

RESOURCE BOOKLET FOR TEACHERS LEADING CHANGE

Grade: 7/8	Sustainable Seafood Unit
Big Ideas:	<ul style="list-style-type: none"> ● Science (Gr. 7) <ul style="list-style-type: none"> - Evolution by natural selection provides an explanation for the diversity and survival of living things. - Earth and its climate have changed over geological time. ● Science (Gr. 8) <ul style="list-style-type: none"> - Life processes are performed at the cellular level. ● Applied Design, Skills and Tech (Gr. 7 & 8) <ul style="list-style-type: none"> - Design can be responsive to identified needs. - Complex tasks may require multiple tools and technologies. ● English Language Arts (Gr. 7 & 8) <ul style="list-style-type: none"> - Exploring and sharing multiple perspectives extends our thinking. - Questioning what we hear, read, and view contributes to our ability to be educated and engaged citizens.
Critical Questions:	<ul style="list-style-type: none"> ● How are we connected to the ocean? ● What is aquaculture? ● How do we rely on the ocean? ● What jobs rely on the ocean? ● What is sustainability? ● What is sustainable aquaculture? ● What is the difference between wild fishing and aquaculture? ● What are the pros and cons of wild fishing? ● What is bycatch? ● What is overfishing? ● What is sustainable wild fishing? ● What are the pros and cons of aquaculture? ● How do you know you are consuming sustainable seafood? ● What is the process of aquaculture? ● What is the history of aquaculture? ● Should we utilize aquaculture (why or why not)? ● How do life cycles impact aquaculture? ● How has aquaculture improved since the beginning? ● How can aquaculture improve/be more sustainable in the future?
Unit Rationale:	<ul style="list-style-type: none"> ● Our oceans supply the world with an incredibly valuable social and economic resource: seafood. The demand for seafood has been increasing alongside our growing global population and innovative methods and techniques have been developed to support this

	<p>demand. The following lessons will facilitate learning about how we are connected to the ocean, how the food we extract from the ocean serves us, the technology in place to produce seafood and opportunities to critically analyze the benefits and challenges of aquaculture and wild fishing. Both methods showcase how to conduct seafood from a sustainable and unsustainable viewpoint; allowing the students key opportunities to explore and debate ethical choices when purchasing and consuming seafood. Above all, these lessons will educate and equip students with a basic understanding of the technology and social connections at play within the seafood industry to enable them to be empowered stewards for ocean conservation.</p>
<p>Students do apply the following CURRICULAR COMPETENCIES:</p>	<p>Science (Gr. 7 & 8)</p> <ul style="list-style-type: none"> ● Questioning and predicting; demonstrate curiosity, observe objects and events in similar contexts, ask questions, and make predictions. ● Processing and analyzing information; interpret local environment, represent data using different models, seek pattern and connections in data, and draw conclusions. ● Evaluating; consider the implications of findings from their own and others' investigations. ● Applying and innovating; transferring knowledge to real-life scenarios, contribute to care for self, others, community, and world through personal or collaborative approaches. ● Communicating; share ideas and findings, reflect on learning. <p>English Language Arts (Gr. 7 & 8)</p> <ul style="list-style-type: none"> ● Comprehend and connect (reading, listening, viewing). ● Create and communicate (writing, speaking, representing).
<p>Students will know the following CONTENT:</p>	<ul style="list-style-type: none"> ● Survival Needs (Science Gr.7) ● Evidence of climate change over geological time and the recent impacts of humans: physical records and local First Peoples knowledge of climate change (Science Gr.7) ● Characteristics of life (Science Gr.8)

LESSON PLANS: #1-7

	Topic	Objectives	Information & Activities	Resources	Assessment
1	<p>The Earth has one big ocean with many features ~</p> <p>All humans are connected to our oceans and seafood is an important part of that connection.</p>	<ul style="list-style-type: none"> Students understand how they are connected to the oceans via their diet. Students can assess where their seafood comes from. 	<p>Critical Questions: How are you connected to the ocean? How does the ocean serve you? Who relies on the ocean? How big is the seafood industry? How is the seafood industry connected locally and globally?</p> <p>Background Information: The seafood industry is an expansive business that shapes the lives of countless people. This lesson will have the students reflect on their own connection to the ocean and the importance of seafood to the global population. Moreover, students will see the breadth of the seafood industry via maps and statistics to comprehend the significance seafood upholds in supporting human life.</p> <p>Task:</p> <ol style="list-style-type: none"> Class discussion: What kind of seafood does your class consume? Where do your students think their seafood was sourced from? Was it local species? Was it from across the globe? Workbook Page 1 & 2 : Answer the questions listed in your workbook with the stats and data provided. Reflection: Have the students share their findings in class to analyze their results. The stats and data can be found here in which the charts are interactive to break down the content further. Discuss how increased demand of fish is to be sustained for a growing global population? <p>Action: I will share awareness of the link between consumer habits and ocean health.</p>	<p>Websites:</p> <ul style="list-style-type: none"> -Global Fishing Watch Map -SOFIA 2018 Stats <p>Videos:</p> <ul style="list-style-type: none"> -Ocean Wise: Sustainable Shrimp Farming in Vietnam -WWF: We are all Connected 	<p>Formative;</p> <p>Students respond to questions about global fishing and aquaculture data.</p>

<p>2</p>	<p>The ocean made the Earth habitable ~</p> <p>A variety of seafood that we eat can be produced in an aquaculture/farmed environment.</p>	<ul style="list-style-type: none"> • Students can understand key aquaculture terms • Students can explore differing aquaculture practices. 	<p>Critical Questions: What is aquaculture? What are the methods and techniques utilized by aquaculture? Why is aquaculture important?</p> <p>Background Information Aquaculture uses a variety of methods and techniques. This lesson will provide fun ways for your students to identify, define and analyze aquaculture terms through a form of charades. Students will be acting out how various species are reared and cultivated to understand the challenges and benefits these techniques present. As the teacher, feel free to explore Monterey Bay’s Fishing and Farming Methods page to review key concepts.</p> <p>Task:</p> <ol style="list-style-type: none"> 1) Introduction: Watch the following video to learn why aquaculture use is increasing: Make Better Seafood Choices- Seafood Watch by the Monterey Bay Aquarium (Ocean Wises’ Sustainable Seafood criteria is based on Monterey Bay’s Seafood Watch Program). 2) Workbook Page 3: List with key terms and images to introduce basics of aquaculture found here. 3) Activity: Aquaculture charades: Divide the class into small groups. Each group receives a key term of aquaculture to act out for the rest of the teams to guess. The team who guess correctly first wins a point. 4) Watch the video Sustainable aquaculture. 5) Reflection: Reflect on the challenges and benefits of each aquaculture method. How efficient do you think each method is? What species would be involved? How often are these systems used? <i>Surprise:</i> Aquaculture represents over 50% of global production and consumption of seafood. <p>Action: I will chat with my friends and family about sustainable seafood choices.</p>	<p>Websites:</p> <ul style="list-style-type: none"> - Ocean Wise: Farming Techniques - Canadian Aquaculture Industry Alliance: Aquaculture in Canada - Conserve Energy Future: What is Aquaculture? <p>Videos:</p> <ul style="list-style-type: none"> - CEFAS: Sustainable aquaculture - PBS: Aquaponic farming saves water, but can it feed the country? - Monterey Bay Aquarium: Call to action: Seafood Watch - TED Talk: The case for fish farming 	<p>Formative; Using Think Pair Share strategy, students discuss the strengths and challenges of aquaculture techniques described in lesson.</p>
----------	--	--	--	---	---

<p>3</p>	<p>The ocean is a major influence on climate and weather ~</p> <p>Sustainable seafood can minimize negative environmental impacts while providing an important food source.</p>	<ul style="list-style-type: none"> • Students can explain how the sustainability of aquaculture is determined. • Students can identify the short and long term effects of aquaculture on the environment. 	<p>Critical Questions: What is sustainability? What is the criteria for sustainable aquaculture? What are the potential short and long term impacts on the environment?</p> <p>Background Information: The seafood industry is directly connected to ocean health and obstacles such as habitat destruction, pollution and declining fish populations. These are prominent points of discussion when equipping students with the awareness that the ocean has a major influence on the climate of our planet. This activity enables students to break down these terms and apply them to seafood practices. The main message being the significance sustainable choices have on the health and balance of habitats and species.</p> <p>Task:</p> <ol style="list-style-type: none"> 1) Introduction: Watch the video Farms under the sea could feed the world in 2050 2) Workbook Page 4: Divide the students into small groups and have them create their own criteria of rating the assessment of sustainability of aquaculture sites; using the key terms on the workbook page to shape the criteria. Afterwards, students create their own seafood symbol to represent the brand of criteria they made for regulating sustainable aquaculture. 3) Workbook Pages 5 & 6: Provide the case studies from the Ocean Wise Sustainable Seafood of 2 systems who were assessed for Ocean Wise Sustainable Seafood recommendation. Using the student made criteria, they will either refuse or accept the candidate to receive a recommendation. 4) Reflection: Students present their criteria, symbol and recommendation to the class. Review the Ocean Wise sustainable aquaculture criteria found here to compare to the student made criteria. Reveal which candidate was recommended by the official Ocean Wise Seafood team (the first candidate is recommended). <p>Action: I will choose Ocean Wise products to support ocean health.</p>	<p>Websites:</p> <ul style="list-style-type: none"> -Ocean Wise: To Eat or Not to Eat Farmed Fish? -Ocean Wise: BC Salmon -Ocean Wise: Feeding Farmed Finfish Sustainably -Ocean Wise: Seafood Recommendations for Sustainability <p>Videos:</p> <ul style="list-style-type: none"> - VA: Ocean Wise and Sustainable Seafood - Ocean Wise: What is an Ocean Wise Assessment? - TED-Ed: Underwater farms vs. climate change? - Ocean Wise: Ocean Wise and Sustainable Seafood. 	<p>Formative;</p> <p>Students develop criteria for sustainable aquaculture, test these on case studies and compare their criteria to those of Ocean Wise.</p>
----------	--	---	--	---	---

<p>4</p>	<p>The ocean and humans are interconnected ~</p> <p>Wild fishing and aquaculture both have capacities to provide sustainable seafood.</p>	<ul style="list-style-type: none"> • Students can compare and contrast wild fishing and aquaculture. • Students are able to identify sustainable seafood with a critical eye. 	<p>Critical Questions: What is wild fishing? What are the key differences between wild fishing and aquaculture? Can you identify the pros and cons of both options?</p> <p>Background Information: Wild fishing and aquaculture are key players of the seafood discussion and evaluating the similarities and differences is crucial for students to make informed opinions and decisions. In this module, students will investigate the pros and cons of wild fishing and aquaculture to emphasize the negative and positive outcomes of our relationship with seafood.</p> <p>Task:</p> <ol style="list-style-type: none"> 1) Workbook Page 7: Discuss and respond to the three statements that are included in the workbook: <ol style="list-style-type: none"> a) All wild caught fish is good. b) Farming fish is always bad. c) Sustainable seafood is always expensive 2) Watch the video Wild vs. Farmed Seafood: Mythbusters. 3) Prezi: Wild Fishing Key Terms and Breakdown → 4D Seafood on Prezi 4) Workbook Page 8: Split the class into two groups; one group is assigned aquaculture, the other is assigned wild fishing. Students must create pros/cons list for each form of seafood harvesting. Thereafter have class discussion to share findings. 5) Reflection: What were the similarities and differences found? Were you surprised by any of your findings? How do your findings shape your outlook of sustainable seafood? <p>Action: I will evaluate where my seafood comes from and share my findings with friends.</p>	<p>Websites:</p> <ul style="list-style-type: none"> - Ocean Wise: Fishing and Farming Methods - Global Aquaculture Alliance: Environmental Impact of Aquaculture - Environmental Science: Environmental Consequences of Fishing Practices - One World One Ocean: Know Your Seafood <p>Videos:</p> <ul style="list-style-type: none"> -Ocean Wise: Wild vs. Farmed Seafood: Mythbusters -Ocean Wise: Haidi Gwaili Shore Lunch w/ Ned Bell -TED-ed: Will the ocean ever run out of fish? -Musqueam: An Introduction- Hunting and Fishing 	<p>Summative;</p> <p>Students compare and contrast the processes and impacts of catching wild fish and raising farmed fish.</p>
----------	--	---	---	--	---

<p>5</p>	<p>The ocean supports a great diversity of life and ecosystems ~</p> <p>Aquaculture mimics the natural rhythms of marine ecosystems to raise an array of fish species.</p>	<ul style="list-style-type: none"> • Students can identify components of recirculating aquaculture systems. • Students can connect life cycle stages to aquaculture systems. 	<p>Critical Questions: What species can be farmed in aquaculture? Why are certain factors important to support marine life? How has aquaculture evolved to provide these factors?</p> <p>Background Information: The diversity of life and ecosystems is extensive, making it quite the challenge for aquaculture to replicate. In this lesson, students will have the opportunity to understand what makes farming aquatic species possible. They will critically analyze components of differing ecosystems and interpret how to present those factors to their peers. Moreover, students will link these factors to aquaculture systems to comprehend the innovation taking place to sustain ethical seafood consumption.</p> <p>Task:</p> <ol style="list-style-type: none"> 1) Class discussion: Discuss how an aquaculturist must uphold a healthy ecosystem for their stock to thrive. To accomplish this, aquaculture systems mimic the rhythms of the ocean. 2) Workbook Page 9 & 10: Review the information of the layout of a recirculating aquaculture system (RAS) and how it supports fish. A great webpage that breaks this down further can be found here to help facilitate the learning. 3) Workbook Page 11: Have the students fill in the blanks about the lifecycle stage of a Rainbow Trout life to the description of the RAS production stage. Answer Key can be found here. 4) Reflection: What components must a RAS have? Why is it important the RAS has certain components to support fish? What could impact these systems? <p>Action: I will be an active consumer and investigate the systems in place that brings seafood to my plate.</p>	<p>Websites:</p> <ul style="list-style-type: none"> - Ocean Wise: Spot Prawn Fishery - Canadian Govt: Aquatic Ecosystems - Food and Agriculture Organization of the United Nations: Guide to Recirculation Aquaculture <p>Videos:</p> <ul style="list-style-type: none"> -Bon Appetit: Brad Explores an Oyster Farm -National Lobster Hatchery: The Lobster Process and Release - California Academy of Sciences: Coastal Food Webs -CBC: Arctic Char eggs from Whitehorse 	<p>Formative; Students connect life cycle stages of rainbow trout with the components of a recirculating aquaculture system (RAS).</p>
----------	---	--	---	---	--

6	<p>The ocean, and the life in the ocean shapes the earth ~</p> <p>Seafood has a substantial environmental and social impact</p>	<ul style="list-style-type: none"> • Students can demonstrate an understanding of the social and economic impacts upon the seafood industry. • Students collaborate to explore the range of perspectives within the seafood industry. 	<p>Critical Questions: How does the harvesting of seafood shape our lives (social & economics)? Who is employed by the seafood industry (farmers, restaurants, fishermen, retail etc.)? What communities are influenced by seafood?</p> <p>Background Information: In this module, students will collaboratively analyze what social groups are connected to the seafood industry and how various scenarios could influence them. A major influence is the status of the environment ranging from habitat loss, pollution and unsustainable resource extraction. Students will explore these avenues to learn how interconnected society is to the environment and vice versa through seafood.</p> <p>Task:</p> <ol style="list-style-type: none"> 1) Introduction: Have the students brainstorm about the people (professionals, cultural groups, consumers, etc.) that are connected to the seafood industry. 2) Workbook Page 12 & 13: Split the students into 3 groups and assign them each a different group of people (example: fish farmers, seafood chefs, commercial fishers etc.) and with a blurb about that group found in the workbook. Have students brainstorm in their groups to answer the questions in their workbook and then come back together and discuss as a class. 3) Reflection: What differences and similarities are found in the responses to the scenarios? What role can consumers play in these scenarios to support these groups? How do environmental factors influence the outcomes of the proposed scenarios? <p>Action: I will support people who promote and provide sustainable seafood.</p>	<p>Websites:</p> <ul style="list-style-type: none"> - DFO: Communities & Employment - DFO: Socio-Economic Impacts of Aquaculture <p>Videos:</p> <ul style="list-style-type: none"> - Roundtable: A false fish economy? - Food and Agriculture Organization of the United Nations: Promoting Sustainable aquaculture in the Black Sea -Coast Salish Peoples Clam Gardens (scroll to bottom of page for video) - Squamish Nation Stewardship 	<p>Formative; Students observe and analyze the social impacts of the seafood industry.</p>
---	--	---	---	---	--

<p>7</p>	<p>The ocean is largely unexplored ~</p> <p>Aquaculture is always changing - innovation is important to create more sustainable options.</p>	<ul style="list-style-type: none"> • Students are able to critically evaluate seafood sustainability and technology. • Students can develop their own interpretations of seafood sustainability. 	<p>Critical Questions: What are some challenges of aquaculture? What are some benefits of aquaculture? How does innovation contribute to sustainability?</p> <p>Background Information: Aquaculture is an evolving industry that is consistently striving to become more efficient and sustainable. This lesson will prompt students to get creative to form their own version of sustainable aquaculture. The objective for them is to take the knowledge they have cultivated from this education kit and apply it with their own interpretation. Encourage students to explain their aquaculture method then highlight the importance of questioning and understanding how seafood reaches our plates and how innovation can further the reliability and sustainability of these practices.</p> <p>Task:</p> <ol style="list-style-type: none"> 1) Introduction: Watch one or all of the following videos in the resource section to open up the conversation of innovation in aquaculture. 2) Discuss: How would your students identify innovation in this/these video/s? Why have these innovations been made? Why are people looking for new methods of aquaculture? How does this connect to sustainability? 3) Watch the video: Innovative Tools in Aquaculture 4) Workbook Page 14: Split the class into groups so that each group has around 3-4 students. The students must design their own aquaculture business that is able to harvest seafood sustainably. Answer the questions in the workbook to showcase the reasoning why its sustainable. Afterwards, have the students create their system by either drawing on poster paper, 3D printing or using Canva to illustrate their ideas. 5) Reflection: Compare answers to discussion questions. What were the similarities and differences between projects? What did you find difficult and easy to accomplish this task? <p>Action: Share ideas to learn and explore options for sustainable seafood.</p>	<p>Websites:</p> <ul style="list-style-type: none"> - Sea Choice: Aquaculture Methods <p>Videos:</p> <ul style="list-style-type: none"> - Ocean Wise: Variety is the Spice of Aquaculture - Ocean Wise: Geoduck Aquaculture - Ocean Wise: Wolf-eels: Sustainable Seafood? - DFO: DFO Aquaculture Research - DFO: Innovative Tools in Aquaculture 	<p>Formative; Students develop an aquaculture industry that follows self developed criteria for sustainability</p>
----------	---	--	--	--	--

