

6.4.1 Learning Episode 2 Field Data Collection

Standard 6.4.1 Learning Episode 2	
Title: Field Data Collection	Overview: Students are visiting one or more field sites to collect water data measurements.
Overarching Performance Expectations (Standard): 6.4.1 Analyze data to provide evidence for the effects of resource availability on organisms and populations in an ecosystem. Ask questions to predict how change in resource availability affects organisms in those ecosystems. Examples could include water, food, and living space in Utah environments.	
Lesson Performance Expectations: Students will work together in groups to carry out an investigation in which they are collecting chemical and/or biological measurements from a water ecosystem/s to compare over time or between multiple sample stations along a stream corridor.	
CCC: Patterns, Stability and Change of Systems	
SEP: Planning and Carrying out Investigations	

GATHER	
<p>Student Purpose</p> <p>Students check that each person within the group has the materials they need before they leave. In each group;</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Instructor has the instruction sheet. <input checked="" type="checkbox"/> Manager has the testing kit materials. <input checked="" type="checkbox"/> Recorder has the student sheet on a clipboard. <input checked="" type="checkbox"/> Expert has the resource sheet/s. <input checked="" type="checkbox"/> Leader has waders, works with manager and instructor to collect water samples. <ol style="list-style-type: none"> 1. When at the field collection site, students are first noticing the surroundings and then helping the recorder get the details written down. (later students will record this on their own data sheets when they return to the classroom.) 2. Instructor reads the directions. 3. Manager gets the materials and prepares what is needed. 4. Leader puts on waders and gathers water samples. 5. Expert helps recorder to record results in the correct place on the data chart and reflects on how the measurements compare to the Utah standards. 6. Everyone helps to carry out the tests. 7. Leader makes sure all waste is cleaned up 	<p>Teacher Guidance</p> <p><u>Shorter time (1 hour) (less supplies available)</u>- Before students leave check off that each “expert group” has the materials for their specific test.</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> The manager/expert should have the test kit and/or materials, and resource sheets. <input checked="" type="checkbox"/> The instructor should have the instruction sheet. <input checked="" type="checkbox"/> The recorder should have the field data sheet on a clipboard with pen ready for recording. (Recorder’s data sheet can be used in the classroom later so that all students can transfer the data onto their own sheets.) <input checked="" type="checkbox"/> The leader will need waders. These can be transported to the site or carried. <p><u>Longer time (half day to a full day):</u> Each group can have their own tub that has all the materials needed for each test. Instruction sheets for each test should be in the tub for reference. Each student should have a journal or sheet for recording information. If visiting multiple sites make sure students have a data sheet for each site.</p> <p>Once students are set up at their testing</p>

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<p>and put in waste containers. The tests should be done more than once for validity.</p>	<p>stations, check in with each group. Encourage all students to collect water sample data following proper procedures.</p>
<p>Teacher Preparation</p> <ul style="list-style-type: none"> • Organize testing supplies for students (see teacher notes for setting up) • Arrange transportation and parking. If walking to site make sure route is safe. • Go to the site beforehand to make sure the accessibility is safe, place flagging if needed so the students know where to carry out their tests. • Teacher should arrange to have adult help for the field trip. Ideally one adult per testing group is essential for safety and to assist students with testing. • Prepare a first aid kit for cuts, bites, bruises. Towels and sweatshirts for wet cold students. • Remind students to wear appropriate clothing and shoes for the field day, dress in layers for a cold changing to warm day. Sunscreen, hats, bug spray. • Bring a garbage bag and container for disposing of testing supplies. 	
<p>Management Strategies Prepare parents that they will help the group they are supervising to stay on task by reminding students of their roles and what they should be doing. Have parents ask students to explain what information is being collected and why it is important.</p>	

REASON	
<p>Student Purpose</p> <p>Students at each site should make sure they observe their surroundings and talk about how the area around the river relates to the measurements they are collecting. Students should be looking at shade vs. sunny locations for temperature. Higher oxygen levels and riffles or higher oxygen levels and location of algae and/or shade vs. sun. The number of nitrates related to land uses in the area surrounding water source. Higher/lower turbidity related to the weather event the day before? Was it raining or sunny?</p> <p>If students are visiting more than one site they can make predictions about what they expect the measurements to be at the next site.</p>	<p>Teacher Guidance</p> <p>While testing is happening, teacher rotates from group to group making sure the students are following instructions so their data collection is accurate. Ask students why they think the measurements are what they are. Ask questions that help students construct deeper meaning of what is happening. * (Look at management strategies to see ideas for questioning to probe student thought.)</p>
<p>Management Strategies https://www.teachingchannel.org/videos/questioning-in-the-classroom Phrasing to use to help students think more critically about what they are doing... 40 pages worth of suggestions on this pdf link.</p>	

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<http://www.dentonisd.org/cms/lib/TX21000245/Centricity/Domain/68/Science%20Sentence%20Stems%20and%20Corresponding%20Strategies%20for%20ELPS.pdf> (may need to copy and paste link if the link does not work directly.)

COMMUNICATE

Student Purpose

Once students have finished water tests, students communicate their findings with one another. This can be done in the field if the group is carrying out all the tests at one or multiple sites.

If materials and time are limited, students can share information when they return to the classroom.

1. Students return to original groups in the classroom. The recorders share site background information and field measurements so that everyone in the group fills in their own field data sheet.
2. Students as experts of their tests will jigsaw to new groups so that a representative from each test shares their data with others in the class. This way, all students can record all the parameters on the student data sheet.
3. Students return to original groups and help each other to fill in any missing information.
4. Once charts are filled in students can write questions they have and discuss their predictions about the water quality based on data and surrounding site observations.

Teacher Guidance

Longer time group: Students within their groups share their observations and data sheets so that each person compiles a data sheet that is complete while at the water site.

Shorter time group: The recorder will have to share information with everyone in their group when they return to class. Students in these groups will jigsaw to form new groups so all field data is shared and recorded by everyone in the class.

If using a jigsaw strategy (see link below) to share information, assign each group the numbers 1-6 (some students may have two numbers). Have all the ones combine, twos combine, etc. In these groups each expert will share their data so all students can complete their data sheet.

If groups have uneven numbers in the groups, the teacher can collect papers and create the groups so that each group has one representative to share data from each test. The groups may have as many as 7-8 students if multiple tests were measured.

Students can then return to their original groups and re-share if anyone missed any measurements.

Before graphing (in the next episode), have groups share their predictions about water quality based on data and site observations.

Teacher Preparation: Check to make sure all students have copies of the field data sheets.

Management Strategies: <https://www.jigsaw.org/>

Notes for setting up this unit

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Student groups have been set up in class. Prepare testing supplies for each group.
Shorter class period (less supplies): Make sure each group is prepared with their specific test kit materials, instruction sheets, resource sheets, clipboard with student field data sheet, waste container, waders, first aid kit, 1 adult supervisor per group.

Longer class time, visiting multiple sites: Each group will have a bin filled with all the water chemistry testing materials needed, materials for collecting macroinvertebrates (if applicable), packet of instruction sheets, resource sheets, waste container, students will each have field data sheet/s to complete while in the field, waders, first aid kit, and an adult supervisor.

Macroinvertebrates

Materials:

* For information on equipment for loan or for purchase, contact USU Water Quality Extension at (435) 797-2580 or www.extension.usu.edu/waterquality

- Kick nets
- Plastic pans
- Transfer pipettes
- Magnifying glasses
- Copies of student worksheet
- Macroinvertebrate keys and photos
- Copies of macroinvertebrate sampling instructions
- Bucket
- Pencils
- Clipboards
- Plastic petri dishes
- Waders

If you wish to preserve samples:

- Ethanol or isopropyl alcohol (70% alcohol, 30% water)
- Small glass vials

Algae

Materials:

- Collection bottles
- Microscope
- Algae identification keys and photos
- Microscope slides and slide covers

<http://extension.usu.edu/utahwaterwatch/ou-files/Instructions/HABFieldID.pdf>
http://extension.usu.edu/utahwaterwatch/ou-files/Instructions/ID_Sheet.pdf

Water Chemistry Tests

Materials:

- pH test kits*
- Dissolved Oxygen kits*
- Turbidity Tubes*
- Field thermometers*
- Nitrate kit*
- Bucket
- Copies of the student worksheet
- Copies of the chemical sampling instruction sheets
- Waste bottles/containers
- Clip boards
- Pencils

*For information on equipment for loan or for purchase, contact USU Water Quality Extension at (435) 797-2580 or www.extension.usu.edu/waterquality

Assessment of Student Learning

Students are doing a self-assessment where they are making predictions based on observations

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and land use conditions then determining if those predictions are accurate in episode 3.

Student Worksheet

Name: _____

Group Name or Number _____

Date: _____

Site Name: _____

Site Observations:

Type of waterbody (e.g., stream, lake, wetland): _____

Weather today: _____

Weather yesterday: _____

Air temperature: _____

Water appearance (e.g., clear, brown, foamy, milky): _____

What type of land uses are in the immediate area? _____

What type of land uses are in the surrounding area? _____

Is the area shaded by trees? _____

List all other abiotic factors you can observe that might be important in this aquatic ecosystem:

Abiotic Factor	Your Results	Utah allowable Range	How do the Site Observations impact results? Explain in terms of expected Utah allowable range.
pH		6.5-9.0	
Dissolved Oxygen	(mg/l)	Minimum of 6.5 mg/l for cold water fish, 5.5mg/l for warm water fish.	
Turbidity	NTUs	An increase of 10 NTU's from previous data	
Temperature	° Celsius	Max of 20° C for cold water fish and max temperature for warm water fish 27° C	
Nitrates	(mg/l)	Nitrate concentrations of 4 mg/l in stream water are considered an indicator of pollution problems.	

Biotic Factors	Your Results	Utah Allowable Range	How do the Site Observations impact results? Explain in terms of expected Utah allowable range.
Algae Types		No HAB's	
Macroinvertebrates (WQI)		>79 = excellent 60-79 = Good 40-59 = Fair <40 = Poor	

Use back to draw what the testing area looks like. Take pictures so you can remember. Use your photos to add to your drawing when you are in class.

Student Worksheet

Name: _____

Group Name or Number 1

Date: 10-10-17

Site Name: _____

Site Observations:

Reservoir

Type of waterbody (e.g., stream, lake, wetland): Lake

Weather today: sunny with wind

Weather yesterday: The same

Air temperature: 76° 48.7°

Water appearance (e.g., clear, brown, foamy, milky): brown

What type of land uses are in the immediate area? Farm forest

What type of land uses are in the surrounding area? far houses

Is the area shaded by trees? no

List all other abiotic factors you can observe that might be important in this aquatic ecosystem:

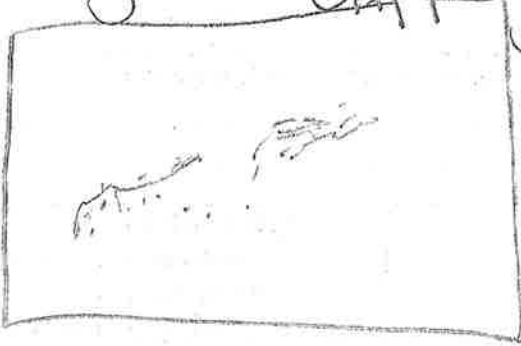
temperature, rocks, nitrates,

Abiotic Factor	Your Results	Utah allowable Range	What do the water measurements indicate about the water quality? What questions do I have?
pH	<u>7</u>	6.5-9.0	<u>6.5 to about 9.5. it is in about</u>
Dissolved Oxygen	<u>9</u> ppm (mg/l)	Minimum of 6.5 mg/l for cold water fisheries and 5.5mg/l for warm water fisheries.	<u>9 Deeper 9 shall the rgh</u>
Turbidity	NTUs <u>3cm</u>	An increase of 10 NTU's from previous data	
Temperature	<u>57</u> ^{oF} ° Celsius	Maximum of 20° Celsius for cold water fisheries and the maximum temperature for water fish is 27° Celsius	<u>It is a good tempature for fish</u>
Nitrates	<u>0</u> ppm (mg/l)	Nitrate concentrations of 4 mg/l in stream water are considered to be an indicator of pollution problems.	<u>No pollution</u>

Biotic Factors	Your Results	Utah Allowable Range	What does this mean? Questions I have?
Algae Types	<u>Blue-Green</u>	No HAB's	<u>lots</u>
Macroinvertebrates (WQI)		>79 = excellent 60-79 = Good 40-59 = Fair <40 = Poor	

Use back to draw what the testing area looks like. Take pictures so you can remember. Use your photos to add to your drawing when you are in class.

grass clippings



grass clippings

