

# *Florida's Honeymoon Island State Park*



## *Guide to Beach Treasures*

**Angel Wing**  
*Cyrtopleura costata*



The Angel Wing is one of the most graceful shells found on our beaches. To compensate for its delicate shell, it has the ability to burrow up to three feet deep in mud or to more shallow depths in soft rock, clay or even wood. It digs these tunnels by using its foot to rock its tooth-like short side to burrow and dig. It also uses jets from the mantle cavity to flush particles from the excavation.

The bivalve then spends the rest of its eight-year life in its den. Long siphons protrude above the surface to circulate water and filter out food. It cannot retract the siphons fully, nor can its weak muscles completely close its shell.

The Angel Wing can grow up to seven inches long. The shells are normally white, however, some are pink-tinted due to exposure to red tide.

*Live shells should never be taken from any FL State Park.*

**Ponderous Ark**  
*Noetia ponderosa*



The Ponderous Ark is one of the few bivalves that are found undamaged, due to their heavy thick shell. They lack the straight hinge line of other arks and grow to 2 ½ inches. Shells often still have a dark brown or black velvet-like periostracum (organic shell layer). This covering is sometimes mistaken for a layer of oil or tar.

Ponderous Arks trickle spawn throughout the year with peaks in the summer and fall. They live in waters to 60 feet deep. Studies have been conducted in Florida to determine if aquaculture of this bivalve would be profitable. Results show that there is limited appeal by traditional clam customers.

The photo above shows a sea whip skeleton attached to the clam. These and other soft flexible corals are often found attached to the posterior of Ponderous Arks. Since Sea Whips feed on plankton suspended in the water, they may benefit from the water currents created by the filter-feeding Arks.

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**Cut-Ribbed Ark**  
*Anadara floridana*



The Cut-Ribbed Ark, as with some other Arks, has a conspicuous long straight hinge-line. It is distinguished from other similar shells by a deep narrow cut in the center of each radiating rib. This bivalve can grow to 4".

Embryos develop into free-swimming larvae and live among the plankton before maturing into a bivalve. Their habitat is in soft bottoms of mud and sand. They can be found from shallow water to a depth of 300 feet.

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**Calico Clam**  
*Marcocallista maculata*



This bivalve has a shiny shell with very fine growth lines. The surface is cream colored with blurry brown rectangles and smudges. Occasionally albino specimens are found. Calico Clams are part of the Venus family of which there are about 500 species. The Sunray, Cross-barred Venuses, Southern Quahogs and Dosinias are also found on Honeymoon Island.

The Calico Clam uses its strong foot to bury itself in the mud or sand around seagrass beds in waters from 6 to 60 feet. From this protected position it uses siphons to pull in food. The clam's embryos develop into free swimming planktonic larvae, then into a bivalve veliger, which looks like a miniature clam.

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**Channeled Duck clam** *Raeta plicatella*  
**Smooth Duck clam** *Anatina anatina*



Duck clams can be distinguished from similar sized and shaped clams by the distinctive spoon-shaped pit behind the central hinge teeth. The Channeled Duck Clam (top and left) is a little more common than the Smooth Duck Clam (bottom right). Both have thin shells, but the Channeled Duck Clam has broad concentric ribs and a more rounded shape.

These bivalves use a foot to dig into the sand in 10 to 18 feet of water. Living outside of the surf zone, live clams are not usually found on the beach. Both clam species have two long siphons that exit the flared hind end. These siphons extend up into the water above the sand where one filters out food and the other expels waste.

These clams have a ligament that holds the shells slightly open, while the adductor muscles are relaxed. Threatened, the adductor muscles contract, closing the shells and protecting the clam.

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**Prickly Cockle**  
*Trachycardium egmontianum*



The Prickly Cockle is distinguished by its rough spiny shell that grows up to 1 ¼ to 2 ¾ Inches.

These bivalves have a strong narrow foot with which they can “jump” by bending and then quickly straightening it. The foot is also used to bury itself just below the sea floor.

They feed on plankton by drawing in seawater through their short siphons. They exhibit gonochorism (the sex varies according to surrounding conditions).

Cockles’ predators are shore birds, fish, sea stars and humans.

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**Atlantic Giant Cockle**  
*Dinocardium robustum*



The Atlantic Giant Cockle, with its hard, sturdy shell can grow to be five inches long. It is also known as the Great Heart Cockle. If you put two halves together and look at them from the side, it looks like a heart.

A strong muscular foot allows them to burrow into sediment where they extend siphons into the water to filter for plankton and other organic material. They can also use this foot to leap away, in pole-vault fashion, from attacking predators.

Cockles are eaten in European countries and used in chowder in the United States. Cockles are found living in shallow water and to depths of 100 feet. This species is 65 million years old.

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**Van Hyning's Cockle**  
*Robustum vanhyningi*



A subspecies of the Giant Atlantic Cockle, its shell is more elongate, slanted and more brightly colored. It grows up to 5 inches. This shell is named after Thompson Van Hyning, who was the first director of the Florida Museum, from 1914 until 1941.

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**Yellow Cockle**  
*Trachycardium muricatum*



This shell is a cheerful yellow, sometimes with pale brownish markings. The inside of the shell can be a pale yellow as well. The nearly round-shaped shell measures up to 1¼ to 2½ inches.

These bivalves have a strong narrow foot that can be used to push off and “jump” by bending and then quickly straightening. The foot is also used to bury itself just below the sea floor.

They feed on plankton by drawing in seawater through their short siphons. They exhibit gonochorism (the sex varies according to surrounding conditions).

Cockles’ predators are shore birds, fish, sea stars and humans.

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**Common Egg Cockle**  
*Laevicardium serratum*



This shell has an oval shape with ridges along the inner margin. They are glossy white and can reach 3 inches across.

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They feed on plankton by drawing in seawater through their short siphons. They exhibit gonochorism (the sex varies according to surrounding conditions).

Cockles’ predators are shore birds, fish, sea stars and humans.

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**Coquina**  
*Donax variabilis*



The Coquina is a small wedge-shaped bivalve growing to a maximum of 1 inch. They are favored by shell collectors because they have a wide range of colors; white, yellow, pink, orange, red, purple, brown and blue. Some have colorful ray markings.

They live in colonies just below the sand’s surface where they migrate with the tide. They reposition themselves by frequently allowing wave action to wash them to a new location where they quickly rebury themselves. They have two short siphons and feed on suspended plant material and detritus.

Coquinas can be boiled and simmered to make a seafood broth.

Large deposits of Coquina shells are used for building materials. Compacted over time, they create a limestone that can be cut into blocks.

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**Disk Dosinia**  
*Dosinia concentrica*



The Disk Dosinia is a member of the Venus Family. It's very similar to the Elegant Dosinia but can be differentiated because the Disk Dosinia has finer concentric ridges that cannot be counted with the naked eye. (The Elegant Dosinia ridges are broad and easily seen and counted.)

These bivalves live buried in sand and sandy mud, preferring water shallower than 10 feet. They favor protected beaches and bays where they feed by pulling sea water in and out through siphons.

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### Common Jingle Shells

*Anomia ephippium*



These shiny 1" to 2" bivalves are named for the bell-like sound made when several shells are shaken together. Other names include: Mermaid's toenails, Neptune's toenails, toenail shells, gold shells and saddle oysters.

Beachcombers collect these shells to use for a variety of craft projects. They have industrial uses in the manufacture of glue, chalk, paint, shellac and solder.

Jingle shells are filter feeders, sieving water through their gills to remove plankton. They attach themselves by using their byssus gland to secrete byssal threads which secure them to a hard surface. The shell then takes the shape of the object it is attached to. Since the lower half of the bivalve is firmly anchored the upper half is the shell most often found on beaches after the animal dies.

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### Buttercup Lucine

*Anodontia alba*



The Buttercup Lucine shell is dull white with an interior that is white to butter yellow. The shell may grow to 2 inches.

The bivalve lives in soft mud or sand in areas of low nutrients, low oxygen and high sulfides in waters 3 to 300 feet deep. Its very long foot that may be 6 times as long as the shell! It uses the foot to construct a mucus-lined tube in the sand. Through this tube it draws in water and food. After filtering out the nutrients, the wastes and water are then expelled through a long siphon. The siphon is unusual in that it retracts by turning itself inside out.

The Buttercup Lucine also hosts symbiotic sulfur-oxidizing bacteria in their gills which provides additional sustenance.

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### Kitten's Paw

*Plicatula gibbosa*



This bivalve is obviously named for its thick shell with curving digit-like ribs resembling a kitten's paw. They are white to gray with red-brown to orange markings on the ribs. The shell can be ¼ to 1½ inches wide. This bivalve belongs to a small family of about 10 species which all live in tropical waters.

Their habitat is in water from the low-tide line to 300 feet deep. There they cement the highest part of their shell to a rock. The hard thick shell provides protection from crushing or boring by predators.

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### Pennsylvania Lucine

*Lucina pennsylvanica*



This bivalve is misnamed as its habitat is from North Carolina south and does not occur in the waters off of Pennsylvania. The 1" to 2" smooth white shell has a deep crease behind the umbo (pointed top). The live clam has a ridged periostracum (semi-soft outer covering) that may help secure it while buried. The periostracum easily flakes off and is often missing on shells found on the beach.

This Lucine is a filter feeder, and lives in sand and gravel at depths from 2 to 250 feet. It has been reported in extreme environments such as hydrothermal seafloor vents.

Their embryos change into free-swimming planktonic larvae before developing into juvenile clams. The genus name *Lucina* is one of the names of the Roman goddess Juno, "giver of light".

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### **Eastern Oyster** *Crassostrea virginica*



This large irregularly-shaped thick-shelled bivalve lives cemented to other oysters in large colonies. They live on hard or soft bottom up to 40 feet deep. The smooth inner surface has a purple muscle scar.

Eastern Oysters feed on planktonic organisms and detritus filtering and purifying up to fifty gallons of water a day. They start life as male, change sex several times, and end life as female. These oysters can live up to 30 years and reach a maximum size of 11 inches. Predators include crabs, seabirds, sea stars, and Cownose Rays.

People love to eat oysters. Thirty miles of the Florida Panhandle has historically produced 90% of the State's oysters. Storms, salinity changes, habitat loss and overfishing have decimated populations. The decline is so critical that the Florida Fish and Wildlife Conservation Commission has suspended the harvest of all wild oysters in Apalachicola Bay until December of 2025.

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### **Flat Tree Oyster** *Isognomon alatus*



The flat tree oyster's color is pale brownish to purplish black with a shiny cream interior. It has a long hinge line. It is a very thin bivalve and can be easily confused with a jingle shell. Although many of these shells are small, they can grow to 3 inches.

Its habitat is in areas of high sedimentation. It is often found in dense patches on Red Mangrove roots where they attach themselves with byssal shock-absorbing threads, secreted by the byssus gland in the foot. The Flat Tree Oyster feeds by passing seawater through its gills, filtering out plankton and other organic particles.

In the spring, changes in water temperature, salinity, and food supply, trigger mass spawning by the oysters. Together they release their egg and sperm cells into the water where the eggs are fertilized and the larvae float with plankton for a couple of weeks.

Flat Tree Oysters have been used to determine if heavy metal pollution has occurred. Since their bodies readily absorb impurities, analyzing them can determine the amount of toxins in the water.

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### **Half-naked Pen Shell** *Atrina seminuda*



Similar to the Stiff Pen shell, but having much longer tubular spines on the upper half of its shell. Also, the posterior muscle scar is within the pearly interior area.

These large bivalves grow to 12 inches. They can be found in and around seagrass beds, buried and anchored to hard objects by their byssal threads which protrude from the beak of the shell. With the upper half of their shell exposed, it they filter plankton from the seawater.

Small crabs often live within the shell's mantle cavity, and snails take up residence on the exterior of the shell. The Pen Shell is preyed upon by sea stars and the horse conch. It has a large adductor muscle which is edible.

The interior of these shells can be very iridescent and a broken piece of shell often catches the eye of beachcombers.

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### **Stiff Pen Shell** *Atrina rigid*



This bivalve has a dark brown shell, with 15 to 20 radiating ribs and short tubular spines. Their posterior muscle scar is outside the shiny inner shell.

These large bivalves grow to 12 inches. They can be found in and around seagrass beds, buried and anchored to hard objects by their byssal threads which protrude from the beak of the shell. With the upper half of their shell exposed, it they filter plankton from the seawater.

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### **Sawtooth Pen Shell**

*Atrina serrata*

Photo Coming

This Pen Shell has 30 radiating ribs with hundreds of short spines.

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### **Southern**

### **Horse Mussel**

*Modiolus squamosus*



The southern Horse Mussel can be identified by its purplish non-ribbed shell. They can reach 2.5 inches.

This bivalve feeds by pulling water into its mantle cavity with hair-like cilia on its gills. Food is sorted by size and rejected particles are removed as water exits the mantle cavity.

Reproduction is triggered by environmental conditions and is accomplished by external fertilization. Hatched larvae travel with the current for 3 to 4 weeks before settling to the sea floor where they anchor themselves with a secreted byssus. Byssus threads are very strong and can stretch to more than half their length allowing the horse mussel to adjust to the current. After attachment the Horse Mussel larvae metamorphose into juvenile clams.

*Live Animals should never be taken from any FL State*

### **Scallop**

*Pectinidae*



Compared to oysters and clams, scallop shells are thin and lightweight to aid in swimming. Scallops are filter feeders and their particular shell color depends on the type of plankton they eat.

Scallops are one of the cleanest shellfish available. The edible adductor muscle is not used to filter water, so scallops are not susceptible to toxins or contaminants the way that clams and mussels are. Scallops are low in calories, sodium and saturated fats, and are more than 80% protein.

Unlike mussels and clams, scallops are the only bivalve mollusk that is free-swimming. They swim by quickly opening and closing their shells. They also have up to 200 amazing blue eyes around their mantle.

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### **Southern Surfclam**

*ParkSpisula raveneli*



The Southern Surfclam is white to cream with rusty tones. It grows to 5.5 inches. This bivalve is a close relative of the Northern Surfclam which has been commercially harvested for 40 years and is widely consumed.

Surfclams are filter feeders with two short united siphons that draw in water and nutrients and expel waste. A powerful foot allows it to bury itself just below the surface in sand. They are common in water to 100 feet.

The sexes are separate. Eggs and sperm are dispersed into the water where they bond. The larvae swim free for two weeks before settling to the sea floor. They become sexually mature at one year and grow rapidly for seven years. A 37 year old S. Surfclam has been recorded.

They are preyed upon by Sea Stars and gastropods.  
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### Southern Quahogs *Mercenaria campechiensis*



These large sturdy bivalves can grow to 6 inches. The inside of the shell has two muscle scars. These clams move through the mud with their hefty muscular foot. They are exceptional filter feeders and can sieve a gallon of water per hour. During this process they can absorb pollutants, bacteria and viruses from contaminated water. This does not harm the clams, but can pose a health risk to humans who consume them.

Southern Quahogs, along with their related Northern Quahogs, are extensively harvested. The entire body is edible, not just the large adductor muscle. At seafood markets the smallest (youngest) Quahogs are called Countnecks. As they get larger, Littlenecks, then Topnecks, Cherrystones and finally Quahogs.

Historically, Native Americans made “wampum” from the Quahog’s thick shell. They would drill, then punch out 1/4" elongated tubular beads. The name “quahog” comes from the native’s name “poquauhock” meaning horse fish. *Live shells should never be taken from any FL State Park.*

### Turkey Wing *Arca Zebra*



The Turkey Wing is one of the easiest shells to identify, with its color and shape resembling the wing of a Wild Turkey. Also notable is the long straight hinge line that connects it to a matching shell half. Its shell is thick and can grow up to 4 inches in length. This bivalve can be found from the low-tide mark down to 20 feet deep where it attaches itself to rocks or other hard surfaces with shock-absorbing byssal threads.

Living animal shells are covered with a thick coating or periostracum. They are important and efficient filter feeders that filter large amounts of plankton from the water.

Thousands of tons of these clams are harvested in the Caribbean each year. In Bermuda, “Turkey Wing Pie” is a favorite.

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### Florida Spiny Jewelbox *Arcinella cornuta*



This bivalve is small, growing to about 1". Its off-white shell is thick. It has distinct erect tubular spines in 7 to 9 rows across the shell. The interior is shiny and tinted pink to purple. The spikes and the hard shell help protect the Spiny Jewelbox from predators. Specimens found on the beach may have had their spines somewhat eroded.

The Spiny Jewelbox is a filter feeder that extracts plankton from the seawater. The animal starts life cemented to a hard structure. While still young, they detach themselves, then move freely and mature on the sandy sea floor.

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### Cross-barred Venus Clams *Chione elevata*



These bivalves are seldom larger than 1½ inches and are the most numerous shells found on our beaches. As its name implies, it has raised, bladelike concentric ridges superimposed on strong radial ribs giving a lattice appearance. The hinge of the shell has two teeth and the shell edge is finely ridged.

The clam’s preferred habitat is in the sand around seagrass beds. Using a siphon system, seawater is passed over a mucus collection net which extracts plankton for food. There are approximately 23 species of the genus *Chione* in Florida, however the distinctive raised cross-bar pattern identifies the *elevata* species.

Predators of the Cross-Barred Venuses are numerous carnivorous gastropods. For us, a tasty chowder can be made, although that requires a lot of clams.

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**Sunray Venus**  
*Macrocallista nimbosa*



The Sunray Venus clam lives close to shore in water up to a depth of 25 feet. This beautiful bivalve has bands of darker colors which radiate from the beak (umbo) to the margin (periphery). The shell, which may reach a length of 6 inches, fades quickly from sun exposure. It has a large foot which it uses to bury itself in sand or mud. There it extends siphons to take in water and filter out food.

In Florida there is ongoing research focusing on aquafarming Sunray Venus Clams. Sunrays grow faster than hard clams, reaching an optimal 2-inch harvest size in about a year. Other clams take up to six months longer to harvest. They also have more than twice as much meat because the shells are not as thick or heavy as other clams. Lastly they are sweet and briny making them a favorite seafood choice.

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**Apple Murex**  
*Phyllonotus pomum*



The Apple Murex shell is easy to identify with its spiny vertical folds, ridges and fine encircling lines. It is white to pinkish white and has a large round aperture (opening). It is one of six Murex snail species found in Florida.

This gastropod lives on coral reefs, mangroves, rubble, rock, sand, seagrass and shell beds. It is carnivorous, drilling holes in bivalves to feed on their bodies.

The Apple Murex is a communal spawner. Multiple snails work together to build a shared egg casing that can be over a foot in diameter. The egg mass resembles a large sea sponge.

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**Common American Auger**  
*Terebra dislocata*



The Common American Auger shell may be off-white, tan, or gray with ladder-like ribs. These gastropods are small and have a pointed spire.

It is very mobile in chasing its prey. It has "teeth" that work like a harpoon to inject poison into marine worms. In some species the poison is a danger to humans but the Common American Auger's is not.

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**Common Atlantic Slipper**  
*Crepidula fornicata*



This gastropod is easy to identify as it has a shelf on its interior making it resemble a bedroom slipper. It can be smooth or wrinkled and grows to 1 ½ inches.

The Atlantic Slipper feeds by filtering out food brought into the mantle cavity by water currents. There, the food is covered by a mucous secretion and drawn into the stomach. It spends its entire life in one spot attached to a hard surface. This means that an opercula (door) or another half shell is not required.

The snail is often attached to other Slippers making reproduction convenient. They are hermaphroditic (a single individual alternates sexes) and lay 70 to 100 eggs in thin-walled capsules. The Atlantic Slipper has few predators and can become quite numerous. This can be a threat to Oysters, as they compete to filter from the same food source.

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**White Baby Ear**  
*Sinum perspicuum*



This very white gastropod is a member of the Moon Snail Family. Its small (1" to 1 ½") flattened shell has broad spiral grooves. The live animal's body can completely envelop its shell and cannot be fully withdrawn.

To help with burrowing, the White Baby Ear produces copious amounts of slimy mucus. Despite its delicate appearance, this snail is carnivorous, using its foot to chase down bivalves in soft sediments. It then consumes its prey by softening the shell with acid secretions, then drilling through the shell with a rasping radula (small teeth). A proboscis is then inserted to suck up the dinner.

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### Dwarf Cerith

*Cerithium lutosum (on penny)*



These gastropods are small and have a pointed spire.

The Ceriths are such good algae feeders that they are used by aquarium enthusiasts for cleaning their fish tanks.

The Dwarf Cerith is only  $\frac{1}{4}$  to  $\frac{3}{4}$  inches. Thousands of these can be found at low tide among the rocks on the South end of Honeymoon Island.

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### Chestnut Turban Snail

*Turbo castanea*



The Chestnut Turban Snail is a common gastropod in Southwest Florida. The “turbo” in its Latin name means “spinning top”. And the “castanea” is the Latin name for “chestnut”.

The shell can grow to 1.5 inches. Although the shell is normally brown, there is a variety that is bright orange. It can be distinguished from other gastropods by the turban shape and a round shell opening (aperture).

Turban Snails are found in shallow water among and under rocks. These snails are popular with aquarium enthusiasts for their ability to clean large amounts of algae, green slime and diatoms (single-celled algae) from their fish tanks.

These snails are edible, but because of their tough flesh and small size, they are not often harvested.

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### Florida Cerith

*Cerithium atratum*



These gastropods are small and have a pointed spire.

The Ceriths are such good algae feeders that they are used by aquarium enthusiasts for cleaning their fish tanks.

The Florida Cerith is the most common Cerith found in Florida. It is whitish with brown markings and has raised points on its shell.

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### Common Nutmeg

*Cancellaria reticulata*



This gastropod's shell has a cross-hatched texture and can be tan to creamy white with blurry brown streaks. The inner lip of the aperture (opening) has two white folds on the columella (axis of the shell).

Its habitat is in sand among turtle grasses from the low tide line to a depth of 50 feet. The snail has small teeth arranged on a radular ribbon which is most likely used to feed on soft bodied animals on the sea floor.

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**Crown Conch**  
*Melongena corona*



The Crown Conch's shell has spiny bumps on the spirals, making it look like a crown. The snail can grow up to five inches in length. They reside in shallow sea beds and salt marshes, typically no more than three feet deep. They are subtropical and have little tolerance for cold water.

These gastropods are carnivorous and feed on slow moving victims such as oysters, clams and snails as well as dead organisms. Crown Conchs are wary of others of their species, as they are cannibalistic. In some areas these gastropods eat oysters so extensively that they ruin oyster beds and destroy nearby reefs.

Predators of this conch include some whelks and murex which have the capability of penetrating the thick shells. Crown Conchs are not harvested for food, although their abundance can sometimes indicate the decline of nearby oyster and clam populations.

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**Horse Conch**  
*Triplofusus papillosus*



The Florida Horse Conch is Florida's State Shell. It is predatory and kills other gastropods and bivalves. It smothers them with its large bright orange foot. It is cannibalistic, eating smaller Horse Conches.

The shells have been used for drinking containers, anchors, art paint holders and musical instruments.

This Conch is the largest snail in the Western Hemisphere and second in the world. It grows up to 24 inches. The Horse Conch is edible.

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**Florida Fighting Conch**  
*Strombus alatus*



The Florida Fighting Conch is named after its pear-shaped operculum. An operculum is the snail's door that closes for protection. When the snail extends its foot to move around, the operculum extends out and looks like a sword.

Since they only eat algae, this greatly helps the sea grasses where they live, since unchecked algae can smother sea grass and kill it.

Be careful when collecting these shells, as the live animal can hide deep inside.

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**Alphabet Cone**  
*Conus spurius*



These snails are predatory and attack their prey with a hollow harpoon-shaped tooth filled with venom. Cone venom is made up of complex conotoxins that interfere with nerve impulses to the muscles, immobilizing or killing the victim.

These gastropods can adjust the chemistry of their venom for different uses such as defense. Many drugs have been developed using the venom for treatment of neurological diseases such as Alzheimer's, Parkinson's, depression, and epilepsy.

Cone Snails in Florida are not as deadly as are some species found in the South Seas. They live in deep water, so live specimens are rarely found on the beach.

The Alphabet Cone is named for the letter-like markings on the cone shaped shell.

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**Florida Cone**  
*Conus anabathrum*



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Cone Snails in Florida are not as deadly as are some species found in the South Seas. They live in deep water, so live specimens are rarely found on the beach.

The Florida Cone markings are not as bright as the Alphabet Cone and its spire is higher.

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**Lettered Olive**  
*Oliva sayana*



The Lettered Olive snail is named for the dark markings that vaguely resemble letters. They can be found by looking for the grooves it makes in the sand at low tide. It hunts bivalves and crustaceans, capturing them with its foot and dragging them back below the surface to consume.

Long ago Native Americans used these shells to make jewelry as do beach combers today. It is the state shell of South Carolina. The animal is large enough that it can extend its body out to cover the entire shell.

This gastropod lays 20 to 50 eggs which develop into larvae. These live in a planktonic form before they develop into adults.

*Live Animals should never be taken from any FL State Park*

**Junonia**  
*Scaphella Junonia*



The Junonia is a distinctive gastropod with a cream-colored spiral shell spotted with square chestnut shaded spots. The body of this snail is mottled purple with a pattern somewhat like its shell. It grows to 4 ½ inches.

It lives far from the shore at depths of 40 to 250 feet of water, so the shells rarely get washed up on the beach. Most Junonia shells for sale have been dredged up by shrimp boats.

The Junonia does not have an operculum (door). They are carnivores/scavengers. The Junonia buries itself in the sand but does not extend its short siphon up to the sand's surface. Eggs are laid in masses of joined capsules. The young emerge as small shelled snails.

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**Slipper Shell**  
*Crepidula*



There are three types of Slipper Shells: The Eastern White Slipper Shell, *Crepidula plana*, *Crepidula atrasolea* also referred to as the Eastern White Slipper and the Depressed Slipper, *Crepidula depressa*. Until recently they were thought to be one species. They can be distinguished only by examination of their foot and reproductive organs, not by their shells. The Common Atlantic Slipper, *Crepidula fornicata*, also found on our beaches, is much thicker and has a brown marked shell.

The Eastern White / Depressed Slippers are very thin with a shell shaped to the hard surface to which they were attached. They have an interior shelf. They are often found in large gastropod shells inhabited by Hermit Crabs (see photo on right, Slipper attached inside a True Tulip Shell).

These animals filter food from the water currents. Food particles are covered by a mucous secretion, then drawn into the stomach.

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### **Shark Eye Snail**

*Neverita duplicata*



Moon snails have a foot large enough to cover its entire shell. Normally most of the snail's body is out of its shell and the shell is filled with water. If threatened it must squirt out this water to retreat inside and close its operculum (door).

These gastropods are carnivorous and can smell their prey's body proteins. The victim often can detect the imminent slow-motion attack and flee. If caught, the moon snail envelops the clam with its foot. Then excretes an acidic solution to soften the victim's shell. Then a toothed radula (tongue) bores a circular beveled hole. Enzymes are injected to weaken the victim's adductor muscles and allow the snail to have its dinner.

Shark eyes have whorls that form an "eye", while the Colorful Moon is cream color with brown zigzags.

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### **Eastern Banded Tulip**

*Fasciolaria lillium*



These gastropods are slow, aggressive predators that feed on clams and other snails including their own species. Using its radula, a "toothed" tongue, coated in an acidic solution, it bores a hole through the shell of its victim. The tongue is then inserted to

devour the soft contents.

Tulips are edible and reported to taste like conch.

To attract females the Banded Tulip male ejects water that sets up vibrations felt by potential mates. The female lays oviger (egg) capsules attaching them to rock or other hard surfaces. Most of these ovigers are unfertilized. During the next month the normally developing snails feed on the non-developing unfertilized eggs within their capsule.

The Banded Tulip's fine dark rings distinguish it from the related True Tulip's dark brown and more mottled shell. The Banded Tulip grows to three inches long and lives in water 2 to 150 feet deep.

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### **Moon Snail**

*Naticarius canrena*



Moon snails have a foot large enough to cover its entire shell. Normally most of the snail's body is out of its shell and the shell is filled with water. If threatened it must squirt out this water to retreat inside and close its operculum (door).

These gastropods are carnivorous and can smell their prey's body proteins. The victim often can detect the imminent slow-motion attack and flee. If caught, the moon snail envelops the clam with its foot. Then excretes an acidic solution to soften the victim's shell. Then a toothed radula (tongue) bores a circular beveled hole. Enzymes are injected to weaken the victim's adductor muscles and allow the snail to have its dinner.

Shark eyes have whorls that form an "eye", while the Colorful Moon is cream color with brown zigzags.

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### **True Tulip**

*Fasciolaria tulipa*



These gastropods are slow, aggressive predators that feed on clams and other snails including their own species. Using its radula, a "toothed" tongue, coated in an acidic solution, it bores a hole through the shell of its victim. The tongue is then inserted to devour the soft contents.

Tulips are edible and reported to taste like conch.

The True Tulip's dark brown and more mottled shell distinguish it from the related Banded Tulip's fine dark rings. The True Tulip grows to nine inches and lives in water to 30 feet.

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**Lightning Whelk**  
*Sinistrofulgur sinistrum*



Whelk are carnivorous, finding their prey by sight and smell. They prefer bivalves, and eat about one clam-like animal a month. They hunt down prey, then insert the edge of their shell between the opening edges of the victim's shell,

and pry it open. If that fails they use their shell to grind a hole. The radula (tiny teeth) and proboscis (nose) are used to scrape out the soft tissues.

The Lightning Whelk is named for the lightning strike patterns found on juveniles. This gastropod can grow up to 16 inches. They are unusual in that they have a left-handed whorl (see left photo) unlike other gastropods with right handed spiraling (right photos).

The Pear Whelk is smaller, growing to 5 ½ inches. Its color is yellowish, with brown axial streaks. *Live Animals should never be taken from any FL State Park*

**Worm Snail**  
*Vermicularia*



The Worm Snail is not a worm but a gastropod (meaning stomach foot) with a worm shaped shell. There are three species in Florida: The Variable Worm Snail, whose shells are fused into what looks like a porous rock (not shown), and the Fargo and Florida Worm Snails. These snails start making their shells by developing a tight spiral. Then after growing to ½" to 1", (depending on the species) the coil shape begins to straighten out and grow into a long wormlike shape.

Unlike most other gastropods, Worm Snails are sessile, meaning they cement themselves to a solid object and stay fixed there for life. To feed, they shoot out strings of mucus from the mantle, a foot-like appendage at the tube's opening. These strings stream out into the current forming a sticky web. Plankton and other debris stick to the mucus. As this is pulled back in by the mouth, it strains out food through barbs on its tongue (radulae) and devours the catch.

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**Pear Whelk**  
*Fulguropsis spirata*



Whelk are carnivorous, finding their prey by sight and smell. They prefer bivalves, and eat about one clam-like animal a month. They hunt down prey, then insert the edge of their shell between the opening edges of the victim's shell, and pry it open. If that fails they use their shell to grind a hole. The radula (tiny teeth) and proboscis (nose) are used to scrape out the soft tissues.

The Lightning Whelk is named for the lightning strike patterns found on juveniles. This gastropod can grow up to 16 inches. They are unusual in that they have a left-handed whorl (see left photo) unlike other gastropods with right handed spiraling (right photos).

The Pear Whelk is smaller, growing to 5 ½ inches. Its color is yellowish, with brown axial streaks. *Live Animals should never be taken from any FL State Park*

**Eastern Banded Tulip Egg Case**  
*Fasciolaria lillium*



The egg case (left) of the Eastern Banded Tulip (right) looks somewhat like a small bouquet. Close examination reveals little holes in the flat end of the capsule from which the small snails have emerged. The capsules are composed of a protein similar to that in our fingernails.

Tulip Snails are gonochoric in that individuals are either male or female. They move into shallow water in the winter to lay and fertilize their eggs after they've been attached to a hard surface. Most of the egg capsules "ovigers" are unfertilized. During the next month the normally developing snails feed on the unfertilized eggs within their capsules.

True Tulips have similar egg cases but with more frilly rims.

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### Horse Conch Egg Case

*Triplofusus papillosus*



Horse Conchs copulate to reproduce. Mating groups can number in the thousands. The Female may lay hundreds of thousands of eggs. These egg masses are dozens of flat sacks clustered in a twisted clump. The cases are attached to a rock or other hard surface. Each pie-shaped segment contains several dozen eggs. The larvae emerge after five days and may ride ocean currents as plankton for a month before finding suitable habit and settling on the seabed.

The Horse Case is similar to the Tulip egg case but is larger and has ridges on its surface.

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### Lightning Whelk Egg Case

*Sinistrofulgur sinistrum*



Lightning Whelks, as do many other marine snails, have separate sexes and mate to reproduce. The female lays her eggs in a long spiral casing that can be three feet long. The egg casing is manufactured by a special gland under the female's foot. The string can contain 200 pouches with each pouch having about 100 eggs.

Only about 10 percent of the eggs will hatch. This normally occurs in May. They then begin their predatory lives by consuming the unhatched eggs within their pouch.

Hatching Lightning Whelks escape through an opening near the edge of each capsule. They have shells that provide protection for the small juveniles.

A Lightning Whelk's egg case is often referred to as a "Mermaid's Necklace".

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### Shark Eye (Moon) Snail Egg Case



Shark Eye Snails reproduce by mating in the surf zone. Before laying her eggs, the female will excrete mucus around her shell and mix it with sand. She then uses her cilia (eye-lash like filaments on the foot) to deposit the eggs, forming a gelatin-like collar. A second layer of mucus and sand protects the eggs from above.

Close examination of the collar reveals thousands of transparent pockets, which are minute eggs imbedded in the case. Its hydrodynamic shape helps it remain upright in turbulent water. The eggs hatch in the summer as swimming larvae. Collars found on the beach likely have developing eggs since the collars harden and soon disintegrate after hatching.

Female Shark Eyes live up to 14 years.

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### Operculum



Operculum is a word derived from Latin that means lid or cover. This "door" is used to cover a gastropod's aperture (opening). It is a corneous structure (made of a hard layer of protein).

The operculum is attached to the upper surface of the snail's foot. In many cases the operculum has the exact shape of the aperture of the shell. This can be round, oval or pointed with the shape varying greatly depending on the species. When closed, it protects the animal from drying out if exposed to the air during low tides. It also provides protection from predation by animals like birds, raccoons and crabs.

The operculum pictured on the above left is 3 inches long and from a Lightning Whelk. The operculum on the right is 1 inch long and from a Florida Fighting Conch. The operculum's sword-like appearance gives this Conch its name. The Operculum can be dug into the sand and with a forceful push, propel the snail across the seabed. It is not used as a weapon.



## Heart Urchin

*Echinocardium cordatum*



Sometimes called a sea biscuit, heart urchins are small, only a few inches in diameter. The test (internal skeleton) is fragile with four porous spaces (petaloids). The body is elongated with its mouth at one end and the anus at the other. This gives it a heart shape; hence its

name. It is covered with spines of various colors, such as brown, green and red.

Heart Urchins normally live in waters to 160 feet but have been documented as deep as 1,500 feet. The urchins burrow 6 to 8 inches into the sand, head first. They continuously move their tubular feet, creating a shaft of water which provides them with oxygen. The tube feet also gather organic particles from the wet sediment around them and move the nourishment to its mouth. Living buried in the sand, they are not normally found alive.

Heart Urchins reproduce by releasing sperm and eggs into the water. After the egg is fertilized, it forms a planktonic larva which subsequently settles to the seafloor and develops into a Heart Urchin.

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## Brittle Star

*Ophiocoma imbricatus*



Brittle Stars can be identified by their five long skinny arms and central disk. They have a calcium carbonate skeleton as seen in the partial specimen in the photo. They start life as eggs, which soon hatch, becoming larvae. For months the larvae are

suspended and move as zooplankton in the currents, then drop to the seafloor as juvenile Brittle Stars. They mature in about two years and live for five.

The mouth is on the underside of its body and has five teeth. The arms serve as sense organs, detecting light and odor. Brittle Stars feed by extending one or two arms into the water or mud, while the others serve as stabilizers. They feed on plankton, detritus and occasionally larger prey.

Brittle Stars have a water vascular system like Sea Stars. But unlike Sea Stars, they twist and bend their arms to move, which allows them to move more quickly. Brittle Stars are preyed upon by fish, sea stars and crabs. If lucky enough to get away with only the loss of a limb, they can regenerate another.

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## Lined Sea Star

*Luidia clathrata*



Sea Stars used to be referred to as Starfish. This has changed since they're not fish. Sea Stars are echinoderms, related to sea urchins and sand dollars. Most are divided into 5 sections.

Echinoderms have no blood or brains. Instead sea stars have a hydraulic vascular system that pumps seawater to circulate food and oxygen throughout the body. By changes in pressure it also provides ambulatory power to the hundreds of tiny tube feet on each arm. They have light-sensitive "eyes" at the end of each arm.

The Lined Sea Star is an opportunistic predator which uses chemical sensory cells to find its prey. Suction cups on the ends of the tube feet attach to its victim. In the case of a bivalve, they attach to each side of the shell and pull outward until it starts to open. Then they extrude their stomach around or into their victim to dissolve the meat. Next they pull that stomach back in and a second stomach finishes the digestion and passes the nutrients into the hydraulic system.

This sea star also feeds by ingesting sediment and extracting food particles. Most Sea Stars can regenerate arms that are lost to predation.

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## Short-spined (Variegated) Sea Urchin

*Lytechinus variegatus*



The Short-Spined Sea Urchin has a symmetrical, slightly flattened test (skeleton) composed of calcium carbonate. The test, which can be up to 4 ½ inches across, is covered with blunt, short tubular spines which readily detach after death.

The Sea Urchin's mouth, located on its bottom surface, has five teeth, called "Aristotle's lantern", used for rasping food from surfaces. It feeds on sea grass. In addition, it also collects floating debris with its tube feet for added nourishment.

Sea Urchins may cover themselves with shells and small rock fragments. It is believed that this behavior is to shield themselves from light or ultraviolet radiation and or to provide stability in turbulent water.

Sea Urchins reproduce by ejecting eggs and sperm into the water, where they are fertilized. Larvae develop through several stages. Then through metamorphosis (abrupt change in body structure) become juvenile urchins.

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## Keyhole Sand Dollar

*Mellita tenuis*



The *Mellita tenuis* is native to Florida's Gulf Coast. Sand Dollars, sea biscuits and sea stars are echinoderms (Greek, meaning spiny skin). The white Sand Dollar found on the beach is actually a bone-like inner structure called a test. Counting the rings on the Sand dollar can determine its age, which can be up to ten years.

Live animals have a soft brownish purple covering of moveable spines and hairs with which they move along sandy bottoms and over food particles. Their mouth (bottom center) has five tooth-like sections used to "chew" their food. The spines also serve as gills.

The 5 "keyholes" provide a shortcut in moving food to the mouth and also allow them to sink into the sand. In calm water, they bury themselves on edge, leaving one half protruding above the sand. In rougher conditions they lie flat or burrow into the sand. When continuously exposed to turbulent water, they can grow to be thicker and stronger.

Sand Dollars can only live a few minutes out of the water. Please do not remove them from the water.

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## Clearnose Skate Egg Casing

*Raja eglanteria*



The Clearnose Skate is a wide flattish fish with a cartilage skeleton. It is a bottom feeder that eats crabs, worms, bivalves and small fish. It can grow to 100 pounds (photo right).

The Skate's egg case is 3 to 4 inches long, black with four tendrils. They are composed of keratin, the protein in our fingernails which makes it tough enough to deter many predators. The case is formed around the egg just before being deposited it on the sea floor. The case "horns", anchor the egg, extract oxygen from the seawater and excrete waste. They are waterproof since the embryos do not have gills until they are three weeks old. At that time holes open in the tips of the horns to admit seawater.

After 3 to 15 months the case splits open at one end releasing the young skate. The empty egg cases have several names; mermaid's purse, devil's purse and sailor's purse.

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## Ghost Crab

*Ocypode quadrata*



Ghost Crabs are not often seen on our beaches as they are nocturnal. However their 1 to 2 inch burrow entrances are visible and numerous, starting at the high tide line to several hundred feet inland. The burrows can be up to 4 feet deep and are dug at a 45 degree angle to allow sea breezes to cool the interior. Their scientific name *Ocypode* means "fast feet" and they can travel up to 10 miles an hour.

These crabs feed on sea turtle eggs and hatchlings, clams, insects, other crabs and scavenge most any dead creature. They are preyed upon by shorebirds and raccoons.

Being terrestrial, they are able to use hairs on the base of their legs to wick moisture from damp sand up to their gills.

Ghost crabs normally mate near the male's burrow. An interesting detail of the mating is that along with sperm the male discharges a fluid that hardens in the female, preventing her from further breeding.

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## Lined Seahorse

*Hippocampus erectus*



The Lined Seahorse can grow to seven inches and has a wide range of colors including brown, orange, yellow or red. It has a series of white dots in a line down its body giving it its name.

Instead of fish scales the seahorse has skin stretched over boney armor. It swims slowly in an upright position, having only a dorsal fin for propulsion.

Their habitat is in 2 to 230 feet of water. It is often found clinging to aquatic vegetation or man-made objects with its prehensile tail. It has no teeth and feeds on very small animals and plants. These are sucked into its mouth, which is at the end of its snout, and swallowed whole.

The Lined Seahorse mates with a single partner. After a courtship performance, the female deposits 250 to 650 eggs into the male's brood pouch. The male seals the pouch and fertilizes the eggs. A Capillary network oxygenates the eggs which hatch in 20 days. Juvenile seahorses emerge as miniature replicas of the adults and swim freely away.

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## Moon Jellyfish

*Aurelia aurita*



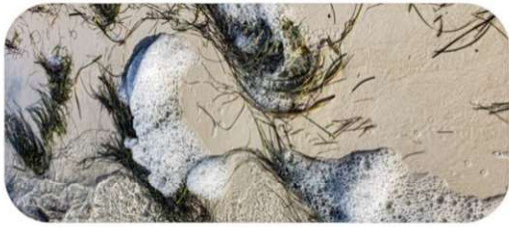
The Moon Jellyfish is a very simple animal. They are 95% water, have a mouth, digestive system and a simple nervous system. The four brown internal rings are reproductive organs. Having no lungs, they absorb oxygen thru their body surface. These jellies are poor swimmers only able to maintain a level position close to the surface by pulsations of its body.

This floating position is optimal for their short tentacles to capture plankton, fish eggs, small mollusks and shrimp. The Moon Jellies tentacles have stinging cells, but are not powerful enough to penetrate thru human skin. But avoid touching this jelly as some people are sensitive to the sting.

Moon Jellyfish can grow to 2 feet in diameter and are a food source for birds and turtles. Trash plastic bags can resemble these jellies and thousands of animals die by mistakenly ingesting this rubbish. As a Moon Jelly dies, its body comes apart and small clear blobs can be found on the beach (right photo).

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## Sea Foam



Many people see foam on the beach and conclude that it is a result of some type of pollution. While this is sometimes the case, most sea foam is harmless and occurs naturally.

When large amounts of algae, seaweed and other marine plant life are broken down by wave action, they can degrade to molecules that act as foaming agents. When these molecules are mixed by turbulent waves and wind, they form bubbles held together by surface tension. This is the foam you see blown onto the beach.

There are also some harmful foams. This can result from algae blooms, such as red tide, that produce toxins and from human made sources such as fertilizers. These also produce foaming agents. As these foam bubbles burst they release contaminants that cause eye irritation and respiratory problems. Bird die offs have also been attributed to some foams. These contaminants destroy waterproofing on feathers making the birds susceptible to hypothermia and inhibiting flight.

## Sea Hare

*Aplysia fasciata*



This description of the Sea Hare would more correctly be filed with the "Gastropods", but given its slug like appearance, most people looking to identify this creature look under "Beach Finds". It is, in fact, a gastropod having an internal shell made of protein. Sea Hares can be distinguished from other Sea Slugs in that they have swimming wings.

The two protuberances on the head are sensory organs that detect chemicals in the water allowing them to find food and detect predators. They are plant eaters and their reddish to greenish color depends on the color of their food. They have a structure of tiny teeth to scrape food particles off a surface and into their mouth.

The camouflage color of the Sea Hare, and its ability to bury itself helps protect it from predators. It also can release toxic ink, like an octopus. The toxin is also in their skin making them an unpleasant meal.

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## Sea Pork

*Aplidium stellatum*



Sea Pork is a colony of hundreds to thousands of animals. They are marine invertebrates called zooids (pron. zo-oid). These animals excrete a cellulose substance which forms a sheath that functions as a gelatinous exoskeleton. Look closely: the zooids appear as reddish little round circles or pores

covering the surface of the globular structure.

The individuals are filter feeders. They have intake and outtake siphons which bring in nutrients and oxygen and expel waste.

Sea Pork reproduce by releasing larvae resembling miniature tadpoles. They gather as a group to create their gelatinous sheath and to attach themselves to a rock or other hard surface. The new colony can grow to more than a foot in size and weigh up to ten pounds.

Sea Pork gets its name from dead colonies that bleach to white on the beach, resembling a slab of pork fat. Sea pork colonies are preyed upon by sharks, rays and skates.

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## Spotted Spoon-nose Eel

*Echiophis intertinctus*



Discovered on Honeymoon Island's beach wrack line was what looked like a dead snake (left photo). Turns out it was a Spotted Spoon-nose Eel that had been stranded half in its burrow as the tide went out. Pushed to the water, it came alive and within a few minutes wiggled into the sand, burying itself tail first, and disappeared (right photo).

These eels can grow to over four feet long, have a stout cylindrical body and a tail that is over half its body length. The tail tip is hard and pointed allowing the eel to bury itself tail first for protection from predators.

It hunts during the day and catches its victims with strong pointed teeth. Its cream color, spotted with brown dots, provides camouflage in its shallow sand and soft bottom habitat. Burrowing by this and other marine animals is important, as it oxygenates the marine sediments making it more habitable for other organisms.

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## Graceful Redweed

*Gracilaria tikvahiae*



Graceful Redweed is one of 7000 species of red algae. Graceful Redweed is often found on the beach wrack line and can be greenish to bright red. They have 12-inch forked branches that can be flat or round resembling spaghetti.

Graceful Redweed may grow free floating or attached to a hard surface from the water's surface to 30 feet deep. Under high light and nutrient conditions it can become a huge biomass causing habitat destruction. Beaches in Lee County, FL were fouled in 2003-2004.

Graceful Redweed is important for the production of the hydrocolloids carrageenan and agar which provide texture, thickening, gelling or structure to many foods and medicines. A few examples are toothpaste, processed cheese, marmalade, salad dressing, ice cream and non-stick bandages. This plant is also eaten as a vegetable. Have you had some seaweed today?

Graceful Redweed is also a potential energy-producing plant as it is fast growing and can be used to produce methane.

## Parchment Worm

*Chaetopterus variopedatus*



Parchment worms (left photo in a garden trowel) live buried in the sand. Their location is obvious as it leaves tube shaped mounds on the surface (right photo). The worm lives in a u-shaped parchment-like tube with each end extending above the surface. At one end is a shovel-like

mouth that has fan like structures to pump water containing plankton and other organic material thru the subsurface tube. As the water and nutrients are moved thru the body a mucous film forms a bag-like filter. When the filter reaches a certain size it forms a ball and is moved to the mouth. The remaining material continues to the animals anus end and is expelled on the surface.

Two species of filter feeding crustaceans are almost always found in Tube Worms. In addition, another crustacean and two species of shell-less gastropods are sometimes present. They feed on the mucus net or the feces of the worm.

## Mangrove Propagules



Three species of propagules are often found within the beach wrack line. Mangroves have a unique method of reproduction. Their propagules sprout and start embryonic development while still on the tree, unlike other flowering plants that disperse dormant

seeds. The developing propagules are released from the tree to be dispersed by water.

Red Mangroves produce an approximately six inches long, ½ inch diameter propagule. It must remain in the water for about 40 days to continue development. They are viable for a full year. Finding a suitable habitat the propagule will "stand" for a period of 15 days before it sprouts roots and leaves.

Black Mangrove propagules are about 1 inch long, must remain in water for 14 days, are viable for 4 months and must stand for 7 days.

White Mangrove propagules are smaller at about ½ inch, sprout after they fall from the tree, must remain in the water or wet soil for 8 days, are viable for one month and must stand for 5 days.

## Crab Claws



There are numerous crab species living in the waters off our beaches. As these animals are preyed upon and or die, some of their body parts are washed up onto the shore. The arm on the left side of the photo is from a Spider Crab, with barnacles growing on its surface. There are two species of Spider Crabs in Florida, the Longnose, *Libinia dubia*, and the Portly, *Libinia emarginata*. They co-exist in the same habit and are very similar. These crabs are unusual in that they are slow and move in a forward direction. They are predatory and feed on Sea Stars.

The Claw on the right is from a Florida Stone Crab, *Menippe mercenaria*. These crabs are well known for their claw meat. When harvesting, one claw is removed and the crab is then released to regenerate another. The claws are used for defense and to hunt prey. Adult Stone Crabs live in slanted 12- to 20-inch burrows.

### Wool Sponge

*Hippospongia lachne*



The Wool Sponge is one of twelve types of sponges harvested for commercial use, and along with the yellow and grass sponges, are the most valued. Sponge harvesting in Tarpon Springs, Florida, began in the late 1800s when John Cheney came to town to manage a family business. Touring the State he observed the successful sponge industry in Key West. Learning from Tarpon Springs local fishermen, that they were snagging their turtle hunting nets on sponges, he realized the potential of a local sponge industry.

He formed the Anclote and Rock Island Springs Sponge Company. He then met a Greek Sponge buyer who encouraged experienced Greek Sponge Divers and their families to immigrate to Tarpon Springs. By the mid-1930s there were over 200 boats harvesting sponges. A sponge blight in 1940 decimated the then 3 million dollar Gulf Coast sponge industry.

Today the sponge industry has recovered although not to its historic levels. Tarpon Springs now harvests 70% of the world's natural sponges.

### Red Finger Sponge

*Haliclona compressa*



*The Red Finger Sponge can grow to 16 inches. Its color may vary from bright red or orange to black or brown.*

Sea sponges are a simple colony of single-cell organisms that work together to perform a variety of bodily functions. Sponges have attributes of both plants and animals and for centuries there has been a debate as to which it is. Like plants they do not have a body cavity, brains, digestive or nervous systems. Like plants they root themselves to a solid spot and do not move. However they are animals. Plants use photosynthesis to produce chemical energy. Sponges use cellular respiration typical of animals. Plants have cell walls

and other cellular distinguishing characteristics. Sponges and other animal cells have a unique cell structure to include a cell membrane. Unlike plants, sponges have a skeleton made up of silica (glass) spicules.

### Vase Sponge

*Ircinia campana*



Vase Sponges, like many sponges, are obviously named after their shape. This sponge can grow to two feet.

Sponges are composed of a colony of single-celled organisms that work together to perform a variety of bodily functions. Instead of a skeleton they're supported by a matrix of silica spicules (short tapered glass rods).

Sponges and airplanes have a lot in common. As the speed of the water current increases, the pressure within the sponge decreases and pulls water through its covering of many tiny pores into an internal system of canals. Larger collar cells have hair-like whips that gently mix the water as it moves slowly through the sponge allowing it to feed efficiently. The collar is sticky and collects the oxygen, plankton, bacteria and other organic nutrients. Carbon dioxide and waste are then expelled. In a single day a sea sponge can process 10,000 times its volume of water through its system.

The large amount of water passing through a sponge makes them self-cleaning. Also sponges have antibacterial enzymes to kill bacteria. These attributes make the sponge ideal for washing and cleaning.

### Tube Sponge

*Callyspongia vaginalis*



Tube sponges can grow to 3 feet tall.

Most sponges are hermaphroditic — able to act as either female or male. They can reproduce both sexually or asexually.

Sexual reproduction happens internally. The male cells release sperm into the surrounding water. These are taken in by the female cells and are carried by special amoeba-like cells to the eggs for fertilization. Tiny larvae develop and are released into the water. They have cilia that propel them to a new location. The larvae then settle to the sea floor to grow.

Asexual reproduction occurs when fragments of a sponge break off and drop to the seafloor or are scattered by water currents. These pieces attach themselves to hard objects and grow into mature sponges, thereby increasing the population.

Sponge harvesters have learned that cutting sponges off with a knife rather than ripping the sponge from its attachment allows the remains of the cut sponge to grow again.



## Shingle Tube Worm

*Owenia fusiformis*



The Shingle Tube Worm (also known as the Roof Tube Worm) lives within a six inch tube that is longer than its body. This shelter provides protection from predators. It lives in sand or mud at the lower intertidal zone. It encrusts its tube with

sand-grains or shell-fragments (as shown in the close-up photo) in an overlapping pattern resembling a tiled roof.

The tube worm extends ½ inch out of its tube to filter feed on plankton and organic detritus. It can even bend over and pick up food particles from the sea floor. Collecting food is accomplished with eight branching lobes at its anterior end that gather and channel food into its mouth.

Reproduction begins with the female producing a pheromone that signals the males to shed sperm. This in turn stimulates the females to shed eggs. Most eggs become planktonic, drifting with the water currents. A few remain in or attached to the tube. Eggs hatch into larvae, then develop into juveniles.

*Live Animals should never be taken from any FL State Park*

## Blue Crab

*Callinectes sapidus*



The Blue Crab has paddle shaped back legs which allow them to be excellent swimmers. Their scientific name translates to "savory beautiful swimmer". They have two, stalked compound eyes, consisting of thousands of tiny independent photo receptors. These eyes can be laid into sockets in the shell. The crab grows to 9 inches across and 4 inches from front to back. Males can be identified by a "T" shaped plate on their abdomens (see photo on right), young females are triangular and older females rounded.

Blue Crabs must molt or shed their shell to grow. After backing out of their old shell, they are soft and expand by bringing in water. After the new shell hardens, the water is expelled to allow room for the crab to grow. The female mates only once and can only breed while soft. The male may hold females waiting for them to molt. Egg masses develop on the bottom of the females, and contain as many as 2 million eggs. Larvae hatch and molt over 25 times before maturing.

Blue Crabs are one of the most popular seafoods.

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## Mudflat Fiddler Crab

*Uca rapax*



Fiddler Crabs are named after the male's one oversized claw that resembles a fiddle. The waving of the claw to attract females and defend against

other males enhances the claw's fiddle likeness by imitating an exuberant musician. This crab is small, less than one inch across. The photograph shows a male half in its slanting burrow which can be up to three feet long. Although territorial they are found in large colonies.

Their habitat is along the tidal zone. They plug their burrows during the rising tide and emerge to feed on algae and decaying plant material as the tide recedes. Fiddler Crabs have specialized mouth parts to grind their food and with digestion complete leave behind conspicuous sand pellets. They have gills for breathing underwater and a primitive lung which enables them to stay out of the water for months at a time.

Fiddler Crabs play an important role salt-marsh ecology. In the process of digging their burrows they bring organic matter to the surface, stimulating microbial growth. This activity also increases soil aeration and nutrient availability to nearby plants.

*Live Animals should never be taken from any FL State Park*

## The Horseshoe Crab

*Limulus polyphemus*

The Horseshoe Crab, is not a crab at all! They do not belong in the class *Crustacea* as do true crabs. True crabs have antennae, jaws and five pairs of legs. Horseshoe Crabs have no antennae, jaws and six pair of appendages. Horseshoe Crabs are more closely related to spiders and scorpions, but belong in a class of their own, *Merastomata*, which mean “mouth surrounded by legs”.

Horseshoe Crabs are living fossils which existed long before the dinosaurs. Fossils have been found that are 445 million years old and they show that this animal has changed little since that time. It is extremely adapted for survival.

Armored is a good description of the Horseshoe Crab. The shell is made of chitin, a cellulose-like material. It forms a hard exoskeleton, that protects it from many predators, but not sharks and sea turtles.

The shell has three sections: The Prosoma, the largest section which is shaped somewhat like a horseshoe, hence the animal's name.

The Opisthosoma or abdomen which has movable spines and is hinged to the Prosoma.

Then the Telson or tail. The Telson is not a weapon although native Americans used it as a spear point. It is used to steer itself and If overturned, the crab can also use the Telson to right itself. See photo at left. The crab may be harmed if lifted by its Telson, If handling the crab, hold it with both hands by the shell, the claws are not large enough to harm an adult.

There are many surprising characteristics of Horseshoe Crabs: Their reproduction and growth; body parts and organs that allow it to thrive and survive; a multi-sensor ability to detect a large bandwidth of light; and its unique contribution to human health.



### Dead Horseshoe Crabs all over the Beach!

Many people walking the beach ask “Why are there so many dead Horseshoe Crabs on the beach?” What they are seeing is the molt, left over from the crab shedding its shell so that it may grow larger. This is part of the life cycle of the Horseshoe Crab.

Horseshoe Crabs reproduce all year in Florida. When mating, the smaller male crab grabs the larger female crab with specialized front claws (pedipalps).





Eventually the female drags the male to the beach, usually on the extra high tides of a full or new moon, and he fertilizes the eggs as his mate lays them. Don't try to separate the two because it will damage the male's pedipaps (claspings claws). Egg clusters can have up to 4,000 tiny green eggs and, after repeated spawns with multiple males, a female may lay over 100,000 eggs. The Horseshoe Crab larvae emerge from their nest about the next full or new moon. These juvenile crabs look like an adult, but with smaller tails. They feed on invertebrates in shallow water. As they mature, they move to deeper water.

Horseshoe Crabs are a keystone species. The eggs and juveniles are an important part of shore birds survival. Many of them are preyed upon before their shells are hard and large enough for protection. The photo at right shows an immature Green Heron about to consume a juvenile Shrimp and Horseshoe Crab.



Horseshoe Crabs will molt at least six times during their first year. Then 18 times during the next nine years, until reaching sexual maturity. Females being larger than males will molt more often.



Looking at the Horseshoe Crab molts on the beach, you will notice a slot along the forward edge of the shell. This is where the animal extracts itself. It then expands its soft shell and when hardened has space to grow.

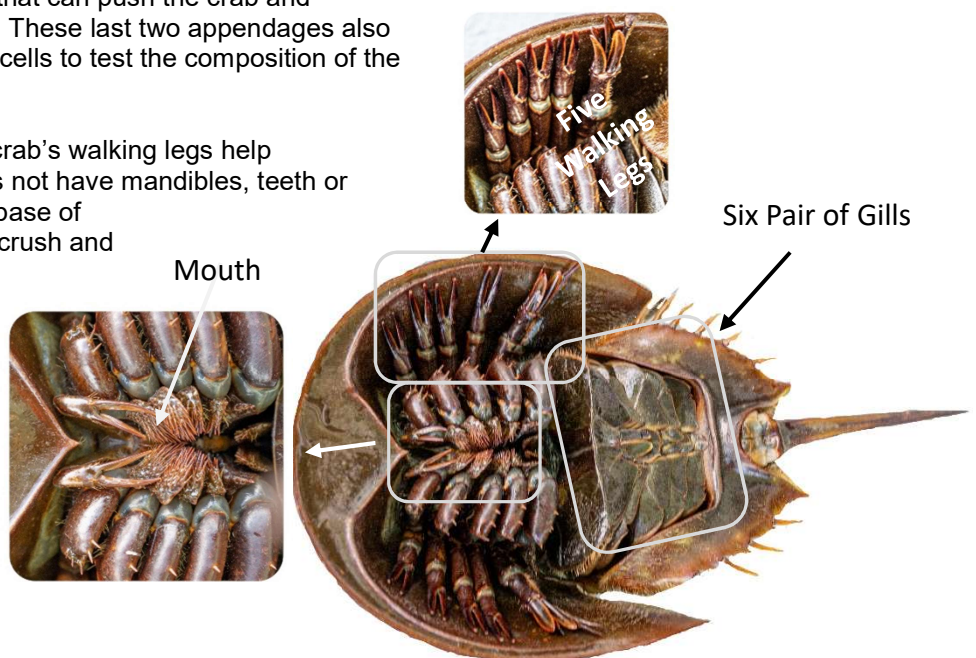
During the male's last molt, he will gain the modified claspings claws (pedipalps) mentioned previously. They generally live about 20 years.

## Breathing, Eating and Locomotion

Five pair of legs to allow it to walk along the seafloor. The first four pair are tipped with a small claw. The last pair of legs has a leaf-like structure that can push the crab and clear away sediment to aid in burrowing. These last two appendages also have approximately one million sensory cells to test the composition of the water passing into the gills.

The two small claws forward of the crab's walking legs help deliver food to the mouth. The crab does not have mandibles, teeth or claws to tear apart food. Instead, at the base of each leg are inward pointed spines that crush and macerate almost any organic material, including small clams, crustaceans and worms. The legs must be moving for it to eat.

The Horseshoe crab has six gills like pages of a book. Each has 150 flap-shaped membranes that extract oxygen from the water.





Horseshoe Crabs can swim. This is accomplished in an inverted position with the front of the crab inclined upward. A rhythmic rowing motion of the legs and pulsing of the gills provide forward motion. This may provide an emergency escape from predators. Search swimming Horseshoe Crab on *Youtube* to watch a video of this behavior.

## Eyes, Eyes and more Eyes

The Horseshoe crab has 10 eyes.

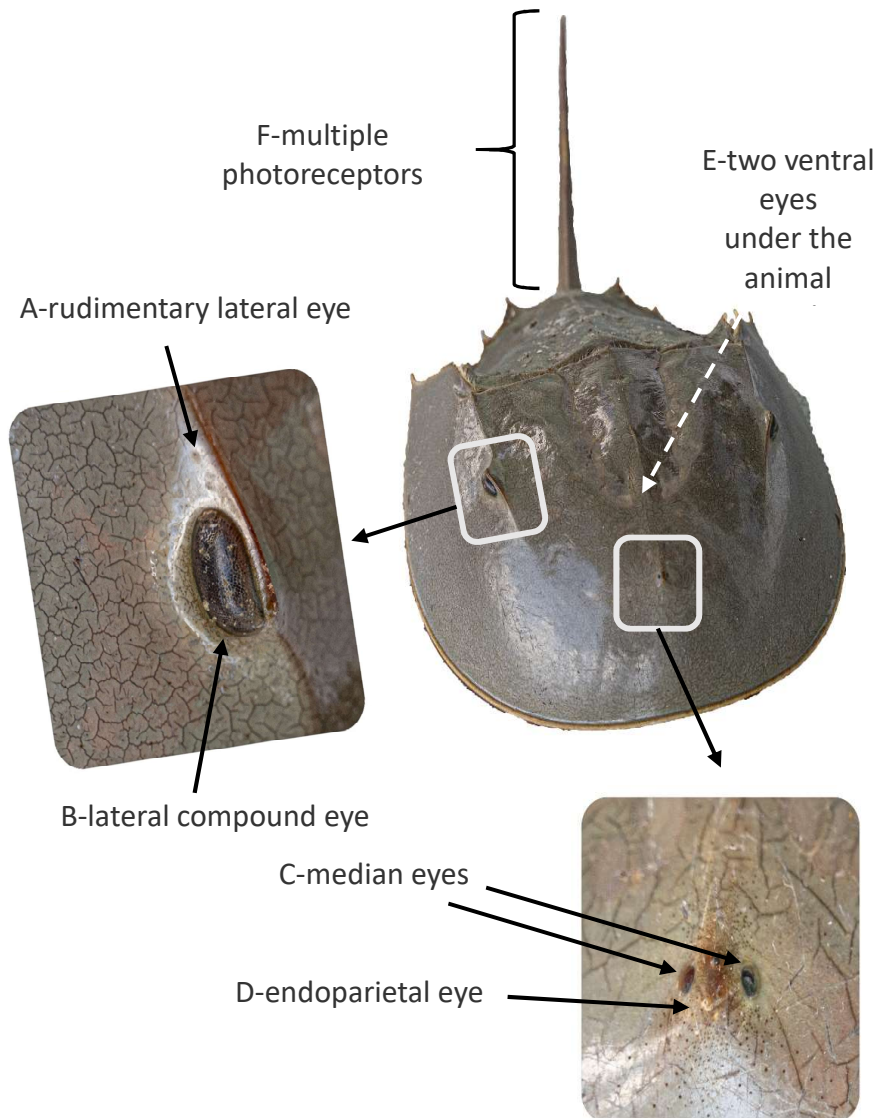
A - Rudimentary lateral eyes (one on each side of the shell) are photoreceptors in which sensitivity is controlled by the brain.

B - Lateral compound eyes, (one on each side of the shell) are used to find mates. Each eye has about 1,000 receptors. These are similar to receptors in human eyes, but 100 times larger. These eyes are chemically stimulated to increase sensitivity at night, allowing the animal to identify other crabs in the darkness.

C & D - Median & Endoparietal eyes detect ultraviolet light. These help it to follow the lunar cycle to coordinate spawning on the new and full moons.

E - The ventral eyes are located near the mouth and may help the crab maintain orientation while swimming inverted.

F - The telson or tail has a series of light sensors that help the brain keep synchronized with day / night cycles.



## Say a Personal Thanks to the Horseshoe Crab

We have all benefitted from Horseshoe Crabs. If you have had a vaccine, injectable drug or implant, their blue blood has insured they were free from bacterial toxins.

The Horseshoe Crab's blue blood has a protein called hemocyanin and contains copper. This is in contrast to our red blood's hemoglobin which contains iron. Since hemocyanin is more effective than hemoglobin in extracting oxygen in water with limited oxygen, it might have given the crab a better survival advantage.

The Horseshoe Crab blood also contains proteins that are released in response to the presence of bacterial toxins. This causes the blood to clot around the bacteria, protecting the animal from further injury. We humans benefit from this clotting action. To ensure that vaccines, intravenous solutions or medical devices are sterile, they are exposed to a drop of the Horseshoe Crab's special protein, Limulus amoebocyte lysate or LAL, to test for contamination.



Photo Credit  
U.S. Fish & Wildlife Service

In the photo Crabs are “donating” their blood. Only about one third of their blood is removed and then they're released back into the water. Only about 70% to 80% of the crabs survive.

The Horseshoe Crab's exoskeleton is also very useful to humans. It contains Chitin a cellulose-type substance. This is used in many helpful products. For example:

- Coating wound dressing for burn victims
- As an antacid and antibacterial agent, it promotes healing of ulcers and lesions
- Treating high blood pressure and cholesterol
- Sutures that promote healing and dissolve slowly
- Used to remove lead and other chemicals from wastewater
- Processed into chitosan to make contact lenses and skin cream

Honeymoon Island State Park, Florida, Volunteer Rangers:  
Roy Lockwood, coauthor, photos, graphic design  
Lyn Rodger, coauthor, editor

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