

Coastal Field Trip

Guiding Concept: Students will learn about how kelp and the organisms that live in the kelp forest are adapted to the physical environment and why it is important to protect kelp.

Make a Difference Actions:

- (Today) Be a citizen scientist and visit a Marine Protected Area.
- (Tomorrow) Work as an urban planner to design a protected area in your neighborhood.

STEM Discovery Focus: Investigate and Analyze

Ocean Discovery Unit

Cross Cutting Concept: Understanding Structure and Function: *The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.*

SE Practice: Constructing Explanations & Designing Solutions: *The products of science are explanations and the products of engineering are solutions.*

DCI:

- Physical Science: 4-PS4-1 *Waves and Their Applications in Technologies for Information Transfer*
 - Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
- Life Science: 4-LS1-1 *From Molecules to Organisms: Structures and Processes*
 - Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Unit NGSS Alignment

Main instructor

- Classroom management
- Watch timing of lesson
- Lead class discussion
- Call on students to include as much of the class as possible

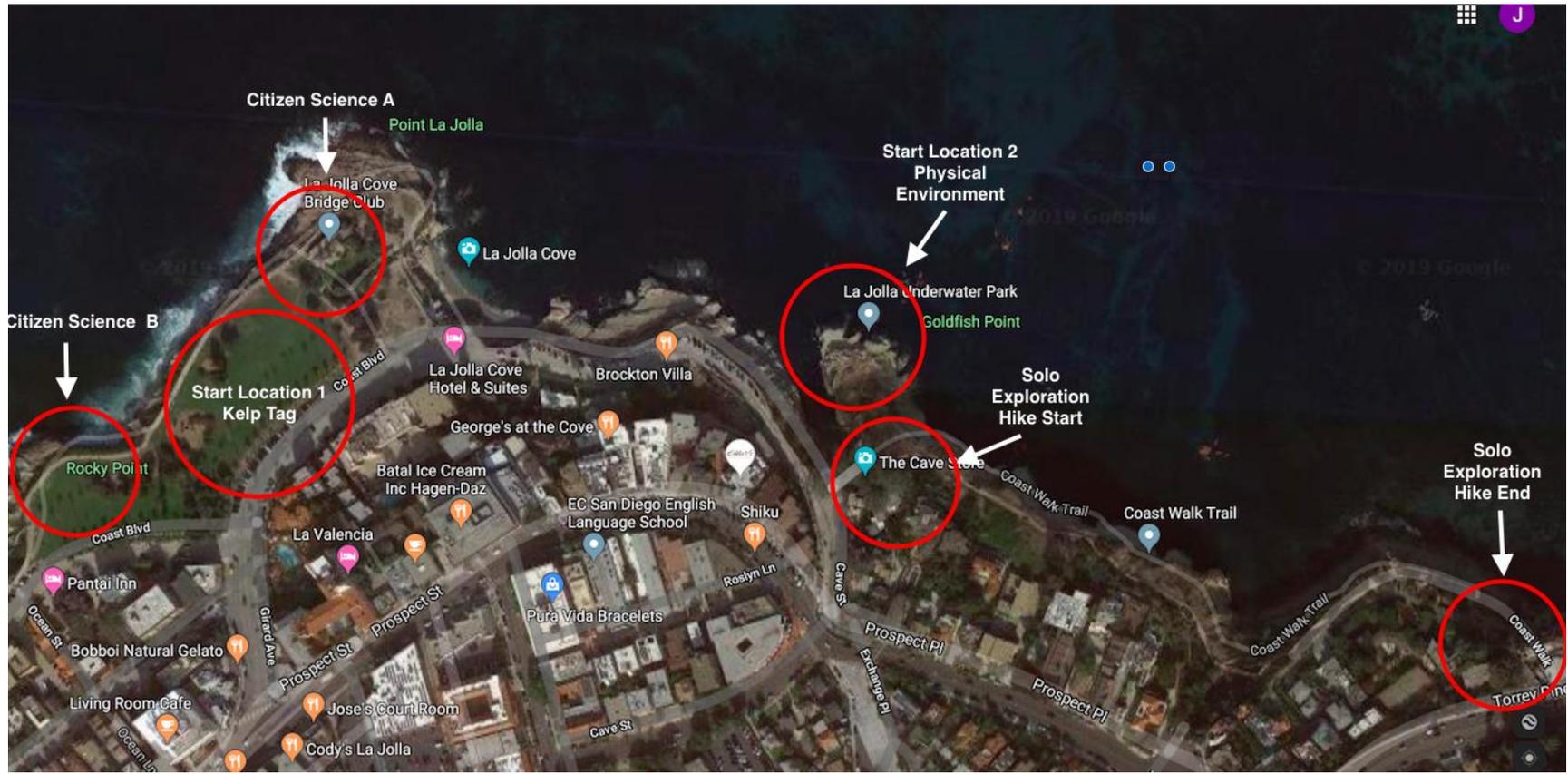
Additional staff/volunteers

- Prep materials
- Whenever not prepping supplies
 - Walk around the classroom and interact with students, ask questions, help, etc.
 - When students are not engaged in an activity, spread out throughout the classroom and stand near any students struggling to pay attention

Supplies:

- White board (4 total -1/station except Kelp Tag)
 - Large square white boards
- Large white board + tripod stand for white board for kelp tag
- Instructor Pack Back
 - Laminated Time Table
 - Binoculars (1/instructor)
 - Dry erase markers 2-3/instructor
 - Extra pens (10/instructor)
 - Portable 1st Aid Kits (1/instructor)
 - Explorer Solo Hike card set (1/instructor)
 - Folder (1/class)
 - Hand held radios (1/instructor)
- Water coolers (filled w/ water) (2)
- Table for watercooler (1)
- Explorer Backpack (1/ students)
 - Water bottles (1/student)
 - Binoculars (1) for half of back packs
 - Hand lens (1/pack) for packs that don't have binoculars
 - Field Journal (1)
 - Pens (1/pack)
 - Calculator (1/pack)
 - Bird ID card (1/pack)
 - Laminated card w/ Kelp Forest Organisms (1/pack)
 - Refractometer (1/pack)
 - Plastic pipettes for collecting sea water (1/pack)
 - Tide chart (1/pack)
 - Thermometer to measure air temp (1/pack)
 - Wave height chart
- Bandanas (4 colors 20 of each color)
- Red bandana (2)
- 6 blankets for sitting
- 2 plastic storage bins
- 2 laminated signs that read "***Please Do Not Touch, Property of Ocean Discovery Institute***"
tapped to two plastic bin lids
- Solo hiker pins (1/student to be [given away](#))
- Stopwatches (2)
- Handheld radios (3)
- Community Agreements poster (2)
- 4 plastic flags on wire stands for kelp tag ([like this](#) but cheaper)
- Laminated copy of Kelp Tag set up
- Stapler (4)
- Extra staples
- Lens paper to clean binoculars (500)
- Sunscreen

Site Map



Group 1 & 2 Schedule

On Time	Group 1	Group 2	A Little Late	A Lot Late
9:45	Arrival		9:50-9:55	10:00-10:05
9:50-10:00	Engagement & Backpacks		10:00-10:10	10:10-10:20
10:00-10:25	Kelp Tag		10:10-10:30	10:20-10:40
10:25-10:50	Citizen Science A	Citizen Science B	10:30-10:55	10:40-11:00
10:50-11:20	Lunch & Bathrooms		10:55-11:25	11:00-11:30
11:20-11:30	Walk North		11:25-11:35	11:30-11:40
11:30-12:00	Physical Environment	Solo Exploration Hike	11:35-12:05	11:40-12:05
12:00-12:30	Solo Exploration Hike	Physical Environment	12:05-12:30	12:05-12:30
12:30-12:45	Post Reflection	Post Reflection	12:30-12:45	12:30-12:45
12:45-12:55	Walk to bus stop	Walk to bus stop	12:45-12:55	12:45-12:55
1:00	Departure		1:00	1:00

Group 3 & 4 Schedule

On Time	Group 3	Group 4	A Little Late	A Lot Late
9:45	Arrival		9:50-9:55	10:00-10:05
9:50-10:00	Engagement & Backpacks		10:00-10:10	10:10-10:20
10:00-10:10	Walk North		10:10-10:20	10:20-10:30
10:10-10:40	Physical Environment	Solo Exploration Hike	10:20-10:50	10:30-10:55
10:40-11:10	Solo Exploration Hike	Physical Environment	10:50-11:15	10:55-11:20
11:10-11:20	Walk South		11:15-11:25	11:20-11:30
11:20-11:50	Lunch & Bathrooms		11:25-11:55	11:30-12:00
11:50-12:15	Kelp Tag		11:55-12:15	12:00-12:20
12:15-12:40	Citizen Science A	Citizen Science B	12:15-12:40	12:20-12:40
12:40-12:55	Post Reflection	Post Reflection	12:40-12:55	12:40-12:55
1:00	Departure		1:00	1:00

Timing Adjustments, if necessary:

Location	On Time	A Little Late	More Late
Arrive	9:45am	9:55am	10:05am
Walk to site/bathroom	9:45am – 10:00am	9:55am – 10:10am	10:05am – 10:20am
Community Agreements/Back Packs/Bathroom	10:00am – 10:10am	10:10am – 10:20am	10:20am – 10:30am
Station 1	10:10am – 10:40am	10:20am – 10:45am	10:30am – 10:55am
Station 2	10:40am – 11:05am	10:45am – 11:10am	10:55am – 11:20am
Lunch/Bathroom	11:05am – 11:25am	11:10am – 11:30am	11:20am – 11:40am
Station 3	11:25am – 11:55am	11:30am – 11:55am	11:40am – 12:05pm
Station 4	11:55am – 12:25pm	11:55am – 12:25pm	12:05pm – 12:30pm
Post Reflection	12:25pm – 12:45pm	12:25pm – 12:45pm	12:30pm – 12:45pm
Walk to bus/bathroom	12:45pm – 1:00pm	12:45pm – 1:00pm	12:45pm – 1:00pm

Arrival & Walk to Site (15 min)

- Meet buses (**Location**)
- Give every student a lunch
- Divide students into four even groups (2 groups/class)
- Take Groups 3 & 4 off the bus first and walk to Physical Environment Investigation for Engagement & Community Agreements
- Once Groups 3 & 4 have moved away take Groups 1 & 2 off the bus, walk to bathrooms for bathroom break and then walk to Kelp Tag station to start Engagement & Community Agreements

Engagement & Community Agreement (20 min)

Set Up

There will be two locations Kelp Tag station and Physical Environment Investigation station

At each station there should be:

- Community Agreement poster
- Half the Explorer backpacks (1 pack/student)
- Bandanas in two colors (1/student)
- Place in plastic storage bin with Please Do Not Touch sign taped to lid:
 - Stapler (2)
 - Extra Staples
 - Folder
 - Extra pens (10)

Teaching Notes

- Distribute explorer backpacks
- Help students put lunches into backpacks
- Distribute bandanas (one color per team)
- Help students develop a team cheer w/ a science focus

Goal of Station: Students will agree to behavioral expectations for the day, students will feel like scientists and know what tools are at their disposal for the day and will feel like a part of a scientific community when they get a piece of team gear (bandana) and create a team cheer.

- Introduce yourself and Ocean Discovery Institute.
- Let all staff members introduce themselves and say one sentence about themselves.
 - Ex. My name is David I have been volunteering with Ocean Discovery for two years now and I am a student at San Diego State.
- Introduce the idea of community agreements -expectations about **how scientists work together**.
- Show community agreements poster and ask students what each one means to them.
- Ask students to abide community agreements with a verbal “yes” or thumbs up, etc.
- Explain that you will be **working as a team of scientists** to continue your **investigation** of kelp forests.
- Remind students that scientist ask a lot of **questions, make observations, look for patterns** and try to **construct explanations** for their observations and questions.
- Introduce explorer backpacks (pack of tools for **making observations** of our environment).
- Give students a chance to look through explorer backpacks.
- Explain to students they will be in teams. Each team gets their own color bandana.
- Give students five minutes to create a team cheer. (Cheer can be used as an attention getter, etc. during the rest of the field trip).
 - Try to focus the cheer on something science based

Solo Exploration Hike (30 min)

Set Up

Start Location: one bench below coast walk trail but above deck



- Set up 6-7 blankets on the ground so that students can sit and face you on bench
- Place in plastic storage bin with Please Do Not Touch sign taped to lid:
 - Whiteboard (1)
 - Exploration solo walk cards
 - Stopwatch (2)
 - Handheld radios (2)
 - Extra pens (10)

Set Up

End Location: Near 2 parking spaces at end of Coast Walk trail



- Plastic bin with 5-6 blankets for sitting (to be placed at far end of coast walk)
- Place in plastic storage bin with Please Do Not Touch sign taped to lid:
 - Whiteboard (1)
 - Handheld radio (1)
 - Extra pens (10)

Teaching Notes

- Sit with students while they wait for their turn to walk. Ask them how they are feeling? Excited, nervous, etc.
- Make sure every student that is leaving the deck has their set of cards out, field notebook open to a blank page and a pen ready to go.
- If you have students who are nervous you can have a couple of students who finish the walk first radio back to that student and tell them how the experience was.
- Accompany any students who are too scared to go on their own.

Goal of station: Students **explore** nature on their own as a scientist making **observations** and **asking questions** in the field. Students continue to **construct an explanation** about why kelp forests are important and should be protected.

- Explain that students will be doing a solo exploration hike.
- Explain that scientists often go out in the field on their own to **make observations** and then come back together to discuss those **observations**.
- Let students know that they will only be a few steps away from each other but that they are to work silently and without interacting.
- Rules of Solo Hike:
 - Wait with instructor/volunteer/teacher. When it's your turn to go, instructor/volunteer/teacher will tell you.
 - Walk along the trail! There is no running. Anyone caught running will sit out for the rest of the solo hike.
 - Whenever you come to a bench along the hike you are to stop. Choose one card from your pack of cards. Read the card and follow the instructions
 - You will only read ONE card per bench.
 - When you finish with the card put it back in your backpack and continue your hike with your notebook and the rest of your cards.
 - By the end of the hike you will have read all five cards.
 - It does not matter what order you complete the cards in – you choose which card to read at each bench.
 - You may be asked to record some information in your field notebook so everyone should have their field notebook open and with them at all times. All notes can go on one or two pages.
 - Tell students that if they see another student at a bench in front of them that they should stop walking until that student has moved on.
 - If people are already sitting on the bench it is okay to stop close to the bench and read your card.
 - Students can use their binoculars at any time during the walk.
 - The exploration solo hike is meant to be silent so there should be no talking.
 - Students need to stay on the trail at all times!
 - When you reach me you will be done and we will discuss what you learned on your solo hike.

- Have all students turn to the next blank page in their field notebook and at the top of the page write: **Solo Hike La Jolla, California** and the **date**.
- Let students know they should write down any notes from their solo hike on this page.

• **Instructions for 2nd adult with your group for solo hike:**

- *Supplies for 2nd/3rd adult: stopwatch (1), hand held radio (1/adult)*
- Check in and see if there are any students who are nervous.
- Let them know that they should go last and can accompany any student who is too nervous to go on their own- but that they should do whatever is possible to encourage students to walk on their own. Leave one hand held radio with this person and let them know when you get to the end you will turn yours on.
- Nervous students who want to walk with the teacher can radio the instructor at the end of the hike so that they can talk to a couple of students who finished.
- Send first student TWO minutes after you have left so that you have time to set up the end of the trail for students.
- Send a student approximately every 1 minute.
- Make sure all departing students have field journals out and a pen or pencil.
- Have students sit in a circle while they are waiting to leave. Either have students high-five everyone before they take off on the solo hike or have your group give their group cheer to each student as they are walking off.

• **Instructions for 3rd adult with your group for solo hike (“lifeguard”):**

- Explain that they will be stationed along the trail so that they can see the majority of the trail.
- Their job is as a “lifeguard” to keep an eye on all the students walking along the trail.
- Only interact with students if they seem “lost” or “afraid” or are doing something they should not such as running or talking with other students.

- At the end of the solo hike trail, set up the blankets in a semi-circle facing the ocean so that the students can sit and write when they finish the hike.
- Write on your whiteboard the below.
 - Congratulations for finishing your solo exploration hike!
 - Please take a seat and take a silent moment to write the following in your journal:
 - How did it feel to be a scientist making observations on your own?
 - What are TWO things you learned about kelp forests on the hike?
 - Once you are done with that drink some water and rest up while we wait for everyone.
 - Please speak in whispers so everyone can finish their work.
- When a student arrives from their solo hike give them a high five, tell them congratulations for begin a solo hiker, ask them how it went, hand them a pin to put on their shirt or bandana, then have them take a seat on the blankets and work on the questions on the board.
- Once all students have returned lead a discussion about some of the things they learned on their solo hike. Guiding questions (bold are most important, non-bold if there is time):
 - **Why is it important to protect our kelp forests?**

- **Discuss kelp as a habitat and as part of the food chain.**
- **Discuss what should students do if they find dead kelp on the seashore.**
 - What did it feel like to be a scientist and do science on your own?
 - Who can share an interesting fact they learned?
 - What are some sounds you heard or smells you got while on the hike?
 - What was your favorite part of the solo hike?
- Leave yourself enough time to put blankets away and walk back along the coastal walk trail without impeding the next group.

Kelp Tag (30-40 min)

- ***Two groups will meet up to play this game together and then separate to debrief the game and continue on to their Shore Protection stations. This station can run a bit longer than the normal 30 minutes but any additional time must be deducted from the Shore Protection station.***

Set Up

- 4 flags (set these up to create two sides of playing field for tag game (see visual))
- Large whiteboard + tripod stand
- Red bandana
- Laminated copy of Kelp Tag field set up
- Stopwatch
- Water cooler (2)
- Table or crate (2) for water cooler

Teaching Notes

- Help monitor/referee tag game
- Monitor water coolers during refills
- Sit amongst students while they listen to instructor
- Walk around and help students during Think-Pair-Shares

Goal of Station: Students understand that **the structure of the kelp forest provides protection from predation** for some organisms and therefore helps those organisms to survive.

- Students sit on grass.
- Explain that the Kelp Forest is home to lots of organisms who try to eat each other because they are part of a food web.
- Draw this food web on whiteboard (show visual/let students look at card in backpacks)
 - Sea lions eat Sheepshead
 - Sheepshead eat Urchins and Lobsters
 - Urchins eat Kelp
- Explain they will play a game that mimics this food web. As scientists you will **collect data** and then **analyze** it the game is over.
- Kelp Tag Rules

Round 1

- Start w/ one sea lion (Have this student tie a red bandana around their head). Place this student on one side of the field (see diagram). Sea Lion's job is to eat (tag) the Sheepshead.
- All other students are Sheepshead fish and start on opposite side of the field from Sea Lion.
- Goal is for Sheepshead to cross safely to the other side of the ocean without getting eaten.
- If a Sheepshead gets tagged it becomes a piece of kelp and cannot move. Any tag counts including clothing and hair, etc.
- Sheepshead have one minute to get to the other side of the field or they automatically become a piece of kelp.

- Instructor yells “Swim!” and Sheepshead begin to cross and Sealion can begin to tag.
- After the minute is up, all remaining sheepshead should be on opposite side that they started from and instructor writes down the number of sheepshead that were tagged.

Round 2

- Sealion starts on the opposite side of the field from the remaining sheepshead.
 - Sheepshead have one minute to cross.
 - Instructor yells “Swim!”
 - Sheepshead again try to cross safely to the other side of the ocean.
 - If a Sheepshead is touching the should of a “kelp” they are safe and cannot be tagged by the sealion.
 - Any sheepshead tagged by sealion become kelp.
 - Instructor writes down the number of sheepshead there were tagged that round and became kelp.
- Water break + water bottle refills
 - Break students back into two groups and find places far away from each other to sit down.
 - Have students take out field notebooks and turn to a blank page and write: **Kelp Tag** on the top.
 - Gather students on the grass for a THINK-PAIR-SHARE
 - Write the below two questions on the whiteboard where all students can see and in field notebook have students answer these TWO questions (Think):
 - Scientists, what do you **observe** about the number of Sheepshead the sealion was able to eat in round 1 versus round 2?
 - Why do you think the sealion was able to eat more Sheepshead in Round 1?
 - PAIR share thoughts with your partner.
 - SHARE out whole group.
 - Instructor focus the conversation so that students walk away understanding that living in the kelp benefits the Sheepshead by providing them protection and is another reason Kelp Forests should be protected.

CITIZEN SCIENCE (20-30 min)

Goal of Station: Students will learn what citizen science is and collect data that can be used to help manage Marine Protected Areas.

Set Up: None

- Choose one of the green huts along the grassy area to sit and make observations of the ocean.

Teaching Notes

- Help students choose the right tools to fill out physical environment section of citizen science data sheet.
 - Help students fill out Activities section of citizen science data sheet.
 - Walk around and sit down with students who are struggling to focus while instructor is speaking.
-
- Remind students that they are next to Matlahuayl Marine Protected Area, one of a 124 protected areas along the California coast.
 - Ask students why they think scientists want to protect and manage this area.
 - Many types of fish, invertebrates, algae, birds and marine mammals make their home here and would benefit from protection from humans.
 - Scientists hope that by protecting and managing this the kelp forest it can recover from former heavy usage.
 - Rules of this protected area include (no consumptive activities):
 - Boats may only anchor in the area during daylight hours.
 - No one may commercial fish- fishing for profit
 - No one may recreational fish- fishing for fun or food
 - Things that are okay to do here (non-consumptive activities):
 - Snorkeling
 - SCUBA diving
 - Kayaking
 - Bird watching
 - When scientists decide to protect an area they need to collect data to see if people follow the new rules.
 - Scientists also have to collect data to manage the protected area and make sure that the new rules they have put in place help make the kelp forest and the organisms that live in it healthy again otherwise they will need to change the rules.
 - Scientists need help to monitor these areas because they over 100 of them and they can be quite large.
 - This is why scientists rely on the help of citizen scientists. Citizen scientists can help scientists collect data for all these Marine Protected Areas.
 - Introduce the concept of citizen science.
 - Citizen science is the collaboration between scientists and volunteers (of almost any age) to expand opportunities for data collection.

- Citizen scientists are able to help scientists collect more data because there can be so many people involved in helping one scientist.
- Citizen scientists can collect data in areas where it is difficult for scientists to get to because of distance constraints.
- Today students are going to collect data that could be used to help monitor this Marine Protected area.
- Hand out worksheets to each pair of students.
- Explain to students that the first information citizen scientists need to gather is about the physical environment at the time they collect the data.
- Explain to students they will have five minutes to gather **PHYSICAL ENVIRONMENT** information using the tools from their backpack.
 - As an example, show students how to take salinity using refractometer.
 - Review terms students may not be familiar with (visibility, precipitation, etc.)
 - Reminds students not to start the Activities portion of the data sheet.
- Give students 5 minutes to collect Physical Environment Data using materials from their backpack. Wander around and help students choose the right tools to collect the data.
- Bring students back together and review data as a team. Let students know their answers might be slightly different but should be close.
- Explain to students that they will have five minutes to collect data on the activities people are engaging in and around the MPA.
 - Students will put a tick mark in the box for each person they see doing the activity.
 - Try to point out an example of each kind of activity so that students know what each thing is.
 - Tell students they may use binoculars.
 - Explain that they should only count each person one time.
- Set a five minute timer and tell students to begin.
- After five minutes are up give students one minute to total up how many people they saw doing each activity.
- Gather students together to share data.
- Thank students for collecting data that could be used to manage the protected area here.
- Ask students if they saw people engaging in any activity not allowed in the MPA.
- Ask students how many people they saw enjoying the MPA and not breaking any rules.
- Ask students if they think the majority of people are following the rules and if the MPA is doing it's job?
- Let students know that they can get involved in citizen science at the Living Lab.

Physical Environment Station (30 min)

Goal of station: Students will learn about the physical environment that kelp lives in and in particular will learn about the power of waves.

Set Up:

Teaching Notes

- Help students take wave measurements including amplitude.
- Help students calculate the number of waves in a day (one minute x 60 x 24 = approx. number of waves in a day)
- Walk around and sit with any student who are having trouble paying attention.

WHAT IS KELP

- Ask students if they think kelp is a plant or an animal and why they think that.
- Tell students that kelp is neither a plant or an animal but is actually brown algae.
- Explain that algae is not a plant but is similar to a plant.
 - One of the main differences is that plants only photosynthesize in their leaves while algae photosynthesize in all parts.
 - Another difference is that plants absorb water and nutrients from their roots in the ground and algae takes those in directly from the water from all parts.
- Ask students to remember the names of the parts of kelp and as they do what it is similar to on a plant.

Plant	Algae
Roots	Holdfast
Leaves	Blades
N/A	Air bladder
Canopy	Canopy
Trunk/stem	Stipe

KELP'S PHYSICAL ENVIRONMENT

- Ask students what kind of environment kelp lives in? Allow students to observe kelp in the ocean for a few moments.
- The physical environment that kelp lives in is pretty harsh. For example – kelp needs sunlight in order to grow but the sunlight does not penetrate very deeply into the water. That's why the water looks so dark and we cannot see the bottom. Kelp has adaptations to help keep it close to the surface
 - Stipe is rigid and strong to keep kelp upright and growing towards sunlight.

- Airbladders to keep blades floating towards surface where sunlight is.
- When you look at the kelp forest what is another thing you notice about the physical environment that kelp must adapt to. Listen to all answers and write them on white board. Focus will be on waves.
- There are many things kelp must be adapted to but we will focus for the rest of this station on waves.
- THINK-PAIR-SHARE
 - THINK – What do you know about waves?
 - PAIR- Share thoughts with a partner
 - SHARE – Share your thoughts or your partners thoughts about waves.

WAVE INVESTIGATION

(Walk students down to the beach at La Jolla Cove if the tide allows, if not stay up on deck area and have students use binoculars – they may need more guidance for guessing wave amplitude from above).

- Have students observe the ocean waves for 1-2 minutes. Ask students to write down any **observations, patterns or questions** they have about the waves.
- Explain to students that they will be learning about how to measure the size of waves and how waves impact the kelp forest.
- Have students sketch a wave in their notebook (draw one on whiteboard as an example)
- Have students label crests and troughs.
- Waves are often measured in terms of their height which is called their **amplitude**. Label this on diagram.
- Explain that amplitude is basically the height a of wave measured from its resting point (or basically a flat ocean).
- Have students take out wave height chart.
- Explain to students that the height of waves is often estimated to be knee, waist, shoulder, head and overhead height.
- THINK-PAIR-SHARE: Estimate the amplitude of the waves you see right now using the wave height chart.
 - THINK: Have students look at ocean and make a hypothesis about the amplitude of the waves they see.
 - PAIR: Share their hypothesis with a partner but explain to your partner what observations you used to come up with your hypothesis.
 - SHARE: Have a few students share out their hypothesis. Focus on what observations led to their hypothesis.
- Come to a conclusion as a group about a wave amplitude estimate.
- Excellent. Now lets see how many waves move through the kelp forest in a minute.
- Set a time for one minute and have students count the number of waves that move through the kelp forest.
- Call on a few students to share their answers and if time allows calculate an average, if not simply choose the median number.
- Let's try to figure out approximately how many waves move through the kelp forest each day.
 - Talk to your partner and see if you can come up with a way to estimate the number of waves that move through the kelp forest each day.

- Guide students through this: have them count the number of waves in a minute. Using that have them estimate the number in an hour and share that then have them figure out the amount for a day.
- Wow! That's A LOT of waves! Remember some days there will be more waves and some days less waves depending on the wind and other things. Some days the waves will be bigger and somedays they will be smaller.
- What do you notice happens to the kelp as the waves move through it?
 - Kelp moves, kelp gets jostled around, etc.
- Think about how many waves move through the kelp forest each day and how that causes the kelp to move around a lot. Can you think of any way the kelp is adapted to stay where it is and not get ripped up?
 - Holdfast – holds the kelp “fast” to rocks on the seafloor.
- Kelp is adapted to deal with waves in other ways as well. We will spend some time at the living lab next week learning another way kelp is adapted to waves.

Self-Reflection (20 minutes)

Set Up

- Folder
- Stapler
- Extra staples
- Extra field journals
- Lens paper

Teaching Notes

- Write guiding questions on white board while instructor sets up activity.
- Label a folder with teacher's name and school name.
- Make sure there are staples in stapler.
- Help staple field notebooks together.
- Check that each collected journal has a name and teacher's name on top.
- Walk around and collect garbage in a storage bin.
- Help students organize/clean out explorer backpacks.
- Help students clean binoculars and hand lenses.
- Sit amongst students while they listen to instructor

Quick Write (Process - Reflection) (5 min)

- Have students sit down in a semi-circle facing you.
- Remind students they have learned a lot today.
- Tell students they are going to try to explain as much as they can about what they learned today in one minute.
- Let students review their notes in their field notebook from the day silently (2 minutes).
- Set a timer for one minute.
- Have them turn to a blank page in their field notebook.
- Have these guiding questions on white board.
 - What is something new that you learned today?
 - What was something that surprised you?
 - What is something you want to tell your family about?
 - What questions do you still have?
- Students should try to write as much as they can and not worry about spelling or full sentences. They can just jot down a couple of words for each thought. If they get stuck – look up at guiding questions on board.
- If they want they can also sketch some pictures but they only have ONE minute.
- Start timer and say go.
- If time allows turn this into a THINK-PAIR-SHARE
 - THINK: Students work silently.
 - PAIR: After one minute is up have students share what they wrote with their partner.
 - SHARE: Choose a couple of students share what they wrote with the whole group.

Circle Toss- (Self Reflection) (10 min)

- Have students turn to a final blank page in their notebook. **Ask them to write down 3 words about how they feel about doing science after their trip today.**
- Give students one silent minute to write.
- Once everyone has written their words have the students rip the page out of their field journal and crumple it up into a ball.
- Have students stand up and form a circle.
- Have all students throw their papers into the center.
- Have each student pick up a paper that is not theirs.
- Have students throw papers into the center again.
- Have students pick up one paper that is not there's.
- Have everyone open their papers.
- Remind students the question was how do you feel about doing science after your trip today?
- Go around the circle and have each student read the three words off the paper until everyone has done so.
- If time allows have students do a THINK-PAIR-SHARE and answer the question:
 - What are you most excited to tell your family about today?
- Have all students throw paper balls into plastic storage bin.

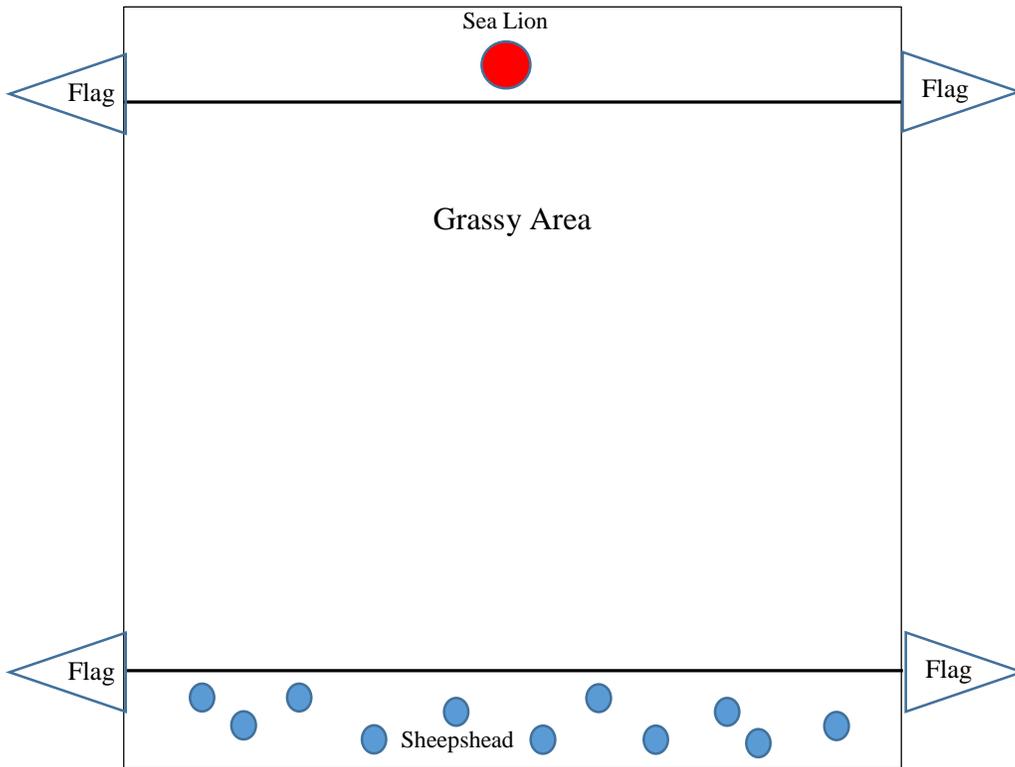
Collect Field Journal Notes & Clean out Explorer Packs (5 min)

- Have students tear out notes from today out of their field journal.
- Have every student write their first and last name AND their teacher's name on top of the 1st paper.
- Go around and staple papers for each student together along the long edge. Use three staples to create a book. While you are stapling double check that students names are on the 1st page.
- Collect all pages and place in folder.
- Clean out explorer packs.
 - Have students throw any garbage from their explorer packs into the plastic bins.
 - Ask student if anyone needs a replacement pen- provide this.
 - Ask if any student has less than three pages left in field journal – if yes, replace their journal with a new one.
 - Have students hold up either a pair of binoculars or a hand lens
 - Give each pair of students a piece of lens paper to clean off eye pieces of binoculars and hand lens. Demonstrate.
 - Throw all used lens paper into garbage bin.
 - Make sure these go in the correct bags.
 - Make sure each student has a calculator.
- 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 kelp forests.
- 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!!
- Walk students back to bus area with a stop at the restrooms if time allows.

Clean Up & Return to Lab

- 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 markers.
- Shake out blankets (take to laundry if they are especially dirty).
- Clean all white boards with dry erase cleaner.
- Charge hand radios.
- Drain and open for drying water coolers.
- Wipe down table with cleaner.
- Restock bandanas, solo hike pins, extra field journals
- Replace any supplies that are running low.
- Organize explorer packs.

Kelp Tag Set Up



Basic Kelp Structure

