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**REMOTE LEARNING LESSON PLANS**

The Remote Learning Lesson Plans are adapted from the IQWST Teacher Edition to support continuous learning. Each plan condenses what is taught with specific teaching recommendations and identifies the digital resources, print resources, and materials needed to teach and learn IQWST remotely.

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| **UNIT TITLE** | **LS1: Where Have All The Creatures Gone?** |
| **DRIVING QUESTION** | What can cause populations to change? |
| **UNIT STORYLINE** | [LS1 Storyline](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1592911289-ls1-3.0-storyline-with-appendix.pdf) |
| **IQWST OVERVIEW** | [IQWST 3.0 Overview](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1534960182-iqwst-3-0-overview.pdfhttps://d16dnhlej6sizh.cloudfront.net/assets/portal/1534960182-iqwst-3-0-overview.pdf) |
| **TEACHER EDITION** | [LS1 Teacher Edition (PDF)](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1596819802-ls1creatures_v3_te_0618.pdf) |
| **STUDENT EDITION** | [LS1 Student Edition (PDF)](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1596819771-ls1creatures_v3_se_0618.pdf) |
| **LESSON PLAN OVERVIEW** | [Remote Learning Overview](http://activatelearning.com/wp-content/uploads/2020/05/remote-lesson-plans-overview.pdf) |

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| **STUDENT MATERIALS:** Each student will need the following materials. Teachers can modify lessons based on which materials the students have access to. For Blended Learning options, teachers may draw from a combination of digital and print resources. | | |
| **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS NEEDED** (FOR EACH STUDENT) |
| * Access to Interactive Student Edition * Access to teacher-led lesson or video * Access to IQWST lesson videos * Audio recordings of readings   **Access from any device with a web browser.**   * For PCs and Chromebooks, we recommend using **Chrome** as the browser * For Macs and iOS, we recommend using **Safari** as the browser * Internet Explorer is NOT supported * Read the full Technical Requirements [here](https://s3.amazonaws.com/al.general/website/pages/ALDP+Requirements.pdf)   Login: <http://activatelearning.com/digital-resources/>   * Select your program * Enter the Username and/or Password provided by your teacher | * LS1 Student Edition * Hard copies of selected Projected Images (PIs)   *Print student editions are necessary for students who do not have internet access (or reliable access).* | **IQWST Equipment (from kit)\***  Pad of sticky notes  Great Lakes Note Cards  **Household Items**  nutrition label from any packaged food or beverage item  **Students may also need the following General Classroom Supplies (if not using the IDE):**  Pencils and sharpener  Colored pencils  Black marker and/or ink pen  Plain paper for drawing (10-20 sheets)  Glue stick or transparent tape  Pad of sticky notes  Scissors  *\* If kits have been purchased, they include enough equipment for 8 groups of 4 students. You will need additional equipment if you opt to provide materials to each student.* |

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| Learning Set 1: The Driving Question | | | | |
| Lesson 1  (2-3 sessions) | *What Can Cause Populations to Change?* | [Download Lesson 1 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1598015128-ls1v2lesson-1.pptx) | | |
| ACTIVITY | TEACHING RECOMMENDATIONS | DIGITAL RESOURCES | PRINT RESOURCES | MATERIALS  FOR EACH STUDENT |
| Activity 1.1  Interactions in Our World | Anchoring Phenomenon: Students (Ss) will have many opportunities to investigate and explore the phenomenon of *particular* interactions between organisms; they begin by looking at photographs to determine what is meant by “organisms interacting” and then doing a field study.  Share Projected Images (PIs) available in the slide decks for each lesson or on the Teacher Portal:   * Apple Core * Anthill * Forest * Spider-Eating Moth * Bee and Flower   Discussion Prompts: Throughout the unit, teachers should: 1) choose discussion prompts applicable to remote learning and ability to discuss with Ss, or 2) have Ss write answers to teacher-selected prompts that can be added to the slide deck, if discussion is not possible, or 3) choose questions in take-home format for Ss to discuss remotely, perhaps writing responses that are then submitted.  Questions in the SEs: Throughout the unit, teachers should decide on the method by which the lesson will be delivered, and then have Ss ignore any questions in their SEs that do not fit the way in which the lesson needed to be enacted remotely. Teachers may provide a handout for print-only Ss who cannot access the curriculum remotely, so that they know which questions in their SEs they should respond to.  Key: Scientists study organisms by looking for evidence of their presence and their interactions with one another and with their environment. | Access to Student Edition (SE) in Interactive Digital Edition (IDE) | Hard copy of the Student Edition (SE) to be used for all activities,  readings, writing tasks.  Color copy of TE Data table for Activity 1.1. | Pad of sticky notes |
| Reading One | *Bacteria, Chimps, Peanuts, and Dolphins*  Key: Frames learning about life science by introducing particular fields of biology. | SE Reading One | SE Reading One |  |
| Activity 1.2  Field Study | Ss could do this activity remotely by watching \*any\* organism and the environment in which they find it. Alternatively (or in addition) the teacher could provide a virtual experience via video.  Discussion and question generation could be combined with Activity 1.3 for a single remote-learning session.  Key: Organisms interact in order to survive, and interactions can lead to change. | SE Act & 1.2 | SE Act 1.2  Photos of living things for field study (refer to Field Study in Lesson 1 Preparation for ideas)(for alternative to outside field study) |  |
| Extension Activity 1.2 What Can Cause Populations to Change? | Optional activity that Ss could be encouraged to do if they are able to do so remotely.  Key: More evidence that organisms interact with one another and with their environment. | SE Extension  Act 1.2 | SE Extension  Act 1.2 |  |
| Activity 1.3 Setting Up the Driving Question Board | Share PI: Anthill  Introduce the Driving Question Board (DQB): Throughout the unit, Ss record their own, original questions as they arise. See *IQWST Overview* for more information on how to use and manage the DQB, and see Sample DQB for this unit in the TE.  Key: Individual needs vs needs of a population for survival. | Teacher-created DQB (e.g., jamboard, padlet) or physical DQB to share during virtual lessons.  Ss will post their own original questions in the “Questions” tab of the IDE | Ss will write questions on sticky notes, and post at the front of their SEs on the *Driving Question Notes* pages. |  |
| Reading Two | *Wildlife Biologists at Work*  See TE for Reading Intro and Followup.  Key: Because the interactions of organisms with one another and with their environment are central to understanding population change (and answering the DQ), the reading and table in the reading hone Ss ability to make observations, make inferences from observations, and ask researchable questions as a scientific practice. | SE Reading Two | SE Reading Two |  |

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| Lesson 2  (1 session) | *What Could Be Causing the Trout Population to Change?* | [Download Lesson 2 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1598015165-ls1v2lesson-2.pptx) | | |
| ACTIVITY | TEACHING RECOMMENDATIONS | DIGITAL RESOURCES | PRINT RESOURCES | MATERIALS  FOR EACH STUDENT |
| Activity 2.1  Introducing the Trout Mystery Share | Share PIs:   * Map of Great Lakes Area * Trout Population Data   Key: Asking questions to solve: What is affecting the trout population? | SE Activity 2.1 | SE Activity 2.1  PIs:  •Map of Great Lakes Area  •Trout Population Data |  |
| Reading One | *What Caused These Population Changes?*  Key: How biologists approach investigating changes in populations. | SE Reading One | SE Reading One |  |

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| Learning Set 2: What Is Food for Living Things? | | | | |
| Lesson 3  (3 sessions) | *Why Do Living Things Need Food?* | [Download Lesson 3 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1598015189-ls1v2lesson-3.pptx) | | |
| ACTIVITY | TEACHING RECOMMENDATIONS | DIGITAL RESOURCES | PRINT RESOURCES | MATERIALS  FOR EACH STUDENT |
| Activity 3.1  What Do Organisms Use Food For? | Given the likelihood of reduced time for remote learning, activities in this lesson could be combined into fewer sessions. For example, have Ss look at a food label and record the information first (Activity 3.2), and then come together to discuss---thus combining 3.1 and 3.2 into one session. Or, look at the potato chip label from 3.2 as part of teaching 3.1, then have Ss look at a food label (remotely) in *preparation* for the next remote-learning session, and then combine their food label investigation with Activity 3.3.  Key: Food supplies energy and the building materials for growth. | SE Activity 3.1 | SE Activity 3.1 |  |
| Activity 3.2  Investigating What Is in Food | Ss are able to do this activity remotely if they are able to look at a food label from any packaged food item.  Share PI: Potato Chip Food Label  Key: Carbohydrates in food are necessary for energy. | SE Activity 3.2 | SE Activity 3.2  PI: Potato Chip Food Label | nutrition label from any packaged food or beverage item(s) |
| Activity 3.3  Investigation: Can We Prove a Substance Is Food? | Ss will not be able to do this investigation remotely. Demo the investigation, or describe and share results from the slide deck.  Key: Food contains one or more of these substances: fat, protein, or carbohydrates (starch, sugar). | SE Activity 3.3 | SE Activity 3.3 |  |
| Reading One | *Energizing Me*  Key: What counts as “food” for the body. | SE Reading One | SE Reading One |  |
| Activity 3.4  Writing a Scientific Explanation | Share PI: Scientific Explanation  Key: Water is not food because it contains none of the substances needed for energy or building blocks. | SE Activity 3.4 | SE Activity 3.4  PI: Scientific Explanation |  |
| Checkpoint: The explanation in Activity 3.4 is an opportunity to assess Ss ability to marshal data as evidence for a CER-formatted explanation, as well as to assess understanding of what makes something “food” for an organism. These initial explanations draw only on Scientific Principles Ss have constructed in Lesson 3, so this explanation is relatively easy to scaffold in terms of helping Ss understand the “reasoning” required in a scientific explanation. | | | | |

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| Lesson 4  (2-3 sessions) | *Where Do Living Things Get the Food They Need?* | [Download Lesson 4 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1598016287-ls1v2lesson-4.pptx) | | |
| ACTIVITY | TEACHING RECOMMENDATIONS | DIGITAL RESOURCES | PRINT RESOURCES | MATERIALS  FOR EACH STUDENT |
| Activity 4.1  Where Do Animals Get the Energy and Building Materials They Need? | For safety reasons, Ss are unable to engage with this investigation remotely. If possible, demo the potato/seed/iodine investigation; otherwise, teachers could combine Activities 4.1 and 4.2 and focus on the “takeaways” of the investigation through discussion and use of the Activity video.  Key: All animals’ food can be traced to plants. | SE Activity 4.1  [Activity Video 4.1 -Testing Starch in Potatoes and Beans](https://iat.wistia.com/medias/zmzwu9ehla) | SE Activity 4.1 |  |
| Activity 4.2  Do Plants Need Food? | Share PI: Do Plants Need Food?  Ss are able to critique the explanations in their SEs remotely if they have the evidence needed from Activity 4.1.  Key: Using water and light, plants make their own food for energy and growth. | SE Activity 4.2 | SE Activity 4.2  PI: Do Plants Need Food? |  |
| Reading One | *Hydroponics*  Key: Sunlight and water are needed for plants to grow; soil is not needed. | SE Reading One | SE Reading One |  |
| Extension Activity 4.2 What Do Trout Eat? | For remote learning, this activity is especially important as it provides information, and it challenges Ss to consider how populations are affected by available sources of food.  Key: Populations are affected by changes to their food source. | Extension SE Act 4.2 | Extension SE Act 4.2 |  |

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| Learning Set 3: How Do Living Things Get Food from Other Organisms? | | | | |
| Lesson 5  (2 sessions) | *Trout: Predator or Prey?* | [Download Lesson 5 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1598016340-ls1v2lesson-5.pptx) | | |
| ACTIVITY | TEACHING RECOMMENDATIONS | DIGITAL RESOURCES | PRINT RESOURCES | MATERIALS  FOR EACH STUDENT |
| Activity 5.1  Food Chains and Food Webs | Ss are unable to investigate connections by constructing a physical model of a food web; therefore, the Great Lakes Note Cards as a 2D-model are essential for remote learning about complex food webs so that Ss have something to “construct” to support their sense making.    Share PI: Food Chains  Key: Organisms in a food web are interrelated via producer/consumer and predator/prey relationships. Changes to any one organism affect others. | SE Activity 5.1 | SE Activity 5.1  \*Great Lakes Note Cards (containing organism name, locale, and food source  PI: Food Chains | Great Lakes Note Cards |
| Reading One | *Where Have All the Puffin Gone?*  Key: Uses a unique organism to reinforce that changes to any one organism in a food web affect others. | SE Reading One | SE Reading One |  |
| Activity 5.2  Changes in a Food Web | Share PI: Great Lakes Food Web  Key: Both direct and indirect interactions affect organisms in a food web. | SE Activity 5.2 | SE Activity 5.2  PI: Copy of Great Lakes Food Web |  |
| Reading Two | *Fisherman’s Journal*  Key: Applies understandings of interrelationships to the Driving Question and the trout mystery: What is causing the trout population to change? | SE Reading Two | SE Reading Two |  |
| Checkpoint: The question at the end of Reading One provides a check of Ss understanding of direct and indirect relationships (and cause & effect) as illustrated in a food web. | | | | |

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| Lesson 6  (1-2 sessions) | *Why Should We Care about an Invader?* | [Download Lesson 6 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1598016372-ls1v2lesson-6.pptx) | | |
| ACTIVITY | TEACHING RECOMMENDATIONS | DIGITAL RESOURCES | PRINT RESOURCES | MATERIALS  FOR EACH STUDENT |
| Activity 6.1  Investigating the Sea Lamprey Background | Share PIs:   * Trout Population Data * Great Lakes Food Web * Sea Lamprey Population Data   Ss need the information in SE Activity 6.1 to set the problem context: the sea lamprey as an invasive species in the Great Lakes region of the U.S. For teachers *meeting* with Ss remotely, consider doing a read-aloud of SE 6.1 information sections to ensure that all Ss understand the problem they will study over the next several lessons. (Teacher read-alouds are described in the *IQWST Overview* booklet.)  Key: Learning about the sea lamprey/providing the problem context for the unit. | SE Activity 6.1 | SE Activity 6.1  PIs:  •Trout Population Data  •Great Lakes Food Web  •Sea Lamprey Population Data |  |
| Activity 6.2  Adding the Sea Lamprey to the Great Lakes Food Web | Activities 6.1 and 6.2 may be combined in one session.  Share PI: Great Lakes Food Web  Key: Establishing the sea lamprey’s place in the GL food web. | SE Activity 6.2 | SE Activity 6.2  PI: Great Lakes Food Web |  |
| Reading One | *There Are a lot of Lamprey Out There!*  Extends learning about what makes an organism “invasive.”  Key: Establishes that all lamprey are not “invasive.” | SE Reading One | SE Reading One |  |
| Checkpoint: Be sure that Ss understand the concept of invasive--that it is not the organism itself, but the organism when it is somehow transported to an environment in which it is not native that then becomes invasive. Therefore what is invasive in one environment may not be beneficial in another. | | | | |

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| Lesson 7  (2 sessions) | *Could the Sea Lamprey Have a Major Impact as a Predator?* | [Download Lesson 7 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1598016982-ls1v2lesson-7.pptx) | | |
| ACTIVITY | TEACHING RECOMMENDATIONS | DIGITAL RESOURCES | PRINT RESOURCES | MATERIALS  FOR EACH STUDENT |
| Activity 7.1  Investigating External Structures | GIven the likelihood of reduced time for remote learning, activities 7.1 and 7.2 could be combined into one session. Teachers can show the specimens (and do the dissection) while Ss observe remotely, or teachers can focus only on the images in the SE, TE, and slide deck. Also, see Dissection Alternative suggestions in the TE.  Share PIs   * Sea Lamprey and Bony Fish External Structures * Structure/Function Table   *\*video of Internal structures of Lamprey - this is beyond the scope of this lesson, but Ss should find this of interest*  \*\* video of Perch dissection *- this is beyond the scope of this lesson, but Ss should find this of interest*  Key: Comparing structures and functions for moving and eating. Also, adding *parasite/host* to the ways that organisms in a food web can be related. | SE Activity 7.1  [Activity Video 7.1 Yellow Perch: External Structures](https://iat.wistia.com/medias/c84vzupvfc)  [Activity Video 7.1 -Lamprey:External Structures](https://iat.wistia.com/medias/kehmizvau6)  [Activity Video 7.1 -Yellow Perch: Internal Structures](https://iat.wistia.com/medias/pingpnnnss)  \*[Internal Structures of Lamprey video](https://youtu.be/X1tQGeEzAjI)  \*\*[Perch Dissection](https://youtu.be/pNZQEmGp11k) | SE Activity 7.1  •Sea Lamprey and Bony Fish External Structures  •Structure/Function Table |  |
| Activity 7.2  Investigating the Internal Structures of the Sea Lamprey and the Yellow Perch | Share PIs:   * Structure/Function Table * Sea Lamprey and Bony Fish Internal Structures   Key: Comparing structures and functions for breathing and reproduction. | SE Activity 7.2 | SE Activity 7.2  •Sea Lamprey and Bony Fish External Structures  •Structure/Function Table |  |
| Reading One | *Sea Lamprey and Lake Trout*  Key: Reinforces structure and function comparison of the two organisms. | SE Reading One | SE Reading One |  |
| Activity 7.3: Constructing a Scientific Explanation | Share PI: Could the Sea Lamprey Have a Major Impact as a Predator?  If they are able to do so, Ss are prompted by the SE to share what they have learned with an adult, to reinforce what it means to construct an explanation that is “convincing.”  Key: Answering the question of the sea lamprey’s role as a predator using data as evidence. | SE Activity 7.3 | SE Activity 7.3  PI: Could the Sea Lamprey Have a Major Impact as a Predator? |  |
| Checkpoint: The SE 7.3 is an opportunity to gauge understanding of the role of structures and functions in how organisms eat, move, breathe, and reproduce---and---to gauge Ss understanding of marshalling evidence in support of a claim in a CER-formatted explanation. | | | | |

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| Lesson 8  (1 session) | *Could the Sea Lamprey Have a Major Impact as a Predator?* | [Download Lesson 8 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1598017026-ls1v2lesson-8.pptx) | | |
| ACTIVITY | TEACHING RECOMMENDATIONS | DIGITAL RESOURCES | PRINT RESOURCES | MATERIALS  FOR EACH STUDENT |
| Activity 8.1 Structures and Functions for Meeting Survival Needs | The photographs can be shown virtually--in color. They are also available in both the IDE and print SEs. The emphasis in Activity 8.1 is on specialized structures/functions in plants and animals, which is key conceptual understanding for MS science. Given the likelihood of reduced time for remote learning, teachers could use the reading during remote instruction of 8.1, thus including both plants and animals in the discussion. See the IQWST Overview for ideas for a teacher think-aloud for the reading, for example.  Share PIs:   * Comparing Structure and Function * Trout Population Data * Sea Lamprey Population Data   Key: All plants and animals have specialized structures that perform the functions necessary for reproduction and eating. | SE Activity 8.1 | SE Activity 8.1  PIs:  •Comparing Structure and Function  •Trout Population Data  •Sea Lamprey Population Data |  |
| Reading One | *Plant Structures*  Key: Structure and function specifically in plants for making food and for reproducing. | SE Reading One | SE Reading One |  |

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| Learning Set 4: How Do Organisms Compete? | | | | |
| Lesson 9  (3 sessions) | *How Can an Invader Affect an Ecosystem?* | [Download Lesson 9 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1598017061-ls1v2lesson-9.pptx) | | |
| ACTIVITY | TEACHING RECOMMENDATIONS | DIGITAL RESOURCES | PRINT RESOURCES | MATERIALS  FOR EACH STUDENT |
| Activity 9.1  Exploring the NetLogo Model Ecosystem | Ss deep understanding of ecosystem interactions is supported by engaging with a cause/effect and stability/change simulation. Ideally, Ss log on to the simulation and manipulate variables remotely, and then return to discuss findings. If that is not possible, Ts should share their own screens with Ss and manipulate the variables and talking Ss through the simulation if that is possible.  The same is true for Activity 9.3 as both simulations model the phenomenon of ecosystem interrelationships and change.  Share PIs:   * NetLogo Interface * SE Activity 9.1 * Sample NetLogo Graphs   The Lesson calls for use of the NetLogo Simulation of competition in an ecosystem.  [Activity 9.1 NetLogo Simulation](https://d16dnhlej6sizh.cloudfront.net/assets/portal/ls1/L9_Model_9.1_nl5.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAJ2JSYZ7O3I4JO6DA%2F20170907%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20170907)  In case there are issues accessing NetLogo, the following simulation is similar and does not require downloads or securing setting changes. Adjust the language for discussion and in the SE to address the organisms Ss will encounter in this simulation.  [Interactivate: Rabbits and Wolves](http://www.shodor.org/interactivate/activities/RabbitsAndWolves/)  Key: Organisms in an ecosystem compete for limited resources like space, food, and water. | SE Activity 9.1  Computer and  [Activity 9.1 NetLogo Simulation](https://d16dnhlej6sizh.cloudfront.net/assets/portal/ls1/L9_Model_9.1_nl5.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAJ2JSYZ7O3I4JO6DA%2F20170907%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20170907) | SE Activity 9.1  PIs:  •NetLogo Interface  •SE Activity 9.1  •Sample NetLogo Graphs |  |
| Reading One | *A Stable Ecosystem in the Park*  Key: Focuses on Yellowstone Park as a real-world example of a stable ecosystem with multiple populations interacting. | SE Reading One | SE Reading One |  |
| Extension Activity 9.2 |  |  |  |  |
| Activity 9.2  Can All Three Populations Survive | Share PI: Sample NetLogo Graphs  Key: When there is not enough of a resource in an ecosystem individuals in the population die. Also, ability to read graphs. | SE Activity 9.2 | SE Activity 9.2  PI: Sample NetLogo Graphs |  |
| Activity 9.3 How How Does an Invasive Species Affect a Food Web? | Share PI: What Does the Invader Eat?  [Activity 9.3 NetLogo Simulation](https://d16dnhlej6sizh.cloudfront.net/assets/portal/ls1/L9_Model_9.3_nl5.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAJ2JSYZ7O3I4JO6DA%2F20170907%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20170907T171039Z&X-Amz-Expires=300&X-Amz-Signature=a)  Key: A food web changes when an invasive species enters the ecosystem. | SE Activity 9.3  Computer and  [Activity 9.3 NetLogo Simulation](https://d16dnhlej6sizh.cloudfront.net/assets/portal/ls1/L9_Model_9.3_nl5.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAJ2JSYZ7O3I4JO6DA%2F20170907%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20170907T171039Z&X-Amz-Expires=300&X-Amz-Signature=a) | SE Activity 9.3  PI: What Does the Invader Eat? |  |
| Homework 9.3 What Does the Invader Eat? | An opportunity to write a CER-formatted explanation to be shared with an adult. | SE Homework 9.3 | SE Homework 9.3 |  |
| Reading Two | *An Invader in Yellowstone National Park*  Key: Two key takeaways: 1) An invader changes the ecosystem, and 2) a population can decline in one area and increase in another. | SE Reading Two | SE Reading Two |  |
| Checkpoint: Ss explanations are an opportunity to check their understanding of interrelationships among organisms in an ecosystem and of how those relationships change when an invasive species enters. It is also an opportunity to assess Ss ability to develop a strong, evidence-based argument. | | | | |

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| Lesson 10  (1 session) | *How Does the Sea Lamprey Affect the Trout?* | [Download Lesson 10 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1598017876-ls1v2lesson-10.pptx) | | |
| ACTIVITY | TEACHING RECOMMENDATIONS | DIGITAL RESOURCES | PRINT RESOURCES | MATERIALS  FOR EACH STUDENT |
| Activity 10.1  How Does the Sea Lamprey Affect the Trout? | Share PIs:   * Great Lakes Food Web (Lesson 5) * Trout Population Data (Lesson 2) * Sea Lamprey and Trout Population Data * Chub Population Data   Ss apply graph-reading skills along with knowledge of ecosystem interactions to specific sea lamprey/trout mystery, which raises new questions.  Key: The sea lamprey is a predator of the trout and competes with it for food, but these factors do not fully explain all of the data in the graphs. | SE Activity 10.1 | SE Activity 10.1  PIs:  •Great Lakes Food Web (Lesson 5)  •Trout Population Data (Lesson 2)  •Sea Lamprey and Trout Population Data  •Chub Population Data |  |
| Reading One | *Your Space or My Space?*  Key: Plants can also be invaders that compete for ecosystem resources. | SE Reading One | SE Reading One |  |

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| Learning Set 5: Do Abiotic Factors Affect Populations? | | | | |
| Lesson 11  (1 session) | *Are There Other Things that Affect Populations?* | [Download Lesson 11 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1598017897-ls1v2lesson-11.pptx) | | |
| ACTIVITY | TEACHING RECOMMENDATIONS | DIGITAL RESOURCES | PRINT RESOURCES | MATERIALS  FOR EACH STUDENT |
| Activity 11.1  Worms and Moisture | Share PI: Sea Lamprey and Trout Population Data  Some Ss may be able to do the worm investigation and experience this phenomenon remotely if they are able to locate a living worm in their own environment.  Key: Organisms are also affected by *abiotic* factors in an ecosystem. | SE Activity 11.1 | SE Activity 11.1  PI: Sea Lamprey and Trout Population Data | \*If Ss are able to locate a living worm in their environment then (1) worm, (2) paper towels, and water |
| Reading One | *When More Is Too Much*  Key: Bioaccumulation (abiotic factors also affect ecosystems as they become increasingly concentrated in organisms that eat one another). | SE Reading One | SE Reading One |  |

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| Lesson 12  (1 session) | *Are Abiotic Factors Affecting the Trout?* | [Download Lesson 12 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1598017918-ls1v2lesson-12.pptx) | | |
| ACTIVITY | TEACHING RECOMMENDATIONS | DIGITAL RESOURCES | PRINT RESOURCES | MATERIALS  FOR EACH STUDENT |
| Activity 12.1  Analyzing Dioxin Data | Share PIs:   * Trout Population Data * Great Lakes Dioxin Levels   Key: There may be more than one factor affecting changes in a population. | SE Activity 12.1 | SE Activity 12.1  PIs:  •Trout Population Data  •Great Lakes Dioxin Levels |  |
| Reading One | *Return of the Green Goo*  Key: A specific real-world example in which more than one factor affects a population. | SE Reading One | SE Reading One |  |
| Checkpoint: This is a good opportunity for independent research if Ss have the opportunity to investigate local or regional invasive species or abiotic factors (including environmental pollution) that affect the ecosystems. | | | | |

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| Lesson 13  (1 session or more) |  | [Download Lesson 13 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1598017942-ls1v2lesson-13.pptx) | | |
| ACTIVITY | TEACHING RECOMMENDATIONS | DIGITAL RESOURCES | PRINT RESOURCES | MATERIALS  FOR EACH STUDENT |
| Activity 13.1  What Is Causing the Trout to Change? | Key: Construct and debate evidence-based explanations about the change in the trout population. | SE Activity 13.1 | SE Activity 13.1 |  |
| Activity 13.2  What Is Causing this Population to Change? | Share PI: The Sea Lions  Key: Construct an evidence-based explanation about the change in a population that Ss research. | SE Activity 13.2 | SE Activity 13.2  PI: The Sea Lions |  |
| Checkpoint: Any phenomena Ss are able to explore remotely--either independently or as part of a group--will support language and learning as they share ideas, come to a conclusion (or different one), use evidence to support claims, and record their ideas in a video or conference call or in writing. This may be done now, or following the Appendix lesson as a summative assessment for the unit. | | | | |

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| Appendix | | | | |
| Lesson 1  (1-2 sessions) | Lesson 1— Great Lakes Sea Lamprey Control | [Download Appendix Lesson 1 Teaching Slides](https://drive.google.com/file/d/1dGv18NZt9e3gu6WsQTnPBEV4Irs7FMAB/view?usp=sharing) | | |
| ACTIVITY | TEACHING RECOMMENDATIONS | DIGITAL RESOURCES | PRINT RESOURCES | MATERIALS  FOR EACH STUDENT |
| Activity 1.1 Great Lakes Sea Lamprey Control | This lesson extends what Ss have learned as they evaluate--from an engineering perspective in which they consider criteria, constraints and intended and unintended consequences--how to manage/control the problem of sea lamprey in the Great Lakes.  Key: Activity 1.1 plus the two readings, plus the discussion support Ss in understanding how scientists and engineers approach and attempt to solve a problem that involves ecosystem interactions. | SE Activity 14.1 | SE Activity 14.1 |  |
| Reading One | *Controlling Sea Lamprey in the Great Lakes, Part 1* | SE Reading One | SE Reading One |  |
| Reading Two | *Controlling Sea Lamprey in the Great Lakes, Part 2* | SE Reading Two | SE Reading Two |  |

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| SUMMATIVE ASSESSMENT: Ss should be able to write a scientific, CER-formatted explanation for the Driving Question: *What Can Cause Populations to Change?* |

*Teachers might choose to emphasize only a portion of this as a final assessment, given what they are able to teach and what Ss are actually able to do during this remotely taught unit.*

*\* Extension Activities and Homework tasks deepen students’ understanding as they apply what they are learning to new contexts. Extension activities may be used as assessment opportunities or for enrichment.*