

Locally Developed Course
Grande Yellowhead Public School Division

Water Experience
15

Parks Canada (Palisades) Stewardship Education Centre

Student - Pre-Immersion Course Package



Overview of Water Experience Course

The objectives of this course are to build water navigation skills, aquatic ecosystem knowledge and leadership skills in a context of critical thinking. We feel that this is particularly important as we strive to better educate youth for their own safety and as ambassadors for our wild places.

Water Experience 15 embodies the principles of place-based education. It has been developed for implementation at the Parks Canada Palisades Stewardship Education Centre in Jasper National Park. Students following this course will be engaged in video-conference team teaching and learning provided by the expertise of the Palisade's Educational Director and his staff as well as their GYPSD teacher. They will be required to participate in and complete instructional material prior to their immersion experience.

During the Immersion component of this course, to encourage a culture of teamwork, empathy, and ethical citizenship, youth will share meals and communal living spaces. They will be expected to work collaboratively in an effort to build caring, cooperative and respectful relationships that value diversity. They will initiate discussions that lead to genuine interaction and encourage innovative ideas that demonstrate diverse perspectives.

There will also be post immersion activities and course material to complete prior to receiving credit for the course. Students will gain greater understanding of water safety/ risk management, paddling techniques, ecological impacts of waterways. They will work collaboratively to share their knowledge and skills with a diverse audience and identify innovative problem solving approaches that apply to the sustainability of our most precious resource.

Recommended Course Materials

It is suggested that students keep a binder that they devote to the Water Experience 15 course (Pre-Immersion, Immersion and Post-Immersion activities). There will be a series of handouts and a journal that students will be expected to keep and look back on as the course progresses. As part of their reflection exercises throughout the program, students are encouraged to take photographs of activities that they take part in and other ideas relating to the Water Experience course.

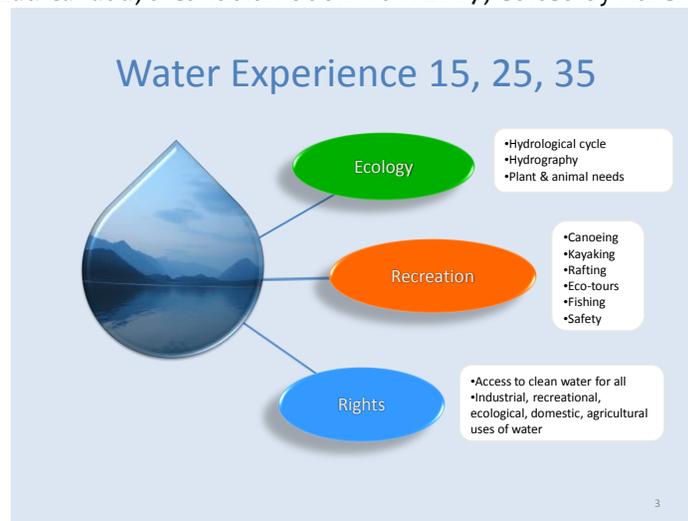
Recommended Course Materials List

- Journal/notebook or binder and writing utensils & cameras
- Eau Canada, Edited by Karen Bakker (2007) to be used in WE 15 and WE 25.

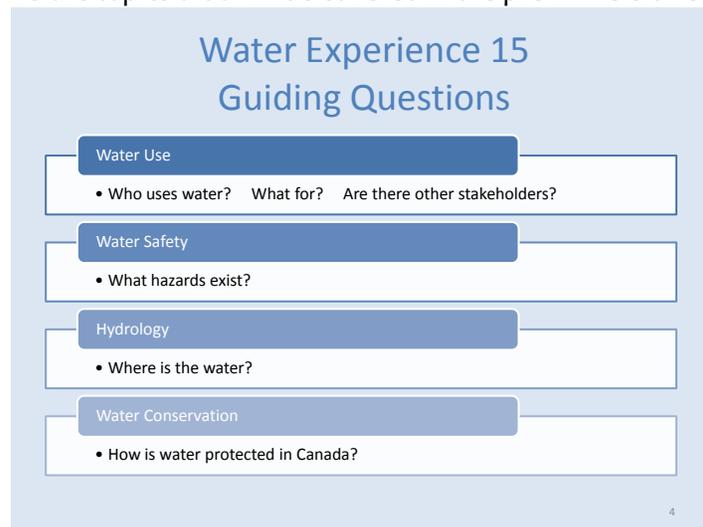
Session 1

1. Look at the first PowerPoint slide. there are three main water topics that will be covered in this course. Take 5 - 10 minutes to discuss the following:

- Water **Ecology** refers to the hydrological cycle, hydrography (where the water is) and basic plant and animal needs related to water. This will be discussed briefly in Water Experience 15 but will be the main focus in the 25 level course.
- Water **Recreation** will be present throughout the three levels, but will of course take place mainly during the Immersion portion of the course. In the 15 level, students will be introduced to canoeing, kayaking, and rafting. In the 25 level, students will be kayaking, rafting and canoeing while working on ecosystem monitoring activities. In the 35 level course the main activity of the Immersion portion will be the planning and execution of a two night trip on Maligne Lake, while kayaking or canoeing.
- Water **Rights** will also be a main area of concern during all three levels, and we will be looking at some issues in the pre and post portions of the courses. One of the main resources that will be referred to during Water Experience 15, 25 & 35 is *Eau Canada*, a Canadian book from 2007, edited by Karen Bakker.



2. The following diagram shows the topics that will be covered in the pre-immersion sessions.



3. Loot at your *Eau Canada* books (or photocopies of chapter 1 & 2, pages 1 - 35.) start by reading the Editor's Bio (in the book's Appendix) and consider that it covers politically charged issues.

The articles in this book are not meant to be memorized, but instead should be skimmed and then discussed.
 Optional Extension activity : Research the Waterkeeper Alliance (where the proceeds from the sale of this book are donated).

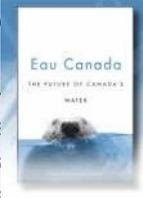
Eau Canada

The main resource for Water Experience courses

"This book focuses on two aspects of our relationship with water: water governance and water management. "Water governance" refers to the decision making process we follow, whereas "water management" refers to the operational approaches we adopt. Governance refers to how we make decisions and who gets to decide; management refers to the models, principles, and information we use to make those decisions.

Significant changes are going to be made to water governance and management in Canada over the next decade. One of the premises of this book is that informed public input is essential to good policy outcomes. Accordingly, the goal of this book is to introduce these issues to the broader Canadian public in the hope that people will continue to engage with, and build upon, the ideas and debates presented here. Our water is too important to do otherwise."

Eau Canada, page 16



5

4. Spend 10-15 minutes and skim the introduction to this book (Pages 1 - 20). While you read write down as many of the water problems or issues that Canada is facing as they can in their folders. Beside each issue, they need to put a number representing their prior knowledge on that subject (1 = I know very little, 10 = I am an expert).
5. After 10-15 minutes, review the issues raised (see the PowerPoint slide) and add any others you have discovered. Discuss which issues are already widely known about, and which ones are new to the group.

Water Issues



Environmental / Ecological Issues

- Droughts
- Floods
- Climate change



Water Standards

- Lack of data, lack of enforcement, lack of a united approach
- Poor monitoring, bad science



Human Issues

- Water ownership
- Water contamination, public safety
- Mistaken beliefs about water

6

6. Who Owns the Water of the Great Lakes? Watch the Quick Time Video Clip (5 minutes 48 seconds)

<http://www.youtube.com/watch?v=NhE28kcTE70>

Consider and discuss after the video clip:

- What is the major issue surrounding the water in the Great Lakes?
- What does the scientist mean when she says she thinks we need to be careful about "commodifying the basis of life"?
- Some companies have looked at the Great Lakes as a resource that should be shared throughout the United States. What do you think?
- Do you think that transporting water from the Great Lakes is a cost effective solution to providing water in other regions? Does every community have the right to obtain sufficient water?

7. If there is time, read the second chapter dealing with Canadian water misconceptions, "Great Wet North?" by John B. Sprague (pages 23 - 35 in [Eau Canada](#)). *Look through the following worksheet and discuss the questions orally before reading the chapter.*

If there is not time in class to read together, discuss the associated questions and complete this activity at home. Note the rubric that will be used to evaluate the assignment.

"Who Owns the Water of the Great Lakes?"

WE15 Background Information

Without water, life would not exist. Even though more than 70% of Earth's surface is water, most of this is salt water, and there is only a limited amount of clean, fresh water on Earth. Both population growth and global climate change are currently affecting the water supply. As the use and demand for water continues to increase, learning how to conserve and recycle water is becoming more and more important.

The Great Lakes, which include Superior, Michigan, Huron, Erie and Ontario, are the largest group of freshwater lakes in the world, covering an area of more than 90 thousand square miles. Rainwater and groundwater from the surrounding area, called the Great Lakes watershed, drain into the Great Lakes to replenish the water supply. The watershed includes all or part of the states of Minnesota, Wisconsin, Illinois, Indiana, Michigan, Ohio, Pennsylvania and New York, as well as part of the Canadian province of Ontario. About 37 million residents who live in this area rely on the Great Lakes for their drinking water. Many animals and plants that make the watershed home also rely on the water.

Many towns outside of the Great Lakes watershed, such as Waukesha, WI, get their water from an aquifer. An aquifer is an underground layer of rock, which contains water in its open spaces. Wells are drilled into the aquifer in order to draw up the water. However, rainwater recharge of underground aquifers can take place very slowly. For instance, the water in the Ogallala aquifer, which supplies water to eight states in the Midwest, accumulated over tens of thousands of years. Today, water is being extracted from the aquifer at a rate which is over one hundred times the replacement rate.

The issue of selling or diverting water from the Great Lakes has been discussed in political arenas for years. But in the coming years, some people think that the need to transport water from the Great Lakes to other areas by tankers or pipelines will become a more pressing issue. Some politicians are looking for a national water policy to aid areas lacking the necessary water supply, but Great Lakes leaders are not so quick to support the idea. They recognize that poor urban planning and speedy over-development in some cities may have contributed to the lack of necessary water resources. They

feel that it is not fair to put the Great Lakes' ecosystem at risk in order to make up for this lack of foresight by developers. As a result, the Great Lakes Compact, an agreement among eight states and two Canadian provinces to prevent water diversion from the Great Lakes, has been drafted to provide legal protection for the water supply. As of September 2008, the Great Lakes Compact was not yet in effect, as it still awaited approval in multiple states.

In an effort to avoid having to take water from distant sources, some cities are looking for sensible and efficient ways to protect their water supply through better water management techniques and conservation. For example, Las Vegas now recycles all of its waste water. In addition, there are over 13,000 desalination plants worldwide that provide drinking water from the ocean's saltwater.

Teachers' Domain, Who Owns the Water of the Great Lakes?, published September 5, 2008, retrieved on December 24, 2009, <http://www.teachersdomain.org/resource/wnet08.sci.ess.watcyc.wnetgrlake/>

"Great Wet North?"

WE15 Questions

by John B. Sprague pages 23 - 35 in *Eau Canada* (2007)

1. On page 23, the author explains that there is a difference between volume of water and renewable supply of water. What is this difference? Use words from the text and your own words to describe it.
2. On page 25, what does Sprague say 6.5 % represents? What does 2.6% represent?
3. Why is it important to have a good understanding of the usable supply of water that Canada has?

4. Allowing the export of Fresh Water... What's your opinion and why?

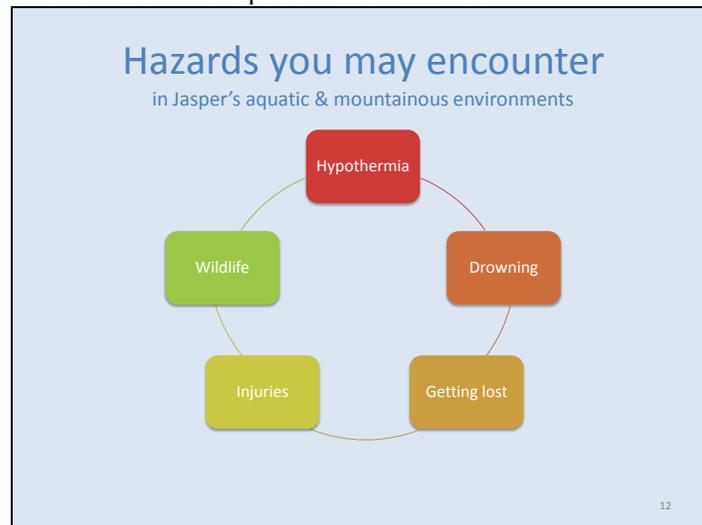
5. Give an example of an acceptable (to you) use of water, and an unacceptable use of water.

6. Give an example of an acceptable (to you) diversion of water, and an unacceptable diversion.

7. Write here the words or ideas from this chapter that you would like to know more about.

Session 2

1. The first activity is to discuss and correct as a group the assignment from the previous session.
2. Look at the following PowerPoint slide. During the rest of this class, you will be researching hazards that they could encounter in a typical mountainous & aquatic environment.



4. Take this time to uncover / discuss some of the possible hazards that are faced on the Athabasca River and Pyramid Lake (where students may be visiting in the Immersion portion of the course). Discuss some of the situations that the kids have faced themselves or ones they have heard of.
5. Next look at the *Drowning Prevention, Public Safety and Hazards* assignment sheet (pages 14 & 15). You have the rest of the class to work on the assignment. Review the rubric that will be used to mark it. If for some reason the river hazards website (http://www.performancevideo.com/river_hazards) is unavailable, a copy of the information there is in this document's Appendix.

Drowning Prevention, Public Safety, and Hazards

WE15 Assignments

1. Using the internet, research **at least two** of the following four questions. Be prepared to share your findings. You are allowed to copy and paste, but make sure you copy the site address where you found the information you use.
 - a) What are the Lifesaving Society's Top 10 Water Smart tips?
 - b) Research Canadian drowning statistics. Who is drowning? Where are they drowning? What are some recommendations?
 - c) Research the transport Canada's regulations for personal watercraft. What equipment is mandatory?
 - d) What is the difference between a lifejacket and a PFD? Research some different lifejackets and PFDs. Copy and paste pictures and descriptions into a document to share with others.

Question A-D	Response

2. The Most Dangerous Hazard...

Write a short paragraph about the hazard that you find to be the most dangerous; the hazard on a lake or river that you wouldn't touch with a ten foot pole. Explain what it is, why it's dangerous, and how it could be avoided. Be prepared to share your paragraph with the group next class. Creative writing is encouraged!

Use your notes from today and visit http://www.performancevideo.com/river_hazards for more descriptions of moving water hazards for boaters.

1. The first activity is to discuss and correct as a group the assignments from the previous class.
2. Look at the You Tube clip of the water cycle rap to introduce the next topic. It can be found at <http://www.youtube.com/watch?v=i3NeMVBcXXU> The water cycle is something you likely already knew about and that the next step in understanding water is to learn about watersheds and hydrography / hydrology. These concepts are essential to cover to have a good understanding of aquatic ecosystems. They also tie in with water rights issues as well.
3. Next read Canada's Hydrologic Diversity, (as a group if you like)

Canada's Hydrologic Diversity

WE15 In-class Assignment

"The relatively wet, mountainous Montane and Boreal Cordillera and Pacific Maritime ecozones covering British Columbia, southwestern Alberta and much of the Yukon Territory form the western fringe of the country. High runoff from these ecozones drains westward into the Pacific Ocean – exceeding 3,000 mm annually in some coastal areas – and eastward into the vast, dry Interior Plains. The latter region comprises the flat, fertile Prairies ecozone in the south and the Boreal and Taiga Plains ecozones to the north. Generally, runoff on the Plains averages well under 200 mm per year, especially in the south where it can average less than 50 mm.

Most of central and eastern Canada is covered by the rugged Boreal and Taiga Shield and Southern Arctic ecozones, for which annual runoff trends from 15 mm in the northwest to 800 mm in the southeast, to over 1000 mm along the Atlantic coast. Surrounded by the Shield, the extensive wetlands of the Hudson Plains ecozone drain northward into Hudson and James bays.

The humid Mixed Wood Plains ecozone of the Great Lakes-St. Lawrence River Valley encompasses the heavily populated area of southern Ontario and southern Quebec. Annual runoff ranges from as low as 200 mm in the southwest to over 600 mm in the northeastern end of the ecozone. To the east of the Mixed Wood Plains lies the rugged, wet Atlantic Maritime ecozone which covers all of the provinces of New Brunswick, Nova Scotia and the Atlantic provinces and a portion of eastern Quebec. Runoff increases significantly from west to east, varying from 600 mm annually in the western part of the ecozone to 2000 mm along the Atlantic coast.

In the far north, the desert-like Northern Arctic ecozone straddles the Northwest Territories and Nunavut. Few data on runoff are available in this ecozone, but in view of the very low precipitation (100-200 mm annually) annual runoff is considered to be very low also. Even less is known about runoff from the glaciated, mountainous Arctic Cordillera ecozone, most of which covers Nunavut's east coast.

The climates of Canada range from continental in the south to boreal or subarctic in the mid-latitudes and arctic in the north. Maritime influences modify both the west and east coast climates, the east coast less, because of the predominantly eastward movement of interior air masses. Permafrost occurs throughout the mid- to northern latitudes. Annual precipitation varies from 50 mm in the far north to as much as 4000 mm on the Pacific Coast."

From Environment Canada

http://www.wsc.ec.gc.ca/hydrology/main_e.cfm?cname=hydro_e.cfm#rwi

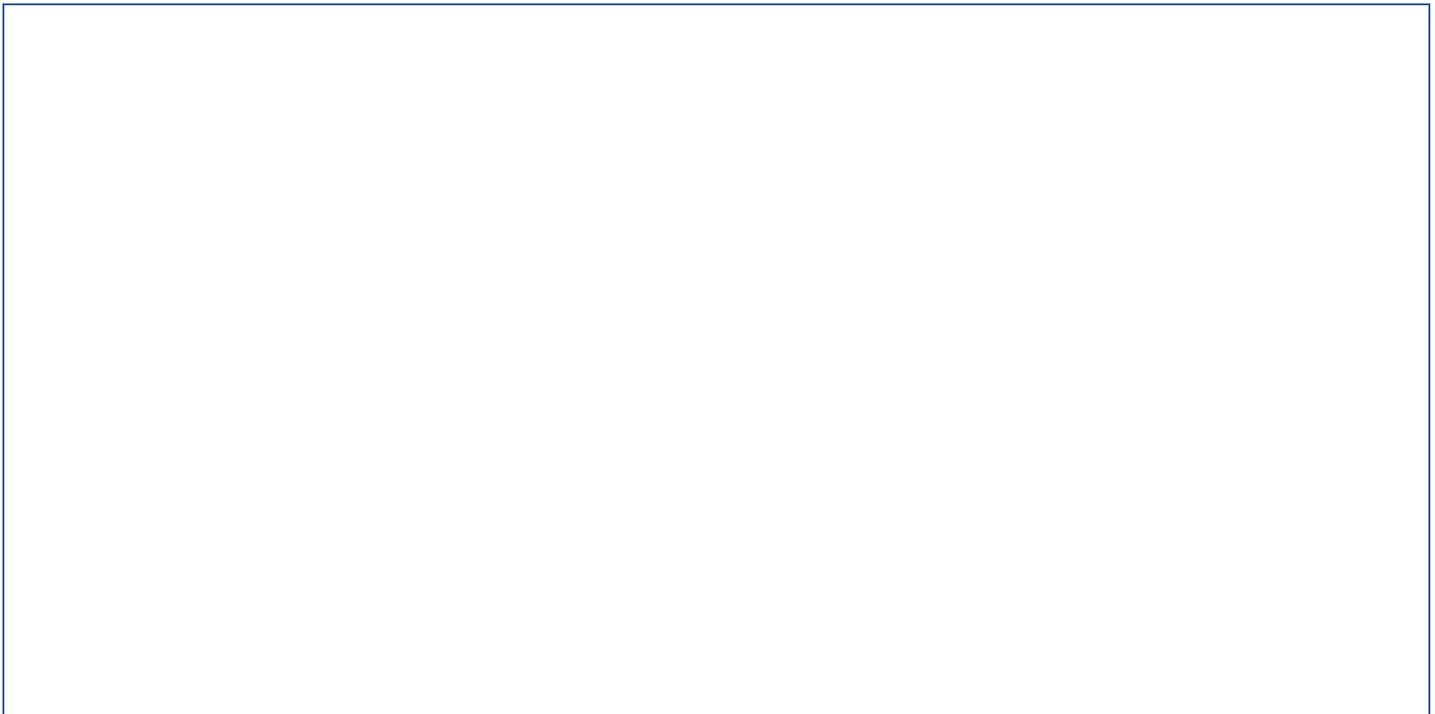
Now try to underline all the new vocabulary you find and write a brief summary of the text you have just read and also draw a map of Canada. Then Compare maps and also discuss any vocabulary you found difficult or that was new.

1. Write a short summary of the above text that succinctly explains the main points:

Canada's Hydrologic Diversity

WE15 Assignment

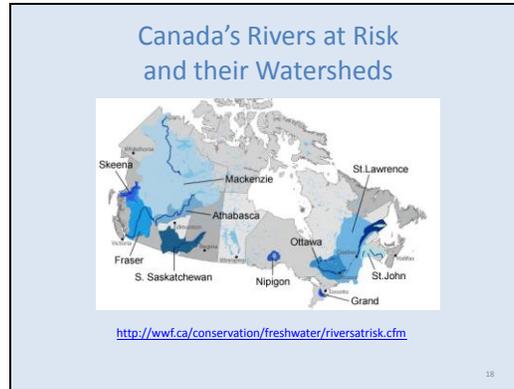
2. Draw a free-hand map of Canada and label the different areas. You will need to include: **Name of the area** and at least one **descriptor** (dry, high runoff, wetlands, etc.). Include all oceans, major lakes and rivers.



4. Go to the Natural Resources Canada website (<http://atlas.nrcan.gc.ca/site/english/maps/reference/national/drainbasins>) and search the Athabasca River. Discuss how Jasper is at the start of the river and that there are many communities downstream which are affected by local use and treatment of the water. Then search another river, determine the drainage basin it lies in and which ocean it drains into.

5. As a group or individually, go to the World Wildlife Fund's website: <http://www.wwf.ca/conservation/freshwater/>

Look around the site for a few minutes and come up with at least one interesting / shocking fact related to water issues and share this with the group.



6. Next complete the *What is a watershed?* definition & labelling worksheet on the next page. The answers can be found at (<http://assets.wwf.ca/downloads/whatisawatershed.pdf>).

Headwaters

_____s
 _____er,
 _____ie,
 _____ks.

Surface Runoff
 Water from rain and snowmelt that flows over land when the soil is saturated and unable to absorb it.

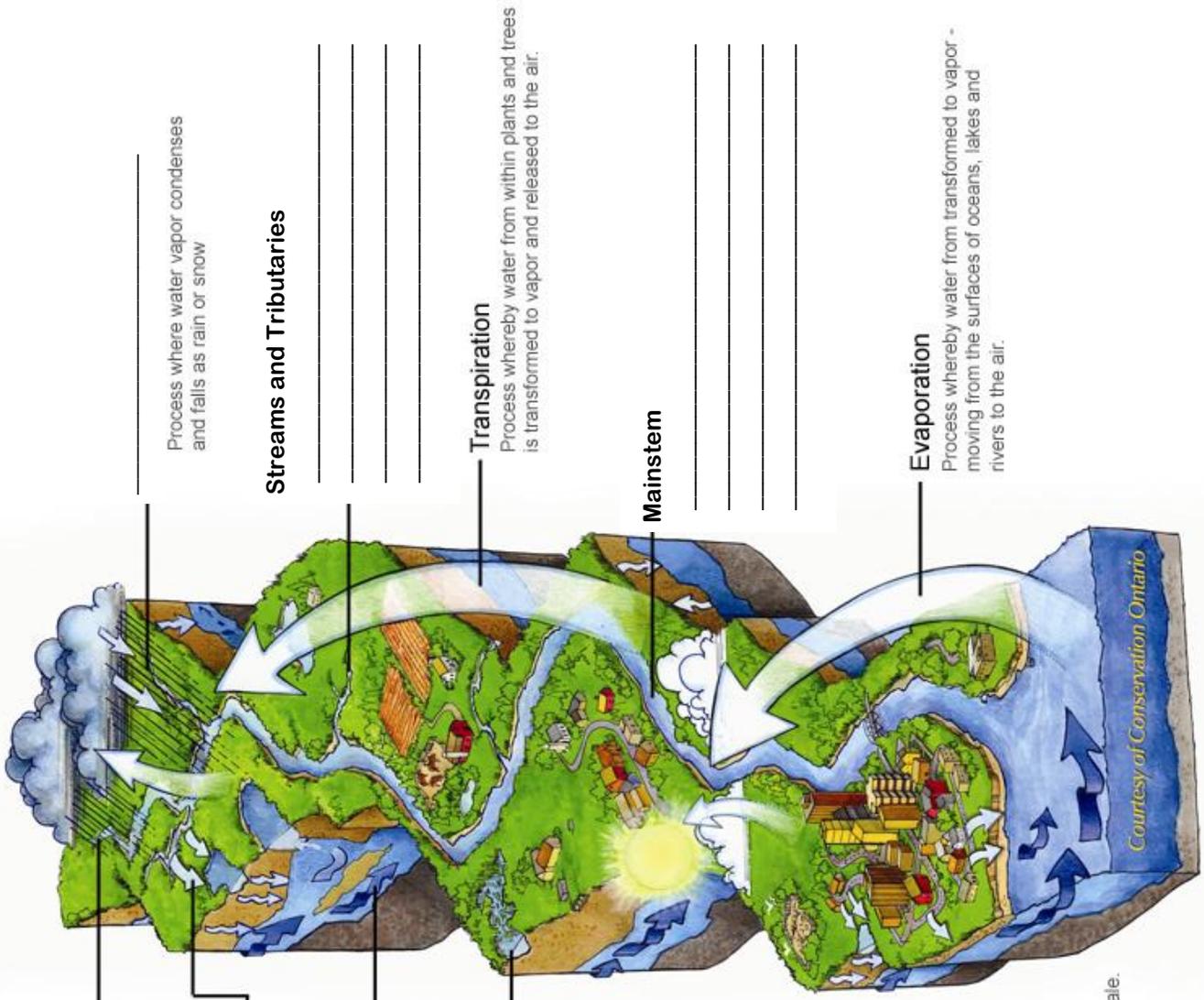
_____ter
 Groundwater is subsurface water that moves through or is stored in pores, cracks, and crevices in the earth. It is a source of water for wells and springs, and is often a significant source for lakes and rivers.

Wetlands

_____s
 _____id
 _____ar
 _____s.

What is a watershed?

As the image above illustrates, watersheds are complex systems with multiple interacting and interconnected parts and processes. Soil, vegetation, animals, climate, water and humans are all integral elements of the watershed. Water extraction, land use changes, urban developments, and industrial, forestry and agricultural operations all impact the watershed. Keeping rivers healthy requires an integrated approach to planning and management that considers the cumulative impacts of these many pressures at the watershed scale.



Process where water vapor condenses and falls as rain or snow

Streams and Tributaries

Transpiration

Process whereby water from within plants and trees is transformed to vapor and released to the air.

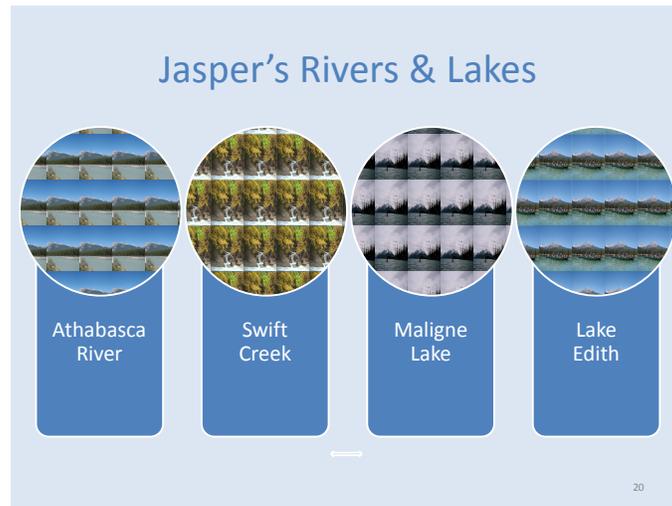
Mainstem

Evaporation

Process whereby water from transformed to vapor - moving from the surfaces of oceans, lakes and rivers to the air.

Session 4

1. The first activity will be to discuss and correct as a group the assignment from the previous class (What is a Watershed?). This should have been a straightforward assignment, but ask your teacher if there were any questions or problems encountered while completing the worksheet.
2. Open up Google maps and go to Jasper, Alberta. Find the following bodies of water on the map as a group. Spend about 10 minutes on this.



3. For another 10 minutes, brainstorm the different types of activities that one can normally do on a lake or river: Kayaking, canoeing, motor boating, jet skiing, fishing, swimming, rafting, tubing, etc.

Next, put the activities in the following categories

- Permitted
- Not permitted
- Permitted but not recommended
- Permitted with certain restrictions.



4. Then research in groups or individually the role that Parks Canada plays in protecting water resources. Search the Parks Canada website <http://www.pc.gc.ca> and any others that may be useful for 10-15 minutes. A key idea here will be *Ecological Integrity*. Try to discover what Parks Canada says about water resources, especially Marine Conservation Areas and Heritage Canals. After 10 - 15 minutes, come back together as a group and discuss what the you have discovered.

You should make a list of questions in their folders about Parks Canada's role and also the role that all Canadians play in water conservation. These are questions that the group will try to answer during their upcoming trip to the PSEC and after reflecting on the next reading. Good websites include:

<http://www.pc.gc.ca/eng/progs/np-pn/ie-ei.aspx>

http://www.chrs.ca/Main_e.htm

5. Next work through the Anticipation Guide (next page in this document).

An anticipation guide is a tool that has statements that may be true or false. It will give you an idea of what you are about to read and will introduce some of the key concepts. It also gets you making judgments before and also after reading. It is a good way to think about shifting beliefs as you gain more understanding.

After you have complete the anticipation guide, read "*Moving Water Conservation to Centre Stage*" By Brandes, Brooks and M'Gonigle. Chapter 14, pages 281 - 300 in *Eau Canada* (2007). This text takes a good look at what decisions could be made in Canada to protect our water supplies. Discuss as you go and feel free to spend less time on certain parts and more time on others that you find interesting.

by Brandes, Brooks & M'Gonigle pages 281 - 300 in *Eau Canada* (2007)

Directions: On the continuum in front of each of the numbers, place an "x" that indicates where you stand in regard to the statement that follows. Be prepared to defend and support your opinions with specific examples. After reading the text, compare your opinions on those statements with the author's implied and/or stated messages.

Strongly Agree Strongly Disagree

1. The largest source of new water won't be new at all but, rather, more efficient use of the water we already have.

2. It will be impossible to meet future water demands simply by reducing water use.

3. Changing behaviours and attitudes of Canadians is a major first step in meeting our water demands.

4. Ecological governance means thinking about ecosystem health and processes both upstream and downstream and throughout the watershed.

5. Australia, South Africa, Europe, Israel, Florida and California are on the right track with their water management approaches.

6. The Hoover Dam should be celebrated as a "temple of modernity."

7. The financial costs of new water supply schemes are greater than the ecological costs.

8. Simple "off the shelf" technologies (such as low-flow showerheads) are not enough to significantly reduce water consumption.

9. Government leadership and action are important parts of water conservation.

10. Demand management means having incentives, public education, and real-cost pricing to help reduce water demand instead of trying to figure out how to supply more water.

11. Efficiency is more important than conservation.

12. The "soft path" approach asks *Why?* instead of *How?* and has sustainability as its fundamental principle.

13. Demand Management and Soft Path thinking need to be adopted together in order to conserve water.

Congratulations, you have completed your Pre Immersion

Your next step is to go to the Palisades!

Appendix – water Hazards

River Hazards

from http://www.performancevideo.com/river_hazards

The following river hazards are described briefly which forces the paddler to adapt an inquisitive attitude. The river sense of experienced boaters is based on this approach.

Don't let these descriptions intimidate you. Your purpose is to understand the hazards clearly, enabling you to know when they are a factor to your safety. If you would like further explanation, ask local instructors to point them out on nearby rivers.

A **Foot entrapment** is simply catching a foot in rocks on the bottom of the river. It is caused by trying to stand up while getting swept downstream in water usually in water mid-thigh to mid-torso deep. Prevention is easy: stay in the safe swimmer's position (on your back, feet up and pointed downstream) unless the water is less than knee deep. Practice swimming and manoeuvring through rapids aggressively, on your back, looking between your feet at the side of the river you wish to avoid. In very deep water practice swimming freestyle, on your stomach. River swimming wisdom is to ball up when swimming over a sheer drop of more than 3-4 feet.

Strainers are trees or single branches in the current, with river water flowing through, causing a severe pinning hazard. Strainers are caused by erosion. Trees fall because of old age, floods, and storms. Look for them on wooded riverbanks, along small creeks after high water, often found on the outside of bend, and on less frequented rivers. Assume they are present unless you know otherwise. Use downstream vision to spot bobbing twigs or irregular flow patterns.

Man Made Entrapments Anything manmade in the river is dangerous and are a constant cause of alarm and are inherently more dangerous than most things natural. Keep an eye out for bridge pilings, low head dams, junked cars, any man made junk found commonly in urban riverways, under highway crossings, and at abandoned dam sites. Maintain a habit of visual downstream scanning. Avoid anything suspicious!

Broaches Getting pinned on a rock, either amidship or at the ends. Avoid sharp rocks that can potentially crease a boat or serve as point to be wrapped by your kayak! Develop the instinct to lean into the rock with your boat and body leaning together like a bell buoy. Reach your body out to "Love the rock". Practice this skill with an instructor on gentle, shallow water until it becomes instinct.

Undercut Rocks Undercuts are a water feature where a slab of rock, or rock shape, forces the current flow to go under the surface. Learn to spot them by the dark shadow on the upstream side of the rock, the lack of pillowing action by oncoming water, and by the lack of a predictable eddy on the downstream side. Most dangerous undercuts are well known by locals, and listed in guidebooks.

Entanglement Getting tangled exiting your boat is most likely to be caused by ropes, and loose lines, in your boat. Practice wet exits and critically evaluate your outfitting for entanglement potential. Treat throw ropes as a potential hazard. Keep them neatly bagged, and carry a knife for rescue.

Vertical Pins occur when the bow buries and gets pinned on the bottom after a steep drop. This is not a concern until you are paddling drops of over 3 or 4 feet. Advanced paddlers prevent them by checking the water depth first, and leaning back into a 'boof' move to keep the bow up. Paddling boats with a large volume bow reduces this risk substantially- That's why creek boats have high volume!

Hydraulics The killer hydraulics have evenly formed backwash, water moving back upstream for four or more feet. Holes with more of a wave shape are intimidating, but typically less hazardous than water flowing smoothly upstream. Dams, and hydraulics that are very regular, and perpendicular to the current are far more dangerous than hydraulics angled with one end downstream.

Long Swims Many people unfamiliar with the sport might expect long swims to be a primary killer. Since most beginner/intermediate rivers have pools between the drops, this is rarely the case. Wearing a tight PFD, matching your ability to an appropriate river, and being dressed for a swim can be excellent defence against a long swim. Of course another great precaution is a competent group of friends with either a shore or boat based rescue plan.

Back to basics: wear a helmet in kayaks, and learn to tuck tight forward to the deck when you flip ...dress appropriately for the water and air temperatures. Drysuits and wetsuits are a must if the combined water and air temperature is under 100 degrees.