

Lesson # 12: Setting the Stage

Topic:	Equilibrium: Tipping the Scales
Science 14 Program of Studies outcome(s): Science, Technology and Society (STS) and Knowledge	<p>Students will:</p> <p>2. Analyze a local ecosystem in terms of its biotic and abiotic components, and describe factors of the equilibrium</p> <ul style="list-style-type: none"> • describe how interactions among organisms limit populations (<i>e.g., predation, parasitism, competition</i>) • - assess the impact of the introduction of exotic species on a specific ecosystem or biome (<i>e.g., purple loosestrife in western Canadian wetlands, English sparrows in North America, zebra mussels in the Great Lakes</i>) • https://education.alberta.ca/media/3069383/pos_science_14_24.pdf
Skills	<p>Initiating and Planning:</p> <p>Ask questions about relationships between and among observable variables and plan investigations to address those questions</p> <ul style="list-style-type: none"> • Identify questions to investigate arising from practical problems and issues • Define questions and problems to facilitate investigation <p>Performing and Recording:</p> <p>Conduct investigations into the relationships between and among observations, and gather and record qualitative and quantitative data</p> <ul style="list-style-type: none"> • Carry out procedures, controlling the major variables • Organize data, using a format that is appropriate to the task or experiment • Use tools, technology and apparatus safely <p>Analyzing and Interpreting</p> <p>Analyze qualitative and quantitative data, and develop and assess possible explanations</p> <ul style="list-style-type: none"> • State a conclusion, based on experimental data; and explain how evidence gathered supports or refutes an initial idea • Identify and evaluate potential applications of findings • Identify new questions and problems that arise from what was learned <p>Communication and Teamwork</p> <p>Work collaboratively on problems; and use appropriate language and formats to communicate ideas, procedures and results</p>

	<ul style="list-style-type: none"> • Receive, understand and act on the ideas of others • Communicate questions, ideas, intentions, plans and results, using lists, notes in point form, sentences, data tables, graphs, drawings, oral language and other means • Work cooperatively with team members to develop and carry out a plan, and troubleshoot problems as they arise
Attitudes	<p>Most of the Attitude Outcomes stated in the Program of Studies are included into each of the <i>Wading in for Water</i> lessons. This includes; Interest in Science, Mutual Respect, Scientific Inquiry, Collaboration, Stewardship, and Safety. Please refer to the specific outcomes</p> <p>· https://education.alberta.ca/media/3069383/pos_science_14_24.pdf</p>
Planning ahead	<p>-have Smarties, cups, bowls, spoons, and activity cards printed and cut out</p> <p>-preview the video to ensure it works. If not, contact your IT department</p> <p>- Unit review tomorrow</p>
Type of lesson	<p>Discussion</p> <p>Video</p> <p>Activity</p> <p>-NOTE: Interactions Among Organisms (Teacher Instructions); (Student Instructions); (Game Cards I); (Game Cards II) There is only one set of game cards, but they are to be printed back to back, so one is the top of the card, and one is the underside of the card.</p>
Word Wall	Listed in Appendix A

Getting Started

Topic opener “hooks”	<p>Intro/ Hook ideas: Sometimes a disease hitches a ride on a boat when you move your boat from one lake to another. The disease is now spread to the second lake. The same goes for firewood, seeds from flowering weeds, and many other organisms. This could cost the province millions of dollars to try to remove this disease, rather than preventing it from happening in the first place. In this type of situation, places like National Parks may use pesticides to stop the spread of certain unwanted organisms.</p> <ul style="list-style-type: none"> • Has anyone been stopped on the highway to have their boat checked by a Conservation Officer in Alberta or BC? Why are they doing this? Teacher Resources: <ul style="list-style-type: none"> ○ https://www.albertaparks.ca/albertaparksca/science-research/aquatic-invasive-species/ ○ http://www.cbc.ca/news/canada/british-columbia/invasive-mussels-check-point-vehicle-blew-past-1.3573755 • Sniffer dogs are often used to detect problems. Teacher Resource: https://www.alberta.ca/release.cfm?xID=3790838D33CF4-B115-F96A-5160BAF6737AF90E
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Lesson Sketch	<ol style="list-style-type: none"> 1. We have learned about how abiotic factors affect populations. Now we will explore how biotic factors affect populations. 2. Describe how interactions among organisms limit populations. When does one organism negatively impact another organism? <ol style="list-style-type: none"> a. Predation: hunting another organism for food/territory Video (2:40): https://www.youtube.com/watch?v=CsfJL-IIVz4 b. Parasitism: one organism is getting food/shelter from another organism at the cost of the host organism's health. Video (4:43): https://www.youtube.com/watch?v=CsfJL-IIVz4 c. Competition: This can be from the same species, or from different species competing for the same source of food/water/territory/mates. Video (1:50): https://www.youtube.com/watch?v=hK8TQQp1qAA d. This video highlights predation, and later shows competitions of resources (3:00): https://www.youtube.com/watch?v=ExV4b77qfw 3. <i>Interactions Among Organisms Activity</i> (see below plus Teacher Sheet and Student Sheet; along with Game Cards I and Game Cards II): <ol style="list-style-type: none"> a. Have a class set of spoons and cups and a handout b. Each group of 3 will need a bowl, a set of cards, and a box of Smarties 4. Discuss competition and predation from the location the water was sampled. What organisms were likely competing? And for what resources? What organisms were likely predators? Draw a simple food chain or food web from some of the organisms identified in the study. Label which were competing for resources, and which were preying on each other. 5. Exotic species introduced in an ecosystem 6. Watch the video (28 minutes): http://thewaterbrothers.ca/carpageddon/ or <i>The Nature of Things</i> episode 'Carpe Diem' (45minutes): http://www.cbc.ca/player/play/2410176258 <p>Prediction activity: What do you think will happen to the local ecosystem when the following two exotic species are introduced?</p> <ol style="list-style-type: none"> 1. Goldfish introduced to local waterways (Red Deer) <ul style="list-style-type: none"> • Info sheet: http://aep.alberta.ca/fish-wildlife/invasive-species/aquatic-invasive-species/documents/AIS-Quickfacts-PrussianCarp-May2015.pdf • Teacher Resources: http://aep.alberta.ca/fish-wildlife/invasive-species/aquatic-invasive-species/fish.aspx • Drumheller, AB: https://www.drumhelleronline.com/local/14144-invasive-fish-species-found-in-drumheller-area-bodies-of-water • High River, AB: http://www.huffingtonpost.ca/2015/09/21/southern-alberta-town-hopes-to-rid-storm-ponds-of-invasive-goldfish_n_8161520.html • Bow River, AB: http://calgary.ctvnews.ca/goldfish-and-prussian-carp-threaten-bow-river-s-ecosystem-1.1867792 2. Zebra mussels in the watershed (Lake Winnipeg). <ul style="list-style-type: none"> • Info sheet: http://www.lakewinnipegfoundation.org/zebra-mussels-101 • http://globalnews.ca/video/2348384/what-zebra-mussels-have-done-to-other-lakes-and-the-damage-potential-for-manitoba • http://globalnews.ca/news/2885661/zebra-mussels-multiplying-in-lake-
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	<ul style="list-style-type: none"> • winnipeg-now-found-on-shorelines/ http://www.cbc.ca/news/canada/manitoba/lake-winnipeg-zebra-mussels-lost-cause-eva-pip-1.3264283
Closing ideas	<p>Case study: Whirling Disease has been discovered in Banff and the Bow River that eventually joins up with the Old Man River near Medicine Hat and flows into the South Saskatchewan River that eventually drains into the Hudson Bay (http://www.southsaskriverstewards.ca/the-south-saskatchewan-river-basin.html) This disease can kill trout when infected. There are several trout species, such as Bull Trout and Cutthroat Trout that are already at risk, due to other sensitivities.</p> <ul style="list-style-type: none"> • Banff National Park will kill fish in some lakes to protect the fish downstream: http://www.cbc.ca/news/canada/calgary/whirling-disease-johnson-lake-banff-cutthroat-westslope-parks-canada-two-jack-1.4119302 • Canada: http://www.inspection.gc.ca/animals/aquatic-animals/diseases/reportable/whirling-disease/fact-sheet/eng/1336686597267/1336686806593 • Alberta Environment: http://aep.alberta.ca/fish-wildlife/wildlife-diseases/whirling-disease/default.aspx

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