SCHOOL NAME

Project Title: Water Quality Investigation

School: Tremont Consolidated School

Grade Level: 7-8

Teacher: Jane White

Project Partners: Jane Disney - MDI Biological Laboratory

Teacher Profile: Jane White teaches 5th - 8th grade science at Tremont Consolidated School in Bass Harbor, Maine. She has been teaching for ten years. She studied marine biology and outdoor recreation as an undergraduate and pursued a master's degree in science education at the University of Maine. She is passionate about protecting our oceans and sharing her knowledge with students. The main goal in her teaching is to help students develop a connection and value toward the environment that will lead to making good decisions as an adult. The All About Arsenic project is a perfect way to make science relevant and engaging by collecting and analyzing current data on the quality of water in our own community.

Summary:
The 7th and 8th graders participated in the Water Quality Project at Tremont School. We began the year studying the Bass Harbor Marsh. We took multiple kayaking trips into the marsh to collect water samples. We tested for dissolved oxygen, salinity, and temperature. Students also used an online NOAA program called "Data in the Classroom". Students compared the data collected in the Bass Harbor Marsh and compared it to other locations in the United States through the NOAA website. The goal of this unit was to have students understand what affects the levels of DO and salinity in an estuary and what water quality parameters do living organisms, such as the atlantic sturgeon, require to spawn and survive.

The second unit introduced the basic components of an ecosystem: producers, consumers, decomposers, abiotic factors, biotic factors, community, populations, species, symbiotic relationships, and cycles of matter. While studying these concepts, students developed a project to find out how common household products can affect the growth of duckweed. At this point, students took home their water sampling packets. I had 27 students collect water samples.

Students also participated in a number of activities on the TuvaLabs website. We went through some of the provided lessons and the arsenic data. A few students used the arsenic data on the TuvaLabs program for their science fair projects. Students compared the data on their own samples and compared to other sample collected throughout Maine and New Hampshire.

Project Details:
Specific Curricular Items: See attached.

Community Meeting: Our community meeting was our annual science fair. The majority of students who participated in the project attended the science fair. Approximately 40-50

community members attended. At the science fair, we presented a 12 minute video produced by the 8th grade students. They explained what the water quality project was, introduced arsenic (health problems, how it gets in water, etc.), what they did to collect their samples, and the importance to monitoring water quality in general. The 7th grade presented the same information in a poster board format.

Stipend: The majority of the stipend was used to purchase a phytoplankton monitoring kit. In addition to monitoring salinity, dissolved oxygen, and temperature we can now monitor phytoplankton and add this study to our bass harbor marsh curriculum. The stipend was also used to purchase additional materials needed for the duckweed project and water testing. Petri dishes and para-film were purchased.

Discussion:
Students learned mostly about the importance to monitor the quality of the environment they live in. Specifically, we focused on saltwater and freshwater habitats. Also, they were able to make a connection to how the choices they make on a daily basis can have an impact on the ecosystems around them. Many students shared that they never thought about the water in their house because they assumed it was perfectly safe. Students should ask questions and require reliable data to answer questions. This project was a great example of how citizens, of any age, can help solve problems in your own community. If I were to do this project again, I would want to spend more time on freshwater systems, the water cycle, water supply, and land use. I would also spend more time in the classroom to assess the water tests results.

Conclusion: The water quality project was a great addition to the life science curriculum. Students practicing citizen science and gathering data in their own homes made learning more relevant and engaging. If our children, through education, can build a connection with the environment with up close and personal experiences, they will more likely become stewards of their own communities.

References: none

Ecosystems

Unit Objective: We are studying ecosystems through the lens of an estuary.

Students will be able to:

Week 1	• Identify abiotic and biotic factors.
Week 2	• Define a community, population, species, and organism.
Week 3	• Explain the relationships (symbiosis) between two species: mutualism, commensalism, parasitism.
Week 4	• Understand reasons for population changes in an area: carrying capacity, population density.
Week 5	• Describe the flow of energy in an ecosystem: food chains and food webs. Identify consumers, herbivores, omnivore, carnivores, detritivore, decomposers, scavengers.
Week 6	• Describe the cycling of materials in an ecosystem: water cycle, nitrogen cycle, oxygen-carbon dioxide cycle.
Week 7	• Identify the ways humans affect and change the environment.

Project Based Learning - Project Choices Estuaries -

Students will use their knowledge of ecosystems to investigate a question about the Bass Harbor Marsh. They will ask questions, develop a model, plan an investigation, collect/analyze data, use math, engage in argument from evidence, and communicate information.

Resources:

Student Science Notebook - We have done multiple activities where students should have taken notes in their notebook. Students should also have a vocabulary list in their notebook. Powerschool Class Page has everything that should be in the notebook.

NOAA Data in the Classroom Website - We've been working through the Water Quality activity the last few weeks. Students will find definitions, videos, and data on other estuaries that may be useful in their project.

CHOOSE A PROJECT:

Students will choose from one of the following PBL projects (below) or design their own question to investigate.

1. How does the amount of dissolved oxygen change throughout the estuary?

independent variable: location
dependent variable: dissolved oxygen

2. What is the relationship between temperature and dissolved oxygen?

independent variable: temperature
dependent variable: dissolved oxygen

3. How does the amount of salinity change throughout the estuary?

independent variable: location
dependent variable: salinity

4. How does the variety of plants and animals change in an estuary?

independent variable: location
dependent variable: populations of animals/plants

5. What factors/data are needed to monitor in order to develop a National Estuarine Research Reserve in the Bass Harbor Marsh?

independent variable: estuary locations
dependent variable: data to be monitored (student will collect a sample collection of data (temperature, salinity, dissolved oxygen, etc to model)

Your final presentation can be any product of your choosing. You could pass in a lab report, present to the class (slideshow), create a book/ pamphlet, etc.

Your FINAL PRESENTATION must include:

Check Box	
	Question/Hypothesis • State the question clearly in complete sentences. Student includes independent and dependent variables • State the hypothesis clearly in complete sentences. • Identify criteria and constraints.
	Background Information/Research • Research must relate to the question being investigated • Research must be at least one paragraph (5 sentences). • Research must include a minimum of 5 vocabulary terms from the unit.
	Materials • List materials with quantities and units.
	Procedure • Write in complete sentences with proper punctuation and spelling.
	Data - Table and Graph (Using google sheets) • Label x and y axis' • Include a title • Include units
	Data Analysis • Identifies independent, dependent, and control variables. • Describe the relationship between variables. • Include quantitative data. • Include units.
	Develop a Model: drawing, 3D, song, movie, painting, etc. • Model shows how the variable changes. • Student revises the model or describes how the model could be improved.
	Conclusion • Describe the relationship between variables. • Apply scientific ideas - use vocabulary • Describe what you could do differently next time - revising the model. • What are the strengths and weaknesses of your model
	Sources • Cite sources in MLA format. • 2 or more sources are used.

Water Investigation
7/8 Grade
Due Date: December 21, 2018

Water Investigation - PROJECT OUTLINE

Your REPORT will have the following sections:
- Abstract and Background Information
- Methods and Materials
- Data - Table/Graph
- Observations and Results
- Conclusion

Abstract and Background Information
Includes: Question, Hypothesis, and Background Information

1. Briefly explain the purpose of your investigation.
2. Identify the question or problem that you are investigating.
   How does _____affect_____?
   What is the relationship between _____and _____?

3. Explain your hypothesis.
4. Background Information - Tell me what you know about water (facts).

Methods and Materials

Materials	List all materials used in experiment. Include quantities and units.
Procedure	• List every step in detail. Write in complete sentences. Explain how many trials, how you measured, how often you measured, modifications made. • Describe the solutions you made. What is the ratio of chemical to water? What does the ratio mean? • Fertilizer Iteration - Make sure units are both metric OR english. Explain how you converted your units.
Variable Identification	Independent, Dependent, Control

Data

You need a table **and** graph for each iteration.

Graph- Label X and Y axis' with proper units.
Be sure to include a title and units.

Table- Be sure to include a title and units.

Conclusion

- State your claim with supporting evidence.
- Description of modifications made for each iteration.
- Reasoning: Include statements (from a reliable source -book,article,etc) that supports your findings or adds facts/evidence to your investigation.

Sources

Include a minimum of 2 sources cited in MLA format.