Locally Developed Course

Grande Yellowhead Public School Division

Water Experience
35

Parks Canada (Palisades) Stewardship Education Centre

Pre-Immersion Course Package

Grande Yellowhead
Public School Division

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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. It also highlights best practise methods for inquiry research, problem solving and analysis.

It is our intention that through this initiative students will:

- Display a level of familiarity with techniques and equipment that allows them to confidently respond to emerging situations
- Demonstrate familiarity with fundamental water awareness concepts
- Develop familiarity with basic navigation and personal safety equipment
- Develop informed decision making skills
- Build leadership capacity
- Access and apply risk management resources

The afore mentioned skills will be delivered in the context of the following:

- Teach and model risk management skills
- Foster an appreciation for terrain diversity
- Appreciate the local, regional and global nature of environmental issues
- Demonstrate appropriate use of multiple technologies

Pre-immersion sessions: Five hours of classroom-based sessions are facilitated by a teacher who will either join the students in person or through a videoconference suite. A Bridgit connection with a SmartBoard will be necessary if the sessions will be delivered through videoconference. Included in this teacher package is a PowerPoint presentation divided into 5 sessions for use during the pre-immersion course. Other resources needed for the delivery of the course can be found in more detail in the Instructor Notes that follow.

Immersion sessions: Delivered on-site at the Parks Canada Palisades Stewardship Education Centre near Jasper, Alberta, these sessions will require students to stay in residence at the PSEC site for four days of programming, usually running 8h00 to 22h00. This portion of the course is very hands-on and will require full participation by students. PSEC staff, including interpreters and other Parks Canada personnel, will be on-site to deliver the programming, but teacher chaperones will be needed as well during this time. The 35 level course mainly takes place off-site and is described as a journey. Exact locations will be decided upon by the PSEC facilitators who will base their decision on the weather, group's abilities, and other safety factors.

Post-immersion sessions: Three more hours of classroom-based sessions will be facilitated in the same way as the pre-immersion sessions. Students will link what they experienced and learned in Jasper with what is happening in their home communities or regions. A major culminating project is part of the final student assessment and will usually involve sharing with people outside the course.

Water Experience 35: PRE-IMMERSION Instructor Package

The following plans and activities are to be completed prior to the students' visit to the Palisades Centre. Within this Pre-Immersion package, you will find activities that will cover approximately 5 hours of classroom work. Students will end the Pre-Immersion sessions with a Field Course Briefing by a Parks Canada/Palisades Centre representative.

Technology
In the following activities, students will need some access to various technologies such as videoconferencing and/or SmartBoard where presentations can be shown. Make sure students are situated in the home school appropriately to allow access to this technology. Organizers of this part of the Water Experience course should give videoconference speakers ample time to organize their presentations.

Recommended Course Materials
It is suggested that students keep a binder or folder that they will devote to the Water Experience 35 course (Pre-Immersion, Immersion and Post-Immersion activities). There will be a series of handouts 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 & 25.

Assignments
Any reflection assignments or notes are to be kept in the student's folder and can be used to evaluate the student in the course. Some handouts will be collected by the course administrator or teacher to be used in the student's evaluation. Share the information on the weighting of the assignments (pages 42 & 43 in this document) with the students.

Pre-requisites
Students are required to have current basic first aid certifications. It is the teacher's responsibility to ensure that all students in the course have the opportunity to take basic first aid (16 hrs.) prior to arriving at the PSEC and that it is successfully completed. Talk to the local aquatic centre to schedule a weekend or after school course.

Session 1

Topics this first class will cover:

- Introductions
- Topics to be covered during the 35-level course
- Course readings & other materials
- Schedules for the three components of the course (pre, post, and immersion)
- Questions the students may have about the course or that the instructor may have of the students
- A Case Study of Industrial Uses of Water: The Alberta Tar Sands

Learning outcomes:

- Students will understand the basic framework of the Water Experience courses.
- Students will understand the major learning themes for the35 level course.
- Students will create and organize their 'Water Experience' folder (or get reacquainted with their folder from Water Experience 15 & 25).
- Students will understand that controversy surrounds the tar sands development at the other end of the Athabasca River.
- Students will think about and share their beliefs on industrial development as it pertains to water.

Lesson Preparation & Resources Needed:

- CBC video clip, ready to be viewed (or text version to be read).
- All student handouts are included in this Instructor's Notes package. Copies will need to be made before the course starts.
- There is also a **PowerPoint** file that is to be used during the pre-immersion classroom sessions. Slides from that document have been inserted here for your information. They are all in blue squares.

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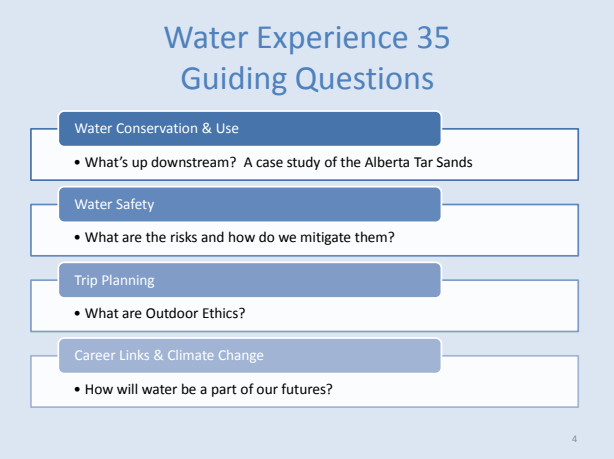
1. Put up the first PowerPoint slide. Explain to the students that there are three main water topics that will be covered in this course. Take 5 minutes to explain and discuss the following:

- Water Ecology refers to the hydrological cycle, hydrography (where the water is) and basic plant and animal needs related to water. This was 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 & 25 levels, students were introduced to canoeing, kayaking, and rafting. 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 (or alternately the Athabasca River) 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 heavy issues in the pre and post portions of the courses. One of the main resources that was referred to during Water Experience 15 & 25 is *Eau Canada*, a Canadian book from 2007, edited by Karen Bakker. In WE 35, many references can be made to the articles previously read.

2. The following slide shows the topics that will be covered in the first four pre-immersion sessions. The fifth session will be a video-conference with the Parks Canada Palisades Stewardship Education Centre (PSEC) staff to brief the students on what they need to know and bring for the Immersion portion of the course. Discuss this overview briefly, and try to get a feel for what the students already know about these issues and if one issue in particular is of great interest to them.



3. A major emphasis of the 35 level course is the careers and lifelong learning components. Ask the students: How will water be a part of your life in the future? Will you continue to develop your paddling & navigating skills? Will you use water recreationally? (i.e. kayaking, canoeing, rafting, for your golf course) Will your career involve water? (i.e. raft guide, aquatic biologist, engineer)

4. In the post-immersion portion of the course, students will be asked to research and present some career opportunities related to water. This could be any job from raft guide to water quality scientist to policy analyst. As the students go through the pre-immersion sessions and during their time at the PSEC, they will need to be recording in their notebooks all they can about these four components. The following handout *(What's Next?)* may be helpful. Students should put it in their WE 35 folders.

5. Introduce the Athabasca River (a river they are already familiar with if they have completed WE 15 & 25) by looking at it in a historic perspective. Check it out at the Canadian Heritage Rivers site: http://www.chrs.ca/Rivers/Athabasca/Athabasca-F_e.htm

6. Introduce the Water Conservation and Use topic by showing the students the following video clip: http://www.cmaj.ca/cgi/content/full/178/10/1261 This is a CBC News video clip on Dr. David Schindler's 2009 report on the Oil Sands (notice who has sponsored the clip... B.C. Hydro). The online text is available here: http://www.cbc.ca/canada/edmonton/story/2009/12/07/edmonton-schindler-oil-sands-toxin.html

   After the clip, ask students what they think & feel about the Athabasca Oil Sands situation. Play the devil's advocate and ensure that both sides of the issue are brought up. For example: *I think the oil sands development is necessary to satisfy our demand for energy, but I feel that the environmental impacts may be too great.*

7. Give the students their first reading assignment, *Pros & Cons of Oilsands* taken from the Edmonton Journal. Inform the students of the source, and highlight the fact that the writer is not a scientist but rather a journalist who may editorialize.

8. Go over the answers together (you may want to turn it into a Senteo quiz, for fun). Ask the students to keep these facts & figures in mind and to report any conflicting or supporting information that they find in the news. How do we know these numbers are accurate?

QUESTIONS

1. How many waterfowl are estimated to have perished on April 29, 2008?
    a. 500
    b. 600
    c. 1,600

2. Approximately, how many barrels of recoverable oil are thought to be in the oilsands?
    a. 10 billion
    b. 100 billion
    c. 175 billion

3. What ratio of jobs are directly related to energy in Alberta?
    a. 1 in 100
    b. 1 in 55
    c. 1 in 13

4. How many barrels of water are used up to create every barrel of bitumen produced?
    a. None -- all the water is recycled
    b. 1-2 barrels
    c. 2-4 barrels

5. How many oilsands projects are there in Alberta?
    a. 10
    b. 50
    c. 90

6. How much land is being used for oilsands extraction?
    a. 50 square kilometres
    b. 100 sq. km.
    c. 500 sq. km.

7. How much area do the tailings lakes cover?
    a. 5 sq. km.
    b. 25 sq. km.
    c. 50 sq. km.

8. How much land has Syncrude reclaimed as certified by the government?
    a. 100 sq. km.
    b. 50 sq. km.
    c. 1 sq. km.

9. Every dollar invested in the oilsands creates how much economic activity?
    a. $1

b. $5
c. $9

10. Which country has the highest greenhouse gas emissions from its energy extraction processes?
    a. Nigeria
    b. Venezuela
    c. Canada

11. According to the Alberta government, who first alerted environment officials to the duck deaths?
    a. Syncrude
    b. Ducks Unlimited
    c. Anonymous tipster

ANSWERS

1 -- c: The first number released to the public was 500 but that was later revised to 1,606.
2 -- c: The oilsands are second only to Saudi Arabia.
3 -- c: This is one major reason why Albertans are so torn over the oilsands. It might drive Greenpeace protests but it also helps drive our provincial economy.
4 -- c: About 70 per cent of water used is recycled -- but since 12 barrels of water are used in the extraction process for each barrel of bitumen, up to four barrels end up in the tailings lakes.
5 -- c: There are actually 91, according to the Alberta government.
6 -- c: That might not seem like much compared to the size of northern Alberta but it's about five times the size of a major city such as Vancouver.
7 -- c: That's an area larger than the size of Fort McMurray and the tailings lakes are large enough to be seen from Earth orbit.
8 -- c: That might seem like a very small amount -- and it is.
9 -- c: Another reason why Alberta's economy is so dependent on the oilsands.
10 -- c: Because of the oilsands, Canadian extraction is dirtier per barrel than it is in Nigeria and Venezuela by 10 to 20 per cent -- according to a report commissioned by the Alberta government and released last June.
11 -- c: This is according to a statement by Premier Ed Stelmach in April 2008.

(My thanks to the Pembina Institute and the Alberta government for many of the facts.)
gthomson@thejournal.canwest.com

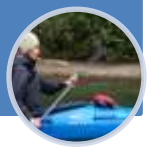
9. As a homework assignment, ask students to write a paragraph on their personal views of the oilsands (and/or industrial development in general as it pertains to water) that they will share next class. Hand out the *At the Other End of the Athabasca* sheet to guide students and go over the rubric before the end of the class. If there is extra time, students can begin their homework in class.

What's Next?

WE35 **Notes**

In the post-immersion portion of this course, you will be asked to research and present some career opportunities related to **water**. This could be any job from raft guide to water quality scientist to policy analyst. To help you prepare for this, and to give you a good idea of how your future could involve water, record any of the following information that you can discover while in class, online, or at the Palisades Centre.

Skills I want to work on



Organizations to check out

Learning opportunities

Trips & activities

Do you know the pros and cons of what's happening in Alberta's north?

By Graham Thomson, Edmonton Journal March 2, 2010

They died in a sewage lagoon almost two years ago -- but their little web-footed ghosts continue to haunt the Alberta government and spook the oilsands industry.

They are the ducks that died one April day in 2008 in a Syncrude tailings "pond" and have thus attained something akin to martyrdom to those protesting against the oilsands. The ducks might be dead but politically speaking they are not dead ducks -- the memory of what happened to them continues to motivate environmentalists.

This week, oilsands giant Syncrude went on trial charged by both the federal and provincial governments with failing to prevent waterfowl from landing on the toxic lake.

The court drama could last eight weeks, which is longer than some murder trials; and, if found guilty, Syncrude faces up to $800,000 in fines, which is more than some companies are penalized after an employee is killed on the job.

That's not to say the charges shouldn't have been laid or that no one should be called to account for the death of hundreds of ducks that innocently landed on a massive tailings pond and then sank in the effluent that is more like yogurt than water.

But there will be those who sympathize with Syncrude and think the government overreacted, that dead ducks are just the cost of doing business. Just as there are those who think the ducks were essentially murdered and deserve justice.

At the very least, the death of the ducks was something of an environmental protest as staged by Mother Nature -- and couldn't have been more effective if each bird had worn a little "Stop the Tar Sands" T-shirt as it disappeared into the sludge.

Before I wade any further, so to speak, into this issue and find myself in contempt of court, let's back up and take a look at Alberta's love/ hate relationship with the oilsands/ tarsands. And let's do it in the form of a quiz, so I don't get accused of picking sides in a legal fight between mallards and magnates.

WE35 Reading Assignment

Do you know the pros and cons of what's happening in Alberta's north?

QUESTIONS

1. How many waterfowl are estimated to have perished on April 29, 2008?

2. Approximately, how many barrels of recoverable oil are thought to be in the oilsands?

3. What ratio of jobs are directly related to energy in Alberta?

4. How many barrels of water are used up to create every barrel of bitumen produced?

5. How many oilsands projects are there in Alberta?

6. How much land is being used for oilsands extraction?

7. How much area do the tailings lakes cover?

8. How much land has Syncrude reclaimed as certified by the government?

9. Every dollar invested in the oilsands creates how much economic activity?

10. Which country has the highest greenhouse gas emissions from its energy extraction processes?

11. According to the Alberta government, who first alerted environment officials to the duck deaths?

At the Other End of the Athabasca *WE35* Response Journal

In class and possibly in the news, you have heard about the Athabasca Oil Sands development taking place in Northern Alberta. Your assignment is to write about your beliefs on this situation. Try to look at both sides of the issue and give examples. Look at how **society**, the **environment** and **you** are affected by and can affect the development of the oil sands.

You may want to use some of the following sentence starters:

- I think ...
- I feel ...
- I know ...
- I wish ...
- I have heard ...
- I have witnessed ...
- I would like to know ...

Rubric	*Oil Sands* Reflection- Depth of response		
4	3	2	1
Reflection shows thorough thoughtfulness. Reflection has supporting details and examples. All parts of the reflection are complete and well done.	Reflection shows some thoughtfulness. Reflection has some supporting details and examples. All parts of the reflection are complete	Reflection shows little thoughtfulness. Reflection has few details or examples. Most parts of the reflection are complete.	Reflection shows no thoughtfulness. Reflection has no details. Reflection is incomplete.

Session 2

Topics this second class will cover:

- Geography of the Athabasca drainage basin
- Identification of risks & hazards associated with paddling activities & outdoor environments
- Ways to mitigate risks
- Leadership skills & teamwork

Learning outcomes:

- Students will gain understanding of the hazards and risks of paddling and of being in remote wilderness areas.
- Students will reflect on their own beliefs about leadership.
- Students will cooperate with other members of the class in order to get to know them better.

Lesson Preparation & Resources Needed:

- Google Earth loaded on computer on SmartBoard (students may want to explore on their own computers) or Google Maps.
- http://paddlinginstructor.com article, ready on SmartBoard
- PowerPoint slides ready on SmartBoard

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1. Ask students to share their responses about the oil sands development. Discuss any recurring themes and any interesting points that are brought up.

2. Now we begin learning about a major component of the Water Experience 35 level course: Safety & Trip Planning. Open Google Earth (also Google Maps in satellite view is helpful) and find the following spots in the Athabasca drainage basin:
   - Fort McMurray (refer to yesterday's topics). Follow the river to the...
   - Town of Jasper
   - Athabasca Falls
   - Columbia Icefields
   - Follow the Maligne river basin up from the Athabasca to Maligne Lake, and go down to...
   - Fisherman's Bay
   - Coronet Creek

While you're doing this, look at how far the river in question is to the nearest road, phone, and hospital. See if you can tell what the terrain is like: Are you in a canyon? Can you identify any hazards in the river from this viewpoint? Can you identify any possible wildlife corridors, based on the vegetation & terrain?

3. Look at the 5 PowerPoint slides for Session 2 and discuss what the students already know about river & lake hazards and risk management.

4. Pass out the Identifying and Minimizing Risk assignment sheets to each student. Have them fill in the answers individually or in groups.

5. Review the answers that they come up with. Discuss leadership and followership qualities. Why do we need good leaders? Why do we need to know how to follow others' directions?

6. Go to the *Human Brain a Poor Judge of Risk* article at: http://paddlinginstructor.com/articles/risk-management.html and discuss how having a plan in advance will help minimize harm while being active outdoors.

Identifying & Minimizing Risk — *WE35* Assignment

Identify and list environmental and human risk factors associated with paddling activities and outline strategies you would adopt to minimize or eliminate those risks.

Environmental Risk Factor	Appropriate Safety Planning
1.	
2.	
3.	
4.	
5.	

Human Risk Factor	Appropriate Safety Planning
1.	
2.	
3.	
4.	
5.	

How can a leader be a risk factor? List the possibilities.
1.
2.
3.
4.
5.

Session 3

Topics this third class will cover:

- Trip planning
- Leave-no-trace ethics
- Risk management

Learning outcomes:

- Students will define the 7 principles of Leave-No-Trace outdoor ethics.
- Students will be able to define the components of ecological integrity and know how recreational users of parks fit into the process.
- Students will understand the concept of ecological integrity.

Lesson Preparation & Resources Needed:

- Students will need access to computers & the internet

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1. Hand out the Jig Saw activity page for the students to complete (*Outdoor Ethics*), and also assign each student to be an expert on a given topic (students can choose or teacher can assign). The topics include:
    - Ecological Integrity (discussed in detail in WE 25)
    - Plan Ahead and Prepare
    - Travel & Camp on Durable Surfaces
    - Dispose of Waste Properly
    - Leave What You Find
    - Minimize Campfire Impacts
    - Respect Wildlife
    - Be Considerate of Others

    Tell students about the following Parks Canada website: http://www.pc.gc.ca/progs/np-pn/ie-ei.aspx and the Leave No Trace Canada website: http://www.leavenotrace.ca/principles if they haven't already figured out where to gather information on the topics.

2. After students have gathered information on their topics, have them present to the class or to their group. Others will take notes and ask questions. Each student should have a completed assignment sheet by the end of the class and should be able to list and describe the Leave No Trace ethics. The following rubric can be completed by the teacher or the students.

Rubric	**Outdoor Ethics Concepts - Depth of ideas presented**		
4	3	2	1
Students demonstrate a thorough understanding of key concepts. Descriptions are complete and in depth.	Students demonstrate a good understanding of key concepts. Descrip… are complete.	Students demonstrate a general understanding of …pts. …ns lack some	Students indicate a lack of conceptual understanding. Issues are dealt with at a superficial level and/or in isolation.

Outdoor Ethics *WE35* Assignment

Your mission is to find out all you can about the following topics. Become an expert about the one that you are assigned to, and then share what you know with the other members of your group. Everyone will be assessed on the completeness and accuracy of their findings.

Ecological Integrity	Plan Ahead and Prepare
Travel and camp on Durable Surfaces	Dispose of Waste Properly

Outdoor Ethics *WE35* Assignment

Leave What You Find	Minimize Campfire Impacts
Respect Wildlife	Be Considerate of Others

3. As a homework assignment, ask students to create a journal response to the following questions. The format can be in a written journal style, or perhaps a blog or short video.

   What have you experienced that goes against the outdoor ethics that we learned about in class today? What have you experienced that is in accordance with the outdoor ethics?

   For example, a student may describe a time when they were out in the bush with their friends and they made a fire in an area where there was no fire pit. They may have found a place where garbage lined a stream, or where animals were endangered by litter or pollution.

   They may describe a time when they cleaned up a riverbank or when they found a neat rock in a Park but left it where they found it. They could describe how they always stay on the trail and never make new trails or use shortcuts.

   As an extra challenge, students could survey their friends to discover what they have experienced, both bad and good, and could retell their stories to the class.

Rubric	**Outdoor Ethics Reflection - Depth of response**		
4	3	2	1
Reflection shows thorough thoughtfulness. Reflection has supporting details and examples. All parts of the reflection are complete and well done.	Reflection shows some thoughtfulness. Reflection has some supporting details and examples. All parts of the reflection are complete	Reflection shows little thoughtfulness. Reflection has few details or examples. Most parts of the reflection are complete.	Reflection shows no thoughtfulness. Reflection has no details. Reflection is incomplete.

Session 4

Topics this fourth class will cover:

- Water Careers
- Climate change

Learning outcomes:

- Students will be able to describe a variety of careers that protect, study, or use water.
- Students will create connections between the theoretical (water issues) and the practical (jobs) and will develop a sense of what they may like to do after high school.

Lesson Preparation & Resources Needed:

- Arrange for a session with one or several of the following organizations / individuals:
  - Ducks Unlimited (video-conference)
  - Bamfield Marine Science Centre (VC)
  - Alaska Sea Life Centre (VC)
  - Royal Botanical Gardens (VC)
  - Parks Canada (conservation biologist, GIS specialist, etc.)
  - Raft Guide / Kayak Instructor
  - Waste Water Treatment Facility Operator

  Ensure that you let the speakers know the following points when you book the session:
  We want to learn about:
  - *How your career involves water. What training you need to do your job?*
  - *How long have you've been doing your job and do you plan on continuing in the field?*
  - *What you like about your job. What you don't like about your job.*
  - *What kind of person would enjoy your job? What other jobs in your field are interesting.*

What do you do in your spare time that involves water?

Let the presenter know the amount of time they will have and ensure they know where to go (arrange a test connection if it is through video-conference). Ask if they have any visuals (ppt presentations, photos, gear, equipment) to bring in and arrange equipment as necessary (projector, etc.)

- Have photocopies of the Tim Flannery chapter "Liquid Gold: Changes in Rainfall" ready to hand out to the students, along with the accompanying anticipation guide.

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1. Prepare for the presentation of a "water" career (or careers, if more than one person has been scheduled to talk). This should last 30 minutes, more or less.

2. After the presentation, students should have time to ask questions. Thank the presenter(s).

3. Ask students to write in their notebooks following the presentation. Have them reflect on the presentation and what they have learned about in the past few classes. They can use the writing prompts handed out in WE 25 if they like.

4. Hand out the reading assignment that should be read before the next class: "Liquid Gold: Changes in Rainfall." It comes from the 2005 book *The Weather Makers* by Tim Flannery. If there is time, students can begin reading together or individually. Start with the following anticipation guide.

Liquid Gold: Changes in Rainfall — *WE35 Anticipation Guide*

by Tim Flannery pages 123 - 134 in *The Weather Makers* (2005)

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. For every degree of warming we create, our world will experience a 1% increase in rainfall.
2. More water is a good thing for nature and humans.
3. The drought in sub-Saharan Africa was brought on by the actions of the people in that region.
4. The Indian Ocean is the most rapidly warming ocean.
5. Global dimming is a good thing created by humans.
6. Religion and politics are the root causes of instability and famine in the Darfur region of Africa.
7. Technology is the only means of protecting ourselves from global warming disasters.

8. The south-west corner of Australia has historically had wet winters and dry summers.

9. A 15% decrease in rainfall is trivial and has little impact on humans and the environment.

10. Natural vegetation kept the salt levels in check by preventing the rains to seep down to the salt in the ground.

11. Groundwater pumping is the best solution to decreasing rainfall.

12. Snowpack offers an inexpensive alternative to dams by holding winter precipitation until the summer months when farmers need it most.

13. Water supplies, hydropower, and fish habitats are all affected by reduced precipitation in the winter.

14. A good solution to the water supply crisis is to build more dams.

Session 5

Topics this last pre-immersion class will cover:

- Climate change and the hydrological cycle
- Adaptations to climate change
- Preparation for the Immersion portion of Water Experience 35.

Learning outcomes:

- Students will understand the potential effects of climate change on the hydrological cycle and living organisms.
- Students will understand what they will need to bring in terms of gear, clothing, etc. for their stay at the Palisades Centre.
- Students will ask questions they may have about their upcoming visit to the PSEC.

Lesson Preparation & Resources Needed:

- Access to the National Geographic video clips.
- Access to the Natural Resources Canada article online.
- A videoconference session with a Parks Canada PSEC staff member will take place during this session. This should last about 20 minutes. Contact the Palisades Centre to set this up in advance.

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1. Discuss the reading assignment and the anticipation guide. See if the students changed their points of view of understandings after reading the article.

2. The next activity will be to look at a 4:22 minute National Geographic video clip on climate change and Pikas. Go to http://video.nationalgeographic.com/video/player/news/animals-news/pika-in-peril-missions-wcvin.html

   There is also a good video clip on glacier melt:
   http://video.nationalgeographic.com/video/player/environment/global-warming-environment/glacier-melt.html

   Discuss the facts that the pika and glacier problems are happening in Jasper National Park as well as in the U.S. and Europe.

3. Look at the Effects of Climate Change on Water Resources diagram (in the ppt slideshow) and discuss the potential impacts for the Athabasca River drainage basin. If there is time, assign the following scenarios / points of view or simply discuss as a group:

   - Columbia Icefields disappear = What is the effect on tourism in Jasper?
   - Columbia Icefields disappear = What is the effect on wildlife in Jasper?
   - Columbia Icefields disappear = What is the effect on recreational opportunities in Jasper?
   - Columbia Icefields disappear = What is the effect on tourism in Alberta?
   - Columbia Icefields disappear = What is the effect on communities in Alberta?
   - Columbia Icefields disappear = What is the effect on agriculture in Alberta?
   - Columbia Icefields disappear = What is the effect on food supplies in Alberta?
   - Columbia Icefields disappear = What is the effect on food supplies in Canada?
   - Columbia Icefields disappear = What is the effect on wildlife in Alberta?
   - Columbia Icefields disappear = What is the effect on fisheries in Alberta?
   - Columbia Icefields disappear = What is the effect on oil production in Alberta?

4. Look at the following Natural Resources Canada article (this will help to make the link between the Athabasca River and the oil production in Alberta question from the previous activity):
   http://ess.nrcan.gc.ca/ercc-rrcc/proj1/theme1/act1_e.php

5. The instructor should give an overview of how students will be assessed during the remainder of the course, including what will be assessed at the PSEC and what the final projects will entail. This

will help students plan for their final project as they immerse themselves in the hands-on activities. Make sure the assignments that have been completed in the previous sessions have been marked and returned to the students.

6. The videoconference session should begin with an introduction from the Palisades interpreter, and a very brief overview of what Parks Canada's role is in the conservation & protection of water resources. The interpreter should then outline what the students need to know about their upcoming visit, and should give a general schedule of events for the 4 day camp. Items that the students need to bring from home will need to be discussed, as well as things that should be left at home. Time should be left for questions from the students and the instructor.

Pre-Immersion (5 classes)
Course Introduction, Water Conservation & Use Water Safety Trip Planning Careers Climate Change, Prep for PSEC visit

Post-Immersion (3 classes)
Reflections on Immersion Experience Trip Planning & Careers Projects Course wrap-up

Immersion (3 nights, 4 days minimum at the Parks Canada PSEC)					
	(optional evening arrival)	Day 1 PSEC	Day 2 Maligne Lake	Day 3 Maligne Lake	Day 4 Maligne Lake / PSEC
Morning Learning Activities		• Trip Planning & Packing	• Paddle to Coronet Creek campsite on Maligne Lake	• Explore Coronet Creek area	• Paddle back to Boat Launch on Maligne Lake; Return home
Afternoon Learning Activities		• Safety		• Paddle to Fisherman's Bay campsite	
Evening Learning Activities	• Team-building Activities	• Outdoor Ethics	• Camp activities	• Scenarios	

7. Before leaving, ensure that the students know that they should bring their Water Experience folders with them to the PSEC.

Water Experience 35 Student Handouts

The following student handouts are already included in the Instructor Notes above, but are also included here for ease of photocopying. The chapter from *The Weather Makers* for session 4 has been scanned and included here as well.

What's Next?

WE35 **Notes**

In the post-immersion portion of this course, you will be asked to research and present some career opportunities related to **water**. This could be any job from raft guide to water quality scientist to policy analyst. To help you prepare for this, and to give you a good idea of how your future could involve water, record any of the following information that you can discover while in class, online, or at the Palisades Centre.

Skills I want to work on

Organizations to check out

WE35 Reading Assignment

Do you know the pros and cons of what's happening in Alberta's north?

By Graham Thomson, Edmonton Journal March 2, 2010

They died in a sewage lagoon almost two years ago -- but their little web-footed ghosts continue to haunt the Alberta government and spook the oilsands industry.

They are the ducks that died one April day in 2008 in a Syncrude tailings "pond" and have thus attained something akin to martyrdom to those protesting against the oilsands. The ducks might be dead but politically speaking they are not dead ducks -- the memory of what happened to them continues to motivate environmentalists.

This week, oilsands giant Syncrude went on trial charged by both the federal and provincial governments with failing to prevent waterfowl from landing on the toxic lake.

The court drama could last eight weeks, which is longer than some murder trials; and, if found guilty, Syncrude faces up to $800,000 in fines, which is more than some companies are penalized after an employee is killed on the job.

That's not to say the charges shouldn't have been laid or that no one should be called to account for the death of hundreds of ducks that innocently landed on a massive tailings pond and then sank in the effluent that is more like yogurt than water.

But there will be those who sympathize with Syncrude and think the government overreacted, that dead ducks are just the cost of doing business. Just as there are those who think the ducks were essentially murdered and deserve justice.

At the very least, the death of the ducks was something of an environmental protest as staged by Mother Nature -- and couldn't have been more effective if each bird had worn a little "Stop the Tar Sands" T-shirt as it disappeared into the sludge.

Before I wade any further, so to speak, into this issue and find myself in contempt of court, let's back up and take a look at Alberta's love/ hate relationship with the oilsands/ tarsands. And let's do it in the form of a quiz, so I don't get accused of picking sides in a legal fight between mallards and magnates.

WE35 Reading Assignment

Do you know the pros and cons of what's happening in Alberta's north?

QUESTIONS

1. How many waterfowl are estimated to have perished on April 29, 2008?

2. Approximately, how many barrels of recoverable oil are thought to be in the oilsands?

3. What ratio of jobs are directly related to energy in Alberta?

4. How many barrels of water are used up to create every barrel of bitumen produced?

5. How many oilsands projects are there in Alberta?

6. How much land is being used for oilsands extraction?

7. How much area do the tailings lakes cover?

8. How much land has Syncrude reclaimed as certified by the government?

9. Every dollar invested in the oilsands creates how much economic activity?

10. Which country has the highest greenhouse gas emissions from its energy extraction processes?

11. According to the Alberta government, who first alerted environment officials to the duck deaths?

gthomson@thejournal.canwest.com

At the Other End of the Athabasca — *WE35* Response Journal

In class and possibly in the news, you have heard about the Athabasca Oil Sands development taking place in Northern Alberta. Your assignment is to write about your beliefs on this situation. Try to look at both sides of the issue and give examples. Look at how **society**, the **environment** and **you** are affected by and can affect the development of the oil sands.

You may want to use some of the following sentence starters:

- I think ...
- I feel ...
- I know ...
- I wish ...
- I have heard ...
- I have witnessed ...
- I would like to know ...

_____

_____

_____

Rubric	*Oil Sands* Reflection- Depth of response		
4	3	2	1
Reflection shows thorough thoughtfulness. Reflection has supporting details and examples. All parts of the reflection are complete and well done.	Reflection shows some thoughtfulness. Reflection has some supporting details and examples. All parts of the reflection are complete	Reflection shows little thoughtfulness. Reflection has few details or e… Most parts of …on are	Reflection shows no thoughtfulness. Reflection has no details. Reflection is incomplete.

Identifying & Minimizing Risk *WE35* Assignment

Identify and list environmental and human risk factors associated with paddling activities and outline strategies you would adopt to minimize or eliminate those risks.

Environmental Risk Factor	Appropriate Safety Planning
1.	
2.	
3.	
4.	
5.	

Human Risk Factor	Appropriate Safety Planning
1.	
2.	
3.	
4.	
5.	

How can a leader be a risk factor? List the possibilities.
1.
2.
3.
4.
5.

Outdoor Ethics *WE35* Assignment

Your mission is to find out all you can about the following topics. Become an expert about the one that you are assigned to, and then share what you know with the other members of your group. Everyone will be assessed on the completeness and accuracy of their findings.

Ecological Integrity	Plan Ahead and Prepare

Travel and camp on Durable Surfaces	Dispose of Waste Properly

Outdoor Ethics *WE35* Assignment

Leave What You Find	Minimize Campfire Impacts

Respect Wildlife	Be Considerate of Others

Liquid Gold: Changes in Rainfall ***WE35 Anticipation Guide***

by Tim Flannery pages 123 - 134 in *The Weather Makers* (2005)

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. For every degree of warming we create, our world will experience a 1% increase in rainfall.
2. More water is a good thing for nature and humans.
3. The drought in sub-Saharan Africa was brought on by the actions of the people in that region.
4. The Indian Ocean is the most rapidly warming ocean.
5. Global dimming is a good thing created by humans.
6. Religion and politics are the root causes of instability and famine in the Darfur region of Africa.
7. Technology is the only means of protecting ourselves from global warming disasters.
8. The south-west corner of Australia has historically had wet winters and dry summers.
9. A 15% decrease in rainfall is trivial and has little impact on humans and the environment.
10. Natural vegetation kept the salt levels in check by preventing the rains to seep down to the salt in the ground.
11. Groundwater pumping is the best solution to decreasing rainfall.
12. Snowpack offers an inexpensive alternative to dams by holding winter precipitation until the summer months when farmers need it most.
13. Water supplies, hydropower, and fish habitats are all affected by reduced precipitation in the winter.
14. A good solution to the water supply crisis is to build more dams.

N

ES IN RAINFALL

er? Or who hath begotten

The Book of Job

pans a range of temperatures
ove, and air at 40°C can hold
-40°C. It's this fact that con-
, and which dictates that, for
rld will experience an average
al fact here is that this rainfall
e and space. Instead, rain is

remember that we are only at the beginning of the West's water crisis. Five thousand years ago, when the American southwest was a little warmer and drier even than it is today, the Indian cultures that had flourished across the region all but vanished. Only when conditions cooled again was the region habitable. For more than a millennium the southwest was little more than one big ghost town.[17]

snow received. If this trend continues for another five decades, western snowpacks will reduce by up to 60 per cent in some regions, which could cut summertime stream flow in half.[15] This will devastate not just water supplies, but hydropower and fish habitats as well.

Changes in the overall volume of snowfall, however, are not nearly as worrying as changes in the way the snowpack forms and melts. Over the past fifty years, the southwest region has warmed by 0.8°C—slightly more than the global average and, even in regions that are now receiving more snow, this and seasonal changes in rainfall and temperature are affecting water supply. These factors have conspired to reduce the snowpack. This is because the higher temperatures are melting it before it can consolidate. On the whole the snowpack is melting earlier, which means that the peak of runoff into streams is now occurring three weeks sooner than in 1948. This leaves less water for the height of summer, when it's most needed, but increases water flow in winter and spring, which may lead to more flooding. With temperatures in the region set to rise between 2°C and 7°C over this century (unless we significantly reduce CO_2 emissions), it can be anticipated that most streams will eventually flow in winter, when the water is least needed.[16]

I can imagine the response of many people to reading this: 'So what? We'll just build more dams.' And it is possible that, as the crisis deepens, this is what people will do. But there are a limited number of sites suitable for dams in the region, and dams mean that farmers will pay for water storage that was once provided by nature. Besides, the changes under way are so vast that even a new program of dam-building is insufficient to counter them. Researchers forecast that snowpack changes could lower farm values by 15 per cent, costing billions. The biggest problem, however, is surely to do with the cities of the US west, which are tethered to ever-dwindling water supplies.

These vast metropolises are impossible to relocate and some—as it was with the ancient cities of Mesopotamia—may, if the rate of change accelerates, have to be abandoned. If this sounds extreme, it's well to

between drought and warmer conditions, and as with the Sahel the link seems to lie in rising ocean temperatures.[13]

Between 1998 and 2002 the Pacific Ocean was in an unusual state. Waters in the eastern tropical Pacific were a few degrees cooler than normal, while those in the central western Pacific were far warmer—around 30°C—than average. These conditions shifted the Jet Stream northwards, pushing storms that would usually track at around 35° of latitude to north of 40°. 'This is a reinforcement of the connectedness of the climate system over great distances and long time scales,' observed Kelly Redmond of Nevada's Desert Research Institute. And, of course, what was driving warmer ocean temperatures was CO_2 in the atmosphere.

The drought conditions in the American west are frequently portrayed in the media as being part of a natural cycle. The only way to be absolutely sure if this is the case is to wait for the decades or hundreds of years required for any natural cycle to play itself out. But the fact that the changes are consistent with those expected to result from global warming, and that they have been observed during warm times in the past, is worrying. Furthermore, the potential of climate change to spawn drought almost anywhere on the planet is so great that leading climatologists have recently warned that 'it would be a mistake to assume any region is safe from megadrought'.[14] In this regard, it is worth pointing out that the near record rains the US experienced over the winter of 2005 in parts of the southwest were not sufficient to make up for the preceding dry years, while the northwest remains in the grip of unprecedented drought.

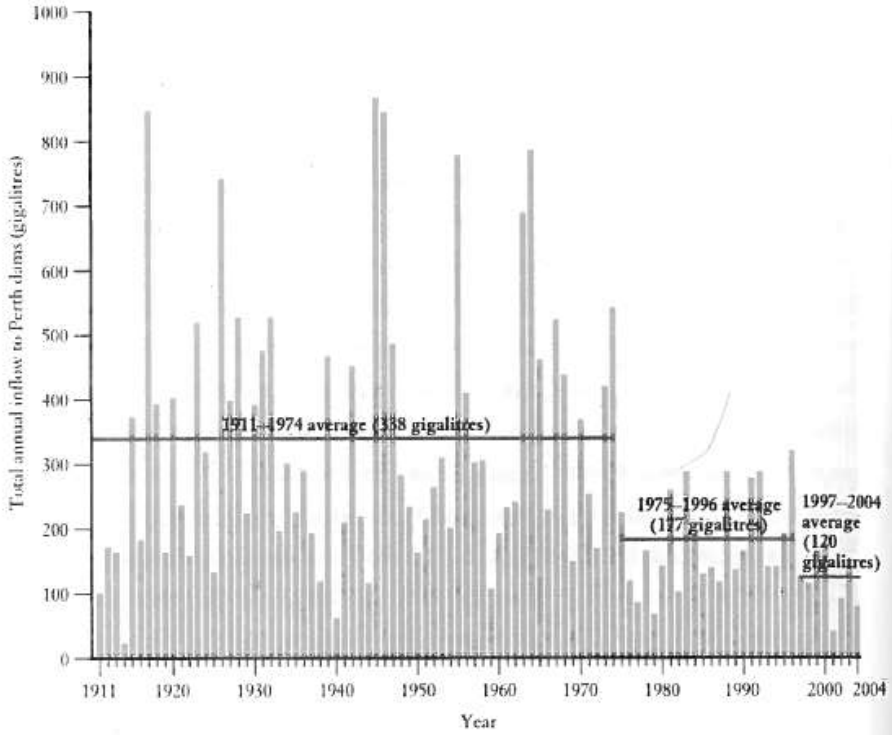
Much of the water in the American southwest comes in the form of winter snow that accumulates on its high mountains. Because it melts over the spring and summer, it provides stream flow when most needed by farmers. In effect the snowpack has offered an inexpensive form of water storage that has minimised the need for dams. The amount of snow that falls has always varied considerably from year to year, and this can hide any longer-term trend from the casual observer. Over the last fifty years, however, there has been a decline in the average amount of

could out of the Gnangara Mound, and in doing so destroy much ancient and wondrous biodiversity, and *still* the fix would only be temporary. Plans have now been laid for a desalination plant at a cost of $350 million dollars, making it one of the largest in the Southern Hemisphere. This though, would still supply only around 15 per cent of the city's water.

Australia's east coast is no stranger to drought, but the dry spell that began in 1998 is different from anything that has gone before. Thus far it has consisted of seven years of below average rainfall; and this is a 'hot drought', with temperatures around 1.7 degrees warmer than in previous droughts, making it of exceptional hostility.[9] The cause of the decline of rainfall on Australia's east coast is thought to be a climate-change double whammy—the loss of winter rainfall and the prolongation of El Niño–like conditions.[10]

The resulting water crisis here is potentially even more damaging than the one in the west, for cities such as Sydney lack the groundwater resources enjoyed by Perth. Its only buffer against rainfall deficits is its dams, meaning that a decline in stream flow translates at once into water hardship. Sydney's water supply is one of the largest domestic water supplies in the world, able to store four times as much per capita as New York's water supplies, and nine times as much as London's. Yet even this capacious storage has proved insufficient. Between 1990 and 1996 the total flow into all eleven of Sydney's dams had averaged 71,635 megalitres, but by 2003 this had dropped to just 39,881 megalitres, a decline of 45 per cent. As of mid-2005 the situation remains critical, with Sydney's 4 million residents having around two years' worth of supply in storage.[11] If the dry conditions continue, this leaves very little time to arrange for alternative water sources such as large-scale desalination plants.

Across the Pacific Ocean, much of the American west is in its fifth year of drought. Research shows that such dry conditions have not been seen in the region for around 700 years, during which time the American southwest was even warmer than it is today.[12] This suggests a relationship



This shows the water flow into Perth's catchments between 1911 and 2004. Large reductions followed the magic gate years 1976 and 1998, and the city has lost two-thirds of its surface water supply over the last thirty years.

Gnangara Mound. For a quarter of a century the city mined this subterranean water, but the failing rains meant that it was not being recharged. In 2001 Perth's dams received virtually no water, and by 2004 the situation of the Gnangara Mound was critical, with the state's Environmental Protection Authority warning that extracting more water from it would threaten some species with extinction.[8] Today, the western swamp tortoise, which is a living fossil, only survives because water is pumped into its habitat.

By early 2005, nearly thirty years after the crisis first emerged, the city's water experts rated the chance of a 'catastrophic failure of supply'—which means no water coming out of the tap—at one in five. Were that to eventuate the city would have no choice but to squeeze what water it

which steady westerly winds have been blowing in from the Indian Ocean for millions of years.

Under every square metre of this land lies an average of between 70 and 120 kilograms of salt. Before land-clearing this didn't matter, for the diverse native vegetation used every drop of water that fell from the heavens, and the salt stayed in its crystalline form. As the summer rains began to fall on the vacant wheatfields, however, water far saltier than the sea began to creep upward, killing everything it touched. The first sign of trouble was a salty taste in the previously sweet brooks of the region. In many cases they quickly became undrinkable, their streamside vegetation died and within a decade or two they had turned into collapsed, salty drains. Today, impoverished and bankrupt farmers are facing the worst case of dry-land salinity in the world. Neither science nor government has been able to provide solutions, and the damage bill is in the billions. Roads, railways, houses and airfields are now besieged by salt, and unless the original vegetation can be returned and induced to grow in the drier and saltier conditions that now prevail, there appears to be no hope of a turnaround.

Western Australia's capital is Perth, a thirsty city of 1.5 million people and the world's most isolated metropolis. There, a taxi driver is likely to be a bankrupt wheat farmer scraping together a living as he tries to sell a now useless farm. For Perth, the most crucial impact from the decline in winter rainfall was less water in the city's catchments, for after 1975 the rain tended to fall in light showers that soaked into the soil and did not reach the dams. Over most of the twentieth century an average of 338 gigalitres of water per year had flowed into the dams that quench the city's thirst. But between 1975 and 1996 the average was only 177 gigalitres—representing a cut of 50 per cent to the city's surface water supply. Between 1997 and 2004 it had fallen to just 120 gigalitres—little more than a third of the flow received three decades earlier.

Severe water restrictions were put in place in 1976, but the situation was soon eased by drawing on a reserve of groundwater known as the

- **Pre-Immersion Assignments & Participation: 40% of final mark**
- **Immersion Assignments & Participation: 40% of final mark**
  (attendance & participation in activities mandatory)
- **Post-Immersion Assignments & Participation: 20% of final mark**

Session 1

Rubric	**Oil Sands Reflection- Depth of response**			This assignment is worth 5% of the final mark for the entire course. Multiply the result obtained here by 1.25 to obtain the true value. i.e. 3/4 = 3.75/5
4	3	2	1	
Reflection shows thorough thoughtfulness. Reflection has supporting details and examples. All parts of the reflection are complete and well done.	Reflection shows some thoughtfulness. Reflection has some supporting details and examples. All parts of the reflection are complete	Reflection shows little thoughtfulness. Reflection has few details or examples. Most parts of the reflection are complete.	Reflection shows no thoughtfulness. Reflection has no details. Reflection is incomplete.	

Session 2

Rubric	**Outdoor Ethics Concepts - Depth of ideas presented**			This assignment is worth 5% of the final mark for the entire course. Multiply the result obtained here by 1.25 to obtain the true value. i.e. 3/4 = 3.75/5
4	3	2	1	
Students demonstrate a thorough understanding of key concepts. Descriptions are complete and in depth.	Students demonstrate a good understanding of key concepts. Descriptions are complete.	Students demonstrate a general understanding of key concepts. Descriptions lack some details.	Students indicate a lack of conceptual understanding. Issues are dealt with at a superficial level and/or in isolation.	

Session 2 or 3

Rubric	**Outdoor Ethics Concepts - Depth of ideas presented**	This assignment is

4	3	2	1	worth 5% of the final mark for the entire course. Multiply the result obtained here by 1.25 to obtain the true value. i.e. 3/4 = 3.75/5
Reflection shows thorough thoughtfulness. Reflection has supporting details and examples. All parts of the reflection are complete and well done.	Reflection shows some thoughtfulness. Reflection has some supporting details and examples. All parts of the reflection are complete	Reflection shows little thoughtfulness. Reflection has few details or examples. Most parts of the reflection are complete.	Reflection shows no thoughtfulness. Reflection has no details. Reflection is incomplete.	

Session 4 or 5 (looking back on this session & previous ones)

Rubric	**Participation - Quality & Quantity of Dialogue / Ideas Shared**			Participation during the class discussions is worth 25% of the final mark for the entire course. Multiply the result obtained here by 6.25 to obtain the true value. i.e. 3/4 = 18.75/25
4	3	2	1	
Students always demonstrate a willingness to share ideas on key concepts. Issues are dealt with in depth. Relevant connections to past experiences and prior knowledge are often made. In-class activities are always completed.	Students demonstrate a willingness to share ideas on key concepts. Issues are sometimes dealt with in depth. Connections to past experiences and prior knowledge are made. In-class activities are always completed.	Students sometimes demonstrate a willingness to share ideas on key concepts. Issues are not often dealt with in depth. Connections to past experiences and prior knowledge are not always relevant. Some in-class activities are completed.	Students indicate an unwillingness to share ideas on key concepts. Issues are dealt with at a superficial level. In-class activities are not completed.	

Water Experience 35 Appendix

Session 4 Video-conference Information

In addition to Ducks Unlimited and Bamfield, two organizations that have good connections with GYPSD already, there are the following suggestions for careers-related video-conference sessions:

1. Alaska Sea Life Center offers a VC session called Marine Science Careers. In this session they look at the positions of researchers, veterinarians, animal trainers, educators, exhibit designers, marketing specialists, and interpreters. This session involves live interviews with these folks at the Alaska Sea Life Center. These folks are great at custom building programs to meet our needs as well.

2. Royal Botanical Gardens in Hamilton offers a VC session called Careers at Royal Botanical Gardens. These folks have been involved in the restoration of Cootes Paradise Marsh, the largest wetland restoration project of its kind in North America. This restoration project involved the construction of a Fishway which restricts the type of fish allowed into the marsh. These folks are also very good at custom building programs to meet our needs.

3. There are also VC sessions on Marine careers offered by the Texas State Aquarium, Mote Marine Laboratory, the New Jersey Academy for Aquatic Sciences, and the Bathysphere Underwater Biological Laboratory.

<u>Further Information on Climate Change</u>

Climate Change Impacts and Adaptation: A Canadian Perspective - Water resources
http://adaptation.nrcan.gc.ca/perspective/index_e.php