

Using Ocean School to Teach Biological Diversity in Landlocked Alberta!



I teach Science in landlocked Alberta—about as far as you can get from the ocean—but I’ve been sold hook, line and sinker on Ocean School. Our Science 9 course has a major unit on biodiversity, so I am always looking for ways to engage my students in more exploratory or inquiry-based activities.

Cue the arrival of Ocean School in my life. Ocean School has hundreds of different media resources that cover an amazing array of scientific concepts. Each piece includes an activity that has been thoughtfully designed to engage students in higher-level thinking. Not only are the activities high quality, they are also customizable and can be added directly to an existing Google Classroom. There are a number of collections that group activities by concept, grade level or media type, but each activity can also be used independently.

I use a single collection and a few additional activities from the Ocean School vault to teach the majority of the Science 9 Biological Diversity unit. In this post, I’ll break down the activities I use and the concepts they cover, as well as the changes or additions I make to existing activities in order to better suit the Science 9 program of studies.

Here’s a quick summary of all the concepts I cover with a single Ocean School collection:

- Variation among and within species
- Niches and interconnected features of ecosystems
- Symbiotic relationships
- Asexual and sexual reproduction (including alternation of generations)
- Adaptations and environmental pressures; speciation and endemic species
- Natural and artificial selection; genetic modification
- Genetic inheritance, heritable and non-heritable traits
- Discrete and continuous variation
- Threats to biodiversity and conservation
- Extinction, extirpation and endangered species

Part 1: Unit Introduction

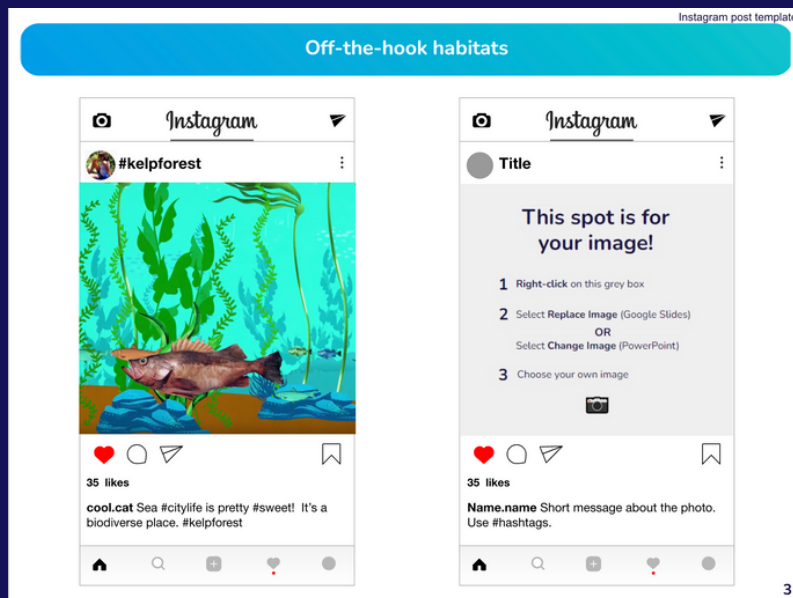
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Lesson 1: Off the hook habitats

Key concepts: abiotic and biotic factors, communities, ecosystem, energy transfer, interconnectedness

I begin my Biological Diversity unit with Off-the-Hook Habitats, a video showcasing a variety of aquatic habitats. The video explores the living and non-living components of ocean habitats, and discusses how energy moves from one organism to another. This media helps us review important concepts from Science 7, including abiotic and biotic factors, communities, populations and ecosystems, as well as the transfer of energy through the food web. Habitat is defined in the video as “where you live, and why you live,” which is an excellent segue into the concept of an ecological niche. I use this video to kickstart conversations about the interconnectedness of living things and the different roles they play in an ecosystem.

For example, my students are asked to refer to a still shot of the kelp forest and tasked with sketching a quick food chain using the organisms pictured. We then discuss the roles of producers and consumers, adding labels to remind them of important terms related to food chains.



The Ocean School activity linked to this piece of media has students create Instagram posts highlighting habitat features using a screenshot from the video. I modify this activity by asking students to include at least one biotic and one abiotic feature in their hashtags.

Off-the-hook Habitats Instagram template

Part 2: Into the Building Biodiversity Collection

After reviewing earlier course material and activating prior knowledge, we dive into [Building Biodiversity](#). This collection will cover most of what I need for the unit. Some of the activities will be completed by the entire class, and some I use as extension activities for early finishers. I also use a couple as optional end-of-unit projects.



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Lesson 2: The four kings

Key concepts: inter- or intra-species variation, discrete and continuous variation



Coral featured in The four kings media

[The four kings](#) is a beautiful video tour of Raja Ampat, an archipelago in Indonesia—one of the most biodiverse marine ecosystems on Earth. This video covers the importance of biodiversity, inter- and intra-species variation, speciation and human threats to biodiversity.

We begin with a quick “while you watch” activity, where students write down examples they see of differences between individuals of the same species and organisms of different species.

It is worth pausing the video for the students to take a closer look, at around minutes 1–2 and 4–5. I guide my classes to observe the different types of coral and fish, then find members of the same species to compare. After our first watch, we categorize and label the examples the students have written down into “interspecies” or “intra-species” variation and define those two terms. I also address discrete and continuous variation with this activity, using the same examples.

Part 2: Into the Building Biodiversity Collection

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Lesson 3: The four kings

Key concepts: biodiversity, inter- and intra-species variation, competition, reproductive strategies

During the next lesson, we re-watch The four kings video, this time focusing on the descriptions of biodiversity. I ask students to try and describe **WHAT** biodiversity is, and **WHY** it is important. Then we complete the activity linked to the video, which guides students to choose another biodiversity hotspot, and create a blog post showcasing facts and images about the area.

You can easily modify this activity to require details about inter- and intra-species variation or competition, reproductive strategies (one of the main outcomes of the unit), or local threats to biodiversity.


The four kings

Biodiversity hotspots

Scientists try to identify places that are especially important when it comes to biodiversity. These can be on land or in the ocean.

These are regions that are home to a huge number of different species, **or** that are home to many **endemic** species.

When one of these special places is also at risk of habitat loss, it is called a "biodiversity hotspot."



Map of land-based biodiversity hotspots, based on Myers et al. 2000 (Spicer, 2017)

Endemic species are species that are **ONLY** found in one particular region.

Biodiversity hotspot formula: $\text{Lots of different species} \text{ or } \text{Many endemic species} + \text{Habitat loss} = \text{Biodiversity hotspot}$

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Biodiversity hot-spot activity

Part 2: Into the Building Biodiversity Collection



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Lesson 4: Diving for diversity

Key concepts: threats to biodiversity

To deepen our understanding of biological diversity, we watch [Diving for Diversity](#) next. This video documents a biodiversity survey, giving us a first-person view of the processes used to measure biodiversity in a given area.

Depending on the time of year and available class time, I either use the linked activity in class or give it as one of the options for the end-of-unit project. The activity challenges students to conduct their own local biodiversity survey. Within the activity they are guided through the planning process, given tips and key questions, and provided with data collection materials. The final piece of the activity involves a critical reflection on what factors may be affecting biodiversity in the area of study and what students have learned through this process.

Biodiversity Survey

Date: _____
Name: _____

Start time: _____
End time: _____

I am surveying: _____

CHOOSE ONE from this list:
Plants, Fish, Marine mammals,
Bats, Reptiles, Birds, Rodents,
Invertebrates, Domestic animals (pets)

Sketch or paste a screenshot of the map.

Species Name	Quantity Seen	Brief Description	Image recorded

Tip: Need more space to write? You can use the next slide

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Biodiversity Survey collection slide



Part 2: Into the Building Biodiversity Collection



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Lesson 5: Sharks are awesome

Key concepts: evolution, adaptations, inter- and intra-species competition


Next on my list is a unique piece of media called Sharks Are Awesome. This resource is not part of the Building Biodiversity collection, but can be found in several of Ocean School's other collections. The media here is a 360° video tour of an underwater habitat featuring several different species of sharks. Students can use a phone, tablet or computer to work through the experience. While exploring underwater, they will learn about a number of unique shark adaptations that optimize these species for life in the ocean.

The activity connected to this media has students consider how sharks have evolved to survive in different aquatic environments, and asks them to create a comic strip about shark adaptations. I usually modify this activity by asking students to include an example of either inter- or intra-species competition in their comic strip.

Sharks are awesome

Eleven facts about sharks!

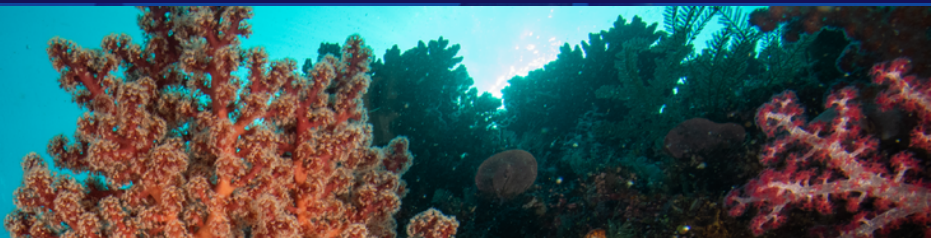
- 1 Shark skin feels like fingernails; it helps sharks swim quickly
- 2 Sharks' dorsal fins help them to make sharp turns
- 3 Sharks use their pectoral fins for lift, like the wings of a plane
- 4 Most sharks need to keep swimming in order to breathe
- 5 Sharks rely on smaller fish to "clean" them by eating parasites off their skin
- 6 Most sharks have 5 rows of teeth and can lose up to 100 teeth a day
- 7 Some sharks give live birth and once born, the sharks are self sufficient



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Sharks Are Awesome—facts about sharks

Extension: I like to add a discussion about how environmental pressures influence adaptations. I have students pair up and choose one of the 11 facts about sharks detailed in the activity. They then brainstorm the environmental pressures that might have caused those adaptations to be advantageous for the shark species. It can be pretty fun hearing their ideas about why hammerhead sharks developed the way they did!



Part 2: Into the Building Biodiversity Collection

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Lesson 6: Recovering reefs

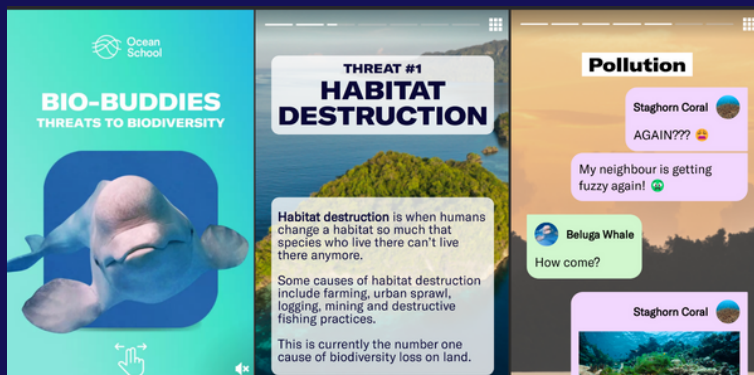
Key concepts: conservation, endangered species, human impacts, sustainability



After the sharks detour, we jump back into the collection with Recovering Reefs. This video digs deep into how human activities are causing massive die-off in fish populations and what we can (and should) do about it. The connected activity asks students to reflect on the effectiveness of awareness campaigns in helping species recover from being endangered. Next, the activity directs students to create a profile of a species that has recovered from the brink of extinction, including researching the conservation efforts that helped in the recovery. This is a great activity for expanding how students think about conservation by studying real-world examples, and I find it helps bring some hope into a pretty bleak topic.

Another activity that further explores threats to biodiversity is Bio-buddies, a social-media style reel that explores five major threats from the perspective of endangered species. The linked activity asks students to continue a “chat” between the species discussing one of the five threats. The discussions can be divided up so that a class covers all five topics. This task can also lead to a conversation about the activity itself as an awareness campaign, and whether or not this is an effective tool for bringing attention to the dangers of biodiversity loss.

Bio-buddies can be used in conjunction with Current News: Biodiversity, another social-media style reel and activity, where students analyze the purpose, audience and messaging in different articles about biodiversity loss, then craft an activism-oriented Instagram post of their own. This is a great cross-curricular activity option for developing scientific literacy.



Screenshot from Bio-buddies

Part 2: Into the Building Biodiversity Collection

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Lesson 7: Supercoral or Coral Morals

Key concepts: symbiotic relationships, genetic inheritance and selective breeding, coral life cycle, genetic modification, threats to biodiversity

Next up are two engaging pieces of media that showcase the development of heat-resistant corals and discuss the ethics of genetic modification: Supercoral and Coral Morals.

Supercoral teaches us about coral bleaching and highlights researchers who are working on creating new, more resistant corals using a process called “assisted gene flow.” The video hits topics like symbiotic relationships, genetic inheritance, and selective breeding, which is the focus of the student activity, where students consider what characteristics they would select in parents to develop favourable traits in offspring. I like to add a slide to the activity that asks students to profile something local that has been selectively bred, such as crop plants or domestic animals.

This video also shows us the coral spawning cycle, where corals release sperm and eggs once per year to make baby corals. It also explains that after this fertilization, the coral polyps reproduce asexually until the next spawning season. Alternation of generations is one of the more difficult concepts for students to grasp, so the visual example from the video is very helpful.

Coral Morals is a media reel containing interviews with experts in the fields of ecology and genetic engineering, and it asks students to consider whether each interviewee would support assisted gene flow. The activity guides students as they consider the pros and cons of genetic modification and also asks them to think critically about why genetic modification may decrease biodiversity. This concept has historically been poorly understood by Alberta students, and I have found that this real-world example helps my students develop a better understanding of the relationship between natural and artificial selection and biodiversity.

Part 3: End of Unit Projects

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End of Unit Projects

All of the media and activities I've covered are items that are completed by the whole class, but unfortunately, we can't always use everything the collection has to offer. At the end of each unit of study, I have students complete projects that showcase their learning in a mode of their choice. I offer a list of suggested projects for them to choose from, and they always have the option to propose one of their own.

For our biodiversity unit, I include the following Ocean School activities as project options:

- Diving for Diversity: where students conduct a local Biodiversity Survey.
- Community Conservation: where students discover the process of establishing a marine protected area. For this project, students have to consider the points of view of multiple stakeholders profiled in the media, and stage a debate using the arguments they develop.
- Monitoring Manta Rays: which profiles a marine conservationist working to protect rays. Students are guided through the process of interviewing a local conservationist and creating a profile showcasing their efforts.
- Take Action for Biodiversity: which is a toolkit designed to help students develop their own plan to take a stand for the ocean. Suggested projects include writing letters to politicians, designing infographics, organizing a beach cleanup, and creating a social media campaign.
 - This toolkit is used in a number of other collections and can be adapted to suit many different areas of activism.

That just about covers the resources I use for my Science 9 Biological Diversity unit—but there are even more insightful and enriching media to be found in the Building Biodiversity collection!

So, there it is—Science 9 Biological Diversity with Ocean School. In my experience, students have been more engaged and have reached deeper levels of thinking using these resources. Planning and setup are simplified for me, and I also get to enjoy the wonderful world of Ocean School with my classes! I am already excited to check out what I can add this year, and I hope my experience will encourage other educators to give this valuable resource a try.

-Teacher Alyssa de Leon