



California State Parks

Video Transcript



Life on the Rocky Shore at MacKerricher State Park

My name is Rouvaishyana, and I'm a park interpreter. I'm going to be giving you a private tour of the tidepools today. What we're going to be doing is we will walk out on the boardwalk—the boardwalk is just right here behind me—and we'll be going out to a set of stairs that lead out to the tidepools. We'll walk down and go out into the tidepools and probably spend about a half-an-hour out there in the tidepools.

But before we go out, I would like to just talk a little bit about how the tides work. I have a model here in my hands, and this is a model of the sun, the moon and the earth. I'm going to use this model to explain a little bit about how the tides work. Tides are really the result of the positions of these three objects—the sun, the moon, and the earth—and it kind of works like this. As the moon revolves around the earth, its gravity pulls up on the water of the earth and that creates a bulge. That bulge then would be one of the high tides. Because of the way water behaves, there is another bulge on the other side of the earth. So there would be another high tide on the opposite side of the earth, opposite the moon. In between, the water is squeezed thin and that would be a low tide. As the earth turns, it turns through those two high tides and two low tides every day.

Now the sun gets into this picture also, because the gravity of the sun also influences the tides. When the sun, the moon, and the earth are all lined up in a straight line, we get very high high tides and very low low tide. That happens at full moon and at new moon—and usually for a few days on either side. In between, when the sun, earth, and moon are at right angles to each other, the high tides and the low tides kind of cancel out one another. So the high tides are not very high, and the low tides are not very low. So the best times to go tidepooling, then, would be at full moon or new moon and a few days on either side of that. We're just a few days past the full moon right now.

A tide table is a little guidebook that lists all the times of the high and low tides throughout the month. These books are available at grocery stores and fishing stores and park visitor centers. It works like this, if you just read down on your tide table and find that day and then look across for the time, you can see whether you have high or low tide at your time of the day. Typically numbers listed in red will be the minus, or very low tides, and we have a nice minus tide today. In fact, our tide today is a minus 1.6-foot low tide, which peaks at about 8:20, a little less than an hour from now. We're going to be heading down the boardwalk and out to the stairs, and we'll be going on out to the tidepools.

Okay, we're out on the boardwalk right now heading out to the Laguna Point tidepool area. This first little rest stop that you see here is an area that actually has an interpretive panel about earthquakes and earthquake faults. It explains the San Andreas Fault and kind of the

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movement of the plates of the earth. We won't be stopping there for long, but you're welcome to take a look at the panel on the way out and after the tidepool program is over. We certainly encourage you to take a look at some more of these interpretive panels that are along the boardwalk because there is lots of other information. In fact, in general there is a lot of great stuff to see in this park, and we encourage you to spend some time here and walk the beach and watch birds and come back to the tidepools on your own in the future.

We're just about to head down the steps to the tidepools here. The steps might be slippery—there may be some sand that's been blown up onto them—so use the handrails. The last few steps are pretty big, they've been washed out. We've got some logs down there, so just watch your step, and we'll be out in the tidepools in just a moment.

This is an extremely low tide today, and you can see that the ocean has drawn back. A lot of these rocks are uncovered. At high tide, everything that you see out here that's covered with seaweed or algae will eventually have water in it. That'll be six or seven hours from now. But these are some of the areas that we'll be going out to explore in just a moment.

All right, well I mentioned that the tidepools are filled with life, and one of the things I want to talk about today is the four zones that are found out in the tidepools. If we look at just the areas of bare rock that are above the seaweed, that's what we call zone one or the spray zone. It really doesn't get covered by the high tides, except maybe during winter storms, but it gets sprayed a lot with waves. We call it the spray zone or maybe the splash zone, that's zone one.

But where we start seeing seaweed or algae growing on the rocks, that is zone two or the high tide zone. That's pretty much where we're standing now. You can see that there's lots of this fuzzy brown algae on the rocks here. This is called goat's beard. There is an olive-green-colored algae here, or seaweed. This is called big rock weed.

But there are some hidden animals here that I want to point out to everyone because these are animals that are delicate, and they're easy for us to damage if we step on them or if we touch them. They're right here. These are sea anemones. It might be hard to believe that they're anemones because they're all closed up, but when the anemones are open, their tentacles will be out. When the tentacles are out, these animals are feeding, and they're going to feed by putting in one or two tentacles at a time for the most part. They're going to grab little bits of plankton and detritus, just floating bits of material in the water, and that's what they'll eat. If a crab or a fish comes by, then all those tentacles might fold in and they'll eat that crab or that fish.

Right now they're folded up. They're covered with little bits of seaweed and pebbles, and this stuff that's stuck to their bodies really serves two purposes—one, it camouflages them; and two, it's like their natural sunscreen. Now, if we were to touch one of these anemones, water would come oozing out of it. That's not good for the anemones because the tide's out right now. They're trying to hold on to their water. If we find some of these sea anemones in the tidepools when they're open, it wouldn't be good to touch them then either, because they're trying to feed then and that would disturb their feeding cycles. In the past, a lot of school groups that came down here would have every student touching the anemones all over the place, and before long all those anemones were closed up and they were not eating. So the

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best way for us to appreciate these sea anemones is just to look at them but not touch them. We do have to be aware of where they are. You can see that they're pretty hidden on the rocks, and that's one of the reasons I wanted to stop here and point them out.

A couple of other things you might look at—on this rock here are little, tiny white barnacles. These are called buckshot barnacles. You'll find those up in this zone one or the spray zone and then on down into zone two, the high tide zone - where we are now. A couple of other life forms to point out—these little shells here are called limpets. We'll see them all over zones one and two, the spray zone and the high tide zone. And then this black stuff here that looks like paint or tar is called tar spot algae. It's actually part of the life cycle of a brown algae that lives here in the tidepools, and it's very slippery, especially when it's wet. So you want to be careful not to step on anything that looks like tar here on the rocks. I'm going to put a little water on it and you can see that it just gets really slippery then. So watch your step.

I want to talk to you about our third zone in the tidepools today and this would be our mid-tide zone or zone three. We've looked at the spray zone already, which is the area of bare rocks. We've looked at the high tide zone, which is the area covered by algae. And now we're standing at the edge of a very typical zone three pool. It's characterized by surf grass—that's this green grassy looking plant. It's actually grass. It's related to the grasses that live on land. In the springtime, this grass will actually release its pollen into the tidepools, and you'll see clouds of pollen floating on the water very much like the pine pollen or grass pollen that blows off the land plants.

Other things that we might find here in the tidepools—there's pink coralline algae. We'll be looking at that close-up in a little while. And we'll start to find larger life forms—larger sea anemones that might be open, more different kinds of crabs moving around in here. So this is zone three. We'll also see another zone three community a little bit later today.

We're standing now at the edge of a zone three pool. You can see this patch of surf grass in front of me. Lots of animals will hide in this surf grass, and a good way to find this life is just to—using your fingers like a comb—gently comb the surf grass aside as I'm doing here. You can see that there is a turban snail shell in here—actually there is a snail living inside the shell. I can tell that there's a snail here because as I look on the bottom of the shell, there's a little trap door. This is called an operculum. The operculum is the trap door that this snail uses to close itself into the shell. Now, if the shell were empty or if a crab came along—a hermit crab came and ate this animal—then it might move into the shell. But this is one kind of animal that's hiding in the surf grass here. Sometimes we'll see crabs in here. Here are some more snails.

I mentioned that these tidepools are places that are filled with life, but, at the same time, this life here is very delicate. It's kind of hanging on by a thin thread, so to speak. What are some of the conditions that tidepool life faces that make it difficult to survive? Well, first of all, as the tide goes out, there's the sun here, beating down on this life, that's trying to dry it out. If it's raining, then they have fresh water, and fresh water is good for land plants but it can be harmful to some of these tidepool animals. There are predators out here. Also, just the effect of lots and lots of people out here in the tidepools exploring has an effect unto itself. In terms of school visitation alone, I personally see about 3,000 students a year coming to the tidepools. And we know that there are many, many times that both in school groups and adult and family

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groups who come to the tidepools who are not necessarily on a guided tidepool program. So if we multiply that out, we're probably looking at tens of thousands of people visiting the tidepools each year, and all that trampling has an effect, too. So, these are all the things that life in the tidepools have to face—drying of sun, rain, it can be hot or cold, predators, and just people as park visitors makes it hard for this life to survive.

Here is another zone three pool. We can see more surf grass, but this pink—it looks like coral—this pink organism that's around the edge of the pool is called coralline algae. Then we also see some anemones that are open. There is a giant green sea anemone and another one right underneath my finger. These animals are open now, their tentacles are out and they're trying to catch their food in the water. Let's see if we see any other life in the pools. I see lots of turban snails on the bottom. There's a fish moving in the water, and this is not a tidepool fish, this would be an open ocean fish, which has come in, and the mother fish has come in and laid her eggs. This would be a baby fish that has hatched out, and as the tide comes back in, this fish will eventually swim out into the open ocean.

We are looking at some orange cup corals. These are these little orange dots, and they're in among this pink coralline algae also surrounded by the surf grass here. These cup corals are solitary. They grow as single organisms, so they're different from the corals that you might think of when you think about a coral reef. These are actually the only kind of corals that really grow on the North Coast. They're related to the sea anemones, but they have this hard shell. If we were to feel it—you're welcome to do that, you won't hurt this organism by touching it—you can feel that it feels like a little calcium or bony kind of a shell. That's what these animals live inside.

Next to the coral is a patch of orange—there are some orange sponges on the rock, and I think there might be a sea slug here. Let's see if we can take a look at that. Yes, right here in my hand, this is a little sea slug. You can see the bottom of its foot. This animal was attached to the rock, and I'm going to go reattach it when we're done looking, but here is its foot. This animal is very much like a snail or like a land slug—no shell—but these animals are often brightly colored. This was living down next to the cup coral.

We are still in zone three, and this animal that you've pointed out and asked me about is right here. It's called a lined chiton. Now chiton is C-H-I-T-O-N. The chiton is related to this limpet that we just saw a moment ago. But instead of having a single shell, it has eight shell plates that overlap like the shingles of a house. If you look closely, you can see a few of those shells here. But this animal is covered with purple and blue lines—it's really quite beautiful if you look at it close up.

In this crevice, we're looking at a nice colony of these orange cup corals right down in here. There's also a giant green sea anemone that's closed up, but you can see its digestive tract almost hanging out through its mouth.

Now we have a very special animal. A couple of gentlemen who were out here in the tidepools collecting abalone have shared one of their abalone with us just for a moment so we can talk about it here. This is a red abalone. You can see the color of its shell is kind of pinkish or brick red. There are four holes here, and these are going to be openings where the abalone will basically breathe through. It's going to pump water in through its mantle. It's a soft-bodied

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animal with a mantle cavity. It pumps the water over its gills, and then that water will exit through these pores, and that's how the animal breathes. It's also how it gets rid of its wastes. Now on the underside of the abalone it has a muscular foot. It's a snail, very much related to the land snails and to the limpet and to the chiton that we've already seen and has this black tissue around the outside edge of its muscular foot here. The animal's tentacles will be up at this end. What this animal does is it will attach itself to the rocks and crawl around grazing on algae. Then in turn, the abalone's shell itself becomes home for colonies of animals. This is a colony of, well it doesn't really have a simple common name, it's called *Membranipora* (sp.). There are some tube worms, and a barnacle that was attached here for a while, it looks like it's still alive. So the abalone itself, then, becomes home for other kinds of life.

We are now at the edge of zone three and zone four. Zone four is the low tide zone. At my feet is the surf grass that's typical of zone three, the mid-tide zone. But right behind me is larger brown algae leading out to the open ocean, and we're at really the edges of zone four. We have found two animals here that are very characteristic of lower zone three and zone four, this low tide zone. Low tide zone here is only exposed to the air at the lowest of low tides, and today is a minus 1.6 tide. In my hand I have an animal called a giant gumboot chiton. This animal is related to the lined chiton that we saw a little while ago, a close relative of the abalone. Like the other chiton, it has eight shell plates, but the plates are covered with a leathery skin, and I'm applying a bit of pressure on this animal to keep it from rolling up. It's actually going to be easiest to put this animal back if it doesn't roll up. So I'm pushing on the middle and really pulling out on its foot. If I didn't do that, it would curl up like this and then it would be hard to let it go.

Down at my feet is an animal called a leather star. In a moment I'm going to pick that leather star up so you can get a closer look at it. But before I do, I'm going to let this chiton go. Would you like to touch it? Again, this animal will have a muscular foot like the abalone, like the limpet, like the other chitons, because it is a mollusk, so it's related to those animals. Inside and around the edges of its foot will be two rows of gills, and sometimes living inside these gills there will be a worm—a little white worm that lives in here that eats the little bits of food that the chiton misses while it's grazing. I don't see the worm right now, but we can certainly see the gills around the edges of the foot here. And once again, I'm applying pretty strong pressure to this animal to keep it from rolling up. It doesn't really like to be out of the water too long, so I'm going to let it go here momentarily.

This animal that we're looking at here is called a leather star. It actually doesn't feel leathery, it's more smooth and almost jelly-like to the touch. Notice this pore here—this is called the mother pore or madreporite. Sea stars all have an amazing hydraulic system built into their bodies. They take in water from the sea and they pump that water under pressure throughout their bodies to operate these organs on the body that are called tube feet. The tube feet help the sea star move around, but they also help the sea star gather its food. At certain times these tube feet will be moving in synchronous motion and they'll move the food down the animal's leg to its mouth, which is in the middle. Different sea stars will have different ways of feeding, some feed on algae, some feed on other sea stars. This particular sea star smells faintly of garlic if you pick it up and smell it. It smells a little bit like garlic. Every animal out here has its particular niche or the place that it fills in the environment, and some sea stars are grazers, some are carnivores. This particular one would be primarily a grazer. It might feed

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on algal film—films of algae that grow on the rocks. Its purpose really is just to live out here and maybe to be beautiful.

A typical zone four animal, this is a purple sea urchin. There are two species of sea urchins out here, purple sea urchin and the red sea urchin. The purple sea urchin is a little bit smaller and has shorter spines, but you can see that the spines are moving just a little bit. This animal is related to the sea star, we just looked at a leather star a moment ago. I can feel its spines moving on my hand now, and if you look closely at my fingertips, you can see that they've been stained purple by the iodine in this animal's spines. If we look at the bottom of the sea urchin, we see that it's attached itself to a rock and to a mussel shell here. Then in the middle of the sea urchin is its mouth. Like the abalone, the urchin is a grazing animal, and it has a piece of kelp here. Eventually it will move this kelp to its mouth, and it'll eat this piece of kelp. Look, it just dropped one of its shells there. Now it dropped the kelp. It probably wants me to drop it. I'm going to put it down here pretty soon. These animals do protect themselves with their spines, and if you were diving or walking out here without good shoes on, you could get one of these spines in your skin and that would be something that would hurt and could be very difficult to get out. So you want to be careful to not let these urchin spines get into your skin. We'll put this animal back down in its crevice. It was hiding underneath some of the surf grass.

Right in here, wouldn't you know, I just found the other species of sea urchins. So I'm going to put him down side by side. Now we have both species of sea urchins here, the red sea urchin and the purple sea urchin. If you look at the red urchin, you'll see that its spines are longer and a little bit thicker, although this is a smaller individual. But, in general, it will have longer and thicker spines. Same kind of mouth on the bottom. You can see those spines really moving around a lot now.

I am standing at the edge of zone four right now, and zone four is really characterized by large brown algae. This is one. This one is called *Laminaria* (sp.), it's also called five-finger kelp, although sometimes it has more than five blades on it. This would be a brown algae. There are green algae, there's red algae, and there are brown algae. This is called feather boa kelp, and some of these blades are a little bit longer—like this one right here. These floats along the length of the kelp stem will float this algae up at the surface of the water at high tide and allow it to get sunlight.

We're looking at a sunflower star. This is the bottom. We can see the tube feet really moving fast. This is one of the fastest moving sea stars in the tidepools. It's a predator. It eats other sea stars and other animal life as well. If you were to put this sea star down next to an abalone, the abalone would sense the chemicals given off by this animal, and the abalone would make fast moves to get out of the way. Here's the mouth in the middle. Then if we turn it over, we can see the color on the top. This animal feels very slimy, very gelatinous. It has many, many arms. Most sea stars will have just five arms, but the sunflower star can have 15 to 20 to 25 arms, or even more. I am on my way over to a pool to let our sunflower star go.

On my way, I see another leather star out here, another one of these leather stars. You can compare the leather star to the sunflower star—notice that the leather star has just five arms, the sunflower star will have many.

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I also see a special type of algae, and I think it's a little bit hard for you to see from up there, but it is called acid kelp. This one is actually toxic to eat, but it's a brown algae that will fade to light green in sunlight. Then it will become rehydrated as the tide comes back in.

Also next to me is another bat star, and on this one we can see that its stomach is partway out, so it has been gathering food in the water in this tidepool. I'll continue on my way to let our friend, the sunflower star go back in its home.

As I'm moving down here to let this sunflower star go, I see another gumboot chiton, a smaller one, and I'm going to look for the worm in it. There's no worm in it, but there is a little snail living just at the edges of the gills here. There's a little snail crawling around on the inside of the gills of this gumboot chiton. There are also lots of sea urchins in this pool where I'm standing. I'll put this chiton out and see if I can get one more urchin out.

We're looking at another purple sea urchin. In this hand on your right, we're looking at a common ochre sea star. The common ochre star lives down in zone four, but it crawls up into zone three to eat mussels, which we're going to talk about in just a moment.

Just a moment ago we looked at an animal called the common ochre star, which lives in zone four, but that sea star crawls up into this community right here, which is a zone three community called the mussel beds. It's right at my feet. And in the mussel beds, of course, we have mussels. These are California mussels all over the rocks. We also have barnacles—these are goose barnacles. The most common plants here would be the sea palm—this seaweed that looks like little palm trees. We also have some rock weed and other plants that we might find in other areas in the tidepools. The sea palm is edible, very good to eat, but in order to collect it you have to have a special commercial collecting permit. This mussel bed community is a major life zone or life community in this zone three or the mid-tide zone.

We have seen all four zones out here in the tidepools. We've seen zone one, the spray zone, which is the area of bare rocks. We've seen zone two, the high tide zone—that's where the algae starts to grow. We spent quite a bit of time in zone three, the mid-tide zone. That's the area where we find the surf grass, the coralline algae. And on a low tide like this one today, we've even gotten out to zone four, the low tide zone, where we found just a great array of life. That kind of brings me back to my original point that I made at the beginning. The tidepools are full of life, but some of this life is delicate, and we're here at state parks to protect it and to teach people like you visitors what we can do to protect them together.

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