WATER QUALITY IN THE PETALUMA RIVER

Teachers: Chris Carter & Lisa Beaudry (sixth grade teachers at La Tercera Elementary)		**Duration: Winter/Spring 2018**
Subject/Course: Ecology, Chemistry	**School: La Tercera Elementary**	**Grade Level: 6th**
Collaborating Organizations: Friends of the Petaluma River		

Standards Met (NGSS, CCSS, or otherwise) Please include full text of standards.	**NGSS** MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. **History & Social Studies** HSS-6.2.1. Locate and describe the major river systems and discuss the physical settings that supported permanent settlement and early civilizations. (Connecting this to our modern civilization through the Petaluma River) **Math** 6.SP.4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots. 6.SP 5. Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
Project Summary (include student role, issue, problem or challenge, action taken, and purpose/beneficiary)	Students will have the opportunity to sample water along Petaluma River multiple times during the school year (February-April) and identify potential human impacts to the environment in these areas. They will assess impacts at these sites by: 1) recording abiotic parameters at these sites, including temperature, dissolved oxygen, pH, nitrogen, ammonia, phosphates, turbidity, salinity, and conductivity. 2) Students will then work to develop a plan/proposal for reducing or eliminating identified impacts to these sites. This information could then be shared with interested local parties/stakeholders.
Essential Question Question students will explore throughout the course of the unit.	1) What impacts to the environment exist within the Petaluma River watershed, and what can we do to reduce or eliminate these impacts?

Key Learning Objectives and Assessments Concrete objectives for student skill building and comprehension and how these will be measured.	Learning Objective				Assessment		
	Part 1: Water Sampling Over Time				Students will collect and test water samples during several visits to the Petaluma River. They will record their results and then enter them into spreadsheets, where they will be used to track data over time.		
	Part 2: Making Sense of the Data				Graphs will be used to visually represent their findings, as well as a written explanation. Students will investigate water quality parameters over time, seeking to determine the cause of certain recorded levels or changes over time. Students will work to identify readings as the result of natural cycles or human impacts.		
	Part 3: Developing a Plan and Sharing				Students will develop a proposal/plan for reducing or eliminating identified human impacts from Part 2. They will create posters and/or digital presentations to share with interested community members.		
Orientation	In-Class Visit	X	Field Trip to River Heritage Center	X	Other		If other, describe in timeline how you will meet entry activity requirements
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.	All student data collected in **Key Learning Objectives and Assessments** will be part of what students share in the presentation they create. Students will share this information digitally via Chromebooks and/or on posters they have created as part of their proposal/plan for reducing and/or eliminating an impact to the environment. This information and presentation will take place at a STEM showcase event at La Tercera in the Spring 2018 trimester, where students share their work with members of the La Tercera community, including other students, teachers, parents, and interested community members who wish to attend. This information would also be shared at the Watershed Classroom Student Showcase.						

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.*
	In-Class, Assessment: Pear Deck presentation looking at history of rivers, human connections to these waterways & impacts	Presentation outline: The rise of human civilizations linked to rivers. (Egypt, Mesopotamia, Greece, Rome, China) What impacts have these rivers seen as civilizations grew along their banks? Connect this to students → Petaluma River: Is it impacted too?	Chromebooks (one per student, which we have in our district in intermediate grades), Google Classroom, (for student post-presentation response) and a teacher MacBook and paired Apple TV combination to present the Pear Deck presentation to the class.	Mid to Late-January 2018
	In-Class: Friends of the Petaluma River Presentation	Individuals from Friends of the Petaluma River will visit the classroom and introduce the watershed and the various water tests.	Watershed model and water testing kits	TBD Early to Mid-February 2018?
	Field Work: Field trips to identified study site for monitoring.	Students will be able to effectively test the water in the Petaluma River on three different occasions, recording the data from a variety of tests on each visit.	Bus for transportation of ~55 students and adults, student site data collection sheet, clipboards for ~55 students, data collection equipment. (Wishlist: tubidimeter, water quality test kits, stream flow meter)	Late-February/Early-Early April 2018

	Assessment: What connections can be found between data and conditions found at sites?	Students will analyze data from field visits and what explanations they may have for the results. Based on this data, they will begin to evaluate the samples and look for potential impacts that may be occurring. They will publish these findings and create a plan/proposal for reducing or eliminating any identified impacts.	Student data collection sheets, Chromebooks for transferring information into a spreadsheet and creating a visual representation (graph) of collected data at different sites. Word processing software to publish their ongoing findings, as well as PowerPoint to produce a presentation for their plan/proposal for reducing and/or eliminating impacts.	Late-February/Early-April 2018
	Presentation: La Tercera Spring STEM Showcase and Watershed Classroom Student Showcase.	Students present their findings with a plan/proposal (digital and/or in poster presentation form) to La Tercera community and Watershed Classroom Student Showcase events.	Chromebooks for digital presentation components, an area to effectively display non-digital presentations.	March/April 2018?

Please add more rows if needed. (Right click in last box, "Insert Row Below")

Other Notes:
All dates above are somewhat flexible and open to being rearranged for scheduling purposes. Thank you for your time and consideration.

Sincerely,
Chris Carter