MARINE and ESTUARINE

**Marine and Estuarine communities are unchanged from the 1990 Guide, with the exception of Salt Marsh and Mangrove Swamp(formerly Tidal Marsh and Tidal Swamp) which are now classified under "Marine and Estuarine Vegetated Wetlands"*

General Information

Marine Natural Communities and Estuarine Natural Communities occur along coastlines and include subtidal, intertidal, and supratidal zones. The distinction between Marine and Estuarine Natural Communities is often subtle. Estuarine Communities may temporarily exhibit freshwater conditions during periods of heavy rainfall or upland runoff or marine conditions when rainfall and upland runoff are low. Generally, however, estuarine areas are those areas within which seawater is significantly diluted with freshwater inflow from the land, while marine areas are those areas without significant freshwater inflow. The primary criterion for separation is the salinity level of the water, which often varies with local and temporal climatic conditions. In general, freshwater communities have salinity levels below 0.5 parts per thousand (ppt), Estuarine Natural Communities have salinity levels between 0.5 and 30 ppt, and Marine Natural Communities have salinity levels between 30 and 37 ppt. Differences in species compositions may exist between otherwise similar Marine and Estuarine Natural Communities, because of differences in salinity tolerance or other physical or biological factors.

Both Marine Natural Communities and Estuarine Natural Communities of Florida may be separated into Mineral Based, Faunal Based and Floral Based Communities. Mineral Based Communities include Consolidated Substrate and Unconsolidated Substrate communities which occur in subtidal, intertidal and supratidal zones. Faunal-based Communities include Octocoral Bed, Sponge Bed, Coral Reef, Mollusk Reef and Worm Reef Communities which occur in subtidal zones (Worm Reefs also occur in intertidal zones). Floral-based Communities include Algal Bed, Seagrass Bed, Tidal Marsh† and Tidal Swamp† Communities which occur in intertidal and supratidal zones (Seagrass Beds are subtidal only). Composite Substrate Communities include components of various other Marine and Estuarine Natural Communities in quantities too sparse to be classified as those communities. Composite Substrate Natural Communities occur in subtidal, intertidal and supratidal zones.

†These communities have been removed from this category (see * above)

MINERAL BASED

Consolidated Substrate

Description: Marine and Estuarine Consolidated Substrates are Mineral Based Natural Communities generally characterized as expansive, relatively open areas of subtidal, intertidal, and supratidal zones which lack dense populations of sessile plant and animal species. Consolidated Substrates are solidified rock or shell conglomerates and include

coquina, limerock or relic reef materials. These communities may be sparsely inhabited by sessile, planktonic, epifaunal, and pelagic plants and animals but house few infaunal organisms (i.e., animals living within the substrate).

The three kinds of Consolidated Substrate Communities occurring in Florida are of limited distribution. Coquina, which is a limestone composed of broken shells, corals and other organic debris, occurs primarily along the east coast, in marine areas in the vicinity of St. Johns and Flagler Counties.

Limerock substrates occur as outcrops of bedded sedimentary deposits consisting primarily of calcium carbonate. This Consolidated Substrate is more widespread than coquina substrate and can be found in a patchy distribution under both marine and estuarine conditions from north Florida to the lower-most keys in Monroe County. Relic reefs, the skeletal remains of formerly living reefs, are more limited in distribution than limerock outcrops but more common than coquina substrate.

Consolidated Substrates are important in that they form the foundation for the development of other Marine and Estuarine Natural communities when conditions become appropriate. Consolidated Substrate Communities are easily destroyed through siltation or placement of fill, and deliberate removal by actions such as blasting or nondeliberate destruction by forces such as vehicular traffic.

Another type of disturbance involves the accumulation of toxic levels of heavy metals, oils, and pesticides in Consolidated Substrates. Significant amounts of these components in the sediments will kill the infauna, thereby eliminating a food source for certain fishes, birds and other organisms. A film of pollutants engulfing Consolidated Substrates can render these areas unsuitable for colonization by marine and estuarine flora and fauna. Such problems occur in some of the major port cities, in areas where there is heavy industrial development, and along major shipping channels where oil spills are likely to occur.

Global and State Ranks: G3/S3

Crosswalk and Synonyms: hard bottom, rock bottom, limerock bottom, coquina bottom, relic reef

Unconsolidated Substrate

Description: Marine and Estuarine Unconsolidated Substrates are Mineral Based Natural Communities generally characterized as expansive, relatively open areas of subtidal, intertidal, and supratidal zones which lack dense populations of sessile plant and animal species. Unconsolidated Substrates are unsolidified material and include coralgal, marl, mud, mud/sand, sand or shell. This community may support a large population of infaunal organisms as well as a variety of transient planktonic and pelagic organisms (e.g., tube worms, sand dollars, mollusks, isopods, amphipods, burrowing shrimp, and an assortment of crabs).

In general, Marine and Estuarine Unconsolidated Substrate Communities are the most widespread communities in the world. However, Unconsolidated Substrates vary greatly throughout Florida, based on surrounding parent material. Unconsolidated sediments can originate from organic sources, such as decaying plant tissues (e.g., mud) or from calcium carbonate depositions of plants or animals (e.g., coralgal, marl and shell substrates). Marl and coralgal substrates are primarily restricted to the southern portion of the state. The remaining four kinds of Unconsolidated Substrate, mud, mud/sand, sand, and shell, are found throughout the coastal areas of Florida. While these areas may seem relatively barren, the densities of infaunal organisms in subtidal zones can reach the tens of thousands per meter square, making these areas important feeding grounds for many bottom feeding fish, such as redfish, flounder, spot, and sheepshead. The intertidal and supratidal zones are extremely important feeding grounds for many shorebirds and invertebrates.

Unconsolidated Substrates are important in that they form the foundation for the development of other Marine and Estuarine Natural Communities when conditions become appropriate. Unconsolidated Substrate Communities are associated with and often grade into Beach Dunes, Tidal Marshes, Tidal Swamps, Grass Beds, Coral Reefs, Mollusk Reefs, Worm Reefs, Octocoral Beds, Sponge Beds, and Algal Beds.

Unconsolidated Substrate Communities which are composed chiefly of sand (e.g., sand beaches) are the most important recreational areas in Florida, attracting millions of residents and tourists annually. This community is resilient and may recover from recreational disturbances. However, this community is vulnerable to compaction associated with vehicular traffic on beaches and disturbances from dredging activities and low dissolved oxygen levels, all of which can cause infaunal organisms to be destroyed or to migrate out of the area. Generally these areas are easily recolonized either by the same organisms or a series of organisms which eventually results in the community returning to its original state once the disturbance has ceased. In extreme examples, such as significant alterations of elevation, there is potential for serious long-term impacts from this type of disturbance.

Another type of disturbance involves the accumulation of toxic levels of heavy metals, oils, and pesticides within Unconsolidated Substrates. Significant amounts of these compounds in the sediments will kill the infaunal organisms, thereby eliminating a food source for certain fishes, birds, and other organisms. Such problems occur in some of the major port cities, in areas where there is heavy industrial development, and along major shipping channels where oil spills are likely to occur.

Global and State Ranks: G5/S5

Crosswalk and Synonyms: beach, shore, sand bottom, shell bottom, sand bar, mud flat, tidal flat, soft bottom, coralgal substrate, marl, gravel, pebble, calcareous clay

Coral Reef

Description: Marine and Estuarine Coral Reefs are Faunal Based Natural Communities generally characterized as expansive conglomerates of hard, sessile, limestone-building coral occurring in warm subtidal waters. Coral Reefs are formed from a diverse assemblage of carbonate precipitating organisms of the phylum Cnidaria (Coelenterata). Two classes of Cnidaria are the principal reef builders. Hydrozoa, the class which includes coral, are important fast growing, colonial reef builders that are capable of withstanding temperate water temperatures. Fire coral are distributed as far north in Florida as Tarpon Springs in the Gulf of Mexico and at least to Cape Kennedy in the Atlantic Ocean. The second class of reef building Cnidarians are the Anthozoa. This class is divided into two subclasses, the Octocorallia (e.g., soft coral, sea fans and sea feathers) and the Zoantharia (e.g., true stony coral, and colonial anemones). The Octocorallia represent the group of organisms comprising Octocoral Bed communities. The Scleractinians, or true stony coral, are the primary hermatypic or reef building coral that belong in this subclass. Examples of the reef building, true stony coral, are: elkhorn, staghorn, mountainous star coral, rough and smooth starlet coral, cavernous star coral, lobed star coral, sheet coral, ivory tree coral, giant brain coral, grooved brain coral, smooth coral, pillar coral, and fungus coral. As many as thirty four species of coral have been reported on individual Coral Reefs in the Florida Keys.

Coral Reefs can be classified into at least four kinds including: shallow and deep water barrier reefs and shallow and deep water patch reefs. Patch reef communities are roughly dome shaped with a topographic relief of 5 to 10 feet. Patch reefs vary considerably in dimension, depending on the size and number of coral colonies comprising the reef. A patch reef may be as small as a single giant brain coral head with its associated biota, or as large as several acres. Common builders of patch reefs include mountainous star coral, giant brain coral, smooth starlet coral, cavernous star coral, smooth brain coral, grooved brain coral and fire coral. Associated flora and fauna vary greatly between shallow water and deep water patch reefs.

A common feature associated with patch reefs is the "halo" effect. A zone of barren solid substrate, sand, or rubble is formed as a result of grazing by various species of fishes and invertebrates. The organisms exit at night from the refuge of the coral heads to forage on the attached algae and sea grasses, thus leaving a "halo" of barren, exposed substrate surrounding the patch reef. The halo is easy to spot from the surface, which aides in locating patch reef habitat. An important function of halos on solidified substrates is that reef-expansion is made possible because coral recruitment can take place only on hard (consolidated) substrates.

Major barrier reef communities form the expansive, living structures oriented parallel to the shoreline and serving as natural, protective breakwaters. Barrier reefs may form as shallow-water reefs or deep-water reefs at the edge of the shelf, providing light penetration is adequate. Barrier reefs are important in absorbing wave energy as a primary line of protection for the shoreline allowing formation of low energy communities such as Tidal Swamps in areas that would be inhospitable otherwise. Distinctive features of the barrier reef are the presence of staghorn and elkhorn corals,

coral zonation by depth, and spur and groove formations oriented seaward. A generalized bank reef can be subdivided into various biological zones including fore reef, back reef/rubble zone and spur and groove zone. This zonation is determined by water depth, degree of light penetration, and wave energy.

A major barrier reef builder is elkhorn coral. This fast growing species forms the structural framework for the reef while supplying the necessary habitat for reef oriented organisms. Other major reef builders in this type of reef habitat are: knobby brain coral, mountainous star coral, smooth brain coral, giant brain coral, leaf coral, cactus coral, fungus coral and pillar coral. However, reef coral species and associated flora and fauna vary greatly between shallow-water and deep-water barrier reefs.

Factors affecting the distribution of Coral Reefs include temperature, light penetration (turbidity), salinity, water currents and availability of suitable substrates. Most corals are very sensitive to cold temperatures, being largely restricted to seas that average above 21°C (70°F). Additionally, the water must be quite clear, since the symbiotic algae living within the corals are generally restricted to water depths of less than 50 meters (164 feet). Most Coral Reefs occur in marine waters with salinities between 30 and 37 ppt. Exposure to freshwater kills most species of corals within 30 minutes. Water currents transport essential nutrients and remove biological waste materials, silts and sands which could smother the reef. A hard substrate is necessary for completion of development of the planktonic larvae of coral.

Coral Reefs are among the most diverse and productive environments in the world. Coral Reefs provide shelter and food for a myriad of reef fishes and marine invertebrates. Gross production of calcium carbonate is between 100 and 500 tons per acre per year on actively growing reefs. Fragmented coral are often the primary source for creating and nourishing the beaches of nearby islands. These qualities, combined with their structural complexity, biological richness, and aesthetic appeal make Coral Reefs an extremely valuable resource wherever they occur.

Coral Reefs are biologically and structurally sensitive systems. They are slow growing, requiring decades to fully develop. Thus, structural damage caused by boat groundings, anchors, and other physical impacts may require decades to fully recover. Coral Reefs in Florida are at the northern extent of their range. As such, they are vulnerable to decreases in water temperature. High water temperatures also affect corals adversely. Sedimentation and turbid water restrict coral growth and, when significant, smother and kill Coral Reefs. Thus, dredge and fill operations or upland developments which increase the amount of suspended sediments in runoff water impact coral reefs. Pollutants may trigger planktonic algal blooms, reduce oxygen levels, or otherwise upset the delicate balance of the reef ecosystem, thereby damaging the Coral Reef community. Over-fishing, coral collecting, and other recreational activities may also create chronic problems in this community and should be periodically assessed.

Global and State Ranks: G2/S1

Crosswalk and Synonyms: deep-water barrier reef, deep-water patch reef, shallow-water barrier reef, shallow-water patch reef, live bottom community, hard bottom community, transitional reef, Hawk Channel reef, bank reef

Mollusk Reef

Description: Marine and Estuarine Mollusk Reefs are Faunal Based Natural Communities typically characterized as expansive concentrations of sessile mollusks occurring in intertidal and subtidal zones to a depth of 40 feet. In Florida, the most developed Mollusk Reefs are generally restricted to estuarine areas and are dominated by the American oyster. Less common are Mollusk Reefs dominated by mussels and others dominated by Vermetid worm shells. Numerous other sessile and benthic invertebrates live among, attached to, or within the collage of mollusk shells. Most common are burrowing sponge, anemones, mussels, clams, boring clam, oyster drill, lightning whelk, polychaetes, mud worms, oyster leech, barnacles, bluecrab, mud crab, stone crab, pea crab, amphipods, and starfish. Several fish also frequently occur near or feed among Mollusk Reefs, including cow-nosed ray, menhaden, lizardfish, gafftopsail catfish, pinfish, sea trout, spot, black drum, and mullet. Mollusk Reefs that are exposed during low tides (e.g., coon oysters) are frequented by a multitude of shorebirds, wading birds, raccoons, and other vertebrates.

Reef-building mollusks require a hard (consolidated) substrate on which the planktonic larvae (i.e., spat) settle and complete development. The spat dies if it settles on soft (unconsolidated) substrates, such as mud, sand or grass. Hard substrates include rocks, limestone, wood and other mollusk shells. Hard substrates are often limited in Estuarine Natural Communities because of the large amounts of silt, sands and muds that are deposited around river mouths. Once established, however, Mollusk Reefs can generally persist and often expand by building upon themselves.

The most common kind of Mollusk Reef, oyster mollusk reefs, occur in water salinities from just above fresh water to just below full strength sea water, but develop most frequently in estuarine water with salinities between 15 and 30 ppt. Their absence in marine water is largely attributed to the many predators, parasites, and diseases of oysters that occur in higher salinities. Prolonged exposure to low salinities (less then 2 ppt.) is also known to be responsible for massive mortality of oyster reefs. Thus, significant increases or decreases in salinity levels through natural or unnatural alterations of freshwater inflow can be detrimental to oyster Mollusk Reef communities.

Mollusk Reefs occupy a unique position among estuarine invertebrates and have been an important human food source since prehistoric times. They present a dynamic community of estuarine ecology, forming refugia, nursery grounds, and feeding areas for a myriad of other estuarine organisms.

The major threats to mollusk reefs continue to be pollution and substrate degradation due, in large part, to upland development. Mollusks are filter feeders, filtering up to 100 gallons of water a day. In addition to filtering food, they also filter and accumulate toxins from polluted waters. Sources of these pollutants can be from considerably distant areas, but are often more damaging when nearby. Substrate degradation occurs when silts, sludge and dredge spoils cover and bury the Mollusk Reefs. Declining oyster and other Mollusk Reef populations can be expected in coastal waters that are being dredged or are receiving chemicals mixed with rainwater flowing off the land, or from drainage of untreated residential or industrial sewage systems.

Global and State Ranks: G3/S3

Crosswalk and Synonyms: oyster bar, oyster reef, oyster bed, oyster rock, oyster grounds, mussel reef, worm shell reef, Vermetid reef

Octocoral Bed

Description: Marine and Estuarine Octocoral Beds are soft Faunal Based Natural Communities characterized as large populations of sessile invertebrates of the Class Anthozoa, Subclass Octocorallia, Orders Gorgonacea and Pennatulacea. The dominant animal species are soft corals such as gorgonians, sea fans, sea feathers, sea fingers, sea pansies, sea plumes, sea rods, and sea whips. This community is confined to the subtidal zone since the sessile organisms are highly susceptible to desiccation. Other sessile animals typically occurring in association with these soft corals are sea anemones. An assortment of non-sessile benthic and pelagic invertebrates and vertebrates (e.g., sponges, mollusks, tube worms, burrowing shrimp, crabs, isopods, amphipods, sand dollars, and fishes) are associated with Octocoral Beds. Specific species of interest living on or among the soft corals include the flamingo tongue shell, the purple shrimp, and the basket starfish. Sessile and drift algae can also be found scattered throughout Octocoral Beds.

Octocoral Beds require hard bottom (consolidated) substrate (i.e., coquina, limerock, relic reefs) on which to anchor. Hard bottom substrate occurs sparsely throughout Florida in marine and estuarine areas; however, soft corals prefer the warmer waters of the southern portion of the state, severely limiting the distribution.

Octocoral Beds may grade into other marine and estuarine hard bottom subtidal, intertidal, and supratidal communities (i.e., Consolidated Substrate, Sponge Bed, Coral Reef, Mollusk Reef, Worm Reef, lithophytic Algal Bed) as well as soft bottom communities (i.e., Unconsolidated Substrate, sammophytic Algal Bed, Seagrass Bed, Tidal Marsh, Tidal Swamp).

Management considerations should include locating all true Octocoral Beds within the state, thought to be more prevalent off the Southeast coast, and providing protection for them from external degradation. Primary threats to Octocoral Beds include siltation from beach "renourishment" or "restoration" projects, anchor damage by nautical craft, trawling by commercial fishermen, collecting for tourist-oriented trade, and water pollution, particularly oil spills.

Global and State Ranks: G2/S1

Crosswalk and Synonyms: gorgonians, sea fans, sea feathers, sea fingers, sea pansies, sea plumes, sea rods, sea whips, soft corals

Sponge Bed

Description: Marine and Estuarine Sponge Beds are soft Faunal Based Natural Communities characterized as dense populations of sessile invertebrates of the phylum Porifera, Class Demospongiae. The dominant animal species are sponges such as branching candle sponge, Florida loggerhead sponge and sheepswool sponge. Although concentrations of living sponges can occur in marine and estuarine intertidal zones, Sponge Beds are confined primarily to subtidal zones. Other sessile animals typically occurring in association with these sponges are stony corals, sea anemones, mollusks, tube worms, isopods, amphipods, burrowing shrimp, crabs, sand dollars, and fishes. Sessile and drift algae can also be found scattered throughout Sponge Beds.

Sponge Beds require hard bottom (consolidated) substrate (i.e., coquina, limerock, relic reefs) on which to anchor. Hard bottom substrate occurs sparsely throughout Florida in marine and estuarine areas; however, sponges prefer the warmer waters of the southern portion of the state, significantly limiting the distribution severely.

Sponge Beds may grade into other marine and estuarine hard bottom subtidal, intertidal and supratidal communities (i.e., Consolidated Substrate, Sponge Bed, Coral Reef, Mollusk Reef, Worm Reef, lithophytic Algal Bed) as well as soft bottom communities (i.e., Unconsolidated Substrate, ammophytic Algal Bed, Seagrass Bed, Tidal Marsh, Tidal Swamp).

Management considerations should include locating all true Sponge Beds within the state, thought to be more prevalent off the SW coast, and providing protection for them from external degradation. Primary threats to Sponge Beds include siltation from beach "renourishment" or "restoration" projects, anchor damage by nautical craft, trawling by commercial fishermen, collecting for tourist-oriented trade, and water pollution, particularly oil spills.

Global and State Ranks: G2/S2

Crosswalk and Synonyms: branching candle sponge, Florida loggerhead sponge, sheepswool sponge

Worm Reef

Description: Worm Reefs are Faunal Based Natural Communities characterized by large colonial conglomerates of rigid Sabellariid worm tubes of the species Phragmatopoma lapidosa. These shallow water "reefs" are generally found in the lower reaches of the intertidal zone or upper reaches of the subtidal zone. Sabellariid reefs provide shelter for a diverse assortment of small benthic vertebrate and invertebrate organisms, particularly since the surrounding habitat is generally bare substrate (e.g., Consolidated Substrate or Unconsolidated Substrate). Therefore, the mere presence of Worm Reefs greatly increases the faunal diversity of a given area.

Of all the Marine and Estuarine Natural Communities, Worm Reefs are probably the least well known. Worm Reefs are known from several locations along the southern coast of the state.

A Worm Reef can be surrounded by and grade into virtually any of the remaining Marine and Estuarine Natural Communities but is more likely to grade into an expanse of Unconsolidated Substrate. Information regarding effective management of Worm Reefs is lacking. However, excessive turbidity and siltation are probably significant factors in the decline of Worm Reefs. A beach renourishment project in West Palm Beach threatens one of the few remaining productive Worm Reef sites, located in one to three meters of water near the shore.

Global and State Ranks: G1/S1

Crosswalk and Synonyms: Sabellariid Reef

Algal Bed

Description: Marine and Estuarine Algal Beds are Floral Based Natural Communities characterized as large populations of nondrift macro or micro algae. The dominant plant species include star alga, Argardhiella, Avrainvellea, Batophora, Bryopsis, Calothrix, Caulerpa, Chondria, Cladophora, Dictyota, Digenia, Gracilaria, Halimeda, Laurencia, Oscillatoria, shaving brush, Rhipocephalus, and Sargassum. This community may occur in subtidal, intertidal, and supratidal zones on soft and hard bottom substrates. Vascular plants (e.g., seagrasses) may occur in Algal Beds associated with soft bottoms. Sessile animals associated with Algal Beds will vary based on bottom type. For Algal Beds associated with hard bottom substrate (lithophytic), faunal populations will be similar to populations associated with Octocoral Beds and Sponge Beds. Those associated with soft bottom substrate (psammophytic) may have similar benthic and pelagic species in addition to infauna species. Recent research has shown that Algal Beds provide critical habitat for juvenile spiny lobsters, a species of great commercial importance.

Lithophytic Algal Beds are thought to be less widespread within Florida than psammophytic Algal Beds. The precise distribution of both kinds is not known; however, the distribution is thought to be less than for Marine and Estuarine Seagrass Beds.

Marine and Estuarine Algal Beds may grade into Seagrass Beds, Tidal Marsh, Tidal Swamp, or many of the other Marine or Estuarine Natural Communities. Supratidal Algal Beds such as periphyton beds (e.g., blue-green algal mats) may grade into various coastal Palustrine and Terrestrial Natural Communities.

Distribution information for Algal Beds is lacking. The location of major beds must be determined before this Natural Community can be managed adequately. Existing state dredge and fill laws provide specific protection for Marine and Estuarine Seagrass Beds but not for Algal Beds. The correction of this deficiency could prove to be the most effective management tool available.

The primary threat to Marine and Estuarine Algal Beds are dredging and filling activities which physically remove or bury the beds. Other damage occurs from increased turbidity in the water column which reduces available light; pollution, particularly from oil spills; and damage from boats.

Global and State Ranks: G3/S2

Crosswalk and Synonyms: algal mats, periphyton mats

Seagrass Bed

Description: Marine and Estuarine Seagrass Beds are Floral Based Natural Communities typically characterized as expansive stands of vascular plants. This community occurs in subtidal (rarely intertidal) zones, in clear, coastal waters where wave energy is moderate. Seagrasses are not true grasses. The three most common species of seagrasses in Florida are turtle grass, manatee grass, and shoal grass. Nearly pure stands of any one of these species can occur, but mixed stands are also common. Species of Halophila may be intermingled with the other seagrasses, but species of this genus are considerably less common than turtle grass, manatee grass and shoal grass. Widgeon grass can also be found occurring with the previously listed seagrasses although they occur primarily under high salinities while widgeon grass occurs in areas of lower salinity.

Attached to the seagrass leaf blades are numerous species of epiphytic algae and invertebrates. Together, seagrasses and their epiphytes serve as important food sources for manatees, marine turtles, and many fish, including spotted sea trout, spot, sheepshead, and redfish. The dense seagrasses also serve as shelter or nursery grounds for many invertebrates and fish, including marine snails, clams, scallops, polychaete worms, pink shrimp, blue crab, starfish, sea urchins, tarpon, bonefish, seahorses, pompano, jack, permit, snapper, grunt, mullet, barracuda, filefish, and cowfish.

Marine and Estuarine Seagrass Beds occur most frequently on Unconsolidated Substrates of marl, muck or sand, although they may also occur on other Unconsolidated Substrates. The dense blanket of leaf blades reduces the wave-energy on the bottom and promotes settling of suspended particulates. The settled particles become stabilized by the dense roots and rhizomes of the seagrasses. Thus, Marine and Estuarine Seagrass Beds are generally areas of soil accumulation.

Other factors affecting the establishment and growth of Seagrass Beds include water temperature, salinity, wave-energy, tidal activity, and available light. Generally, seagrasses are found in waters with temperatures ranging from between 20° and 30°C (68°-86°F). Seagrasses occur most frequently in areas with moderate current velocities, as opposed to either low or high velocities. Although Marine and Estuarine Seagrass Beds are most commonly submerged in shallow subtidal zones, they may be exposed for brief periods of time during extreme low tides.

One of the more important factors influencing seagrass communities is the amount of solar radiation reaching the leaf blades. In general, the water must be fairly clear because turbidity blocks essential light necessary for photosynthesis. The rapid growth rate of seagrass under optimum conditions rivals that of most intensive agricultural practices, without energy input from man.

Marine and Estuarine Seagrass Beds are often associated with and grade into Unconsolidated Substrate, Coral Reefs, Tidal Swamps, and Tidal Marshes, but may also be associated with any other Marine and Estuarine Natural Community.

Marine and Estuarine Seagrass Beds are extremely vulnerable to human impacts. Many have been destroyed through dredging and filling activities or have been damaged by

sewage outfalls and industrial wastes. In these instances, the Seagrass Beds are either physically destroyed, or succumb as a result of decreased solar radiation resulting from increased water turbidity.

Seagrass Beds are also highly vulnerable to oil spills. Low concentrations of oil are known to greatly reduce the ability of seagrasses to photosynthesize. Extreme high temperatures also have adverse impacts on Seagrass Beds. The area surrounding power plant outfalls, where water temperatures may exceed 35°C (95°F), has been found to be lethal to seagrasses. Marine and Estuarine Seagrass Beds are susceptible to long term scarring cuts from boat propellers, anchors and trawls. Such gouges may require many years to become revegetated. When protected from disturbances, seagrasses have the ability to regenerate and recolonize areas. Additionally, some successful replantings of Seagrass Beds have been conducted. However, the best management is to preserve and protect Marine and Estuarine Seagrass Beds in their natural state.

Global and State Ranks: G3/S2

Crosswalk and Synonyms: seagrass meadows, grass beds, grass flats

Composite Substrate

Description: Marine and Estuarine Composite Substrates consist of a combination of Natural Communities such as "beds" of algae and seagrasses or areas with small patches of consolidated and unconsolidated bottom with or without sessile floral and faunal populations.

Composite Substrates may be dominated by any combination of marine and estuarine sessile flora or fauna, or mineral substrate type. Typical combinations of plants, animals and substrates representing Composite Substrates include soft and stony corals with sponges on a hard bottom such as a limerock outcrop; psammophytic algae and seagrasses scattered over a sand bottom; and patch reefs throughout a coralgal bottom. Any of the remaining Marine and Estuarine Natural Communities can grade into Composite Substrate communities.

Although Composite Substrates can occur in any marine or estuarine area in Florida, some combinations are common while others are extremely rare. Combinations of Consolidated and Unconsolidated Substrate components offer the greatest opportunity for diversity, and should be high priority areas for protection. Management requirements are negligible providing the composite community is adequately protected.

Protection efforts will vary slightly based on components of the Composite Substrate community. Generally, degradation of physical and chemical water quality parameters should be prevented, as well as mechanical disturbance from anchoring, dredging, trawling and similar activities.

Global and State Ranks: G3/S3

Crosswalk and Synonyms: