

To what extent is animal colouration used by organisms in the Great Bear Rainforest?

In this activity, students examine various strategies animals use for survival and reproductive success in the Great Bear Rainforest. They then use these strategies to create organisms that would be successful in the Great Bear Rainforest and/or their local environment.

Learning Objectives

Students will:

- Make observations aimed at identifying their own questions, including increasingly abstract ones, about the natural world
- Apply First Peoples oral stories and histories, perspectives and knowledge, other ways of knowing, and local knowledge as sources of information
- Formulate physical or mental theoretical models to describe a phenomenon
- Learn about microevolution, including:
 - » adaptation to changing environments
 - » natural selection

Preparing for the Activity Plan

- Read the background information and preview the videos and websites.
- Videos and websites relating to the environment and animal life in coastal British Columbia are provided below. Teachers and students must have a basic knowledge of their local environment and nearby animal life.

Materials

- computer and projector
- student computers / tablets / devices
- access to the Internet
- Blackline Master 1: Colouration in the Great Bear Rainforest
- Blackline Master 2: Create!
- paper and art supplies

Background Information and Resources

The Great Bear Rainforest has many inhabitants that use camouflage for survival. An unusual example of this is the spirit bear; it is believed that this bear is more effective at fishing than its darker counterparts. This lesson explores this and many other unique colouration strategies.

Videos

Do you see what eye see? (6:20)

This video shows how oceanographers are studying cephalopod camouflage in Indonesia.
<https://www.hakaimagazine.com/videos-visuals/do-you-see-what-eye-see/>

Great Bear Rainforest in 4K—Exploring British Columbia, Canada (3:26)

This short video shows the Great Bear Rainforest and some of its many habitats. This video has beautiful footage and is more from a human perspective.
https://www.youtube.com/watch?time_continue=13&v=7wWQ-0CKv1M&feature=emb_logo

Masters of Camouflage (5:10)

This video introduces several colouration strategies, including countershading and reflection, and shows various examples of concealing colouration.
<https://www.hakai.org/blog/masters-of-camouflage/>

Welcome to the Great Bear Rainforest (2:59)

This video is an excellent introduction to the Great Bear Rainforest. It starts with the location of the Great Bear Rainforest and features shots from the various coastal, marine, and inland environments within it.
https://www.youtube.com/watch?time_continue=7&v=jAHNqN_8p2k&feature=emb_logo

Articles:

Encyclopaedia Britannica: Concealing Coloration

This article gives general information about various types of concealing colouration (background matching, disruptive colouration, and countershading).

<https://www.britannica.com/science/concealing-coloration#ref178033>

For Manta Rays, Survival isn't Black and White

This article gives insight into melanism (increased pigmentation), with a focus on colour variations in manta rays.

<https://www.hakaimagazine.com/news/for-manta-rays-survival-isnt-black-and-white/>

Natural History: Spirits of the Great Bear Coast

This article from Natural History has pictures of the spirit bear and the Great Bear Rainforest. It describes how the spirit bear colour variation may have been an advantage during the last ice age.

http://www.web.uvic.ca/~darimont/wp-content/uploads/2018/09/Natural-History_Spirits-of-the-Great-Bear-Coast_July-August-2018.pdf

Nudibranchs: Armed and Fabulous

This article discusses how nudibranchs are generally brightly coloured—this is a warning to other animals not to eat them.

<https://www.hakaimagazine.com/videos-visuals/nudibranchs-armed-and-fabulous/>

Spirit Bears become 'invisible'

This BBC article explains why spirit bears may be more successful at fishing than their darker bear counterparts.

http://news.bbc.co.uk/earth/hi/earth_news/newsid_8344000/8344367.stm

Informational Websites:

Washington Department of Fish and Wildlife

This webpage provides information about the kelp greenling and its sexual dimorphism.

<https://wdfw.wa.gov/species-habitats/species/hexagrammos-decagrammus>

Zoo New England: Hooded Merganser

This webpage provides information about the hooded merganser and its sexual dimorphism.

<https://www.zoonewengland.org/stone-zoo/our-animals/birds/hooded-merganser/>

Delivering the Activity Plan

Access Prior Knowledge

- To introduce students to the Great Bear Rainforest, show the video [Welcome to the Great Bear Rainforest](#), which shows both the geography and animal life in the Great Bear Rainforest.
- Have students brainstorm the environmental characteristics of the Great Bear Rainforest and their local environment. They can record this information on Blackline Master 1: Colouration in the Great Bear Rainforest.
- To prompt reflection on the environment of the Great Bear Rainforest, ask students what characteristics of animal colouration may be advantageous to species in the area and why (marine, terrestrial, freshwater, etc.). Then ask what characteristics animals exhibit in students' local environments.

Inquire

- Have a class discussion about whether the spirit bear is an example of effective camouflage. Have students discuss when the spirit bear's colour could be advantageous and when it might be a disadvantage. Background information on this can be found at: [Spirit Bears become 'invisible'](#).
- Other excellent examples of camouflage include countershading, reflective colouring, mimicry, skin patterning, and colour changing. These are all outlined in the video [Masters of Camouflage](#). Have students view the video and note various approaches to camouflage on their blackline master.

Experience

- Tell students they are to design two fictitious animals. One organism is to be best suited for the Great Bear Rainforest and a second is to be suited for their local environment.
- Provide students with Blackline Master 2: Create! for more detailed instructions.
- In the process of creating their animals, students will investigate how they might camouflage differently/similarly.

Explore/Read

Here are some possible characteristics students may investigate as part of their research:

- melanism (increased pigmentation)—For [Manta Rays, Survival Isn't Black and White](#).
- leucism (reduced pigmentation that spirit bears exhibit)
- warning colouration—[Nudibranchs: Armed and Fabulous](#)
- sexual dimorphism (male and female birds with different colouration) and sexual selection (differences in individuals connect to reproductive success)
 - » [Hooded Merganser](#)
 - » [Kelp greenling](#)
- concealing colouration—[Encyclopaedia Britannica: Concealing coloration](#)

Assess

- Did students use reliable sources for their information? These sources may address colouration strategies, environmental characteristics, and actual animals present.
- To what extent were students able to make observations aimed at identifying their own questions, including increasingly abstract ones, about the natural world?
- Were students able to formulate physical or mental theoretical models to describe a phenomenon?
- How did students apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information? What are the oral stories of local First Nations groups about the colouration of the spirit bear?
- Did students effectively incorporate actual colouration strategies in the design of their fictitious animals? Were their animals designed to be successful in their respective environments?
- Did students demonstrate an understanding of microevolution including:
 - » how organisms adapt to changing environments, and
 - » natural selection?

Go Beyond

- The spirit bear's colouration seems to give it an advantage when fishing, but it doesn't seem to fit with the rest of its environment. What would the ideal environment look like for the spirit bear? Have students research this question and design the ideal environment for the spirit bear.

Blackline Master 1

Colouration in the Great Bear Rainforest

After watching “Welcome to the Great Bear Rainforest,” reflect on how your local environment compares to the video. What types of animals live in each area? Use this chart to organize your observations.

	Great Bear Rainforest	My Local Environment
Environment Characteristics (precipitation, plant life, temperature, geography, etc.)		
Animals Present		

1. What types of colouration are advantageous in the Great Bear Rainforest? In your local environment?
2. After watching “Masters of Camouflage” what are some colouration strategies that marine animals use?

Blackline Master 2

Create!

You are to design two previously undiscovered animals from the same order:

- one animal that lives in the Great Bear Rainforest
- one animal that lives in your local environment

Both animals are successful in their respective environments because of their colouring.

The criteria you must meet for this project are as follows:

- Create a detailed rendering of each of your animals that depicts the colouration strategies they use.
- Describe the colouration strategy (or strategies) used by each animal. Give examples of actual animals that use the same strategies.
- Describe the habitat of each animal and why each animal is successful in it.
- Compare your two animals and the strategies they use. What was similar and what was different?
- Describe how your animals demonstrate the theory of natural selection.
- Document your research in a bibliography.



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