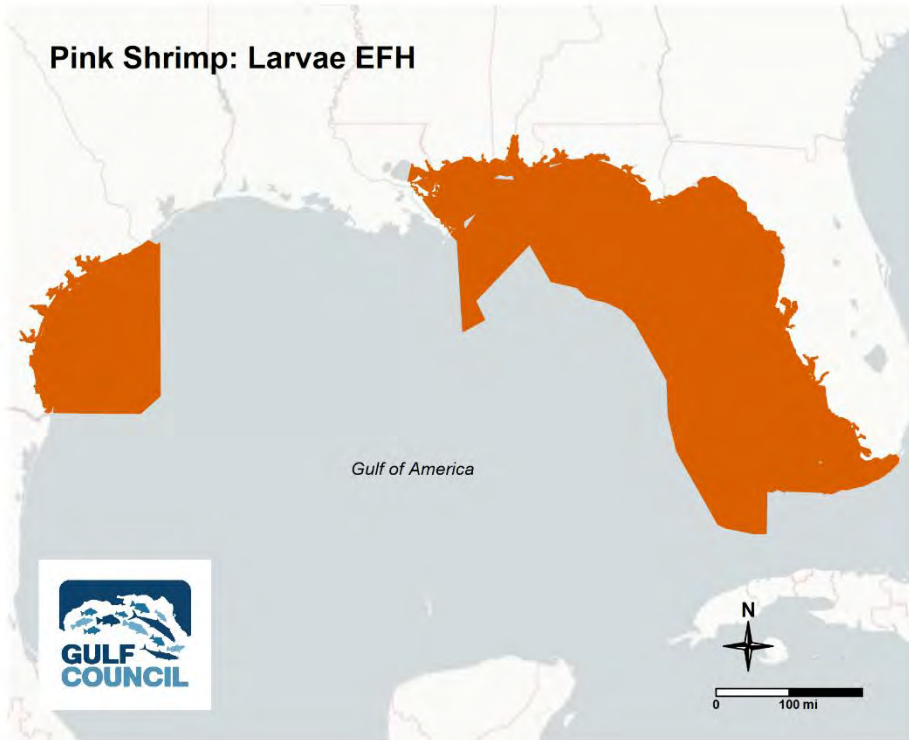


Figure C.3.9. Pink shrimp larvae EFH map.

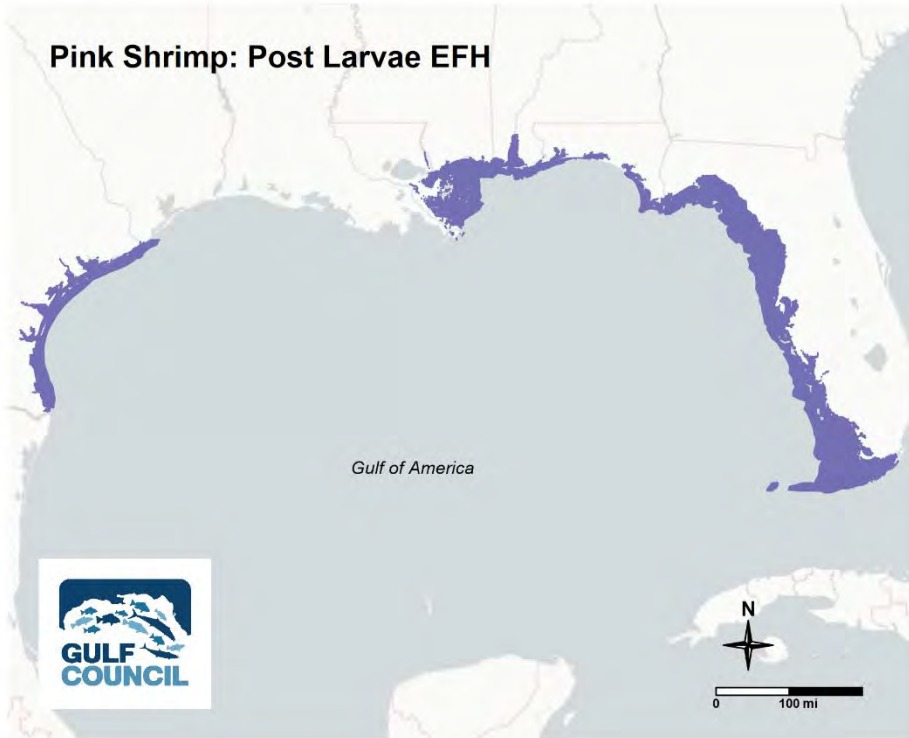


Figure C.3.10. Pink shrimp post larvae EFH map.

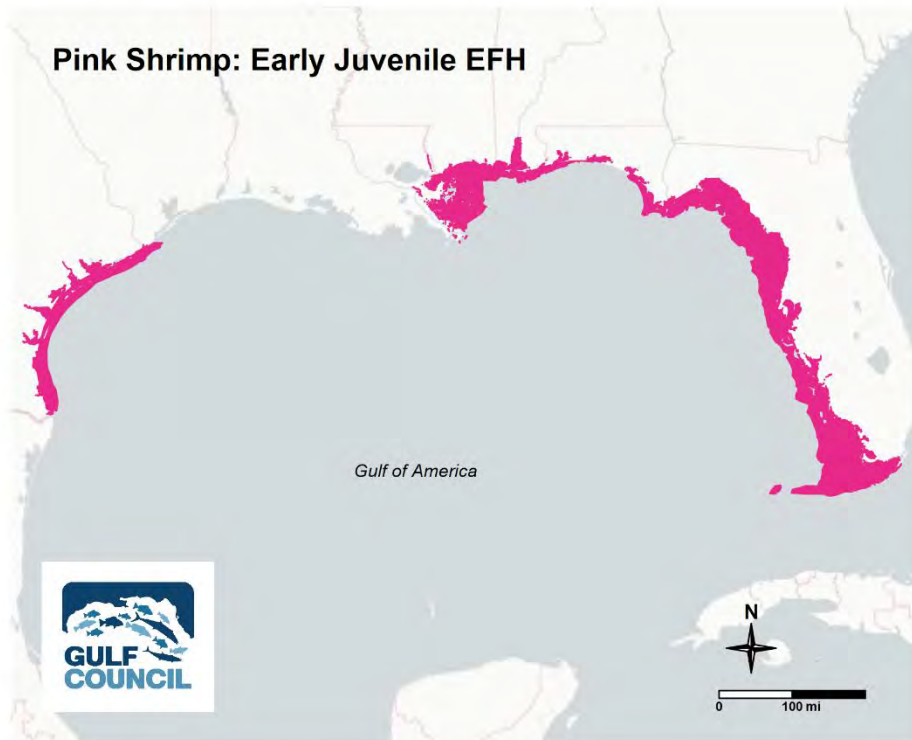


Figure C.3.11. Pink shrimp early juvenile EFH map.

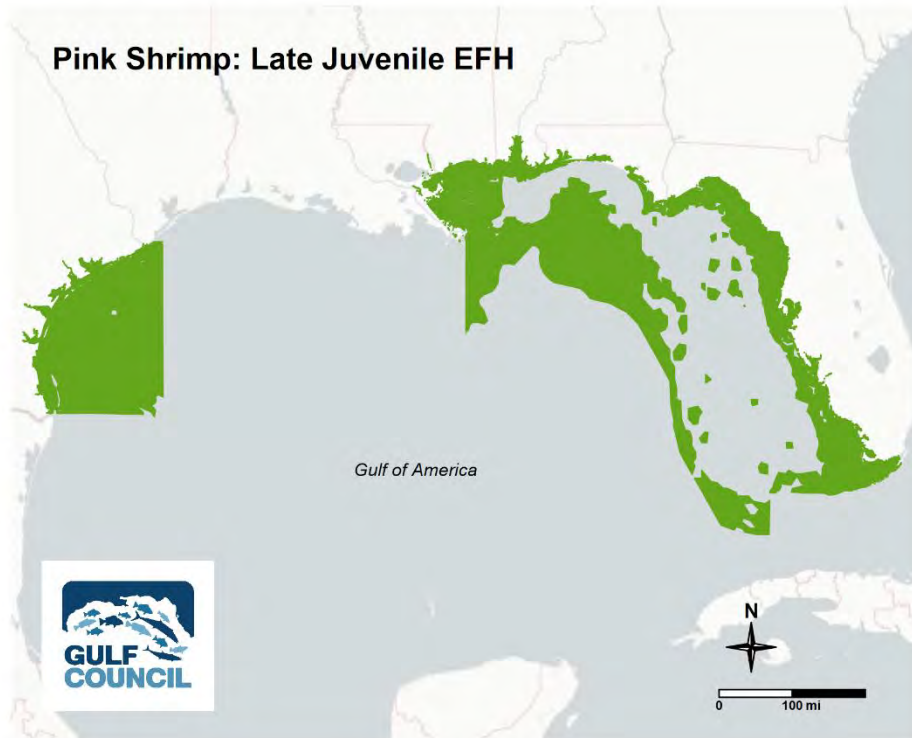


Figure C.3.12. Pink shrimp late juvenile EFH map.

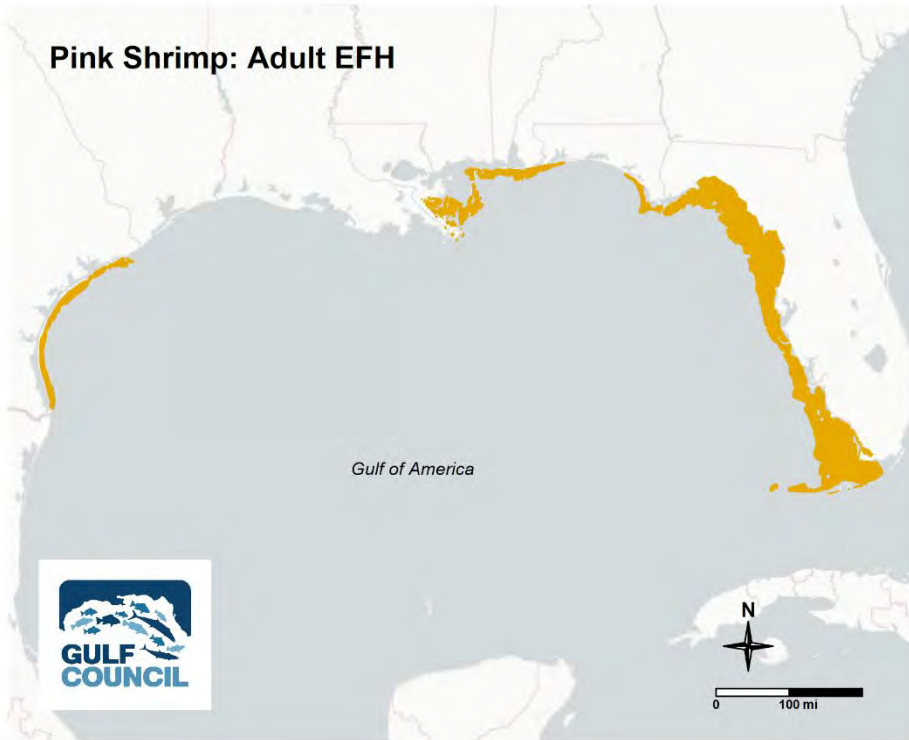


Figure C.3.13. Pink shrimp adult EFH map.

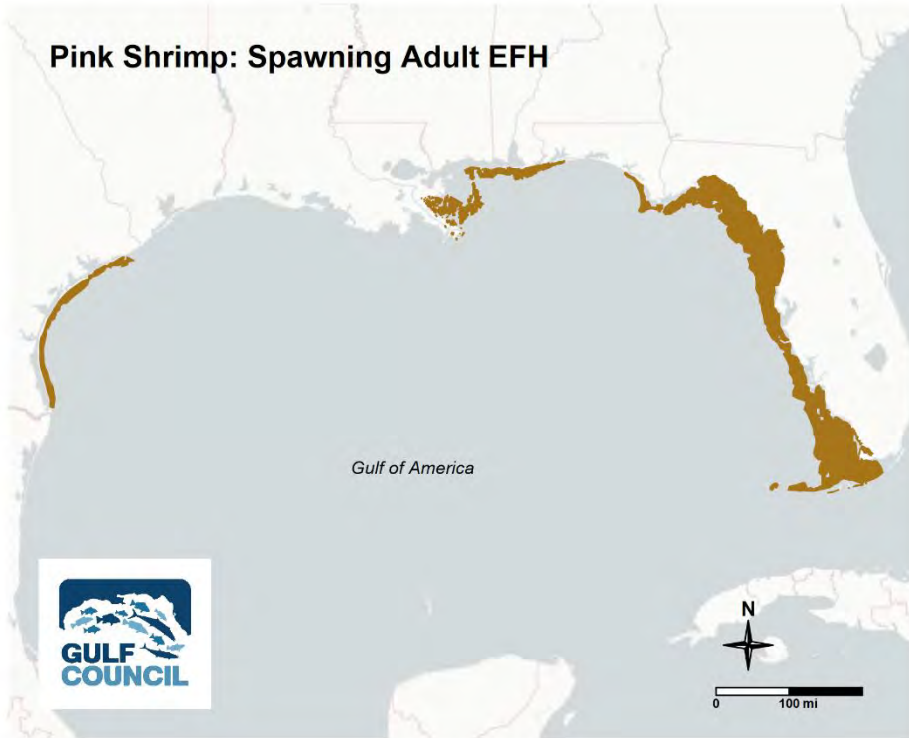


Figure C.3.14. Pink shrimp spawning adult EFH map.

Royal red shrimp

This species spends its entire life cycle in open Gulf waters, may have up to five year classes occurring together, and lives in a relatively stable environment. In addition, no mature during year the first year (i.e., age 0). Royal red shrimp occupy habitat along the upper continental shelf at depths between 140 and 730 m. Royal red shrimp are less common in depths less than 250 m and greater than 500 m. The highest concentration has been reported in the northeastern part of the Gulf at depths between 250 and 475 m.

Fertilized eggs: ER 1 and ER 3 in offshore (greater than 60 feet [18m] in depth) habitats and are associated with the shelf/slope edge.

Larvae/ Pre-settlement Post larvae: Information not available.

Late post larvae/ Early juvenile: Information not available.

Sub Adults (Late Juvenile): Information not available.

Adults: Gulf-wide ER 1-5 offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 140-750m, associated with the shelf/slope edge, soft bottom, and sand/shell substrate.

Spawning adults: Gulf-wide ER 1-5 offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths 250-550m, associated with the shelf/slope edge.

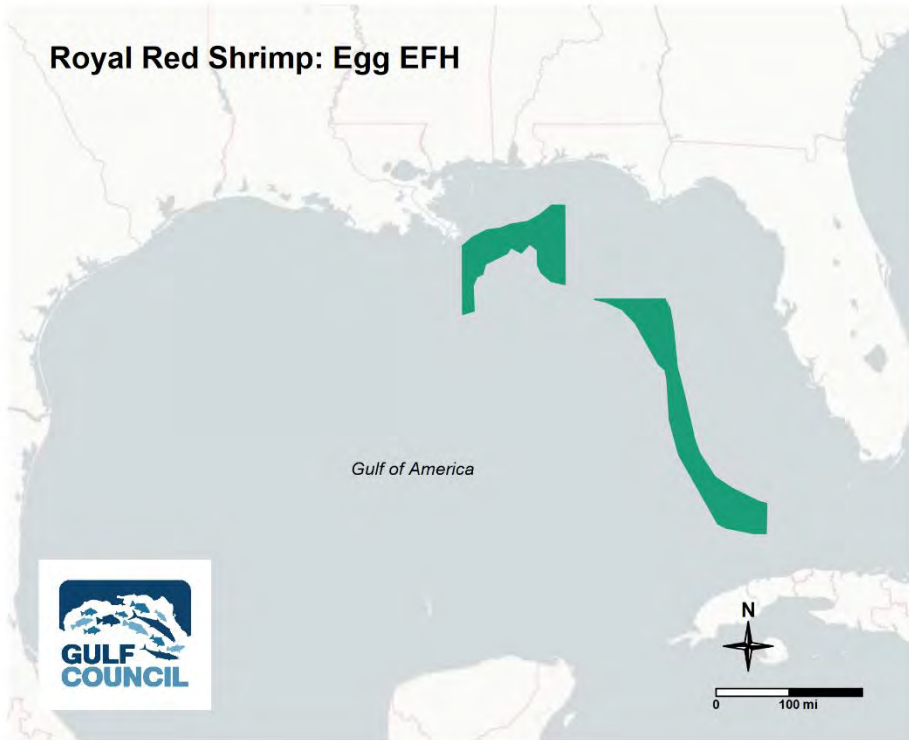


Figure C.3.15. Royal red shrimp egg EFH map.

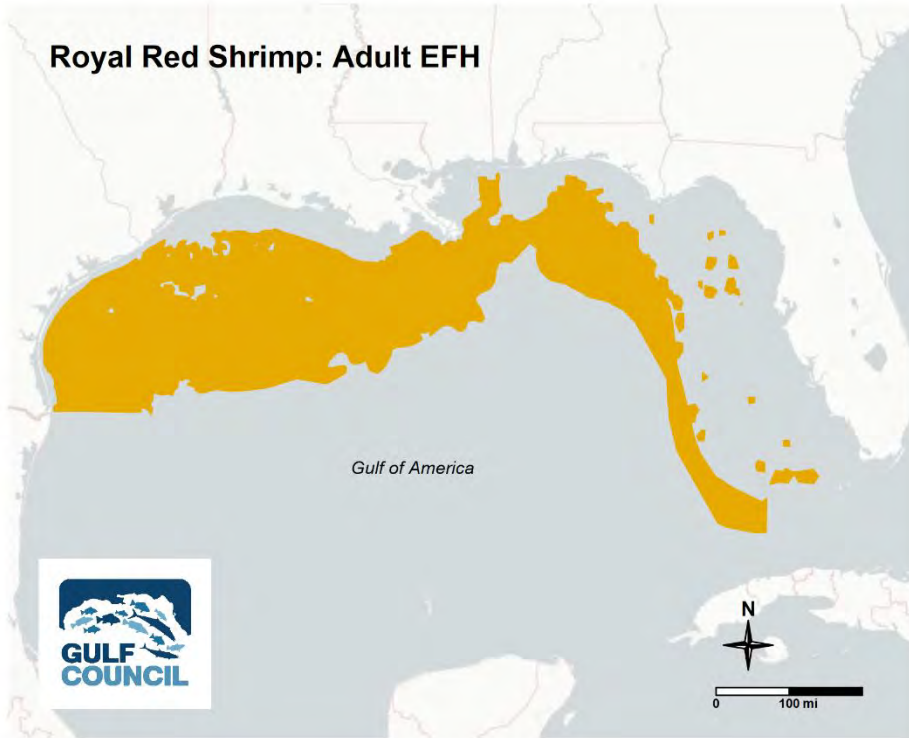


Figure C.3.16. Royal red shrimp adult EFH map.

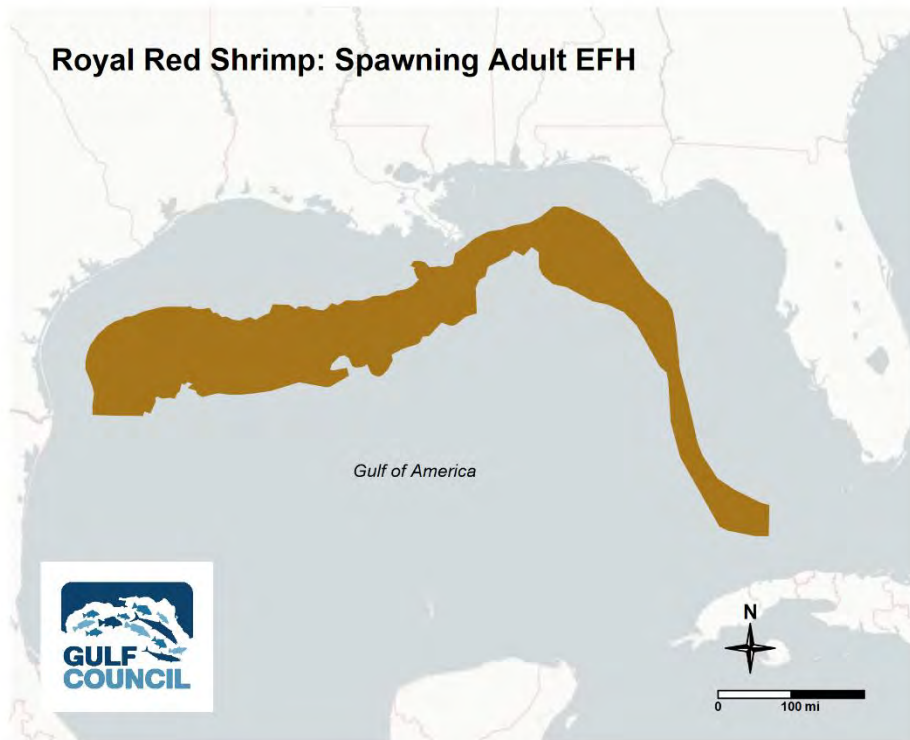


Figure C.3.17. Royal red shrimp spawning adult EFH map.

White shrimp

White shrimp are found in estuaries and out to depths of 40 m (but usually less than 27 m) from Florida's Big Bend through Texas. White shrimp spawn in depths between 9-34 m (but usually less than 27 m) from spring through fall. White shrimp post larvae enter estuaries through passes from May through November with peaks in June and September. White shrimp migration is in the upper two meters of the water column at night and at mid-depths during the day. Post larvae and juveniles inhabit mostly mud and peat bottoms with large amounts of decaying matter or vegetative cover, and they tend to be more active during the day than brown. Sub-adult white shrimp leave estuaries in late August and September on ebb tides during full moons (Whitaker 1982), and the timing appears to be related to shrimp size and environmental conditions (e.g., sharp temperature drops in fall and winter). Adult white shrimp inhabit nearshore Gulf waters to depths less than 30 m on bottoms of soft mud or silt.

Fertilized eggs: ER 2, ER 3, ER 4, and ER 5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats.

Larvae/ Pre-settlement Post larvae: ER 2, ER 3, ER 4, and ER 5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats.

Late post larvae/ Early juvenile: ER 3, ER 4, and ER 5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats, concentrated in depths <5m, associated with submerged aquatic vegetation, emergent marsh, oyster reef, soft bottom and mangrove habitat.

Sub Adults (Late Juvenile): ER 2, ER 3, ER 4, and ER 5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats and are associated with soft bottom and sand/shell substrate.

Adults: Gulf-wide in ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitats, concentrated in depths between <27m, associated with soft bottom substrate.

Spawning adults: Gulf-wide in ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats and are associated with soft bottom habitat.

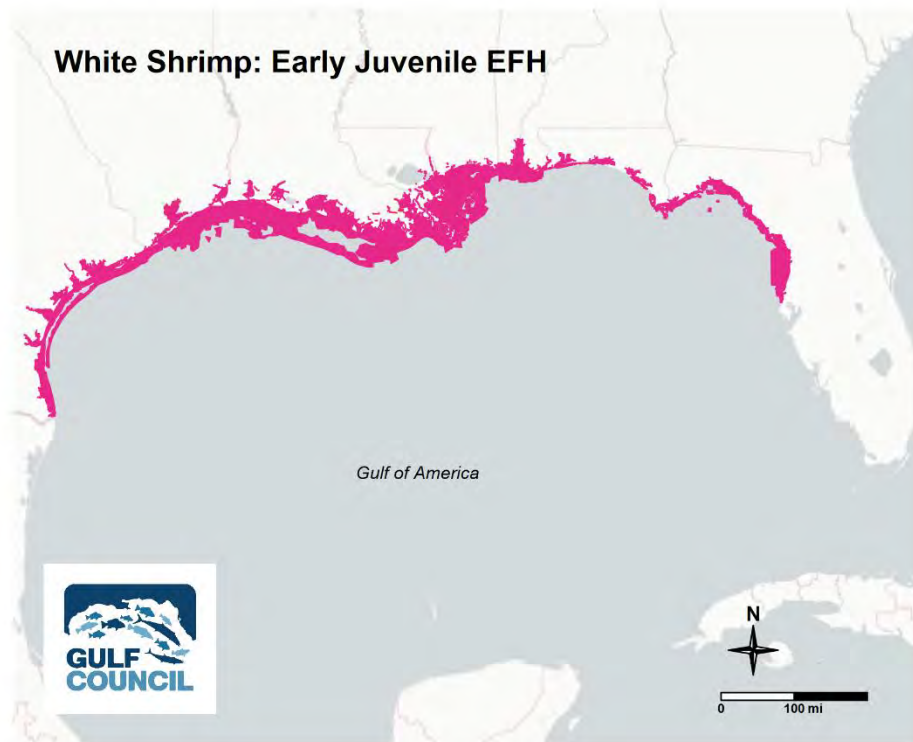


Figure C.3.18. White shrimp early juvenile EFH map.

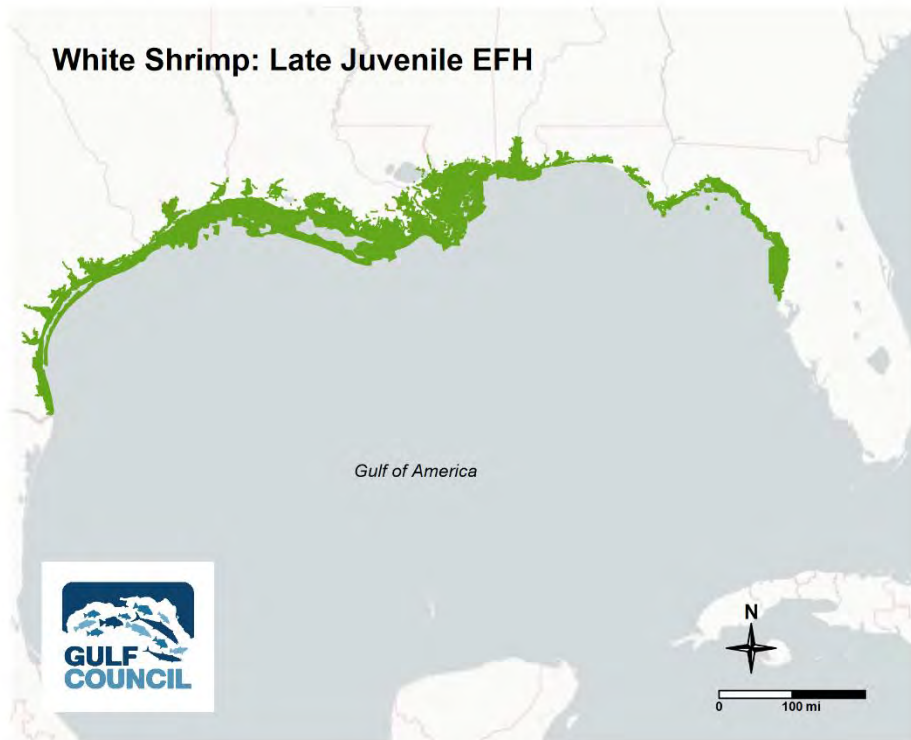


Figure C.3.19. White shrimp late juvenile EFH map.

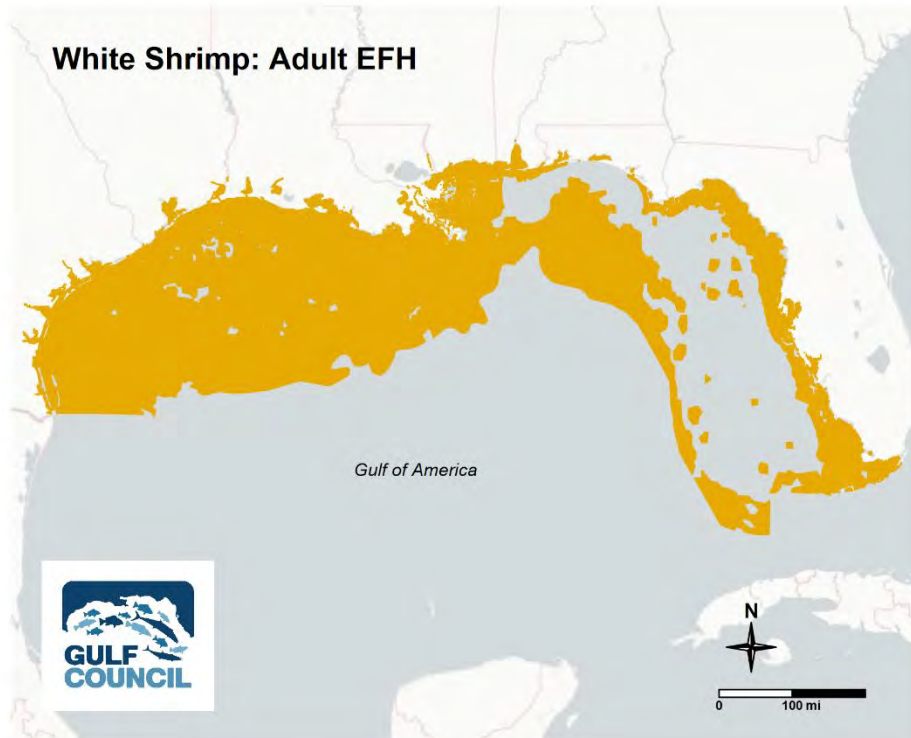


Figure C.3.20. White shrimp adult EFH map.

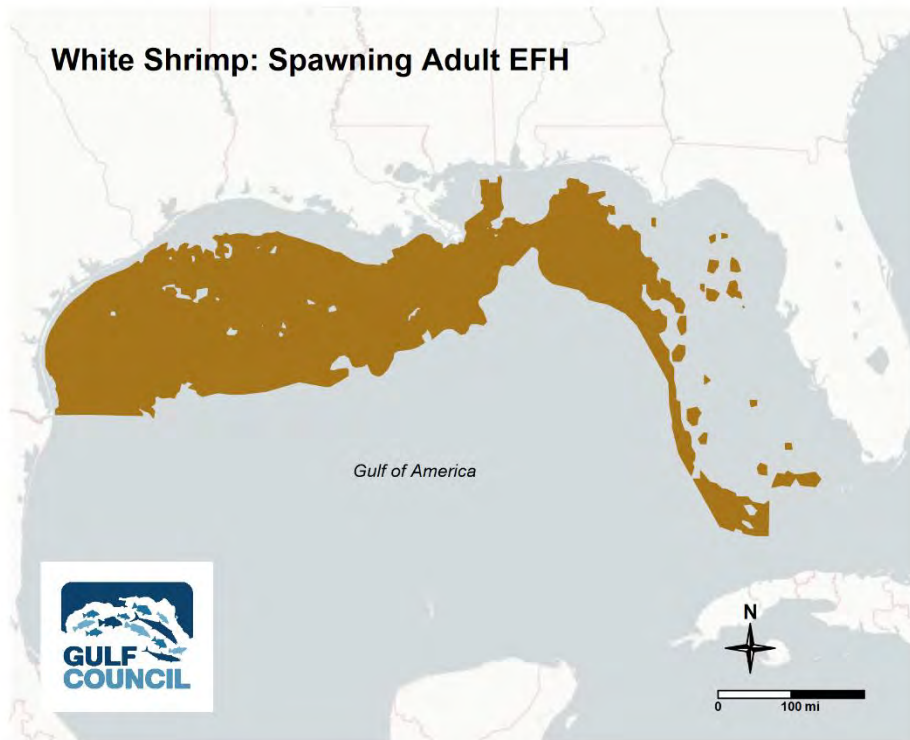


Figure C.3.21. White shrimp spawning adult EFH map.

C.4. Red Drum

Red drum

Red drum are distributed throughout the Gulf. Depending on life stage, they are found from estuarine to offshore waters and occur over a variety of habitat types including submerged aquatic vegetation, soft bottom, hard bottom/reefs, emergent marsh, sand/shell, and early life stages are water column associated.

Egg: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and is associated with the water column.

Larvae: Gulf-wide ER 1-5 in estuarine (inside barrier islands and estuaries), habitat, concentrated at depths between 18-31m, and are associated with submerged aquatic vegetation, soft bottom substrate and the water column.

Post Larvae: Gulf-wide ER 1-5 in estuarine (inside barrier islands and estuaries) habitat, concentrated at depths between 18-31m, and are associated with submerged aquatic vegetation, emergent marsh, soft bottom and sand/shell substrate.

Early Juvenile: Gulf-wide ER 1-5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats and are associated with submerged aquatic vegetation, emergent marsh, and soft bottom substrate.

Late Juvenile: Gulf-wide ER 1-5 in estuarine (inside barrier islands and estuaries) and nearshore (60 feet [18m] or less in depth) habitats and are associated with submerged aquatic vegetation, soft bottom, hard bottom/reefs and sand/shell substrate.

Adult: Gulf-wide ER 1-5 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats, concentrated at depths 1-70m, and are associated with submerged aquatic vegetation, emergent marsh, soft bottom, hard bottom/reefs and sand/shell substrate.

Spawning Adult: Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat, concentrated at depths 40-70m, and are associated with submerged aquatic vegetation, soft bottom, hard bottom/reefs and sand/shell substrate.

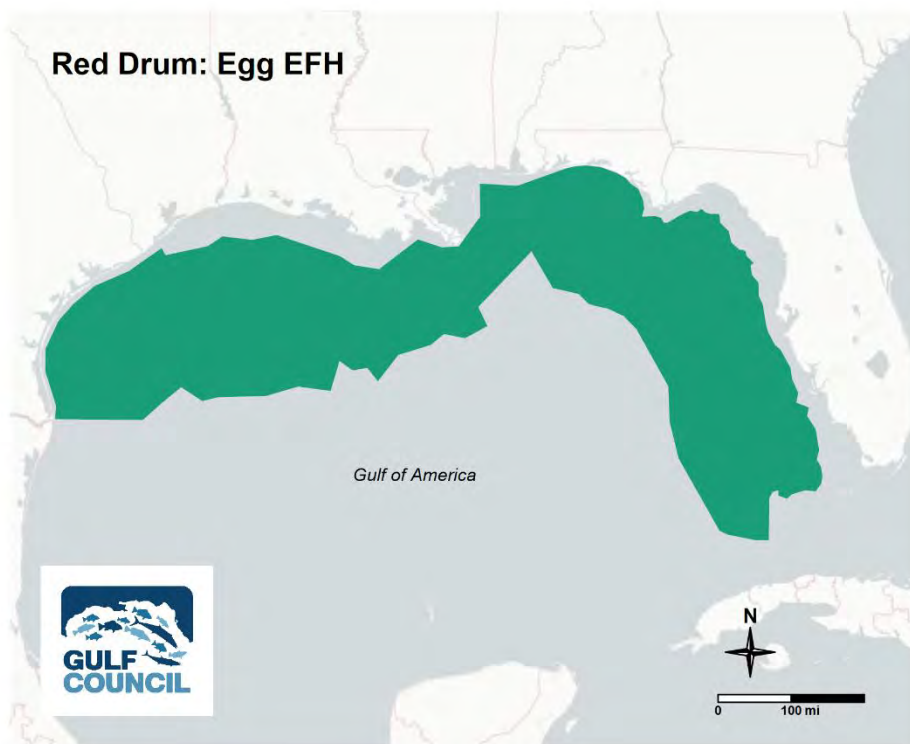


Figure C.4.1. Red drum egg EFH map.

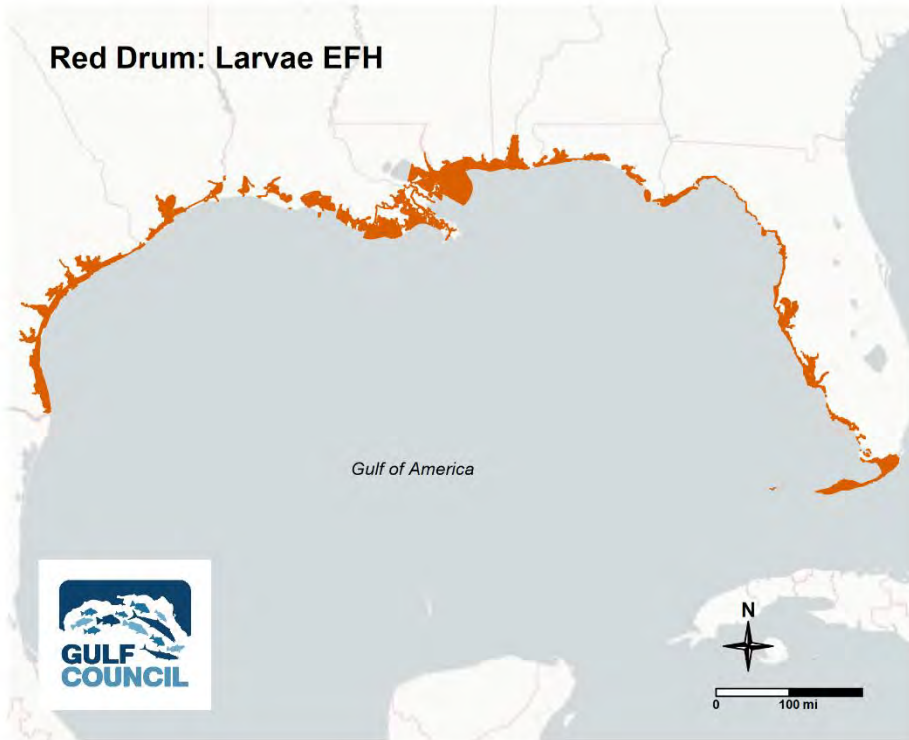


Figure C.4.2. Red drum larvae EFH map.

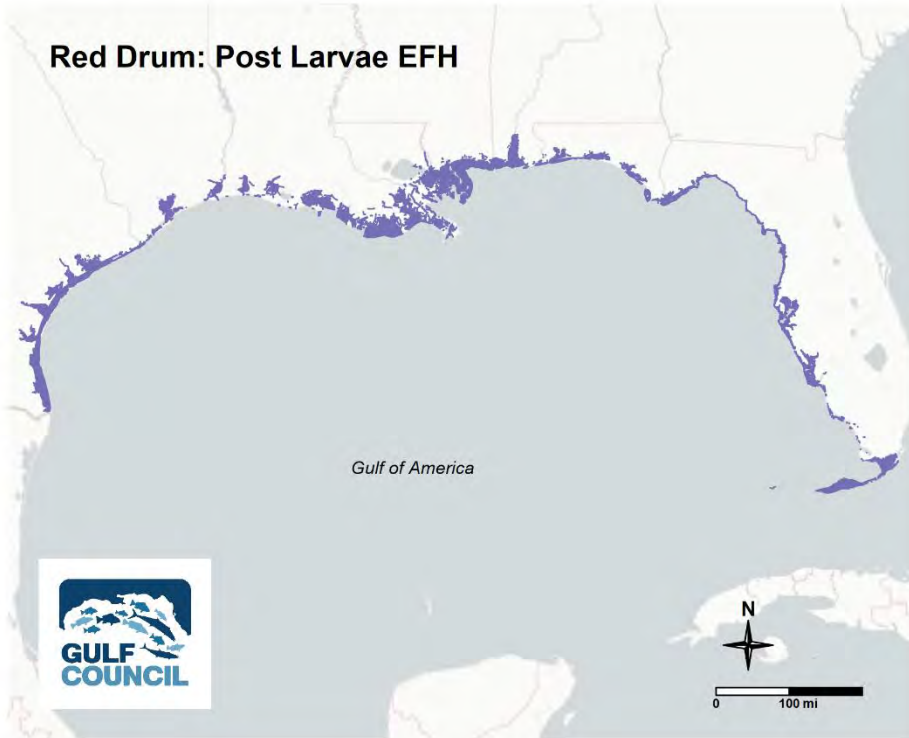


Figure C.4.3. Red drum post larvae EFH map.

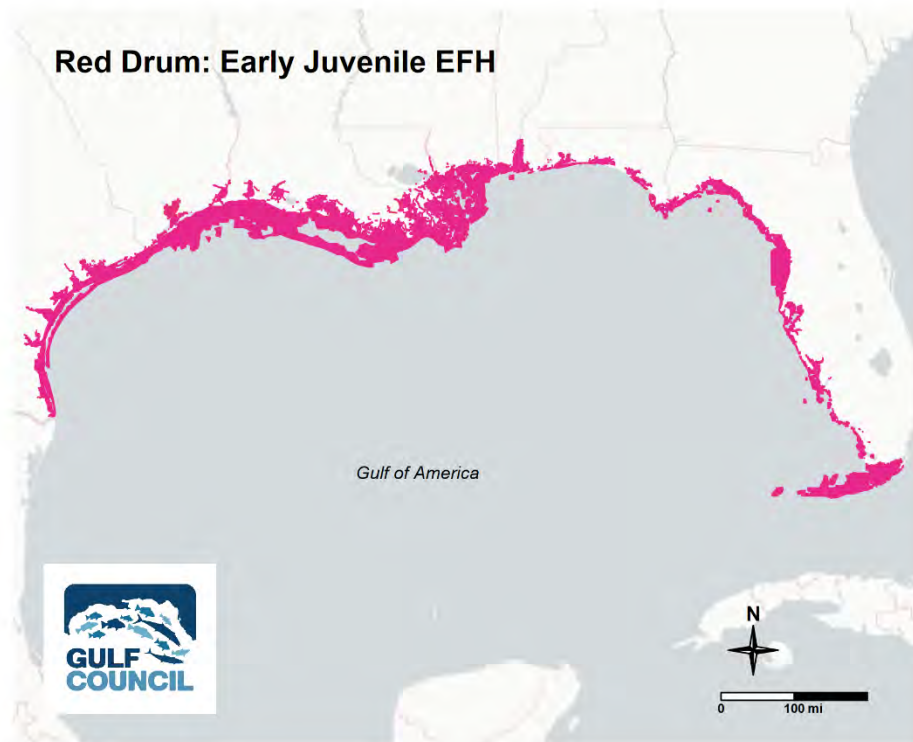


Figure C.4.4. Red drum per early juvenile EFH map.

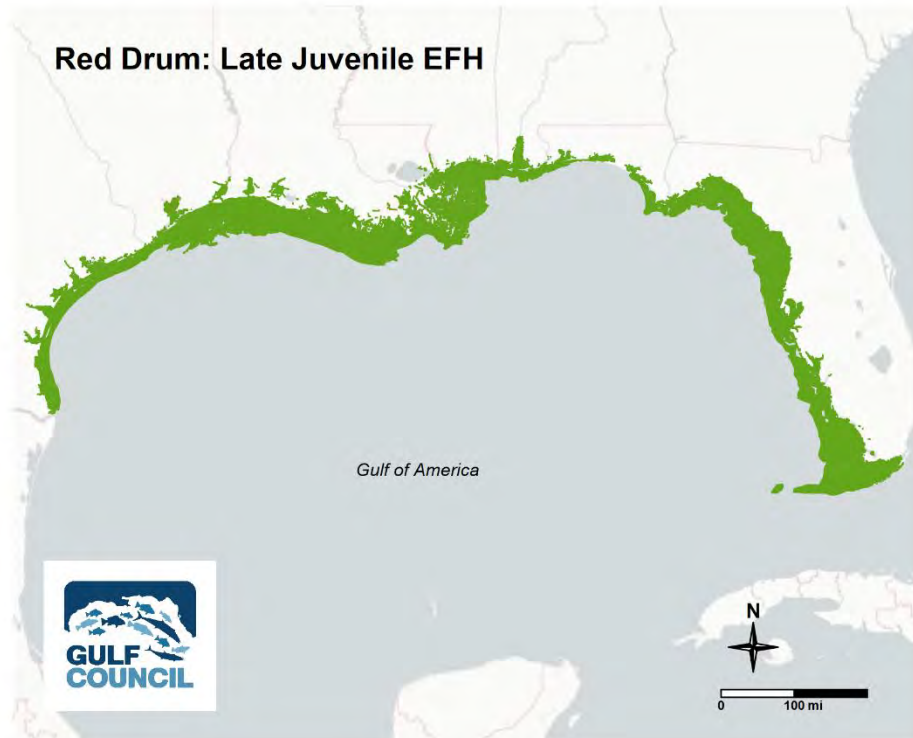


Figure C.4.5. Red drum per late juvenile EFH map.

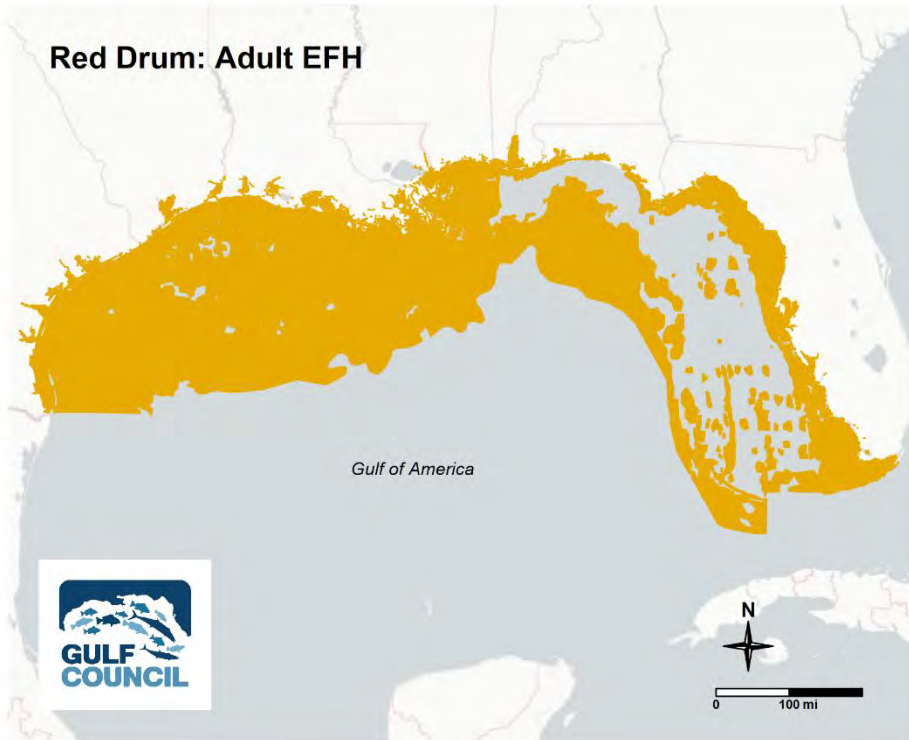


Figure C.4.6. Red drum adult EFH map.

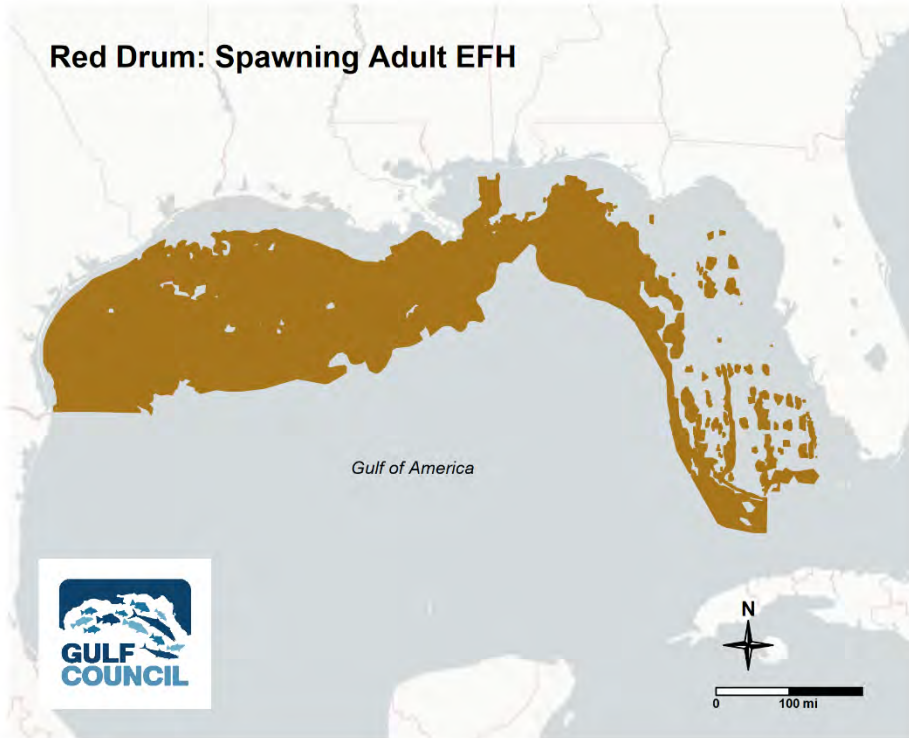


Figure C.4.7. Red drum spawning adult EFH map.

C.5. Spiny Lobster

Spiny lobster

Spiny Lobster are primarily found along the southwest coast of Florida. The principal habitats used by spiny lobster are offshore hard bottom/reefs and seagrasses to depths of 80 m or more with the South Florida Reef Tract appears to be the most important feature for spiny lobster. Areas of high relief on the continental shelf serve as spiny lobster habitat and include hard bottom/reefs, ledges and caves, sloping soft-bottom areas, and limestone outcroppings.

Phyllosome Larvae (Larvae): Gulf-wide ER 1-5 in offshore (greater than 60 feet [18m] in depth) habitat and is associated with the water column.

Puerulus postlarvae (Post Larvae): ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats, and are associated with submerged aquatic vegetation and the water column.

Early Juvenile: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats, and are associated with submerged aquatic vegetation and hard bottom/reefs.

Late Juvenile: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats, and are associated with submerged aquatic vegetation and hard bottom/reefs.

Adult: ER 1 in estuarine (inside barrier islands and estuaries), nearshore (60 feet [18m] or less in depth), and offshore (greater than 60 feet [18m] in depth) habitats, and are associated with submerged aquatic vegetation and hard bottom/reefs.

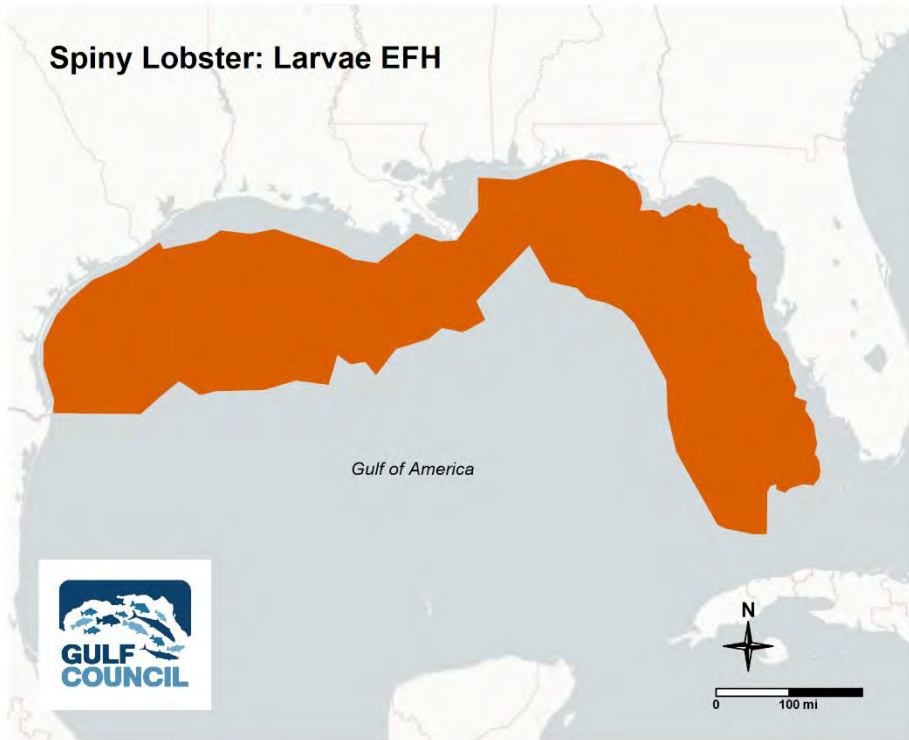


Figure C.5.1. Spiny lobster larvae EFH map.

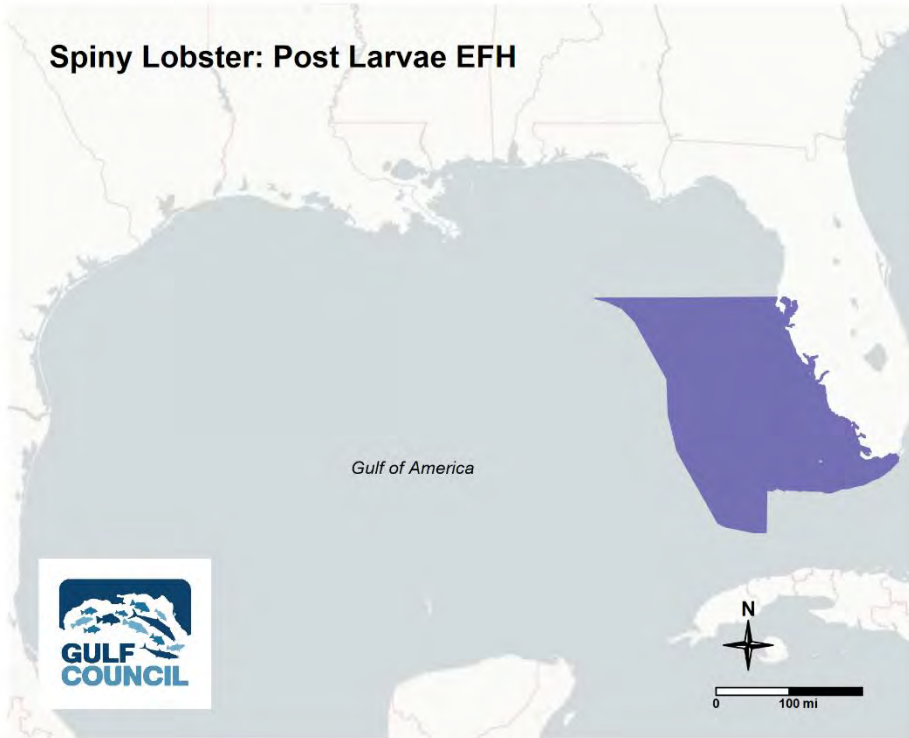


Figure C.5.2. Spiny lobster post larvae EFH map.

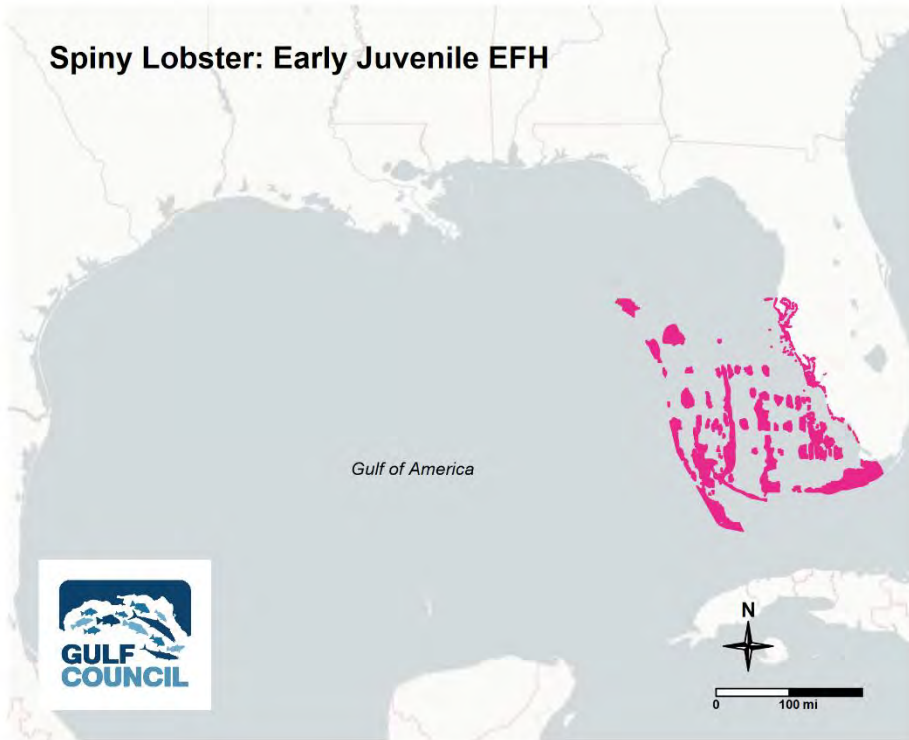


Figure C.5.3. Spiny lobster early juvenile EFH map.

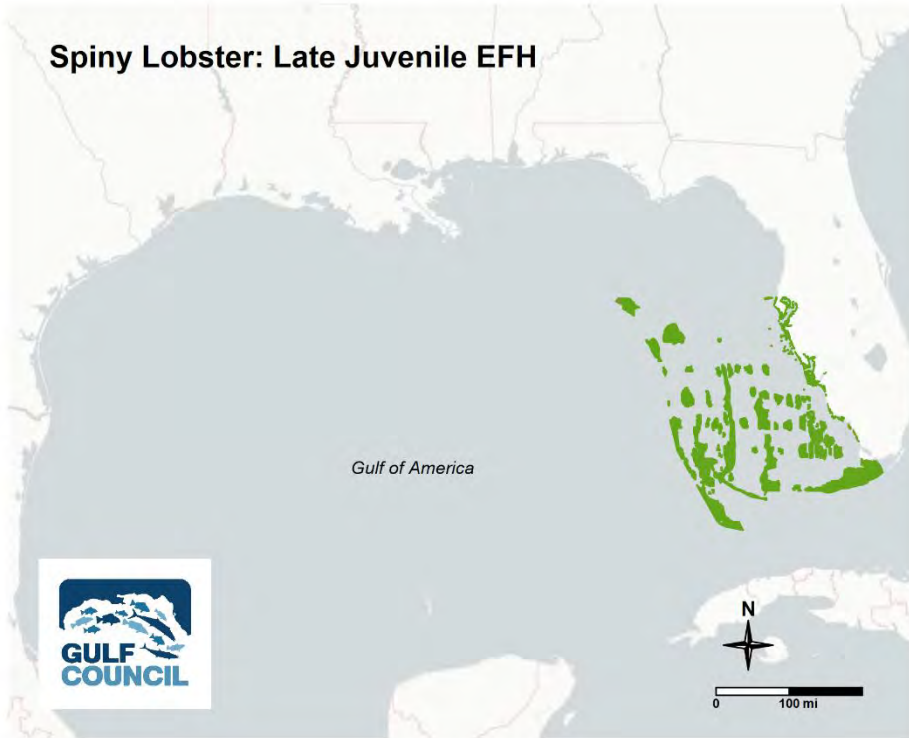


Figure C.5.4. Spiny lobster late juvenile EFH map.

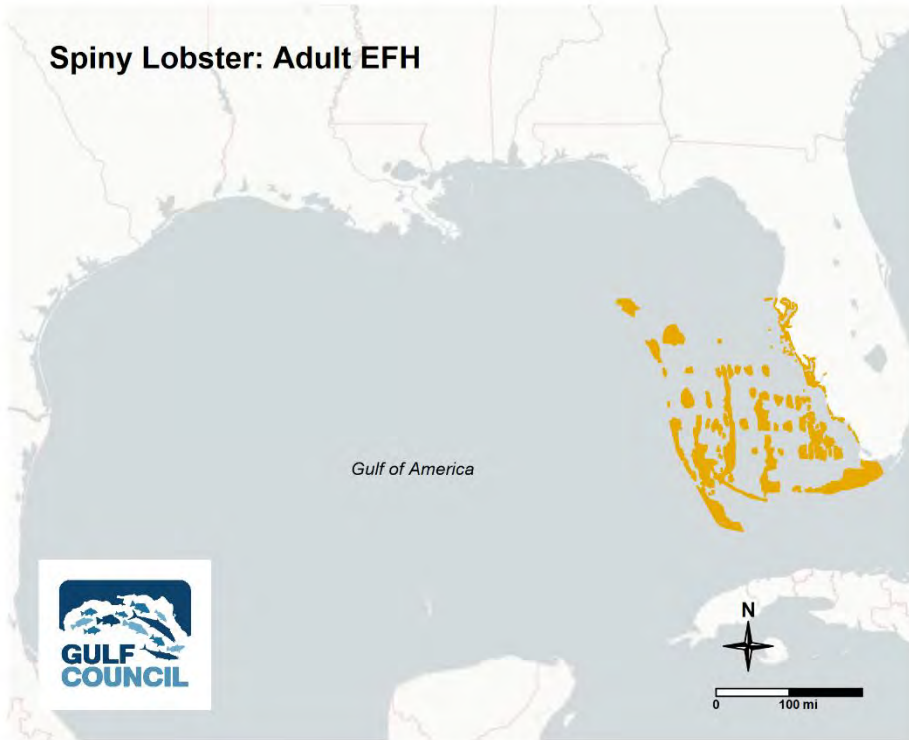


Figure C.5.5. Spiny lobster adult EFH map.