

Virtual Program Curriculum

Platform: Ocean Habitats

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Virtual Program

Overview

STEM Discovery Focus:

- Explore and Wonder
- Make a Difference

Ocean
Discovery
Unit

Next Generation Science Standards:

K-ESS3-3 Earth and Human Activity

- Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

2-LS4-1 Biological Evolution: Unity and Diversity

- Make observations of plants and animals to compare the diversity of life in different habitats.

4-LS1-1 From Molecules to Organisms: Structures and Processes

- Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

LS4.D: Biodiversity and Humans

- There are many different kinds of living things in any area, and they exist in different places on land and in water.

NGSS Alignment

Virtual Program Story

Students explore nearby coastal habitats and the animals that live there while learning about the importance of protecting these special places. Content will focus on how animals are adapted to their habitats and what a Marine Protected Area (MPA) is.

During the Exploration Day students participate in a virtual field trip to an MPA in La Jolla where they explore tide pools and the kelp forest and learn how the animals that live there are adapted to those habitats. Students meet living tide pool animals, take a virtual “dive” into the kelp forest, and have opportunities to ask questions of Ocean Discovery staff.

During the Make a Difference Day students learn about how humans impact the coastal habitats they explored and the importance of MPAs in keeping these areas safe. Students will discuss how they can make a difference by teaching others the importance of MPAs and will design posters to educate their family, friends and community about MPAs.

Students love visiting the coast, seeing tidepool creatures up close, “diving into” the kelp forest, learning from scientists and making a difference in the world!

Overarching Responsibilities of Producer:

- Run all technology in the background
- Help Lead Instructor switch from program to program
- Inform Lead Instructor of students who have questions, etc.

Overarching Responsibilities of Facilitator:

- Lesson delivery & timing of lesson.
- Execution of all lesson material in this curriculum:
 - *Italics* – utilize the exact language when teaching.
 - Regular – content that should be covered using language of your choice.
 - (Parenthesis) – Teaching notes and actions.
 - **Technology Producer** – Cues Producer on how to utilize technology throughout lesson.
 - **Technology Facilitator** – Cues Facilitator on how to utilize technology throughout lesson.
 - **Adaptation:** - Ways to adapt the lesson up or down for the audience you are teaching.
- Lead discussions & ask guiding questions to get students thinking about science.
- Use Belief and STEM exploration language during lesson.
- Encourage participation from all students to create an inclusive environment.
- Whenever possible call students out by name.

Exploration Day

Goal: Students explore the rocky seashore and learn how animals are adapted for this habitat through a virtual field experience.

Supplies:

- Facilitator backpack with:
 - iPad in Armor X case
 - Armor X tripod fully assembled
 - AirPods
 - AirPod safety strap
 - iPad charging cable
 - Portable power bank
 - Hand sanitizer
 - Alcohol wipes
 - Ziploc for trash
 - Portable aerators (2)
 - Snorkel mask
 - Carabineer

- Producer backpack with:
 - iPad in Amazon case
 - AirPods
 - AirPod safety strap
 - iPad charging cable
 - Portable power bank
 - Hand sanitizer
 - Alcohol wipes
 - Ziploc for trash
 - Small FirstAid kits
 - iPad “cheat sheet”
- Tide pooling aquaria
 - Large w/lid (1)
 - Small w/compartments (1)
- Temperature gun and clipboard for COVID self-screening
- Explore Day ESRI Map Link:
 - <https://storymaps.arcgis.com/stories/b57f4848854f402a8ef87505c30873ee>

Timing:

Time	Activity
0:00-0:05	Students log on & Producer Checks Roster
0:05-0:15	Intro & ESRI Map
0:15-0:40	Tide Pool Meet and Greet
0:40-0:45	Wrap-Up

Set Up

- Check the tides on the tide app. If tide is coming in, set up far enough back that you will not need to move for the day. Set up far enough away from the other group that sound does not travel between you.
- Talk with each other about who will handle what responsibilities in the lesson: talking with the teacher, calling on students, etc.
- Facilitator Set up
 - Set up tripod with facilitator iPad:
 - Remove shoulder strap by sliding forward the small lock underneath the handstrap, extending the kickstand, and pulling forward on the pull tab.
 - Tighten all pieces of the tripod.
 - Slide the iPad into the tripod with the release tab facing the iPad's camera. Slide until you hear it click. To release, push outward on the release tab and slide out.
 - Attach facilitator backpack to the middle of tripod with carabineer to add weight.
 - Ensure tripod legs are secure on the rocks.
- iPad Set up
 - Turn on iPad.
 - Connect AirPods.
 - AirPods should automatically connect to your iPad. If they do not:
 - Open case, open Settings, open Bluetooth, and select name of AirPods.
 - Open ESRI StoryMap and Videos.
 - Ensure they are bookmarked and the link ESRI StoryMap link is copied (Producer only).
 - Facilitator should still have it open just in case.
 - Open DataPropeller and locate class Zoom link.
 - Check iPad battery.
 - If necessary, plug into external power bank.
 - Note: can keep iPad on airplane mode while tide pooling to save battery (swipe down from top right, select airplane icon), but remember to turn this off before.
- Tide pooling
 - Search for animals as close as possible to the tripod set up.
 - Place small organisms like snails and hermit crabs in the small aquaria. Ensure they are fully covered with water.
 - Place large organisms or organisms that are good climbers, like sea hares and shore crabs, in the large aquaria. Ensure they are fully covered with water and put the lid on.
 - Note: If you plan to keep the organism for more than one class period, use the portable aerator to provide oxygen.
 - Move the aquaria close to the tripod outside the tide line, but as close to where they were found as possible.
 - Monitor animals for signs of distress, such as not holding on to the aquaria wall or not reacting to touch.

Between Classes

- Charge iPad with portable charger and charge AirPods in case.
 - If iPad needs more charge, can keep the charger connected during the lesson.
- Return all small, abundant animals such as snails and hermit crabs as close as possible to where they were found. Replace these with different animals and make note of where they were collected from.
- Monitor any animals being kept for another class. Ensure that they are showing no signs of distress. If they are, return them as close as possible to where they were found.

Log In (5 min)

- Locate class Zoom meeting link in DataPropeller and join the Zoom call 5-10 minutes before the scheduled start time.
- Greet the teacher:
 - Facilitator and producer both introduce themselves
 - *Can you please make both Ocean Discovery staff co-hosts of the meeting?*
 - *How do students raise their hands – physically or using the Zoom button?*
 - *Do you use the chat feature? If students ask questions in the chat normally, we ask that they send all their questions to you. It is difficult for us to monitor the chat on our iPads, so it would be helpful if you could read those questions out loud during the question & answer times.*
 - *Are there any “virtual class norms” to be aware of?*
 - **Turn video off**
- Check Zoom names:
 - Rename to “Miss/Mr. _____ - Ocean Discovery” if necessary by clicking on your name in the participant list.
 - You will only be able to do this once the teacher gives you co-hosting capability.
- **Based on your conversation with the teacher, either disable the chat or change it “host only” so that the students can send questions to their teacher.**
- (Say hello to students by name, as many as you can).
- Before starting the lesson, tell students there will be times when you will ask questions to them and they can ask questions to you (during question and answer time). Review how and when you would like them to answer/ask questions.
 - Review how to use these features:
 - Hand raise (button or in person, depending on teacher)
 - Thumbs up/down (to camera, not button)
 - Have students practice thumbs up by asking questions. Potential questions include:
 - Put your thumbs up or down to answer these questions. Thumbs up for yes, thumbs down for no.
 - Have you ever been to the tide pools before?
 - Are you excited to visit the ocean today?
 - Have you ever done science with Ocean Discovery Institute before?
 - (Producer) will help me call on students during today’s lesson.
 - Let’s practice answering questions and getting unmuted.
 - (Depending on the class, you can ask them to unmute/mute themselves or send the request to unmute/mute them yourself).
 - **Unmute/mute students who are called on to respond.**
 - What is your favorite animal?
 - How many brothers or sisters do you have?

Intro (10 min)

- **Spotlight facilitator.**
 - Switch to gallery mode once spotlighted so you can see all students
- *Welcome to Ocean Discovery Institute **scientists!***
- *We are so excited that you could join us for a field trip to **explore** the rocky seashore.*
- Introduce yourself. Include:
 - My name is xx. I am an instructor at Ocean Discovery Institute.
 - College and major (explain what your major is in student friendly language),
 - Community connections (ODI alum, attended a school in City Heights, etc.),
 - Why you work/volunteer at Ocean Discovery, and an interesting or funny fact about yourself
- Ask producer to introduce themselves.
 - **Unspotlight facilitator.**
 - **Spotlight self.**
 - **Give an introduction with the same info as above, and explain your role so that students understand that you are there but mostly off screen.**
- Explain that you will not be wearing it because you are outdoors and six feet away from everyone but that you have it handy in case someone comes close by.
 - (Show mask.)
- Remind students how to ask questions during the field trip:
 - There will be opportunities to ask questions.
 - If you have a question any other time, type it into the chat feature and send to the teacher (if not using chat, skip this).
- **Screen share ESRI Story Map.**
 - **Disable annotation.**
- Describe field trip location. Be sure to include:
 - **Scroll through 2 map locations:**
 - (1) City Heights, CA – Here you guys are.
 - (2) La Jolla, CA – Here we are. La Jolla about 20 minutes away.
 - Stress how close this place is to where they live.
- Introduce rocky seashore.
 - **Scroll to rocky seashore photo.**
 - Explain that today they will **explore** the rocky seashore and learn about some of the animals that live there.
 - **Ask students to show you thumbs up/down:** Have you ever been to the rocky seashore?
 - **(Call out names of some students who are following directions.)** Example: I see Lesley and Jorge have visited a rocky seashore before and several of you haven't so I'm really excited to get to share this special place with you!
 - Discuss the harsh physical environment at the rocky seashore. Be sure to cover:
 - **Ask students to raise their hand:** What do you see in the rocky seashore?
 - Waves – waves are constant; can be rough; can knock animals off the rocks
 - Rocks – this is where the rocky seashore gets its name – lots of rocks around big and small
 - Sun – can be very sunny; animals can dry out

- Pools of water – tidepools; sometimes there/sometimes not there; can be a great place to look for animals
- Introduce scientist to talk about rocky seashore.
 - There are rocky seashores all over the world.
 - Paolo is a scientist who studies the rocky seashore in Hawaii, and he sent a video just for you!
- **Screen share scientist video.**
- **Switch to live feed of Facilitator after it ends.**
- Debrief scientist video.
 - Potential questions include:
 - Where was Paolo born?
 - What kind of scientist is he?
 - What does he study?
 - Did the rocky seashore in Hawaii look like the rocky seashore here in La Jolla?
 - (Move camera around to show students live feed of rocky seashore.)
 - What was similar?
 - Thumbs up if someday you might want to be a scientist like Paolo?
- Introduce concept of high and low tide. Be sure to include:
 - **Return to ESRI map.**
 - **Scroll to high tide/low tide (slide back and forth as instructor talks).**
 - Today the tide at the rocky seashore is (high/low).
 - There are high and low tides:
 - Define high tide – water is higher and covers lots of the rocks.
 - Define low tide – water is lower and more rocks are uncovered.
- Teach students high/low tide dance:
 - Show students high/tide low tide dance.
 - Put arms straight up while standing on tip toes and in a high squeaky voice say “High tide!”
 - Keep arms straight down while crouching down as low as you can and in a deep low voice say “Low tide!”
 - Ask students to turn on cameras if they wish and let them know the producer will unmute them.
 - **Unmute all students.**
 - (Have students stand up and practice high tide/low tide dance a few times.)
 - **Mute students again when done with dances.**
- Briefly review the harsh physical environment at the rocky seashore. Include:
 - Waves, sun, amount of water available changing.
 - Animals that live at the rocky seashore have to be adapted to live here. They need to:
 - stay attached to rocks and not get knocked off by waves
 - survive both with and without water
 - protect themselves from predators
 - Animals must be adapted to live here.
- Introduce adaptations:
 - **Scroll to adaptation definition.**
 - Define adaptation:
 - Adaptation = anything that helps an animal survive

- Ask students what kinds of adaptations polar bears have.
 - Be sure that students connect and adaptation to how it helps the animal survive.
- **Switch to live feed of facilitator.**
 - **Spotlight video.**
 - **Switch to galley view.**
- Q & A
 - Pause a moment and see if anyone has any questions?
 - If you have a question raise your hand and (Producer) will unmute you one at a time so you can ask.
 - (**Ask the teacher to share any questions that were written into the chat with the Facilitator.**)
 - (**Unmute a student and let Facilitator know who is asking.**)
 - (**Ex. Ms. Rachel I am unmuting Jacob who has a question for you**)
- Let's explore the animals at the rocky seashore!
- Now we're going to take a look around! I am going to turn my camera off for a moment while I grab it.
- (**Turn off camera and take camera off tripod. Turn it back on and flip the screen. Slowly pan around so students can see where you are.**)
- Let's get an up-close view of a tide pool.
- (**Take camera to pre-chosen tide pool.**)
- Welcome to the rocky seashore!
- (**Show students inside the tide pool.**)
 - Talk about one invertebrate you can see clearly in the tide pool.
 - Mention an adaptation they have for surviving in this environment.
 - (Ask students if they have any questions to raise their hands.)
 - (Call on students one at a time to unmute themselves and ask questions.)
 - (Take 2-3 questions then move on.)

Meet and Greet (25 min)

- (Producer) and I were out here earlier collecting some animals from the tide pools so you can get a better look.
- (**Walk over to the 1st invertebrate that you have in an aquarium.**)
- Show 1st invertebrate. (**Get camera close to invertebrate. Film underneath the animal – show all sides of animal if possible.**)
 - Give name of invert.
 - (Ask students to raise hands if they have questions about this animal.)
 - (Call on students one at a time to unmute themselves and ask questions.)
 - (Take 2-3 questions then move on.)
 - Repeat the above procedure with other inverts (as time allows).
 - As you progress try to get students to come up with the adaptations before you tell them what they are.
 - Potential additional questions:
 - Can anyone see another adaptation this animal might have?
 - How would that adaptation help this animal survive at the rocky seashore?
 - How might this animal be adapted to waves?
 - Why would an animal here want to be able to stay stuck to the rocks?

- How might this animal be adapted to staying stuck to the rocks?

Meet and Greet/Other Animals (Optional: If time allows or you aren't able to collect tide pool animals.)

- *Now we are going to investigate some animals that live at the rocky seashore but live closer to the waves and sometimes below the water.*
- (Pan the camera over to the water.)
- (Return camera to tripod. Turn off camera while attaching it)
- *In order to see them, we are going to need to "dive in!"*
- *Everyone needs to put on their dive masks and snorkel!* (show students how to do this).
- (Put on your mask and snorkel.)
- *Let's go!*
- **Screen share StoryMap and scroll to additional animals**
 - Click on photos using cursor to zoom out and see whole photo
- **Scroll to each animal and through photos as facilitation talks about them**
- Repeat the procedure from the above meet and greet with video inverts (as time allows).
 - Try to get students to come up with the adaptations before you tell them what they are.

Wrap Up (5 min)

- **Switch to Live Feed of facilitator.**
- **Spotlight facilitator.**
 - Switch to galley view.
- Welcome back to the surface scientists!
- (Take off mask and snorkel.)
- (Have students "take off their mask and snorkel".)
- Debrief Field Trip. Things to include:
 - Learned what an adaptation is.
 - Learned about the environment at the rocky seashore.
 - Learned about how animals are adapted to live at rocky seashore.
 - Potential questions to include:
 - Do you think it's important to protect areas like the rocky seashore?
 - What did you like about doing science with Ocean Discovery Institute today?
 - Do you think learning and doing science like we did today is important? Why or why not?
 - Would you like to visit the rocky seashore again?
 - Do a round of "would you rather" with students to help with debrief and learn about student interests'. Include as many as time allow. Tell students to hold up a 1 or 2 with their fingers depending on the answer.
 - Would you rather have tube feet like a sea star to climb things or a shell that helps you camouflage with anything around you?
 - As a scientist, would you rather study the animals in the tide pools or the animals in the deep sea where no one has ever been?
 - Would you rather study the rocky seashore in Hawaii, like Paolo, or study the rocky seashore in San Diego, like us?
 - Come up with your own!
- Invite students back to the rocky seashore.

- Explain they can come back anytime -it's free!
- *Next time we meet we will talk about how important the rocky seashore is and how we can help protect it and the animals that live there.*
- Let's end our class the same way we end every Ocean Discovery activity – with our cheer!
 - *You all did an awesome job today scientists! At Ocean Discovery Institute we have a cheer we do at the end of every day of exploring and learning science – we put our hands in the center and say “Gooooo Awesome!” Since you are now Ocean Discovery scientists I'd like you join me in our cheer.*
 - (Ask students to put hands in center.)
 - **Unmute students.**
 - *On the count of 3 we'll all say “Go Awesome!” “1, 2, 3... Go awesome!!”*
- *Thanks for coming! See you next time scientists!*

Clean Up

- Fully log out of all Zoom accounts
- Break down and put away all supplies
- Return animals to tide pools as close as possible to where they were found

Make a Difference Day

Goal: Students learn about the importance of Marine Protected Areas and create posters to educate family and friends in their community about this natural resource.

Supplies: (for set up for one group)

- Tripod (1)
- Webcam and rolling screen (1)
 - Wireless keyboard and mouse
 - Ethernet
- Bluetooth adapter for large computer
- AirPods (2)
- Laptop and monitor (1) w/charger
- Make a Difference Day ESRI Map Link:
 - <https://storymaps.arcgis.com/stories/55a37f79727441f697729540b3142912>

Timing:

Time	Activity
0:00-0:05	Students log on & LI Checks Roster
0:05-0:20	Intro (ESRI Map & SCL)
0:20-0:25	Break
0:25-0:40	Create MPA Drawings
0:40-0:45	Wrap-up

Set Up:

- Open all windows in room if not already open.
- Turn lights on.
- Move webcam/tripod and screen to taped marks on floor.
- If webcam was unplugged, plug it back into the long USB extension cord.
- Ensure screen is connected to power and ethernet cord.
 - Ethernet cords in ceiling can be accessed with trash picker.
- Set up producer laptop and second screen on table. Plug into Ethernet and power.
- Connect AirPods: Facilitator to rolling screen and producer to laptop.
 - If AirPods don't automatically connect to the devices:
 - Click Start > PC Settings > Devices.
 - Scroll down until you see Audio.
 - Click on AirPods.
 - Click Connect.
- Set up wireless keyboard and mouse on rolling cabinet for facilitator.
 - Turn on and test.
- Open ESRI StoryMap and videos
 - Open bookmarks and have ready
- Talk with each other about who will handle what responsibilities in the lesson: talking with the teacher, calling on students, etc.
- Open DataPropeller and locate class Zoom link.
- Keep masks on.

Log In (5 min)

- Locate class Zoom meeting link in DataPropeller and join the Zoom call 5-10 minutes before the scheduled start time.
- Greet the teacher:
 - Facilitator and producer both introduce themselves.
 - *Can you please make both Ocean Discovery staff co-hosts of the meeting?*
 - *How do students raise their hands – physically or using the Zoom button?*
 - *Do you use the chat feature? If students ask questions in the chat normally, we ask that they send all their questions to you. It is difficult for us to monitor the chat on our iPads, so it would be helpful if you could read those questions out loud during the question & answer times.*
 - *Are there any “virtual class norms” to be aware of?*
 - **Turn video off.**
- Check Zoom names.
 - Rename to “Miss/Mr. _____ - Ocean Discovery” if necessary by clicking on your name in the participant list.
 - You will only be able to do this once the teacher gives you co-hosting capability.
- **Based on your conversation with the teacher, either disable the chat or change it “host only” so that the students can send questions to their teacher.**
- (Say hello to students by name, as many as you can).
- Ask students if they all have a paper and something to draw with (or whiteboard). Tell them to go grab that now if they don’t have it ready.
- Before starting the lesson, remind the students how they asked and answered questions during the last lesson, and let them know we’ll do it the same way today.

Intro (15 min)

- **Spotlight facilitator.**
 - **Switch to gallery mode once spotlighted so you can see all students.**
- *Welcome to Ocean Discovery Institute!*
- *We are so excited that you could join us again to do more science and learn about how you can make a difference in the world!*
- Briefly introduce yourself and the producer.
- Briefly explain why you are wearing a mask today.
- Review the Explore Day. Potential questions to include:
 - Who remembers the name of the place we visited? (the rocky seashore)
 - Who can describe what it was like at the rocky seashore (waves, rocks, tidepool, etc.)
 - Who can describe what an adaptation is?
 - Can anyone remember an animal they saw at the rocky seashore?
 - What kind of adaptations did the animal have to help it survive there?
 - (Show dance move related to adaptations and have students repeat this.)
 - **Let facilitator know which students have their hand raised.**
 - **Mute/unmute students as they are called on.**
- **Screen share StoryMap**

- Introduce Living Lab. Be sure to include.
 - The Living Lab is Ocean Discovery's building in City Heights.
 - **Scroll to map.**
 - **Ask students to show you thumbs up/down if they have ever visited the Living Lab before.**
 - Introduce Living Lab tour video.
 - Would you like to see a little more of the Living Lab? This video will show you all our favorite parts of the Living Lab, and we hope you can visit it soon!
- **Screen share Living Lab Video**
 - Invite students to visit the Living Lab on their own.
 - You can pick up dinner at the Living Lab every weekday from 3-5pm with your family. While you are here, we can tell you and your family how you can get involved after school. We have after-school programs right now at the Living Lab that you can sign up for!
- Introduce Ocean Discovery alumni.
 - *Lots of students have participated in Ocean Discovery Institute programs at the Living Lab and I'd like to introduce you to one of our alumni – Daisy.*
 - *Daisy was a City Heights student who participated in our Ocean Leader program.*
 - *Daisy is now an environmental consultant!*
 - *I'm going to let Daisy tell you more about herself.*
- **Screen share Ocean Discovery alumni video.**
- Debrief Ocean Discovery Alumni video. Potential questions include:
 - Where is Daisy from? Where did she go to school?
 - What kind of scientist is Daisy now?
 - How does she help protect animals?
 - Thumbs up if you might want to grow up to be a scientist like Daisy.
- Define Marine Protected Area. Be sure to include:
 - The rocky seashore we visited in La Jolla was a Marine Protected Area.
 - **Scroll to MPA definition.**
 - Define marine protected area.
 - MPA's are like underwater national parks and they have special rules.
 - All marine protected areas have different rules, in some MPA's you are not allowed to go fishing, and in some you can't drive a boat or anchor a boat anywhere inside the MPA.
 - In the MPA we visited, you could not take or harm any of the animals there.
 - There are marine protected areas worldwide.
 - **Scroll to MPA map**
 - Define light and dark blue portions of the map.
 - Only 7% of the world's oceans are marine protected areas- you got to visit one of them.
- **Switch to live feed of facilitator**
 - **Spotlight instructor.**
 - **Switch to gallery view.**
- Discuss why are marine protected areas important. Be sure to cover:
 - Keeps the animals that live there safe.
 - What could harm the animals that live in the MPA:
 - Stepping on the animals.

- Taking the animals away from their habitat
- Littering/trash/pollution
- Etc.
- *Not everyone knows about all the cool animals that live at the rocky seashore that need our help! Do you think people would be more careful about stepping on the animals or littering if they knew about these cool animals?*
- *One of our most important job as scientists is to share our knowledge with other people. That is one of the ways that scientists make a difference in the world.*

Active Break (5 min)

- (Tell students you are going to lead them on an active break).
- (Remind students if they have their video turned off to turn it back on and ask them to unmute).
 - **Unmute students if you are going to have them say them with you. If not, keep them muted.**
- (Tell all students to stand up.).
- Play a game of Simon Says with students using adaptations they have learned:
 - Flat body
 - Camouflage
 - Tube feet
 - Muscular foot
 - Hard shell
 - Eye stalks

MPA Drawing (15 min)

- Introduce MPA drawing. Be sure to include:
 - We will create a drawing to help educate others about marine protected areas and the animals that live there.
 - We will draw a picture of the marine protected area we visited last.
 - You will guide them through their drawing.
 - Their drawing does not need to look exactly like yours but it needs to be a drawing of you exploring the rocky seashore.
 - Your drawing does not need to be perfect.
- Check that all students have a piece of paper to draw on.
 - (Have everyone hold up their paper and pen or pencil.)
- (Switch to whiteboard on Zoom and draw an example.)
- Guide students through drawing. As you add each item draw it on your Zoom whiteboard. Go slow enough that students have a chance to stay caught up.) Be sure to include:
 - Land
 - Ocean
 - Write the words at the bottom: Marine Protected Area
 - Waves
 - Rocks
 - Sun
- Add some rocky seashore animals to our drawing.
 - Ask students to remind you what animals you saw when you visited the rocky seashore.
 - (Type a list of student responses on the whiteboard.)
 - **Unmute/mute students as they are called on.**

- Explain to students that they have five minutes to add as many of the animals we listed to their drawing as they would like.
- (Give students time reminders as they work.)
- Check in one-on-one with students.
 - Call out a particular student.
 - Have them unmute themselves.
 - Ask them about their drawing.
 - What are you adding to your drawing?
 - What do you still want to add?
- (Let students know when four minutes is up.)
- Finally we will add ourselves to the drawing. You can draw yourself exploring the rocky seashore however you want.
 - Ask students what are some things they could do at the rocky seashore?
 - (Create a list of student responses on the whiteboard.)
 - Explain to students they will have five minutes to draw themselves exploring the rocky seashore- if they finish early they can add more animals or other details.
- (Give students time reminders as they work.)
- Check in one-on-one with students.
- (Let students know when four minutes is up.)
- Stop sharing whiteboard.

Wrap-up (5 min)

- Ask students to raise their hand: *Would anyone like to share their drawing with the group and tell us about what they drew? Who are you going to share your drawing with today?*
 - (Choose 2-3 students to share. Remind them to unmute and turn video on).
 - Mute/unmute students as they are called on.
- Have all students hold theirs up at the same time to look at everyone's.
- Share live animal from the rocky seashore.
 - Another cool thing about the Living Lab is that we have big tanks where we keep live animal's upstairs. So I brought one more rocky seashore animals for you to meet.
 - Show animal.
 - Ask students to raise their hand: What kinds of adaptations do you think this animal has to live at the rocky seashore?
- Wrap-up. Be sure to include:
 - Marine protected areas area valuable resource that not many people know about.
 - You have learned about the rocky seashore and the animals that live there.
 - As a scientist you can make a difference by sharing your knowledge of the rocky seashore and the animals that live there with others who don't know about them.
 - You can use your drawing to help explain to family and friends about marine protected areas.
 - It's up to you to make a difference and help protect the rocky seashore and the animals that live there!
- Great job today scientists!
- Unmute students.

- *Let's end our class the same way we end every Ocean Discovery activity – with our Go Awesome cheer! Put your hand out, and on the count of 3 we'll all say "Go Awesome!" "1, 2, 3, Go awesome!!"*
- *We look forward to seeing you again and hopefully at the Living Lab soon!*

Clean Up

- Fully log out of all Zoom accounts
- Put laptop, charger, mouse, and mousepad away in drawer
- Move screen and webcam to preferred out-of-school location
- Turn off mouse and keyboard
- Sanitize all spaces used (tables, chairs, keyboards, mice, etc.)
- Close screenless windows
- Turn off lights

Invertebrate Facts Sheet

Hermit Crabs

- Predator or Prey: Prey
- Living organism adaptation: Hard shell
- Physical environment adaptation: Round body
- They eat: Mussels, plankton, or dead plants/animals (scavengers)
- Eaten by: Birds and larger crabs
- Other information:
 - Have to find a shell to live in because they do not make their own. These shells are left behind from other animals like snails.
 - They do not stay in the same shell their entire lives. When a hermit crab grows too big, it needs to find a bigger shell (like when you grow and need to buy bigger clothes).
 - Sometimes hermit crabs fight over the best available shell available.
- Potential questions:
 - Who do you think makes the shells that the hermit crabs live in? (snails, other invertebrates!)
 - What do you think a hermit crab uses its big claws for?



Sea Stars

- Predator or prey? Both
- Living organism adaptation:
 - They can regenerate their legs as long as enough of their central disc is intact.
 - Spiny skin to protect themselves against predators.
- Physical environment adaptation: Tube feet
- They eat: Other invertebrates like barnacles, mussels, snails, clams or urchins
- Eaten by: Fish, snails, crabs, shrimp, otters, birds and even other sea stars
- Other information:
 - Commonly referred to as starfish but they are not fish.
 - Can evert their stomach to digest prey.
- Potential questions:
 - Why is it helpful that the sea star can regenerate its legs?
 - What part of their body do you think they use to move around the rocky seashore?



Shore Crabs

- Predator or Prey? Both
- Living organism adaptation:
 - Claws (helps as predator)
 - Exoskeleton (helps as prey)
- Physical environment adaptation: Flat body
- They eat: Other invertebrates (like limpets), algae, or dead plants/animals
- Eaten by: Sea otters, fish, larger crabs, octopus, turtles
- Other information:
 - Hard exterior, called exoskeleton, is not made of bone (because they are invertebrates!). When the crab grows too big, it will shed its exoskeleton, like a snake sheds its skin, and grow a new one.
 - Crabs only move sideways and can squeeze into cracks in rocks.
- Potential questions:
 - What do you notice about the color/pattern of this crab? Do you think this an adaptation?
 - What is it an adaptation for?



Wavy Top Snails

- Predator or Prey? Prey
- Living organism adaptation: Hard shell
- Physical environment adaptation: Muscular foot
- They eat: Algae
- Eaten by: Sea stars, octopus, lobsters, and fish
- Other information:
 - Shell helps protect themselves from predators and also helps them keep from drying out in the sun, like a hat or sunscreen.
 - They can close their entire body into their shell and close a “trap door” (operculum) to protect their soft bodies.
 - They can live up to 12 years and are the largest snails in California.
- Guiding questions:
 - What do you notice about the shape of their shell? How is this an adaptation?



Keyhole Limpets

- Predator or Prey? Prey
- Living organism adaptation: Hard shell
- Physical environment adaptation:
 - Muscular foot (for sticking)
 - Round body (for waves)
- They eat: Algae
- Eaten by: Birds, sea stars, lobsters, crabs
- Other information:
 - Muscular foot can also help limpet hold on to rocks so predators cannot remove them.
 - The hole on top is where waste is expelled, some people think it is an eye.
 - Eyespots are located near tentacles.
- Guiding questions:
 - What adaptations would an animal need to eat this keyhole limpet?



Sea hares

- Predator or Prey? Prey
- Living organism adaptation: Spits out ink
- Physical environment adaptation:
 - Muscular foot
 - Camouflage
- They eat: Algae
- Eaten by: Sea stars, lobsters, and even some sea slugs (Navanax)
- Other information:
 - This is a type of sea slug. They are related to snails.
 - Have muscular foot to help them move and hold onto rocks.
 - They protect themselves by spitting out purple ink/mucus to confuse their predators, since they don't have a hard shell to protect themselves.
- Guiding questions:
 - Why would a sea hare need to spit out its intestines or shoot out ink?
 - Why do you think the sea hare is slimy and covered in mucous?



Sea Urchins

- Predator or prey? Prey
- Living organism adaptation:
 - Spines
 - Shell (internal)
- Physical environment adaptation: Tube feet
- They eat: Algae
- Eaten by: Crabs, snails, otters, birds, fish, and even some sea stars (Sunflower star)
- Other information:
 - This is a sea otter's favorite food. Without otters, or other predators like fish and humans, the sea urchins can take over a kelp forest!
 - Urchins will often cover themselves with pieces of shell and algae for camouflage.
- Guiding questions:
 - Why do you think it has spines?
 - What other animals have tube feet? Do you think they are related?



Sea Cucumbers

- Predator or prey? Prey
- Physical environment adaptation:
Tube feet
- Living organism adaptation:
 - Releases toxins through skin
 - Eversion and regeneration of guts, sticky and confusing to predators
- They eat: Algae and organic waste on the seafloor (decomposers!)
- Eaten by: Crabs, fish, and sea stars
- Other information:
 - Their false spines to seem scary to predators.
 - They poop out clean sand after they have extracted all the nutrients!
 - Related to sea stars and sea urchins.
 - Can expel some internal organs (gut) to scare off predators. They then regrow these insides!
- Guiding question:
 - What does this animal have in common with its cousins the sea star and urchins?
Tube feet!



Chitons

- Predator or prey? Prey
- Physical environment adaptation: Muscular plate to stick to rocks with their armor-like shells to protect them from predators.
- Living organism adaptation:
 - Hard shell (plates)
 - Rolls up in a ball when dislodged from rocks
- They eat: Algae, barnacles, and tiny invertebrates like microscopic plankton
- Eaten by: Sea stars, crabs, fish, sea anemones and seagulls
- Guiding questions:
 - Do you think it is easy for a predator to eat a chiton? Why or why not?



Anemones

- Predator or prey? Predator
- Physical environment adaptation: They grab shells from the environment. These shells act like sunscreen to protect their soft, squishy body from drying out from the sun.
- Living organism adaptation: Stinging cells to eat prey
- They eat: Small fish, plankton and algae
- Eaten by: Sea stars, sea slugs, crabs and larger fish
- Guiding questions:
 - What do you think the anemone uses the shells for?
 - What does the anemone feel like?
 - Why do you think the anemone is moving around your finger?
 - Why do you think the anemone has stinging cells?



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