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| **Teachers:** Lois Wildgrube, Heather Shepherd | | | | | | | | **Duration:** |
| **Subject/Course:** Earth System Science | | | | **School:** Live Oak Charter School | | | | **Grade Level:** |
| **Collaborating Organizations:**  Petaluma Educational Foundation (pending) | | | | | | | | |
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| **Standards Met**  (NGSS, CCSS, or otherwise) Please include full text of standards. | [MS-LS2-1 Ecosystems: Interactions, Energy, and Dynamics](https://www.nextgenscience.org/pe/ms-ls2-1-ecosystems-interactions-energy-and-dynamics" \t "_blank) Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. [MS-LS2-4 Ecosystems: Interactions, Energy, and Dynamics](https://www.nextgenscience.org/pe/ms-ls2-4-ecosystems-interactions-energy-and-dynamics" \t "_blank) Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. [3-LS4-4 Biological Evolution: Unity and Diversity](https://www.nextgenscience.org/pe/3-ls4-4-biological-evolution-unity-and-diversity" \t "_blank) Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.\*  3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.  3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.  3 LS2.C: Ecosystem Dynamics, Functioning, and Resilience  When the environment changes in ways that affect a place’s physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. | | | | | | | |
| **Project Summary**  (include student role, issue, problem or challenge, action taken, and purpose/beneficiary) | The 4th and 7th grade students at Live Oak Charter School propose to engage in a citizen/student monitoring project with the Friends of the Petaluma River. The project will take place over 6 weeks in the fall and 6 weeks in the spring. The project will support real student learning in Environmental Science, will contribute to understanding and monitoring of the health of the Petaluma River, and will facilitate inter-age social support for our school. | | | | | | | |
| **Essential Question**  Question students will explore throughout the course of the unit. | Does distance from an urban center (city of Petaluma) influence water quality (pH, Dissolve Oxygen if possible, Salinity/TDS, Turbidity/Suspended solids, Settleable solids), invertebrate species (that settle in Hester-Dendie samplers), and diatom species (as collected on microscope slides)? | | | | | | | |
| **Key Learning Objectives and Assessments**  Concrete objectives for student skill building and comprehension and how these will be measured. | Learning Objective | | | | Assessment | | | |
| Data collected from the natural world can be used to prove or disprove a hypothesis | | | | Written task: “How would you prove that pollution has an affect on fish populations?” | | | |
| Water quality is influenced by human activity | | | | Written task: “How do humans influence their environment?” | | | |
| Design a workable environmental experiment | | | | Written task: “Design an experiment to demonstrate ladybug habitat needs” | | | |
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| **Orientation** | In-Class Visit | Week of Oct 20 | Field Trip to River Heritage Center | NA | Other: Multiple trips to Petaluma River to set up and conduct experiments |  | If other, describe in timeline how you will meet entry activity requirements:  Oct 30: First Field visit  Nov 15: Second Field visit  Dec 6: final fall field visit  Spring dates to be determined (3 dates, spanning about 6 weeks) | |
| **Making Products Public**  Include how student work will be shared with community members and/or organizations, who students will engage with during/at end of project, and which product(s) will be presented at the Watershed Classroom Student Showcase. | Students will present at Student showcase.  Students will enter data on the Watershed atlas.  Students will present poster presentation for parents night (Open House)  One other event will be identified in the Spring for interested students to present their work. | | | | | | | |
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| PROJECT TIMELINE | | | | |
| Please list all activities which are part of the unit in the order they will be implemented. Timeline must include pre and post-assessments, other in-class assessments, an entry activity, at least three outdoor fieldwork activities, a plan for participation in the student showcase, and any other supporting activities and classwork. | | | | |
| **Activity** | **Type of Activity**  (Field Work, In-Class, Presentation, Assessment) | **Description** | **Resources Needed** | **Exact or**  **Approximate Dates** |
| *Name the activity* | ***Field Work:*** *Any hands-on outdoor lesson or field trips*  ***In-Class:*** *Any in-class activity or project*  ***Presentation:*** *Any activity during which students share their work with each other or an outside audience*  ***Assessment:*** *Any written or oral exams given to assess student understanding and knowledge* | *A thorough outline of the activity.* | *All reading materials, activity materials and equipment, transportation, third party help, or other resources needed to make the activity possible.* | *Please be as specific as possible so that we best know when to reach out with resources and tools to aid in implementation. Exact dates will be emitted from publicly shared version to protect student privacy.* |
| Orientation | In class | Watershed classroom staff present to students (each grade separately) |  | Week of Oct 21 |
| Pre assessment | In Class | Administer assessment questions | questions | Week of Oct 21 |
| Preparation | In Class | Introduce project  Review maps of sampling areas  Build hester dendies  Review water quality parameters  Learn about water quality | Maps  hester dendy materials (to be supplied by school)  water testing kits | Week of Oct 21 |
| Field visit | Field Work | Setting up sampling stations  Taking preliminary water quality samples  Set hester dendies  Set slides for diatoms | Water testing kits  Record sheets | Oct 30 |
| Field visit | Field Work | Sampling water quality  Pull first hester dendies  Pull first slides | Water testing kits  Invertebrate, algae and diatom identification guides | Nov 15 |
| Field visit | Field Work | Sampling water quality  Pull second hester dendies  Pull second slides | Water testing kits  Invertebrate, algae and diatom identification guides | Dec 6 |
| Post assessment | In class | Administer assessment questions | questions | May 2020 |
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Please add more rows if needed. (Right click in last box, “Insert Row Below”)

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| **Other Notes:**  **We have not determined the specific dates in the spring, but the same process will be followed beginning in March.**  **We will set sampling stations, take water quality measurements and identify associated macro invertebrates, algae and diatoms.** |