Wonders of the Wetlands

Table of Contents

Overview Wonders of the Wetlands

Science Discovery Process Focus:

- Make a Difference
- Explore and Wonder

Ocean Discovery Unit

Next Generation Science Standards:

K-ESS3-3 Earth and Human Activity: Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

5-ESS3-1 Earth and Human Activity: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

LS4.D Biodiversity and Humans: Populations live in a variety of habitats, and change in those habitat affects the organisms living there.

Alignment

Overarching Responsibilities of Team Lead:

- Classroom management & timing of lesson.
- Execution of all lesson material in this curriculum.
- Adaptation of curriculum up or down for grade level audience.
- Use of attention getters when necessary.
- Lead group discussions.
- Use of guiding questions to get students thinking about science.
- Use of Belief and Science Discovery Process language throughout lesson.
- Creation of an inclusive environment that encourages participation from all students.
- Discussion of floor management with staff and volunteers BEFORE the start of lessons.
- **ASC – Accountability-Safety-Communication.**

Overarching Responsibilities of Assistant Team Lead:

- Assist Team Lead with classroom management.
  - Never be standing in the background.
  - Sit with students and model good listening behavior.
  - Sit or stand near any students struggling to pay attention.
  - Participate in all things (kinesthetic movements, attention getters, activities, etc.)
- Assist Team Lead in execution of all lessons in this curriculum.
  - Engage with and mentor students during and in-between all activities.
  - Ask students questions that help them to make their own discoveries.
  - ~~Assist students who are struggling to complete tasks or stay focused.~~
- **ASC – Accountability-Safety-Communication.**

Wonders of the Wetlands Story

Internal – Staff and Teachers

During Wonders of the Wetlands, students explore the many ways wetlands are important, the ways they can help protect wetlands, and about the people who traditionally inhabited this ecosystem- the Kumeyaay. Students also build belief that science is something they can do, and a scientist is someone they can become.

On day one, students explore becoming a science leader by hearing about the pathway of current Ocean Discovery alumni who share their experiences around becoming a science leader. Students then journey through the canyon on a Watershed Adventure where they solve clues and complete challenges to learn about how wetlands purify air and water, provide homes for wildlife, and act as a nursery for juvenile fish. Throughout the day, students build a sense of community while learning about their fellow student scientists by answering questions about themselves through a series of sharing circles.

Over the next three days, students continue to explore and investigate wetlands. On one day, they investigate how wetlands prevent flooding and erosion by conducting an experiment to see the effects of rain on a developed and undeveloped wetland. On another day, students explore how wetlands provide different types of food for different types of birds through an activity where students "become" birds and compete for food. On another day, students are transported back in time to explore the wetland as Kumeyaay kids, where they gather plants and animals necessary for survival from throughout the watershed and learn how Kumeyaay lived in harmony with the land.

On their final day in the program, students make a difference by participating in a community science project to identify local bird populations using Cornell University's Merlin Bird and eBird software and learn about future careers as environmental consultants

Wonders of the Wetlands Story

External – Students

I am excited to continue my journey with Ocean Discovery Institute this fall by joining the Wonders of the Wetlands camp. Over the years, Ocean Discovery has helped me believe that science is something I can do, and a scientist is someone I can be.

On our first day of program, I meet the Ocean Discovery staff and other student scientists. We watch a video about kids who participate in Ocean Discovery programs and I learn that I am on the pathway to becoming a science leader - awesome! After that, we go on an adventure through the watershed so that we can learn why wetlands are important. During the adventure we meet plants and animals that live in the wetland, solve puzzles, and share about ourselves. I learn that I have a lot in common with my fellow student scientists and the Ocean Discovery staff. I'm excited to learn more about wetlands the rest of the week!

Over the next few days, I learn that wetlands are important in so many ways. One day we learn how wetlands reduce flooding and erosion by doing an experiment where we make it "rain" on a wetland full of plants and a wetland that is covered with houses and buildings. Another day we become birds and wear funny bird glasses with feathers and complete for food. Did you know different birds eat different things in the wetlands based on their beak shape? So cool! On another day we become Kumeyaay kids and gather things we would need to survive from throughout the watershed. We get to see, touch, and smell lots of different plants the Kumeyaay used and we even try to grind up seeds the way they used to using a stone! It must have been tough but fun to be a Kumeyaay kid!

On the last day, we help to make a difference by working as community scientists and collecting data on the different types of birds that live in the canyon near Ocean Discovery Institute. We are able to identify birds using binoculars and software on an iPad. At the end of the day, we come together and upload all of our data to a program from Cornell University in New York! It feels good to help out scientists! All in all, it was an awesome week!

Day 1: Pathway of an Ocean Leader/Wonders of the Watershed Adventure

Goal: Students build a sense of belonging while also learning they are a unique individual contributing to a community of scientists through participation in an adventure activity where students read clues, solve puzzles, and learn about some of the ways wetlands are important while sharing about themselves and their experiences.

Supplies: (For one group of 10 students)

Visuals:

- Seed to Tree Ocean Discovery Alumni video
  - Papi/Curriculum/CI New
- "Wonders of the Wetlands" PowerPoint
- Watershed Poster (will be used every day of the program)
  - Made from a large piece of butcher paper with a drawing including the canyons and the ocean.
- Labels for Watershed Poster
  - Laminated in a large font "Wonders of the Wetlands"
  - Laminated in a slightly smaller font:
    - "Wildlife Housing"
    - "Fish Nursery"
    - "Air Purification Post"
    - "Water Treatment Plant"
- Word Wall (will be used every day of the program)
  - "Word Wall" written in large letters
  - Laminated words in a large font:
    - Watershed – an area of land that drains into the same water source.
    - Wetland – a place where water and land meet
    - Family – a group of people that care for you.
    - Science Leader – a person who uses science to make our world a better place.
    - Diversity – lots of different kinds of something.
- Wetland Benefits Posters (1 set/group):
  - Fish Nursery
  - Wildlife Housing
  - Air Purification Post
  - Water Treatment Plant

Supplies:

- Science notebook (1/student)
- Fabric for armbands (1/student + 1/adult)

  - Different color for each group
- Painters Tape
- Betty Butterfly + Thought Bubble (1)
- Antonio Red Shouldered Hawk + Thought Bubble (1)
- Sofia Sage + Thought Bubble (1)
- Ahmed Topsmelt + Thought Bubble (1)
- Magnetic Fish Alphabet & Number puzzle (2)
  - Be sure the combo to the lockbox is written under the below pieces of the magnetic puzzle:
    - 1st no of combo: under fish "1"
    - 2nd no of combo: under fish "2"
    - 3rd no of combo: under fish "N"
    - 4th no of combo: under fish "D"
- Ahmed Topsmelt's Message (1)
- Lock box (2)
- Butterfly Puzzle (2)
  - Write Betty Butterfly's Message on the back of the puzzle
- Sofia Sage's Puzzle:
  - 8 x 11 Letter "S" (2)
  - 8 x 11 Letter "A" (2)
  - 8 x 11 Letter "G" (2)
  - 8 x 11 Letter "E" (2)
    - When the letters spell out "AGES" they should be able to read Sofia Sage's message.
- Antonio the Red Shouldered Hawk's Message (1/instructor)
- Instructor Guide Wonders of the Wetlands Adventure (1/instructor)

Timing:
Regular Start

Time	Activity	Learning Cycle
3:45p – 3:55p	Introduction	Engagement
3:55p – 4:30p	Wonders of the Watershed Adventure	Exploration & Guided Analysis
4:30p – 4:45p	Process Reflection	Reflection

Set up

- Write daily agenda on white board and set on white board stand
- Set up technology & visuals:
  - Open "CI Wonders of the Wetlands Camp" PPT slides and test links for the day.
    - Be sure to move past commercials for any videos.
  - Put up Word Wall Poster and set words for the day at instructor station.
  - Put up Watershed Poster.
  - Check sound on Seed to Tree Ocean Discover Alumni video
- Set up large cardboard cutouts of each characters in the canyon according to the map.
  - See Instructors Guide Wonders of the Watershed Adventure about how to set up each location.
- Set Why Wetlands Are Important posters and stickers for completing adventure off to one side.

Assistant Team Lead

- Help students to place words on the Word Wall.
- During Wonders of the Watershed Adventure:
  - The lead instructor will be at the front and the fellow at the back of the group to make sure all students stay accounted for.
  - Help students maintain social distancing while completing challenges and during sharing circles.
  - Encourage students who are quiet to participate.
  - Help to maintain respectful silence of other students when one student is sharing.
  - Participate by sharing about yourself during share out circles.
- During the process reflection you have a **Mentoring opportunity**. Potential questions include:
  - Do you think learning about wetlands is important? Why?
  - What did you enjoy about being out in the canyon today?
  - Do you think you might want to become an Ocean Leader? Why?

Introduction

Orient students to schedule and space.

- Review daily agenda on the white board.
- Orient students to the space.
    - Water fountain and bathrooms
    - UPSTAIRS ONLY:
        - Highlight the Solar Trees. Be sure to cover:
            - Connection to name Plaza Del Sol
            - How sunlight is used to power the Living Lab which is a net-zero energy building.

Community Agreements.

- 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 if they can agree to be their best self when working with Ocean Discovery.

Introduce Ocean Discovery Family.

- Potential questions include:
    - How many people have visited the Living Lab before? How many people are here for the first time?
    - How many of you have done an Ocean Discovery program before? What did you do?
    - Have any of you had Ocean Discovery in school? Where did you go? What did you do?
- Some of you may already be a part of the Ocean Discovery Family and some of you are new to the Ocean Discovery Family.
- Today everyone is a part of the Ocean Discovery family.
    - Our definition of a family is a group of people who care about you.
    - (Ask a student to place “Family” on word wall.)

Goals for the day.

- (Show Goals for the Day slide.)
- Today we will focus on three goals

1) Getting to know your Ocean Discovery Family
2) Learning about the Science Leader Pathway
3) Learning about wetlands and why they are important.

- Introduce Science Leader Pathway.
    - We believe that all students are science leaders.
    - Define Science Leader – a person who uses science to make our world a better place.
        - (Ask a student to place "Science Leader" on word wall.)
    - Science leaders who come from City Heights, like you, are especially important! We can create diversity in the science workforce and bring new ideas, perspectives, and experiences to our work.
        - Define diversity: lots of different kinds of something.
        - In City Heights there are many people who are different races, religions, etc. We have a diversity of people and that's excellent for science!
        - (Ask a student to place "Diversity" on word wall.)
- Introduce Seed to Tree Science Leader Pathway video.
    - Ocean Discovery wants to support students who want to become science leaders, so we have many programs to help you on your pathway.
    - Watch a video that shows Ocean Discovery students in different places along their pathway to becoming science leaders.
        - (Show Science Leader Pathway video.)
- Debrief Science Leader Pathway video.
    - Potential questions include:
        - In what ways are you similar to the people in the video?
        - What did you see in the video that gets you excited?
        - How would you describe a science leader?
- How you can be a science leader.
    - Be a science leader today by:
        - Share what you learn
        - Raise your hand to answer questions
        - Make good decisions
    - Be a science leader in the future by:
        - mentoring others
        - going to college
        - having a career in science

Wonders of the Watershed Adventure

Timing Breakdown:

- Intro to Watershed & Wetlands (5 min)
- Introduce Wonders of the Watershed Adventure (5 min)
- Wonders of the Watershed Adventure (25 min)

Intro to Watershed & Wetlands

- Alright science leaders, we are going to work on goals two and three now, getting to know your Ocean Discovery Family and learning about wetlands and why they are important.
- To do this, we are going to embark on an adventure through the watershed.
- Introduce the concept of a watershed. Be sure to cover:
    - Watershed = An area of land that drains into the same water source.
        - (Show What is a Watershed slide.)
        - Many watersheds start in the mountains and end in the ocean.
        - (Ask a student to place "Watershed" on the word wall.)
    - 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 any water that is not absorbed by plant roots and soil moves downhill until it reaches the ocean, therefore we have a direct connection to the ocean.
    - All along the watershed are wetlands.
        - Wetlands = where land and water meet.
            - (Ask a student to place "Wetlands" on the word wall.)
        - The canyons outside the lab are part of the Pueblo San Diego Watershed and are considered a wetland.
        - Even though there is no water running through the canyon today, when it does rain a stream exists.
            - (Show Rain in the Canyon video.)
        - Wetlands are a very special type of ecosystem and today while you journey through the watershed you will learn about why they are so important.

Introduce Wonders of the Watershed Adventure

- (Utilize Wonders of the Watershed Adventure Slide on PowerPoint.)
- Goals of our Wonders of the Watershed Adventure:

1) Getting to know your new Ocean Discovery Family
2) Learning about wetlands and why they are important

- As we journey through the watershed to learn about wetlands, you will need to solve puzzles to learn information about the importance of wetlands and answer questions about yourself in order to get to know your Ocean Discovery family.
- If we are able to figure out all the puzzles and learn about each other and why wetlands are important a prize awaits us when we return to the lab!
- We will need to work together as a team and use all our skills in order to complete this challenge.
- These pieces of fabric symbolize that we are ae team!
  - (Pass out fabric ribbons for each student to wear to symbolize your team.)

<u>Wonders of the Watershed Adventure</u>

- We will start here at the lab with the beginning of your story.
  - (Team Lead shows Wonders of the Watershed Adventure Story Slide in PowerPoint.)
  - (Team Lead should read the story out loud.)
- We are ready to start our journey!
  - Remember solving the puzzles and learning about the importance of the wetlands is just one piece of this challenge.
  - We also want to learn about each other.
  - We will need to stay together so everyone must stay between (team lead) and (assistant team lead).
- Let's go!
  - Scavenger Hunt Order (to prevent overlap):
    - <u>Blue:</u>
    - Group 1: Fish, Butterfly, Sage, Hawk
    - Group 2: Butterfly, Fish, Hawk, Sage

    - <u>Red:</u>
    - Group 1: Hawk, Sage, Butterfly, Fish
    - Group 2: Sage, Hawk, Fish, Butterfly

    - <u>Green:</u>
    - Group 1: Hawk, sage, butterfly, fish
    - Group 2: sage, hawk, fish, butterfly

    - <u>Orange:</u>
    - Group 1: fish, butterfly, sage, hawk
    - Group 2: butterfly, fish, hawk, sage

- (Think ASC)
    - (Count the number of students throughout to ensure accountability and safety.)
    - (Be sure to pause and form a circle for sharing the answer to each question.)
    - (Encourage students to have fun and ensure that they stay together as a group for collaboration.)
- (Once students have solved all four puzzles and completed four sharing circles lead them back to the lab and give them each a sticker for completing the adventure.)

Process Reflection

Timing Breakdown:

- Debrief (10 min)
- Introduce Watershed Poster (5 min)

Debrief

- As humans is there any reason we should care about protecting wetlands?
    - (Utilize Why Wetlands are Important slide.)
- Debrief why wetlands are important. Be sure to cover:
    - Definition of a wetland.
        - Canyon is dry now but there are times when a stream is running through it.
        - Show Rain in the Canyon video.
    - Why wetlands are important and should be protected by humans:
    - **Wetlands are a Fish Nursery.**
        - Many fish use the coastal wetlands near the ocean as a place to grow up before journeying to live in the open ocean.
        - (Show associated kinesthetic movements and poster).
            - Fish nursery- swing arms as if rocking a baby and sing "rock-a-bye fishy…" to the tune of rock-a-bye baby
    - **Wetlands are Wildlife Housing**
        - Many birds and animals live in the wetlands.
        - (Have students name some animals they saw today.)
        - (Show associated kinesthetic movements and poster).
            - Wildlife Housing- put arms overhead like a roof
    - **Wetlands are an Air Purification Post**.
        - Plants in the wetlands provide fresh oxygen for humans and animals to breath.
        - (Show associated kinesthetic movements and poster).
            - Air Purification Post- loudly breath in an out, saying "Ahhhh…"
    - **Wetlands are a Water Treatment Plant**.
        - The plants and soil in wetlands can filter water and remove some of the pollutants before they reach the ocean.
            - (Show associated kinesthetic movements and poster).
                - Water Treatment Plant- use arms to motion water coming into yourself and then away, saying "woosh, shwoosh"
- What are some things humans could do to help protect wetlands?
- Do a think-pair-share:
    - What is something you found out you have in common with someone else?
    - What is something you learned about someone on your team that you didn't know before?

Introduce Watershed Poster

- Introduce the theme of the week – Wonders of the Wetlands.
- All week we will use this map of the watershed to improve our knowledge of wetlands.
    - (Ask a student to add the laminated words "Wonders of the Wetlands" to the poster.)
- Ask students what they learned about today.
    - (Have students add laminated words to watershed poster as they say them.)
    - Be sure to include:
        - Watershed
        - Wildlife Housing
        - Fish Nursery
        - Air Purification Post
        - Water Treatment Plant
- Great job today scientists! We will see you tomorrow to continue learning about the wonders of the wetlands.

Into the Watershed Adventure

(PowerPoint)

Slide 1:

This is Fatima Woodpecker here with WTER TV – bringing you all the News of the Wetlands!

Today, our top story focuses on human impacts on the wetlands. Many residents are concerned that humans are unaware of how they affect our home.

Here to talk with me about this is local wetland resident, Harvey Harlequin Beetle. "Harvey what can you tell us?"

Slide 2:

Harvey Harlequin Beetle here!

I was enjoying the view from my bladderpod plant when I saw four humans running though the plants in our wetlands. They were stepping off the trails, and I tried to yell "STOP!" but they didn't realize I was there. Fatima, it was like they didn't know they could be damaging plants and animals' habitats!

Wow Barry! That is unbelievable to hear! I mean one would think… Hold on everyone! We are getting some breaking news! We are going to go live to another part of the wetland for more news!

Slide 3:

WTER TV reporter Antonio Ant here – a little bug with BIG news! I am here with Larry Lemonade Berry a local resident who just saw a group of humans leave the wetland. Larry, can you tell us what you saw?

Listen Antonia, people may think that I'm just a plant and I don't know anything, but let me tell you, I am extremely upset by what I've been seeing in the wetlands recently.
The people were not picking up after themselves and left trash everywhere. What they don't realize is, that when it rains, the trash will get washed into the ocean. Who wants to look at trash all day? Not me! I don't want trash all over my home!

Don't people care?? I don't understand it, Antonia.

Slide 4:

(Antonio Ant) Wow Larry Lemonade Berry! That sounds terrible! If Humans understood how important the wetlands are, they would be more considerate. Something really needs to be done! Back to you Fatima.

(Fatima Woodpecker) Well folks, this is a breaking story we will continue to follow, but we need help from Science Leaders!

Do you know any kind and generous science leaders who care about the wetlands?

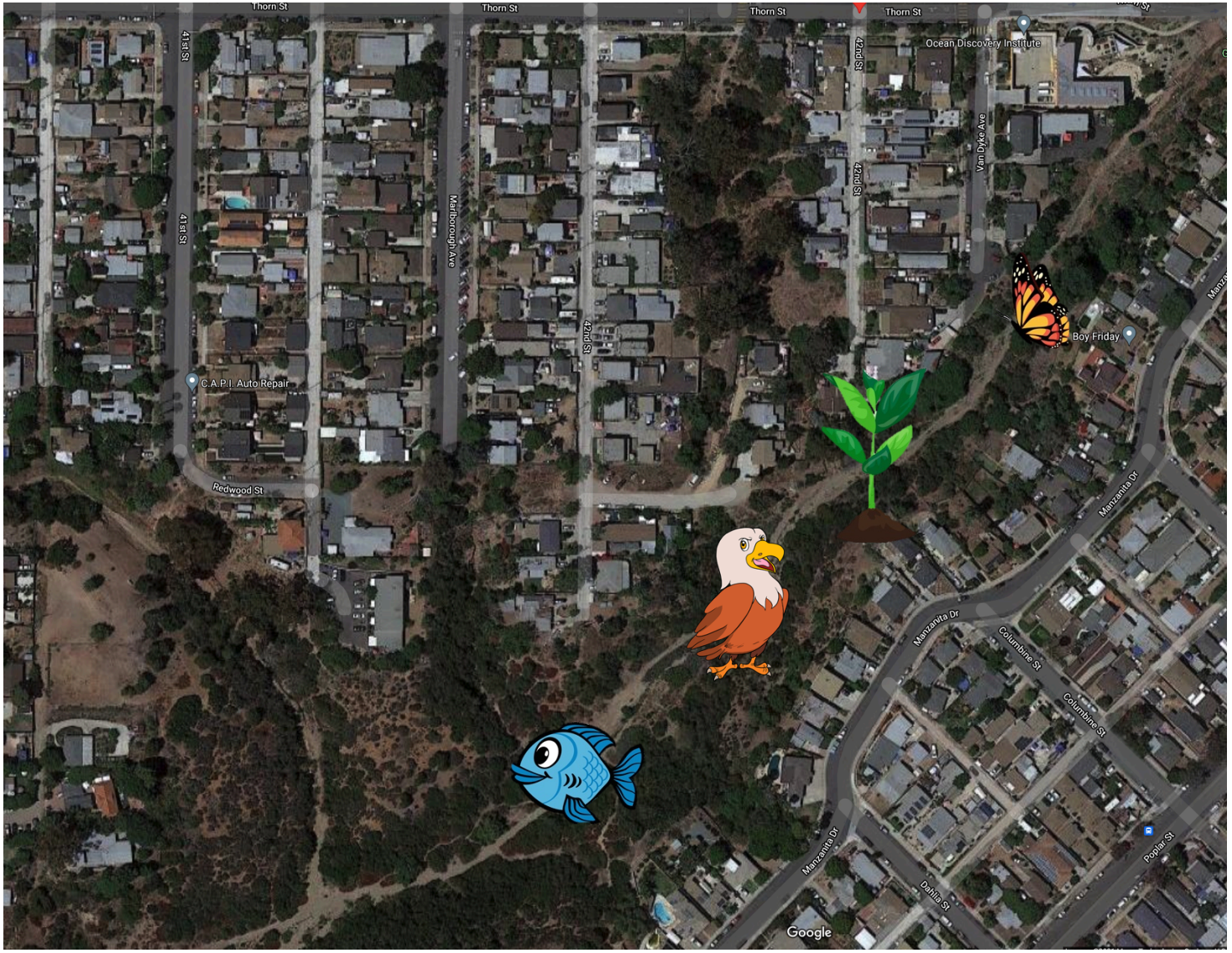
If you are a science leader who wants to learn more about why wetlands are important, you must go on a journey into the watershed to meet some of the local residents who will teach you why the wetlands are important. Good luck!

INSTRUCTOR'S GUIDE WONDERS OF THE WATERSHED ADVENTURE

Character	Set-Up	Clue for Character	Character's Message
Ahmed Topsmelt	o Place clue inside plastic ball. o Next to Ahmed place the magnetic alphabet & numbered fish puzzle and the lockbox. o Be sure the combo to the lockbox is written under the below pieces of the magnetic puzzle: 1st no of combo: under fish "1" 2nd no of combo: under fish "2" 3rd no of combo: under fish "N" 4th no of combo: under fish "D" Inside the lockbox place "Ahmed Topsmelt's message".	One fish, two fish Red fish, Blue fish Find FISH to reveal the secret code, With the code open the box to learn about my wetland abode	Many fish like me grow up in the wetlands near the coast because it is a safe and protected place to live while we are young and before we head out to the open ocean where dangers await! That is why we say that Wetlands are a **Fish Nursery**! **Question**: What is you first childhood memory? Before you leave: return the fish to the puzzle and the message to the box. Close and lock the box. Now that I have taught you what you must know, choose your next adventure. Off you go!
Betty Butterfly	o Place clue inside plastic ball. o Next to Betty place the butterfly puzzle broken apart.	Compete the puzzle and I will teach you what I know about the wetlands. When this puzzle joins together, You will know the wetlands better!	I love to float on the breezes in the wetlands. One thing I wish humans understood about the wetlands is that all the lovely plants that live here clean the air and remove pollutants. They make the air so clean and fresh! That's why we say the Wetland are an **Air Purification Post**! **Question**: What activity do you like to do outdoors in the fresh air? Before you leave: break up the puzzle and return it to the box. Now that I have taught you what you must know, choose your next adventure. Off you go!

Sofia Sage	o Place clue inside plastic ball. o Next to Sofia place the four large letters to spell SAGE (based on grade level).	Take the letters of my name. Rearrange them- it's a game. Make a new word and it will spell out. How long plants have ruled the wetlands – shout it out! **K-2 Modification** Take the letters of my name. Rearrange them- it's a game. Make a new word and it will spell out. How long plants have ruled the wetlands – shout it out! Hint: The new word starts with A and ends with S.	Many people don't realize that the soil and all the plants in the wetlands, (like me!) are able to filter the water and remove pollution that would otherwise get washed into the ocean. Plants and soil help to keep our water and the ocean clean! That is why we say that Wetlands are a **Water Treatment Plant**! **Question**: How do you help your family? Before you leave: reorder the papers so that they spell SAGE. Now that I have taught you what you must know, choose your next adventure. Off you go!
Antonio the Red Shouldered Hawk	o Place clue inside plastic ball.	I soar above the wetlands wild and free. Looking down on all the animals I see. Now it's time you look like me. Pose as a hawk and take a photo if you all agree.	*Once the students have taken a picture with everyone posed as a hawk, you can give them Antonio's message.* As a hawk I am almost always flying above the wetlands! I get to see so many different animals who make their home here – birds, insects, mice, snakes, lizards, fish, the list goes on and on. Many people don't realize that the wetlands provide a home and a place to rest for so many animals, big and small. That is why we say that Wetlands are **Wildlife Housing**! **Question**: What is something you like about where you live? Now that I have taught you what you must know, choose your next adventure. Off you go!

Wonders of the Watershed Adventure Map



Day 2, 3 or 4: Wetlands Are a Flood Control Center & Erosion Prevention Station

Goal: Students will learn that the plants in the wetlands work to prevent flooding and erosion by doing an experiment.

Supplies:

Visuals**:**

- Watershed Poster
- Labels for Watershed Poster
  - Laminated in a slightly smaller font:
    - "Flood Control Center"
    - "Erosion Prevention Station"
- Fish Nursery, Wildlife Housing, Air Purification Post, Water Treatment Plant, Flood Control Center, and Erosion Prevention Station posters.
- Word Wall Poster
  - Laminated words:
    - Experiment – to test something
    - Erosion – the movement of soil from one place to another

Supplies:

- General:
  - Painters tape (2)
  - Sharpie (2)
- Experiment:
  - Pans (2/three students)
    - ½ labeled "Developed Wetlands"
      - These will be created beforehand using trays to plant multiple kinds of plants that will resemble a wetland.
    - ½ labeled "Undeveloped Wetlands"
      - These will be created by students during the experiment.
  - Plants (enough to create "Developed Wetlands" trays)
    - Order Crystal Frosty Sedge from City Farmers Nursery
  - Planting soil
  - Rokenbok blocks (lots for building "homes" and "buildings"
  - 500 mL plastic beakers (1/three students)
- Process Reflection:
  - Outlines of plants (pre-cut) (1/student)
  - Small art supply plastic bins filled with colored pencils, crayons, and markers (4)
  - Scotch tape rolls (4)

Timing:

Time	Activity	Learning Cycle
3:45p – 3:50p	Introduction	Engagement
3:50p – 4:10p	Science Leader Student Connection	Engagement
4:05p – 4:30p	Flood Control and Erosion Prevention Experiment	Exploration and Guided Analysis
4:30p – 4:40p	Process Reflection	Reflection
4:40p – 4:45p	Break	N/A

Set Up

- Write daily agenda on white board and set on white board stand
- Set up technology and test for Zoom call with scientist.
  - Check sound.
  - Check that the camera shows as many students as possible.
- Set up visual materials:
  - Open "CI Wonders of the Wetlands Camp" PPT slides and test links for the day.
    - Be sure to move past commercials for any videos.
  - Put up Word Wall Poster and set words for the day at instructor station.
  - Put up Watershed Poster.
- Set up for Flood Control Center and Erosion Prevention Station Experiment:
  - Have "Undeveloped Wetlands" trays ready to go.
  - Label ½ the pans "Developed Wetlands"
  - In outdoor space:
    - Set out pans, bucket of dirt, plants, and bins of Rokenbok blocks to be used to wetland creations.
  - In classroom space:
    - Fill an orange home depot bucket with water.
    - Create example beakers of dirt collected during experiment.
      - None
      - A little
      - A lot
    - Set Erlenmeyer flasks and beakers off to the side.
- Prep small plastic art supply bins with pre-cut outlines of plants, crayons, colored pencils and markers.

Assistant Team Lead:

- Help students to place words on the Word Wall.
- Do the kinesthetic "Why Wetlands Are Important" movements with students.
- During the Flood Control and Erosion Prevention Experiment:
  - Help students build their Developed Wetlands.
  - Help students take mL reading of water after experiment is completed.
  - Help students fill in their data table after the experiment in their science notebook.
  - Potential questions to ask:
    - What do you notice?
    - Why do you think that is happening?
    - What is different between the two wetlands when it rains? Why do you think that is happening?
- During the process reflection you have a **Mentoring opportunity**. Potential questions include:
  - Do you think learning about the wetlands is important? Why?
  - What did you like about doing science today?
  - Can you think of a time today when you were doing science? What were you doing?
- Help students to tape their plants to the Watershed Poster.

Introduction

- Review daily agenda on the white board.
- Review the previous day using the Word Wall and Watershed poster. Potential questions include:
    - What did we learn about on our adventure yesterday?
    - What is a watershed?
        - Watershed = An area of land that channels rainfall and snowmelt to streams and rivers, and eventually to bays, reservoirs, or the ocean.
        - (Show watershed poster.)
    - What is the definition of a wetland?
        - Wetland = a place where water and land meet.
    - What are some ways that wetlands are important?
        - (Be sure to review the following using posters and the associated kinesthetic movements.)
            - Fish Nursery
            - Wildlife Housing
            - Air Purification Post
            - Water Treatment Plant
- Today we will continue to learn more ways in which the wetlands are important by doing an experiment.
    - Define: Experiment - to test something
    - (Give a student the laminated word “experiment” to place on the Word Wall.)
    - Today we are going to do an experiment to see how different types of wetlands react to rain.

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.
    - Each day we will meet virtually with a science leader.
        - This science leader is someone who believes that each of you can do science and be a science leader!
        - Today we will learn about their pathway to becoming a science leader, what they do in their work, and how their work is related to fish.
    - 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 importance of wetlands. Why do you think this 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.)

Flood Control Center and Erosion Prevention Experiment

Timing Breakdown:

- Introduction (5 min)
- Create Wetlands (10 min)
- Experiment (10 min)

Introduction:

- We will do an experiment to see how rain impacts different types of wetlands.
- Look at two types of wetlands – Developed and undeveloped.
    - (Show Natural vs. Developed Wetlands slide.)
    - Define Developed Wetland: a wetland where humans have built homes and buildings
    - Define Undeveloped Wetland: a wetland left in its natural state- no homes or buildings.
- Create wetlands
    - (Show Wetlands Set-Up slide)
    - Your group will have two pans.
        - Undeveloped Wetland your team will be given an undeveloped wetland filled with plants.
        - Developed Wetland your team will create a developed wetland by placing xx (amount of) dirt on the bottom of the pan and then placing blocks on top of the dirt to represent houses and buildings.
            - You can put as many houses and buildings as you want but no plants.
            - In a developed wetland most of the plants are removed to make space for houses and buildings.

Create Wetlands

- (Break students up into groups of three to work.)
- (Walk students to outdoor location.)
- (Show students supplies to build developed wetland.)
- (Give student time to create their developed wetland and hand out an undeveloped wetland to each group.)

Experiment

- Now that we have two types of wetlands, we are going to see how rain impacts both types.
    - (Show Experiment - Make it Rain!slide.)
- You will make it “rain” over both types of wetlands, make observations, and collect data on what you see.
- Review steps of experiment while demonstrating:
    1. Fill Erlenmeyer flask from orange bucket with 500ml of water.
    2. Position Developed Wetland over a beaker at a 45-degree angle.

3. Wait for instructor to make it rain.
4. Pour water from Erlenmeyer flask all over the wetland.
5. Measure the amount of water and soil collected in the beaker.
6. Record this data on in your science notebook.
7. Share your data with the class on the whiteboard.

- Have students open up to Flood Control and Erosion Prevention Station Experiment page in their science notebook.
  - Data table in notebook (see below).
    - (Show Data Table slide.)
  - Review the data they will be collecting for each wetland:
    - How much water comes off the wetland measured in mL's from the beaker.
      - (Show how to take this measurement.)
    - Estimated amount of dirt that comes off the wetland.
      - (Show example beakers of None, A Little, A Lot.)

Process Reflection

Timing Breakdown:

- Analyze Data (5 min)
- Return to Watershed Poster (5 min)

Analyze Data

- Analyze class wide data from datasheet on PowerPoint to determine how rain impacts developed and undeveloped wetlands.
    - Explain that an average amount of water has been calculated using everyone's data.
- Be sure to cover (see potential questions in box to the right):
    - Less water and dirt came off Undeveloped Wetland.
    - **Undeveloped Wetlands have many plants whose roots absorb rainwater and hold onto the soil which helps to prevent flooding and erosion.**
        - Developed wetlands have so few plants that water is not absorbed and just runs off the land creating floods.
        - Developed wetlands have so few plants to hold onto the soil that the flooding water simply carries away the dirt as well- this is called erosion.
            - Define erosion – the movement of soil from one place to another.
        - Humans don't want flooding or erosion.
    - **Undeveloped Wetlands have lots of plants and act as Flood Control Center and Erosion Prevention Station.**
        - (Show associated kinesthetic movements and posters).
            - Flood Control Center- put hands up and say, "Water, stop here"
            - Erosion Prevention Station- wave finger saying, "Dirt, do no enter"
        - (Have students fill in the bottom of their science notebook page Wetlands are a Flood Control Center and Erosion Prevention Station.)
- Great job using experimentation today to figure out another way that wetlands are important and should be protected!

Return to Watershed Poster

- Ask students to tell you a new reason they learned that wetlands are important today.
    - Flood Control Center and Erosion Prevention Station!
- Ask students what part of the wetland helped to absorb water and keep the soil in place?
    - Plants!
- Today we will add plants to our wetlands poster!
    - Choose a plant outline from your bin to color and then it will be added to the poster.
- (Give students a time limit to work.)
- (Provide students with time reminders.)
- (When a student is finished help them tape it to the Watershed Poster.)

- Review the rest of the roadmap for the week.
- (Have students wash hands.)
- Great job today scientists!

Developed Versus Undeveloped Wetland Experiment Data

Wetlands are a Flood Control and Erosion Prevention Station

	Natural Wetland	Developed Wetland
Amount of Water	mL	mL
Amount of Soil	None A Little A Lot	None A Little A Lot

Wetlands are:

Day 2, 3 or 4: Wetlands are a Bird Motel and Restaurant

Goal: Students will learn that many different types of birds use the wetlands as a place to eat a variety of foods and a place to rest.

Supplies:

Visuals:

- Fish Nursery, Wildlife Housing, Air Purification Post, Water Treatment Plant, Flood Control Center, Erosion Prevention Station, and Bird Motel and Restaurant posters.
- Watershed Poster
- Labels for Watershed Poster
    - Laminated in a slightly smaller font:
        - "Bird Motel and Restaurant"
- Word Wall Poster
-

Supplies:

- General:
    - Painters tape (2)
    - Sharpie (2)
- Experiment:
    - Rent birds from: San Diego Natural History Museum (3)
        - Short beak (1)
        - Long beak (1)
        - Scoop beak (1)
    - Plastic cups (1/student)
    - Beaks
        - Chopsticks (1 for every three students)
        - Spoon (1 for every three students)
        - Clothespins (1 for every three students)
    - Bird glasses (1/student)
    - Bird "food"(lots of each type)
        - Red pipe cleaners (worms)
        - Marbles (fish)
        - Beads (seeds)
    - Dry erase marker (2)
    - Calculator (1)
- Process Reflection:
    - Outlines of birds (pre-cut) (1/student)
    - Small art supply plastic bins filled with colored pencils, crayons, and markers (4)
    - Scotch tape rolls (4)

Timing:

Time	Activity	Learning Cycle
3:45p – 3:50p	Introduction	Engagement
3:50p – 4:05p	Wetlands are a Bird Motel and Restaurant	Engagement
4:05p – 4:30p	Bird Motel and Restaurant Experiment	Exploration and Guided Analysis
4:30p – 4:40p	Process Reflection	Process Reflection
4:40p – 4:45p	Break	N/A

Set Up

- Write daily agenda on white board and set on white board stand
- Set up technology and test for Zoom call with scientist.
  - Check sound.
  - Check that the camera shows as many students as possible.
- Set up visual materials:
  - Open "CI Wonders of the Wetlands Camp" PPT slides and test links for the day.
    - Be sure to move past commercials for any videos.
  - Put up Word Wall Poster and set words for the day at instructor station.
  - Put up Watershed Poster.
- For Wetlands are a Bird Motel and Restaurant experiment:
  - Put a layer of sand in each tray.
  - In each tray spread out lots of beads, pipe cleaners, and marbles so there is plenty of food for each student to "eat".
    - **If doing the experiment outside near the Fisler Family Tree spread marbles, beads, and pipe cleaners around in the sand. Place different beaks and stomachs off to the side to pass out.
  - Place bird glasses off to the side to be handed out before experiment begins.
  - Set up a whiteboard on a stand at the front of the room and write the data table on it.
  - Place a calculator at the front of the room to be used by the Assistant Instructor to get totals for each box on the data chart.
- Prep small plastic art supply bins with pre-cut outlines of birds, crayons, colored pencils and markers.

Assistant Team Lead

- Help students to place words on the Word Wall.
- Do the kinesthetic "Why Wetlands Are Important" movements with students.
- For Wetlands are a Bird Motel and Restaurant experiment:
  - Help pass out bird glasses to students.
  - Help students count food after experiment.
  - While students are adding data to the whiteboard sum up each box to get a total number of food for each type.
- During the process reflection you have a **Mentoring opportunity**. Potential questions include:
  - Do you think learning about the wetlands is important? Why?
  - What did you like about doing science today?
  - Can you think of a time today when you were doing science? What were you doing?
- Help students to tape their birds to the Watershed Poster.

Introduction:

- Review daily agenda on the white board.
- Review the previous day using the Word Wall and Watershed poster. Potential questions include:
  - What is a watershed?
    - Watershed = An area of land that channels rainfall and snowmelt to streams and rivers, and eventually to bays, reservoirs, or the ocean.
  - What is the definition of a wetland?
    - Wetland = a place where water and land meet.
  - What are some ways that wetlands are important?
    - (Be sure to review the following using posters and the associated kinesthetic movements.)
      - Fish nursery
      - Wildlife Housing
      - Air Purification Post
      - Water Treatment Plant
      - Flood Control Center
      - Erosion Prevention Station
- Today we will continue to learn more ways in which the wetlands are important by doing another experiment.
  - Define: Experiment - to test something
- Today we are going to do an experiment to see how different types of birds eat different kinds of food in the wetlands.

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.
    - Each day we will meet virtually with a science leader.
        - This science leader is someone who believes that each of you can do science and be a science leader!
        - Today we will learn about their pathway to becoming a science leader, what they do in their work, and how their work is related to fish.
    - 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 importance of wetlands. Why do you think this 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.)

Bird Motel and Restaurant Experiment:

Timing Breakdown:

- Introduction (10 min)
- Experiment (15 min)

Introduction:

- Remind students that on Day 1 they went on an adventure through the wetlands.
- Walking around the wetlands we saw many different plants and animals – this is one reason that so many birds like to visit or live in the wetlands because there are many sources of food.
- Let's look at some examples of birds we might find in wetlands throughout the watershed here in San Diego.
    - (Take out SDNHM birds.)
    - (Name each type of bird.)

  Ask students to make general observations about the different birds.
    - (Ex. colors, legs, feathers, beaks, etc.)
- Although these are all birds they are very different from each other. There are a diversity of birds that live in the wetlands.
- Think-pair-share: Do you think these birds eat the same things? Why or why not?

Experiment:

- Overview
    - Today we will do an experiment about what birds eat in the San Diego wetlands.
        - Question: Do different birds eat different types of food?
        - (Show Bird Experiment Question slide.)
    - Ask students what part of their body birds use to eat – beak.
    - Explain that in this experiment each student will be a different type of bird and have a different type of beak to eat with.
        - (Show chopsticks, clothes pin, and spoon beaks and relate them to one of the SDNHM birds.)
    - There will be different types of food for you to eat in the wetland.
        - (Show foam invertebrates, marbles, and sunflower seeds.)
    - When a bird eats, where does the food go after they swallow it? – Stomach.
        - (Show students plastic cup = stomach.)
        - When they pick up food with their beak they may place it in their stomach (plastic cup.)
    - You may eat whatever kind of food you like but you should eat as much as you can in the minute you have to eat.
    - Remind students that birds do not want to eat sand so they should avoid shoveling too much sand into their stomach or they will be sick.

- Tell students that they must lift their beaks and stomachs above their heads as they "fly" over the wetland looking for food.
- When you say "Eat!" they may dive down and start "eating" food of their choice.
- When you say "Fly!" they must immediately stop eating and take off lifting their beaks and stomachs into the air.

- Experiment:
  - To become a bird we must look like birds!
    - (Pass out a pair of bird glasses to each student.)
  - Now we need a place to eat and some other birds to eat with.
    - (Give each student a set of chopsticks or a spoon, or a clothes pin.)
    - (Try to have equal numbers of chopsticks, spoons, and clothes pins.)
    - (Hand out a plastic cup (stomach) to each student.)
  - Alright birds let's get ready! "Everyone fly"
    - (Demonstrate this by putting your beak and stomach in the air.)
    - (Check that all students have beaks and stomachs in the air.)
  - Okay birds it's time to "Eat!".
    - Let students eat in the wetland for one minute."
    - Then say "Fly!"
    - (Be sure all students stop eating and lift their beaks and stomachs up.)
  - Ask students to put stomachs and beaks down and open their science notebooks to the "Wetlands are a Bird Motel and Restaurant" page.
    - (See below.)
  - Explain that all students should now count each type of food their bird ate and record it in the chart for their beak type.
    - (Demonstrate this – using one example. Be clear that students should be writing on a specific line.)
  - When students have filled out the chart in their notebook, they should come to the front of the room to add their data to the whiteboard.
    - (Assistant instructor should get a total for each box using the calculator and write the number largely and circle it in each box on the whiteboard.)

	Beads (seeds)	**Pipe Cleaners (worms)**	**Marbles (Fish)**
Short beak (clothespin)			
Long beak (chopsticks)			
Scoop beak (spoon)			

Process Reflection:

<u>Timing Breakdown:</u>

- Analyze Data (5 min)
- Return to Watershed Poster (5 min)

Analyze Data

- Analyze class wide data from the whiteboard to answer the question: Do different types of birds eat different things?
    - Explain that the data has been added up to provide a total for each box.
- Be sure to cover (see potential questions in box to the right):
    - Different types of birds eat different things based on the type of beak they have.
        - Scoop beaks = fish
        - Long thin beaks = poke down into ground/sand for invertebrates
        - Short beaks = seeds
    - Birds sometimes eat food their beaks aren't best at just like we did in the experiment but the majority of food they eat is what their beak is best at catching/eating.
    - **Wetlands are a Bird Motel and Restaurant.**
        - Birds use the wetlands to find many different types of food and as a place to rest.
        - (Show associated kinesthetic movements and poster).
            - Bird Motel and Restaurant- stand on one leg and place thumb in armpit to create a "wing" and act as if eating with a fork while making chewing sounds.
        - (Have students fill in the bottom of their science notebook page Wetlands are a Bird Motel and Restaurant.)
        - Wetlands should be protected by humans because birds need wetlands as a place to find food and rest.
- Great job using experimentation today to figure out another way that wetlands are important and should be protected!

Return to Watershed Poster

- Ask students to tell you a new reason they learned that wetlands are important today.
    - Bird Motel and Restaurant!
- Ask students what we should add to our wetlands poster? - Birds
    - Choose a bird outline from your bin to color and then it will be added to the poster.
- (Give students a time limit to work.)
- (Provide students with time reminders.)
- (When a student is finished help them tape their bird to the Watershed Poster.)
    - Based on what type of bird they have ask them were in the Watershed they think they should tape their bird.
        - Ex. a scoop beak bird would live closer to the water.
- Review the rest of the roadmap for the week.
- Great job today scientists!

Day 2, 3 or 4: Wetlands are a Place of Native People

Goal: Students learn that native people of San Diego – the Kumeyaay utilized plants and animals of the wetlands for everyday life.

Supplies: (For one group of 10 students)

Visuals**:**

- Watershed Poster
- Labels for Watershed Poster
  - Laminated in a slightly smaller font:
    - "Place of Native People"
- Word Wall
  - Word Wall Poster
  - Laminated words:
    - Kumeyaay – a native people of San Diego

Supplies:

- Painters tape (1)
- Glue sticks (1/student)
- Living plants (1/each):
  - Lemonade berry
  - Black sage
  - Pickleweed
  - Salt grass
  - Buckwheat
- Living animals (1/each)
  - Wavy top snail
  - Abalone
- Acorns (inside basket)
- Buckwheat pancakes
- Animal cut outs (1/each):
  - Mouse
  - Rabbit
  - Brown pelican
- Kumeyaay baskets (2)
- Each of the below names written in LARGE font on half a piece of poster board:
  - Headwaters
  - Mission Valley (Nipaguay)
  - Mission Bay (Coastal Marsh)
  - River Mouth (Paulpa)

  - Dog Beach (Sand Dunes)
- Acorns for grinding (4-5)
- ¼ pieces of blank white paper (1/student)
- Small art supply plastic bins filled with colored pencils, crayons, and markers (4)
- Scotch tape rolls (4)

Timing:

Time	Activity	Learning Cycle
3:45p – 3:50p	Introduction	Engagement
3:50p – 4:05p	Science Leader Student Connection	Engagement
4:05p – 4:30p	Wetlands Are a Place of Native People Activity	Exploration and Guided Analysis
4:30p – 4:40p	Process Reflection	Reflection
4:40p – 4:45p	Break	N/A

Set Up

- Write daily agenda on white board and set on white board stand
- Set up technology and test for Zoom call with scientist.
  - Check sound.
  - Check that the camera shows as many students as possible.
- Set up visual materials:
  - Open "CI Wonders of the Wetlands Camp" PPT slides for the day.
  - Put up Word Wall Poster and set words for the day at instructor station.
  - Put up Watershed poster.
- For Wetlands are a Place of Native People activity:
  - Set up the five posterboards around the Living Roof (start Headwaters near the canyon and Dog Beach ending around Watershed Plaza).
  - Place potted plants/animal cut outs around the posters they are found on.
  - Attach to each potted plant/cut out a paper sleeve with the stickers that pertain to that plant/cut out.
    - (Ex. Place "abalone" cards in a paper sleeve taped to the front of the abalone cut out.)
  - Set up Metate (or mortar and pestle) for grinding of seeds near the Headwaters station.
    - See Instructor Supplemental material for a video on how to make Shawii so that you can talk about this process with your students.
- Prep small art supply bins with ¼ pieces of blank paper, crayons, colored pencils and markers.

Assistant Team Lead

- Help students to place words on the Word Wall.
- During the Wetlands are a Place of Native People activity:
  - K-4th grade: You will take half the students on their "journey". You will move together as a group to find the thing you need and help students paste them into their journal.
  - 5th- 8th grade: You will be stationed at the Headwaters and help students grind acorns using the metate and mana.
    - See Instructor Supplemental material for a video on how to make Shawii so that you can talk about this process with your students.
- During the process reflection, you have a **Mentoring opportunity**: Potential questions:
  - How did it feel to be a Kumeyaay kid today?
  - How do you think your life today is different than that of a Kumeyaay who lived 200 years ago in San Diego?
  - Do you think it is important to learn about the native people who live in San Diego? Why or why not?
- Help students tape their people to the Watershed Poster.

Introduction:

- Review daily agenda on the white board.
- Review the previous day using the Word Wall and Watershed poster. Potential questions include:
  - What is a watershed?
    - Watershed = An area of land that channels rainfall and snowmelt to streams and rivers, and eventually to bays, reservoirs, or the ocean.
  - What is the definition of a wetland?
    - Wetland = a place where water and land meet.
  - What are some ways that wetlands are important?
    - (Utilize Wetland Power Point.)
    - (Be sure to review the following using posters and the associated kinesthetic movements.)
      - Fish nursery
      - Wildlife Housing
      - Air Purification Post
      - Water Treatment Plant
      - Flood Control Center
      - Erosion Prevention Station
      - Bird Motel and Restaurant
- Today we will continue to learn more ways in which the wetlands are important by learning about some of the native people who used to live in or near the San Diego wetlands.

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.
    - Each day we will meet virtually with a science leader.
        - This science leader is someone who believes that each of you can do science and be a science leader!
        - Today we will learn about their pathway to becoming a science leader, what they do in their work, and how their work is related to fish.
    - 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 importance of wetlands. Why do you think this 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.)

Wetlands are a Place of Native People

Timing Breakdown:

- Introduction (5 min)
- Becoming a Kumeyaay Kid (10 min)
- Being a Kumeyaay Kid Activity (15 min)

Introduction

- Remind students they have been studying how wetlands are important over the last few days and how wetlands should be protected by humans.
- Introduce the Kumeyaay. Be sure to include:
    - The Kumeyaay are the native people that first lived here in San Diego.
    - They migrated between summer and winter village sites and made their homes along the river.
    - The Kumeyaay village of Nipaguay was located where we now find the Mission Valley Mall. A river used to flow through Mission Valley, before modern-day humans built buildings and streets in the valley.
- Think about the things we need every day in order to survive.
    - Food, water, clothing, shelter, medicine, etc.
    - Where do you get those things – Grocery store, clothing store, Kmart, etc.
    - Were the Kumeyaay people able to shop in stores for the things they needed?
        - No, they had to find everything they needed from the land.
        - The wetlands along the river and the coast were great places for them to find many of the things they needed for survival.
            - For example, they would collect willow and juncus plants that grew near the water to weave baskets to hold food and even water.
                - (Show basket.)
            - They used rocks to grind plants and seed for food.
        - Kumeyaay were always respectful of nature and only took what they needed.

Becoming a Kumeyaay Kid:

- Today you will become a Kumeyaay kid.
- Kumeyaay children did not go to traditional schools like you, but rather learned from their parents and other village elders about how to manage the land, collect different plants and animals for food and medicine and create clothing and shelter.
- We are going to transform the Living Roof and Watershed Plaza into a Kumeyaay watershed from a 1,000 years ago.
- Within the Watershed, there will be five main areas that spread from the mountains all the way down to the coast that you will visit.
    - (Show slide of watershed on PowerPoint.)

- Headwaters: are up in the mountains (show on the watershed map) and is where the watershed begins. The headwaters used to be filled with trees, and were a rich and clean source of water.
- Mission Valley: a river used to run through this area and there were lots of plants and animals – no highways like today.
- Mission Bay: this area used to be a coastal marsh filled with plants and animals
- River Mouth: this is the place where the watershed meets the ocean, the same water that has traveled from the top of the mountain all the way down to the ocean. The river mouth was once known as Paulpa, a small Kumeyaay village. Many Kumeyaay people came here to collect plants, animals and trade with other people.
- Dog Beach: was once an area of sand dunes that protected the wetland and where many different types of plants could be found.

- As a Kumeyaay kid, you will each have certain tasks to do, to help your village and make sure you and your clan survive. You will travel through the watershed to gather what you need and record your journey in your science notebook.
- Each entry in your science notebook is a different day because you will have to travel to different parts of the watershed to find what you need and that would take time.
  - By carefully reading the entries in your science notebook, you will figure out where in the watershed you need to go.
  - Once you are in the right place, you can use the clues in your notebook and the information on the poster to help you figure out what plant or animal you need.
- Kumeyaay are extremely respectful of nature and the environment, so before taking a plant or animal, you must ask the plant or animal for permission, by saying:
  - *I know that you are alive, just like me, so I will only take what I need, and I promise to use you carefully. (Name of plant or animal), I need you to help me (describe what you will do with it.)*
    - Ex. Lemonade berry I need you to help me make a delicious drink.
  - Only after you have asked permission, you can reach into the envelope and collect the plant or animal you need. Then taking a glue stick, glue the plant or animal where it belongs in your notebook.
  - (Go through an example of how you read an entry, find where to go and then look for the plant/ animal you need, ask permission to take it and then glue it into your notebook.)
- Two of the plants you gather will require a little extra work. Once you get to this point, you will take what you gathered and your instructor will give you further instructions.

Being a Kumeyaay Kid Activity

- Have students open their notebook to "Wetlands are a Place of Native People" page.
- For 5th-8th Grade:

  - It is a Choose Your Own Adventure style. They do not need to collect things in the order they are written. They can fill out their journal in any order they want to but they need to complete the whole journey.
- For K-4th Grade:
  - Divide group in half.
  - Half the students go with assistant instructor and follow the journal from start to finish while the other half of the student go with the lead instructor and follow the journal backwards from the end to the beginning.
- Have students look at the first entry to find out where their first destination is.
- (As students travel between sites, monitor their journey and journals.)
- (If a student finishes their journey early, have them sit down at their table and let them decorate and color their journey pages and drawings of plants or animals they collected.)

Process Reflection

Timing Breakdown:

- Debrief (5 min)
- Return to Watershed Poster (5 min)

Debrief

- Share some of the real Living Roof plants that students "collected" on their journey and their uses.
- Do a think-pair-share:
    - What are some examples of the plants and animals that helped you? What were you able to use them for?
    - (If time allows) Do you think it would easy or difficult to grow up as a Kumeyaay kid two hundred years ago? Why?
- Review what students have learned about the Kumeyaay. Be sure to cover (see potential questions in box to the right):
    - Today, and for thousands of years previously, the Kumeyaay people have been wetland experts and have used plants and animals from it to survive in a way that does not hurt the ecosystem.
    - The Kumeyaay people still exist as a tribal nation today.
        - I am going to share a short video of a group of traditional Kumeyaay singers with you now.
        - (Share Kumeyaay Bird Singers Video.)
    - **Wetlands are a Place of Native People**
        - At one time the Kumeyaay people lived all over San Diego, from the mountains where the watershed begins down to the ocean. At one point, they may have even lived where your house or this building is today!
        - Kumeyaay people have had to adapt to the changes in this area as other humans have developed the land and towns and cities were constructed over the wetlands, but Kumeyaay are still alive, active and thriving community in San Diego.
    - The wetlands can be used by humans in ways that don't harm them, when people are respectful and careful about what they do or bring into the wetlands.
        - (Show associated kinesthetic movements and poster).
            - Place of Native People – mime using a metate and say "We respect the wetlands!"
        - (Have students fill in the bottom of their science notebook page Wetlands are a Place of Native People.)

Return to Watershed Poster

- Ask students to tell you a new reason they learned that wetlands are important today.
    - Wetlands are a Place of Native People.

        - (Ask a student to add laminate "Wetlands are a Place of Native People" to the Watershed poster.)
    - Ask students what we should add to our wetlands poster? - People
        - Explain to students that they will draw themselves as a Kumeyaay kid living in the watershed.
        - They can add any of the plants or animals they collected today to their drawing.
        - Remind students that they do not need to have perfect drawings.
    - (Give students a time limit to work.)
    - (Provide students with time reminders.)
    - (When a student is finished help them tape their person to the Watershed Poster.)
        - Ask what their person appears to be doing?
        - Is this person using the wetlands respectfully?
    - Review the rest of the roadmap for the week.
- (Have students wash hands.)
- Great job today scientists!

Headwaters:

- Lemonade berry: berries are used to make a lemony-fresh drink.
- Prickly pear: the stems of this plant could be used as a natural band- aid and the fruit made into a jam.
- Acorns: were a food eaten at nearly every meal. To eat them they were put in a basket and rinsed in water for several weeks, they were then ground and mixed with water to create an acorn mush called shawii.
    - ** Metate – once students gather acorns they will be directed to visit the metate. An instructor should share the following with students while they use the metate to grind acorns:
        - *Acorns were an important part of the Kumeyaay diet. Some acorns are stored whole in baskets, called granaries to be saved and prepared later.*
        - *Acorns are used to make shawii.*
        - *Shawii was served at almost every meal and is a food that goes with everything.*
        - *To make shawii, you have to grind acorns in a metate with a mana (show this).*
        - *The job of grinding acorns is very difficult because the nuts are very strong. Try to grind these seeds, to get an idea of how long it would take to make a meal.*
        - *(Let students attempt to grind acorns with metate and mana.)*
        - *Once the acorns are all ground up (like flour) water would be passed over the flour like substance several times to leech out all the bitter parts.*
        - *The dough was then cooked over the fire to create the shawii.*

Mission Valley/Nipaguay:

- Juncus: is used to make baskets.
- Black sage: was used in food for added flavor.

Coastal Marsh:

- Pickleweed: was eaten for a salty treat.
- Wavy top snail: the meat inside was cooked and eaten.
- Brown pelican: after the meat is eaten, the skin and feathers of this bird are used like a raincoat.

River Mouth/Paulpa:

- Abalone: meat is eaten, and then the shells are turned into jewelry, fish hooks, or traded.
- White sage: is a special plant used in ceremonies or rubbed over the body to disguise the human scent.

Dog Beach/Sand Dunes:

- Primrose: has seed pods that are cooked and eaten as a popular snack by kumeyaay kids.
- Salt grass: is good for colds when the leaves are made into a tea.

Day 5: Make a Difference

Goal: Students will learn how they can help protect wetlands today by being community scientists and collecting data about local bird populations and learn how they can protect wetlands in the future by learning about careers in environmental consulting.

Supplies:

Visuals:

- Fish Nursery, Wildlife Housing, Air Purification Post, Water Treatment Plant, Flood Control Center, Erosion Prevention Station, and Bird Motel and Restaurant posters.
- Watershed Poster
- Word Wall Poster
  - Laminated words:
    - Make a Difference

Supplies:

- iPad/iPod with wifi capabilities
  - K-5th grade (1/group)
  - 6th-8th grade (1 per two students)
- Binoculars (1 per students)
- Bird ID card (1 per 2 students)
- 8 x 11 pictures of (1/two students):
  - Nuttall's Woodpecker
  - Red Shouldered Hawk
- 8 x 11 picture of (1/class):
  - House sparrow
  - Hooded Oriole
- Thought bubble cut outs (10)
- Stickers for end of program (1/student)

Timing:

Time	Activity	Learning Cycle
3:45p – 3:55p	Introduction	Engagement
3:55p – 4:25p	Make a Difference	Exploration
4:25p – 4:40p	Process Reflection	Guided Analysis & Reflection
4:40p – 4:45p	Break	N/A

Set Up

- Write daily agenda on white board.
- Download Merlin Bird app on all iPad/iPods.
  - Upload Southern California bird list.
- For Make a Difference Day activity:
  - Log into eBird
    - Username: OceanDiscoveryInstitute
    - Password: ocean4255
    - Email: oceandiscoverycicamp@gmail.com
    - Password: ocean4255
  - Log into Merlin Bird ID
    - https://merlin.allaboutbirds.org
- Have bird pictures, iPad, bird ID cards, and binoculars off to the side.
- Prep small art supply bins with thought bubbles, crayons, colored pencils and markers.

Assistant Team Lead

- Help students to place words on the Word Wall.
- For Make a Difference Day Activity:
  - Help students utilize Merlin Bird ID program during training.
  - K-5th grade take half the students to show them how to use the Merlin Bird ID program during training.
    - Let each student have a turn with the iPad during the training while the other students help share information to identify the bird.
  - Potential questions include:
    - Do you think Community Science is important? Why?
    - Do you think it's important for scientists to share their knowledge with others? Why or why not?
    - Do you think other programs like this one exist if you wanted to identify plants or tide pool creatures, etc.?
- Help students tape thought bubbles to the Watershed Poster.

Introduction

- Review daily agenda on the white board.
- Review the previous day using the Word Wall and Watershed poster. Potential questions include:
    - What is a watershed?
        - Watershed = An area of land that channels rainfall and snowmelt to streams and rivers, and eventually to bays, reservoirs, or the ocean.
    - What is the definition of a wetland?
        - Wetland = a place where water and land meet.
    - What are some ways that wetlands are important?
        - (Utilize Why Wetlands are Important slide.)
        - (Be sure to review the following using posters and the associated kinesthetic movements.)
            - Fish nursery
            - Wildlife Housing
            - Air Purification Post
            - Water Treatment Plant
            - Flood Control Center
            - Erosion Prevention Station
            - Bird Motel and Restaurant
            - Place of Native People
- This week we have learned a lot about wetlands, the plants and animals that live there, why they are important, and how they are used by native people.
- Introduce Making a Difference.
    - *o* As scientists it is important that we not only learn about science, but we also take that information and try to make a difference in the world.
    - *o* Reference any science leaders they met throughout the week that are making a difference.
        - (i.e., Remember (scientist's name) who we talked to on Zoom? They are studying _____ and helping to make a difference by _____.)
    - o (Give a student the laminated words "Make a Difference" to place on the Word Wall.)
    - o One of the ways science leaders make a difference is by collecting data about area that they want to protect.
    - o Science leaders can collect data about all kinds of things – number and types of plants, number and types of animals, whether there are artifacts from native people, soil conditions, weather conditions, etc.
    - o Collecting data like this can help people decide if an area should be developed or not, or if new rules or laws need to be put in place to protect an area or the things that live in it.
- Introduce community science.
    - o Scientists need help collecting data like this because there is so much data to be collected and so many places that it would be helpful to know more about.

- This is why scientists rely on the help of community scientists.
  - Community scientists are people, of any age, from any neighborhood, who are trained to help scientists collect data.
  - Having the help of community scientists allows science leaders to collect more data in more places than they could on their own.
- Today you are going to be community scientists and we are going to collect data about the number of birds and the different types of birds that live in the canyon.
  - Review why wetlands are important to birds.
    - (Bird Motel and Restaurant.)
  - If someone wants to build on this wetland in the future our data could be used to help determine if this wetland should be developed.

Make a Difference

Timing Breakdown:

- Training (20 min)
- Community Science Data Gathering (15 min)

Training

- First let's learn how to identify birds we see.
    - To do this we will be using an developed by Cornell University called Merlin that will help us figure out what types of birds we are looking at.
    - (Divide students into groups of two.)
    - (Give each group an iPad/iPod.)
- We will start by learning how to use this software by identifying a bird in a picture.
    - (Hand out pictures of Nuttall's Woodpecker.)
- (Have students follow along with you on the Merlin app while you demonstrate using the SMART board.)
    - (Have students open up Merlin Bird app.)
        - (Show Merlin Bird app slide.)
        - (Click on Start Bird ID.)
    - Where did you see the bird?
        - (Show Start Bird ID slide.)
        - Enter Living Lab zip code: 92105
    - Fill in the date and click next.
        - (Show Bird ID: Date slide.)
    - What size was the bird.
        - (Show Bird ID: Size slide.)
        - Do you best to estimate the size based on the pictures.
    - What were the main colors?
        - (Show Bird ID: Color slide.)
        - You can choose between 1-3 colors. It's okay if there are more than three colors.
    - Was the bird…?
        - What was the bird doing when you saw it?
        - (Show Bird ID: Behavior slide.)
        - Picture shows it resting in a bush. Pick whatever the bird is doing when you see it.
    - Now you must scroll through the pictures of birds until you find one that looks similar to the one you are looking at.
        - Scroll to the left/right to see other pictures of the same bird.

        - (Show Bird ID: Choose your Bird slide.)
            - Click "This is my bird!" When you find it.
            - Click "Save with Merlin"
    - Choose a location:
        - (Show Bird ID: Choose Location slide.)
        - Give your location a name: "Ocean Discovery Institute"
        - Choose "San Diego, CA"
        - Click on the dot on the map.
        - Click Next.
    - Now your data is saved!
        - (Show Bird ID: Data Saved slide.)
        - Then click "ID Another Bird."
- If you don't see your bird after scrolling though at the bottom find "Can't find your bird?"
    - You can use this to change any of your settings.
    - Most often changing the size will show you new birds.

- We will practice doing this a few times before going out into the field to try it with binoculars.
    - Show students another bird picture- Great Blue Heron on the PowerPoint to identify.
        - (Use Bird ID slide.)
        - We will work through this one together.

- Let student practice more independently.
    - Give students another bird picture – Red Shouldered Hawk.
    - Have them try to identify it using Merlin.
        - Ask student to pause when they get to choose your bird screen.
        - Come together and determine the identity of the bird.
        - Have all students go through the process of saving their data.

- Add in binoculars and place a bird on a stick in one corner of the classroom and have students use their binoculars to try and ID the bird.
    - (Give each pair of students a set of binoculars.)
    - In the field you will work together, one person with binoculars to share information about a bird and one person to enter the information in the app.
    - House sparrow
    - Hooded Oriole

Community Science Data Gathering

- Remind students that all their data will be collected in the app.
- Talk to students about the importance of being quiet when we look for birds. Potential questions include:
    - Do you think birds want to hang around with us when we are loud? Why not?
    - How do you think we should act when we walk outside if we want to see the most birds?
        - Quiet, still, observant
- Walk students out into the canyon to look for birds using the app.

Process Reflection:

Timing Breakdown:

- Analyze data (5 min)
- Return to Watershed Poster (5 min)

Analyze data

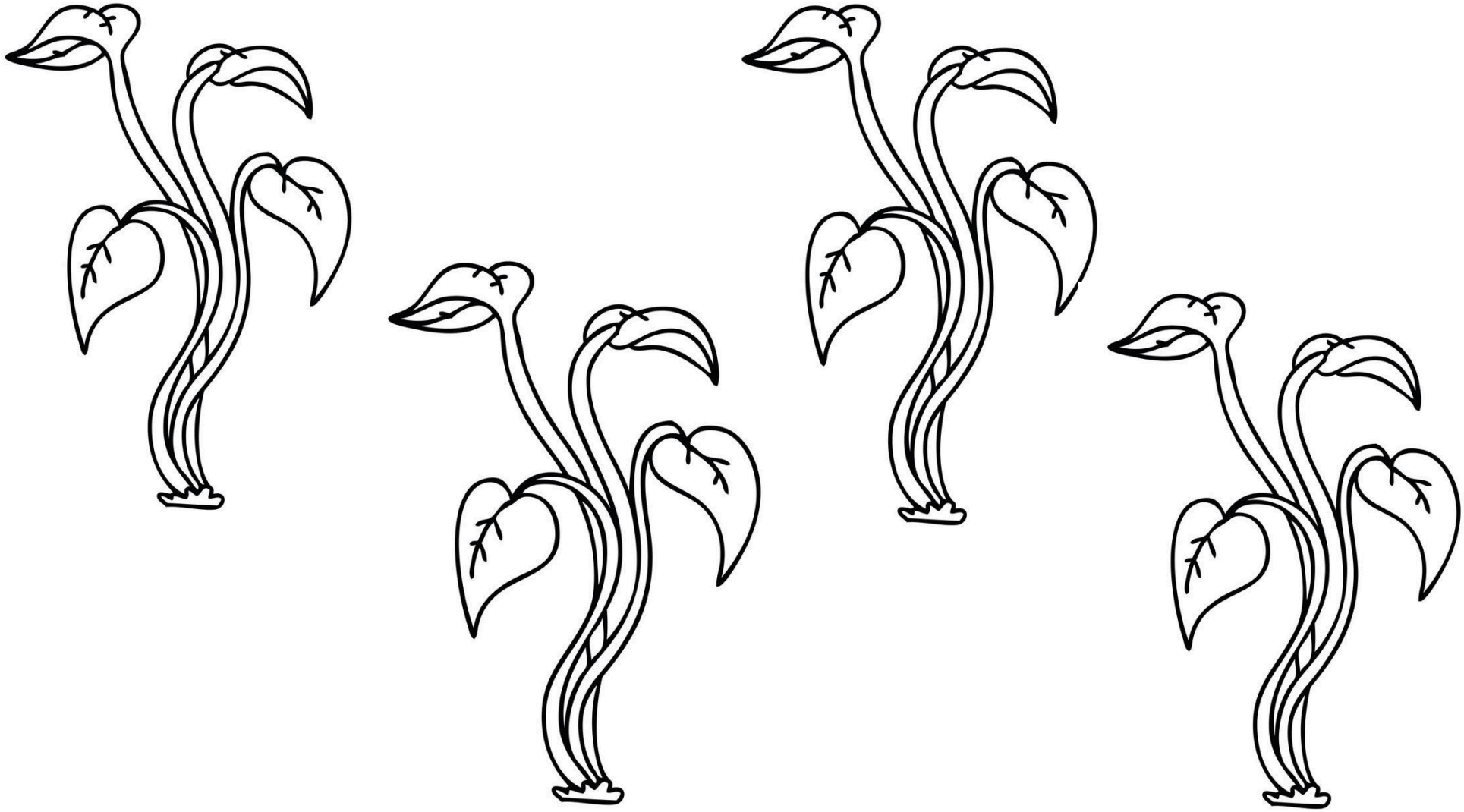
- Ask students to share a bird they saw.
    - (Create a list of birds on the board.)
    - Ask other students if they saw the same bird.
    - Ask what types of behaviors the students notice the birds engaging in.
        - Connect this to Bird Motel & Restaurant
            - Birds resting (motel)
            - Birds eating (restaurant)
- Ask students if there was any other evidence of birds they noticed?
    - Heard a bird.
    - Saw bird poop (scat).
    - Saw feathers.
- Do a think-pair-share:
    - Do you think it is easy or difficult to collect data about birds? Why?
- Review what students have learned the importance of wetlands for birds.
    - Wetlands serve an important function for birds.
        - Many birds live full-time in the wetlands and therefore make their homes and find food here.
        - Other birds use the wetlands as a place to stop and rest during their migration.
        - As science leaders it is important to collect data like we did today to monitor bird populations over time and make sure they are healthy.

Return to Watershed Poster

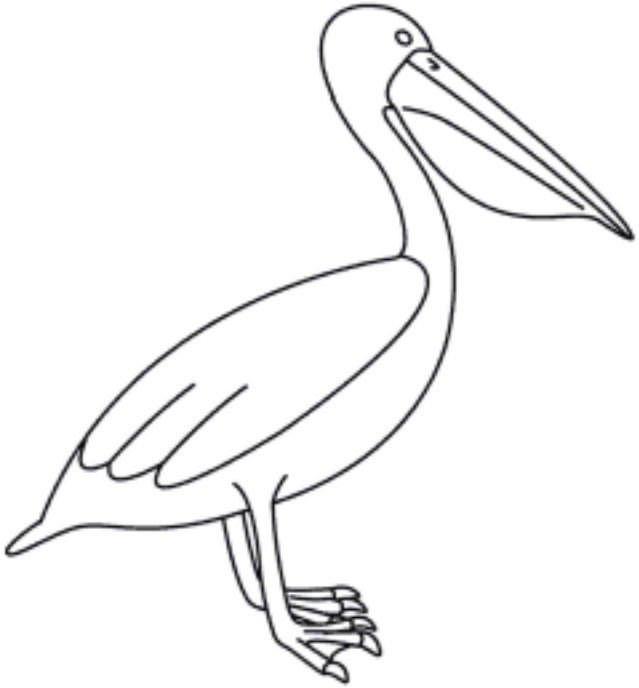
- As scientists this week we have learned so much about how important wetlands are.
    - (Point to poster.)
- Today we were community scientists helping to collect data about the kind of birds found in our local wetland.
- Do you think there are other ways that humans can help protect wetlands?
    - Have students brainstorm other ways humans can protect wetlands.
- (Give each student a thought bubble)
    - Ask each student to share how people can make a difference to protect the wetlands and to write that idea in a thought bubble.
- Have each student come up and place their thought bubble on the poster.

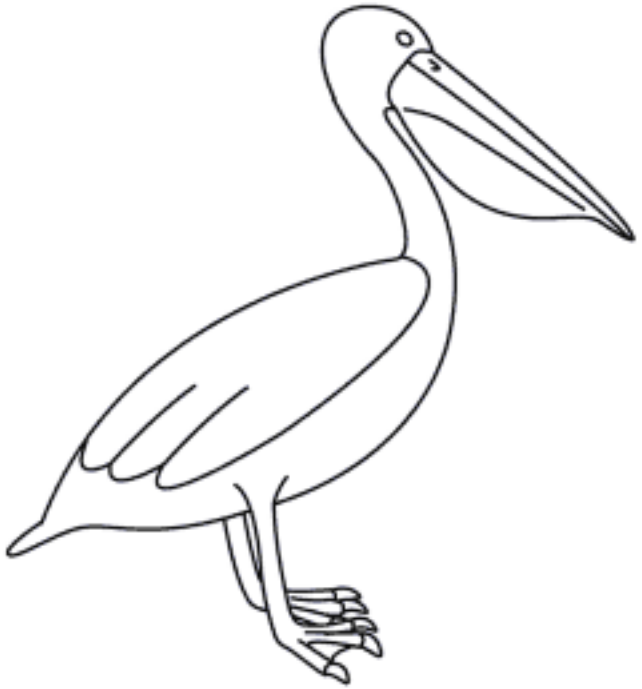
MATERIALS FOR LESSONS

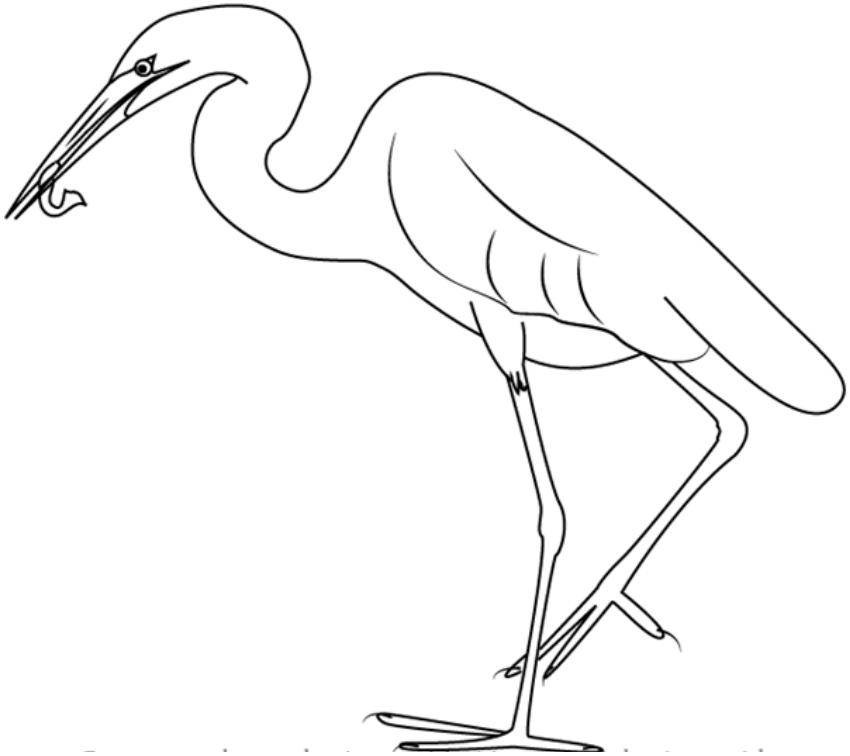
Outlines of Plants

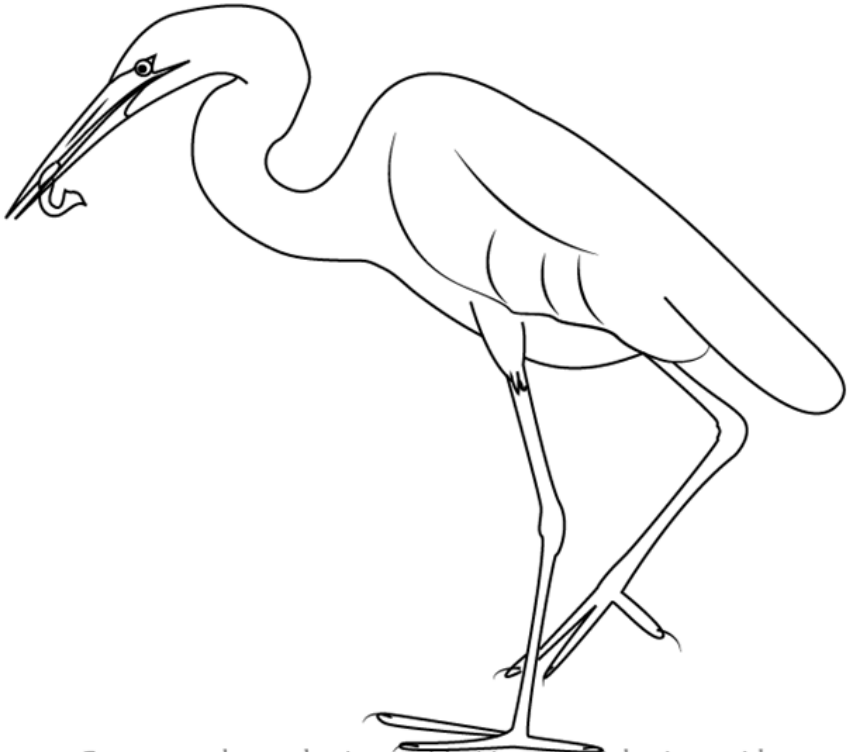


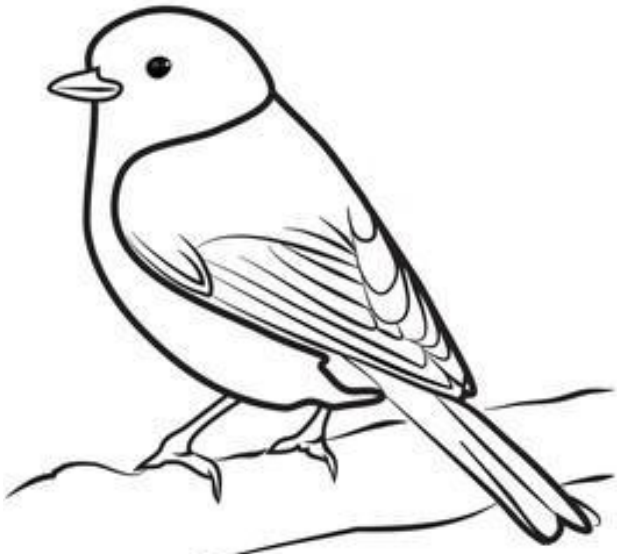
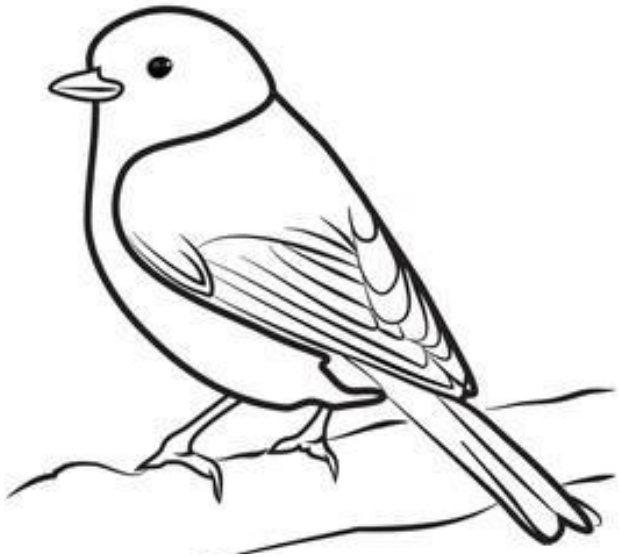
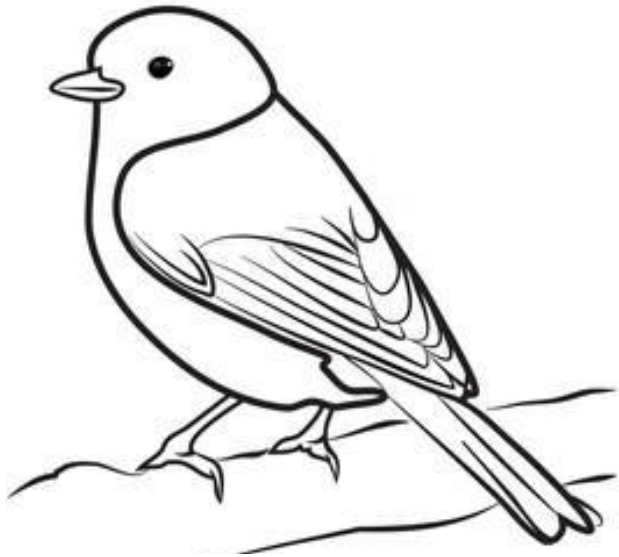
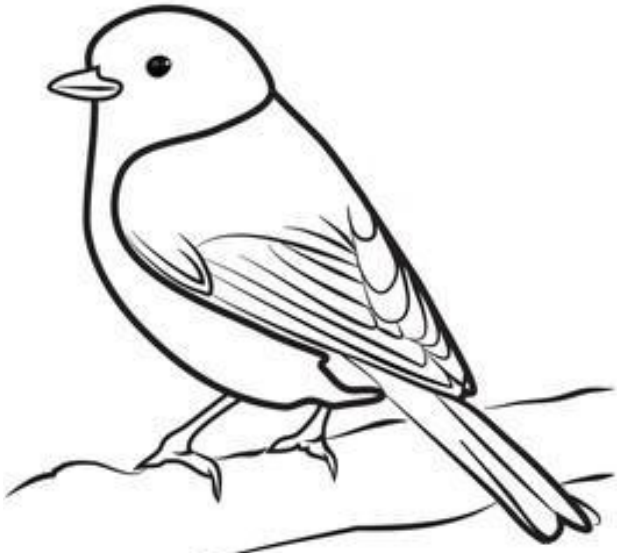
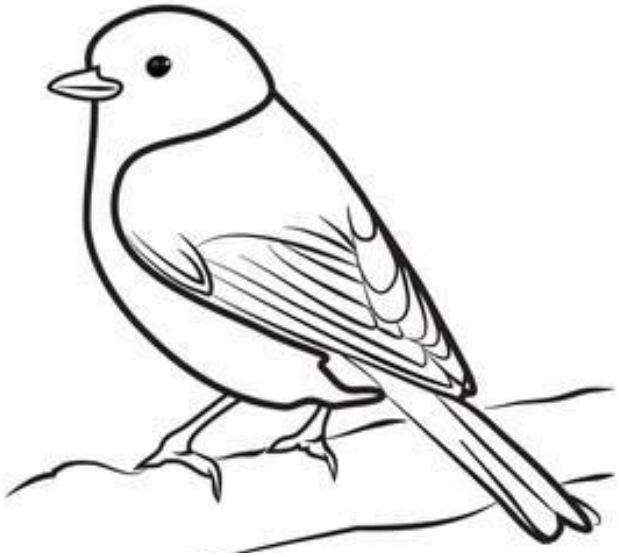
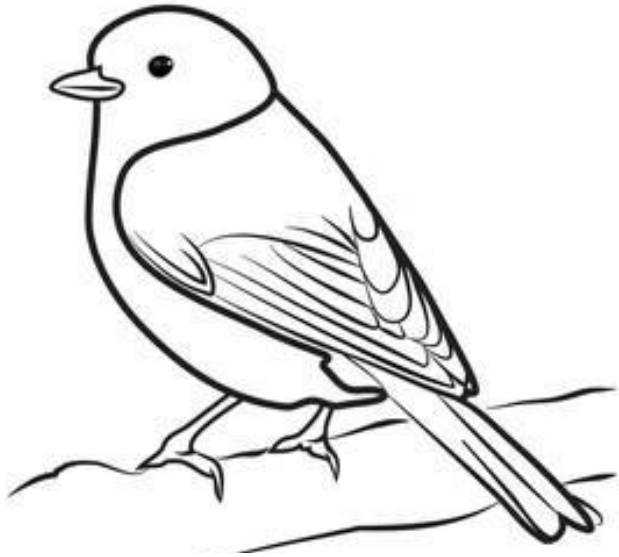
Outlines of Birds









Instructor Supplement

Information on Pueblo San Diego Watershed

- https://projectcleanwater.org/watersheds/san-diego-bay-wma/

Native People of San Diego (Kumeyaay)

- Video of making Shawii