Auxiliary Resource Provided by the Film Producers

EDUCATOR GUIDE

GREAT BEAR RAINFOREST

A Film for IMAX® and Giant Screen Theatres

OCEAN NETWORKS CANADA

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MACGILLIVRAY FREEMAN FILMS

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INTRODUCTION TO THE EDUCATOR'S GUIDE

"I get a lot of fulfillment just being here, in this world of diminishing ecological returns. It is hard to describe how special this place is. I think we are just so fortunate to have a place that still has the working parts—the full suite of flora and fauna—and we're not talking about How are we going to bring these animals back? and How are we going to restore this system that's been destroyed? which is really the ecological conversation for most other places. Here, we just have to protect what we have. If we just leave it alone and stop treating it like an inexhaustible resource it would have a fighting chance. I love it up here. I've raised my kids up here. There's still so many things left to do and places to explore."
—Ian McAllister, director of Great Bear Rainforest

This eductor's guide, created for MacGillivray Freeman Films by Orca Book Publishers with contributions from Ocean Networks Canada, is a companion resource to the giant-screen film *Great Bear Rainforest*. The guide provides a variety of multidisciplinary activities rich in language, science, ecology, social sciences and character education, each of which ties directly to the film. Lessons are grouped into learning plans and are organized according to age (e.g. kindergarten and primary; upper elementary; middle school; high school). Where relevant, we have connected the content of the learning plans to the Next Generation Science Standards (NGSS). Every learning plan and lesson connects with common English Language Arts standards, and many address Social Studies standards as well. We've also given you a bulleted list of character education/emotional intelligence competencies when those skills are developed.

A list of resources at the end of the guide provides additional connections for educators and learners to extend their inquiries.

THE INQUIRY APPROACH TO LEARNING

One thing you will notice in this eductor's guide is that we've set many of the learning experiences up for an inquiry approach, where your students can take charge of their explorations—and take their

learning deeper. This shows up especially in activities where students decide for themselves what to research and focus on, based on their own interests. While many of the guide's activities are designed for a traditional classroom setup, we acknowledge and support the global shift toward inquiry.

Inquiry as an approach to educating children is transforming schools across the world. In its essence, inquiry means creating space for students to pursue the things that interest them the most *on an individual level*. Not learning the same thing that the kid in the desk next to you is learning just because it's 1:30 on a Wednesday afternoon and the schedule says *MATH*.

Inquiry is a very natural way of learning—in fact, it's inborn to all of us. A baby learns to walk because it is motivated to learn a better way to get around, and it is curious enough to try (and fail) until it reaches mastery. A young child learns everything they can about dinosaurs, watching shows and reading books and playing with figurines and excavating bones from blocks of dry sand, then painstakingly reconstructing them. As young children, we naturally follow our interests and motivations, asking questions and seeking to understand.

Inquiry in the classroom works much the same way. Acting as guides, educators walk beside learners as they explore and investigate the things that matter to them. It's a radical transformation to a system that has historically dispensed identical packets of content to each student at prescribed periods in their development—teaching them *what* to learn. But after generations of this kind of approach, we've come to realize that's not the way humans learn best. The modern world is fast-changing and unpredictable, requiring people to know themselves well so they

can navigate challenges with purpose and resilience. We can't teach the same thing to every student and think they'll be prepared for real life anymore—not when 75 percent of their jobs haven't even been invented yet. They'll be far better equipped to learn if we teach them *how* to learn.

Inquiry has been shown to:

- deepen engagement;
- foster curiosity and a desire to learn;
- inculcate self-regulation and a growth mindset;
- sharpen research skills;
- enhance learners' ability to ask good questions;
- expand critical thinking and interdisciplinary thinking, as inquiry takes students' learning on a much deeper dive than you usually see in traditional schooling; and
- show students how much power and enjoyment they have when they take ownership of their learning.

True inquiry—where educators walk beside learners as mentors while the students progress on their journey of discovery—shows kids that their interests matter. In so doing, it puts them in the driver's seat of their learning, which in turn fosters self-discipline, faith in one's own capabilities and a better understanding of oneself. While this guide is not set up for full inquiry (as we don't know each child's deepest personal interests), the activities here give your students flexibility and autonomy in their choices in learning about the Great Bear Rainforest.

Character education and emotional intelligence are also key competencies for young people heading into the career sector in the twenty-first century. Inquiry learning is well suited to support emotional intelligence, as learners check in with themselves constantly about their direction and focus. As they develop more sophistication, they learn to ask better questions, and they reach out to members of the community to help them in their inquiries. This in turn helps them develop agency, building strong networks of mentors around them—a key piece in wellness and mental health.

We can see the importance of mentorship in inquiry learning in *Great Bear Rainforest* as well: Nelson is learning from his father, Marven, about taking care of the spirit bears. Saul has learned how to fish and lead from his father and the line of ancestors before him. Mercedes is learning to capture bear hair from rub trees in order to study their DNA. Her mentor

is Douglas Neasloss, chief councillor for the Kitasoo/Xai'Xais Nation. Douglas works with other young people as well to get them engaged and interested in caring for the territory. "We have some of the highest amount of protected area in all of the coast," Douglas says. "We have a very strong young core of youth stepping up and getting ready to take some of these roles, whether it's hereditary chief titles, whether it's band council titles, or whether it's leadership roles in the community." It is mentorship that makes possible this transfer of knowledge and stewardship.

The inquiry method of learning is modeled very strongly in Ian McAllister, the director of *Great Bear Rainforest*. Ecological concerns captured Ian's heart as a teenager. By the time he was in university he knew it was where he wanted to focus his energies. He participated in blockades and protests, learned how to climb trees and camp out in their branches, started a nonprofit organization (Pacific Wild) and taught himself how to carry his message of conservation so that it would be heard by the people whose minds needed changing. By trying and failing—a hallmark of the inquiry process—Ian figured out how to photograph and film the rainforest and its wildlife so he could spread awareness, developing his skills to a level where he is now an award-winning photographer and creator of a film for the giant screen. He and his wife, Karen, were recently named "Leaders of the 21st Century" by *TIME* magazine because of their work.

All because of a deep interest and the drive to keep exploring it.

We wish you adventure and joy as you embrace inquiry with your students.

BACKGROUND ON THE GREAT BEAR RAINFOREST

"We have a belief, in all of our work, that what we have here is not ours. It belongs to future generations. And my Elders have always stated that if you take care of the land, the land will take care of you."
—Douglas Neasloss, Chief Councillor, Kitasoo/Xai'Xais Nation

In the northwest corner of British Columbia, between Alaska and the northern tip of Vancouver Island, lies a land of forest green and sparkling blue. This place is home to an immense array of wildlife: vast schools of herring, spirit bears and their grizzly bear cousins, coastal wolves, black bears, herons, humpback whales, eagles, all five species of salmon, ancient cedar trees, clams, sea urchins, seals, ravens. The biodiversity is stunning—and all because this place remains relatively untouched by humans. It's still natural, much the way it has been for millennia.

This is the Great Bear Rainforest: misty, lush, wild, abundant. It rains most of the time in this coastal paradise—an average of 6,650 millimeters per year. Measuring 6.4 million hectares—about the size of Ireland or Nova Scotia—the Great Bear Rainforest is one of the wildest places on Earth. It supports the largest tract of intact temperate rainforest left on the planet. Threats to this intact temperate rainforest include logging, overfishing, hunting and climate change.

About 18,000 people live in the Great Bear Rainforest today. But because of its natural bounty and endless sources of food, it likely has been much more densely populated throughout history, prior to colonial contact. Indigenous peoples have called this coast home for well over 10,000 years. Some twenty-six First Nations live in the Great Bear Rainforest. Their cultures and languages, while often distinct from each other, all reflect the beauty, scale and generosity of this territory.

Residents of the Great Bear Rainforest live in small towns like Bella Bella, Kitamaat (Kitimat), Klemtu and Hartley Bay, as well as in more remote communities. *Great Bear Rainforest* director Ian McAllister has lived for the past quarter century on Denny Island, just across the channel from Bella Bella. Here, most towns and villages are accessible only by boat or float plane. This makes it a difficult place for people to access—and it's also one of the main reasons why it's so wild. But even remote places like the Great Bear Rainforest face an uncertain future as more and more of the world's natural resources are harvested.

Ian McAllister has long recognized the threats to the Great Bear Rainforest and, through his books and photography, has sought to raise awareness about this cradle of life in the Pacific Northwest. After years of work he finally secured the financial backing to create a film about the rainforest for IMAX and giant-screen theaters. Filming of *Great Bear Rainforest* began in 2016, and it pushed the envelope in terms of what had previously been done in wildlife filmmaking.

A quarter century ago the Great Bear Rainforest was formally designated a Timber Supply Area, or TSA, by the Canadian government. Back then, few people outside the Great Bear's borders knew it even existed, and even fewer knew of the First Nations people who have occupied its rich, treed wilderness for thousands of years. As more and more people learned about the fabled rainforest and the bears and wolves

and people who call it home, more and more voices spoke out for its protection. First Nations communities patiently but forcefully kept reminding the Canadian government that their rights and title have never been surrendered and that protecting their traditional territories was vital to their culture and history.

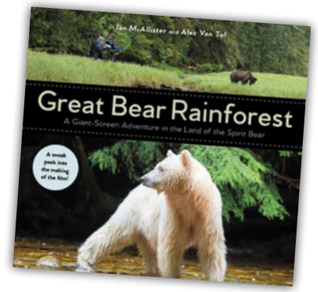
Today 30 percent of the Great Bear Rainforest has been protected from industry and development. The Government of Canada has taken the first step toward protecting the marine environment with a pledge to protect 10 percent of the seabed by the year 2020. Canada promises additional protection in years to come.

Much has been done to protect the Great Bear Rainforest since its designation as a TSA, but there is still much to do to bring back the abundance that once characterized this coast. Wild salmon, whales, herring and many other species all need conservation attention. The film gives viewers a glimpse of how precious but also how fragile the Great Bear Rainforest is. It shows the richness, both ecologically and culturally, of the rainforest, and it will, hopefully, also inspire public participation in its protection.

ABOUT THE *GREAT BEAR RAINFOREST* BOOK

For an in-depth look at the making of a wildlife film in such a remote and rugged locale, pick up a copy of *Great Bear Rainforest: A Giant Screen Adventure in the Land of the Spirit Bear* (Orca Book Publishers, 2019). The book includes:

- additional science and ecology content, such as keystone, foundation and umbrella species, bubble-net feeding, kelp forests, genetic inheritance and adaptation;
- expanded content about some of the First Nations who live in the Great Bear Rainforest;
- expanded content about conservation in the Great Bear Rainforest, such as the end of the grizzly bear trophy hunt, concerns about fossil fuel spills, overfishing in both the commercial salmon and herring fisheries;
- behind-the-scenes clips from the making of the film; and
- profiles of the film crew.



For more books about the Great Bear Rainforest from Orca Book Publishers, visit greatbearbooks.com.

SUMMARY OF THE LEARNING PLANS

Learning activities are based in twenty-first-century skills, many with a basis in inquiry that scales according to age. Several learning plans are created around one or more of the Next Generation Science Standards and also connect with standards in other subject areas (for example, English Language Arts, Health/Planning, Social Studies). Each learning plan is created with a specific age band in mind and offers:

- materials and length for each lesson within the learning plan;
- an explanation of how the learning plan connects to the IMAX film;
- necessary background for teacher understanding;
- activity/activities;
- blackline masters (if applicable);
- web links (if applicable).

Below is a brief description of the nine learning plans included in this guide. By viewing the film *Great Bear Rainforest* and incorporating the lessons and resources found here, teachers can build a robust way to talk about the Great Bear Rainforest, concepts in ecology, and conservation and sustainability.

Learning Plan 1 (K–3)

When Herring Bring the New Year
Honoring the land and its gifts
Topics: Recognizing the Earth's resources and bounty, expressing gratitude, acknowledging emotions in others

Learning Plan 2 (1–3)

A Close Examination of Habitat
Habitat observation
Topics: observation skills, connecting with nature, making and recording observations

Learning Plan 3 (2–4)

Rainforest Communities
Intraspecies interdependence
Topics: community composition and cooperation, creating a model, constructing an argument

Learning Plan 4 (3–5)

Mapping the Great Bear Rainforest
Mapping and spatial skills
Topics: exploring classical maps/globes/atlases, exploring Google Maps, analyzing landforms, longitude and latitude

Learning Plan 5 (4–6)

When Things Don't Go as Planned
Coping with disappointment, change and failure
Topics: identifying emotions, coping mechanisms, empathizing, reframing, mindset

Learning Plan 6 (6–8)

When You Change an Ecosystem
Herring as a foundation species for the Great Bear Rainforest
Topics: foundation species, industrial commercial fishing, conservation, research, writing an argument

Learning Plan 7 (9–12)

Connecting with Climate Change
Examining climate models to forecast climate change
Topics: heat maps and other global climate models, research, forecasting, interviewing

Learning Plan 8

Systems in Harmony
Intraspecies cooperation to ensure and enhance survival
Topics: healthy ecosystems, cooperation, research, Reconciliation, systems thinking

Beyond the Scenes

Exploring the Ocean of the Great Bear
Using real-time data from remote locations
Topics: networking, undersea cabling, ocean observation and health

LEARNING PLAN 1:
WHEN HERRING BRING THE NEW YEAR

LEARNING PLAN 1:
WHEN HERRING BRING THE NEW YEAR

Grade level K–3
Lesson 1 ~45 minutes

Theme: *Honoring the land and its gifts*

English Language Arts Standards
- CCSS.ELA-LITERACY.SL.K.2–3.2 Recounting key ideas or details from information presented through media.

Emotional Intelligence Skills
- recognizing the emotions of self and others (self-awareness, empathy)
- acknowledging different ways of showing gratitude and honor
- exploring and expressing gratitude for things in the natural world (resilience, curiosity)
- acknowledging commonality between cultural groups in the way each expresses gratitude for the Earth and its resources (relationships, empathy)

Learning Plan Overview
In this lesson children will reflect on the Indigenous way of honoring the land and committing to care for it so that it continues to sustain their way of life. They will make connections to their own lives by identifying things they can be thankful for. The lesson will culminate with the children creating a song of thanks that recognizes the way the Earth supports and sustains them.

From the Film
In the film, we can see the joy on the faces of the Heiltsuk fishers out on their boat, working together to collect the hemlock branches that hold millions of herring eggs—an important source of food and celebration. As they work, cutting branches and neatly stacking them in the boat, we hear children singing. It is their community's children singing a traditional song that celebrates the harvest.

Materials and Resources
- link to well-known songs that express gratitude: mindfulteachers.org/2015/11/songs-about-gratitude.html
- musical instruments: drums, xylophones, sticks, bells, etc.
- an outdoor space—your schoolyard or the neighborhood will do

Teacher Prep
Day 1
- Read the following background information about herring so that you're ready to share it with your students. (Information is excerpted from the research notes and manuscript of *Great Bear Rainforest: A Giant Screen Adventure in the Land of the Spirit Bear*, Ian McAllister and Alex Van Tol, 2019, Orca Book Publishers).
- You can also read the **Herring Backgrounder** in this guide (Learning Plan 6).

The herring is important to the Heiltsuk First Nation's culture. Not only does the herring spawn mark the beginning of their new year, signaling the end of a long winter, but the eggs (roe) themselves provide a rich source of food. "When the herring come, everything else comes alive," says Saul Brown (Ḥáziłba, pronounced Ach'ebuh), who took part in the filming. "The whales come to feed on them, the wolves, the marine and terrestrial animals come to feed on them…everything comes alive."

"I believe to be well we need to eat our traditional foods, we need to harvest our traditional foods, and that brings us in contact with our lands and waters, which we've intimately known for a long time but often forget about if we're not out in the land and water and using it, and serving it as a purpose and it being purposeful back to us the way our ancestors did."—Saul Brown

Day 2

- Bring your box of musical instruments with you.

Day 1 (~35 minutes)

1. 10 minutes—Ask children to recall the part from the film where the Heiltsuk fishers are out on their boat, collecting hemlock branches. Did they hear the children singing? And did any students remember what the narrator said about why they were singing? [because they were celebrating the harvest/herring] Ask students to think about why the children would be singing this song of thanks. Talk about the fishers' gratitude for the ocean, for the fish that will feed their community, for the tradition of fishing in a similar way to what their ancestors have done for thousands of years.
2. 10 minutes—Have children think of other songs of gratitude. Do they know any? What songs do people sometimes sing before they eat? What about worshipful songs? Mantras? Encourage children to share their songs of thanks through singing them. Chances are, more than one child will be familiar with a few of the songs, and you may get a few people singing! Share one of your own from your childhood, or play a couple from the link we've provided.
3. 5 minutes—Talk about the importance of the herring for the Heiltsuk First Nation. Like other Indigenous groups, these people—their culture, their language, their food, their learning—have been deeply connected to the land for thousands of years. (To help the children make sense of how long these First Nations civilizations have lived in this part of the world, explain that these people's ancestors likely lived at the same time as the mammoths.) It has always been important for them to honor the land and the ocean that feeds and sustains them. Singing a celebration song while gathering herring eggs is one way of showing respect to the Earth. Another is fishing carefully, by letting the herring lay their eggs on branches instead of catching the whole fish and taking the eggs out of its stomach. This is a wise way of making sure they never take more from the ocean than the ocean could support.

4. 10 minutes—Go on a "walk of thanks" in the community near your school. You don't even have to leave the schoolyard if you don't want to. There is enough for students to be grateful for just outside the door. How about the clouds, for providing moisture that we need to drink and bathe? What about the trees, for cleaning our air and providing shelter for so many animals? How about the sun, for feeding every plant so that they can feed us and the animals we eat? What about the oxygen in the air? How about the worms in the soil beneath you? How about eyes to see with? Feet to walk on? Hands to touch the grass and feel the rain?

Day 2 (~35 minutes)

1. 10 minutes—Gather the students. Let them share stories of their experiences during their "walk of thanks." Talk about how much gratitude they discovered during the exercise. Draw parallels between their appreciation for the Earth and the appreciation traditionally shown by Indigenous people. How would we feel inside if we all did that more often? If we stopped to thank a tree for growing, or expressed our respect to the sun for warming us, or told a bird that its song was beautiful? Steer children toward a recognition that focusing on the many things they can be grateful for is a healthy way to think. Talk about how our relationship with the planet might be healthier, too, if we spent more time honoring the land for sustaining us.
2. 5-10 minutes—Invite children to create their own song of thanks. They can fan out into their own space and take an instrument with them if they like. Let them know they can focus on anything to honor, big or small. They can sing to the Earth or to themselves or to their parents or to the herring or to the school… If they want to dance, let them dance. However they want to move their bodies and make noise to express their appreciation, make space for it.
3. 10-15 minutes—Gather and have the children share their songs.

LEARNING PLAN 2:
A CLOSE EXAMINATION OF HABITAT

LEARNING PLAN 2:
A CLOSE EXAMINATION OF HABITAT

Grade level 1-3
Lesson 1 ~35 minutes
Lesson 2 ~45 minutes

Theme: *Habitat observation*

English Language Arts Standards

- CCSS.ELA-LITERACY.RL.1.4–3.4 Describe how words and phrases provide meaning and sensory details in a story
- CCSS.ELA-LITERACY.SL.1.1–3.1 Participate in collaborative conversations with diverse partners about with peers and adults in small and larger groups

NGSS Standards

- 2-LS4-1 Make observations of plants and animals to compare the diversity of life in different habitats

Learning Plan Overview

In this learning plan students will review their observations of the diversity of life in the Great Bear Rainforest. Then, guided by the teacher, students will deepen their understanding of what it means to really *observe* something. They will practice their observation skills by a) taking a nature walk and b) spending time alone in nature, looking and listening to their surroundings. The learning culminates with students recording their data in a visual form.

From the Film

There is much to observe in *Great Bear Rainforest*. The film offers sweeping panoramic shots taken from the helicopter and drone; close-ups of organisms like the wolf eel, the sea anemone and the spirit bear; and noises from the rainforest like falling rain, ravens cawing, bears snuffling, whales blowing and surf scoters screeching.

Materials and Resources

- a book that can form the basis for a conversation with children about observation skills. Suggested titles:
  - *Robert Bateman: The Boy Who Painted Nature*, by Margriet Ruurs and Robert Bateman (2018, Orca Book Publishers)
  - *Looking and Seeing: Learning to Observe*, by Carol J. Rosen Chihara (2011, Bookstand Publishing)
  - *I Took a Walk*, by Henry Cole (1998, HarperCollins)
- chart paper, whiteboard or something to capture and display student ideas as they talk about what they observed in the film
- a natural, wild or park area that's within walking distance of your school, where students can fan out and sit independently, quietly observing the habitat surrounding them; this could even be your schoolyard if there are sufficient natural features. Try for a place with long grass, trees, bushes, a stream or pond, etc., as these features provide habitat for more species.
- a notice to send home with students about proper clothing for a nature observation; any risk assessments your school requires for off-site trips
- class set of photocopies of **Observing the Diversity of Life**

Teacher Prep

Day 1

- Bring your chosen book about observation skills to share with students.
- Prepare chart paper, section of whiteboard or a Word doc projected on the screen to record student observations from watching the *Great Bear Rainforest* film.

Day 2

- Organize three to four parent volunteers (or older students) to accompany you as you take the students out to make their observations in a natural area.
- Send home a notice: on the day of the outing, children should have proper outerwear to stay warm (or cool!), dry and comfortable, depending on your climate.

Day 3

- Photocopy **Observing the Diversity of Life**, one for each learner.

To Do Before Viewing *Great Bear Rainforest* (setting up the learning)

Tell students you're all going to watch *Great Bear Rainforest* on the giant screen. In summarizing the film, let them know that they will see and hear many different animals and things in the forest habitat (e.g., bears, rivers, wolves). As they watch, you want them to use their seeing and hearing skills to help them really observe what's happening in the film. Now introduce the book you've selected. Set the stage by telling the students that you're sharing this book to teach them about the power of carefully observing things in their natural habitat. Share the book by reading it to them, and let them have lots of time to look at the images. Can they imagine the noises they might hear if they could step into the habitat that is pictured? What smells might they pick up on? What might they feel?

Day 1 (~35 minutes)

1. 5 minutes—Review the term *habitat* to ensure all children understand. Ask learners to think back to the film. Were there different kinds of habitats? What sorts of things did they see in those different habitats in the rainforest? What sounds did they hear? Record students' thoughts and observations on the whiteboard (or chart paper). Don't worry about details at this stage; just jot down their general observations (for example, the spirit bear, a school of herring, an eagle catching a fish, the black bear falling out of a tree). Leave plenty of space between different observations on the whiteboard, so that as this lesson progresses you'll have room to add detail to each of them. This also models for students how to organize their thinking when recording their observations.
2. 10 minutes—Read your chosen book about observation again. Talk about the parts of the book where the main character notices important things about their surroundings or about their subject. Does the character slow down? Get quiet? Stand very still?
3. 10-20 minutes—Highlight for students the importance of observation in understanding our world—in the case of *Great Bear Rainforest*, a collection of habitats that are rich in different kinds of life (biodiversity). Have them think about a particular scene in the movie that they remember clearly. Invite students to pull forward more details about those scenes. *For example:* When the eagle caught the fish, her talons arced downward toward the water. She looked down at the fish, and she stopped beating her wings. Then the water splashed up around her feet as she grabbed the fish and pulled it out of the water. She resumed beating her wings so she could climb back into the air, and then she straightened her neck to look forward again.

   As the students share their observations from *Great Bear Rainforest*, invite learners to reenact those moments with their bodies. If someone remembers a bear splashing through a stream, splash through a stream! Does somebody remember a humpback whale surfacing to grab a mouthful of herring? Create gigantic humpback mouths with your arms, and catch those herring! Let your little learners stretch and bend so that they begin to create a physical connection to the learning, encoding it with a different modality. As the children communicate (and enact) their observations, write these extra details down on the whiteboard.
5. 5 minutes—Set the stage for the next day's learning. Tell students you will be going outside to visit a natural area so that they can practice their observation skills in the real world. Remind them to dress for the weather, because they'll be sitting quietly in nature—on the ground—for about 10 minutes.

Day 2 (~45 minutes)

1. 5 minutes—Head out on your nature walk. If a student wants to bring along paper and a pencil, that's fine, but it's not required at this time.

The idea is to simply observe, to sit quietly and be still, to watch, to listen, to smell and to notice.

2. 5 minutes—Model for students what sitting quietly in nature looks like. Find a place to sit, demonstrate how to sit comfortably so you don't have to wiggle around, and show them how to close their eyes to bring their listening sense into focus. As you listen, tell them what you hear. Then open your eyes and show them what visual observation looks like. When you find something interesting to watch, explain what you're doing. Move slowly, and talk softly.
3. 10-15 minutes—Have the children spread out and find their own places to sit. This is not the time for buddy work! Have parents or senior students fan out to check on all the kids as they get settled. Make sure they're alone, sitting comfortably and able to view a good amount of their natural surroundings. Sit for ten minutes (if the kids are able), listening, smelling, looking. If children become restless, invite them to lie down or change body position instead of standing up and moving around, as this will disturb other students.
4. 5 minutes—Head back to the school. When students are comfortable and have settled down from being out in the fresh air, hand around a copy of **Observing the Diversity of Life.** As you do, talk about the word *diversity*. What meanings do children have for this word? It can mean different things, but its general definition is "different kinds." That's what they're going to be recording now—the different kinds of things they observed on the nature walk.
5. 10 minutes—Have children record their observations on the page. Encourage them to use a mixture of drawings and printing to communicate their observations. Spell words on the whiteboard as they are requested. Let them use colorful markers, pencils, pens, crayons—whatever they like to get their thoughts down on the page.
6. 5–10 minutes—Gather the students for a debrief. What did they love about today's work? What did they learn today that they would not have learned on a screen? How does that experience help them learn differently or better? Talk about the importance of dressing for the elements. How do they think scientists and researchers handle long periods of observation? Encourage children to share their observations if they want to.

OBSERVING THE DIVERSITY OF LIFE

The habitat I observed is...	
Sounds that I heard	Details about those sounds
Plants and animals that I saw	Details about those organisms
Smells that I smelled	Details about those smells

LEARNING PLAN 3:
RAINFOREST COMMUNITIES

LEARNING PLAN 3: RAINFOREST COMMUNITIES

Grade level 2–4

Three lessons, ~45 minutes each

Theme: *Intraspecies interdependence within rainforest ecosystems*

English Language Arts Standards

- CCSS.ELA-LITERACY.RI.2.2–4.2 Determine the main idea of a text, recount the key details, explain how they support the main idea
- CCSS.ELA-LITERACY.SL.2.1–4.1 Engage in collaborative discussions with diverse partners, building on others' ideas and expressing their own ideas
- CCSS.ELA-LITERACY.W.2.7–4.7 Participate in shared research and writing projects
- CCSS.ELA-LITERACY.W.2.8–4.8 Gather information from provided sources to answer a question
- CCSS.ELA-LITERACY.SL.2.4–4.4 Report on a topic with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace

NGSS Standards

- 3-LS2-1 Construct an argument that some animals form groups that help members survive

Learning Plan Overview

In this learning plan students investigate animal communities in the rainforest. They learn about how each of these animals works together within their own groupings to obtain food and defend themselves. The teacher begins by helping children create connections to what they already know, i.e. by talking about family groupings as communities. Then students investigate sea otters, humpback whales and coastal wolves.

From the Film

Many animal communities rely on each other to survive in the Great Bear Rainforest. In *Great Bear Rainforest* we see how sea otters care for their young in the shallow kelp beds along the north coast of British Columbia.

Materials and Resources

- **Rainforest Communities**—graphic organizer for capturing information after watching videos and reading about animal communities
- **Rainforest Animals**—blacklines of sea otters, humpback whales, wolves that children can cut out when creating their model, if they wish to use pre-drawn images
- materials for learners to create posters, mobiles, weavings, chains or 3-D webs:
  - poster board, magazines, strips of construction paper, copies of **Rainforest Animals** for learners to cut animal pictures from
  - single-hole punch
  - scissors
  - glue, tape, brads or fasteners
  - markers
  - fabric, twine, yarn
  - twigs or other natural elements

Teacher Prep

Day 1

- Preview the following links to these BBC videos:
  - *Whales' Bubble Net Fishing* (~4 minutes) youtube.com/watch?v=Q8iDcLTD9wQ
  - *A Sea Otter's Life* (~3 minutes) youtube.com/watch?v=Q4MxLqWRobM
  - *Sea Wolves Score a Treat* (~2 minutes) youtube.com/watch?v=gnTn4iWA_os
- Photocopy a class set of **Rainforest Communities.**

Day 2

- Photocopy enough blackline masters so each child can choose one rainforest animal to cut out.
- Gather poster board, twigs, twine, glue, scissors, etc. from the materials list so children have ready access to these items in creating their models.

Day 3

- No prep

To Do Before Viewing *Great Bear Rainforest* (setting up the learning)

Connect with learners' prior understanding of communities, where the individuals in those communities work together to procure food, stay safe and keep each other well. Ask: *What makes a community?* Guide the children's thinking toward the family as a key community that helps to accomplish these goals. Have them think of examples of how their family fits into the description of a community. Record these on one side of a two-column chart so children can see their personal connections. Broaden the conversation to what learners think a community in a rainforest might look like. You may wish to show a few images of animals living in rainforests—both tropical and coastal temperate—so children can quickly grasp the connection. Help the children articulate the ways rainforest animals might similarly form communities that look out for one another. Record these on the other side of the chart. Tell the children that they'll be learning more about rainforest communities in *Great Bear Rainforest.*

Day 1 (~45 minutes)

1. 5 minutes—Gather learners together. Hand each a small slip of paper and a marker. Talk about what they learned about communities while watching *Great Bear Rainforest.* As one child shares an observation, invite another child to write it down and then stick it to the whiteboard so everyone can see. (Paraphrase the message so it's easy to spell—and invite other learners to help with the spelling.)
2. 5 minutes—Ask learners to share ways the rainforest animals' communities worked together to find food or care for each other. Record these as well. Did they see any examples of animals who generally don't group together for survival?

3. 15 minutes—Allow children to sit or stand where they are comfortable. Watch the three clips:
   a. *Whales' Bubble Net Fishing*
   b. *A Sea Otter's Life*
   c. *Sea Wolves Score a Treat*

   After each clip, have students share their observations of how this animal group works together to help each other survive.
4. 5 minutes—Designate three areas in the room, one for each animal. Have each child decide which animal interests them the most. Then have each child take a copy of **Rainforest Communities** to their designated area, where they will join other learners interested in the same animal.
5. 5 minutes—In their groupings, have learners retell scenes and recall evidence from the videos and *Great Bear Rainforest* that proves some animals form groups that help members survive. Each child can record these thoughts on their page through both pictures and words. Move around to each group to hear the conversations and help learners find the right words to capture the main ideas.

   Extension: Encourage deeper research and engagement with the material by making available a selection of nonfiction books for students to consult when seeking evidence of animals helping each other survive.
6. 5 minutes—Gather together and have children share their observations. Collect student copies of **Rainforest Communities** for the next lesson. Let them know that in the next class they will be creating a model that shows how their animals help others in their community survive. Encourage them to look for evidence, when they go home tonight, that their family members do the same.

Day 2 (45 minutes)

1. 5 minutes—Have learners think back to yesterday's lesson on rainforest communities. Who has an observation about how their own family works to help its members survive?
2. 5 minutes—Outline today's work to the children. They will choose a creative way to demonstrate how that animal community works together to survive. Orient them to the materials available for creating their model—glue, scissors, twigs, yarn, blackline cutouts of their rainforest animal, poster paper. Tell children they may absolutely help one another in their work, but that they each will create their own representative model. Let learners know that they may be asked to show and explain their model, so to think about their decisions as they work.
3. 20–30 minutes—Allow children to work wherever they are most comfortable in the room. Move around the room and connect with each child, if you can, to ask questions about their reasoning and choices. As children work, emphasize their job of *showing the interconnectedness* of individuals in an animal community: their model should show in some way the interconnectedness of the community members (e.g., yarn that is woven together; paper-chain rings that are linked; lines drawn on a poster). Early finishers can help others or tidy the work areas. Use this as a teachable moment: they, too, are working together as a community to help each other do their jobs well.

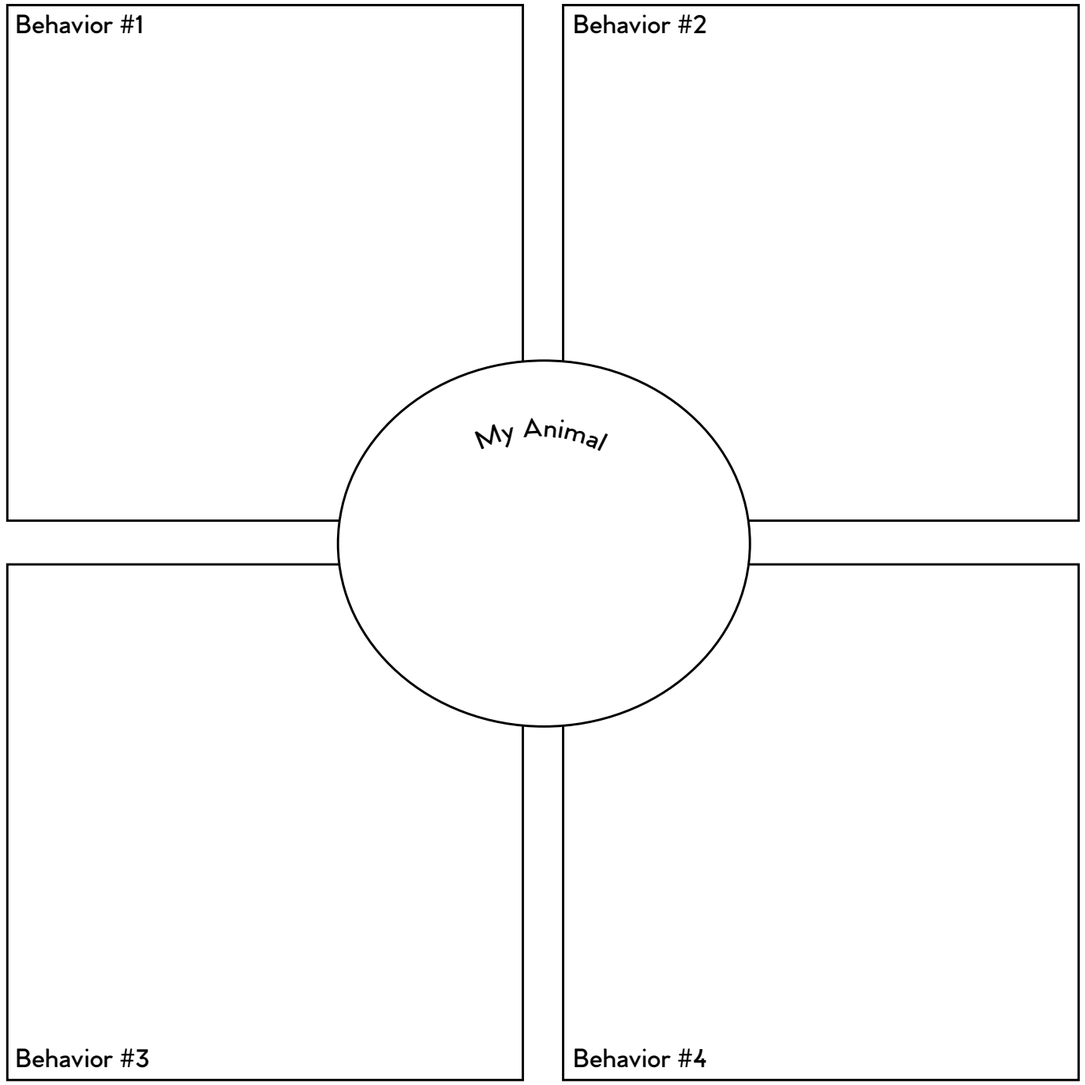
Day 3 (45 minutes)

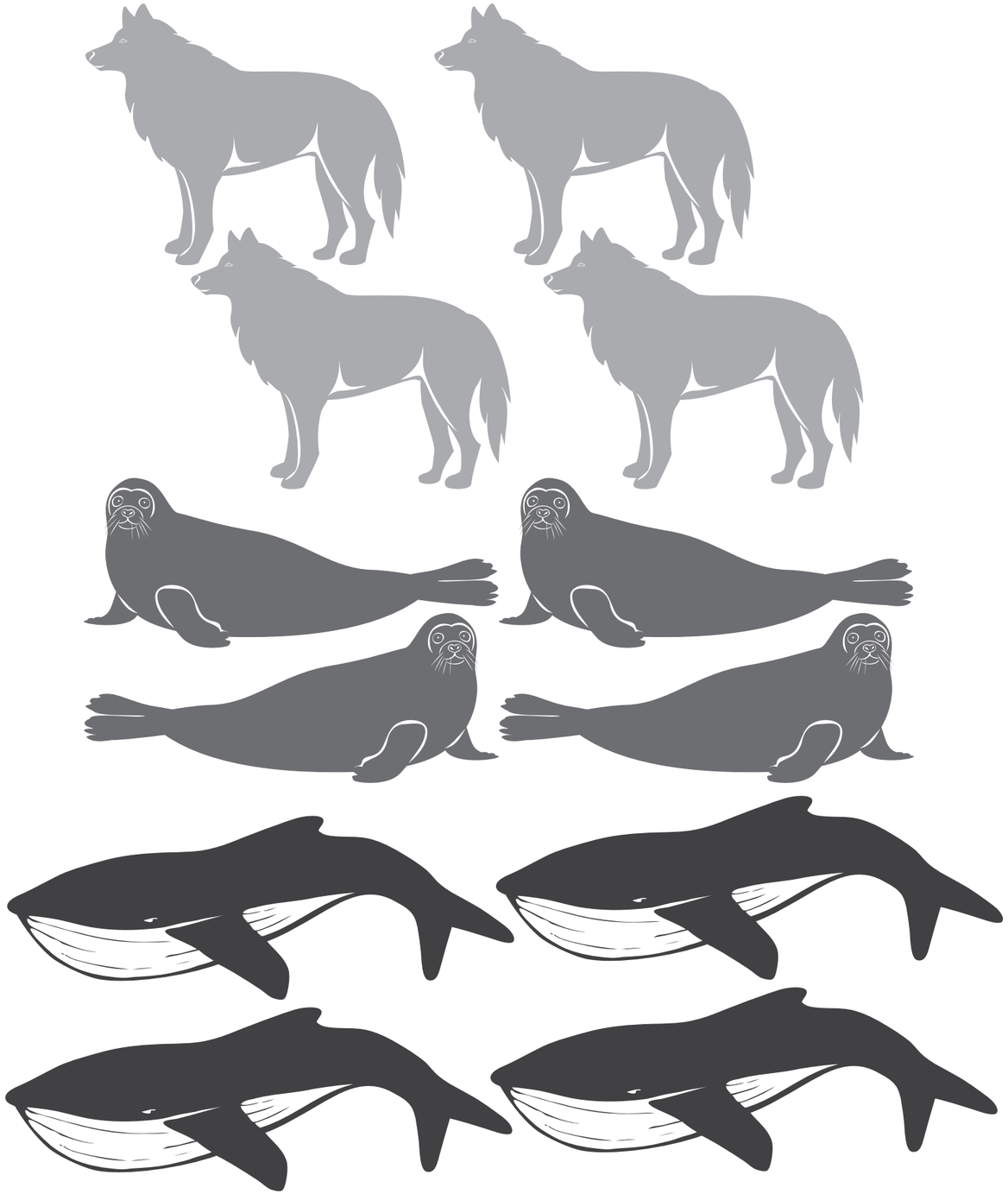
1. 5 minutes—Connect back with yesterday's work of creating models of animal communities. What parallels do learners see between their families and the animal groupings they studied?
2. 30 minutes—Gather the group so that those who would like to present their models can do so. Ask them to show evidence (create an argument) that their chosen animal benefits from living in a cooperative community. Record in a chart on the whiteboard or on paper all the different ways animal groupings can be advantageous. For children who are hesitant about presenting independently, help them interpret their work for the class or invite another student to assist. (Again, another example of a community helping its members to do their work.)
3. Display the children's work around the classroom.

RAINFORESTCOMMUNITIES HANDOUT

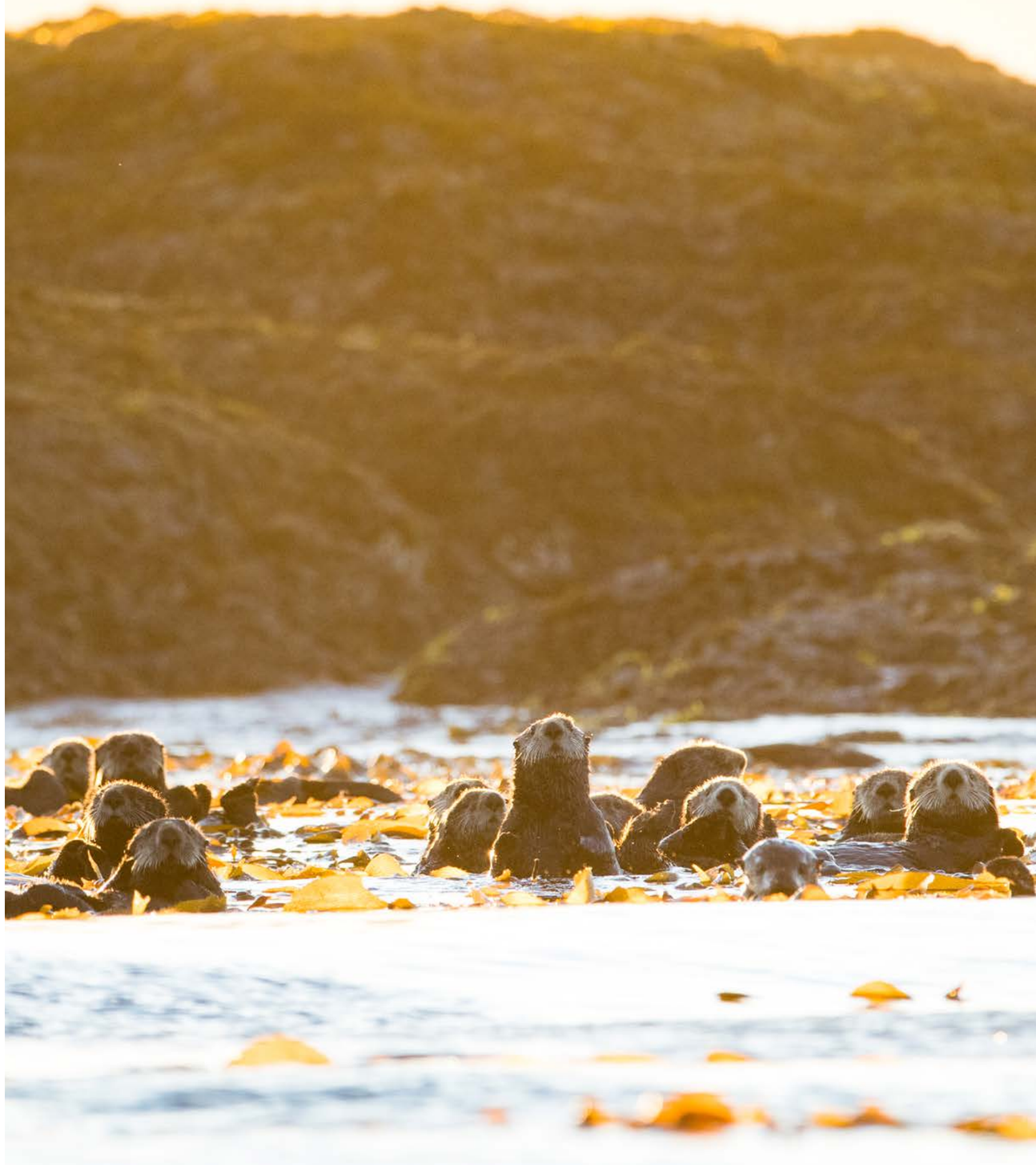
Many different animals live in communities in the Great Bear Rainforest. The one I chose to learn more about is: _____.

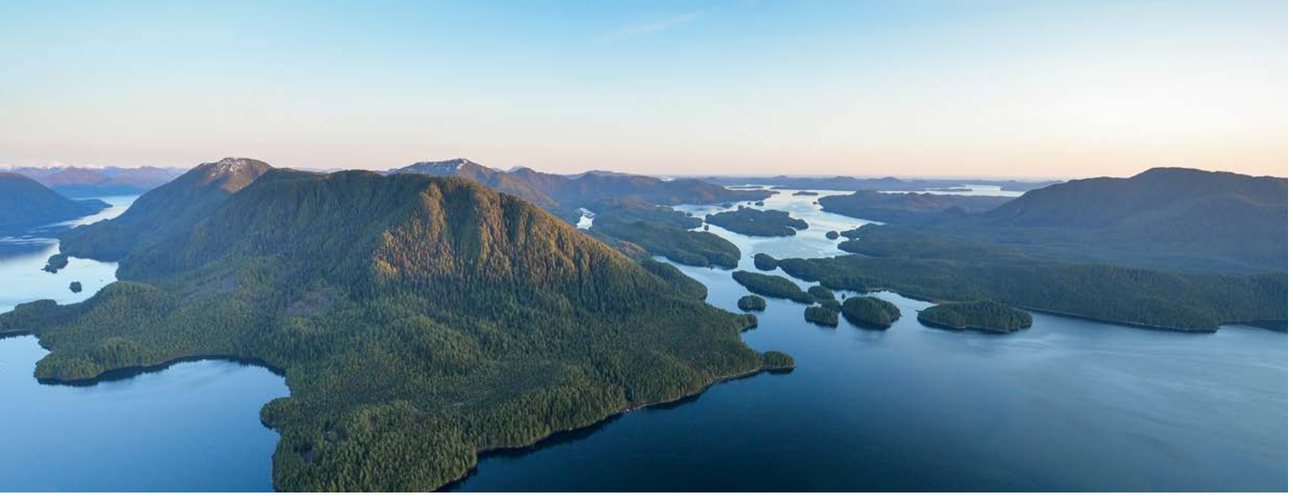
Here are some ways that these animals help each other survive:





LEARNING PLAN 4:
MAPPING THE GREAT BEAR RAINFOREST





LEARNING PLAN 4:
MAPPING THE GREAT BEAR RAINFOREST

Grade level 3–5
Two lessons, ~45 minutes each

Theme: Mapping and spatial skills

English Language Arts Standards
- CCSS.ELA-LITERACY.RI.3.7–5.7 Interpret information presented visually or quantitatively and explain how the information contributes to understanding

NGSS Standards
- 4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features.

Learning Plan Overview
Students will connect what they've seen in *Great Bear Rainforest* to a map of British Columbia, where the Great Bear is located. Using Google Maps, the educator will guide students in positioning the Great Bear in North America, then in British Columbia. Discussion will include features of the map, such as compass and longitude and latitude. Learners will explore the area's topography and geography using satellite images and will then translate their learning into a map of their own creation using atlases, globes and Google Maps.

From the Film
The film opens with grand aerial landscapes of the Great Bear Rainforest: forests climbing the sides of jagged mountains; roaring waterfalls; snowy glaciers; and misty fjords. Several minutes in, viewers see a globe that shows the locations of the world's coastal temperate rainforests, most of which are now destroyed. The Great Bear Rainforest is highlighted on the western edge of North America, as the narrator identifies its location along 500 miles of the British Columbia coastline.

Materials and Resources
- projector and screen so you can use Google Earth
- globes
- atlases
- class set of laptops (or your school's computer lab)
- class set of **Map of North America**
- class set of **Map of the Great Bear Rainforest**
- students' coloring materials (markers, pencil crayons)

Teacher Prep
Day 1
- Prepare projector and screen for use with Google Earth.
- Arrange to have your class use the school laptops or be in the computer lab.

Day 2
- Photocopy class sets of both maps.

Day 1 (~45 minutes)
1. 10 minutes—Have students think back to the landscapes they saw in the film. Talk about what they remember from the movie—the ocean, the islands and archipelagos, the waterfall, the snowy mountains, the river valleys, the forest near the ocean. Remind students that the film also mentioned how this is a super-productive area due to the cold water holding more nutrients than warm water does. What alterations might climate change introduce into the environment if the water keeps warming?
2. 20 minutes—Ask students: Where is British Columbia? Where is

the Pacific Northwest? Use Google Earth to investigate. Enjoy your explorations with the students.

a. Start with "North America" so students become oriented to the continent.
b. Enter "Canada" and talk about the landforms they see (e.g., Hudson Bay, snow-capped mountains in the west, forest stretching from northwest to southeast).
c. Scale to "British Columbia." Take a few minutes to look at the topography of the province. Where are the mountains? Where's the continental shelf? Where is the Alaska panhandle?
d. Search "Great Bear Rainforest." Google Maps will zoom you in really close! Zoom back out again so you can show students how the Great Bear fits within the BC coastline. You will see the town of Hartley Bay, home of the Gitga'at First Nation, where Nelson and his dad, Marven, live (they're the people from the film who keep a watch on the spirit bears).
e. Move the mouse farther north, toward Bella Bella. This is where fisherman Saul Brown lives, in the Heiltsuk Nation. And bear researcher Mercedes lives with her family in Kitasoo Xai'Xais territory, farther south in Klemtu.

3. 5 minutes—Once you've had a chance to explore, ask students about some of the features on the map. Where is the compass? Where is the longitude and latitude? Help students understand what these measurements are used for. A globe is useful for introducing the concepts of longitude and latitude. (Be sure to explain to students that lines of longitude and lines of latitude are not actual lines on the ground! They're like meters and yards, units of measure that help us understand our world.)
4. 10 minutes—Allow students some time to investigate Google Maps, either alone (if you have enough computers) or with a partner. Let them have this time to further their exploration of the Great Bear Rainforest or, if they prefer, to check out another part of the world. It doesn't matter whether they choose to go to Hollywood or Morocco; allow their curiosity to drive their learning. Circulate and engage with students as they explore.

Day 2 (~45 minutes)

1. 10 minutes—Have students think back to yesterday's map explorations. What do they enjoy about using Google Maps? What did they like and remember about exploring the Great Bear Rainforest?
2. 5 minutes—Explain that today students will be transposing some of the information from Google Maps onto a blank map of the Great Bear Rainforest. Hand out a blank map of North America and tell students this is their reference so they can see at a glance where the Great Bear fits.
3. 30 minutes—Hand out copies of the blank map of British Columbia. Have students consult the globes, the atlases, Google Maps and other mapping materials in order to put together a meaningful representation of the Great Bear Rainforest. Students should use their colors to represent and reflect the following:
    a. landforms like mountains and valleys
    b. watersheds, rivers, streams
    c. ocean and coastal areas
    d. areas of snow or glacier cover
    e. areas of human settlement (towns)

4. 5 minutes—As a concluding activity, gather students and ask them what part of the Great Bear Rainforest they are most drawn to. What part of this region would they want to learn more about? The mountains? The ocean? The wolves? The Kitasoo Xai'Xais bear researchers? How the trees use the salmon?

MAP OF NORTH AMERICA

MAP OF THE GREAT BEAR RAINFOREST

LEARNING PLAN 5:
WHEN THINGS DON'T GO AS PLANNED

LEARNING PLAN 5:
WHEN THINGS DON'T GO AS PLANNED

Grade level 4–6
Two lessons, ~45 minutes each

Theme: *Coping with disappointment, change and failure*

English Language Arts Standards
- CCSS.ELA-LITERACY.SL.4.2–6.2 Interpret information presented in diverse media and formats and explain how it contributes to a topic
- CCSS.ELA-LITERACY.W.5.2 Write informative/explanatory texts to convey ideas and information clearly

Emotional Intelligence Skills
- empathizing with others when they experience challenging situations (ethics, empathy)
- identifying and naming emotional states (self-awareness, self-regulation)
- critically evaluating coping mechanisms and assessing their applicability to one's own life (self-awareness, self-regulation)
- recognizing feelings that arise from fear, failure, disappointment and change, and responding to those feelings with self-talk and growth mindset (self-regulation, resilience)

Learning Plan Overview
In this learning plan, students will watch the behind-the-scenes (BTS) video of the making of *Great Bear Rainforest*. This short clip is really enjoyable to watch, especially following the screening of the actual film, as students get to see a bit of the work and energy that goes into making a film like this. Here, students will watch the clip several times, paying close attention to the occasions where the film crew experienced disappointment, failure, setbacks or unexpected changes. We want them to note these events and dig deeper into how the film crew might have managed their feelings arising from those setbacks. The last part of the learning is for students to use a similar lens when looking at their own disappointments, challenges, setbacks and failures, and to increase their capacity to choose the mental habits (tools) that will best serve them to stay focused and positive.

From the Film
Even though the film itself is only forty-one minutes long, creating *Great Bear Rainforest* for IMAX was nearly a three-year process. Ian McAllister worked full-time on the project, and many film crew and experts were also brought in to help with the filming. As students will see in the behind-the-scenes (BTS) film, the crew had to face myriad problems and failures as they worked together to create this important story.

Materials and Resources
- link to the behind-the-scenes video
- **Emotions**, a sheet that lists human emotions (one per student—this is important as a handout, as the act of circling/shading the emotions creates deeper learning than just looking at it on a screen)
- **Behind the Scenes** excerpts from the book (4)
- **When Things Don't Go as Planned**

Teacher Prep
Day 1
- Photocopy a class set of **Emotions.**
- Prepare the behind-the-scenes clip for students to watch.

Day 2
- Prepare the **Behind the Scenes** excerpts for sharing on the projector/screen.
- Photocopy a class set of **When Things Don't Go as Planned.**

To Do Before Viewing Great Bear Rainforest (setting up the learning)

Start the conversation with something learners can relate to, whether it's making a movie, building a robot or building a bridge or skyscraper. All of these things take a long time and require lots of different people working on the project. And sometimes things don't go as planned. Let students know there is a lot more behind the filming of *Great Bear Rainforest* than they actually see in the forty-one-minute movie. The weather gets in the way, or someone becomes sick, or a critical piece of gear breaks. Maybe no wildlife shows up on the day the crew was supposed to shoot. As students watch the film, have them think about the challenges of filming in such a wild, remote location. How did the weather affect the filming? What about wildlife encounters?

Day 1 (~45 minutes)

1. 5 minutes—Allow students to talk about their experience of the film. What did they really enjoy? What part do they have more questions about? Talk about some of the challenges they think the crew would have faced in filming such an epic project.
2. 5 minutes—Screen the behind-the-scenes video for *Great Bear Rainforest*. Before clicking *PLAY*, remind students to pay attention to those times when things went sideways. What challenges and setbacks did the crew face? How would the crew members have felt about those challenges?
3. 10 minutes—Hand out **Emotions**. Have students circle or shade in the emotions they predict the crew members felt when something blocked their progress or presented a challenge during the filming. Watch the BTS short again, and have students circle more emotions if they recognize (or infer) them. Students can infer their *own* emotions as part of this exercise too, circling how they would feel if faced with some of the same situations: How would they feel if they spent all night awake during a winter storm on a boat? How would they feel if their gear was frozen stiff or wet at a time when they actually needed it?

4. 15 minutes—Talk through some coping mechanisms. Students are likely familiar with these and can offer even more than you'll find in the list below. What kinds of tools could the crew use at those times when things went wrong? Examples of positive coping mechanisms include
    a. focusing on what actually *is* working;
    b. reminding yourself that the current situation and discomfort will not last forever;
    c. bringing your attention to your breath and keeping it there;
    d. reframing the situation so that you can see what's good about it;
    e. supportive self-talk that reminds you of your power to choose outcomes;
    f. taking a problem-solving mindset; and
    g. asking for help.

Day 2 (~45 minutes)

1. 25 minutes—Share some behind-the-scenes excerpts from *Great Bear Rainforest: A Giant Screen Adventure in the Land of the Spirit Bear*. After you read each one with/to the students, ask what feelings that crew member might have struggled with. What coping tools might have turned their mental framework around for the better? Talk about the coping mechanisms that you brought up last class.
2. 10 minutes—Challenge students to each think about a time when they experienced a disappointment, setback or failure. What were some of the emotions they felt? What were some of the negative thoughts they developed? Did they cope well or not well at all? What positive coping strategy/strategies could they have used to shift their outlook from one of failure to one of growth or opportunity? Model this line of thinking with an example from your own life.
3. 20 minutes—Hand out copies of **When Things Don't Go as Planned**. You can mock up an exemplar on the screen for the students, using the personal example you just shared. Allow students time to think and record their experiences on the page.

EMOTIONS

Here is a list of positive and negative human emotions. You probably recognize quite a few of them from your own emotional experience!

The more aware you are of your emotions, the more power you have to manage them maturely. Not everything is going to go perfectly all the time. In fact, life is known for throwing curveballs. It's how you *react* to those curveballs that determines your wellness—and your success.

In the chart below, circle the emotions you think the *Great Bear Rainforest* crew felt when they hit challenges and obstacles in the filming.

Angry	**Sad**	**Anxious**	**Hurt**	**Embarrassed**	**Happy**
Irritated	Disillusioned	Nervous	Abandoned	Confused	Confident
Offended	Dismayed	Cautious	Tormented	Pathetic	Elated
Disgusted	Tearful	Worried	Aggrieved	Repugnant	Relieved
Impatient	Pessimistic	Skeptical	Victimized	Ashamed	Relaxed
Spiteful	Paralyzed	Bewildered	Deprived	Guilty	Excited
Defensive	Depressed	Confused	Shocked	Inferior	Content
Annoyed	Regretful	Vulnerable	Isolated	Lonely	Comfortable
Frustrated	Mournful	Stressed	Betrayed	Self-conscious	Trusting
Grumpy	Disappointed	Afraid	Jealous	Isolated	Thankful

WHEN THINGS DON'T GO AS PLANNED

Sometimes you make a mistake. Sometimes a situation takes a turn you didn't expect, or an outside force prevents things from going smoothly. And sometimes…you simply fail. Write about it in the box below. Then work your way through the rest of the page.

One time I experienced a setback or failure was:

Here are some of the emotions I felt at that time:

1. _____
2. _____
3. _____
4. _____
5. _____

These emotions are normal. Everyone feels them—especially when things go wrong. What's important is how I use my skills to reframe my experience, so that I don't just focus on the negative.

Here's how I used—or could have used—a positive coping mechanism to feel better:

Here's another positive coping mechanism that could be helpful:

EXCERPT #1:
BEHIND THE SCENES: WOLF TAKES A SELFIE

From *Great Bear Rainforest: A Giant Screen Adventure in the Land of the Spirit Bear*, by Ian McAllister and Alex Van Tol (Orca Book Publishers, 2019)

One of the limitations of filming for the imax screen is the sheer size and weight of the cameras and lenses. Typically, the cameras are mounted on a tripod. But carrying a huge tripod through dense rainforest is challenging. "You have to set it up, and then you have to get a camera on it and it's noisy, and then you're stuck in one place to film wildlife that are often on the move," says Ian.

Besides, Ian usually likes to film alone, because then he has a better chance of seeing wildlife. "Imagine yourself walking down an alley at night and there's one person coming at you," Ian says. "You're probably like, *okay*, but if there are three people coming at you, it's like, *oh*, *this isn't so good*. And I think wildlife often respond that way, where understanding the intentions of one person is a lot different than understanding the intentions of multiple people."

So that he could film alone in the forest, Ian asked the camera technicians to find a system that would let him walk through the trees without lugging a tripod but still being able to capture a stable image. The solution was a backpack of sorts with a curved arm that arched up over Ian's head and transferred the weight of the camera from his arms to his hips. "It was an actual exoskeleton that I would wear," says Ian. He was able to control the camera with a stabilizing gimbal attached to the arm, which kept the image stable even while he was walking.

Or running, in some cases. When a sly wolf sneaked up and stole Ian's GoPro camera, Ian gave chase through the trees. The wolf eventually dropped the GoPro, leaving Ian to retrieve it from the forest floor.

EXCERPT #2
BEHIND THE SCENES: MAMA BEAR, UP CLOSE AND PERSONAL

From *Great Bear Rainforest: A Giant Screen Adventure in the Land of the Spirit Bear*, by Ian McAllister and Alex Van Tol (Orca Book Publishers, 2019)

Picture this: It was the end of a long day of shooting in the fall, and the crew was tired. Ian and his gang were ready to head back to *Habitat*, so Deirdre headed back to the area where the crew had been filming to gather up the last few bags. Along the way, she spotted a mother grizzly with a cub in tow. Knowing that grizzly bears can sometimes be unpredictable, Deirdre chose to stop walking and wait quietly for the duo to pass.

The mother bear kept walking—straight toward Deirdre. "It was the most awe-inspiring moment," Deirdre recalls. When the grizzly sow was about ten feet (three meters) away—close enough that Deirdre could see the pupils of her eyes—she turned suddenly and headed in a different direction. Her cub followed suit.

Working with wildlife requires patience, trust, understanding and good judgment. Working on *Great Bear Rainforest* has taught the crew about more than just the world of the grizzly. "You definitely learn about yourself," muses Deirdre. "I've learned a lot about myself over the past couple years."

EXCERPT #3
BEHIND THE SCENES: WAITING FOR THE WOLVES

From *Great Bear Rainforest: A Giant Screen Adventure in the Land of the Spirit Bear*, by Ian McAllister and Alex Van Tol (Orca Book Publishers, 2019)

It was late days in the wolf shoot, and Tim was beginning to worry. He'd been out for two solid weeks, but he hadn't yet captured any audio of a wolf howling. He was panicking: he only had two days left before he had to leave for his daughter's wedding. What if he didn't get any wolves?

In the pre-dawn hours on the morning before Tim was scheduled to fly out, the radio crackled to life on *Canadian Shore*, informing the crew that a wolf howl had been pinpointed on one of the local islands. Discouraged, Tim went back to sleep: his recorder was strapped to a tree on a different island. No chance of getting that howl.

In the morning, though, he asked a boat driver to take him and his gear to the island where the wolf howl had been reported, in hopes of capturing some wolf sound bites. He strapped his recorder to a tree and set off for the beach with additional recording gear and a tripod.

"So I'm walking on the beach by myself," Tim recalls, "and walking right toward me is a big male wolf. And I put the tripod down. And I hit record."

Thirty feet (ten meters) away the wolf stopped and looked at Tim, then looked away, toward a nearby island. "I figured he was going to jump in the water and swim away, or he was going to go back into the forest where he came from," Tim says. "And I'm looking at him and I said to him, *Look buddy, you've gotta howl for me. I'm leaving tomorrow, literally. This is my last day. You've got to howl.*"

The wolf looked back at Tim, then turned to walk away. "And as he's turning to walk away, he lifts his head and just howls," Tim says. "And I've got a microphone pointing right at him, and the surround

EXCERPT #3
(cont'd from previous page)

mic and the digital recorder off in the distance in the trees, all recording. And from everywhere, ravens come in and start circling around him and yelling at him. So if you're in the IMAX theater, they're in the roof. And he's in the middle."

The wolf gave Tim seven howls over the course of eight minutes. When he was finished, he walked straight toward Tim and then past him, watching him the whole time. "Then he gets in the water and swims away. It was just unbelievable," Tim says. "The next thing I hear is Ian on my radio: [crackle] *Yeah, are you guys out there?* And I'm like, *Yeah. Ian, I can go home now. I got it.*"

EXCERPT #4
BEHIND THE SCENES: YOU NEVER KNOW WHAT'S COMING

From *Great Bear Rainforest: A Giant Screen Adventure in the Land of the Spirit Bear*, by Ian McAllister and Alex Van Tol (Orca Book Publishers, 2019)

Interacting with dozens of large carnivores underwater is all in a day's work for Ian. On more than one occasion, a curious sea lion has investigated him very thoroughly, usually by coming up behind him and putting its open jaws over his head. That might sound startling—and it was for Ian the first couple of times it happened. But after years of living in the rainforest and learning about their behavior, Ian understands that sea lions often explore their environment with their mouths. "You have this thousand-pound animal putting its jaws over your head and giving a little squeeze, but they're really just trying to feel what it is," Ian says. "You can imagine if they wanted to treat your head like a grape they could, but they don't. They're just curious. You kind of have to just have faith that they're not going to keep pressing."

Ian indeed has that faith, because he realizes two things: First, sea lions are highly intelligent creatures with established natural cycles that don't include humans as a cause of great concern. Second, following on from the first, humans aren't part of their menu. They much prefer fish!

Being able to observe and learn from the sea lions is a rush for Ian. "In the underwater world where we're so clumsy and awkward and vulnerable, it's amazing to have these sea lions, especially the big bull sea lions, moving around like mermaids. Sometimes you can be surrounded by thirty, forty, fifty of them, and they're all trying to feel you with their jaws," he says, laughing. "I think the closest I've ever been to drowning was just laughing so hard underwater having this happen to me."

LEARNING PLAN 6:
WHEN YOU CHANGE AN ECOSYSTEM...

LEARNING PLAN 6:
WHEN YOU CHANGE AN ECOSYSTEM...

Grade level 6–8

Lesson 1 ~55 minutes
Lesson 2 ~45 minutes
Lesson 3 ~40–60 minutes (or assigned as out-of-class work)

Theme: ***Herring: Foundation species for the Great Bear Rainforest***

English Language Arts Standards

- CCSS.ELA-LITERACY.RI.6.1–8.1 Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text
- CCSS.ELA-LITERACY.RI.6.3–8.3 Analyze the interactions between individuals, events and ideas in a text
- CCSS.ELA-LITERACY.RI.6.5–8.5 Analyze the structure an author uses to organize a text
- CCSS.ELA-LITERACY.RI.6.6–8.6 Determine an author's point of view or purpose in a text and analyze how the author distinguishes his or her position from that of others
- CCSS.ELA-LITERACY.RI.6.8–8.8 Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims
- CCSS.ELA-LITERACY.W.6.1–8.1 Write arguments to support claims with clear reasons and relevant evidence
- CCSS.ELA-LITERACY.W.6.4–8.4 Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience

- CCSS.ELA-LITERACY.W.6.7–8.7 Conduct short research projects to answer a question, drawing on several sources and generating additional questions for further research
- CCSS.ELA-LITERACY.W.6.8–8.8 Gather relevant information from print and digital sources, using search terms effectively; assess the credibility and accuracy of each source
- CCSS.ELA-LITERACY.W.6.9–8.9 Draw evidence from literary or informational texts to support analysis, reflection, and research

NGSS Standards

- MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations

Learning Plan Overview

In this learning plan, students will learn more about the importance of the herring in the Great Bear Rainforest and how these fish have over time been decimated by industrial commercial fishing practices in the North Pacific. They will also learn about conservation efforts to bring the herring population back. Students will independently research a similarly threatened species of their choice and investigate conservation efforts. They'll finish the learning by writing a short essay asserting that changes—in this case, human-induced changes—to ecosystems affect populations.

From the Film

In the spring the herring return to the North Pacific coast. Their return is very important to the Heiltsuk people—so important, in fact, that the event marks the start of the Heiltsuk new year. In the film, Heiltsuk fisher Saul Brown speaks about the sustainability of the traditional herring fishery, noting that traditional First Nations harvesting practices allow the fish to spawn up to six times over its lifetime. This is different from the commercial herring fishery, where the whole fish is removed from the ecosystem, never to spawn again.

Materials and Resources

- **Herring Backgrounder**—information for the teacher to share with the class
- **How to Evaluate Your Web Sources**—to share with the class on the projector
- **Research Organizer: Species at Risk**—one copy per student (note: this is double-sided, so be sure to copy both pages)
- **Writing an Argument**—one copy per student

Teacher Prep

Day 1

- Review Part A of the **Herring Backgrounder** so you're prepared to lead the class in a discussion about this organism's significance to the Great Bear Rainforest ecosystem.
- Have **How to Evaluate Your Web Sources** ready to project onto the classroom screen/whiteboard.
- Photocopy a class set of the **Research Organizer: Species at Risk** (this is a double-sided handout, with notes about the species on one side and notes about conservation efforts on the other).

Day 2

- Review Part B of the **Herring Backgrounder** so you can educate the class about the traditional versus commercial herring fisheries.

Day 3

- Photocopy a class set of **Writing an Argument**.

To Do Before Viewing *Great Bear Rainforest* (setting up the learning)

Talk about ecosystems and how they function. What do students already know about rainforest ecosystems? Marine ecosystems? Prairie ecosystems? Mountain ecosystems? Meet them where they're at—that is, if you live far from the ocean, choose a relevant nearby ecosystem like a stream or a forested area near your school. Talk about the different species that function as producers, consumers and decomposers in that ecosystem. What happens if one of those species is wiped out or significantly depleted? You can use an economic analogy to help students grasp the concept that an ecosystem needs all parts in order to function well as a whole (e.g., How would our community change if suddenly all the nurses and doctors walked off the job? Or all the people who run grocery stores?) Tell them to pay special attention to the necessary parts of the rainforest ecosystem while they watch *Great Bear Rainforest*.

Day 1 (55 minutes)

1. 5 minutes—Hook students' attention by asking them to recall what they remember about herring from the film. You can have a student jot these observations on the whiteboard, or you can just talk about it. What questions do they have after watching the film? (Students may want to know what the industrial commercial fishery is like, or how the Heiltsuk use the roe, or why they use hemlock branches to collect the eggs, for example.)
2. 5 minutes—Tell students you'd like to share more in-depth information about the herring and how they form an important part of the rainforest ecosystem. Use Part A of the **Herring Backgrounder** for reference as you broaden their knowledge. Let them know they don't need to take notes, just listen to learn.
3. 5 minutes—Read students this quote from Saul Brown: "That herring provide so much sustenance for so many species is really a gift. It's a gift that needs to be guarded, and cherished, and nurtured. So we take care of the herring, and the herring take care of us." Ask students: What if we looked at more things in our natural world like this? What gifts can you think of in our local environment that could be better guarded and nurtured?
4. 10 minutes—Tell students their work for today is to think of a species at risk—one that has been overfished, overhunted or similarly

threatened by human action (e.g. Douglas fir, salmon, bison, cod, wolves, elephants, etc.). Each child should be interested in the species they're going to research—this engagement is key in inquiry! Explain that students will have some time to research their chosen species using different websites. On the projector, share **How to Evaluate Your Web Sources**. Go through this with students to ensure they are familiar with what makes for an authentic, reliable website. Inform them that it's their responsibility to draw information from only those sites that we can trust—and to keep a record of the URLs they consult.

5. 30 minutes—Give students a copy of the **Research Organizer: Species at Risk** and time to research. Circulate to ensure they are drawing their information from reputable sites, such as BBC, CBC, NASA, *New York Times*, NPR, Smithsonian, KidsPost (the *Washington Post*), and sites that are at their level of understanding. They can also use Google Scholar as their search engine. Let learners know that in the next class they will be using the same sheet to record conservation efforts, so they should keep it in a binder for easy access.

Day 2 (45 minutes)

1. 5 minutes—Review what students remember from yesterday's discussion about herring—their importance to Indigenous people and to the food chain in the Great Bear Rainforest. Have them predict what they think poses a risk/risks to the herring population.
2. 10 minutes—Use Part B of the **Herring Backgrounder** to fill in the gaps for students, so they can understand the commercial industrial herring fishery and how it has put pressure on the rainforest ecosystem. Discuss.
3. 10 minutes—Have students share some of the research they did yesterday into their chosen species at risk. Tell students their work for today is to continue the research, but this time with a focus on human impacts on their species and its ecosystem (through overhunting, overfishing, logging, etc.). They'll be looking for information about any conservation efforts that are underway to try to protect that species.
4. 20 minutes—Using the backside of the **Research Organizer**, have students research and take notes about conservation efforts for their species. Circulate to help them apply their research skills and to answer any questions.

Day 3 (~45 minutes—or you can assign this for work outside of class)

1. 5 minutes—Explain to students that the culminating piece to their investigation into species at risk is to write (or record) an argument for how changes to an ecosystem affect populations. Essentially, their job is to make a case, supported by evidence from their research, that will convince audiences that yes, changing an ecosystem *will* in fact change the populations of species living there.
2. 10 minutes—Share with students the guiding sheet called **Writing an Argument**. Walk them through the steps of organizing a persuasive essay—or a recording, for those who like to share and learn aurally. Tell them this page will help them organize their ideas, so that when it comes time to create a final draft, their argument is entirely planned—and therefore much easier to write.
3. 30 minutes—Allow time for students to work. Circulate to help them organize their ideas, form a thesis statement and/or express their knowledge in a persuasive manner.
4. Assign students a final or polished draft for submission, if desired.

HERRING BACKGROUNDER

Part A—Information to share with students

- Herring is one of the Great Bear's foundation species. A foundation species supports many other species in an ecosystem—just like the foundation of an apartment building supports all the homes inside. The health of nearly every other organism in the rainforest depends on the health of herring populations.
- Herring are an important food fish for salmon, making up more than half their diet. They also provide a nutrient-dense food source for seabirds, wolves, mink, eagles and black bears, and for marine mammals like sea lions, dolphins and humpback whales. A herring school can be up to several miles (kilometers) in length, so when a bunch of them swim by, it's like a dinner bell for everyone in the water.
- The herring is important to the Heiltsuk First Nation's culture too. Not only does the herring spawn mark the beginning of the Heiltsuk new year, signaling the end of a long winter, but the eggs themselves (called roe) provide a rich source of food. "When the herring come, everything else comes alive," says Heiltsuk fisher Saul Brown. "The whales come to feed on them, the wolves, the marine and terrestrial animals come to feed on them…everything comes alive."
- These little fish travel in schools weighing tens of thousands of tons.
- Unlike salmon, herring don't die off after they spawn; they can spawn up to six times before they reach the end of their lifespan. If conditions are right, each female can lay up to 20,000 eggs during the spawn.
- Salmon lay their eggs in gravel and then carefully cover their nests. But herring take the sea by storm, depositing millions of eggs on underwater plants in the near-shore environment. Only one in 10,000 of these eggs will survive to adulthood.
- Fatty and rich in nutrients, herring eggs are the caviar of the North Pacific.

- Recent archeological digs have revealed 6,000-year-old herring bones at some settlement sites. Scientists think that in the past, herring were even more abundant than salmon.

Part B—Information to share with students

- For decades, non-Indigenous fishers had open access to the waters where the herring live, even though these territories were traditionally inhabited by Indigenous people. Commercial fishers harvested tons of fish every season—more than the herring population could handle. The herring were mostly used for making fishmeal and fish oil or as bait. Over time the herring "kill fishery" scooped up billions of fish, and by the late 1960s British Columbia was forced to close the herring fishery.
- In the 1970s, after commercial fishing had taken a few years' rest, the Canadian government decided that it could resume. Sometimes Fisheries and Oceans Canada would open the fishery for just a few hours. But in those hours, large seine boats would descend on herring-rich waters, scooping up as many fish as they could at one time, then throwing their nets back into the water as fast as possible to catch more.
- The Heiltsuk are careful in how they harvest the herring roe. They don't follow industrial commercial fishing practices that kill the adults to extract the roe. They're sensitive to maintaining the balance of the entire ecosystem; they understand that to overfish one species means causing a disastrous ripple of impact throughout the whole rainforest.
- In recognizing that the herring are a gift from creator, the Heiltsuk accept the responsibility of proper stewardship.
- The Heiltsuk have an ancient relationship with herring. The way they fish herring today isn't that different from how they did it thousands of years ago. For generations, Heiltsuk fishers like Saul have collected roe from lines of kelp or, as you see in the film, hemlock branches placed in sheltered areas along the coast. This allows the people of the rainforest to benefit from the nutritious herring eggs without destroying the whole animal.
- The Heiltsuk are trying to share this message with the wider world: creating a more sustainable fishery will benefit humans and fish alike and will help to rebuild the herring population after decades of destructive commercial fishing.

Sources:

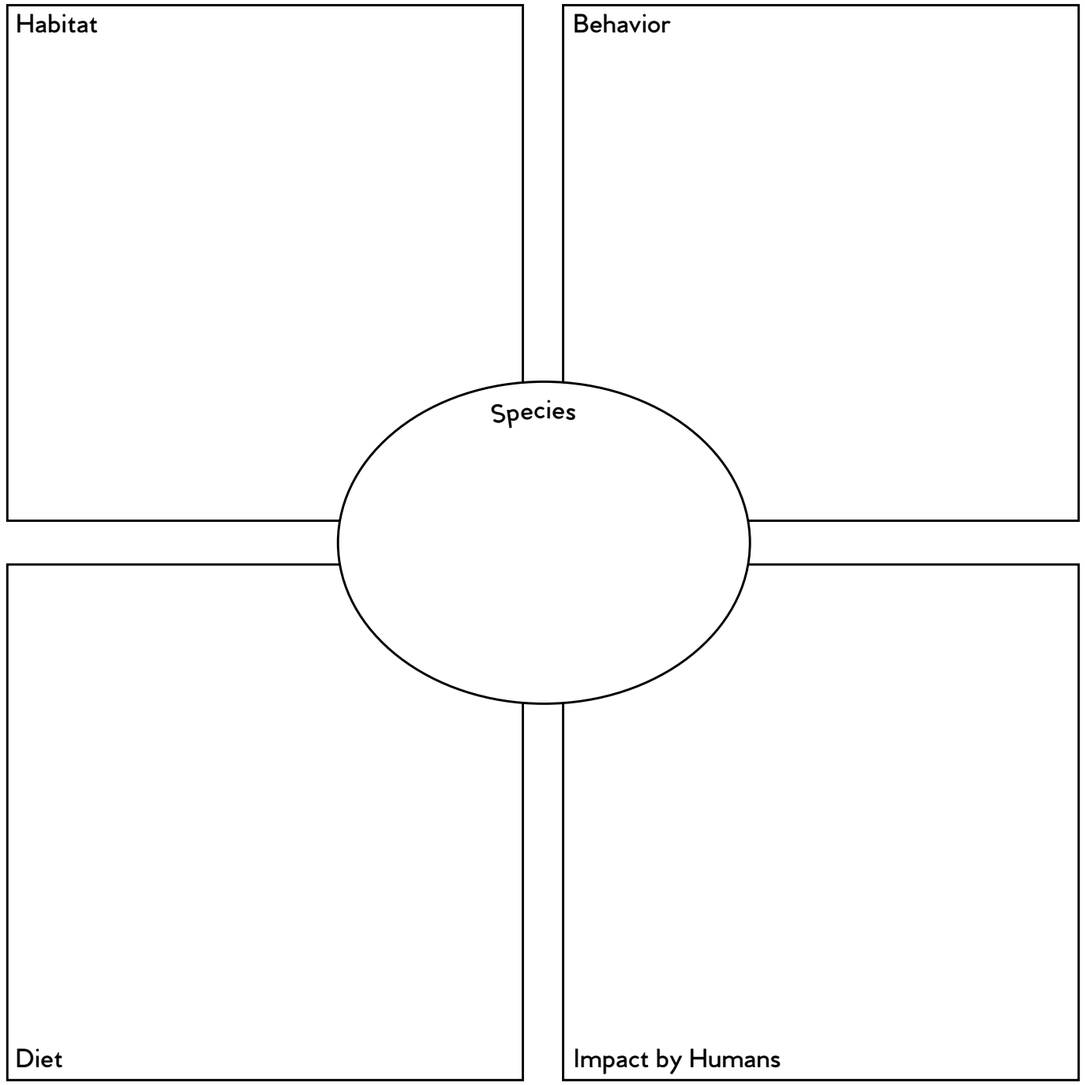
1. Gill, Ian. "Of Roe, Rights and Reconciliation." *Hakai Magazine*, August 28, 2018. hakaimagazine.com/features/of-roe-rights-and-reconciliation/
2. McAllister, Ian, and Alex Van Tol. *Great Bear Rainforest: A Giant Screen Adventure in the Land of the Spirit Bear*. Victoria, BC: Orca Book Publishers, 2019.

HOW TO EVALUATE YOUR WEB SOURCES

- ☐ If the website is owned by an organization, does this seem to be a reputable organization?
- ☐ Is the information reliable?
- ☐ Is the creator/author an expert in the field?
- ☐ Are the sources of information stated?
- ☐ Can you verify the information by doing a cross-reference?
- ☐ Do you detect any bias?
- ☐ Is the information factual or opinion-based?
- ☐ Does the author use words like *always* and *never*?
- ☐ Does some of the information conflict with information you found on another website?
- ☐ Is each section of the page labeled with a heading?
- ☐ Is the site cluttered with ads?
- ☐ Is the article/post up to date?
- ☐ Is the information easy to get to, or is it buried by many links?
- ☐ Is there a search function on the web page?
- ☐ Do any of the links lead to dead ends or 404s?
- ☐ Are there images on the page? Can you be certain these haven't been changed? If not, should you accept these images as true?

RESEARCH ORGANIZER: SPECIES AT RISK

Record your learning in the graphic organizer below.



Checklist for web-based research:

- ☐ I kept track of the websites I used (e.g. in a clearly labeled bookmarks folder)
- ☐ I consulted only websites where I knew the information could be trusted
- ☐ I took notes in my own words, instead of copying directly from the screen

CONSERVATION EFFORTS FOR MY CHOSEN SPECIES

Species	
What conservation is being done to minimize the risks to this species?	
Which groups are working on conservation efforts?	
What challenges stand in the way of these conservation efforts?	

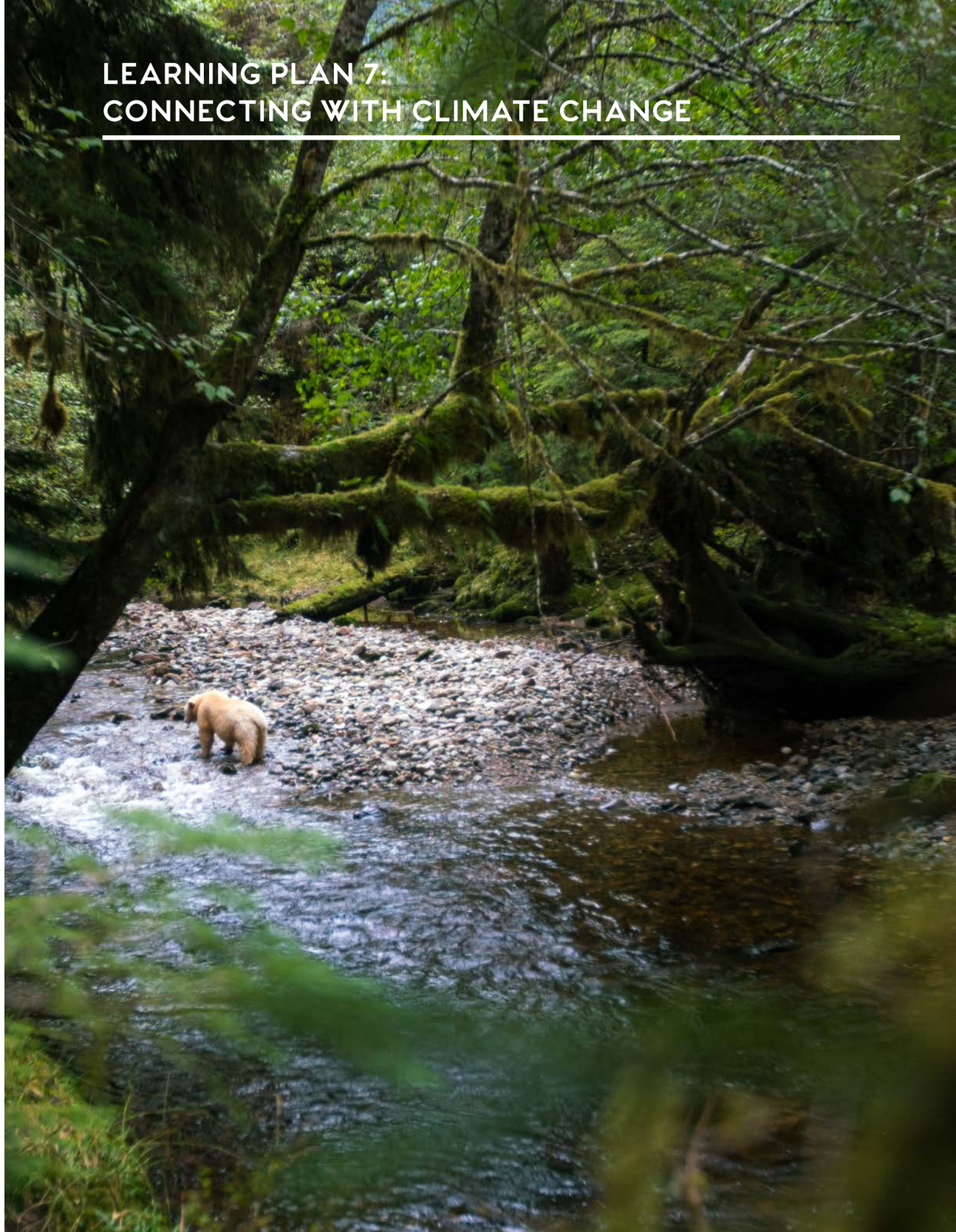
Checklist for web-based research:

- ☐ I kept track of the websites I used (e.g. in a clearly labeled bookmarks folder)
- ☐ I consulted only websites where I knew the information could be trusted
- ☐ I took notes in my own words, instead of copying directly from the screen

WRITING AN ARGUMENT

Introductory paragraph	Introduce your topic in a way that will capture the reader's attention
	Thesis statement (this expresses your position on the issue and your arguments)
	Transition to body of essay
Body paragraph #1	Argument #1 (reason for your position)
	Evidence/detail that supports your argument
	Evidence/detail that supports your argument
	Transition sentence into the next paragraph
Body paragraph #2	Argument #2
	Evidence/detail that supports your argument
	Evidence/detail that supports your argument
	Transition sentence into the next paragraph
Body paragraph #3	Argument #3 (this should be your ***most powerful*** argument for your position)
	Evidence/detail that supports your argument
	Evidence/detail that supports your argument
	Transition sentence into your conclusion
Concluding paragraph	Restate your position
	Summary of your reasons
	Clincher (this is what seals your argument; it could be a call to action or a look at next steps

LEARNING PLAN 7:
CONNECTING WITH CLIMATE CHANGE



LEARNING PLAN 7: CONNECTING WITH CLIMATE CHANGE

Grade Level 9–12

Lesson 1 ~ 60 minutes
Lesson 2 ~ 50 minutes
Lesson 3 (extension, ~50 minutes)

Theme: *Examining climate models to forecast climate change*

English Language Arts Standards

- CCSS.ELA-LITERACY.SL.9-9.1–12.1 Initiate and participate in a range of collaborative discussions with diverse partners, building on others' ideas and expressing their own clearly and persuasively
- CCSS.ELA-LITERACY.SL.9-9.2–12.2 Integrate multiple sources of information presented in diverse media or formats, evaluating the credibility and accuracy of each source
- CCSS.ELA-LITERACY.RI.9-9.1–12.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text
- CCSS.ELA-LITERACY.RI.9-9.2–12.2 Determine a central idea of a text and analyze its development over the course of the text
- CCSS.ELA-LITERACY.RI.9-9.3–12.3 Analyze how the author unfolds an analysis or series of ideas or events
- CCSS.ELA-LITERACY.RI.9-9.8–12.8 Delineate and evaluate the argument and specific claims in a text
- CCSS.ELA-LITERACY.RH.9-9.7–12.7 Integrate quantitative or technical analysis with qualitative analysis in print or digital text
- CCSS.ELA-LITERACY.RST.9-9.7–12.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart)

NGSS Standards

- NGSS HS-ESS3-5 Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth's systems

Learning Plan Overview

Here, students will be introduced to the latest United Nations report on climate change. Together as a class, they will learn to read a heat map as one model of geoscience data that demonstrates climate change, and then they will break into groups to talk about and investigate other models. Students will use recent sources to conduct research into and create a model of the predicted unfolding of climate change in the coming years in one key area of choice. As an extension activity, students will conduct interpersonal interviews with a climate-change expert to expand their understanding of the issue and to help develop more sophisticated questions to deepen their inquiry.

From the Film

In one scene from *Great Bear Rainforest*, we can see evidence that global weather patterns are changing the shape of the world. When a torrential rainstorm delivers more than a foot of rain to the Great Bear in the span of twenty-four hours, the spirit bear's fishing stream changes irreversibly. Unable to absorb the totality of the rain that falls, the forest instead rearranges itself to accommodate the flood. Thousands of tons of earth wash down from the hills above the spirit bear's valley, choking the stream channels with mud and dead trees.

Materials and Resources

- laptop and projector so you can show videos
- **Asking Good Questions** (for projecting or as a handout)

Teacher Prep

Day 1

- Read or listen to recent news about the UN Intergovernmental Panel on Climate Change (IPCC) report on climate change (released week of October 8, 2018) in preparation for leading a knowledgeable

discussion with students. *Note*: *These are also excellent links for your students to investigate, if they want to deepen their inquiry.*

- PRESS RELEASE (~8-minute read): Summary of ipcc report: ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/
- VIDEO (~3 minutes): UN Secretary-General António Guterres calls for global action on climate change: youtu.be/VNe-jBVij-g
- AUDIO (~24 minutes): CBC Radio. The Current: "Eat less steak and ice cream": What climate change means for the food you love. cbc.ca/listen/shows/the-current/segment/15613255
- PRINT (~5-minute read): The Guardian: "We have 12 years to limit climate change catastrophe, warns UN" theguardian.com/environment/2018/oct/08/global-warming-must-not-exceed-15c-warns-landmark-un-report
- PODCAST (6 episodes ~30 minutes each): CBC Radio: 2050: Degrees of Change cbc.ca/radio/podcasts/2050-degrees-of-change/
- Review this web page on how to read a heat map from nasa's Jet Propulsion Laboratory. There is a heat-map video too (3 minutes), which you'll be using in class. jpl.nasa.gov/edu/teach/activity/earth-science-data-visualizations-how-to-read-a-heat-map/

Day 2

- no prep

Day 3 (extension)

- Read the interview with *Great Bear Rainforest* director Ian McAllister at greatbearrainforestfilm.com for examples of good open-ended questions.
- Have **Asking Good Questions** ready to share on the projector/screen (you can also photocopy handouts).

To Do Before Viewing Great Bear Rainforest (setting up the learning)

Talk with students about climate change, about how we can see the direct effects on the Earth in both urban areas and in remote, wild areas. Have students talk about what they know—or can extrapolate—about the effects of climate change in the Pacific Northwest. What's happening in the oceans? On the coastlines, where the water meets the land? In the high Coast and Rocky Mountains? In the coastal temperate rainforest? Tell students to keep climate change in mind as they watch *Great Bear Rainforest*.

Day 1 (~60 minutes)

1. 5 minutes—Talk about what students remember from *Great Bear Rainforest* in terms of the effects of climate change. In the conversation, students will bring up the rainstorm that wiped out the spirit bear's stream. Have them connect this with other extreme weather events around the world, such as hurricanes, ice storms, wildfires and floods.
2. 10 minutes—Give students some space to talk about their concerns around climate change. How do they think their lives will be shaped if humans—especially in industrialized countries—don't change course? What changes and initiatives are they aware of that give them reassurance?
3. 15 minutes—Share the video from un Secretary-General António Guterres with students. youtu.be/VNe-jBVij-g. Discuss students' observations and thoughts around the video. What's standing in the way of our ability to make things better? If you have an understanding of the innovation and solutions that science has developed to address climate change, and an understanding of how policymakers and corporate interests often block these solutions, create some space to talk about that. It's okay not to know all the answers. Let students fill in some blanks; often their understanding is sophisticated and detailed, and they can learn from each other.
4. 10 minutes—Tell students that today's work is to look at some models of climate change to get a better feel for where we've come from and where we might be headed. Let them know you're going to share a heat map from NASA's Jet Propulsion Laboratory as an example of this kind of model. Before you play the video, see what students already know about heat maps. What kind of information can they show?

Let students know that this video, even though it's short, contains a lot of information, so you'll be watching it a couple of times.

VIDEO: jpl.nasa.gov/edu/teach/activity/earth-science-data-visualizations-how-to-read-a-heat-map/

a. The first time through, have students watch the colors, listen to the narrator and simply absorb this new knowledge about carbon dioxide in the atmosphere. Talk about their observations.
b. The second time through, ask them to notice the date counter at the bottom of the screen as it rolls from January through to December. Have them also pay attention to how the map colors shift from winter to summer and back to winter.

5. 10 minutes—What other global climate models do students know of? Have students form groups or partner up and locate models. Give them a few minutes to search, examine and understand. Have them select one model to share with the class. It should be something they're reasonably confident they can explain.
6. 10 minutes—Invite groups to share the climate-change models they found during their research. Have one student keep a log of the different models that the different groups found; you will be using these links in the next lesson.

Day 2 (50 minutes)

1. 5 minutes—Bring forward the learning from last class. Are there any other thoughts or observations that students have about the *Great Bear Rainforest* film? About exploring NASA's global heat map?
2. 10 minutes—Set the stage for today's learning. Tell students you want them to select an area of personal concern regarding climate change. This is going to be independent work, so have them focus on what interests *them* the most. Is it melting polar ice? Is it rising sea levels? Extreme storms? Landslides or floods? Wildfires? Rising temperatures and desertification? Food insecurity? Political instability as poor nations are harder hit by rich nations' continued use of fossil fuels? There are many aspects of climate change to choose from; hopefully, the students will scatter themselves across the issue so that the learning captures a full picture. Don't worry, though, if ten of them want to focus on, say, storms or rising sea levels. They should pursue whatever problem interests them the most on a personal level.

3. 30 minutes—Assign students to investigate their issue of concern. They are responsible for taking notes as they do their research and for keeping a record of the sources they consult. Let them talk with each other if they want and assist each other with their inquiries.

***Before you do the last part of this lesson, decide whether you're going to include the extension activity (Day 3), which sees students learning to ask good questions and asking those questions of climate-change experts as part of their research.*

4. 5 minutes—Assign students (or provide them with another work session) to create a graph, physical model, infographic, analogy or other model of climate change *in their chosen area of interest.* Have them consult the other models for guidance and ideas in how they might best represent the future in their area of climate change interest.

***Note: If you would like to go deeper with students and are considering teaching how to create computer simulations of their predictions around climate change, you can read* "Exploring the Use of Computational Models in Teaching Climate Change in K–12": serc.carleton.edu/earth_rendezvous/2016/program/afternoon_workshops/w14.html

Day 3 (50 minutes—extension)

1. 10 minutes—Explain to the class that while conducting research online and using trusted resources is important, often we can learn much more—and much more deeply—by speaking with someone who is an expert in a given field. A human conversation reveals so much more information than what we see on a screen—there is a whole vocabulary of nonverbal language, there's tone of voice, there's laughter, there are spontaneous diversions from the topic. Tell students that today they will be learning and practicing how to ask good questions. They then will apply these interviewing skills

to a conversation with an expert in their chosen area of interest regarding climate change.

2. Having a great conversation requires some practice in asking the right kinds of questions. See if you can give an example of good questions you have asked in your own life, or use an example of a podcast that you enjoy (you can share a quick clip with the students to illustrate). You can also use the interview with *Great Bear Rainforest* director, Ian McAllister, which is on the *Great Bear Rainforest* website (greatbearrainforestfilm.com).
3. 10 minutes—Share **Asking Good Questions** with students. You can do this on the screen or by handing each student a personal copy of the tip sheet. Work through each section and talk about it. As a class, have students suggest examples of open-ended questions.
4. 5 minutes—Assign students time to develop three to four targeted, open-ended questions about something they can relate to among their peers, such as music preferences, *Netflix* shows, social media, their jobs, chores, schoolwork, YouTube channels, career aspirations.
5. 5 minutes—Break students into groups of three. Have students read each others' questions and give feedback to make them stronger.
6. 15 minutes—Break students into pairs. Have students take turns asking targeted open-ended questions about their area of interest. They can use their voice recorders/iPhones if they want to, and *if their partner is okay with it*. Be sure they are prepared to take notes as well; a good journalist always takes notes as a backup. As students conduct their brief interview, have them jot new questions that arise as part of the conversation.
7. 5 minutes—Assign students to connect with a climate-change expert and conduct a fifteen- to twenty-minute interview. Have them record additional questions that come up during and after the interview; they can use these to deepen their inquiry as they put their climate change model together.

LEARNING PLAN 8: SYSTEMS IN HARMONY

LEARNING PLAN 8: SYSTEMS IN HARMONY

Grade Level 9–12

Lesson 1 ~ 50 minutes
Lesson 2 ~ 75 minutes

Theme: *Intraspecies cooperation to ensure and enhance survival*

Emotional Intelligence Skills

- empathizing with others' difficulties (ethics, social justice, empathy)
- recognizing the interconnectedness of relationships (wellness, cooperation)

English Language Arts Standards

- CCSS.ELA-LITERACY.SL.9-9.1–12.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, group and teacher-led) with diverse partners on grades 9-10 topics, texts and issues, building on others' ideas and expressing their own clearly and persuasively
- CCSS.ELA-LITERACY.RI.9-9.1–12.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text
- CCSS.ELA-LITERACY.W.9-9.2–12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts and information clearly and accurately through the effective selection, organization and analysis of content
- CCSS.ELA-LITERACY.W.9-9.4–12.4 Produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience

NGSS Standards

- NGSS HS-LS2-8 Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce

Learning Plan Overview

In this learning plan students reflect on and investigate how species in the Great Bear Rainforest use cooperative methods to promote safety and food capture, thus ensuring their survival. Through research, students will uncover ways that other species work together to create a healthy ecosystem and help one another survive, drawing parallels to species in the Great Bear. To enrich and deepen the learning by connecting it to their own experience, students will examine the importance of creating healthy interpersonal ecosystems to help them live their own lives as well as they can. In the second lesson, we invite students to investigate how traditional cultural practices of Indigenous groups both in and outside the Great Bear Rainforest have worked to fulfill this function through time.

From the Film

There are numerous examples of intraspecies cooperation in *Great Bear Rainforest*. Whether it's thousands of herring traveling in a school, dozens of sea otters rafting together with their young, or the Heiltsuk fishers who work together to gather roe on hemlock branches to feed their families, many groups work together to improve their odds of survival and reproduction.

Materials and Resources

- laptop, projector and screen
- Internet access
- **Evidence of Intraspecies Cooperation**
- **Reclaiming a Way of Life** (excerpt from *Great Bear Rainforest*)

Teacher Prep

Day 1

- Photocopy **Evidence of Intraspecies Cooperation**.

Day 2

- Photocopy or project **Reclaiming a Way of Life**.
- Ensure students have access to blank or lined paper to record their thinking during the web-making activity.

To Do Before Viewing Great Bear Rainforest (setting up the learning)

Before your class views the film, have them connect to prior knowledge with a brief discussion. Review the word *ecosystem* and talk about the *system* part of it. What do we know about systems? (Students should generate an answer along the lines of, *All parts in a system work together.*) When they watch the film, ask your students to pay attention to how members of a species work together to ensure survival (and therefore reproduction).

Day 1 (~50 minutes)

1. 10 minutes—Have students think back to the film. Where in *Great Bear Rainforest* do they see evidence that group behavior affects a species' chance to survive and reproduce? Phrase it this way: *Did you see any species working together to improve their chances of survival?* Listen to student input. If they haven't already mentioned the following, suggest the herring (which travel in enormous schools), the humpback whales (one of which will blow a ring of bubbles around the herring school to confuse the fish and trap them in a ball, thereby enabling the other whales to lunge-feed by swimming right through the herring ball) and the sea otters (which raft together in kelp beds to rest and keep their babies safe from predators). Together with students, pull out as many examples as you can remember from the film.
2. 5 minutes—Project **Evidence of Intraspecies Cooperation** on the screen. Talk about the prefix *intra* and ensure students understand the difference between *intra* and *inter*. Have them generate examples of similarly prefixed terms, such as *interpersonal* versus *intrapersonal*; *Internet* versus *intranet*; *intercellular* versus *intracellular*, etc.
3. 5 minutes—For each example of intraspecies cooperation students gave from the film, record these on your projection of **Evidence of Intraspecies Cooperation**. Explain that you're doing this to model how you would like them to keep track of their research in the next stage of the lesson.

4. 15 minutes—Hand out copies of **Evidence of Intraspecies Cooperation**. (You can also distribute this handout digitally and have learners fill it in on their computers.) Independently or with a partner, students will use the web or appropriate classroom resources to research other examples from the plant or animal kingdom. (Tell them that recent research has shown some pretty interesting evidence that trees cooperate with each other to foster survival, so students should not overlook them.) Can they get five or more examples into their **Evidence of Intraspecies Cooperation** chart? Can they find an example from outside kingdom Plantae and kingdom Animalia? Have students record details of species behavior that demonstrates evidence of intraspecies cooperation for survival, and remind them to keep track of their sources. Students should be ready to share their findings with the group when the research is over.
5. 15 minutes—Gather together to learn about what other groups uncovered through their research. Talk about cooperation as an adaptive mechanism: do learners believe these are altruistic acts? Or do they have an evolutionary basis?

Day 2 (75 minutes)

1. 5 minutes—Make the connection between the intraspecies cooperation students have researched from the nonhuman realm and that of humans. Get them thinking about ways that human groups often work together to promote and ensure not only survival but also the overall wellness of the group. What kinds of groups do this? (Examples include sports teams, healthy families, healthy social groupings, volunteer groups, activity groups like Scouts and Young Entrepreneurs and Junior Achievement.) As an interesting discussion point, see what your students think about gangs: they work together to promote group survival, but do they qualify in the same sense as the species we've seen in *Great Bear Rainforest*? Why or why not?

2. 15 minutes—Divide into groups of three to create a web or mind map of how human groups work together. Assign each group to choose two different groupings of humans to examine with this lens. On their webs they should place the group name in the center and then "web out" evidence of that particular group's cooperation. They are welcome to research further if they want to. Have students be prepared to share their thinking with the class.
3. 10 minutes—Gather the students to share their webs. As the discussion goes on, help students see and understand that their own well-being is directly connected to the well-being of the groups they choose to affiliate with. Talk about how human groups fulfill not only food, protective and sexual needs, but also emotional and spiritual needs. How healthy do students feel their own groupings are? Ask them to reflect on this privately over the next few days.
4. 30 minutes—Now turn the conversation toward Indigenous peoples and how, before contact and colonization, traditional cultural practices of Indigenous groups (both in and outside the Great Bear Rainforest) once worked to fulfill the function of cooperative survival in much the same way. Use the Heiltsuk fishers as an example from the film: the community comes together to harvest herring roe on kelp or hemlock branches; this in turn keeps members of the community connected to each other while also securing a food source to share with the wider group. Read **Reclaiming a Way of Life.** Break back into small groups and research an Indigenous group of choice from anywhere in the world. Have students create a web for that group that shows how group members work—or once worked—together to help provide for everyone's needs in the community.
5. 15 minutes—Have students return to the larger group and ask a few to share their findings. After the groups have had a chance to report, engage students in a discussion about how contact and settlement in different parts of the world disrupted existing human systems that were already in play, causing them to fray and lose functionality. What parallels do they see with the disruptions humans have introduced to the natural world?

EVIDENCE OF INTRASPECIES COOPERATION

In the chart below, record examples from your research. Be sure to cite or bookmark the websites you consult; good researchers always keep track of their sources.

Type of organism	Habitat or biome where this species is found	Evidence that when in groups, this species displays cooperative tendencies to ensure survival of other group members
Latin name: Common name:		
Latin name: Common name:		
Latin name: Common name:		
Latin name: Common name:		
Latin name: Common name:		
Latin name: Common name:		

RECLAIMING A WAY OF LIFE

Excerpt from *Great Bear Rainforest: A Giant Screen Adventure in the Land of the Spirit Bear* by Ian McAllister and Alex Van Tol (Orca Book Publishers, 2019)

Saul Brown and his father, Frank Brown, are Heiltsuk people living in the Great Bear Rainforest. Descended from a long line of hereditary chiefs, Saul works as a negotiator for the reconciliation process between the government of Canada and Aboriginal people. He's also a herring fisherman, collecting spawn from kelp. Much of what Saul knows he learned from his father, who learned from his grandfather before him and so on, throughout his family's long history in this region.

The Heiltsuk have lived in these territories for at least 14,000 years—long before European settlers arrived. For centuries they governed themselves and the land they shared with other creatures, keeping a careful balance between what they took and what they gave back. Heiltsuk law essentially instructs its people to "speak and act correctly," says Saul, noting that it's a very different approach from European law, which tells people what they can't and shouldn't do. "We would try to live in an honorable way," he says, "and in a way that was conducive to abundance and sustainability in our territory."

The herring have always been important to the Heiltsuk people, forming a cultural and economic foundation for this rainforest-based community. But that all changed when privately owned companies began logging and fishing in the Heiltsuk's traditional territories, beginning in the mid-1800s. Rivers became filled with silty runoff, and fish spawning beds were destroyed. Too much fishing depleted herring and salmon stocks. The Heiltsuk were frustrated and angry, because their land and ways were being destroyed. But their law was not recognized as being as important as Canada's federal and provincial laws—and so their voice was drowned out. They were even forbidden to harvest and hunt with the ecologically sensible methods they had used for thousands of years.

All the First Nations people in the Great Bear Rainforest were badly affected by the arrival of settler society. European colonization changed their lives over the course of a century and a half—and recovering from those changes is proving difficult. Coastal First Nations were forced to burn their totem poles and other cultural materials. Tens of thousands died of smallpox, a virus brought by the settlers. They were forced off their traditional territories onto smaller land reserves. Their hunting and fishing rights were restricted. They were forbidden to conduct potlatches, a system of feasts and gift giving that shaped economic and social structures within and between nations. And generations of First Nations children were sent away to Christian residential schools whose job it was to "kill the Indian in the child."

Like many nations, the Heiltsuk never gave up trying to be heard. They pointed out how logging was damaging their territory. They showed how their own ways of harvesting herring were much more sustainable than commercial fishing practices. They continue to fight for their environment and their rights and title.

Now, after so many years, reconciliation is finally on the Canadian government's agenda. The First Nations people are at last being heard.

But there is still much to be done.

BEYOND THE SCENES: EXPLORING THE OCEAN OF THE GREAT BEAR—A SPECIAL SECTION WITH OCEAN NETWORKS CANADA

Grade Level K–12

Suggested lesson plans provided below

Theme: *Using real data in the classroom, accessed remotely in real-time*

NGSS Standards

- Depending on how you use the deep-sea observatory data, you might meet any number of the NGSS standards for your age/grade level.

Learning Plan Overview

In this series of lessons and explorations, you and your students can take a deep dive into the ocean that surrounds the Great Bear Rainforest. You can even go further than that, if you want. Ocean Networks Canada, an initiative of the University of Victoria (Canada), develops, operates and maintains cabled ocean observatory systems around the Great Bear Rainforest and beyond. The data collected from below the surface is open for everyone to use and learn from—so share it with your learners, and enjoy your explorations!

From the Film

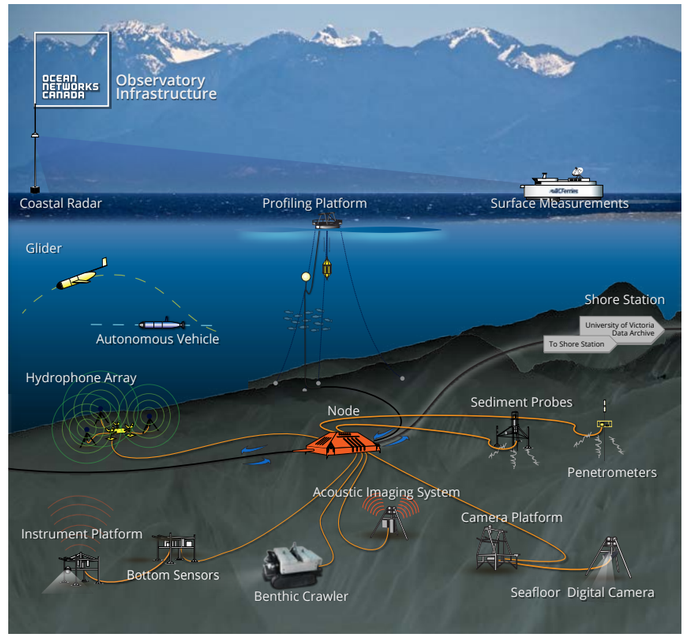
On the western edge of the Great Bear Rainforest lies the Pacific Ocean. As much a part of the ancient forest as the trees and bears themselves, the ocean brings life, nutrients and fish to the forest. Though critically important to all life on this planet, it is difficult to understand and explore the ocean beyond the surface due to its vastness and depth. The filmmakers of *Great Bear Rainforest* make exploring the ocean look easy, but it's a huge area that requires special skill and equipment to observe.

Background for Educators

One way scientists are learning to better understand this mysterious environment is via cabled ocean observatories on the seafloor. Ocean Networks Canada (ONC) develops, operates and maintains these systems. This innovative infrastructure supplies continuous power and Internet connectivity to a broad suite of subsea instruments from coastal to deep-ocean environments on the world-leading NEPTUNE and VENUS observatories, as well as the ever-expanding network of community observatories in the Arctic and coastal British Columbia. Whether large or small, these observatories enable communities, users, scientists, teachers and students to monitor real-time and historical data about the marine environment from anywhere on the globe.

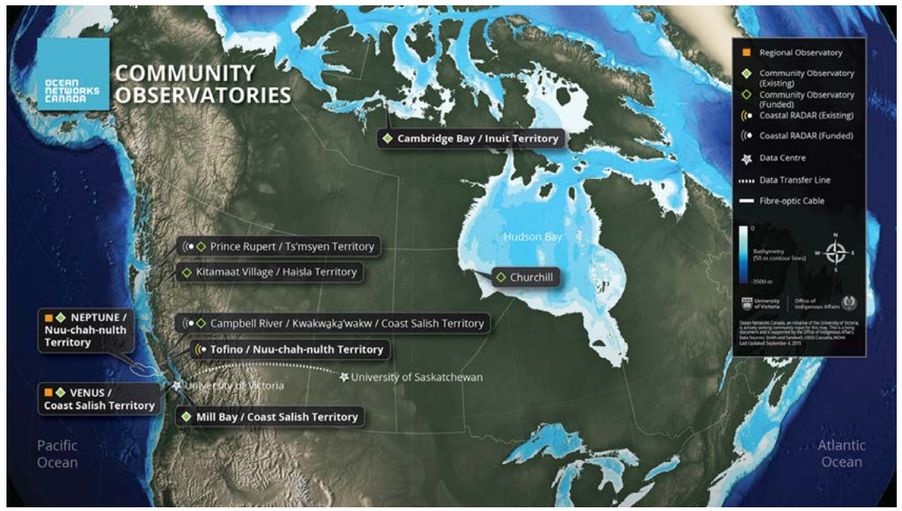
Data from the observatories add reality and firsthand experience to lessons and activities about the ocean. As promised by ONC's tagline, "Discover the ocean; understand the planet," the technology allows educators, students and the public to explore the ocean from the comfort of their home or classroom, no matter where they're located. This resource empowers educators and learners to pursue the ideas and questions inspired by the film *Great Bear Rainforest*, allowing audiences to explore and access live, real-time data from the ocean.

What is a cabled observatory, and how is it useful?



Cabled observatories on the seafloor are unique in that underwater cables provide the instruments with continuous power (they are not reliant on batteries or solar energy) and allow the data they collect to be immediately available to users via the Internet. Cabling also enables instruments to be networked together, allowing for multiple data types to be collected at the same time. This makes it possible to collect real-time data in environments that may be inaccessible due to weather or other hazards, and it allows the managers of the sensors to change the collection parameters in response to events or challenges. For example, researchers can change the direction of a camera from their laptops to better observe a species—a much more cost-effective approach than having to go back into the field. Further, if a user decides it may be helpful to have an additional piece of information, they can access the network and add parameters that allow

them to compare multiple types of data. For example, a researcher may be curious about whether a change in temperature impacted animal behavior. Using the network, that researcher could download temperature data and video from a co-located camera to explore answers to their question.



How can I use observatory data in my classroom?

You can use this data with any degree of complexity you would like. Want to keep it simple? Use the cabled observatory data to check the ocean temperature on a daily basis. If your learners are ready to develop projects that require deep-sea footage of marine life on a regular basis, the cabled network lets you do this too. You decide what's right for your classroom.

We've provided some suggestions for engagement below:

Real data and everyday classroom activities

Real data can be used everywhere in the classroom. Make it part of your everyday routine and see what you can learn!

- Record and graph parameters like water temperature, salinity and solar radiation from within the Great Bear Rainforest (Kitamaat Village or Prince Rupert), or on any other station that interests you. oceannetworks.ca/learning/ocean-sense/community-observatories
- Compare other environments to those in the Great Bear Rainforest using real data. For example, you can compare temperatures in Cambridge Bay, Nunavut, to where you live, or the Great Bear Rainforest — or to somewhere else entirely. oceannetworks.ca/learning/ocean-sense/community-observatories/cambridge-bay
- Analyze changes in the state of the ocean over time. Discuss how large, continuous data sets can enhance learning. Access these suggestions via: oceannetworks.ca/data-tools

Real data and the *Great Bear Rainforest* film

Explore how real data can be used to further your experience after viewing the film. And check out how real data can be used in other areas too!

- In the film, you observe whales and seals in their natural environment. Listen to the sounds they make when they communicate by accessing Ocean Networks Canada's hydrophone clips of marine mammals. soundcloud.com/oceannetworkscanada
- Observe beneath the waves by accessing deep-sea cameras just like the divers use in the film. Explore how each environment changes with depth and seasons.
- Dive deep into animal adaptations with a visit to Ocean Networks Canada's photostream on Flickr flickr.com/photos/oceannetworkscanada. Choose an animal and identify what features allow it to thrive in the ocean. Brainstorm what adaptations that organism might possess that are invisible to us, e.g. How does is survive living in a high-pressure environment? How does it respire?
- Explore thousands of images from the shallow coast to the deep sea through the free images collected by Ocean Networks Canada expeditions.

Real data and the *Great Bear Rainforest* Eductor's Guide

Use these suggestions to extend the students' learning using the lessons provided.

- **Learning Plan 2: A Close Examination of Habitat** Use video to explore habitats in the ocean just off the coast of the Great Bear Rainforest. Compare the observations you can make when you visit a place in person compared to observations made by cameras. Discuss why it is valuable to watch footage more than once. Suggested videos:
  youtu.be/ZsMh3W5jocs
  youtu.be/3Gelc7z22e8
  youtu.be/9-NifjNMv0A
- **Learning Plan 5: When Things Don't Go as Planned** Explore with students how seafloor cabled observatories can help researchers overcome some of the challenges faced by filmmakers and ship-based researchers. For example, how a camera-in-place can help capture animals that might not show up for filming, or how an instrument array that runs all the time can change what researchers might learn.

ADDITIONAL RESOURCES

WEBSITES

Pacific Wild
pacificwild.org

Filmmaker and *Great Bear Rainforest* author Ian McAllister started the nonprofit society Pacific Wild with his wife, Karen, after living in the Great Bear Rainforest and learning about the risks to its wildlife and ecology. Pacific Wild is committed to defending wildlife and its habitat on Canada's Pacific coast by developing and implementing conservation solutions in collaboration with First Nations communities, scientists, other organizations and individuals. Pacific Wild supports innovative research, public education, community outreach and awareness to achieve the goal of lasting environmental protection in the lands and waters of the Great Bear Rainforest.

The Nature Conservancy
nature.org/en-us/get-involved/how-to-help/places-we-protect/great-bear-rainforest/

Founded in 1951, the Nature Conservancy works to "conserve the land and waters on which all life depends," The Nature Conservancy is a charitable organization and has protected millions of acres of land and thousands of rivers around the world. It works with Indigenous communities, businesses, governments and other nonprofits in more than seventy countries worldwide. In the Great Bear Rainforest, the Nature Conservancy works to foster local natural resource management, support First Nations leadership and engage the next generation to steward their lands and waters.

Raincoast Conservation Foundation
raincoast.org/

Raincoast is a team of conservationists and scientists that operates a research lab, research field station and a research vessel in the name of protecting the lands, waters and wildlife of coastal British Columbia. Community engagement and peer-reviewed science are its tools to further its conservation goals—an approach the organization calls "informed advocacy".

Province of British Columbia
greatbearrainforest.gov.bc.ca/

News about protection measures, stewardship, economic development opportunities and ways for people to get involved in protecting the Great Bear Rainforest.

Spirit Bears, Wolves, Grizzly Bears and Black Bears
spiritbear.com/site/wildlife.html

Explore Spirit Bear Lodge, operated by the Kitasoo Xai'Xais First Nation in Klemtu, British Columbia. This page provides information about the different kinds of large carnivores in the Great Bear Rainforest.

Great Bear Rainforest Film Site
greatbearrainforestfilm.com

Learn more about the educational giant-screen documentary *Great Bear Rainforest* and watch interviews with the filmmakers, fascinating behind-the-scenes clips about the making of the film, and more.

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Great Bear Rainforest is a Spirit Bear Entertainment film presented by Seaspan. The film is directed by Ian McAllister, produced by Jeff Turner and executive produced by Kyle Washington and Byron Horner. It is distributed by MacGillivray Freeman Films.

For more information, please visit GreatBearRainforestFilm.com.