



United Nations
Educational, Scientific and
Cultural Organization



**MOUNT
ARROWSMITH**
BIOSPHERE REGION

BIOSPHERE BOOKLETS

Lesson Plans & Activities

WATERSHED HEALTH

SUMMARY/OVERVIEW

Grades:
3-5

Prep Time:
15 mins

**Learning
Environment:**
Indoor

**Total Lesson
Length:**
2 hours

DESCRIPTION:

This booklet introduces students to what watersheds are, how they are impacted by human activities, why they are important, as well as the 9 watersheds we have in British Columbia.

BACKGROUND:

"A watershed is defined as any surface area from which runoff resulting from rainfall is collected and drained through a common point. It is synonymous with a drainage basin or catchment area. A watershed may be only a few hectares (small ponds) or hundreds of square kilometres (rivers). A watershed embraces physical-biological features as well as socio-economic and political features which have to be integrated into the planning and management process." *Source: <https://www.geo.fu-berlin.de>*

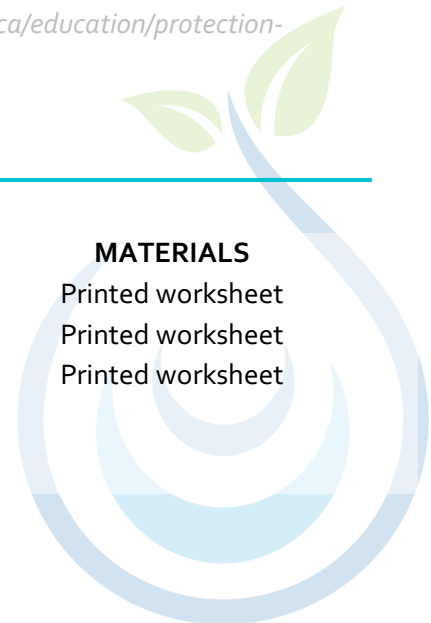
CURRICULUM EXPECTATIONS:

- Identify questions about familiar objects and events that can be investigated scientifically
- Experience and interpret the local environment
- Sort and classify data and information using drawings or provided tables

"A watershed is an area of land that drains rain, snow, and ground water to a common point, such as a creek, wetland, lake, or ocean. Watersheds can be different sizes and scales. Small watersheds can be part of larger watersheds. The capital region is comprised of over 300 major watersheds which are over 100 hectares in size, plus numerous smaller named and unnamed watersheds." *Source: www.crd.bc.ca/education/protection-stewardship/watersheds*

LESSON PLAN

TIME	ACTIVITY	LOCATION	MATERIALS
45 mins	1. Introduction – What is a watershed?	Indoor	Printed worksheet
45 mins	2. Indicator Species	Indoor	Printed worksheet
30 mins	3. Conclusion – BC's watersheds	Indoor	Printed worksheet



TIME	ACTIVITY	LOCATION	MATERIALS
45 mins	1. Introduction – What is a Watershed?	Indoor	Printed worksheet

Introduction: What is a watershed?

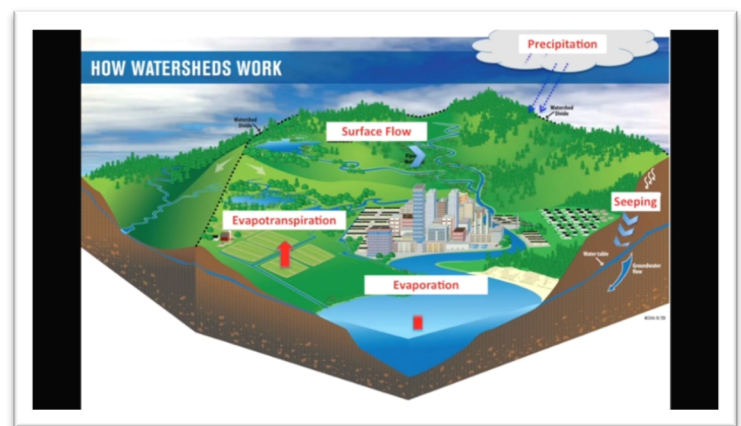
GOAL: Introduce the concept of watersheds and why they are important.

PREPARATION: Print worksheet (page 3), have access to internet.

LESSON PLAN: Students will watch a video and then create a watershed map diagram, picturing a watershed and its connection to the water cycle.

Video available at:

<https://www.bctomorrow.ca/blog/watersheds>



CONTENT: Watershed is a broad term used to refer to **areas that drain water**. Water drainage is important because rain water needs to go somewhere. What is the function of a watershed? Why does it exist? A river passing by may look plain to us, but it participates in the fundamental puzzle of the water cycle.

Watersheds are important because they supply us with our drinking water, provide us with water for farming and manufacturing, offer opportunities for recreation, and provide habitat to all the plants and animals within the watershed.

Some of the “functions” of watersheds are:

- **Move sediment/soil/rocks from the mountains to the beaches and bays**, sorting it along the way to create diverse landscapes and habitats
- **Cycle nutrients** and change them into forms that living organisms can use
- Watershed floodplains and wetlands **purify, absorb and store water**, and then control its release to reduce harmful flooding while also maintaining flows during dry periods
- Change air quality by **absorbing pollutants**
- Provide many **ecosystem services** necessary for our economic well-being, including reducing drinking water treatment costs and protecting property values

Infographic of a watershed

Use what you have learned about watersheds to create a **diagram** (with arrows, speech bubbles, and drawings - be creative!) explaining the basic parts of a watershed. Label at least **two of its functions** and show where the water is coming from and going using arrows.

Some parts to get you started: ocean, mountains, lake, river, rain, snow, farmland, forest, city, and anything else you can think of!

TIME	ACTIVITY	LOCATION	MATERIALS
45 mins	2. Indicator Species	Indoor	Printed worksheet

Watershed Indicator Species

GOAL: To introduce students to species that are very sensitive to their environment and therefore are used as indicators of the environment's "health".

PREPARATION: Print worksheet (page 5).

LESSON PLAN: Students will match the indicator species to its description and image.

CONTENT: An indicator species is an organism whose characteristics are used as an index to measure for other species or environmental conditions of interest. In other words, they are **used as a "landmark"** to assess the ecosystem of interest (in our case, watersheds).


Indicator species have been used as a convenient way to analyze environmental conditions for several decades. Plants and animals have both been used successfully to assess air and water quality and to help classify communities.

Research Source: N Lee. *Conserving Biodiversity in Greater Vancouver: Indicator Species and Habitat Quality*. VOLUME I – April 2003. 1. 1.0 BACKGROUND. In 1999, under the Georgia ... Accessed on 04/07/21. Available at www.urganecology.ca


Images from:

<https://www.fisheries.noaa.gov/species/coho-salmon>; <https://www.bcreptiles.ca/snakes/comgarter.htm>; <http://www.californiaherps.com/salamanders/pages/a.gracile.html>; <https://wildsafebc.com/species/black-bear/>; <https://www.nwf.org/Educational-Resources/Wildlife-Guide/Birds/Northern-Spotted-Owl>

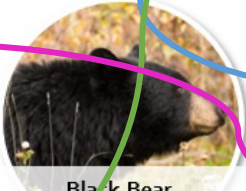
ANSWER KEY:




Northern Spotted Owl
(*Strix occidentalis caurina*)




Coho Salmon
(*Oncorhynchus kisutch*)



Black Bear
(*Ursus Americanus*)



Northwestern Salamander
(*Ambystoma gracile*)



Common Garter Snake
(*Thamnophis sirtalis*)

These animals are considered indicators due to their feeding requirements. The presence of these reptiles reflects the existence of a lot of different prey species - which in turn require many different types of functional habitats.

This animal is considered an indicator because its terrestrial adult stage requires specific soil health in order to fill their burrowing nature (however, they may be able to adapt to water quality unfavourable to other animals). This amphibian can be found in marshes, swamps, bogs, lakes or ponds.

These animals are indicators because during its first year of life (before it migrates to the sea) it is at its most sensitive to environmental stress factors, such as poor water quality and poor habitat quality.

These animals are non-migratory. They prefer old-growth forests, particularly Douglas fir forests, to make their nests. These trees typically take 150 to 200 years to mature. Their presence therefore indicates a healthy old growth forest.

These large mammals are indicators of healthy salmon populations, and are currently threatened by human garbage as well as illegal trades of body parts.

Indicator Species

Match the image of the animal with its description on how their presence indicates the relative health of a watershed.



These animals are considered indicators due to the diversity of what they eat! The presence of these **snakes** reflects the existence of a lot of different prey species - which in turn require many different types of functional habitats.



These animals are non-migratory. They prefer old-growth forests, particularly Douglas fir forests, to make their nests. These trees typically take 150 to 200 years to mature. This **owl's** presence therefore indicates a healthy old growth forest.

This animal is considered an indicator because its land based adult stage requires specific soil health in order to fill their burrowing nature (however, they may be able to adapt to water quality unfavourable to other animals). This **salamander** can be found in marshes, swamps, bogs, lakes or ponds.



These **fish** are indicators because during their first year of life (before they migrate to the sea) they are at their most sensitive to environmental stress factors, such as poor water quality and poor habitat quality.



These large mammals are indicators of healthy salmon populations. These **bears** are currently threatened by human garbage as well as illegal trades of body parts.

TIME	ACTIVITY	LOCATION	MATERIALS
30 mins	3. Conclusion – BC’s watersheds	Indoor	Printed worksheet

Conclusion - BC’s watersheds

PREPARATION: Print word search (page 7).

LESSON PLAN: Students will find the name of the watershed in a word search and match it to its region on the map.

CONTENT: BC has 9 watershed basins (basins are depressions, or bowl-shaped dips in the earth’s crust), which include: the Mackenzie, the Fraser, the Columbia, the Pacific Ocean Seaboard (sometimes divided into the North Coast and South Coast), the Nass, the Skeena, the Stikine, Taku and the Yukon. Each basin includes many smaller watersheds.

Source: <https://www.bctomorrow.ca/blog/watersheds>

ANSWER KEY:

Word search grid with highlighted words: FRASER, MACKENZIE, PEACE, COLUMBIA, CAMPBELL, SEATTLE, VANCOUVER, PORTLAND, SASKATOON, CALGARY, DENVER, SALT LAKE CITY, SAN FRANCISCO, FAIRBANKS, ANCHORAGE, WHITEHORSE, YUKON, CHURCHILL.

Map source: Rodenhuis, & Music, Biljana & Braun, Marco & Caya, Daniel. (2011). *Climate Diagnostics of Future Water Resources in BC Watersheds*. 10.13140/RG.2.1.2765.9369.

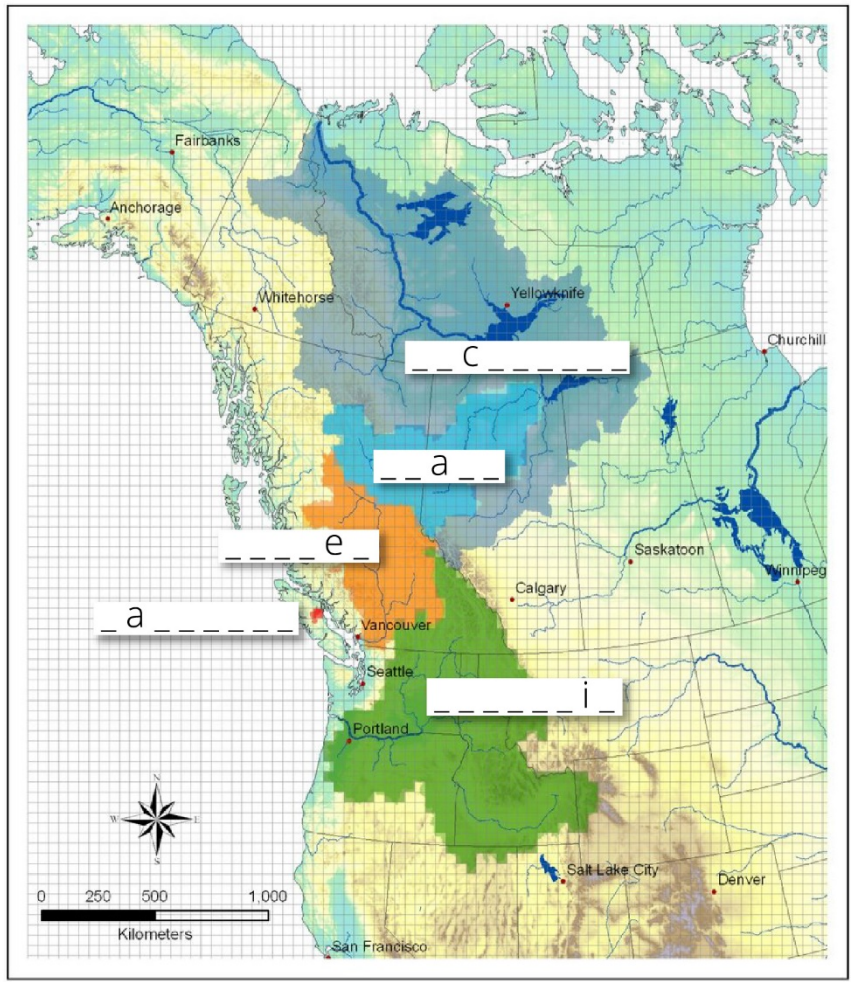
BC's major watersheds

Complete the image below with the words you find in the word search.

Word Bank:

Columbia Fraser Campbell Peace Mackenzie

E W E F L A E S O R H D S O O W A R F U S O O N H S Y U P
 E Y U C A B A T E X H I A F R A S E R I A C T E O H Q S Z
 A L S H T B Y A L S I T O W U N R S I T R W U X R U I E A
 G B P A S I W Q L S F A L H G D I S F P S H G A E J A N J
 L N A H Y U O S W K L X
 T F O Y G A Q W S S A O
 A H S K S Y P O A O P X
 B D M L H S A E L W O Y
 R K A A F H M S A H W K
 W A C A B W M I E C O S
 O I K X S I O Z Q I E J
 X W E Y L J L Q O S J T
 M E N G W L A E I L W I
 I R Z U L G S E R H C T
 O N I N S T C M R G C S
 C H E B G C O D E T O M
 O A R M T P L L S A B H
 X L M E I I U A T O G I
 S G E P U E M W B Z I E
 N J C R B K B I D H A S
 W S P K H E B R C A D E T O M P B S E D S W T I O U I W N
 P R E A W C L U P I L S A B H O K P E K P O Y A D L A L A
 Y T T N S Q K L Q P F K O G I S D Y S S L S K W F K E S J



Show us your results! Snap a picture and share it with us on social media,
or email it to the MABR Coordinator at

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