1st Grade Curriculum

Platform: Kelp Forest

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1st Grade Curriculum

Overview

Ocean Discovery Unit

Guiding Concept: Students explore why kelp forests are important, how marine animals, birds, and humans use the kelp forest, and how we can protect kelp forests today and in the future.

Science Discovery Process Focus:

- Make a Difference
- Explore and Wonder

NGSS Alignment

Next Generation Science Standards:

Cross Cutting Concept:
Systems and systems models – students understand that a system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. They can also describe a system in terms of its components and their interactions.

Overarching Responsibilities of Instructor:

- Classroom management & 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
- Lead discussions & ask guiding questions to get students thinking about science.
- Use Belief and Science Discovery Process exploration language during lesson.
- Provide rules for activities.
- Encourage participation from all students to create an inclusive environment.
- Determine floor management with team BEFORE the start of the lesson.

Overarching Responsibilities of Assistant Instructors:

- During Instructor's introduction and closing:
  - Prep supplies quickly then join the class.
  - Participate in any kinesthetic movements.
  - Sit with students and model good listening behavior.
  - Sit or stand near any students struggling to pay attention.
- During hands-on portion:
  - Mentor students in your floor area by asking questions, providing guidance, and providing positive reinforcement.
  - Engage students who are struggling.

1st Grade Story

Internal – Staff and Teachers

Students explore what a kelp forest is, why kelp forests are important, how marine animals, birds, and humans use the kelp forest, and how they can protect kelp forests today and in the future.

During the Community Building Day in the classroom, students are introduced to the kelp forest ecosystem and the organisms that live there by building a classroom kelp forest and populating it with animals that live in and around the kelp forest. Additionally, students build belief that they are a unique individual who belongs to a community of scientists by learning what scientists do and creating an action that represents them as an individual scientist.

During the Exploration Day at Cabrillo National Monument, students build on the belief that they can recognize and do science as they investigate a real kelp forest and use scientific tools to explore how marine animals, birds, and humans use the kelp forest.

During the Make a Difference Day at the Living Lab, students learn how they can help protect the kelp forest today and in the future as scientists. Students experience being a marine biologist by, using their imagination and dressing in field gear to collect data about the relationship between sea lions and fish, and by dissecting a holdfast to learn about the organisms that live there and considering how they can protect the kelp forest in the future as a scientist. Students share their love of the kelp forest with their family and friends by creating a magnet to communicate the importance of the ecosystem and ways we can work to protect it. Students meet and talk with science leaders who share their story, career path, and obstacles they have overcome to become the person they are today. Collectively, these experiences build students' belief that science is important and relevant, that a career in science is a possibility for them, that challenges can be opportunities to learn and grow, rather than permanent obstacles, and that they can make a difference in the world.

Students love becoming marine biologists, exploring the kelp forest, using scientific tools, getting to know science leaders, and making a difference in the world!

1st Grade Story

External – Students

I am excited to continue my journey with Ocean Discovery Institute in 1st grade by learning about the kelp forest and the animals that live there. Last year, Ocean Discovery helped me believe that science is something I can do, and a scientist is someone I can become.

On our first day, I meet the Ocean Discovery staff when they come to our classroom. We work together to build a model kelp forest for our classroom and fill it with drawings of animals that live there. I think it's pretty cool that I know all the parts of kelp and some of the animals that call a kelp forest home! Later on, we learn some fun dances that relate to all the things scientists do and I even get to create my own dance that represents me as a scientist.

I am so excited when we get to the Cabrillo National Monument to explore a REAL kelp forest! We see so much cool stuff and spend the whole day talking about how sea lions, birds, and humans use the kelp forest! We look for whales, and I get to look out over the ocean and see my home of City Heights from far way- cool!

On our last day we go to the Living Lab and learn how people can help protect the kelp forest. We dress up as marine biologists and collect data about the relationship between fish and sea lions. One of my favorite parts of the day is when we dissect a holdfast and use microscopes to see all the living organisms. Wow- there are all kinds of tiny animals living in the holdfast. I would never have guessed that! Before lunch, we get to meet a real science leader who tells us about how they got to be a scientist and lets us ask questions about their job and what kinds of things they do as a scientist. It got me thinking that I might want to be a scientist someday. Now that I know how important the kelp forest is, I'm excited to create a magnet to teach others about how our neighborhood is directly connected to the ocean and how things from the city streets can get to the ocean and harm the animals that live in the kelp forest. I really like making a difference and helping my new kelp forest friends!

I can't wait to be a part of Ocean Discovery in 2nd grade!

Community Building Day

In-School Experience

Goal: Students establish belief that they are a unique individual contributing to a community of science.

Visuals:

- Science Discovery Process poster w/ Velcro pieces
  - \\vmfile01.aquatic.com\Master Files\Curriculum\SI New
- 1st Grade Community Building Day PowerPoint from teacher portal
  - \\vmfile01.aquatic.com\Master Files\Curriculum\SI New\Lower Elementary (K-2)\1st Grade\Community Building Day Visuals
- Kelp Forest Poster
  - \\vmfile01.aquatic.com\Master Files\Curriculum\SI New\Lower Elementary (K-2)\1st Grade\Community Building Day Visuals
- Kelp Video (on PowerPoint or YouTube)
  - https://www.youtube.com/watch?v=GIJFTbAS6S0

Supplies:

- Chart paper
- Sharpies (3)
- Giant butcher paper drawing of Kelp Forest
  - Protocol for creation in SI Manual
- 6-8 Plastic Bins with minimal art supplies
  - Multiple pieces of colored & white paper in small squares (1 per student)
  - 20-30 markers of various colors
  - 2-3 safety scissors
- Laminated "Kelp Forest Animal Card #1" (8)
- Laminated "Kelp Forest Animal Card #2" (8)
- Laminated "Kelp Forest Animal Card #3" (8)
- Rolls of tape (2)

Timing:

Time	Activity	Learning Cycle
0:00 – 0:10	Introduction & Discovery Dances	Engagement
0:10-0:20	Kelp Forest Intro	Exploration
0:20-0:35	Create Kelp Forest Animals	

Next Generation Science Standards: **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.** **25**		
0:35-0:50	Populate the Kelp Forest	Guided Analysis
0:50 – 1:00	Reflection	Reflection

Instructor Set Up & Teaching Notes:

- € Introduce yourself and staff to teacher
- € **Collect waivers from teacher**
- € Ask teacher if they would prefer you to write on board or chart paper.
- € Determine if there is floor space for students to sit during into and self-reflection, if not:
  - o Students can do intro and self-reflection at their desks/tables.
  - o Pair up students sitting next to each other for self-reflection.
- € Invite teacher to participate throughout and explain when you and staff will need their help during the lesson:
  - o Participate in Discovery Dances
  - o Help students create animals during activity, organize students for self-reflection, etc.
- € Discuss floor management plan with other staff.
- € Use attention getters whenever necessary. (i.e. transitioning from activity to activity, when giving a set of directions, when bringing the class together to share out, etc.)
  - o Use the Scientist dances and their unique Be a Scientist movement as an attention getter

Assistant Instructor Set Up:

- € Cue up 1st Grade Community Building Day PowerPoint from teacher portal -OR- bring all visuals to front of classroom:
  - o Believe! Achieve! Lead! poster

Introduction & Discovery Dances

Introduction:

- (Have students sit together or if there is no room students can stay at their desks/tables for introduction.)
- All staff take 30 seconds to introduce themselves and share their story.
    - (Details for your story can be found in **SI Education Guide**)
- Introduce Ocean Discovery Institute.
    - Give a very brief overview of the program (3 days, 1 class visit, 1 exploration day, etc.).
- Introduce the concept of being a scientist with Ocean Discovery Institute:
    - Some students have had Ocean Discovery since Kindergarten and for some students it's their first year.
    - When you work with Ocean Discovery – you are a scientist.
    - What are some things you think scientists do?

Community Agreements:

- Introduce the concept of being a scientist with Ocean Discovery Institute:
    - When you work with Ocean Discovery – you are a scientist.
    - As scientists we all must agree to follow a certain set of expectations when we work together.
- At Ocean Discovery we believe everyone should Be Their Best Self.
    - (Show Community Agreements slide.)
- **To Be Your Best Self**, you should:
    - **Be curious!**
        - Ask questions, make observations, and share your thoughts and ideas.
    - **Be respectful!**
        - Respect people, living things, and the environment around you.
    - **Be safe!**
        - Take care of yourself and others.
- Ask students to give a thumbs up or a verbal "yes" if they can agree to be their best self when working with Ocean Discovery.

Science Discovery Process:

- What scientists do:
    - Today you are a scientist.
        - Ask: What are some things you think scientists do?
    - Scientists do many things – all of them are included in the Science Discovery Process.
        - (Show Science Discovery Process slide.)
    - This is a process scientists use to do science!
    - Go through each part of the Science Discovery Process provide a brief explanation and show the movement associated, then have students copy the movement.
        - Example: Scientists Explore and Wonder! (Add Explore and Wonder to the poster.) Scientists are always wondering about the world around them and asking questions- just like many of you said. They make observations about things they see and hear while exploring the natural world. To remember that scientists Explore and Wonder we cross our arms, rub our chins, and make a

questioning face as we explore and wonder. Let's practice this. Can everyone say, "Explore and Wonder!" Great! Can everyone show me Explore & Wonder?

- Scientist Dances & Brief Descriptors of the Science Discovery Process:
  - Explore and Wonder*: Scientists are always wondering about the world around them and how it works. Scientists ask lots of questions and take time to explore.*
    - **Dance move**: Crossed arms/rub your chin/ make a questioning face.
    - **Sound**: Wonder!
  - Investigate*: Scientists like to make lots of observations and collect information when exploring. They can do this using any of their senses like seeing, hearing, touching, tasting and smelling.*
    - **Dance move**: Hands up to eyes like binoculars & look side to side.
    - **Sound**: Investigate!
  - Analyze*: Once scientists make observations, they like to look for patterns and try to come up with explanations for their questions.*
    - **Dance move**: Typing on keyboard.
    - **Sound**: Analyze!
  - Communicate*: Scientists know it is really important to share the things they learn with other people.*
    - **Dance move**: Turn to your left and give a high-five, continue high fiving around the circle until the high-five returns to the first person. (This can be done in the future with smaller groups.)
    - **Sound**: Communicate (say it as they pass the high-five)!
  - Make a Difference*: Scientists work to make the world a better place with the things they learn.*
    - **Dance move**: Stand like a superhero with legs apart and hands-on hips.
    - **Sound**: Make a difference!
- Have students go through the series of Scientist Dances while saying the words a couple of times. (You can change it up by doing slow motion, speed up version, super quiet, super loud, etc.)

Uniqueness and Belonging:

- Introduce uniqueness and have students create a dance move that represents them as a scientist. Be sure to include:
  - We are all scientists, but we are not all the same. We all think differently and have different ideas – that is what makes science exciting!
  - Students will create their own dance move to represent themselves as an individual different from the rest of the scientists in the group.
  - The dance move can be anything they want or can be one of the three we suggest.
    - Suggested dance moves:
      - Scientist investigating animals in the wild, so I need to be quiet and hide.
        - Movement: Peeking through the bushes.
      - Scientist examining something they found with a hand lens.
        - Movement: hold something in your hand and the other hand is holding a hand lens.
      - Scientist exploring the DNA of two animals to see if they are related.
        - Movement: pouring liquid from one test tube to another.

- Have students close their eyes for a moment and picture themselves exploring as a scientist. Remind students that they can make up their own movement or use one of the three options provided.
  - (Give students 20-30 seconds to think silently about how they want to represent themselves as a scientist.)
- *In a moment, I will say the words "Be a scientist!" and you will show me your dance move while saying the words "Be a scientist!" Let's try it. "Be a scientist!"*
- (Students should show their dance move and yell out "Be a scientist!". You may need to practice this a few times.)
- (If time allows go through all Scientist dance moves again and add personal scientist movement in and say "Be a Scientist!".)

- Great job scientists!

Attention Getter:

- Explain "Be a scientist!" will be an attention getter for the day.
  - When I say, "Be a scientist!" you say, "Be a scientist!", show me your scientist dance, and wait quietly for instructions.

Kelp Forest Intro

Introduce Kelp Forest:

- We will be investigating a special ecosystem here in San Diego called a kelp forest.
- Uncover prior knowledge:
  - Has anyone ever visited a kelp forest before?
  - What is it like there?
  - Where do we find kelp forests?
- Okay science leaders! It is time to **Explore and Wonder**!
  - (Point to Science Discovery Process poster.)
  - In a moment we will watch a video of the kelp forest. While you watch, make observations about what you see and think about questions you have about kelp.
- Let's see what it's like at the kelp forest!
  - (Show Kelp Forest video slide.)
  - (Show Kelp Forest picture slide.)
  - Ask students:
    - What questions do you have?
    - What did you observe?
    - What do you think it would be like to be inside a kelp forest?

Anatomy of Kelp

- Kelp forests can be found in the ocean near the shore in certain parts of San Diego- like La Jolla.
- Define kelp forest: an underwater habitat with lots of kelp
  - (Add "kelp forest" to the world wall.)
- Kelp – a brown algae
  - (Add "kelp" to the world wall.)
- Plant vs. Algae:
  - Kelp is neither a plant nor an animal, it is algae.

        - Algae is similar to plants and needs many of the same things, sunlight, water, nutrients, etc. to grow.
        - Algae also uses light from the sun to photosynthesize which creates oxygen in the ocean for other animals.
- Anatomy:
    - (Show Kelp Anatomy slide or draw an outline of kelp on the chart paper.)
    - Point out and label the parts of kelp. Briefly mention what each part does.
        - Air bladders – keeps blades towards the surface where sunlight is
        - Stipe – like the trunk of a tree, helps keep the kelp upright
        - Blades – like leaves collect sunlight
        - Holdfast – "holds" the kelp in place
    - Remind students that while kelp isn't a plant it has similar features. Ask students what each part of kelp seems to relate to on a land plant.
        - Stipe- stem.
        - Blades- leaves
        - Holdfast- roots

<u>Kelp Forest vs. Rainforest:</u>

- (Show Kelp Forest vs. Rainforest slide on PowerPoint.)
- A Kelp forest is like an underwater rain forest.
    - Roots of trees in rainforest = holdfasts in kelp forests
    - Trunks of trees in rainforest = stipes in kelp forests
    - Leaves of trees in rainforest = blades in kelp forests.
- Rain forests have many different animals that live from the top to the bottom of the rainforest and the same is true for kelp. Animals live from the holdfasts to the uppermost kelp forest blades.

Create Kelp Forest Animals

Assistant Instructor Set Up:

- € Place laminated "Kelp Forest Animal ID Cards #1-4" on table (1/student)
  - o Try to get a variety of cards at each table.
- € Place 1-2 art bins on the center of each table.
  - o Add a small piece of paper for each student to the bin.
- € Write these sentence frames on board/chart paper in large handwriting:
  - o My animal is a ___ (name of animal from ID card) ___.
  - o I think it spends most of its time (holdfast/stipe/blades/water/etc.) ___ because _____.

Assistant Instructor Teaching Notes:

After the instructor intro:

- € Walk around the classroom and help students decide which animal to make.
- € Help students learn the name of the animal they are making.
  - o Many students can't read at this age so help them to read what they are making from the card.
- € Help students create animals, encourage students who are struggling to get started.
- € As students are working stop and ask them the following questions so they are ready to place their organism in the kelp forest when it is time.
  - o What animal are you building? Why did you choose that?
  - o Where do you think your animal lives in the kelp forest – the holdfast, the stipe, the blades, the water around the kelp forest? Why?
  - o What questions do you have about this animal?
- € If a student finishes their animal before time is up explain that they can create another animal.
- € Help students who are finished tape their animal to the 2D Kelp Forest.

- *Okay scientists! It is time to Investigate!*
  - *o* (Point to Science Discovery Process poster and put your hands up to your eyes like binoculars & look side to side.)
  - *o* We need to investigate what kind of animals live in the kelp forest.
- Introduce creating kelp forest animals. Talking points should include:
  - o Students will be creating animals to place in a kelp forest that will stay in their classroom.
  - o Each person has a kelp forest animal key which shows several different animals that live in the kelp forest.
  - o Each student can choose one animal to create and place in their classroom's kelp forest.
    - ▪ Explain that students can pick any animal on the card even if they can't say the name of the animal. Adults will walk around while they are working to help them learn their animal's name.
  - o Everyone will get a piece of paper and can use anything in the art bin to create their animal.
  - o (Give students 30 seconds to look over their ID cards and pick an animal they want to create.)

- (Have students give a thumbs up when then have decided on an animal.)
- Students will have 10 minutes to work.
- Drawings do not need to be perfect but need to be complete when time is up. The goal is to have as many animals in the kelp forest as possible.
- If a student finishes early they can cut out their animal using scissors or create another animal for the kelp forest.

- Ask students to reach into the art bin and make sure everyone at their table has a piece of paper to draw on.
- (Put a visual timer up on the board and tell students to begin working.)
  - (Give students lots of verbal reminders of time.)
- Tell students when time is up.

Populate the Kelp Forest

Assistant Instructor Set Up:

- Quickly collect art supplies.
- Throw away any old/used up art supplies.
- Give each adult a roll of tape.

Assistant Instructor Teaching Notes:

- Give each student a piece of tape and show them how to attach it to their animal while the first group is putting their animals in the kelp forest so that they are ready to go when called.
- Help your group place their animals in the kelp forest as quickly as possible so that all the groups have time to come up.

- (Collect art supplies.)
- (Assign each adult in the room one table of students to work with.)
- *Okay scientists! It is time to communicate your new knowledge!*
  - (Point to Science Discovery Process poster and high-five a student.)
- Introduce how to share information with a scientific partner. Talking points should include:
  - Everyone will share their new knowledge with a partner.
  - Each student will tell their partner what animal they drew and where they think it might live in the kelp forest – the holdfast, the stipe, the blades, in the water around the kelp forest, etc.
    - (Direct students' attention to sentence frame on the board.)
      - My animal is a __ (name of animal from ID card) __ and I think it lives on the (holdfast/stipe/blades/water/etc.) __ because _____.
      - For example, you might say something like:
        - My animal is a shrimp, I think it lives in the holdfast because it is a place where a small animal can hide.
    - Let students know that if they can't say the name of their animal they can point to it on their card.
  - (Give students one-minute to silently think about how they want to fill in their sentence frames on the board.)
  - (Pair students up.)

- *o* (Explain which partner will share first. Example: Partner with the shortest hair will go first.)
    - (Give the first partner 30 seconds to share.)
- o Let students know it is time for the other partner to share.
    - (Give the second partner 30 seconds to share.)
- o (While students are sharing, hand out a piece of tape to each student.)

- Introduce how to populate the classroom kelp forest:
    - o Introduce 2D Kelp Forest.
        - It will remain in their classroom- we just need to fill your kelp forest with animals.
    - o Invite one table at a time to place animals in the kelp forest.
    - o Students will use their piece of tape to stick their animal in in the kelp forest.
    - o Students should place their animal in the area they think it spends the most time.
    - o Once a student has taped their animal they are to quickly return to their seat.
    - o (Invite students up one table at a time to place animals in kelp forest.)
- Once all animals are in the kelp forest:
    - *o* *Look at your amazing kelp forest! Scientists, you have done a great job filling your classroom kelp forest with animals.*
- Introduce the concept of diversity. Talking points should include:
    - *o* Have students acknowledge the many different types of animals they created = diversity of animals.
    - *o* Define diversity = lots of different types
    - *o* Healthy kelp forests have a diversity of animals.

Self-Reflection (10 min)

Assistant Instructor Set Up:
- € Collect visuals
- € Collect Kelp Forest Animal ID Cards

Assistant Instructor Teaching Notes:
- € Help get students into two lines and join the line to yourself.
- € While students are partner sharing help them be good listening partners.
- € Make sure both partners are getting a chance to share.

Reflection:

- Introduce why we do reflection:
    - Reflection is a part of every Ocean Discovery Institute experience.
    - Reflection allows you to process and share thoughts and feelings about the experiences you have had. It can open your mind to possibilities and can highlight ways you are growing as a person each day.
    - It's an opportunity to exercise your imagination, to discover new ideas, to wonder about what you've experienced and what it means.
- Self-Reflection:
    - Today we will take a few minutes to reflect on our unique "Be a Scientist!" movement. Now is a time for you to think about why you created that move to represent yourself as a scientist and a time to share those thoughts with another person.
    - You will also have the opportunity to hear another person's thoughts on the same subject. You may find you have similar or different ideas than another person. Both are great!
    - Lead students through a pair-share where they show another person their "Be a Scientist" dance move and explain what they are doing.
        - (Choose a partner to share first. Example: Taller partner will go first.)
            - (Give the first partner 30 seconds to share their dance and explain it.)
        - Let students know it is time for the other partner to share.
            - (Give the second partner 30 seconds to share.)
    - Talk about uniqueness and belonging.
        - Have all students show their "Be a scientist!" dance move and freeze.
        - Have students look around and notice the diversity of dances.
            - We are all scientists, but we are not all the same.
            - A diversity of scientists allows for a diversity of ideas and having different ideas leads to new knowledge.
            - One day maybe some of you will decide to become scientists and contribute to how science happens!
    - *o* Think-Pair-Share a sentence frame:
        - (Show Think-Pair-Share sentence frame.)
        - Today, I felt like I was doing science when _____.

Closing:

- Remind students that they are now a member of a community of scientists and that they will be visiting a real kelp forest with Ocean Discovery Institute on ____ date.
    - **REMINDER TO STUDENTS**: We will be doing a lot of walking! Please make sure to pack water, comfortable shoes, sun protection and a jacket for the wind.
- Please share your "Be a Scientist! dance move and everything you learned about the kelp forest with your friends and families tonight.
- Thank you for being your best self today science leaders!
- (Show Believe! Achieve! Lead! slide.)
    - At Ocean Discovery Institute we **BELIEVE** that science is something you can do and a scientist is someone you can be, that you can **ACHIEVE** in science and think critically about our world, and you can **LEAD** in science and conservation and make a difference in the world. Because we believe this, we do a "Believe! Achieve! Lead! Go Awesome!" cheer at the end of every program so that you will continue to do awesome things after we leave.
    - On the count of three we will yell "Believe! Achieve! Lead! Go Awesome!"
-

Exploration Day

Coastal Field Experience

Goal: Students build belief that they can recognize and do science while exploring how marine animals, birds, and humans use the kelp forest.

Supplies:

- Ocean Discovery Institute Field Trip Volunteer Card print out (1/adult volunteer)
- Cover sheet (1/class)
- 1 visor (1/student + 1 adult)
    - 4 colors (so each group has their own color visor)
- Explorer Backpacks (1/student)
    - Binoculars
    - Marine Animal ID Cards (laminated)
    - Picture of animals interacting with kelp (laminated)
    - Map of Cabrillo National Monument (laminated)
        - Papi://Curriculum/SI New/Lower Elementary (K-2)/1st Grade/Explore Day Visuals
    - Science Notebook
    - Pencil
- Instructor backpacks (1/instructor)
    - Mini white boards
    - Dry erase markers (2)
    - Dry erase eraser (1)
    - Colored markers (20-30)
    - Mini Believe! Achieve! Lead! poster (1)
    - Mini Science Discovery Process poster (1)
    - Hand sanitizer (2)
    - Trash bag (2)
- Hand cart for carrying trash around (1/instructor)
- Orange cones (6-8)
- Rope (1)
- Paper towels
- Ziploc bags (1/class)
    - To store student science notebooks to be returned on Living Lab day
- Lens paper (1000 sheets total for program)

1st Grade Explore Timing – Cabrillo National Monument

On Time:

On Time	Group 1	Group 2	Group 3
9:45-9:55	Arrival		
9:55 - 10:20	Introduction **Intro #1**	Introduction **Intro #2**	Introduction **Intro #3**
10:20 - 11:00	Birds **Event Bluff Trail**	Marine Animals **Whale Watch Overlook**	Humans **Lighthouse**
11:00 - 11:30	Lunch + Bathroom Break **Event Bluff Trail**	Lunch + Bathroom Break **Whale Watch Overlook**	Lunch + Bathroom Break **Lighthouse**
11:30 - 12:10	Marine Animals **Whale Watch Overlook**	Humans **Lighthouse**	Birds **Event Bluff Trail**
12:10-12:50	Humans **Lighthouse**	Birds **Event Bluff Trail**	Marine Animals **Whale Watch Overlook**
12:50 - 1:10	Self-Reflection **Lighthouse**	Self-Reflection **Event Bluff Trial**	Self-Reflection **Whale Watch Overlook**
1:10 - 1:15	Goodbye + Load Buses		

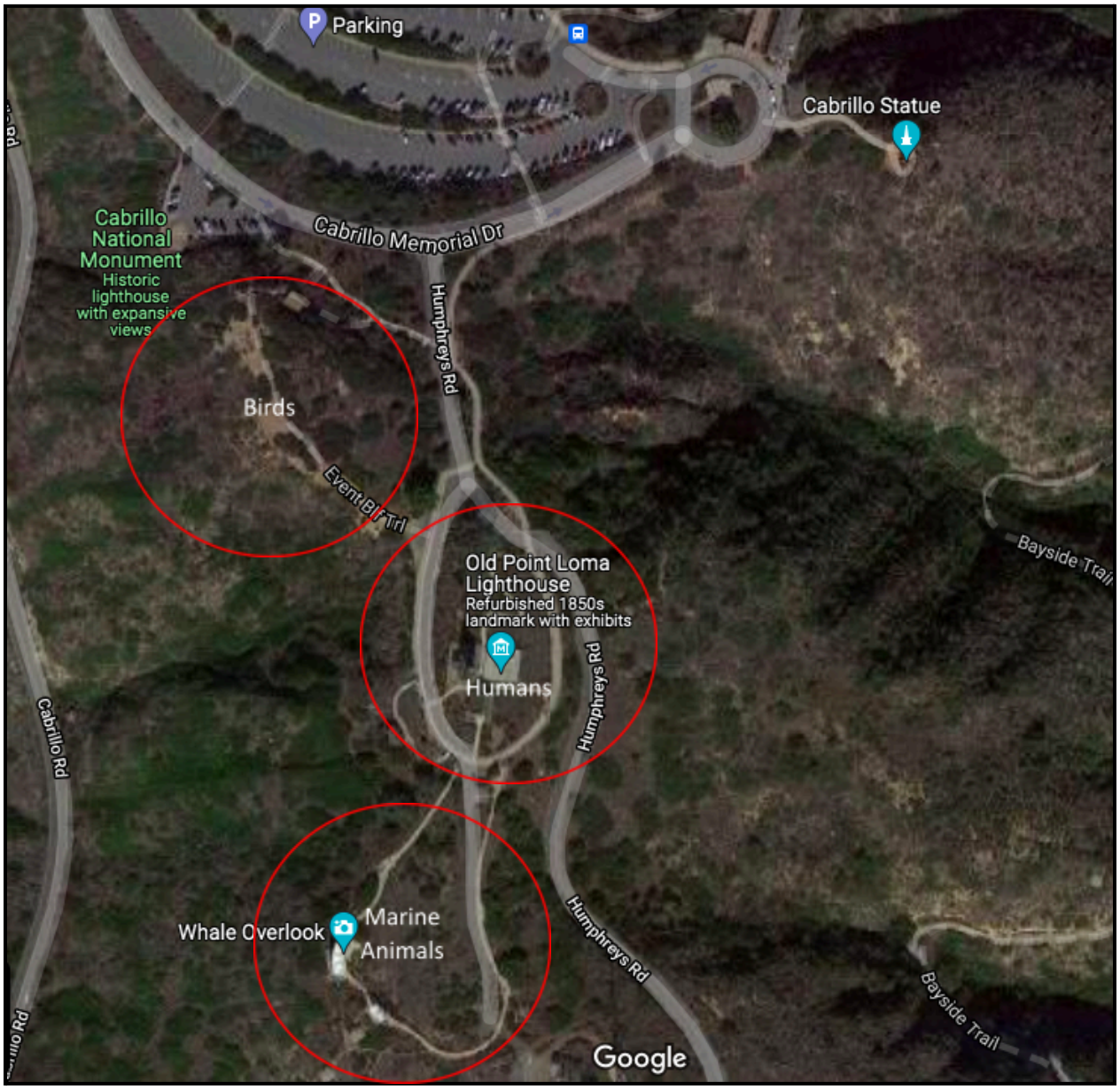
Late:

On Time	Group 1	Group 2	Group 3
9:55-10:05	Arrival		
10:05 - 10:20	Introduction **Intro #1**	Introduction **Intro #2**	Introduction **Intro #3**
10:20 - 11:00	Birds **Event Bluff Trail**	Marine Animals **Whale Watch Overlook**	Humans **Lighthouse**
11:00 - 11:25	Lunch + Bathroom Break **Event Bluff Trail**	Lunch + Bathroom Break **Whale Watch Overlook**	Lunch + Bathroom Break **Lighthouse**
11:25 - 12:15	Marine Animals **Whale Watch Overlook**	Humans **Lighthouse**	Birds **Event Bluff Trail**
12:15 - 12:55	Humans **Lighthouse**	Birds **Event Bluff Trail**	Marine Animals **Whale Watch Overlook**
12:55 - 1:10	Self-Reflection **Lighthouse**	Self-Reflection **Event Bluff Trail**	Self-Reflection **Whale Watch Overlook**

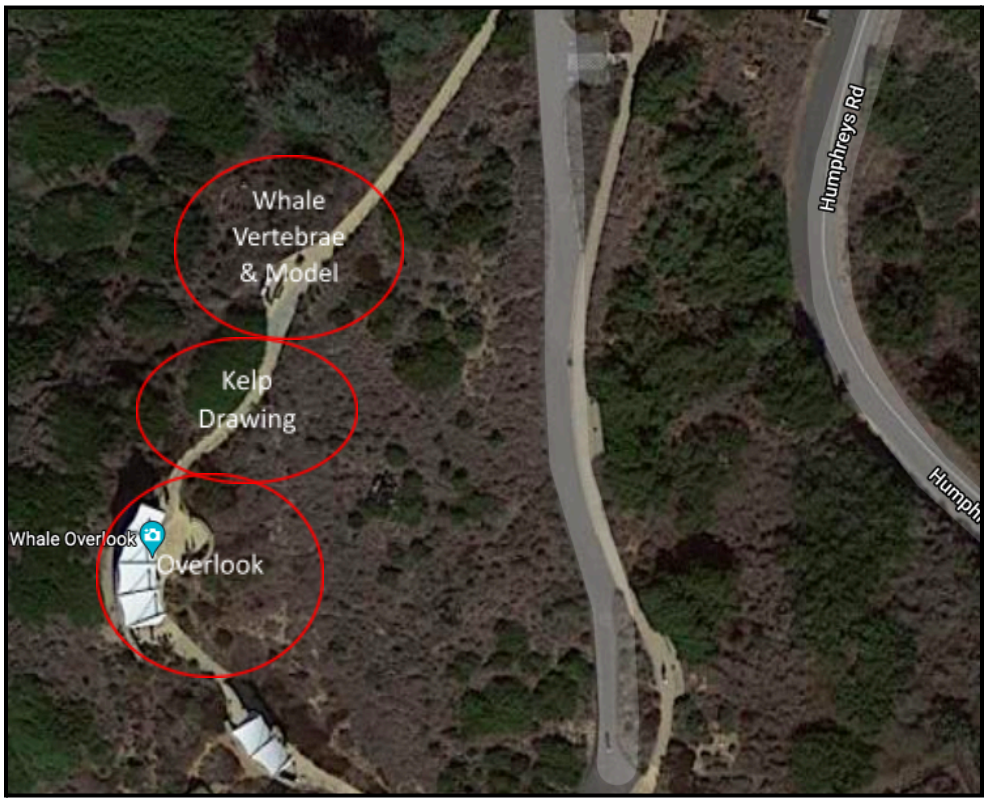
1:10 - 1:15	Goodbye + Load Buses

Arrival & Introduction Map

Stations Map:



Marine Animal Station Map:



Bird Station Map:

Humans Station Map:

Students can sit along the low wall for observations.

Arrival (10 min)

Trip Lead Notes:

- Make sure all staff know where to park when they arrive at Cabrillo.
- Discuss with Ocean Discovery staff who will take on each of the **Arrival Tasks** (see below).
- Decide where each group will meet when students get off the bus.
- Decide which Instructor/Assistant Instructor will start in each Introduction area.

Program Set Up:

- Fill student water bottles at lab
  - ~5 per group as more students bring personal bottles now
- Set out by Cabrillo Visitor's sign (in front of Visitor's Center):
  - Ocean Discovery Institute Field Trip Volunteer Cards (1/volunteer)
  - Explorer backpacks (1/student)
    - Try to pull a consecutive grouping of backpack numbers (e.g., #'s 1-15) for each group. This will make it easier at the end of the trip to separate backpacks that need to be restocked vs. those that don't.
  - Extra water bottles for students who don't have one
- Set out by each Introduction area:
  - Visors (1/student)
- Set up cones and rope to create a safe a barrier from cliff at Bird Observation area (see above map).
- Determine what your group's name will be.
  - Easiest is a color + animal.
    - Ex. Blue Egrets, Green Sharks, Purple Hermit Crabs, etc.

- Trip Lead: Meet buses, introduce yourself to teachers, and assign instructors to groups before they get off the bus.
  - Each group will be one full class.
- (Begin Arrival Tasks.)
  - (Note: The below should take place simultaneously so students are unloading, meeting their group and having a bathroom break, while the Trip Lead and classroom teachers are dealing with rosters and another of the Instructors is meeting with adult chaperones.)
  - Trip Lead (1)
    - Take teachers off buses and have them note any students absent on the roster and sign a cover sheet stating they've collected all waivers to the best of their ability.
    - Unload students to groups (one class per instructor) send student to their instructor.
  - Instructor (1)
    - Take adult chaperones aside and discuss expectations for the day.
    - Provide each one with an "Ocean Discovery Institute Field Trip Volunteer Card" and explain how they can be most helpful today:

- No cell phones unless snapping a quick picture.
- Interact with the students. Ask them questions. Don't be worried if you don't know the answers to things, that is okay!
  - On your card there is a short list of some questions you can ask students.
- Participate with the group. Sit in the circle with the students. Do dances, answer questions, be a partner with a student during pair-shares.
- Please no side conversations while the instructor is talking.
- Have fun!

▪ Have chaperones help hand out lunches to students as they get off the buses.
- (Assign two chaperones to each bus.)

o Instructor (1)/All Assistant Instructors (3)

- Meet students in their group as they get off the bus.
- If students brought their own backpacks:
  - Explain that they will be using a backpack from Ocean Discovery for the day and will need to place their personal backpack in the Explorer backpack.
- Distribute:
  - Explorer Backpacks
  - Water bottles, if needed
  - Lunches into backpacks

o As soon as your group and Instructor is ready, walk to your Introduction area and begin.

▪

Introduction & Community Agreements (20 minutes)

Assistant Instructor Teaching Notes:

- Distribute visors (1 color/group)
  - Wear a visor! Students love to do what you do!
- Sit with students during community agreements intro.
- One of the goals of the day is for students to feel that they are **doing science**. Potential questions to ask throughout the day include:
  - How are you using science to look at this?
  - What are you wondering about?
  - What tool(s) are you using to help you explore?
  - What have you written in your scientific notebook?

- (Have students sit or stand in a circle.)
- Introductions:
  - All staff + volunteers take 30 seconds to introduce themselves and share their story.
    - Details for story can be found in **SI Education Guide.**

- Introduce Cabrillo National Monument:
  - We are at the southern tip of Point Loma.
    - 30 minutes by car from City Heights
  - It commemorates the landing of Juan Rodríguez Cabrillo at San Diego Bay in 1542. Cabrillo's landing was the first time a European ever set foot on the west coast of what would become the United States.
  - From here we can see San Diego Harbor and the Pacific Ocean.
  - Off the coast in the Pacific Ocean we will be able to see a kelp forest.

- Review kelp forest and kelp anatomy:
  - Define kelp forest: a forest of kelp.
    - Ask students to name some of the living things in the kelp forest.
      - You can remind them of their classroom kelp forest if they struggle.
  - Ask students to remind you of different parts of the kelp.

- Review Scientist Dances:
  - We will be scientists investigating the kelp forest here at Cabrillo National Monument.
  - Review what scientists do using the Scientist Dances.
    - *See Community Building Day.*
    - Go through motions a few times, you can change it up by doing slow motion, speed up version, super quiet, super loud, etc.

- Preview the theme of the day:
  - Today we will focus on how marine animals, birds, and humans use the kelp forest.
  - You will visit three different stations. One station will focus on marine animals, one will focus on birds, and one on humans; however, as we walk from station to station, don't hesitate to make observations about anything related to the kelp forest.

- Introduce Science Notebooks and Explorer Backpacks:
    - To make observations, scientists need tools and a place to write their observations and questions.
    - Each backpack has a science notebook.
        - Scientists use notebooks for recording things they see, and questions and thoughts they have.
        - Can be used anywhere- in the lab, in the field, at home.
        - You can write, draw, or sketch in your science notebook at any time today.
        - At the end of this program your science notebook will be yours to take home.
    - Each backpack has tools for investigation.
        - You may use any tool at any point today to make observations about the kelp forest.
        - Binoculars:
            - Have all students practice using and focusing binoculars.
            - (Choose an item close by for all students to look at using binoculars and then an item further away.)
        - Treat all tools respectful and be sure you return them to your backpack when you are finished using them.
        - You are responsible for your backpack all day.
    - (Give students time to look through backpack.)

- Introduce scientific visors:
    - Scientists work as a team. Even though we are unique individuals with our own thoughts, ideas, and questions, we must be able to work as a team.
    - Look around you- these are your fellow scientists.
    - We will all have the same color visor to signify our unity as a team.
    - Adults have bandanas as well because they are also part of the scientific team. Feel free to ask any adult questions throughout the day!
    - Pass out visors to students and adults.
        - Have students write their name on visor (not too large because they will decorate later today).

- Introduce team name:
    - Tell students their team name.
    - Explain that the team name is an attention getting signal.
    - Example:
        - When you here “Blue!”
        - You all shout “Egrets!”
        - (Practice call and response a few times.)

- Review Believe! Achieve! Lead!:
    - Scientists who work together must have a set of agreements they adhere to.
    - Remind students:
        - That at Ocean Discovery we “Believe! Achieve! Lead!
        - In 1st grade we focus on Believe!

- I believe science is something I can do, and a science leader is someone I can be

- We believe that everyone can do science. To do science it is important that we:
  - Are curious and **wonder** about things,
  - we **explore**, ask questions, and share ideas, and
  - we **investigate** and **analyze** data we collect.
- When science leaders work together it is important that they:
  - Are respectful of each other, materials, and the environment, and
  - are helpful, include everyone, and make good decisions.
  - Remind students that science leaders want to share their knowledge with others so they must be very respectful of other visitors to the park (i.e., don't block the sidewalks, keep voices at a respectful level, etc.)
- Ask students if they can BELIEVE! while they are scientists with Ocean Discovery using a verbal "yes" or thumbs up, etc.

<u>Marine Animals and Kelp</u> (40 minutes)

Assistant Instructor Teaching Notes:

- Walk around and interact with students while they are making observations. Potential questions include:
  - What do you notice about the marine animals?
  - How are the marine animals using the kelp forest?
  - Why do you think the (marine animal) is doing that?
  - What do you think the (marine animal) is doing when they dive under water?
  - Why do you think the (marine animal) spends time near the kelp?
- Remind/help students to use the tools in their backpack.
- Remind/help students to write their observations in their science notebook.

<u>Location</u>: Whale Watch Overlook/Kelp Diagram

<u>Timing for this station</u>:

- Walk to station (10 min)
- Observations (5 min)* if this is your first station
- Intro (5 min)
- Marine Animal Observation (10 min) * (15 min if you skipped "Observations")
- Process reflection (10 min)

<u>Observations:</u>

- (Walk to the Whale Watch Overlook.)
- (Have students stand along the wall overlooking the water.)
- Observations. Goal: Students to have that "wow!" moment before settling in to observe marine animals.)
  - *Think-Pair-Share*: What do you observe?
  - Have student stand quietly for 2-3 minutes and simply observe.

- Encourage them to write down any observations/question in their science notebook -Extra Space page.
  - Remind students that they can write anything they want on this page throughout the day.
- Have students share observations in partners.
- Have students share observations with the group.

Intro:

- If this is your first station:
  - Orient students to what they are looking at.
  - (Point out the kelp.)
    - (Have students use tools to better observe kelp forest.)
    - (See Potential Questions box.)

Potential Questions:

- What part of the kelp do you think are looking at – canopy.
- As the waves move and push the kelp how do you think it is able to stay in place – holdfast.
- Why do you think the kelp grows towards the surface? – Needs light like a plant in order to grow.
- What part of the kelp helps it grow towards the surface rather than along the bottom – stipe and air bladders.

- At this station you will investigate - **How do marine animals use the kelp forest?**
  - (Have students open up to "Marine Animals and the Kelp Forest" page in their science notebooks.)
  - At this station we will be focusing on marine animals.
    - Ask students if they know what marine animals are? Do they have any tools that can help them identify marine animals in their Explorer Backpack?
      - Define marine animal = an animal that lives in the ocean.
    - Ask students to name some examples of marine animals they can look for.
  - Your job is to look for a marine animal and then observe how they use the kelp forest. You will draw a picture in your notebook of your marine animal and how it is using the kelp forest.
    - Example: I might see a grey whale and I might see it eating a piece of kelp so what I would do in my notebook is draw a grey whale eating a piece of kelp. I also might notice that the sea lion seems to be using the kelp blades as a pillow so I will add that to my picture too.
      - (Draw a picture of a sea lion eating kelp and using it as a pillow.)
  - Introduce how to look for marine animals.
    - It may be difficult to see marine animals from up here so use any tools in your backpack that can help you.
    - (Introduce the concept of watching for spray from the whale's blow hole – as they may not see the actual whale itself.)
  - You will have 10/15 minutes* to observe marine animals using any tools in your backpack and draw two ways marine animals use the kelp forest.
  - Define boundaries from which students may make observations.

Marine Animal Observation:

- Give students 10-15 minutes* to make observations of marine animals.
- (If 10 minutes passes and you don't think the students will be able to see any marine animals from the observation area then have students look at information placards around the overlook which show marine mammals, then walk them further down the path to the gray whale painted on the side walk and the small gray whale statue.)
    - *o* Talk to students about gray whales – they migrate right off the coast every year as they travel between Alaska where they eat and Baja Mexico where they have their babies.
    - *o* Allow student to consider how the gray whales might use the kelp forest.
- (Help students to see any seal/sea lions swimming near/in kelp and any whales which may be migrating by.)
- (Ask students questions as they make observations – see Potential Question box below.)
- Give a 5-minute warning. Remind students if they haven't drawn two ways marine animals use the kelp they should do so now.

Potential Questions:

- What do you notice about the marine animals?
- How are the marine animals using the kelp forest?
- Why do you think the (marine animal) is doing that?
- What do you think the (marine animal) is doing when they dive under water?
- Why do you think the (marine animal) spends time near the kelp?

Kelp Drawing* (*if time allows*)

- (Walk students along the kelp drawing on the ground.)
- (Be sure students do not block walkway for other visitors.)
- Ask students to point out the parts of the kelp anatomy.
- Point out the size of the kelp.
    - o Giant kelp grows to an average of 100ft.
    - o Giant kelp can grow up to 175ft.
- Ask students what part of the kelp keeps it floating towards the sun?

Process Reflection:

- Reflect with students.
    - o What ways are marine animals using the kelp forest?
        - (Ask students follow up questions to their response in order to get to the idea of why sea lions are interacting with the kelp.)
            - Ex. Student- The sea lions are swimming in the kelp.
            - Teacher – Why do you think the sea lions swim in the kelp?
            - Student – Because it is a good place to hide.
            - Teacher – Why do the sea lions need to hide?
            - Student – From predators.
            - Teacher- What kind of predators do you think sea lions have?
            - Student – Sharks.
            - Teacher – So how could kelp help a sea lion protect itself from a shark.

- Student – The sea lion could hide in the kelp so that the shark has a harder time seeing it or maybe sharks can't easily swim in between the kelp.

o Do you think marine animals need kelp to stay alive? Why or why not?
- Main idea: (NGGS Cross Cutting Concept: Systems and System Models) Kelp is part of the ecosystem that sea lions/seals live in/near. It is where they get their food, where they play, where they can hide from predators, etc. It would be very difficult for seals/sea lions to survive without kelp.
- Whales migrate past kelp forests and they have been known to utilize the kelp forest to avoid one of their main predators- orcas. Additionally, kelp is home to many small invertebrates and crustaceans that some whales eat. While kelp forests may not be absolutely necessary for the survival of whales they certainly make it easier for them to stay alive.

Birds and Kelp (40 minutes)

Assistant Instructor Teaching Notes:

€ Walk around and interact with students while they are making observations. Potential questions include:
- o What do you notice about the birds near/on the kelp?
- o How are the birds interacting with the kelp?
- o Why do you think the birds do that? What are the benefits?
- o What other animals in the kelp forest do you think the birds might interact with?
- o What kind of bird do you think that is? How do you know?
- o What scientific tools are helping you to make your observations?
- o Why do you think the birds live close to the kelp?

€ Remind/help students to use the tools in their backpack to observe the birds.

€ Remind/help students to write their observations in their science notebook.

Location: Event Bluff Trail

Timing for this station:
- Walk to the station (5 min)
- Observations (5 min)* if this is your first station
- Intro (5 min)
- Walk along trail to observation (5 min)
- Birds Observation (10 min)* (15 min if you skipped "Observations")
- Process reflection (10 min)

Observations:
- (Walk to the beginning of the Event Bluff trail.)
- (Have students stand along the edge overlooking the ocean and kelp forest.)
- Observations. Goal: Students to have that "wow!" moment before settling in to observe marine animals.)
  - o *Think-Pair-Share*: What do you observe?

- Have student stand quietly for 2-3 minutes and simply observe.
- Encourage them to write down any observations/question in their science notebook -Extra Space page.
  - Remind students that they can write anything they want on this page throughout the day.
- Have students share observations in partners.
- Have students share observations with the group.

Intro:

- If this is your first station:
  - *(If this is not our first station skip to below the Potential Questions box.)*
  - Orient students to what they are looking at.
  - (Point out the kelp.)
    - (Have students use tools to better observe kelp forest.)
    - (See Potential Questions box.)

Potential Questions:

- What part of the kelp do you think are looking at – canopy.
- As the waves move and push the kelp how do you think it is able to stay in place – holdfast.
- Why do you think the kelp grows towards the surface? – Needs light like a plant in order to grow.
- What part of the kelp helps it grow towards the surface rather than along the bottom – stipe and air bladders.

- At this station you will investigate - **How do birds use the kelp forest?**
  - (Have students open up to "Birds and the Kelp Forest" page in their science notebooks.)
  - At this station we will be focusing on birds.
    - Do they have any tools that can help them observe birds in their Explorer Backpack?
  - Your job is to look birds and observe how they use the kelp forest. You will draw a picture in your notebook of a bird and two ways it is using the kelp forest.
    - Example: I might see a bird and I might see it sitting on the kelp reading a book. I also might notice that the bird seems to be using the kelp blades as a pillow so I will add that to my picture too.
      - (Draw a picture of a bird sitting on kelp reading and using kelp as a pillow.)
  - You will have 10/15 minutes* to observe birds using any tools in your backpack and draw two ways birds use the kelp forest.
  - Define boundaries from which students may make observations.

Bird Observation:

- Give students 10-15 minutes* to make observations of birds.
- (Help students to see birds who are resting/swimming/flying near/in kelp.)
- (Ask students questions as they make observations – see Potential Question box below.)
- Give a 5-minute warning. Remind students if they haven't drawn two ways birds use kelp they should do so now.

Potential Questions:

- What do you notice about the birds near/on the kelp?
- How are the birds interacting with the kelp?
- Why do you think the birds do that? What are the benefits?
- What other animals in the kelp forest do you think the birds might interact with?

Process Reflection:

- (Have students return to a sitting/standing circle away from distractions.)
- Reflect with students.
    - Potential usages to cover: area to rest, food, protection from predators, protection from storms, etc.
    - What ways are the birds using the kelp forest?
        - (Ask students follow up questions to their response in order to get to the idea of why sea lions are interacting with the kelp.)
            - Ex. Student – The birds are sitting on the kelp.
            - Teacher – Why do you think the birds sit on the kelp?
            - Student – Because they are resting.
            - Teacher – How are the birds able to sit on top of the kelp to rest and not sink?
            - Student – They are swimming and maybe the kelp helps keep them up.
            - Teacher – How could the kelp help keep the bird up?
            - Student – They are sitting on top of the canopy and the air bladders help them float.
            - Teacher – Do you think it's a good idea for bird to rest on the canopy?
            - Student – Yes.
            - Teacher – Why?
            - Student – Because it is relaxing and they don't have to work as hard.
    - Do you think you were doing science just now? How do you know?
        - What about right now, while we are sitting and sharing? Is that science? Why or why not?
        - Be sure to cover:
            - Using scientific tools – science notebook, binoculars, etc.
            - Making and recording observations/questions
            - Analyzing your observations through questions
            - Communicating your observations to other scientists, etc.

Humans and Kelp (40 minutes)

Assistant Instructor Teaching Notes:

- Walk around and interact with students while they are making observations. Potential questions include:
    - Do you see any people around the kelp? What do you think they are doing?
    - What do you think people are doing swimming/kayaking/etc. in the kelp?
    - What do you think people might be fishing for? Why do you think some people bring their boats to the kelp forest?
    - Why do you think people are interacting with kelp? What about that could be helpful?
    - What are people using to help them interact with the kelp?
    - What scientific tools are helping you to make your observations?
- Remind/help students to use the tools in their backpack to observe people.
- Remind/help students to write their observations in their science notebook.

Location: Juan Cabrillo Statue + Lighthouse

Timing for this station:

- Walk to the station (10 min)
- Observations (5 min)* if this is your first station
- Intro (5 min)
- Observation of Humans (10 min)
- Process reflection (10 min)

Observations:

- (Walk to the front of the lighthouse.)
- (Have students stand along the edge looking out at the San Diego coastline.)
- Observations. Goal: Students to have that "wow!" moment before settling in to observe humans.)
    - *Think-Pair-Share*: What do you observe?
    - Have student stand quietly for 2-3 minutes and simply observe.
    - Encourage them to write down any observations/question in their science notebook -Extra Space page.
        - Remind students that they can write anything they want on this page throughout the day.
    - Have students share observations in partners.
    - Have students share observations with the group.

Intro:

- Point out the Lighthouse and give a brief history:
    - The lighthouse was first operational in 1855 over 170 years ago.
    - Lighthouses were used to protect and guide ships a long time ago.
    - Lighthouses were used to let ships know there where land was and how to avoid hazards like rocks and reefs where ships could run aground and sink.
    - When Cabrillo was a working lighthouse, there were lighthouse keepers who lived here and kept the lighthouse working throughout the night.
    - The lighthouse keepers lived here right next to the lighthouse (point at the lighthouse keepers' quarters.)
- Orient students to what they are looking at using their Cabrillo National Monument map.
    - (Point out that that student are looking at an entrance to San Diego Bay.)
    - (Have students use tools to better observe.)
    - (See Potential Questions box.)

Potential Questions:

- Have students look at their Cabrillo National Monument map.
- Do you think you can see kelp from where you are standing? – no.
- Is there kelp close by? – Yes, right around the point.
- Do you think the old light house keepers used kelp in anyway? How?
- Do you think humans today go from San Diego Bay to the kelp forest? – maybe.

- At this station you will investigate - **How do humans use the kelp forest?**
    - *o* At this station we will be focusing on how people use kelp.
        - Do you have any tools that can help you observe what people are doing in your Explorer Backpack?
            - Binoculars
            - Map
    - *o* Your job is to observe people and think about how they might use kelp or the kelp forest.
    - *o* You will draw a picture in your notebook of a human and two ways they might use the kelp forest.
        - Example: I think people might drive to the kelp forest on a boat to get some kelp to use in their dinner.
            - (Draw a stick figure and a dinner plate with kelp on it.)
    - *o* You will have 10 minutes to make observations with your tools and draw a picture of how people might use kelp.
    - *o* (Have students open up to "Humans and the Kelp Forest" page in their science notebooks.)
        - (Have students draw a simple human stick figure in the center of their page.)
    - *o* Define boundaries from which students may make observations.

<u>Human Observation:</u>

- Give students 10 minutes to make observations of humans.
- (Help students to see people who are swimming/kayaking/boating/fishing/etc. then ask students if they might do this same activity in the kelp forest and why.)
- (Ask students questions as they make observations – see Potential Question box below.)
- Give a 5-minute warning. Remind students if they haven't drawn two ways humans use kelp they should do so now.

Potential Questions:

- What do you see people doing in the water?
- Do you think these people might do the same things in/near the kelp forest? Why? What might they be looking for?
- Can you think of any way people might use kelp?
- What do you think people might be fishing for? Why do you think some people bring their boats to the kelp forest?
- Why do you think people are interacting with kelp? What about that could be helpful?
- What are people using to help them interact with the kelp?
- What scientific tools are helping you to make your observations?

<u>Process Reflection:</u>

- (Have students return to a sitting/standing circle away from distractions.)
- Reflect with students.
    - o What ways are the humans using the kelp forest?
        - Potential usages to cover: relaxation, fishing (food), harvesting of kelp for products (toothpaste, cosmetics, medicine, etc.)

- (Ask students follow up questions to their response in order to get to the idea of why humans are interacting with the kelp.)
    - Ex. Student – There are people who have boats in the kelp forest.
    - Teacher – Why do you think people bring their boats to the kelp forest?
    - Student – Maybe to go fishing.
    - Teacher – Why do you think people would want to go fishing in the kelp forest?
    - Student – Because there are lots of fish that live there they could catch.

o Since humans don't live in and around the kelp forest naturally, we have invented things that help us access the kelp forest. What do humans do to mimic what animals do to access the kelp forest?

- Binoculars – strong vision like birds
- Kayaks – paddles like fish/marine animals
- Boat - fish/marine animal's ability to access the water, etc.
    - Teacher – Since humans aren't designed to live in or near the kelp forest like birds and marine animal's they have to have special equipment to visit like boats. Why do people need boats?
    - Student – Because they can't swim like whales or fly like birds so they need a way to get to the kelp forest and stay there because people can't swim as long as whales.

<u>Lunch & Bathroom Break (25-30 min)</u> – Outdoor Classroom

Assistant Instructor Teaching Notes:

- Sit with students and model good listening behavior during intro.
- Help students decide what to draw on their visor if they are struggling. Ask questions like:
  - When do you remember being a scientist today? What were you doing?
  - Do you remember using a tool in your backpack today? What were you doing with it?
- Encourage students not to get bogged down by creating a perfect drawing.
- When students are sharing make sure they are making eye contact with their partner.

- Before lunch have students take a bathroom break and refill water bottles.
- Tell students that they will need to keep an eye on trash and not let it blow away.
- Pass out hand sanitizer to each student before lunch.
- Give students a five-minute warning before clean-up.
  - Explain that all trash will go into the black trash bag you have brought.
- Remind student that we strive to leave an area cleaner than when we found it.
  - Have students take two minutes to walk around and clean up their area.
- Put closed trash bag in cart to be carried out to dumpsters at the end of the field trip.

<u>Self-Reflection</u> (20 minutes)

Instructor Notes:

- Take markers out of instructor backpack and put in small piles for students to use.

- Have students sit down in a circle.
- You have done a lot of science with Ocean Discovery today!
- Lead them through a **think-pair-share** for the following prompt.
  - Describe to your partner a time when you were doing science today. Describe what you were doing, any tools you were using, and what you were thinking about.
- Now we are going to take our visors and draw a picture of ourselves as scientists doing science. You can draw yourself doing what you just described to your partner or you can draw another picture of yourself when you were doing science today. It's up to you.
  - Remind students that their pictures do not have to be perfect.
  - Hand out markers.
  - Give students 5-7 minutes to draw on their visors.
  - Collect and put away markers.
- If time allows invite students to share their drawing with the group.

<u>Clean up + Goodbye + Load Buses</u> (10 min)

** **If using the "A Little Late" or "A Lot Late" schedule skip this entirely, but have kids line up backpacks in that way that will make it easier for you during clean up (straight line, multiple lines of a few, etc.) and do "Go Awesome!" cheer.**

Assistant Instructor Teaching Notes:

- Walk around and monitor students while they eat lunch – ask them questions about their experience.

- Have students sit in a circle and take out their field notebooks.
- Have student hold notebooks up and make sure everyone has a first, last and teacher's name on their science notebook.
- Collect notebooks and let students know they will get them back when they come to the Living Lab.
- Collect all notebooks and place in folder with school and teacher's name on it.
- Collect borrowed water bottles.
- Clean out explorer packs.
    - Have students empty out their backpacks onto the grass.
    - Have students make sure they have each of the following:
        - ___Binoculars (1)
        - ___Pencil or Pen (1/pack)
        - Marine Animal ID Cards (1)
        - Picture of animals interacting with kelp (1)
        - Trail map of the area (1)
    - If anyone has extras of anything collect them. If anyone is missing something replace it.
    - Have students throw any garbage from their explorer packs into the plastic bins.
    - Have students clean binoculars:
        - Give each pair of students a piece of lens paper to clean off eye pieces of binoculars. Demonstrate.
        - Throw all used lens paper into garbage bin.
    - Have students replace everything into their bags.
- Have students sit and remind them you will see them one final time when they come to the Living Lab where they will continue to do science and learn more about the kelp forest.
- *Great job today scientists! As usual after an awesome day of doing science we at Ocean Discovery like to say "Go Awesome!" One the count of three let's all say "Go Awesome!" 1, 2, 3… Go Awesome!!*
- Walk students back to bus area with a stop at the restrooms if time allows.

Clean Up & Return to Lab (Instructors/Volunteers Only):

- Place folders with field notes into file box in SciTech Lab.
- Empty garbage and paper into recycling can.
- Throw away and replace any dried-up white board and regular markers.
- Clean all white boards with dry erase cleaner.
- Drain/open water coolers for drying.
- Restock:
  - Visors
  - Pens
  - Dry erase markers
  - Markers
  - Extra science notebooks
- Place new science notebooks in explorer backpacks.
- Organize explorer packs (if there wasn't time for students to do this).

Make a Difference Day

Living Lab Experience

Goal: Students build belief that science is important and relevant, that they can make a difference, and that a career in science is a possibility for them.

Make a Difference Actions:

- (Today) I love the kelp forest and teach others about it.
- (Tomorrow) I am a marine biologist who explores the kelp forest.
- (Imagination Station) I imagine I am a marine biologist who explores the kelp forest.

Visuals:

- Believe! Achieve! Lead! poster (1)
- Science Discovery Process poster (3)
- 1st Grade Make a Difference Day PowerPoint

Supplies:

General:

- Ocean Discovery Institute Field Trip Volunteer Card (1/adult volunteer)
- Cover sheet (1/class)
- Instructor backpacks (1/instructor)
    - Binoculars
    - Mini white boards
    - Dry erase markers (2)
    - Dry erase eraser (1)
    - Extra pencils (10)
    - Clipboard
        - Laminated timetable
    - Portable 1st Aid Kits
- Science notebook (1 per student)
    - Return the same notebooks to students they used on Explore Day
    - Have ~5 extra science notebooks for students who were absent from Explore Day
- Water coolers (filled w/ water) (2)
- Reusable cups for water (1/student)

Science Leader-Student Connection

- Camera (1)
- Microphone and stand (1)
- Speakers (1)
- Zoom link (from Program Manager)
- Whiteboard & stand (1)
- Whiteboard marker (1)

Make a Difference Today

- Watershed table
    - Coffee grinds
    - Red pepper flakes
    - Red food coloring
    - Tiny pieces of plants from the canyon
- Odi costume
- Magnet (1/student)
- Roll of blue tape (3)
- Scissors (3)
- Small plastic bins filled with assorted markers (1/table)
- Pencils (1/student)

<u>Make a Difference Tomorrow</u>

- Holdfast (1)
- Tiny organisms to place in holdfast (lots)
- Dissection Trays (1/table)
- Hand lenses (3-4/table)
- Microscope (1/table)
- Plastic petri dishes (5-6 table)
- 500mL plastic beakers (1/table)
    - To hold seawater
- Plastic pipettes (2/table)
- Magnifying table lens (1/table)
- Towels (5)

<u>Imagination Station</u>

- Sheepshead glasses (20)
- Sea Lion hats (3)
- Free-standing Kelp (20)
- Mask & Snorkel (10)
- Dive slates (10)
- VR glasses + iPod (1/student)
- (4) orange cones to create boundaries of “kelp forest”
- Bubble machine (1) + bubble machine liquid
- Whiteboard + stand
- Whiteboard marker + eraser (1)

<u>Self-Reflection</u>

- Speaker + iPod (with multiple kids ocean songs, like *Baby Shark* and *Under the Sea*) (3)
- Laptops (3)

Timing:

On time:

Time	Group 1	Group 2	Group 3
9:30-9:40	Arrival Watershed Plaza		
9:40-10:00	Intro + Community Agreements Group 1: Eco Lab Group 2: SciTech Lab Group 3: Ocean Alcove		
10:00-10:35	MAD Tomorrow **Eco Lab**	MAD Today **SciTech Lab**	Imagination Station **Ocean Alcove/Plaza Del Sol**
10:35 – 10:55	Science Leader Student Connection **Eco Lab**	Science Leader Student Connection **SciTech Lab**	Science Leader Student Connection **Ocean Alcove**
10:55-11:25	Lunch + Bathroom Break **The Commons and Rocky Amphitheater**		
11:25-12:00	Imagination Station **Ocean Alcove/Plaza Del Sol**	MAD Tomorrow **Eco Lab**	MAD Today **SciTech Lab**
12:00-12:35	MAD Today **SciTech Lab**	Imagination Station **Ocean Alcove/Plaza Del Sol**	MAD Tomorrow **Eco Lab**
12:35-12:50	Reflection + Teacher Survey Group 1: **SciTech Lab** Group 2: **Plaza Del Sol** Group 3: **Eco Lab**		
12:50-1:00	Clean Up + Goodbye		

A Little Late (~15 min)

Time	Group 1	Group 2	Group 3
9:45-9:50	Arrival Watershed Plaza		
9:50-10:00	Intro + Community Agreements Group 1: Eco Lab Group 2: SciTech Lab Group 3: Ocean Alcove		
10:00-10:35	MAD Tomorrow **Eco Lab**	MAD Today **SciTech Lab**	Imagination Station **Ocean Alcove/Plaza Del Sol**
10:35 – 10:55	Science Leader Student Connection **Eco Lab**	Science Leader Student Connection **SciTech Lab**	Science Leader Student Connection **Ocean Alcove**
10:55-11:25	Lunch + Bathroom Break **The Commons and Rocky Amphitheater**		
11:25-12:00	Imagination Station **Ocean Alcove/Plaza Del Sol**	MAD Tomorrow **Eco Lab**	MAD Today **SciTech Lab**

12:00-12:35	MAD Today **SciTech Lab**	Imagination Station **Ocean Alcove/Plaza Del Sol**	MAD Tomorrow **Eco Lab**
12:35-12:50	Reflection + Teacher Survey Group 1: **SciTech Lab** Group 2: **Plaza Del Sol** Group 3: **Eco Lab**		
12:50-1:00	Goodbye + Load Buses		

Very late (~25 min)

Time	Group 1	Group 2	Group 3
9:55-10:00	Arrival Watershed Plaza		
10:00-10:05*	Intro + Community Agreements Group 1: Eco Lab Group 2: SciTech Lab Group 3: Ocean Alcove		
10:05-10:35	MAD Tomorrow **Eco Lab**	MAD Today **SciTech Lab**	Imagination Station **Ocean Alcove/Plaza Del Sol**
10:35 – 10:55	Science Leader Student Connection **Eco Lab**	Science Leader Student Connection **SciTech Lab**	Science Leader Student Connection **Ocean Alcove**
10:55 -11:25	Lunch + Bathroom Break **The Commons and Rocky Amphitheater**		
11:25-12:00	Imagination Station **Ocean Alcove/Plaza Del Sol**	MAD Tomorrow **Eco Lab**	MAD Today **SciTech Lab**
12:00-12:35	MAD Today **SciTech Lab**	Imagination Station **Ocean Alcove/Plaza Del Sol**	MAD Tomorrow **Eco Lab**
12:35-12:50	Reflection + Teacher Survey Group 1: **SciTech Lab** Group 2: **Plaza Del Sol** Group 3: **Eco Lab**		
12:50 – 1:00	Load Buses		

Program Set Up:

Ocean Discovery Outdoor Amphitheater:

- € Believe! Achieve! Lead! Poster
- € ODI Field Trip Volunteer Cards

Ecolab, SciTech lab, Ocean Alcove

- € Science Discovery Process poster
- € Student science notebooks (one class at each location)
- € Fill water jugs
- € Reusable cups (1/student)
- € Smart Board with "1st Grade Make a Difference Day PowerPoint" loaded up
  - o (Papi/Curriculum/SI New/Lower Elementary (K-2)/1st Grade/Make a Difference Day Visuals)
  - o Connect the speaker (test volume).
- € Prep for Science Leader-Student Connection:
  - o Get Zoom link from Program Manager
  - o Setup and Connect:
    - ▪ Speaker
    - ▪ Microphone & stand
    - ▪ Camera
    - ▪ Whiteboard & stand
      - Write potential questions for students on whiteboard
        - o Make sure they have the correct questions (see curriculum below)
- € Prep for Self-Reflection:
  - O Set up iPod + speaker with fun song cued up.
  - O Set up laptops with teacher surveys.

MAKE A DIFFERENCE TODAY

- € Set up watershed table.
- € Gather materials for watershed table demonstration:
  - O Spray bottles filled with water (2)
  - O Food coloring
  - O Shakers with coffee grinds (1) and red pepper flakes (1)
  - O Plants from canyon
    - ▪ Cut plant up into small pieces to represent plastic trash in the watershed.
- € Cut up magnet paper so each student has a magnet.

Arrival (10 min)

Program Set Up Continued:

MAKE A DIFFERENCE TOMORROW

- € Break holdfast into 3-4 pieces (enough for each group of students to have one piece)
  - o Add tiny organisms to each holdfast pieces to be "discovered" by students
- € Prep:
  - o Dissection trays or other trays to pieces of holdfast
  - o Petri dishes (5-6/table)
  - o Plastic eye droppers (2/table)
  - o Hand lenses (3-4/table)
  - o Beakers w/ seawater (2/table)
  - o Table magnifying arm (1/table)
- € Make sure adult forms of holdfast organisms in rack tanks are alive and healthy
- € Place dry cloth towels to the side

IMAGINATION STATION

- € In Plaza Del Sol:
  - o Set up "Kelp Forest" in Plaza Del Sol:
    - ▪ Define boundaries of the kelp forest with chalk or orange cones.
    - ▪ Spread out pieces of kelp within the "kelp forest" boundaries.
  - o Set Sea Lion hats and Sheepshead glasses off to the side.
  - o Scientists field gear off to the side.
    - ▪ Masks and snorkels
    - ▪ Dive slates
  - o Make sure bubble machine is filled and ready to go.
  - o Set up whiteboard + stand.
    - ▪ Have whiteboard marker and whiteboard eraser nearby.
    - ▪ Draw below chart on whiteboard:

- € In Ocean Alcove:
  - o Set up VR glasses.
    - ▪ Check that iPods are charged and set to Monterey Bay VR of the Kelp Forest.

Arrival:

If bus is 10 minutes late – contact dispatch and update staff on timing.

Trip Lead Notes:

- € Discuss with Ocean Discovery staff who will take on each of the **Arrival Tasks** (see below).
- € Ask Jo details about next upcoming camp to share with students.
  - o Share these with Instructors.

- If walking with school, Trip Lead:
  - **o** Introduce yourself to teachers and volunteers.
  - **o** Take teachers aside and note any students absent on the roster.
  - **o** Sign cover sheet stating they've collected all waivers to the best of their ability.
- If arriving by bus:
  - o Two staff should be waiting at bus stop (corner of Thorn & 42nd) 10 minutes prior to arrival time
- (Meet buses or students walking.)
- (Begin Arrival Tasks.)
  - **o** (Note: The below should take place simultaneously so students are getting an intro while the classroom teachers are dealing with rosters.)
  - ○ Trip Lead (1)
    - For bus schools only: Take teachers aside and note any students absent on the roster.
    - Sign cover sheet stating they've collected all waivers to the best of their ability.
  - **o** Instructor (1)
    - Take adult chaperones aside and discuss expectations for the day.
    - You will be asked to introduce yourself – name, how you got involved with Ocean Discovery, etc.
    - Provide each one with an "Ocean Discovery Institute Field Trip Volunteer" card and explain how they can be most helpful today:
      - Be your best self: be present- no cell phones; sit & participate in activities with students; be a partner with a student during pair-shares.
      - Be safe: help students make good choices concerning their safety
      - Be respectful: don't have side conversations when instructors are teaching
      - Be curious: ask questions of students and try to engage students who seem disengaged.
        - **o** On your card there is a list of questions you can ask students.
  - o Instructor (1)
    - Working as a team of scientists – we will continue to use these community agreements.
    - Review Believe! Achieve! Lead!

- Scientists who work together must have a set of agreements they adhere to.
- Remind students:
  - That at Ocean Discovery we "Believe! Achieve! Lead!
  - Focus on Believe! in 5th grade.
  - **BELIEVE**
    - I believe science is something I can do, and a science leader is someone I can be
- We believe that everyone can do science. To do science it is important that we:
  - Are curious and **wonder** about things,
  - we **explore**, ask questions, and share ideas, and
  - we **investigate** and **analyze** data we collect.
- When science leaders work together it is important that they:
  - Are respectful of each other, materials, and the environment,
  - are helpful, include everyone, and make good decisions.
- Ask students if they can BELIEVE! while they are scientists with Ocean Discovery using a verbal "yes" or thumbs up, etc.

▪ Introduce Living Lab

- Let students know that even though they will be passing by offices and people that they do NOT need to be quiet. They are welcome to talk in a normal voice.
- The Living Lab is theirs & should be a place they feel comfortable being themselves & exploring.

o Assistant Instructors (2)

▪ Take lunches to the Achievement Alcove.

● Students high five ODI statue on the way past.

Introduction & Community Agreements (20 minutes)

Assistant Instructor Teaching Notes:

- € Help students find their science notebook and take a seat.
- € Help to hand out water bottles.
- € Sit with students during introduction and model good listening skills.
- € Participate in Discovery Dances.

Timing for Ocean Alcove:

- Enter/Science Notebook/Water cup (3 min)
- Staff/Volunteer/Living Lab Intro (3 min)
- **Bathroom Break** (4 min)
- OL Video + Debrief (5 min)
- Review Scientist Dances/ Kelp Forest/Make a Difference (5 min)

Timing for Eco Lab:

- **Bathroom Break** (4 min)
- Enter/Science Notebook/Water cup (3 min)
- Staff/Volunteer/Living Lab Intro (3 min)
- OL Video + Debrief (5 min)
- Review Scientist Dances/ Kelp Forest/Make a Difference (5 min)

Timing for SciTech Lab:

- Enter/Science Notebook/Water cup (3 min)
- Staff/Volunteer/Living Lab Intro (3 min)
- OL Video + Debrief (5 min)
- Review Scientist Dances/ Kelp Forest/Make a Difference (5 min)
- **Bathroom Break** (4 min)

Science Notebook/Water cup:

- As students enter the space have them find their science notebook and then take a seat.
- Pass out reusable cups to each student.

Staff and Volunteer Intros:

- Staff and volunteer introductions:
  - All staff + volunteers take one minute each to introduce themselves and share their story.
  - Details for story can be found in **SI Education Guide.**

Living Lab Intro:

- Welcome students to the Living Lab.
  - Ask if anyone has visited before?
  - The Living Lab is your Ocean Discovery Home. It is a place where you can come to learn science, do homework, participate in activities, and lots of other things.
  - At the end of the day today, I will let you know about upcoming opportunities to return to the Living Lab after today.

Introduce Ocean Leader Video:

- I'd like to introduce you to someone who grew up in City Heights and worked with Ocean Discovery just like you who is now a scientist and uses a science notebook every day.
- Meet (xx) who is a (career).
- (Play Ocean Leader video in PowerPoint.)

Debrief Ocean Leader Video:

- Potential whole group questions include:
  - In what ways is (Ocean Leader) like you?
  - Is (Ocean Leader) a scientist? How do you know?
  - What are somethings he/she does for their job?
- Think-Pair-Share for the following question:
  - Do you think you COULD be a scientist if you wanted to? Why or why not?
    - For some students you may need to clarify: You don't have to want to be a scientist. The question is, could you if you wanted to?
  - Have 2-4 students share their thoughts. Follow up questions could include:
    - What kind of scientist would you like to be?
    - What would you like to study as a scientist?
    - Do you think it is difficult to become a scientist? What would make it difficult? What could you do to overcome those challenges?

Review Scientist Dances:

- We will be scientists investigating the kelp forest here at the Living Lab.
- Review what scientists do using the Scientist Dances.
  - Go through motions a few times, you can change it up by doing slow motion, speed up version, super quiet, super loud, etc.

Review Science Notebooks:

- You have one of the most important tools of a scientist in your hand- a science notebook.
- Used to write down or draw thoughts, questions, and observations.
- We will use the notebook as a group at certain times throughout the day but remember you can write things down in your notebook at ANY time.

Review Kelp Forest:

- Review Kelp Forest & Kelp Anatomy.
  - Today we will continue studying the kelp forest.
    - (Show Kelp Forest slide on PowerPoint.)
    - Define kelp forest: a place with lots of kelp
  - Ask students to remind you of different parts of the kelp.
    - (Show the Kelp Anatomy slide on the PowerPoint.)
  - Last week we visited a kelp forest and investigated how marine animals, birds, and humans used the kelp forest.
    - Ask students to share some examples they remember of the how marine animals, birds, or humans use the kelp forest.

Make a Difference:

- Introduce the concept of Making a Difference and protecting the kelp forest.
  - Potential questions include:
    - How many different living things rely on the kelp forest for survival?
    - Do you think the kelp forest is an ecosystem worth protecting? Why or why not?
  - Over the last few weeks, you have learned a lot about kelp forests with Ocean Discovery Institute and we know that kelp forests are important ecosystems therefore we will spend today learning how you can help protect the kelp forest and all the animals that live there.

<u>Make a Difference Today</u> (35 minutes)

Goal: I love the kelp forest and teach others about it.

Objective: Students learn that their neighborhood is connected to the ocean through the watershed and storm drains and that trash and pollution can make their way to the ocean and hurt the animals that live in the kelp forest. Students make a difference today by using their new knowledge to create a magnet to teach family and friends about how to protect the kelp forest.

Assistant Instructor Teaching Notes:

- € Spread out, sit and model good listening behavior during intro and watershed table portion.
- € Help pass out magnets and art supply bins.
- € Help students create magnets.
- € Help students with any reading necessary to complete tasks.
- € Collect student magnets to give to teacher.
  - O **Check that students first name and first initial are on the back.**

<u>Timing for this station:</u>

- Watershed Introduction (15 min)
- Make a Magnet Intro (5 min)
- Make Magnets (10 min)
- Process Reflection (5 min)

<u>Watershed Introduction:</u>

- Build on concept of Making a Difference and protecting the kelp forest.
  - Review what students have learned about the many animals that use the kelp forest and depend on kelp for survival.
  - Now that we know how important kelp is, it is important as science leaders to think about how we can help protect the kelp forest.
  - At this station we will learn how our neighborhood in City Heights is connected to the kelp forest.
- Introduce the concept of a watershed. Be sure to cover:
  - Watershed = An area of land that channels rainfall to streams and rivers, and eventually to the ocean.
    - (Show What is a Watershed Video in PowerPoint.)
      - (**ONLY PLAY VIDEO TO 53 SECONDS**.)
  - Everyone lives in a watershed.
  - We live within the Pueblo San Diego Watershed.
    - (Show slide of Pueblo San Diego Watershed and trace the path of the watershed using the map.)
    - The Pueblo San Diego watershed starts up in the mountains near Mt. Laguna and travels downhill through parts of San Diego all the way to the San Diego Bay which connects with the Pacific Ocean.

        - When it rains in City Heights all the water that lands on the streets runs into storm drains which empty out in the ocean, therefore everyone that lives in City Heights has a direct connection to the ocean.
            - (Show Storm Drain slide on PowerPoint.)
            - Ask students if anyone has ever seen a storm drain.
        - Water from the city streets that goes into storm drains often carries additional things with it that might not be so good for the environment.
            - (Show Trash Around Storm Drain slide on PowerPoint.)
- Watershed table.
    - (Invite students to stand around the watershed table.)
    - Explain that this is a replica of a watershed – a "replica" is like a smaller model of something
        - (Ask students what they observe.)
    - (Demonstrate how a watershed works.)
        - (Make it rain towards the top of the watershed.)
        - (Ask students to observe what happens to the rain.)
            - Main idea: Water eventually ends up in the ocean – this is natural and healthy.

Potential Questions:

- What happens to the rain? Where does it go?
- What happens to the rain that falls on the city streets?
- What happens to the rain that falls on the mountains?
- What happens to the rain that falls in the canyons?

    - Explain to students that sometimes more than water gets carried to the ocean when it rains.
    - (Have students help add things to the watershed.)
        - Red pepper flakes – trash
            - Do you ever see trash around your neighborhood?
        - Red food coloring – oil and gas from cars
            - Do you ever see rainbows on the ground? That is from oil and gas that leaks from our cars.
        - Coffee grinds – dog poop
            - Do you ever see dog poop that doesn't get picked up?
        - Tiny pieces of plants – plastic water bottles/plastic garbage bags/plastic trash
            - Do you ever see plastic water bottles that people haven't thrown away?
    - (Rain in the watershed.)
        - Have a student help you make it rain in the watershed.
        - (Ask students to observe what happens when it rains.)
            - Main idea: All the bad things (trash, oil, gas, dog poop, plastic, etc.) also get carried to the ocean with the rain and that is not healthy for the kelp forest or the animals that live there.

Potential Questions:

- What happens when it rains?
- What do you notice about the ocean this time?
- Do you think the plants and animals that live in the ocean like kelp and sea lions, etc. like to have all those things in the ocean too?
- How do you think trash, plastic, oil and gas, etc. can do to the plants and animals in the ocean?
- Where does all the unhealthy stuff come from?

Make a Difference Intro:

- One of the most important things we can do as scientists is share our knowledge with others.
  - (Show Science Discovery Process slide and point to Communicate. High-five a student.)
- As science leaders you know things others do not.
  - You now know why it is important for people to throw away their trash, recycle plastic, clean-up dog poop, etc.
  - Not everyone else knows the reasons why this is important so they may not do the right thing.
- Today you will make a difference by sharing your knowledge with other people by designing a magnet that you can take home and share with family and friends.
- The goal of your magnet is to teach people how important the kelp forest is or how they can help take care of the kelp forest through a drawing.
- Magnets are small so you will need your drawing to be small.
  - (Show students the size of the magnet.)
- Before you design your magnet you will have time to make a draft in your science notebook.
  - A draft is a sketch of your idea before doing the real one on the magnet.
  - (Have students turn to Make a Difference Today page.)
- You will have the next five minutes to design the drawing you want to put on your magnet in your notebook.
- Your goal is to explain to people how important kelp is or how people can protect kelp.
  - For example: If you want to show people how important kelp is maybe you will decide to draw a picture of kelp with some of the animals you saw that live in or near the kelp and add a heart or a smiley face.
    - (Sketch a quick picture of kelp, a fish and a bird, and a happy face on the board.)
  - Or maybe you want to tell people how to protect kelp so maybe your will draw a plastic bottle next to a storm drain with a "No symbol" (red circle with a slash) over it.
    - (Make a quick rough sketch of this.)
- Once you have drawn your idea in your notebook-raise your hand and an adult will come by to look at your drawing and give you a magnet. Once you have your magnet you can draw your design on your magnet and color it.
  - (Show students box of markers on their table.)

Make Magnets:

- Give students 10 minutes to design their magnets.
  - Give students five and two-minute warnings.
- Walk around and talk with students as they work.
  - See potential questions below.

- During last minute:
  - Have all students stop working and turn over magnet.
  - Have all students write their first name and first initial of their last name on the blue tape.
  - (Collect magnets and give to teachers to hand back in classroom.)

Potential Questions:

- What message are you sharing with your family and friends?
- Why do you think this message is important?
- Can you think of something else you can do to help protect the kelp forest?
- What would you tell someone who asks why should they protect the kelp forest?
- Why do you think it's important for scientists to share what they know?

Process Reflection:

- Think-Pair-Share
  - Share your magnet with your partner and answer the question: How does it feel to make a difference in the world?
  - Invite 3-4 students to the front of the room to share their magnet with the class.

Make A Difference Tomorrow (35 min)

Goal: I am a marine biologist who explores the kelp forest

Objective: Students will explore and wonder about the variety of animals that live within the holdfast of kelp. Students learn that being a marine biologist is career in which they can make a difference in the future by protecting kelp and the organisms that use it as a home.

Assistant Instructor Teaching Notes:

- Spread out, sit and model good listening behavior during intro.
- Pass out/collect holdfasts in dissection/plastic trays.
- Help students:
  - Look for organisms.
  - Use hand lenses/microscopes.
  - Place organisms in petri dishes w/ seawater.
  - Return students return organisms to holdfasts.
- Clean up tables when dissection is finished.
- Dry tables with towels.

Timing for this station:

- Making a Difference Tomorrow- Marine Biologist (5 min)
- Holdfast Dissection Intro (5 min)
- Holdfast Dissection (20 min)
- Process Reflection (5 min)

Making a Difference Tomorrow- Marine Biologist (5 min)

- Build on concept of Making a Difference and protecting the kelp forest.
  - Review what students have learned about the many animals that interact with kelp and other animals that live in/around the kelp forest.
  - Now that we know so much about how important kelp is, it is important as science leaders to think about how we can help protect the kelp forest.
  - One of the ways that you can help protect the kelp forest when you are older is by becoming a scientist who studies the kelp forest.
- Communication as a Scientist:
  - Scientists who learn important things about the kelp forest can tell other people the things they have learned. Remember one of the most important things scientists do is communicate their knowledge to others.
    - (Show Science Discovery Process slide on PowerPoint and point to Communicate. High-five a student.)
  - Scientists who study something can often find value in it that humans were unaware of before.
    - Example: Scientists discovered that kelp has a high concentration of iodine in it. Some people suffer from a disease that makes them very sick because they lack iodine. Kelp can be harvested, and the iodine put in a pill to help keep those people healthy.
    - Example: Scientists learned that kelp can be added to things that we want to be thick at room temperature like ice cream and toothpaste and lipstick.
  - When humans find something that can be useful, they often value that thing more. When humans value something they will care more about protecting it.
  - As a scientist if you can find more ways that kelp is valuable more people will want to protect it.
- Introduce marine biologist.
  - (Show Marine Biologist slide on PowerPoint.)
  - Explain that today they will be marine biologists.
  - Define marine biologist:
    - Marine = ocean
    - Biologist = a person who studies living things
    - Marine biologist – a person who studies living things in the ocean
- As marine biologists we are going to take a closer look at kelp and try to learn something about it that everyone might not know.

Holdfast Dissection Intro:

- Today we are going to take a closer look at the holdfast.
  - (Have students show you the holdfast kinesthetic body movement.)
  - (Place holdfasts on each of the table in dissection tray.)
- Ask students to make observations. Potential questions below.

Potential Questions:

- What does the holdfast do?
- Do you think anything lives in the holdfast? Why or why not?
- What do you notice about the holdfast?
- What kinds of animals might live in the holdfast?

- Let students know they are going to dissect the holdfast. Review what a dissection is through questions:
    - Does anyone know what it means to dissect something?
    - Has anyone every had an older brother or sister who dissected an animal in school?
    - Dissection: To look closely at what's inside and learn more about it.

Holdfast Dissection

- Dissection expectations:
    - The holdfast has already been cut up for you. Do not break the holdfast into pieces.
    - Be gentle with your piece of holdfast – we will return anything we find back to the holdfast at the end.
    - You will be looking for living things –look closely because things may be small. Use any of the tools on your table to help you.
    - If you find an organism, ask an adult to help you remove it from the holdfast.
    - It is important to be VERY gentle with the organism you find! Don't pull hard or some of them may break apart.
    - Remember scientists are very respectful of organisms.
    - If you find something place it in the tiny plastic dishes with some seawater using a pipette.
        - Demonstrate how to do this.
    - Continue searching- you may find many organisms.
- Set a visual timer on the whiteboard for 15 minutes.
- When timer goes off have students place holdfast pieces back into the bin but keep their organisms in the petri dishes.

Process Reflection:

- Remind students that they have just learned that the holdfast is a place where many different types of animals live.
- Think-Pair-Share: How could you make a difference as a scientist in the future?
    - (Read the Reflection question on slide on PowerPoint out loud.)
- *If time allows, potential follow-up questions:*
    - What should people know about the holdfast of kelp?
    - What would you tell someone about why kelp is important?
    - Is the holdfast the only important part of the kelp? Why?

Clean Up

- Have students gently place organism back into holdfasts and make sure all petri dishes are empty.
- Collect holdfasts.
- Organize tools on each table.

Imagination Station (35 min)

Goal: I imagine I am a marine biologist who explores the kelp forest.

Objective: Students imagine they are a marine biologist who explores the kelp forest, by dressing up in field gear and collecting data about the relationship between sea lions and fish.

Assistant Instructor Teaching Notes:

- Model good listening skills during intro and process reflection.
- Help students put on VR glasses and activate VR screen.
- Escort students from Ocean Alcove to Plaza Del Sol.
  - Bring mask and snorkel, dive slate, sea lion hat, Sheepshead glasses and kelp up to Plaza Del Sol.
- Help "marine biologist" students get dressed in field gear:
  - Mask and snorkel
  - Dive slate
  - Have "marine biologists" line up along one side of the kelp forest opposite the sea lions.
- Turn on bubble machine.
- Record "data" on whiteboard.
- Before returning to Ocean Alcove erase data on data chart but leave data chart to be used by the next group.
- Bring mask and snorkel, dive slate, sea lion hat, Sheepshead glasses and kelp back to Ocean Alcove after process reflection.

Timing for this station:

- Imagine You Are a Marine Biologist & VR (10min)
- Kelp Tag (15 min)
- Process Reflection (10 min)

Imagine You Are a Marine Biologist & VR:

- At this station we are going to imagine we are marine biologists.
- Introduce marine biologist.
  - (*Note: if you have already visited the Make a Difference Tomorrow station you can review this briefly*).
  - Define marine biologist:
    - Marine = ocean
    - Biologist = a person who studies living things
    - Marine biologist – a person who studies living things in the ocean
      - Marine biologists can explore any ecosystem in the ocean and some focus their work on the kelp forest.
- Virtual Reality:
  - Let's take a moment to visit the kelp forest as marine biologists. Everyone will get to put on some Virtual Reality glasses and dive into the kelp forest.
  - Explain how to use VR glasses.
    - Encourage students to look up and down and all around while video is playing.
  - Have students "Dive into Kelp Forest!" and look at VR video

    - Explore the Blue: 360 degree Sea Lion encounter: https://sanctuaries.noaa.gov/vr/channel-islands/sea-lion-encouter/
  - After students take off VR glasses ask them to share about their experience. Potential questions include:
    - How did it feel to "dive" into the kelp forest?
    - What did you observe?
    - What would you want to study if you were a marine biologist?

<u>Kelp Tag</u>:

- Explain to students that they will become marine biologists and study the relationship between two animals that live in the kelp forest – sea lions and sheepshead which are a type of fish.
  - (Show slide of Sea Lions and Sheepshead on PowerPoint.)
- Ask students what they think the relationship is between these two animals.
  - Sealions eat Sheepshead.
- Explain that while we know that sealions eat Sheepshead as marine biologists we want to look more closely at their relationship.
- We will become marine biologists.
  - Introduce field gear.
    - Mask and snorkel- to observe these animals underwater.
    - Dive slate- to write down observations while in the water.
  - When you are wearing/holding this gear you are a marine biologist and you are studying the relationship between sea lions and sheepshead.
  - Everyone will have the opportunity to be a marine biologist.
- We will do an activity. During the activity:
  - Three students will be sealions.
    - The sea lions will try to "eat" the Sheepshead by tagging them.
    - (Show sea lion hat that they will be wearing.)
  - Several students will be Sheepshead.
    - Sheepshead will try to avoid being "eaten".
    - If a sheepshead gets tagged, they have been "eaten" and have to sit down on the ground immediately.
    - (Show the sheepshead glasses they will be wearing.)
  - The sea lions and sheepshead will be "swimming" in a kelp forest.
    - Sheepshead can avoid "being eaten" by hiding in the kelp.
    - If a sheepshead is touching kelp it cannot be tagged.
    - Only ONE sheepshead can hide in a kelp at a time.
    - (Show students what "kelp" looks like.)
- (Walk students up to Plaza Del Sol.)
- (Show students the kelp forest boundaries for the game.)
- Divide class into three equal groups.
  - ROUND 1: 1st group = Marine biologists, 2nd and 3rd group = sealions and sheepshead.
  - ROUND 2: 2nd group = Marine biologists, 1st and 3rd group = sealions and sheepshead.
  - ROUND 3: 3rd group = Marine biologists, 2nd and 3rd group = sealions and sheepshead.
- Play tag:
  - ROUND 1:

- (Assistant instructor helps group 1 put on marine biologist gear and grab a dive slate and starts the bubble machine.)
- (Instructor picks three students total from groups 2 and 3 to be sealions and gives glasses to the rest of the students who are sheepshead.)
- (Instructor makes sure all the kelp is on the field – enough pieces for almost every student to be able to "hide".)
- (Assistant instructor lines marine biologists up on one side of the kelp forest.)
- (Instructor explains boundaries, give sheepshead time to spread out in the kelp forest and lines the sealions up on the opposite side of the kelp forest from the marine biologists.)
- Instructor tells sea lions they will have one minute to catch as many sheepshead as they can. (Give the start- Go!)
- Debrief quickly:
    - After one minute – count the number of "eaten" sheepshead and record in on the datasheet on the whiteboard.
        - (See Set-Up)
    - Ask marine biologists what they observed.

o ROUND 2:

- Repeat the same game with students switching roles according to the above and removing half the "kelp".
- Point out there is less kelp. (Give the start- Go!)
- Debrief quickly at the end of the round.

o ROUND 3:

- Repeat the same game with students switching roles according to the above and removing all the "kelp".
- Point out there is less kelp. (Give the start- Go!)
- Debrief quickly at the end of the round.

<u>Process Reflection</u>:

- Collect all the kelp tag costumes and marine biologist gear.
- Have students sit where they can see the data sheet on the whiteboard.
- Think-Pair-Share: What does the data you collected tell you?
    - Goal: Kelp is important because it allows the sheepshead to hide from predators. When there is less or no kelp more fish were eaten.
    - Potential follow up questions:
        - How is kelp important?
        - What would happen to the sheepshead if all the kelp went away?
- Think-Pair Share: Would you consider being a marine biologist when you grow up? Why or why not?

Science Leader-Student Connection

Objective of the Station: Students will meet a science leader, hear about their pathway to becoming a science leader, and have an opportunity to ask questions.

- Provide an overview of the Science Leader Student Connection portion of the program.
    - Today we will meet virtually with a science leader.
        - Learn about their pathway to becoming a science leader, what they do in their work, and their passion for the ocean and kelp forests.
    - You will also have the opportunity to ask the science leader questions.
        - (Brainstorm questions students want to ask – write these on a whiteboard where everyone can see.)
- Introduce Science Leader.
    - Tell the students who they are about to meet (science leader's name) a science leader who (describe what they do in 1-2 sentences and where they work).
        - (Connect Zoom Call).
    - (Welcome the Science Leader.)
    - (Conduct the interaction as one would an interview.)
        - Interview tips:
            - You may change the order or modify the questions based on the Science Leader's responses.
            - If a Science Leader is answering a question that may need to be wrapped up, you can move to the microphone which will signal them that you want to speak.
            - After the Science Leader answers a question, in a sentence or two, reaffirm the point they are making or acknowledge how it ties to the students' experience.
        - Interview questions asked by Team Lead (~10 min):
            - Can you please introduce yourself and tell us about your job and what you love about it? (2 minutes)
            - Tell us about your pathway to your current job. For example, what got you interested in science, your education, etc. (2 minutes)
            - Have you ever faced an obstacle or challenge in your life that you were able to turn into an opportunity? How did you do that? (2 minutes)
            - Students are investigating the kelp forest ecosystem and the animals that live there. Why do you think this work is important? (2 minutes)
        - Student questions (~5-10 min):
            - Give two or three students a chance to ask questions.
            - If needed, remind them about the questions they brainstormed earlier.
    - (Have students say "Thank you!" and all clap for the science leader.)
    - (Disconnect Zoom call.)

Lunch & Bathroom Break (20 min)

- Before lunch have students take a bathroom break.
- Give hand sanitizer to each student before lunch.
- Give students a five-minute warning before clean up.
- Remind student that we are connected to the ocean through the canyon watershed and that any trash that ends up on the ground here can end up in the ocean so we need to be careful.
- Have students take 2 minutes to walk around and clean up their area.

Self-Reflection (20 minutes)

Assistant Instructor Teaching Notes:

- Help pair up students who don't have partners when the music turns off.
- High five students and have a conversation with them about the question being asked.
- Help classroom teachers sign onto laptops so they can take the Teacher Survey.
- Help students with their drawings of returning to the Living Lab.
- Ask students questions about what they draw. Potential questions include:
  - Who did you draw in your picture?
  - What are you doing in the picture?
  - Are you interested in coming back to the Living Lab again with your family or friends?

<u>High-Five Reflection</u> (15 min)

- Activity:
  - Music will play and students and adults will walk around the classroom.
  - When the music stops, high-five the nearest person, hold the high-five and create a two-person bridge.
  - Will hear a question. Everyone will have 20-30 seconds to think about their answer. Then the Instructor will say who of the pair will go first. For example:
    - The person with the longest hair will go first.
    - The shorter person will talk first.
    - The person with the most brothers and sisters will talk first, etc.
  - After the first person responds the Instructor will prompt the second person to speak.
  - Choose 2-3 students to share their thoughts with the group.
  - Turn on the music again and students must walk around.
  - When music stops they must high five someone <u>NEW</u> and face them.
    - Walk around and help pair up any students who don't have a partner.
  - Repeat until you run out of time.
  - Questions:
    - What was something you enjoyed about being a scientist today?
    - Do you think you could be a scientist if you wanted to? Why or why not?
    - Talk to your partner about a time you did science with Ocean Discovery. What were you doing?
    - Tell you partner about the message/picture you put on your magnet today – explain why you chose that message/picture.
    - What is one thing you want to tell your family about the kelp forest?
    - Who would you want to bring to visit the Living Lab with you?

- Have students return to their seats and sit down.

Draw a Picture of You Visiting the Living Lab (5 min)
(Have Assistant Instructor direct teachers to complete teacher survey on laptops.)

- (Show Draw a Picture of You Visiting the Living Lab slide on the PowerPoint.)
- Explain activity to students. Be sure to include:
  - They are going to have the opportunity draw a picture of themselves returning to the Living Lab.
  - They can include other people they would like to bring with them as well- family, friends, etc.
  - You can draw yourself and your family or friends doing any of the activities you did earlier today or something else entirely.
- Think Time:
  - Give students 30 seconds to think about the picture they want to draw and the people they want to include in it.
- Drawing Time:
  - (Have students open to "Reflection: Returning to the Living Lab" page in their science notebooks).
  - They will have three minutes to draw. If they finish early encourage students to add details.
  - (Set a time for three minutes.)
- If time allows have some students share or do a pair-share.

Clean-Up & Goodbye (5 min)

- Invite students back to Living Lab for next upcoming camp.
- Have students turn in reusable water cups.
- Collect science notebooks and give them to classroom teacher.
- Look around you on table and floor – pick up any trash you see.
- Note: While clean-up is happening also do a quick bathroom break before student begin walk or get on buses.
- Push in chairs at tables.
- Walk students to watershed plaza.
- Today, we tried new things, and made new discoveries. Whenever we do that, we have an Ocean Discovery cheer to send us off. We say "Go Awesome!" Say it with me on the count of 3. 1, 2, 3… Go Awesome!!
- Have staff line up next to ODI and high five students on their way out.

Staff Clean-Up (30 min)

See protocol below.

Staff Clean Up

Trip Lead: Determine who will do each of the below activities. Check when complete.

1 **GENERAL ITEMS - IMMEDIATE**

Run reusable cups through dishwasher and move to Transitional Storage
Mop student bathrooms, take out trash and place "Caution Wet Floor" sign up

2 **SCI TECH LAB**

Put away all supplies in designated storage location
Sweep tables, chairs, and floor (mop as necessary)
Turn off SmartBoard
Take out trash as necessary
Return room to default setting (tables, chairs, rolling cabinets, and specimens)

3 **OCEAN ALCOVE & PLAZA DEL SOL**

Put away all supplies in designated storage location
Turn off all iPods in VR glasses
Charge iPods
Return Ocean Alcove screen to camera footage from the pier
Return space to default setting (tables, chairs, and cushions)

4 **ECO LAB**

Put away all supplies in designated storage location
Return holdfast to big tank
Throw out extra seawater
Turn off microscope lights
Sweep tables, chairs, and floor (mop as necessary)
Turn off SmartBoard
Take out trash as necessary
Return room to default setting (tables, chairs, rolling cabinets, and specimens)

5 THE COMMONS/ROCKY AMIPTHEATER

Empty water coolers
Sweep trash and food waste
Empty trash and replace bags
Ensure rope fence is up
Take out trash as necessary
Return room to default setting (tables, chairs, rolling cabinets, and specimens)

6 GENERAL ITEMS – POST TRIP

Turn in completed rosters and waivers to Program Manager or Program Coordinator
Turn in Believe surveys to collection box
Debrief with Program Manager

- Report any broken or missing supplies
- Report any supplies with low inventory remaining
- Share good student stories
- Report any issues/coaching to avoid these in the future

Do a final check of all areas to ensure everything is properly cleaned, put away, and reset for after school programming

Rainy Day Plan

Floor Manager will determine when rainy day plans need to be utilized.

Additional supplies:

- Ponchos (1 per student)
- Large plastic bins w/ lids for storing/transporting ponchos (4)

1 Pre-Arrival

Place "Caution Wet Floor" sign in the Ocean Discovery Gallery.

For Imagination station:

- During light rain:
  - Make sure all costumes and kelp are kept under the overhang between groups.
- During heavy rain:
  - Change locations of Make a Difference Today to Fellow's Bays.
    - North Fellow Bay set up watershed table.
    - South Fellow Bay set up magnet making materials and SMART Board.
  - Imagination Station to the SciTech Lab.

Place a broom and pan in each location where lunch will be eaten.

2 Arrival

Take out ponchos and bring them to the bus stop.

Greet students and teachers on bus:

- Give each student a poncho to put on on the bus.
- Explain that this is their poncho for the day and they must keep it with them all day.

Take students to their Intro location to review Believe! Achieve! Lead!

Floor manager:

- Walk to both intro stations and take teachers aside and note any students absent on the roster.
- Sign cover sheet stating they've collected all waivers to the best of their ability.
- Take adult chaperones aside and discuss expectations for the day (see curriculum above).

3 MAKE A DIFFERENCE TOMORROW

No changes.

4 MAKE A DIFFERENCE TODAY

Light Rain:

- No changes.

Heavy rain:

- Move this station up to the Fellow Bays (see Pre-Arrival for set-up).

5 IMAGINATATION STATION

Light Rain:

- Proceed with station as is having students wear ponchos while in the Plaza del Sol.
- Move debrief to the Ocean Alcove.

Heavy Rain

- This station will take place in the SciTech lab.

6 LUNCH

Student will eat in the location where they finish their first activity.
Make sure students clean-up trash and use broom and pan to sweep up before starting the next activity.

7 DEPARTURE

Have students put on ponchos to walk to the bus.
After all students have boarded the bus have an two adults on each bus collect the ponchos and put them in the bins to carry back to the lab.

8 CLEAN UP – POST TRIP

See Clean Up Protocol above.
Spread ponchos out in the SciTech and Ecolab and leave them to dry out.

Activities for Extra Time

These are quick 5-10-minute activities to be used if a lesson ends early.

Kelp Forest Simon Says:

- Play a couple of rounds of Simon Says using kelp anatomy.
- Simon Says Directions:
    - An adult starts by saying "Simon says…"
    - Any direction that starts with "Simon says…" needs to be followed.
    - Any direction that does NOT start with Simon says should NOT be followed and any students who DO follow it are out.
    - Example: "Simon says show me your holdfast." (Students should show holdfast movement.) "Simon says show me your air bladders." (Students should show air bladder movement.) "Show me your blades." (Any student showing blades would be out and should sit down.)
    - Continue to play until only one student is standing. This student can be the next leader of the game.

Sit/Sensory Spot:

- This activity is most ideal when done outdoors.
- Have students sit down silently and close their eyes for 1-2 minutes.
- Ask students to focus on one sense (hearing/smell/touch) during that time.
- When students open their eyes ask them to share what they smelled/heard/felt, etc. while their eyes were closed.
- Remind students that stopping to focus on one particular sense can allow them to notice things they would not normally.
- Extra: If time allows, have students sketch what they heard/smelled/felt in their science notebook before doing a pair-share.

Pelican-Pelican-Whale:

- This is a game of duck-duck-goose but played with Kelp Forest animals.
- Students sit in a circle facing each other.
- One student is "it" and walks around the circle. As they pass each person they gently tap their head and say whether they are a "Pelican" or a "Whale".
- Once someone is a "Whale they get up and chase "it" around the circle. The goal is for the "whale" to tag the person who is "it" before they can sit back down in the "Whale's" spot in the circle.
- If the "whale" does not tag the person who is "it" before they sit down, they become "it" for the next round and play continues.
- If the "whale" tags the person who is "it" before they can sit down the "it" person has to sit in the center of the circle and the whale becomes "it" for the next round.
- The person in the middle can't leave until another person is tagged and they are replaced.

Charades

- The instructor will whisper something for a student to act out without using any sounds. The rest of the students have to try and guess that the student is acting out.

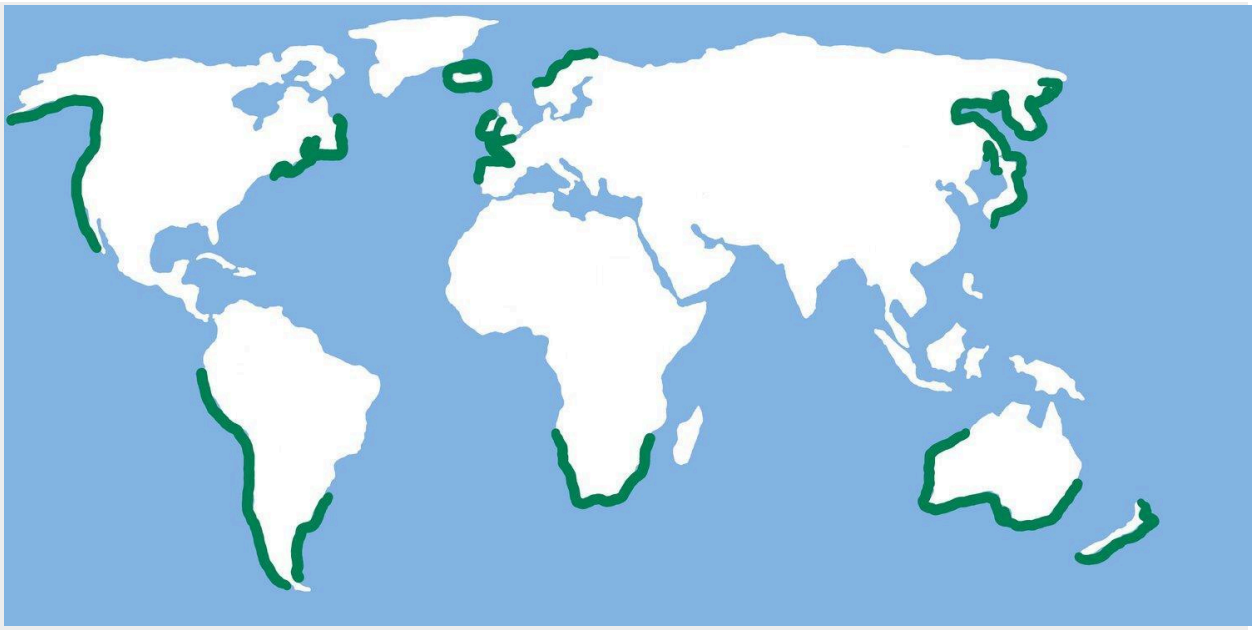
- The student who guesses correctly can be the next "actor" to come up and try to act out a word given to them by the instructor.
    - Idea Bank (ideas should ideally tie into the program):
        - Kelp forest
        - Marine biologist
        - Bird
        - Love
        - Exploring
        - Communication
        - Question
        - Human
        - Scientist
        - Stipe
        - Blades
        - Holdfast
        - Fish

Instructor Background Material

Kelp Anatomy

Excerpt from: *(Kelp) Forests of the Sea*

Giant kelp (*Macrocystis spp.*) are one of the best-known kelp species which make up kelp forests in the Pacific Ocean, and for good reason. They are massive organisms that grow to an average of 30m, and under the best conditions 53m. This species is known to grow up to 30.5 cm a day, meaning in just over 3 months you will have full grown giant kelp, that will live in that spot for up to 7 years. In addition to giant kelp, laminaria, bull kelp, common kelp, and lessonia are other species that make up these underwater forests around the world.



General location of kelp forests around the world. Kelp will usually keep close to shorelines where there is an excess of ocean movement from currents and tides. Although it can be found further from shores where the ocean is not too deep, to allow adequate sunlight for photosynthesis. They are rarely found deeper than 40 meters. Map: World Map Clipart. Kelp forest distribution: Parley.

However, another important question is: what is kelp? Kelp is a species of macroalgae (as opposed to microalgae, think phytoplankton) and despite appearances, kelp is not a plant. Vascular plants, from trees and flowers to shrubs and grasses, all have distinct tissue types like roots, a trunk or stem, leaves and some sort of flowering body. Kelp has different parts, but they do not function the same way the

different parts of a plant do. An algae's holdfast simply holds it in place and unlike roots, will not absorb nutrients. The stipe (rather than a stem) does not transport nutrients and water throughout the kelp, it is a structural support system for the fronds (also known as blades). The fronds are similar to the leaves of plants in that they are the photosynthetic factories of the organism. Kelp also has a special air bladder called a pneumatocyst that fills with gas and helps the blades to float near the surface where there is better access to sunlight. All other water and nutrients the kelp need get absorbed from the water around them. Lastly, kelp reproduce by spores that are transported in ocean currents.

Uses of Kelp

Excerpt from: *Microplastics and seafood: lower trophic organisms at highest risk of contamination*

Seaweeds have been consumed as a traditional food around the globe; however, consumption of seaweed has been increasing in recent years with much of this increase from farming of seaweed rather than from harvesting wild crops. Statistics from the Food and Agriculture Organization of the United Nations state that aquatic plant production grew from 13.5 million tonnes to over 30 million tonnes from 1995 to 2016, with 96.5% of the 31.2 million tonnes produced in 2016 from aquaculture (FAO, 2018). Seaweeds for consumption are generally classified into three groups: red algae (Rhodophyta) such as Dulse and Nori, brown algae (Phaeophyceae) such as kelp and green algae (an informal group containing Chlorophyta, Charophyta, Mesostigmatophyceae, Chlorokybophyceae and Spirotaenia) such as sea lettuce. *Fucus vesiculosus* is a common seaweed in the British Isles and Atlantic coastlines, in the class of brown algae, and is often comsumed as a health supplement.

Kelp Bass

Kelp Bass (*Paralabrax clathratus*) Fish Description:

The Kelp Bass, or also known as the bull bass or calico bass is part of the marine-ray finned fish species. Adult Kelp Bass have an olive green hue, while their adolescent counterparts are more towards a lighter brown. The upper part of the Kelp Bass' head has pale yellow spots, whereas the body has black, white, and/or olive green marks. You can also find they have rows of rectangular white spots across their back. Their ventral areas are often cream or white. To help distinguish Kelp Bass from other marine bass is by their calico-like spotting on the underside of their belly. On the margin of the operculum of the Kelp Bass, a large spine is present. And from third to a fifth of their dorsal fins are all the same length.

Diet and Size:

Kelp basses are carnivores and piscivores, but they can also eat non-insect arthropods. They commonly consume other fish, mollusks, crustaceans, other marine invertebrates, planktons, and algae. Their diet expands as they grow older. The Kelp Bass also shows cannibalistic tendencies. They feed heavier during spawning, from May through September, and feed lighter during the winter.
The Kelp Bass may reach up to 2.4 ft. and the maximum weight known is said to be 15 lbs.

Habitat and Distribution:

You can fish for Kelp Bass all year round in fisheries such as Los Angeles, Orange County, and San Diego. The most action you can get for these fish should be around the warmer months, between May and October, but scoring a large fish is still possible between November and April.
The Kelp Bass can also be caught around islands such as Catalina and San Clemente islands during their overnight fishing expeditions.

They commonly live in kelp forests they are found to be almost exclusive in this type of habitat. Younger Kelp Bass often stay amongst the kelp blades and seaweed in rocky areas, while Adults may stray further from the kelp forest to deeper and rockier habitats, as they are less susceptible to be predated on. Though adult Kelp Bass can be found in depths such as up to 200 ft., they are still found common in shallow waters going only as deep as 8 to 69 feet

Microplastics

Where to they come from?

Except from: *Mircoplastics (National Geographic Society)*

Microplastics, as the name implies, are tiny plastic particles. Officially, they are defined as plastics less than five millimeters (0.2 inches) in diameter—smaller in diameter than the standard pearl used in jewelry. There are two categories of microplastics: primary and secondary.

Primary microplastics are tiny particles designed for commercial use, such as cosmetics, as well as microfibers shed from clothing and other textiles, such as fishing nets. Secondary microplastics are particles that result from the breakdown of larger plastic items, such as water bottles. This breakdown is caused by exposure to environmental factors, mainly the sun's radiation and ocean waves.

The problem with microplastics is that—like plastic items of any size—they do not readily break down into harmless molecules. Plastics can take hundreds or thousands of years to decompose—and in the meantime, wreak havoc on the environment. On beaches, microplastics are visible as tiny multicolored plastic bits in sand. In the oceans, microplastic pollution is often consumed by marine animals.

Some of this environmental pollution is from littering, but much is the result of storms, water runoff, and winds that carry plastic—both intact objects and microplastics—into our oceans. Single-use plastics—plastic items meant to be used just once and then discarded, such as a straw—are the primary source of secondary plastics in the environment.

Microplastics have been detected in marine organisms from plankton to whales, in commercial seafood, and even in drinking water. Alarmingly, standard water treatment facilities cannot remove all traces of

microplastics. To further complicate matters, microplastics in the ocean can bind with other harmful chemicals before being ingested by marine organisms.

How do they get into marine life?

Excerpt from: *Microplastics and seafood: lower trophic organisms at highest risk of contamination*

Broadly speaking, there are two main ways for marine organisms to ingest microplastics: direct ingestion from the natural environment; or indirect ingestion, including trophic transfer from prey and consumption of contaminated aquaculture feedstock. Furthermore, there is some indication that microplastics can be taken up via the gills (Watts et al., 2014). Dietary strategy may be a defining characteristic influencing microplastic ingestion in fish, with planktivores more likely to consume microplastics direct from the natural environment, while piscivores (e.g. tuna) would be expected to consume microplastics mainly through trophic transfer via prey or accidental ingestion while feeding.

Direct ingestion of microplastics is often a consequence of feeding strategy. Indiscriminate feeders show no selection in the matter that they ingest, ingesting prey in proportion to their availability in the environment, whilst discriminate feeders select based on preferential feeding factors (colour, size etc.). Filter feeders such as some bivalves can be considered as indiscriminate feeders as they feed by filtering water through their gills, capturing particulate matter such as plankton and microalgae. This is generally in a non-selective manner; however some of the filtered matter can be rejected. This has been shown recently by Ward et al. (2019), who demonstrated that the bivalves *Crassostrea virginica* and *Mytilus edulis* selectively ingested microplastics preferentially, based on the physical characteristics of the plastic. In this way, microplastics are ingested if they resemble the properties of the organic matter these organisms feed on, such as in size and shape. Discriminate feeders may directly ingest microplastics either when they resemble prey items, or incidentally whilst feeding, e.g. in contaminated feedstock; this feeding strategy is generally utilised by higher trophic-level organisms. Discriminate feeders such as fish may therefore ingest microplastics that resemble their prey. Amberstripe scad (Decapterus muroadsi) appear to ingest blue microplastics preferentially as they resemble their copepod prey in both colour and size (Ory et al., 2017). Evidence of selective feeding on the blue copepods *Pontella sinica* and *Sapphirina* spp. was seen, as was selectivity for blue microplastics.

Indirect ingestion, or "trophic transfer" occurs when organisms consume prey that have already consumed microplastics. Trophic transfer from blue mussels *Mytilus edulis* to the shore crab *Carcinus maenas* has been observed in laboratory conditions (Farrell and Nelson, 2013; Watts et al., 2014). Farrell and Nelson (2013) fed 0.5 µm fluorescent polystyrene microspheres to *M. edulis*, with *C. maenas* subsequently being fed one mussel per crab. Microspheres were subsequently detected in the stomach, hepatopancreas, ovary, gills and haemolymph of the crabs. Results from Nelms et al. (2018) suggest the ability for microplastics to be ingested by grey seals (Halichoerus grypus) through trophic transfer from Atlantic mackerel (*Scomber scombrus*). Detritivores may also be prone to indirectly consuming microplastics present in faeces of contaminated organisms; for example coprophagous copepods can ingest microplastics present in other copepods' egests (Cole et al., 2016). Feedstock

contaminated with microplastics may be a risk to aquaculture, as fishmeal is a commonly used fish feed manufactured from whole fish, therefore any microplastics within the fish may pass into the processed fishmeal (Karbalaei et al., 2019).

How do they impact fish?

Microplastics can harm fish in several ways.

- Tiny plastic particles can physically block or fill up the animal's gut, potentially reducing its ability or desire to feed.
- Microplastics can cause behavioral changes as their presence changes a fish's buoyancy or swimming behavior, which can make the fish more susceptible to predators.
- Microplastics also can carry toxic chemicals into the fish's body, which could bioaccumulate as the fish consumes other prey that have ingested plastics.

Good article on this: *Picture of Chesapeake microplastics grows clearer*.