

CAMP HAMILTON

ENVIRONMENTAL EDUCATION

PROGRAM CURRICULUM

Archdiocese of Seattle
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Environmental Education at Camp Hamilton – Program Curriculum

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About Our Program

Our Environmental Education program provides a residential outdoor environmental education experience for fifth and sixth grade students through the use of scientific observation and investigation based in Catholic social teaching and stewardship at Camp Hamilton, a 570 acre site near Monroe, WA.

Mission

Environmental Education at Camp Hamilton guides each student in recognizing and responding to the Catholic Church's call to be stewards of God's creation.

Program Goals

Students participating in the Environmental Education program at Camp Hamilton will:

- Connect their Catholic faith to the natural world around them.
- Develop a sense of appreciation for God's creation.
- Experience their environment through scientific observation and investigations.
- Gain a deeper sense of Catholic community, respect for diversity and participate in cooperative group living and problem solving.

Rooted in Catholic Faith

The Environmental Education program at Camp Hamilton creates an experience rooted in Catholic spirituality and social teaching. The words of Pope Francis' encyclical on the environment, *Laudato si'*, guide each lesson calling students to be stewards of God's creation.

Morning and evening prayer experiences shape the day, and the visit typically concludes with a celebration of mass to send us forth from camp to our parishes, schools, and communities. Faith-based values are incorporated into all facets of our program, from buying locally-sourced produce and fairly-traded coffee, to minimizing and composting waste on site.

Community Living

Our program is grounded in community and cooperative group living. Students will learn the value of treating others with dignity and respect, teamwork, and accepting personal responsibility for maintaining the group living environment. While at camp, students often interact with other Catholics outside their home community with the goal of facilitating positive interactions, generating awareness of commonalities between diverse groups of people and appreciating differences.

Academic Focus

Students spend a large portion of time each day in Exploration Groups out in the field

participating in lessons based in scientific observation and investigation. The curriculum supports the Next Generation Science Standards, Archdiocese of Seattle religion standards, and Environmental and Sustainability Learning Standards.

Our field studies theme is the interconnectedness of all parts of the ecosystem through studies in skills of a scientist, wildlife, water quality, garden, service, and communication.

Guiding question: How is everything connected?

Student role: Students are investigators exploring the natural world looking for interdependence and interconnections.

Learning Standards

The overarching standards for students' time at camp are the following standards. While our teaching touches on many different standards throughout the curriculum, these two main ideas of interdependence and stewardship guide all the activities we do during a session.

Religion

6th grade: 6-ME-HC-2 Explain the special place human beings have as stewards of God's creation.

5th grade: 5-ME-HC- 2 Understand what it means to be good stewards of God's creation.

Science

6th grade

Disciplinary Core Idea: LS2.A: Interdependent Relationships in Ecosystems

Students will work on:

S-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. (types of interactions could include competitive, predatory, and mutually beneficial.)

MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

5th grade

Disciplinary Core Idea: LS2.A: Interdependent Relationships in Ecosystems

Students will work on:

5-LS2-1. Develop a model to describe the movement of matter (including air, water, decomposed material) among plants, animals, decomposers, and the environment.

Environmental and Sustainability Education Learning Standards
Standard 1: Ecological, Social, and Economic Systems

Students develop knowledge of the **interconnections** and **interdependency** of ecological, social, and economic systems. They demonstrate understanding of how the health of these systems determines the sustainability of natural and human communities at local, regional, national, tribal, and global levels.

The BIG Game

Students are Science Investigators learning about the environment around them and discovering connections between things.

Each student gets a name badge in a reusable holder.

Students can earn ribbon stickers throughout their time at camp and stick them on to the bottom of the badge so they hang down.

Describing the game to students:

While you are here, you are science investigators. Your job is to learn more about the world around- notice, wonder, question, connect, learn, investigate.

Hand out the name badges.

As you spend time investigating, you can earn ribbon badges to represent how much you have discovered.

- You can earn a ribbon for any of the following lessons by finding one of your chaperones and answering some extra questions about you learned:
 - Challenge and Group Communication
 - Wetland Ecology
 - Tree Exploration
 - Garden
 - Wildlife
 - What Lives Here?
- Special Bonus Ribbon for thoughtfully completing the program and your Field Journal (show it to your TN at the last session - Bridges)

****IMPORTANT** - During Bridges, your TN will collect the blue reusable badge holders (reusing these holders instead of buying new ones for every session is one thing we're doing at Camp Hamilton to reduce our consumption and waste! We appreciate your help with this - please make sure you wear it all week, and bring it to the last session to hand in). You can keep your paper name badge, and all of your ribbons! Tuck them into your Field Journal to take home and show off all you learned.**

Transition Activities

While walking from one place to another, identify one understory plant and have students point it out along the path.

For instance-

- "Trillium Walk" or "Salmonberry Walk"
- Bleeding Heart
- Bracken Fern
- Deer Fern
- Devil's Club
- (Dull) Oregon Grape
- Evergreen Huckleberry
- False Lily of the Valley
- Lady Fern
- Salal
- Salmonberry
- Sword Fern
- Vine Maple
- Western Trillium
- Western Yew

"Categorizing"

Ask students what characteristics they might use to identify plants. Talk about the different traits people use to identify plants:

- Leaf/needle characteristics
- bark
- Branch and twig shape
- Flowers- winter bud, spring bud, blooming flowers
- fruit
- seeds/cones

Group Breathing

Get out a small toy and make up a story about how you all will be under water until you arrive at the destination. You only have one oxygen tank (add more than one if the group is too big) you have to share while you all make your way there. You could give them 2 minutes to talk about it before you head out. There isn't any talking on the walk because they will all be holding their breath.

Challenge and Group Communication

Outcomes

- Students can recall the names of everyone in the group.
- Students can develop community among a diverse group using games, initiatives and low elements.
- Students can create and demonstrate community standards.
- Students can explain what the goals are while at camp (learning how all things are connected, learning skills of a scientist -communication, observation, questioning-, and learning about stewardship)

Additional Standards Touched on in This Lesson

Religion

1. Students will identify ways to show respect for all members of a community. (5- LCH-MC-1)
2. Students will give examples of treating yourself and others with respect. (6-ME-HP- 1)
3. Students will define steward through the understanding of donating one's time, talent, and treasure. (5- CMLS-SS)

Introduction:

Introduce yourself to the entire group. Have the chaperones introduce themselves and thank them for being here. Let the students and chaperones know this is their Exploration group, the group that they will spend most of their daytime hours with while they are at Camp Hamilton.

Purpose of being here:

Explain to the campers that their time at camp will be focused on recognizing and responding to the Catholic Church's call to be stewards of God's creation. Ask campers to talk about what a steward is- can use think-pair-share (give time to think, turn to someone near you to share, and then offer time for sharing with the whole group)

As Catholics, stewards see themselves as the caretakers of all Gods' gifts. An environmental steward is someone who knows, loves, and cares for the environment.

Our main goal is to know through finding connections between things, though looking closely and taking time to see and understand the life around us.

Many spiritual and religious guides help us understand ways we can be better stewards and call us out when we aren't. Pope Francis wrote a letter to me, you, and the entire world about care for creation. This type of letter written by a Pope is called an encyclical. He titled this encyclical *Laudato si'*, or Praise Be, taken from the Canticle of the Sun written by St. Francis. We will be using quotes from Pope Francis and other writers throughout our lessons this week.

End in Prayer, asking God for His blessing on the Exploration group. You may use the following prayer, if you would like:

"Dear Lord, As we gather together in this new group, help us to have fun, keep us safe, find the interconnectedness all around us, foster the interconnectedness between us and teach us what it means to be a steward of your creation. Amen."

Explain that you all are going to take this time to get to know each other and build connections. Make sure that all of your students and chaperones are present before leaving the beach. Have one be the "sweeper", the adult at the back of the group making sure there are no stragglers.

Helium Hula Hoop/Stick

If using a hula hoop have the group move into a small circle, making sure there is room for everyone. If a stick is being used have the group distribute evenly on either side of the stick. Explain the rules clearly: everyone's index fingers must remain in contact with the object at all times and the object must rest on top of their fingers at all times (no grabbing or finger curling, etc.). Now have the group extend their index fingers at the same level. Lay the object across the group's fingers. The group must work together to lower the stick to the ground. If anyone's finger in the group, at any time, loses contact with the object you may have them start over.

Debriefing Ideas: Ask if anyone was intentionally trying to sabotage the group by lifting the stick. The answer would most likely be, "No." Ask the group to share examples of groups that they have participated in "the real world" that seemed to be committed folks, but were not productive. Discuss what types of actions are important to keep a group focused on completing a task. Many times during this activity, people become frustrated with others who aren't lowering the stick, and often choose one person as the culprit. Also, some people give up and let the stick come off their fingers. If either happens, be prepared to discuss how blame or giving up affects groups.

Human Knot

Have the group make a large circle. Have everyone put their left hand in the middle, and hold hands with someone in the circle, not directly next to them. Repeat with the right hand, and be sure to hold hands with a different person, who is not directly next to them. Then the group must use teamwork to unravel themselves into a circle again without coming disconnected.

Variations: This can also be run as a race between several circles if you have larger groups.

Magic Carpet (Tarp Turnover)

Unfold the tarp and ask the group to stand on a "magic carpet". The entire group must be on the tarp completely. Once everyone is settled, advise the group that they are going on a magic carpet ride. Tell them that they have risen 100 feet in the air and are ready to go. Unfortunately, the instructions on how to steer and land the carpet are on the other side of the carpet. So, they must flip the carpet over while standing on it.

Lighthouse

This activity deals strongly with communication. There are three different roles for students to play: rocks, a lighthouse, and a rescue boat. The rescue boat is in the sea searching for a lost object, but the rescue boat has lost its vision in the rough sea. The lighthouse can talk to the rescue boat; but faces inland towards the rocks. Rocks are silent, they cannot speak, but they can see the rescue boat. The rocks communicate nonverbally to the lighthouse and then the lighthouse passes the directions verbally to the rescue boat. As the instructor, blindfold the rescue boat, make sure the lighthouse is facing the rocks, and then place the object to be rescued a reasonable distance from the boat. Multiple rounds should be played, allowing the students the opportunity to change any strategies to be more successful and to rotate roles played by students. Not everyone will have a chance to be a lighthouse or rescue boat so come up with a fair system for choosing who is next.

Debriefing Tips: Where there any strategies, or set signals the rocks used? What are some basic directions the rescue boat needed? The lighthouse? Was it hard or easy to communicate in the various ways? Does this provide a good representation of actual everyday communication?

Hoop Pass

Have the group form a circle holding hands. Ask two people to let go of their grip long enough for them to place their hands through a hoop before rejoining them. The team task is to pass the hoop around the circle in a specified direction until it returns to the starting point. Variation: Another way to play is to use two hoops and they go around the circle in opposite directions. They can also be in a line and pass the hoop to the end of the line holding hands. Or they can simply be given a hoop and told that everyone has to pass through the hoop while being timed to see if they can beat their time.

Debrief ideas: What did you notice about the group behavior and mood during this activity? What did you notice about your own behavior and mood during this activity? What ways did you see behaviors and actions that helped the group? Did those helpful behaviors focus on the group getting to the goal or on people having fun? Were there behaviors or actions that ended up not helping the group? Did those unhelpful behaviors hinder the group getting to the goal or making it not fun?

Traffic Jam

Type of Activity: Problem-Solving

Set Up: This activity can be done with a variety of tools. The most challenging option is the 1×12 foot tarp. Leave one square open in the middle. If you are using plastic squares or marker cones, give each participant a marker cone or plastic square and ask them to stand on the square or beside the marker cone. Line them up in semi-circle formation with one extra spot in the center of the semi-circle.

Props Needed: 12'x1' plastic tarp, plastic squares, or marker cones.

Group Size: 6-11 people (you can do this with slightly larger groups, but the area needs to be modified to accommodate the group size. There always needs to be one empty square in the middle to start the activity.)

Time Needed: 20-30 minutes.

Activity Directions

- Each person occupies one of the “spaces,” with an empty space in the middle. Half the group will be on one end, and half of the group will be on the other end. Have everyone face the center spot.
- Using the following “moves,” people on the left side of center must end up in the spaces on the right side, and vice versa.
- Legal moves are as follows:
 - A person may move into an empty space in front of them.
 - A person may move around a person who is facing them into an empty space.
- Illegal moves are as follows:
 - Any move backwards.
 - Any move around someone facing the same way you are, i.e., you are looking at their back.
 - Any move that involves two people moving at once.
 - Any move where someone has to move around more than one person.
- This can be a very frustrating event for some groups. It may need to be halted at some point and then debriefed.

Facilitator Script

- “We are going start by having everyone stand on a spot in the tarp. Please leave the center spot open. *[Pause]* Okay, please turn so that you are facing the center spot.
- “Your goal for the activity is to move yourselves so that every person ends up on the opposite side of the empty spot that they are currently on. However, there are some very specific rules that you must follow.
- “First, you may only have only one person move at a time.
- “Second, you may only move into an empty spot – no sharing spots with anyone else.
- “Third, you may only move in the direction that you are currently facing – no moving backward.

- “Fourth, you may only “skip” over one person in order to move into the empty spot.
- “Fifth, you may only “skip” over people who are facing the opposite direction – you can never pass someone who is facing the same direction as you.
- “If you get stuck, you can always start over and reset into these original spots. Are there any questions? *[Pause]* Okay, good luck!

Tips for Success & Troubleshooting:

- You may need to reinforce what is and isn’t allowed at the beginning of the activity, as participants learn the rules.
- This activity can be exceptionally frustrating, and success is not a sure thing. That’s okay! Be sure to allow time for a thorough debrief and for people to examine why they might have been frustrated.
- For a slightly easier version of the activity, you can position the squares or spots into a semi-circle shape. This allows a better visual overview of what is going on.
- If you do have a smaller group, be sure to keep one spot in the middle empty. If additional spots are empty, they should be the ones outside of the activity space.
- Finally, be sure to familiarize yourself with the solution to the activity, in case a group gets stuck and wants to know if it is possible.

Possible Reflection Questions:

- Who got frustrated during the activity? Why?
- How would you describe your communication during the problem-solving stage?
- Did your communication evolve as the activity went on? What did that look like?
- How would you describe your individual role in the activity? Did that change? Why or why not?
- How is this puzzle like school? Work? Home?
- What do you want to remember about this activity?

Variations:

- With larger groups, you can set up a rotation system so that every time the group has to reset, one person rotates out and serves as an observer, and someone else rotates in. This allows people to gain a fresh perspective and creates more flexibility without having to adjust the setup.
- For those groups that need an extra challenge, have them do this activity on the TP Shuffle tarp that is also in this kit. Require the group to remain on the tarp at all times. They are not allowed to step onto the ground to make their moves. Ask the group to find out how fast they can do it. Can they do it without speaking?

For resources see: “*Silver Bullet*”, Karl Rohnk, *Challenger Kit*

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Wetland Ecology

Materials:

- Canoes
- Life Jackets
- Paddles
- Field Journals
- Laminated TOPO map, and/or topo model of Hamilton
- Water and macroinvertebrate samples collected ahead of time, stored in the shade, and monitored for temperature
 - Large clear plastic tub
 - Net
 - Thermometer on string
 - Spoons
 - Smaller clear plastic tubs
- pH Test kit
 - Tube or bag for water
 - Tablets or drops for testing
 - Test results comparison strip
- "Macroinvertebrate Mayhem" Game Materials
 - Laminated cards
 - Clothes pins

Location: Beach

Sense of Place

Where are we at Camp Hamilton? (At the beach - on the shore of Lake Hannan)
This is where we will investigate the watershed, wetlands, and water quality of Lake Hannan.

Students will...

- *Practice cooperation with a partner to canoe around Lake Hannan.*
- *Build an understanding of how Lake Hannan was formed.*
- *Increase their awareness of wetlands, their characteristics, their importance to wildlife and humans.*
- *Participate in a scientific discussion about the environmental quality "health" of Lake Hannan.*

Keywords: ecosystem, indicator, invertebrate, keystone, pH, watershed, wetland

Additional Standards Touched on in This Lesson

NGSS

1. Students will **describe and identify** the variety of species found in

- terrestrial and freshwater ecosystems. (MS-LS2-5; LS4.D)
2. Students will **predict** how populations will respond to changes in the physical or biological components of an ecosystem. (MS-LS2-4)
 3. Students will **describe and identify** the variety of species found in terrestrial and freshwater ecosystems. (MS-LS2-5; LS4.D)

Religion

1. Students will reflect and pray to make good decisions that care for God's gifts. (6-CMLS-SS)
2. Students will identify current events that illustrate an injustice and lack of respect for the sacramental presence in each person (5-ME-HC).

Activities

- 1) Introduction: Ask the Sense of Place question, and read the "Students will..." Objectives.

Time: 1-2 min.

Materials: Curriculum

Location: Beach

- 2) First things first, CANOES!

- Canoeing Instruction and Safety Demonstration:
 - Have students sit, facing the demonstration area and open their field journals to page 8.
 - Show students how to safely fit a life jacket.
 - Show students how to safely enter and exit a canoe. (3 POINTS OF CONTACT)
 - Show students how to choose the proper size paddle, and describe/demonstrate safe handling of the paddle on land.
 - Show students how to paddle (on land)
 - Show what it means to "raft up"
- Have chaperones help students get a lifejacket and paddle that fit them, and return to the beach (you can help too and/or help direct traffic and do final gear checks).
 - Tell students, "When I say BLUE, I'm going to have you WALK over to the lifejacket racks and get a life jacket. The chaperones will and I will be there to help you find one that fits properly. After you have your lifejacket, you will WALK over to the paddles and find one that works for you. Please remember to keep the tip of the paddle off the ground. Then, after you have both, you will WALK back over to where you are now, but you can remain standing. Your paddles will remain still, tips off the ground." Then say "Okay, BLUE".
- Have chaperones help students get safely in boats - Put chaperones in boats with kids! Instruct everyone to paddle just out past the dock and wait for everyone -

we'll be meeting and "rafting up" in the middle of the lake.

- OBSERVATION of Watershed and Lake
 - Have everyone raft up in roughly the middle of the lake
 - Examples of questions to ask students:
 - What do you notice about the landscape around you?
 - What does it remind you of?
 - What can you find out by using your other senses - smell, touch, etc.?
 - What is the shape of the land?
 - Etc
 - Have students start a sentence with "I wonder.."
 - Examples:
 - I wonder how long the land has looked this way.
 - I wonder how long the trees have been here.
 - I wonder where all the water comes from.
 - Etc.
 - Have students make connections using "It reminds me of.."
 - **How do you think this landscape and this lake might have been formed?***
 - What makes you think that?

- **What we're generally looking for/what you can add or explain after the students offer their ideas:**

ICE AGE:

- Glaciers (sheets of ice) taller than all of these surrounding hills once covered this whole area - the whole North American continent, in fact. The last ice age ended roughly 10 million years ago.
 - When the ice started melting and receding, it flowed like a really slow ice river and scraped and carved the landscape. It created valleys and dips where our rivers still flow, and our lakes sit.
- Anticipatory hint: There's also one other major factor at play here at Camp Hamilton that helped form Lake Hannan. We'll go check that out next to see if you can figure out the mystery...but first we need to talk about the water that's here.

Hamilton Watershed:

- Introduce the topic of a watershed. A watershed is the area of land where all of the water that is under it or drains off of it goes into the same place. Camp Hamilton is in the Puget Sound Watershed.
- The creeks, rivers, and groundwater from Camp Hamilton property flows into the Snohomish River, which confluences with the Skykomish River, the two combined becomes the Snohomish River that flows into the Puget Sound at Everett.
- Using a map that shows Lake Hannan to the Puget Sound, talk about all the things water passes through from the lake to the sound. Discuss how properties within a watershed are interconnected - they share and affect common bodies of water.

- **OBSERVATION of Wetland Area**
 - Have everyone paddle to the area between the wetland and the beaver dam, then raft up again.
 - Ask students:
 - What do you notice?
 - What can you find out by using your other senses - smell, touch, etc.?
 - What's different about this area than the spot we were hanging out in before?
 - What does it remind you of?
 - **What we're generally looking for/what you can add:**
 - Hopefully, students will notice the wetland area and how it looks different from the middle of the lake.
 - Hopefully they will notice the beaver lodges
 - Might have to canoe closer to the dam for them to notice that!

INFO ON BEAVERS TO ADD:

- **KEYSTONE SPECIES**
 - Definition:
 - First have students think about the word "Keystone" and see if they can come up with some ideas of what it means just based on the two parts of the word - "Key" and "Stone"
 - Use "It reminds me of..." "I wonder..."
 - Help them define/remind them what "Species" means
 - a group of living organisms that share enough genes (are similar enough in their DNA) to be able to reproduce.
 - **KEYSTONE SPECIES** Oxford Online definition: a species on which other species in an ecosystem largely depend, such that if it were removed the ecosystem would change [drastically](#).
 - Bonus Info: Current scientific research and experiments suggest that reintroducing beavers to streams and rivers where they used to live (but were removed by people for farming and other industry) can help improve the health of the land, and help with areas suffering from drought (lack of water), better than any human-made solutions!
 - Beavers are Keystone Species because:
 - They are "KEY" in creating the ecosystems of wetlands and lakes, which provide habitat and support for thousands of other living plants, animals, insects, fungi, bacteria, etc.
 - You'll learn more about how awesome beavers are, and some of their cool adaptations for survival in the aquatic (water) environment during your Wildlife rotation, if you haven't already.

- Head back to the beach - can go "long way" to see more of the wetland, and definitely go around the dock/swimming area (eventually - have a mini course?)
- Have chaperones help students properly return and store gear.
- Post-Paddle REFLECTION
 - Have students turn to page 9 in their Field Journals, and work with their paddling partner (even if it was a chaperone) to answer the questions on pages 9 and 10 - remind chaperones to let kids do most of the reflecting first before helping. If the student needs help, the chaperones can prompt with more questions. Remind them all that they can use "I notice(d)..." "I wonder(ed)..." "It reminds (or reminded) me of..." as good ways to start their sentences.
 - TN circulate to help students (especially those not paired with chaperones) to check for understanding, and help with more prompt questions if needed.
 - Ask for a few volunteers from different groups to share a little of their reflections with the whole group.

- **WHY IS WATER QUALITY IMPORTANT?**
 - Have students turn to page 11 in their Field Journal. Ask a volunteer to read the Laudato Si' quote at the top of the page.
 - Share this real life local example of the Duwamish Tribe:

THE DUWAMISH RIVER

We have a local example of the poor and marginalized being disproportionately affected by poor water quality, just south of Seattle, along the Duwamish River.

The Duwamish River flows through the south end of Seattle and into the Puget Sound. Back in 1850, the river and the surrounding land was known to be fertile and home to many fishing villages. The rich farmland attracted developers and by 1913 work began to straighten the river to make room for shipping barges. The location was attractive for businesses and eventually it became an industrial corridor, home to shipyards, mills, and manufacturing plants. Before there were laws in place protecting waterways, these businesses pumped their waste into the Duwamish River for almost 100 years (Person, 2013).

The Environmental Protection Agency has deemed the Duwamish River a Superfund Site (in 2001), one of the country's most contaminated areas. While those of us who benefit from the businesses are not affected, the people that live in the nearby neighborhoods feel the effects.

The people that live along the Duwamish today are more diverse and poorer than the rest of the city of Seattle, with many immigrants living near the waters. Several of these residents are accustomed to catching fish for their livelihoods, to sell or feed to their family. Yet most species in the Duwamish are toxic and can cause cancer. Some of them have to choose between potentially getting sick or not getting enough to eat (Person, 2013).

Our Catholic faith calls us to speak up for those who do not have a voice in our

communities. The poor, the homeless, and immigrants are more likely to be impacted by environmental injustice, and by our lifestyle of consumerism. The clean-up of the Duwamish River has already begun, and we are called by Pope Francis clean-up our lives, to love one another and our earth in our every action.

- Ask for a volunteer to read the first question, then have students discuss their answers with a partner. Ask a few people to share with the group. Give students a minute to write down an answer in their Field Journal. Repeat with the second question.
 - SOME EXAMPLES of ways we can reduce the human impact on watersheds?
 - Decrease our consumption. Use only what we need and what we do use, make sure it is not harmful to others by buying fair trade and organic whenever possible. Then less factories and businesses will need to be built, and only healthy, sustainable farms or companies are supported.
 - Reduce your waste (use reusable dishware, avoid individually wrapped items, never use bottled water) and recycle or compost whenever possible. Properly dispose of your waste and help others do the same!
 - Pick up your dog's poop.
 - Eat less meat and more vegetables! Livestock, especially cows and pigs, take a lot of energy to raise and have a lot of waste.
 - Tell your parents to take the car to a carwash instead of washing it at home. This keeps the pollutants from going straight into the watershed.
 - Visit and support preserved natural areas like wetlands, National Forests, and Parks. Donate to conservation causes.
- **MONITORING WATER QUALITY**
 - Part of taking care of the water in our environment is to regularly monitor the health of the water.
 - Ask students about the last time they went to the doctor for a check-up.
 - What types of things does the doctor check to determine if you are healthy?
 - Explain that we do "water checkups" to test the "health" of Lake Hannan. "Health" is the word we use to describe Lake Hannan's ability to support aquatic life.
 - Ask: "What clues do you think you would look for to figure out how healthy Lake Hannan is?"
 - If they say "Clean" ask them what they mean.
 - No pollution?
 - Variety of Plant and Animal life - (biotic factors - "bio" means "life")
 - More biodiversity (different species of plants and animals) means it's healthier water!
 - Ask them - What supports plant and animal life in the

water? (*These are other, non-living (or abiotic), things we can test to determine the health of the water.

- Nutrients
- Oxygen
- pH!

- Today we're going to focus on just one of these: pH
 - Ask Students if they've ever heard of pH.
 - Or the terms "acidic" or "basic"
 - Some bottled water now advertise the pH of the water in the bottle - "Alkaline" water is a popular health trend right now - supposedly good for you (but with everything like that, you should do your own research).
 - Have students look to page 13 in their Field Journal for a helpful scale showing the pH of a range of common substances.
 - Have them look at the key at the top of page 13. On the right-hand side, it shows the rating scale for the pH of water.
 - What do you notice about the scale? What household/common items have the closest pH levels to the levels we want to see in the lake?
 - Have a volunteer fill a vial of water from the lake to test for pH.
 - Have another volunteer put on safety goggles and gloves and drop in the pH test tablet. They can shake the tube, following the instructions, and hold it so that it can be compared to the test results strip.
 - Have a third volunteer hold the test results strip up and see which color is the best match.
 - Have students write down the number in the blank area of page 13.

- **INDICATOR SPECIES VISUALIZATION**

- In order to explain what an indicator species is, we are going to think about a room in a house as our "ecosystem" and the students are the species in that ecosystem.
- Have them take a moment to think about their preferences when it comes to the cleanliness of their room. Some (we will call Group 1) are neat-freaks and can't stand to be in a dirty room. Some people can stand their room to be a little messy, but don't like it when it's filthy (Group 2). Lastly, (Group 3) doesn't mind their room being really dirty - they can be in a dirty room, no problem!
- Have them show with their fingers which group they belong to. Have the three groups gather in separate places.
- Mark out an area to be the "room." Feel free to describe the room in detail at each stage. Begin with this room being a really clean room. Invite all those that can stand to be in a clean room to step inside. (This should be everyone.) Now they start to make a bit of a mess, and the room is just a little bit dirty. Group 1, those that can only live in a clean room, have to step out. Time passes, and the room gets more and more filthy. Eventually, Group 2 can't stand it anymore and there is only Group 3 left.
- Have everyone step out of the room. Now we are going to use the individuals to try and guess the room's cleanliness.

- Select individuals of only Groups 2 and 3 to be in the room. Ask the students what they think the cleanliness of the room is like. (No Group 1, so not clean)
- Next, have a few Group 1, mostly Group 2, and one or two individuals of Group 3 go in the room. What do they think about the room now? Since there is a Group 3 in the room, does it indicate that it's dirty? No, Group 3 can stand dirty rooms, but they also can be in clean rooms – it's only Group 1 that can't stand to be in a dirty room.
- The presence or absence of a certain species can indicate the quality of an ecosystem. These species are called *indicator species*.

- **LOOKING FOR INDICATOR SPECIES (AKA "Water Canaries")**

- Have the students look at the Macroinvertebrate Groups chart on page 12 of their Field journal.
 - Explain that these 3 groups are just like the 3 groups they were just in with the "rooms". Some can only live in very clean water (Group 1), some can tolerate a little messiness (aka pollution or other environmental stressors that affect the water quality) (Group 2), and some are able to hang in there despite a lower water quality.
- Before moving on, define terms:
 - Ask students if they know what the prefix "Macro" means.
 - Macro means large - i.e. visible with the naked eye...as opposed to "Micro", for which you'd need a "microscope". So all of these species can be seen without a microscope.
 - Ask students if they know what "invertebrate" means.
 - Invertebrate means it does not have a backbone. It might have an exoskeleton or a shell, or it might not...but it does not have any internal bones at all.
- Have students look back at the Macroinvertebrate Groups again.
 - Ask them what it would mean if they found only Group 3 or only Group 2 species.
- Explain to students that we have carefully collected some samples of lake water ahead of time in the interest of being extra sensitive to our impact on the lake's bank, spawning and nesting sites, and vegetation.
 - All samples and any organisms found are kept safely in the shade, monitored for temperature, and will be returned to their habitat unharmed at the end of the day.
- Have students identify and circle organisms found in Field Study Journal. Use identification keys if needed.
- Ask students to count the number of Group 1, Group 2, and Group 3 macroinvertebrates they found. Calculate Biodiversity Index (a formula used to describe the amount of species diversity in a given area)
- Have students make claims about the quality of the water in Lake Hannan based on the macroinvertebrate species they found. Ask them to support their claims with evidence and reasoning (use a science concept to explain their claim).

- **Macroinvertebrate Mayhem Game *If time allows***

- *This game further illustrates the impact of abiotic environmental stressors such as pollution have on water quality*
 - Materials: Laminated “Macroinvertebrate groups” “Intolerant Macroinvertebrates and Hindrances” Macroinvertebrate image and hindrance cards, clothespins
 - Inform the students that their “room” ecosystem is now a pond ecosystem. And that instead of people, they are now all macroinvertebrates.
 - Instead of the “dirtiness” of a room, we will be looking at the effect of an environmental stressor on an ecosystem. Have one student volunteer to be an environmental stressor.
 - Ask students for examples of environmental stressors. (sedimentation, sewage, fertilizer, animal waste)
 - Explain that some macroinvertebrate species are intolerant of certain pollutants and therefore will have hindrances during the activity
- Assign macroinvertebrates by distributing macroinvertebrate image cards. Have students attach the cards to themselves using the clothespins. Assemble macroinvertebrates at one end of the playing space, place environmental stressor midfield. Remind them of their hindrances. To “survive” macroinvertebrates must reach the opposite side of the field without being tagged by the environmental stressor.
 - If tagged, macroinvertebrates must sit out the next round.
 - After a few rounds, discuss the game.
 - Which macroinvertebrate species were easiest to capture? Which species are more and less tolerant of pollution?
 - How does this game help illustrate how some species are more tolerant of pollution than others?
 - Emphasize how this further illustrates the concepts they’ve just learned; that the macroinvertebrates that are intolerant of pollution are considered indicator species. An indicator species is a species whose presence or absence can act as an indicator of the health of an ecosystem.
 - **Conclusion:** Read the Sense of Faith Quote again. Close in prayer for those who live along the Duwamish, those involved in the clean-up, and for us. You can use the following prayer to close, if you would like:

“O God of the poor,
 Help us to rescue the abandoned and forgotten of this earth,
 Who are so precious in your eyes.
 God of love, show us our place in this world as channels of your love
 for all the creatures of this earth.
 God of mercy, may we receive your forgiveness and convey your mercy throughout our
 common home.
 Praise be to you!
 Amen.”

– A Prayer for the Care of Creation, Catholic Health Association of the United States

Notes and Doodles

What Lives Here?

Materials:

- Field guides
 - Fungi and lichen
 - Trees and plants
 - Animals
 - Birds
 - Cause and evidence
- Field cards
- Field Journals
- Giant map of camp

Location: Varying locations

Sense of Faith

Discuss this quote with the students and read the prayer (which is printed in their Field Journals on page 6):

“Creation is not a property, which we can rule over at will; or, even less, is the property of only a few: Creation is a gift, it is a wonderful gift that God has given us, so that we care for it and we use it for the benefit of all, always with great respect and gratitude.”

~ Pope Francis

Creator of the universe,

You entrusted your world to us as a gift.

Help us to care for all things in it as we would a friend.

That we may learn-

What is in creation

How all of creation works together

And how we can be stewards

Through that knowledge.

God, help us to hear the cry of those in poverty, and the cry of the earth, so that we may together care for our common home.

Amen.

Follow the instructions in the What Lives Here BEETLES lesson.

Tree Exploration

Materials:

- Field Cards (condensed lesson for in the field)
- Object to wonder about- if doing the nature science investigator warm-up from field cards
- TN packet
 - “Examples of Things to Observe and Ask Questions About” and “Using language of uncertainty”
 - Questions resource
- Your own finished tree journal page
- Tree field guides
- 10 hand lenses- optional
- Field Journals

Locations:

Near Klickitat

Sense of Faith

Begin the session asking for God’s guidance in looking closely.

You may want to use one of these quotes:

“The ecosystems of tropical forests possess an enormously complex biodiversity which is almost impossible to appreciate fully, yet when these forests are burned down or leveled for purposes of cultivation, within the space of a few years countless species are lost and the areas frequently become arid wastelands (38).” – Pope Francis, *Laudato si’*

“The faith practice of wonder helps us glimpse with surprise just how creative, faithful, good, big, and present God is.” Chris Schoon of the Christian Reform Church

Psalm 111:2 says, “Great are the works of the Lord, studied by all who delight in them.”

Nature Science Investigator BEETLES activity

This card in the field cards offers a great optional warm-up to wonder, observing and questioning.

Tree Exploration BEETLES lesson

For the next step, go to field card 2, switching over to the Tree Exploration lesson.

Skip the Thought Swap (it is similar to the mystery object wonderings in NSI) if you did the Nature Science Investigator warm-up activity.

Begin with the Exploring a Tree section.

Follow through to the end of the lesson.

In Field Journals, ask students to think of your everyday life. What are things that you can do that positively affects the health of a forest? (Draw, journal, write song or poem, diagram, etc.)

Some examples if students need help: Stay on marked trails – don't trample undergrowth, volunteer with a forest conservation organization, pick up garbage when you see it, clean up after pets, build a rain garden, plant native plants, Consume less!

Wildlife

Materials:

- Skulls
- Pelts
- Track casts
- "Repliscat" Scat molds
- Track stencils
- Wildlife stamps
 - Stamp ink pads
- Field Journals
- Field Guides
- Colored Pencils

Location: Longhouse

Sense of Faith

"Each year sees the disappearance of thousands of plant and animal species [...] for reasons related to human activity. Because of us, thousands of species will no longer *give glory to God by their very existence, for they have value in themselves* [...] (33)" – **Pope Francis, *Laudato si'***

Focus Question: What does it mean to be a predator or a prey animal?

Students will...

- Observe differences between predator and prey species based on physical characteristics such as skulls, scat, tracks, and pelts.
- Learn to identify and discuss the physical adaptations of predators and prey that give them a survival advantage.

Standards

NGSS

1. Students will **compare and contrast** interactions between organisms and their environment including competitive, predatory, and mutually beneficial (interdependent). (MS-LS2-2; LS2.A)
2. Students will **describe and identify** the variety of species found in terrestrial and freshwater ecosystems. (MS-LS2-5; LS4.D)

Religion

1. Students will relate the sacredness of all creation with the concept of stewardship in their classroom, school, and parish. (6-ME-HC-2)

Keywords: predator, prey, skull, scat, pelt, track, adaptation, characteristic

- **Introduction:** Read the Sense of Faith quote and have students answer the

question with a partner first, then share with the group, then write down their answer in their Field Journal.

- **Define Terms:**

- Ask students if they are familiar with the terms *predator* and *prey*, and let them describe the difference as they understand it.
 - A predator (an organism that eats another organism) and prey (an organism that is eaten by another organism).
- Ask students if they can define the word *adaptation*.
 - An adaptation is any trait (physical or behavioral) that gives a species a reproductive or survival advantage.

- **OBSERVE:**

- Have the students gather around the table of skulls. Ask them to take one minute to quietly examine the teeth of each skull. Invite them to discuss what they see. Do this for eye position, and sagittal crest. Next, explain the traits and the survival advantage it provides:
 - Teeth shape: canines for tearing, molars for crushing
 - Eye position: "eyes on the side, I hide. Eyes in the front, I hunt"
 - Sagittal crest: high/larger allows for stronger jaw muscles
- Have the students gather around the table of scat. Ask them to take one minute to quietly examine the scat. Invite them to discuss what they see. Next, explain the traits:
 - size of scat often corresponds with size of animal
 - How does it reflect an animal's diet? (i.e. berries vs bones)
 - Pellets = deer, elk, larger rodents; Plop = bear; Large and Tubular: canine, feline; Small tubular: mice, rat; white = birds amphibians
 - Feline scat often have a twirl shape
- Have the students gather around the table of tracks. Ask them to take one minute to quietly examine them. Invite them to discuss what they see. Next, explain the traits of the tracks:
 - corresponds with size of animal
 - depth of track could indicate heaviness of animal
 - What are the uses of the animal's legs? (i.e. swimming, clawing, ect)
 - Retractable claws (felines) won't be seen in track

- **MYSTERY ANIMAL IDENTIFICATION**

- 4 animals are represented (2 predator-Bobcat, Black Bear; 2 prey-Beaver, Whitetail deer) with 3 characteristics (skulls, scat, tracks). The students' task is to work with a team to match them together.
 - Set out labels (skulls 1-4, scat a-d, tracks a-d) and items by group in 4 different spots.
 - Break students into 4 groups. Have each group go to one table and

describe each item in their Field Journal. Have groups rotate tables every few minutes.

- Invite them to use the Identification resources available.
- Highlighting each skull, have the students guess and share their reasons for the matches made. Discuss the answers.

- **OBSERVATION OF PELTS:**

- Take out the pelts of each animal. Ask them to take one minute to quietly examine them. Invite them to discuss what they see. Next, explain the traits of the pelts:
 - Coloration and size help indicate animal
 - Camouflage indicates habitat (i.e. solid or countershading)
 - Thickness of fur indicates habitat (i.e. 2 layers of beaver fur)

- **TEAM CHALLENGE - Create the ULTIMATE Predator or Prey!**

- Have students turn to page 16 in their Field Journal
- In the groups, have students create your ultimate prey or predator As an exploration group, decide together what ecosystem we are adapting to. Assign each group a predator (2) or prey (2).
- Have the students draw their animal (each student will draw their own version of the groups' animal in their own journal as they decide on its adaptations and appearance).
- Label physical adaptations
- Explain how each physical adaptation gives the creature a survival advantage (ie. Coloration for camouflage; canines for hunting; claws for grabbing; eye position, etc.)
- Name your animal
- Allow each group to present their ultimate predator or prey.

- **T-SHIRT DECORATING!**

- Use fabric markers and/or glow-in-the-dark iron-on vinyl sheets to help the students trace their own handprint in the middle on the back of their shirt, then use the fabric markers and the animal track stencils to put a few of their favorite tracks around their own hand print.
 - Assign a chaperone (or two!) to help the kids with this too - assign one specifically to do the ironing. Students should not touch the iron!

- ****PREDATOR OR PREY GAME** (If time allows)**

- One student is the prey in a central location, all others are predators- keeping an "eye" on their prey.
- Have prey count three rounds with their eyes closed: 20, 10, and 5 seconds. During this time, predators must hide (changing hiding spaces each round), but must keep their eye always on the prey.
- Between each closed-eye round, the prey gets 10 seconds of open eyes, where they attempt to call out any predators that they can see. Those called, are "out" until a new prey is chosen.

- After the last open-eye round, the TN yells "Dinnertime!" at which all predators left in the game race to touch the prey (touch their shoe - or the ground or stump they're standing on, depending on the "prey's" preference).

Discuss after a couple rounds: Did anything you learned earlier help you survive as predator or prey? What characteristics were most helpful for survival?

Location: Area with trees and some ground plants near Longhouse

Notes and Doodles II

Garden

Sense of Faith

“Human beings, while capable of the worst, are also capable of rising above themselves, choosing again what is good, and making a new start.” **-Pope Francis**
'Laudato si'

Sense of Place

Where are we at Camp Hamilton?

Focus Question: How is gardening a good way to help the earth?

Outcomes

- I can describe how composting works and its benefits
- I can provide examples of sustainable gardening practices

Standards

NGSS

1. Students will **develop a model** to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. (5-LS2-1; MS-LS2-3)

Religion

1. Students will identify ways they can be stewards of God’s creation at home, school and community. (6-ME-HC-2.6)
2. Students will list ways that one is called to respond as a responsible steward, given the knowledge that all creation is sacred. (5- CMLS-SS)

Keywords: compost, organic gardening, pollinators, greenhouse

Sprouting Seeds: Sometime before or after your group’s time at the garden, have your group sprout seeds. Show them how to get the paper towel wet (keep it damp but not dripping), place a few seeds per paper towel, cover with the other half of the towel and put them into plastic bags. Label the bags with the date and type of plant. Seeds like warmth and moisture to germinate (sprout) and doing it indoors allows us to sort out the seeds that don’t sprout.

Take the germinated seeds from to two weeks prior with you up to the garden for them to plant.

Time: 10 min

Materials: Seeds, Paper towels, Bowl of water, plastic bags, sprouted seeds

Location: Discovery Lodge

- 1) Introduction: Read the Sense of Faith quote and have students interpret its meaning, ask the Sense of Place question, ask the Focus Question, and read the Outcomes

Location: garden

Time: 3 min

Materials: field journal

2) Compost

- Explain what composting is and how we do it
 - Composting is a natural way for food scraps and plants material, such as leaves and yard waste, to decompose. Compost works by combining carbon rich materials, like brown fall leaves or straw, with nitrogen rich materials, food scraps and grass clippings. Many leftover food or rotted fruit and vegetables can be composted. When both carbon rich and nitrogen rich materials are added together in a pile they naturally decompose over time. Every couple days the compost needs to be mixed to help add oxygen. Over the course of a few months the pile will decrease in size and be ready to apply to the garden.
 - Foods that don't belong in our compost pile are animal products like: meat, bones, fish, cheese and other dairy products. This is because when animal products breakdown they emit a smell (like rotten eggs) and these smells attract scavengers (mice, insects, bears). Animal products are able to be composted, but it just takes a specially designed composter and a different style of composting than what we do.
 - Our compost generally shouldn't have an unpleasant odor. If there is an odor the compost may need more water, carbon material or oxygen.
- Benefits of Compost
 - Using compost in a garden is a great way to replenish nutrients and fertilize the soil.
 - Composting cuts down on the amount of waste that ends up in landfills.
 - The above are the main two, but here are more benefits so you can have a deeper knowledge:
 - Helps build and maintain a strong soil structure, which makes a good plant root environment.
 - Can increase the amount of water the soil can hold, which protects plants during drier times of the year and means less watering.
 - Contains macro and micronutrients which help plants grow. It also is a good source of nitrogen, phosphorous and potassium.
 - There is disease fighting bacteria in the dirt, which is beneficial for human health. It's good for you to get dirty!
 - Use a thermometer to measure the temperature of the compost pile. When the plants decompose, they release heat! If a hot compost is working properly, the pile should be 100-160 degrees.
 - Allow students to take turns to mix/turn over the compost piles using the shovels.

Location: garden

Materials: shovels

Time: 10 min

3) Introduce the Garden

- Ask the following questions:

Do you know where your food comes from?

What does a garden need to be able to grow? (sunlight, soil, nutrients, lack of predators)

How can we care for a garden? (weeding, watering, pruning, adding compost/nutrients, protecting from disease, pests, and predators)

Mention that we will be caring for our garden during this lesson

Location: garden

Time: 3 min.

Materials:

4) Sustainable Gardening practices

- We use sustainable gardening practices at Camp Hamilton. Point them out as you walk around.
- We don't use pesticides and chemicals on our plants. Why do farmers use chemicals for gardening in the first place? It's easier and more cost-effective for large scale farming to spray chemicals to kill diseases or predators rather than take the time to use non-chemical strategies (like weeding, mulching, fences).
- Companion planting-planting two or more crops near each other for various benefits like warding off common pests
- Diversifying and rotating crops – planting a variety of plants and moving their locations each growing season allows for natural soil health.
- Agroforestry practices – like planting various levels of plants (ground cover, mid-size and canopy) alongside each other to mimic a natural forest.
- Hosting pollinators (honey bees)- more habitat for the bees and more crop production on less land.
- Why sustainable practices? It is better for the earth (mimicking natural processes and limiting impact) and better for people (knowing where your food comes from, less carbon emissions for travel, good food to keep you healthy)

Location: walking around garden

Time: 5 min.

Materials:

- 5) Greenhouses

- What are they? They are buildings that hold in the sun's warmth to create a warmer, more controlled environment to start a plant's lifecycle. We plant seeds and sprouts here. We also use it to grow plants that need warmer temperatures than our climate at Camp Hamilton.
- How does it work? The sun's rays warm the shelter and the plastic traps the heat inside. The vents allow the temperature in the greenhouse to be regulated, so it doesn't get too hot. You may notice that the greenhouse tends to be warmer than it is outside.

- Greenhouses extend the growing season for plants because they can be planted inside the greenhouse, then transplanted, or moved, outside when the weather is right for that specific plant. This is helpful in our climate since winters are longer in the PNW, relatively speaking.
- Planting/Harvesting: based on which plants are ready to be planted or harvested that week, seeds or sprouts will be planted in the greenhouse or transferred to the garden. If harvesting, the correct method for harvesting that food should be shown as well as how to tell when that plant is ripe.

Time: 5-10 mins (depending on if there are tasks to be completed)

Materials: Gloves, various gardening tools, sprouted seeds

Location: greenhouse

6) Bees

- Honey bees are pollinators. When they gather pollen and nectar for their food, they spread pollen from male parts of the plant to the female parts, enabling fertilization to take place. Then a flower and possibly fruit grows.
- With more pollinators, a garden can have a higher yield with less space – it's another sustainable practice!
- They are only aggressive if you are aggressive to them or they feel threatened by you (ex. being too close to the entrance of the hive...you wouldn't want a stranger hanging out on your front door would you?)
- The waggle: bees do a dance to tell other bees where to find pollen. The dance indicates how far, the direction, and how good of a pollen source it is.

A colony is made up of one queen bee, some male bees that help with reproduction, and hundreds of female worker bees. The female worker bees all have jobs: engineers, gatherers, caretakers, cleaners and guards that check every individual before it enters the hive to make sure it belongs there.

- How the hive works: the bottom box has the queen in it, then there is a screen so she cannot get into the boxes on top. This is where the honey can be collected from.
- Honey is non-perishable. It is the only food substance on earth that will never go bad. (There were jars of honey found in the pyramids that were still good).

Time: 5 min

Location: near the beehive

Materials:

7) Garden Care

- Walk them around and show what is growing in the garden. Encourage them to harvest if the plants are ready, allow them to touch, taste, and smell the plants. Bring some back for snack or the salad bar! Gather mint or Douglas Fir needles and make tea back at Discovery Lodge.
- The work that is done will depend on the season and what needs to be done in the garden. All of the work in the garden is important, including removing the weeds.

Time: Remaining time

Materials: Gloves, various garden tools

Location: Anywhere in the Garden

Work may involve: weeding, planting, watering, harvesting, preventing critters from entering, greenhouse work, etc.

8) Complete FSJ

- If the weather cooperates, have the students spread out and get comfortable in the garden to draw and answer their questions.

Time: 10 mins

Materials: FSJ, pencils

Location: Anywhere in the Garden

Conclusion: Revisit Outcomes to see if students can complete them. Read the Sense of Faith Quote again. Discuss the questions as a group.

Time: 5 min

Materials: Curriculum

Sense of Faith: How humans are a positive force

“Human beings, while capable of the worst, are also capable of rising above themselves, choosing again what is good, and making a new start.” **-Pope Francis**
'Laudato si'

1. God created us and called us “very good” (Genesis 1:31). What can I do to continue God’s good work?
 - Choosing over and over to make a new start and do good.
 - Answers to this are endless.

FSJ Questions:

1. Describe two sustainable gardening practices used at Camp Hamilton. Why are they used?
2. Draw a picture of something in the garden that inspired you.
3. Draw plant that you eat in

Notes and Doodles III

Night Hike

Focus Question: What adaptations do animals have for sensing the environment at night?

Outcomes

- I can describe the role of sensory receptors in collecting stimuli from the environment and transmitting it to the brain via nerve cells.
- I can name specialized cells (rods and cones) in the animal eye for sensing light in the environment.
- I can describe several behavioral and physical adaptations of nocturnal animals.

NGSS

1. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories (MS.LS1.8).

Keywords: diurnal, nocturnal, crepuscular, senses, rods, cones, rhodopsin, triboluminescence

Time: 5 min.

Materials:

Location:

Activity

Deer Ears

Objective: This activity helps students understand that animal body structures are designed to perform specific functions based on design of the structure.

1. Describe the function of ears and the structure of a human ear. Ask students to brainstorm nocturnal animals and to describe the structures of their ears. Ask for comparison of human ear/animal ear structure and function then determine with the group why animal such as deer would need such large ears that can move in several directions.
2. Demonstrate how to cup hands and place behind ears then ask the students to follow suit telling them that these are their deer ears.
3. Have them use these new appendages to re-listen to the night. Ask them to alternate deer ears with human ears.

Discussion: Gather in a circle to discuss differences.

How an Eye Sees With Varying Amounts of Light

In the retina, which is located in the back of the eye, there are rods and cones. Rods and cones are two kinds of light sensitive elements. They are in charge of changing light energy into signals that travel to the brain by the optic nerve. Cones see color and detail. There are approximately 7 million cones in the retina. Cones are primarily used during the day because they adapt to rapidly changing light levels. Since cones work best with more levels of light, the rods in an eye are used in dim light settings. There are approximately 120 million rods in the retina. Rods are more sensitive than cones, more than a thousand times as sensitive as cones, but they are not sensitive to color. This is the reason the human eye cannot see color at night. Rods are also used more than cones in peripheral vision; they allow dimmer objects to be better seen in peripheral vision. The rods employ a sensitive light pigment called rhodopsin. Rhodopsin is the chemical in the rods that allow night vision. If the pigment is exposed to light it bleaches and takes 30 minutes to completely regenerate. Night vision develops after periods of darkness, 30 minutes or longer, because the rod adaption process is much slower than that of the cones. Rhodopsin in the human rods is less sensitive to the red wavelengths of light, so many people use red light to help preserve night vision as it only slowly depletes the eye's rhodopsin stores in the rods and instead is viewed by the cones. (Hyperphysics, Georgia State University)

Time: 5 min

Materials: Markers

Location: Dark space

Light and Color

Objective: Introduce the different types of cells in the human eye: rods and cones

- Hand out a different marker to each student after it is too dark to distinguish the color of the marker. They guess the color of the marker by writing their guess on their hand. You can collect the markers and when they return to the light the students will know if they were right.

Explanation: Colors are nearly impossible for humans to see at night. We have two types of cells in our eyes called rods and cones. Rods are light sensitive cells helpful with seeing at night and cones allow for seeing in color. Humans have many more cone (color) cells than rod (night vision) cells; therefore, our color vision is great (during the day) and our night vision is poor. The only other animals that can see colors nearly as well as humans are diurnal (active during the day) birds. How do we know this? Many female birds choose their mates by the bright coloration of the males. Owls on the other hand, have mostly rods in their eyes so their low-light vision is very good. (See Appendix E.2.)

Time: 5 min

Materials: candle or flashlight

Location: dark space

Candle/Flashlight Stare

Objective: To have students learn about rhodopsin.

1. Explain to students that you will be lighting a candle that they are to stare at with one eye open while closing and covering the other eye. Tell them to cover it well so that no matter what, no light will enter that eye.
2. Ask students to listen to night sounds as they stare at the candle.
3. After a minute or so, blow out the flame and ask students to close the formerly open eye and open the formerly closed one.
4. Have them alternate opening and closing each eye while looking around noting differences in sight. Discuss their findings and reactions.

Explanation: Looking with what had been their covered eye, things should appear clearer and brighter. This is due to a chemical called rhodopsin. Our eyes produce this chemical in low-light situations to improve our night vision. In fact, within five minutes of being in the dark, we can see 1000 times better than when we initially went into the dark. When our eyes are exposed to light, all of the rhodopsin we have been producing is instantly destroyed, making our night vision poor again. Our eyes will not be able to produce the rhodopsin again until we are out of the light.

Time: 5 min

Materials: wintergreen lifesavers

Location: dark space

Lifesavers

Objective: A quick chemistry lesson with a cool effect! Equipment: wintergreen lifesavers (not sugar free) Procedure:

1. Have each student find a partner and stand close to them. Pass out lifesavers. This works with half or even a quarter of one lifesaver.
2. Make sure the students are focused on each other, watching each other's mouth. Take turns chomping down on the lifesaver with their mouth open. Sparks and flashes emit from the lifesavers!

Explanation: This is called triboluminescence (try-bo- loom-in-es-cents; 'tribein' means "to rub" in Greek). When sugar is fractured (in the case of chewed lifesavers), separate patches of charge, either positive or negative, form on the new surfaces or on opposite sides of cracks. The difference in charge compels electrons to leap across the gap, back and forth, and neutralize the patches. When these jumping electrons come in contact with nitrogen in the air (our air is 78% nitrogen), they cause the nitrogen to emit tiny blue- white bolts of light at the same wavelength as natural lightning.

When candies containing both sugar and wintergreen are crushed, an additional wavelength is emitted.

Wintergreen, however, is not triboluminescent. It is fluorescent, like the paint on a black-light poster. It absorbs ultra-violet light and re-emits it as light our eyes can see. When the candies are cracked, some of the light emanating from the sugar is ultra-violet, which gets absorbed by the wintergreen and re-emitted as bright, blue-green light. Most of the light you see is this blue light emitted by the wintergreen, which explains why you get more light from crushing wintergreen candy than plain sugar

candy. A more simple way to explain this phenomena is when the sugar crystals break, they release a weak burst of ultra-violet energy. This energy excites the molecules of the wintergreen oil in the lifesavers and causes the oil to glow, or fluoresce. A similar effect can be seen when two pieces of quartz are struck together. Another example is adhesive tape when torn from a certain surface. (Have you ever peeled a wrapper off of a Band-Aid in the dark? Try it!) (Discover Magazine, December 1988)

Bridges

Sense of Faith

“There is a nobility in the duty to care for creation through little daily actions, and it is wonderful how education can bring about real changes in lifestyle.”–

Pope Francis, *Laudato si'*

“Living our vocation to be protectors of God’s handiwork is essential to a life of virtue; it is not an optional or a secondary aspect of our Christian experience.” –

Pope Francis, *Laudato si'*

“The entire material universe speaks of God’s love, his boundless affection for us. Soil, water, mountains: everything is, as it were, a caress of God.” – **Pope Francis, *Laudato si'***

Outcomes

- I can spend time in quiet reflection.
- I can identify one way I will continue to display compassionate care for creation when I leave camp.

Standards

Religion

1. Students will identify ways they can be stewards of God’s creation at home, school and community. (6-ME-HC-2.6)
2. Students will list ways that one is called to respond as a responsible steward, given the knowledge that all creation is sacred. (5- CMLS-SS)

Keywords: steward

Location: various locations where your group can be separate from other groups

Materials: Field Journals

Introduction: This lesson is the last time the Exploration group spends time together. It is meant to allow time for reflection on the student’s time at Camp Hamilton, on what they will bring back with them (memories, knowledge, lifestyle changes, and conversations at home), and on the goodness and beauty of creation.

Activity:

Students will find a place to sit alone and write out their thoughts on the bridges pages of their journal. After 5-7 minutes, ask students to buddy or truddy up to share their ideas. Encourage students to add to their journal if they like a friend’s ideas.

Bring the group back together and circle up.

Materials: Stick or toss-able object

Use a Talking "Stick" or a toss-able object to facilitate sharing:

- How will they care for creation after camp?
- What are they thankful for this week?
- What was their favorite lesson?
- What was the most beautiful thing they saw/heard/experienced?

If it wasn't already incorporated into the reflective experience, end in prayer, thanking God for the time together, and the encouragement to live out the call to be stewards at home.

Make sure to thank the chaperones for their time spent with you.

Wide Games

Captain's Ball (similar to ultimate frisbee)

- The group is divided into two teams. Each team chooses a captain.
- The captain of each team stands on top of a box, milk crate or something similar at opposite sides of the field.
- The goal of each team is to get the ball and pass it until it reaches the captain.
- Each time that the ball is successfully passed and caught by their captain, a point is scored.
- If the captain falls off of the crate while catching the ball, the point does not count.
- The teammates cannot move while holding the ball except to pass the ball. They do not dribble the ball.
- Play begins like basketball with a ball toss. Unlike basketball or soccer, the captains are stationed on the opposite sides of the rest of their teammates.

Tree Parts Game

- The Moderator of the Game gets to call out different actions and the players with perform them. If they don't get them right, they get eliminated.
- The first command is tree freeze.

Squirrel Tag (Elbow Tag with a plot)

- Everyone playing is paired up and linked by elbows except two. All of the linked pairs are squirrels in a tree.
- There can only be two squirrels in a tree at once.
- One of the unlinked people is a squirrel and the other is a dog. The dog chases the squirrel.
- If the dog touches the squirrel, then the roles reverse.
- The squirrel can link elbows with a squirrel in a tree. If that happens, then the other squirrel in the tree has to start running from the dog.

Bear Salmon Mosquito

- The group is divided into two teams. The entire group modifier will choose a three word code for the teams like ice cream sundae or hot dog surprise. When the moderator yells the first word, (ex. Ice) each group will run to opposite sides of the field. Each group will have about ten seconds to choose to be bears, salmon or mosquitos (. To show that they are bears, the teammates put up their arms and grow. To show that they are salmon, the teammates put their palms together and slightly wiggle their arms as if swimming like a fish around reeds. To show a mosquitoes, the team will put their arms out like wings and make a high pitched noise.)

- When the moderator yells the second word (ex. cream), each team will line up facing the opposite teams.
- Once lined up the moderator will yell the third word: (ex: sundae).
- Each team then shows their chosen creature.
- If both teams choose the same creature, then they start over.
- If one team chooses bears and another chooses mosquitoes, then the mosquitoes can chase the bears (Mosquitoes eat bears). If they tag a bear before they return to the edge of the field, then the bear becomes a part of the mosquito team. If one team chooses salmon, and the other chooses bears, then the salmon must run from the salmon. (Bears eat salmon). If one chooses salmon and the other chooses mosquitoes, the mosquitoes must run from the salmon. (Salmon eat mosquitoes).
- If a person is tagged, they join the other team.

Salamander Tag

- Every player is given a tail (can be a bandana). The players need to tuck one corner of the tail into a belt loop, pocket or their pants' waist. The bandana must dangle somewhat so that a person can grab it semi-easily if close to the person.
- In this game each person gets to play both hawk and salamander.
- Hawks try to get the salamander's tails for "a snack." If a tail is snatched, then the person must wait ten seconds for their tail to grow back and they can return to the game.
- Another variation can allow the players to see how many tails that they can collect without getting their own snatched. In this variation, if the tail is taken, the player is no longer in the game.

Sharks and Minnows

- For this game, about a half dozen players are chosen as the initial "Sharks." The rest of the players are called minnows.
- The minnows taunt the sharks at the edge of the field, saying, 'Sharkies, Sharkies, can't catch me.' The sharks reply, 'Oh yes we can.'
- The minnows return, " Oh no you can't" The sharks say, "Oh yes we can" and then both sides run.
- The sharks try to tag the minnows as they run from one side of the field to the other. If a minnow gets tagged, they become a shark. The game continues with each side running back and forth until basically all of the minnows are tagged by the sharks.

Have You Ever? Or All My Friends Who Have.... Or Like...

- Everyone forms a "happy foot" circle or Elbow Circle meaning that people can stand a little wider than shoulder width and touch the sides of their feet to the people next to them or with hands on hips and elbows out the elbows are touching.
- Once a proper circle is formed everyone can stand normally with hands at sides and feet together if desired.

- One person will be in the middle of the circle and introduce themselves and then say something that they like or have done.
- They will invite everyone who likes the same thing or has done the same thing to find a new place in the circle.
- The last person to find a new place in the circle becomes the new person to introduce themselves and choose a topic to share a characteristic..

“Sticks”(Similar to Capture the flag but multiple flags)

- Divide the group into teams.
- Put two large hoops on each side. One is the “Jail.” The other is where the flags are held.
- Set boundaries of play and a division line between the teams so that “sides” are established.
- Each team needs to try to get their flags from the large hoop safely to their side without being tagged.
- If tagged, the person with the flag can either be forced to drop the flag where it is or give it to the person that tagged them.
- The “tagger” can walk their opponent to jail.
- A person can be freed from jail in a few ways determined by the game moderator. The prisoner can be freed by another teammate by tagging them out. They can also be freed if the moderator calls for a “jail break.” The moderator can also set a limit of how many people can be in jail at time. When the limit is reached, the person there the longest gets to leave jail and return to the game.