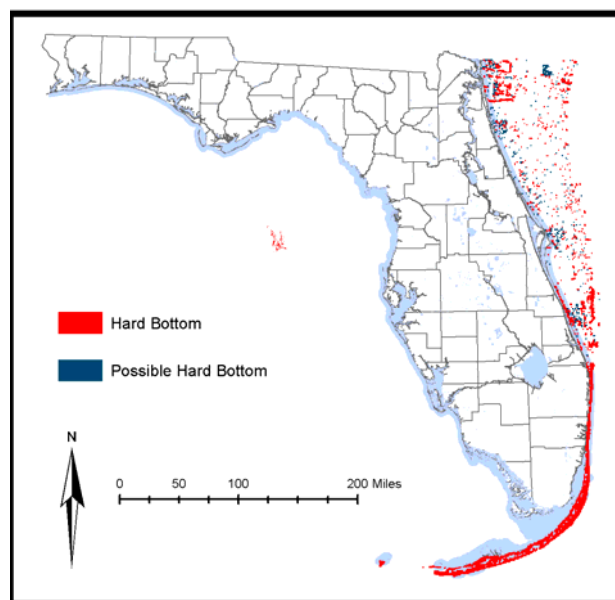


# Hard Bottom



## Status

Current condition: Poor and declining.  
Due to the lack of sufficient map data for this habitat category (see Appendix D. GIS Data Tables), no acreage estimates are currently available.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

## Habitat Description

**FNAI type:** Consolidated Substrate, Octocoral Bed, Sponge Bed

Hard Bottom is characterized as mixed communities of algae, sponges, octocorals and stony corals. This habitat occurs in subtidal, intertidal, and supratidal zones throughout Florida's coastal waters. Hard Bottom is composed of attendant epibenthic biota on a rocky substrate composed of coquina, limestone, or relic coral, molluscan, and annelid reefs. Coquina is a limestone composed of broken shell debris. Limestone rock (many different strata) occurs as high- or low-relief outcrops of calcium carbonate. Relic reefs are the skeletal remains of once-living reefs such as the Vermetid Reef built by worm-like gastropod mollusks, *Petalocochnus*. These reefs are only known to be found in shallow waters seaward of the outer islands in the Ten Thousand Islands area of southwest Florida.

Hard Bottom biological communities are structured by depth and latitude and inhabited by sessile, planktonic, epifaunal, and pelagic plants and animals; infaunal organisms are present in interstitial soft bottom substrate. In the region south of Stuart on the east coast and Bay Port on the west coast, subtidal hard bottom communities are characteristically inhabited by soft corals (octocorals) and sponges. Octocoral Beds have dense concentrations of sea fans, sea plumes, and sea feathers. Mobile species found in octocoral beds include flamingo tongue shell, purple shrimp,

and basket starfish. Sponge beds include the branching, vase, tube, Florida loggerhead, and sheepswool sponges. Other mobile fauna found in both the octocoral beds and the sponge beds include amphipods, isopods, burrowing shrimp, crabs, sand dollars, and many species of fish. Although the coral species found in Hard Bottom habitat are not reef-building, they do contribute to the three-dimensional nature of the areas by increasing the surface area for sessile organisms and by providing important refuges for a variety of fish and invertebrates.

## Associated Species of Greatest Conservation Need

### **Mammals**

- |   |                             |
|---|-----------------------------|
| • <i>Trichechus manatus latirostris</i> | Florida Manatee             |
| • <i>Eubalaena glacialis</i>            | North Atlantic Right Whale  |
| • <i>Tursiops truncatus</i>             | Atlantic Bottlenose Dolphin |

### **Birds**

- |                                     |                  |
|-------------------------------------|------------------|
| • <i>Aythya affinis</i>             | Lesser Scaup     |
| • <i>Gavia immer</i>                | Common Loon      |
| • <i>Podiceps auritus coronotus</i> | Horned Grebe     |
| • <i>Egretta tricolor</i>           | Tricolored Heron |

### **Reptiles**

- |                                 |                      |
|---------------------------------|----------------------|
| • <i>Malaclemys terrapin</i>    | Diamondback Terrapin |
| • <i>Chelonia mydas</i>         | Green Turtle         |
| • <i>Eretmochelys imbricata</i> | Hawksbill            |
| • <i>Caretta caretta</i>        | Loggerhead           |
| • <i>Lepidochelys kempii</i>    | Kemp's Ridley        |

### **Fish**

- |                                     |                          |
|-------------------------------------|--------------------------|
| • <i>Ginglymostoma cirratum</i>     | Nurse Shark              |
| • <i>Carcharhinus brevipinna</i>    | Spinner Shark            |
| • <i>Carcharhinus falciformis</i>   | Silky Shark              |
| • <i>Carcharhinus leucas</i>        | Bull Shark               |
| • <i>Carcharhinus limbatus</i>      | Blacktip Shark           |
| • <i>Carcharhinus obscurus</i>      | Dusky Shark              |
| • <i>Carcharhinus plumbeus</i>      | Sandbar Shark            |
| • <i>Galeocerdo cuvier</i>          | Tiger Shark              |
| • <i>Negaprion brevirostris</i>     | Lemon Shark              |
| • <i>Rhizoprionodon terraenovae</i> | Atlantic Sharpnose Shark |
| • <i>Sphyrna lewini</i>             | Scalloped Hammerhead     |
| • <i>Sphyrna mokarran</i>           | Great Hammerhead         |
| • <i>Sphyrna zygaena</i>            | Smooth Hammerhead        |
| • <i>Alopias superciliosus</i>      | Bigeye Thresher          |
| • <i>Pristis pectinata</i>          | Smalltooth Sawfish       |
| • <i>Manta birostris</i>            | Giant Manta              |
| • <i>Megalops atlanticus</i>        | Tarpon                   |
| • <i>Echidna catenata</i>           | Chain Moray              |
| • <i>Enchelycore nigricans</i>      | Viper Moray              |
| • <i>Gymnothorax funebris</i>       | Green Moray              |
| • <i>Gymnothorax miliaris</i>       | Goldentail Moray         |

- *Gymnothorax moringa*
  - *Gymnothorax vicinus*
  - *Uropterygius macularius*
  - *Opsanus beta*
  - *Opsanus pardus*
  - *Opsanus tau*
  - *Antennarius striatus*
  - *Ogcocephalus corniger*
  - *Ogcocephalus cubifrons*
  - *Halicampus crinitus*
  - *Aulostomus maculatus*
  - *Centropomus undecimalis*
  - *Fistularia tabacaria*
  - *Centropristis ocyurus*
  - *Centropristis philadelphica*
  - *Centropristis striata*
  - *Cephalopholis cruentata*
  - *Cephalopholis fulva*
  - *Dermatolepis inermis*
  - *Epinephelus adscensionis*
  - *Epinephelus drummondhayi*
  - *Epinephelus flavolimbatus*
  - *Epinephelus guttatus*
  - *Epinephelus itajara*
  - *Epinephelus morio*
  - *Epinephelus mystacinus*
  - *Epinephelus nigritus*
  - *Epinephelus niveatus*
  - *Epinephelus striatus*
  - *Hypoplectrus aberrans*
  - *Hypoplectrus guttavarius*
  - *Hypoplectrus nigricans*
  - *Hypoplectrus puella*
  - *Hypoplectrus unicolor*
  - *Liopropoma eukrines*
  - *Mycteroperca bonaci*
  - *Mycteroperca interstitialis*
  - *Mycteroperca microlepis*
  - *Mycteroperca phenax*
  - *Paranthias furcifer*
  - *Rypticus bistrispinus*
  - *Rypticus saponaceus*
  - *Rypticus subbifrenatus*
  - *Serranus annularis*
  - *Serranus baldwini*
  - *Serranus tabacarius*
  - *Serranus tigrinus*
  - *Opistognathus macrognathus*
  - *Opistognathus whitehursti*
  - *Apogon aurolineatus*
  - *Apogon binotatus*
  - *Apogon maculatus*
  - *Apogon planifrons*
- Spotted Moray
  - Purplemouth Moray
  - Marbled Moray
  - Gulf Toadfish
  - Leopard Toadfish
  - Oyster Toadfish
  - Striated Frogfish
  - Longnose Batfish
  - Polka-dot Batfish
  - Banded Pipefish
  - Atlantic Trumpetfish
  - Common Snook
  - Bluespotted Cornetfish
  - Bank Sea Bass
  - Rock Sea Bass
  - Black Sea Bass
  - Graysby
  - Coney
  - Marbled Grouper
  - Rock Hind
  - Speckled Hind
  - Yellowedge Grouper
  - Red Hind
  - Goliath Grouper
  - Red Grouper
  - Misty Grouper
  - Warsaw Grouper
  - Snowy Grouper
  - Nassau Grouper
  - Yellowbelly Hamlet
  - Shy Hamlet
  - Black Hamlet
  - Barred Hamlet
  - Butter Hamlet
  - Wrasse Basslet
  - Black Grouper
  - Yellowmouth Grouper
  - Gag
  - Scamp
  - Atlantic Creole-Fish
  - Freckled Soapfish
  - Greater Soapfish
  - Spotted Soapfish
  - Orangeback Bass
  - Lantern Bass
  - Tobaccofish
  - Harlequin bass
  - Banded Jawfish
  - Dusky Jawfish
  - Bridle Cardinalfish
  - Barred Cardinalfish
  - Flamefish
  - Pale Cardinalfish

- *Apogon pseudomaculatus* Twospot Cardinalfish
- *Apogon townsendi* Belted Cardinalfish
- *Astrapogon alutus* Bronze Cardinalfish
- *Astrapogon puncticulatus* Blackfin Cardinalfish
- *Phaeoptyx conklini* Freckled Cardinalfish
- *Phaeoptyx pigmentaria* Dusky Cardinalfish
- *Phaeoptyx xenus* Sponge Cardinalfish
- *Pomatomus saltatrix* Bluefish
- *Alectis ciliaris* African Pompano
- *Elagatis bipinnulata* Rainbow Runner
- *Selar crumenophthalmus* Bigeye Scad
- *Seriola dumerili* Greater Amberjack
- *Seriola rivoliana* Almaco Jack
- *Seriola zonata* Banded Rudderfish
- *Lutjanus analis* Mutton Snapper
- *Lutjanus apodus* Schoolmaster
- *Lutjanus buccanella* Blackfin Snapper
- *Lutjanus campechanus* Red Snapper
- *Lutjanus cyanopterus* Cubera Snapper
- *Lutjanus griseus* Gray Snapper
- *Lutjanus jocu* Dog Snapper
- *Lutjanus mahogoni* Mahogany Snapper
- *Lutjanus synagris* Lane Snapper
- *Lutjanus vivanus* Silk Snapper
- *Ocyurus chrysurus* Yellowtail Snapper
- *Rhomboplites aurorubens* Vermilion Snapper
- *Anisotremus surinamensis* Black Margate
- *Anisotremus virginicus* Porkfish
- *Haemulon album* Margate
- *Haemulon aurolineatum* Tomtate
- *Haemulon plumierii* White Grunt
- *Haemulon sciurus* Bluestriped grunt
- *Orthopristis chrysoptera* Pigfish
- *Archosargus probatocephalus* Sheepshead
- *Calamus bajonado* Jolthead Porgy
- *Calamus nodosus* Knobbed Porgy
- *Pagrus pagrus* Red Porgy
- *Bairdiella sanctaeluciae* Striped Croaker
- *Equetus lanceolatus* Jackknife-Fish
- *Equetus punctatus* Spotted Drum
- *Odontoscion dentex* Reef Croaker
- *Pareques acuminatus* High-Hat
- *Chaetodon striatus* Banded Butterflyfish
- *Prognathodes aculeatus* Longsnout Butterflyfish
- *Holacanthus bermudensis* Blue Angelfish
- *Holacanthus tricolor* Rock Beauty
- *Amblycirrhitis pinos* Redspotted Hawkfish
- *Abudefduf taurus* Night Sergeant
- *Chromis enchrysurus* Yellowtail Reeffish
- *Chromis multilineata* Brown Chromis
- *Chromis scotti* Purple Reeffish
- *Stegastes adustus* Dusky Damselfish
- *Stegastes diencaeus* Longfin Damselfish

- *Stegastes leucostictus*
  - *Stegastes variabilis*
  - *Bodianus pulchellus*
  - *Clepticus parrae*
  - *Halichoeres bathyphilus*
  - *Halichoeres bivittatus*
  - *Halichoeres caudalis*
  - *Halichoeres cyanocephalus*
  - *Halichoeres garnoti*
  - *Halichoeres maculipinna*
  - *Halichoeres poeyi*
  - *Halichoeres radiatus*
  - *Lachnolaimus maximus*
  - *Thalassoma bifasciatum*
  - *Scarus coelestinus*
  - *Scarus coeruleus*
  - *Scarus guacamaia*
  - *Scarus iseri*
  - *Scarus taeniopterus*
  - *Scarus vetula*
  - *Sparisoma atomarium*
  - *Labrisomus bucciferus*
  - *Labrisomus gobio*
  - *Labrisomus guppyi*
  - *Labrisomus haitiensis*
  - *Labrisomus kalisherae*
  - *Labrisomus nigricinctus*
  - *Malacoctenus aurolineatus*
  - *Malacoctenus macropus*
  - *Malacoctenus triangulatus*
  - *Paraclinus grandicomis*
  - *Paraclinus nigripinnis*
  - *Starksia ocellata*
  - *Acanthemblemaria chaplini*
  - *Emblemaria atlantica*
  - *Hemiblemaria simula*
  - *Stathmonotus hemphilli*
  - *Hypoleurochilus bermudensis*
  - *Ophioblennius macclurei*
  - *Gobiesox strumosus*
  - *Coryphopterus dicrus*
  - *Coryphopterus glaucofraenum*
  - *Coryphopterus thrix*
  - *Gnatholepis thompsoni*
  - *Gobiosoma grosvenori*
  - *Lythrypnus nesiotes*
  - *Lythrypnus spilus*
  - *Nes longus*
  - *Acanthurus bahianus*
  - *Acanthurus chirurgus*
  - *Acanthurus coeruleus*
  - *Paralichthys albigutta*
  - *Balistes caprisicus*
- Beaugregory
  - Cocoa Damselfish
  - Spotfin Hogfish
  - Creole Wrasse
  - Greenband Wrasse
  - Slippery Dick
  - Painted Wrasse
  - Yellowcheek Wrasse
  - Yellowhead Wrasse
  - Clown Wrasse
  - Blackear Wrasse
  - Puddingwife
  - Hogfish
  - Bluehead
  - Midnight Parrotfish
  - Blue Parrotfish
  - Rainbow Parrotfish
  - Striped Parrotfish
  - Princess Parrotfish
  - Queen Parrotfish
  - Greenblotch Parrotfish
  - Puffcheek Blenny
  - Palehead Blenny
  - Mimic Blenny
  - Longfin Blenny
  - Downy Blenny
  - Spotcheek Blenny
  - Goldline Blenny
  - Rosy Blenny
  - Saddled Blenny
  - Horned Blenny
  - Blackfin Blenny
  - Checkered Blenny
  - Papillose Blenny
  - Banner Blenny
  - Wrasse Blenny
  - Blackbelly Blenny
  - Barred Blenny
  - Redlip Blenny
  - Skilletfish
  - Colon Goby
  - Bridled Goby
  - Bartial Goby
  - Goldspot Goby
  - Rockcut Goby
  - Island Goby
  - Bluegold Goby
  - Orangespotted Goby
  - Ocean Surgeon
  - Doctorfish
  - Blue Tang
  - Gulf Flounder
  - Gray Triggerfish

- *Balistes vetula* Queen Triggerfish
- *Cantherhines pullus* Orangespotted Filefish
- *Monacanthus tuckeri* Slender Filefish
- *Lactophrys bicaudalis* Spotted Trunkfish
- *Lactophrys trigonus* Trunkfish
- *Canthigaster rostrata* Sharpnose Puffer
- *Diodon holocanthus* Balloonfish

### Invertebrates

- *Ircinia campana* Vase Sponge
- *Spongia barbara* Yellow Sponge
- *Sphaciospongia vesparia* Loggerhead Sponge
- *Agaricia agaricites* Lettuce Coral
- *Stephanocenia michelinii* Blushing Star Coral
- *Cladocora arbuscula* Tube Coral
- *Colpophyllia natans* Boulder Brain Coral
- *Diploria clivosa* Knobby Brain Coral
- *Diploria labyrinthiformis* Grooved Brain Coral
- *Diploria strigosa* Symmetrical Brain Coral
- *Favia fragum* Golf Ball Coral
- *Montastraea annularis* Column Star Coral
- *Montastraea cavernosa* Great Star Coral
- *Solenastrea bournoni* Smooth Star Coral
- *Solenastrea hyades* Knobby Star Coral
- *Dichocoenia stokesii* Pineapple Coral
- *Meandrina meandrites* Maze Coral
- *Isophyllastraea rigida* Rough Star Coral
- *Isophyllia sinuosa* Sinuous Cactus Coral
- *Mussa angulosa* Large Flower Coral
- *Manicina areolata* Rose Coral
- *Scolymia lacera* Atlantic Mushroom Coral
- *Oculina diffusa* Diffuse Ivory Bush Coral
- *Madracis decactis* Ten-rayed Star Coral
- *Porites astreoides* Mustard Hill Coral
- *Porites porites* Finger Coral
- *Phyllangia americana* Hidden Cup Coral
- *Siderastrea radians* Lesser Starlet Coral
- *Siderastrea siderea* Massive Starlet Coral
- *Zoanthus pulchellus* Green Sea Mat
- *Millepora alcicornis* Fire Coral
- *Lima scabra scabra* Flame Scallop
- *Crassostrea virginica* Eastern Oyster
- *Spondylus americanus* Atlantic Thorny Oyster
- *Octopus vulgaris* Octopus
- *Fasciolaria liliium* Banded Tulip
- *Pleuroploca gigantea* Horse Conch
- *Busycon sinistrum* Lightning Whelk
- *Cypraea cervus* Atlantic Deer Cowrie
- *Cyphoma gibbosum* Flamingo Tongue
- *Charonia tritonis variegata* Atlantic Trumpet Triton
- *Strombus gigas* Queen Conch
- *Oreaster reticulatis* Cushion Star, Bahama Star

- *Diadema antillarum* Long-spined Urchin
- *Lytechinus variegatus* Variegated Urchin
- *Tripneustes ventricosus* Sea Egg Urchin
- *Asteroporpa annulata* Basket Star
- *Astrophyton muricatum* Basket Star
- *Hermodice carunculata* Fire (Bristle) Worm
- *Lysmata wurdemanni* Peppermint Shrimp
- *Periclimenes yucatanicus* Spotted Cleaner Shrimp
- *Panulirus argus* Spiny Lobster
- *Callinectes sapidus* Blue Crab
- *Menippe nodifrons* Cuban Stone Crab
- *Gonodactylus spp.* Mantis Shrimp
- *Lysiosquilla scabricauda* Thumbsplitter Mantis Shrimp
- *Didemnum vanderhorst* Tunicates
- *Eudistoma species indeterminate* Strawberry Tunicates

## Conservation Threats

Threats to Hard Bottom habitats are caused by changes in sediment accretion and removal from beach nourishment activities, damage from ship and boat groundings, cumulative impacts of anchors of all size vessels, and alteration of species composition and trophic interactions caused by parasites and pathogens.

Threats to Hard Bottom habitats that were also identified for multiple other habitats are addressed in Chapter Multiple Habitats Threats and Conservation Actions. These threats include:

- Channel modification/shipping lanes
- Chemicals and toxins
- Climate variability
- Dam operations/incompatible release of water (quality, quantity, timing)
- Disruption of longshore transport of sediments
- Fishing gear impacts
- Harmful algal blooms
- Incompatible fishing pressure
- Incompatible industrial operations
- Incompatible wildlife and fisheries management strategies
- Invasive animals
- Invasive plants
- Key predator/herbivore loss
- Management of nature (beach nourishment and impoundments)
- Roads, bridges and causeways
- Shoreline hardening
- Vessel impacts

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered species composition	High
B	Altered structure	High
C	Altered water quality–physical, chemistry	High
D	Altered weather regime/sea level rise	High
E	Habitat destruction	High

F	Habitat disturbance	High
G	Keystone species missing or lacking in abundance	High
H	Missing key communities or functional guilds/trophic shift	High
I	Sedimentation	Medium

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Parasites/pathogens	High	A, B, E, G, H
2	Disruption of longshore transport of sediments	High	E, F, I
3	Channel modification/shipping lanes	High	E, F, I
4	Incompatible industrial operations	Medium	C, E
5	Incompatible fishing pressure	Medium	A, G
6	Dam operations/incompatible release of water: (quality, quantity, timing)	Medium	A, C, F
7	Climate variability	Medium	D
8	Inadequate stormwater management	Medium	A, C, G
9	Key predator/herbivore losses	Medium	A, F
10	Harmful algal blooms	Medium	A, F, G
11	Invasive plants	Medium	A, H
12	Management of nature (beach nourishment, impoundments)	Medium	A, C, E, F, I
13	Fishing gear impacts	Medium	B, E, F
14	Incompatible wildlife and fisheries management strategies	Medium	A, G
15	Placement of artificial structures	Medium	A, B, E, H
16	Shoreline hardening	Medium	E
17	Vessel impacts	Medium	E
18	Chemicals and toxins	Medium	F
19	Invasive animals	Medium	A
20	Solid waste	Medium	E, F
21	Utility corridors	Low	B, E
22	Roads, bridges and causeways	Low	E
23	Boating impacts	Low	E
24	Incompatible aquarium trade	Low	A
<b>Statewide Threat Rank of Habitat</b>		<b>High</b>	

## Conservation Actions

Actions to abate the threats to Hard Bottom that were also identified as statewide threats (see list above), are in Chapter Multiple Habitats Threats and Conservation Actions. Outcomes identified for this habitat address better understanding of the effects of beach nourishment and ensuring that ship anchorages are not sited over sensitive areas to reduce the probability that vessels run aground.

Highest ranked actions identified for abating this source of stress focus on:

- Establishing a funding source for remediation of damages from vessel impacts
- Development of a vessel anchoring management plan
- Improving the detection of pathogens, parasites, and biotoxins in marine organisms and the ability to rehabilitate impacted animals

Additional actions included:

- Evaluating whether parasites are indicators of estuarine and marine health
- Developing methods for keeping vessels away from sensitive areas
- Supporting restoration of damaged areas and replacement of species lost

The following actions, organized by action type, were identified to abate this threat:

### *Beach Nourishment/Impoundments*

Overall Rank	Land/Water Species Management	Feasibility	Benefits	Cost
<b>H</b>	Review and revise criteria for statewide monitoring protocols to assess beach and offshore habitat impacts related to beach nourishment projects similar to BACI (Before-after-control-impacts: the analytical framework and adaptive management tool).	VH	M	L

### *Parasites/Pathogens*

Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
<b>H</b>	Improve capabilities for/sophistication of inspection, recognition and treatment of aquatic organism diseases and parasites.	VH	M	M
<b>H</b>	Continue and support response teams/hotlines associated with disease outbreak, trauma, strandings, and mortality events for fish and wildlife species.	VH	M	M
<b>L</b>	Expand the number and capabilities of rehabilitation facilities for diseased and injured wildlife.	H	L	VH
Overall Rank	Research	Feasibility	Benefits	Cost
<b>H</b>	Conduct additional research on aquatic wildlife parasites and diseases, and the impacts of biotoxins on fish and wildlife resources.	VH	M	H
<b>H</b>	Synthesize and consolidate understanding, and identify gaps in understanding, of marine flora/fauna diseases, pathogens, and biotoxin impacts on fish and wildlife resources.	VH	M	L

M	Research and examine use of parasites as indicators of estuarine and marine health.	VH	L	M
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### *Vessel Impacts*

Overall Rank	Land/Water/Species Management:	Feasibility	Benefits	Cost
VH	Explore establish a marine/estuarine restoration fund.	M	VH	H
M	Develop a passive warning system for vessels to alert operators of sensitive or danger zones (shallows, reefs).	M	M	H
M	Encourage avoidance of anchorage and moorage in sensitive areas.	M	M	M
M	Identify appropriate areas for anchorage and moorings. Develop educational tools on low-impact mooring techniques.	M	M	M