

COASTAL ECOLOGY – SEAGRASS ECOLOGY

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Welcome to a new location at Fort De Soto. Now we're looking at an environment that's dominated by sea grasses, which is a submerged vegetation compared to the mangroves, which are usually above water. So now we're going to look at the-- the plant community that's underwater. We'll identify a series of-- same as we did with the mangroves-- the different species, different types of sea grasses dominate here in the Tampa Bay region.

We'll look at some of their adaptations. And then, we'll spend some time looking at the organisms that live associated with those sea grasses. If we take a look around our habitat here, we'll notice that there aren't trees adjacent to us. There are mangroves further down the coast from where we are now. Here we're dominated by a seawall structure-- so a man-made structure that limits the plants and the trees' access to the salt water.

So it's a really very productive-- highly productive area-- just like the mangroves because of the contribution of the plants to the entire food web. So the plants here-- sea grasses, even though they're underwater, they provide habitat and protection for the fish communities-- a number of invertebrates, including a lot of commercially-harvested species because this is where they come as juveniles or very small organisms before they grow into adult sizes.

The sea grasses also function similar to the mangroves in that they provide a baffling effect. So they keep the sediments in place. And they provide food. Some of the larger organisms that we might remember living in Florida-- the manatees-- rely on the sea grass. That's the major component of their diet as well as the sea turtles .

Another characteristic as we look around, we see there's a lot more open water here. And there's a lot more wave energy. So there's a lot more energy in the system as far as the water itself and the movement of the water. And the reason-- the way the sea grasses survive is that they have a root system under the water in the sediments.

It's called a rhizome system. So very much similar exactly to the grass that grows on land. So the root systems run parallel with the bottom. So they're not digging deep tap roots like we would expect on a land tree. But their roots actually are horizontal to the sediment and to the bottom.

And they form these really thick masses of sea grass, which we can see here. We have every species-- the three most dominant species in the Tampa Bay region are represented right here where we are sampling now. Sea grass is really unique because it's a flowering plant just like we would see on land. What's really unique is that it's living under salt water. And it actually has to spend its entire life cycle underwater.

So we call it submerged vegetation. It does form flowers just like a land plant-- any flowering plant. And that's seasonal. I don't see any flowers present on any of our sea grasses here. But it tends to

be a very, very tiny flower. So to be able to find one is a really-- a nice find that's really unique to see them while they're blooming.

But we're going to go through. And we just want to show you how we would sample to sea grass. And we'll go through, and like the mangroves, we'll identify the different species and what their unique adaptations are. So, again, the sea grasses-- it's a completely salt water, submerged, flowering plant. But it has developed unique adaptations to be able to survive in this system unlike any other plant that we're aware of that lives totally in salt water.

So let's take a close up look to kind of see what we're standing in here. And here's another example. So in addition to sea grasses in more open water, we also have what's called drift algae. And this is an example here. Again, there's about three species that are dominant in our particular area.

And these don't-- they are an algae, which makes them different from a plant. The sea grasses are a true plant because they do have a root system. Unlike algae. They don't have any roots. So this called a macro algae. And it actually floats and drifts with the currents. Sometimes it will sink and settle on top of the sea grass.

And then the sea grass actually goes through. You see a lot of floating sea grass blades on the water. That's not a negative thing. Actually the sea grasses have no way two, like we would, mow the grass on land. So they don't have a way. They rely on the waves coming through to actually, once the grasses die, to kind of mow the grass and move the dead plant material off of the sea grass meadow so that they can continue to produce and grow in size.

So it's an interesting process. They don't have anything mechanically to move or separate the dying plant material from the still-living and attached plant roots. So let's take a look.

So we're going to retrieve some of these sea grasses so we can introduce you to the different species found here. So this species that we're standing in is the turtle grass. It's a very broad blade. So what we would at like on any plant, we would look at the blade or leaf structure. We'd look at the root system and the coloration of the plant.

So this is a very flat, broad leaf. And this surface-- just having a hard surface in the ocean-- hard space is limited. So you'll notice a lot of encrusting organisms attached to the sea grass. Whether it's living or nonliving, it still serves as a hard structure. So we have a lot of bryozoans-- some little tunicates-- that are attached to this. So if you could feel this, it would have a fuzzy feeling to it. And on the other side, would actually have a hard, crunchy feel.

So three or four different invertebrate species attached to the sea grass and live permanently on the turtle grass that we're looking at here. So turtle grass tends to be furthest offshore. It also likes a higher salinity. So especially in tropical locations in the islands, the Caribbean, we would find lots and lots of thick beds of turtle grass.

A little closer to shore with lower salinities like further up into Tampa Bay and at our mangrove site, we would find this species of sea grass, which is the shoal grass, also known as Cuban shoal grass. And it also, like the turtle grass has a very flat blade, but it's a very narrow blade. And we can get a look at the root system here.

So it gives it a lot of flexibility. You can see the wind is providing movement for us instead of water. But it's that flexibility in a high energy system that actually helps the benefits the sea grass. And this is the root system that runs parallel or horizontal to the bottom type called a rhizome. If you were to look at the grass on your own yard, it would have the exact same structure.

So grass doesn't grow deep. It just spreads out and grows across, in our instance, right here at Fort De Soto. And then our final sea grass is called manatee grass. Unlike the previous two blades, this is a round blade like spaghetti. And this would allow it to actually be in the highest energy because water would just roll past this. And there'd be less resistance with this round shape versus the flat broad leaf of the turtle grass.

So those are our three species of sea grass that are very abundant here in Tampa Bay. And now we'd like to show you just quickly how we would survey the sea grasses similar to the way we would survey the fish that we were catching in the nets and releasing. So we have for any sampling-- same with the seine net-- we want to know-- this is called a transect.

So we have a meter tape that's spread out in the water. This is about a 12-meter distance. And what we would do is estimate the percent coverage of sea grass. So we want to know how much of the bottom it's covering, how thick it is, and the different species that represent particular coverage.

So we would measure using our tape measure first. And at every 4-meter increment, we would drop a grid underwater and then do an estimate of the coverage within that grid. Then we can extrapolate that just like we would with the fish in the nets to estimate how many fish are in a particular body of water, we could estimate the percent coverage of the sea grasses by looking at putting together the data for several small grids and extrapolating the whole distance of area that we're sampling here today. So let's get a close up of the-- of the grids here.

So this grid-- we use the bright, orange lines so we're able to see this. We have very good visibility. But this brings out another point that's important with sea grasses. So sea grasses, like any plant, needs sunlight to grow. So you wouldn't find sea grass in a deep water community. They have to be shallow enough to obtain enough sunlight to grow.

But they can withstand a much higher energy than the mangroves. So within this grid, we would, as researchers, we would have our data sheets that we would bring in. And we would go through. Usually, we often use a mask and snorkel, especially if it's not as clear as it is today. And we would go through and help use our hands to see that there's actually-- the grass is so long that it's laying over the grid. But if we mow the grass, we would see that there's a lot of sand.

So this grid although it appears 100% coverage, once we see how much sand is underneath there, it's actually maybe more accurately 80% coverage within this grid. So we would divide each of these grids. We have a data sheet already developed for us where we would like at each quadrant. And we would estimate the amount of sea grass coverage, the amount of algae, and then the amount of sand or mud that's comprising each one of these grids.

So we would literally draw the shape of this grid on the page and then put a number in each square. And that would tell us a percent coverage. And we'd take the average of those values. So in this particular grid, we have two species represented. We have the turtle grass with the broad, flat blade. And we have the manatee grass with the circular blade shape.

And so we would do this throughout the entire sea grass bed. We would do a series of transects. And I'm really happy to report that here in Tampa Bay, we've had a great deal of success with the sea grass beds thriving. There was a time when sea grasses were being destroyed in Tampa Bay. And so we were losing a lot of coverage-- some of it from man-made reasons-- a lot of it just from cold stress. So they are plant. And they're sensitive to salinity and temperature.

So when temperatures get too cold for these particular species, we will have a large die offs of the sea grass. But we're really happy to report the recovery has been amazing. And Tampa Bay is thriving currently with the sea grass coverage. So that's one grid. And then I would move further down. As a team, we'd move down to a little shallower water and see if our coverage changes as we move along the transect.

So we'd move down. And as I'm walking through the sea grass, you can't feel this. But it's a pretty solid bottom. So it's not nearly as much as she is standing in the mangroves. there's? A lot of sand composition-- a little bit of mud-- but a lot more sand here where we're standing now. And I can feel it the sea grasses really kind of scratchy and prickly if I'm in the turtle grass. And that's because of all those organisms that are attached to the grass and use it as part of their home.

Now I'm standing in a shallower area. And the grid is covering our sea grass. So we're at a different mark another 4-meters away from where we were with our previous grid and we can see here it's a different species of grass. This is Halodule, or Cuban shoal grass.

And, again, if we look down into the water, we can see in the grid although it looks like it's completely covered with grass, there's a lot of sand within each of these grids. So our percent coverage for this entire grid is actually less than the percent coverage of grass in our deeper water transect.

And this is a much flatter blade than flat blade Cuban shoal grass with a few blades of turtle grass. So we'd still have a mixed grass composition. And what we don't see in this shallower water is we don't see as much of the drift algae covering the sea grasses. So that's just a quick observation of some of the other habitats that are really important in shallow water communities.

So today we've looked at the mangroves. We've looked at the sea grasses. We've done comparisons for how these are adapted to live in salt water. And we've also looked at some of the swimmers in the ocean, looking at both the fish and the invertebrates. So our final location on site today is go out to the open beach where we'll have the highest energy system and see how that looks compared to the two sites that we've already visited.