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Young Water Stewards NGSS Alignment

Performance Expectations	
HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity. **Clarification Statement:** Examples of key natural resources include access to fresh water (such as rivers, lakes, and groundwater), regions of fertile soils such as river deltas, and high concentrations of minerals and fossil fuels. Examples of natural hazards can be from interior processes (such as volcanic eruptions and earthquakes), surface processes (such as tsunamis, mass wasting and soil erosion), and severe weather (such as hurricanes, floods, and droughts). Examples of the results of changes in climate that can affect populations or drive mass migrations include changes to sea level, regional patterns of temperature and precipitation, and the types of crops and livestock that can be raised.	In Activity 1, students create a watershed model, then discuss why humans live where they live, and how we use various water sources.
HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.* **Clarification Statement:** Examples of data on the impacts of human activities could include the quantities and types of pollutants released, changes to biomass and species diversity, or areal changes in land surface use (such as for urban development, agriculture and livestock, or surface mining). Examples for limiting future impacts could range from local efforts (such as reducing, reusing, and recycling resources) to large-scale geoengineering design solutions (such as altering global temperatures by making large changes to the atmosphere or ocean).	In Activity 4, students discuss Best Management Practices for various non-point water pollution sources.
HS-LS2-2 Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. **Clarification Statement:** Examples of mathematical representations include finding the average, determining trends, and using graphical comparisons of multiple sets of data.	In Activity 4, students use the water quality data they collected along with historic water quality data. They compare this data with tolerable parameters for salmon and macroinvertebrate life to determine the health of the creek. Students will then discuss Best Management practices for their area.

Science and Engineering Practices	
Analyze data using computational models in order to make valid and reliable scientific claims. **(HS-ESS3)**	In Activity 4, students compare their water quality data with historic data. They identify trends and correlations in the data, and use these results to determine the health of the watershed.
Design or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. **(HS-ESS3)**	In Activities 4 & 5, students discuss Best Management Practices to real-world problems that are relevant in their societies. They take place in a stewardship activity to see those solutions in action.
Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations). **(HS-ESS3)**	In Activity 4, students take part in an activity that poses questions about the best management practices to certain water quality issues. They consider the economic and social implications of these practices when discussing which solution is most realistic.

Disciplinary Core Ideas	
Resource availability has guided the development of human society. **(HS-ESS3)**	In Activity 1, students build a watershed model and are asked to think about where human development takes place and what resources allow for this development.
The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. **(HS-ESS3)**	Throughout the entire program, a main topic of discussion is the irresponsible management of natural resources and what problems arise in both human and non-human populations as a result. The watershed tour allows them to witness firsthand what pollutants contribute to improper management.
When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. **(HS-ESS3)**	In Activity 4, students take part in an activity that poses questions about the best management practices to certain water quality issues. They consider the economic and social implications of these practices when discussing which solution is most realistic.

Crosscutting Concepts	
Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-ESS3)	In Activity 3, students collect water quality data and use this data to make claims about the water quality in their local stream.
Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible. (HS-ESS3)	In Activity 4, students compare the water quality data that they collected with historic data. The historic data also includes seasonal measurements which demonstrate that change can happen over a short timespan.
New technologies can have deep impacts on society and the environment, including some that were not anticipated. (HS-ESS3)	In Activity 2, students participate in an activity in which they are asked to sort non-point source pollution causes and effects. Some causes are from sources that have unanticipated impacts, such as zinc from car tires and copper from brakes.

Young Water Stewards Environment & Sustainability Standards Alignment

Environment & Sustainability Standards Connections	
ESE Standard 1: Ecological, Social, and Economic Systems. Students develop knowledge of the interconnections and interdependency of ecological, social, and economic systems. They demonstrate understanding of how the health of these systems determines the sustainability of natural and human communities at local, regional, national, and global levels.	Throughout the entirety of the Young Water Stewards program, themes of interconnectedness of humans and the ecosystem are a theme; but the interconnectedness is especially highlighted in the Watershed Tour.. We discuss how healthy ecosystems where humans also live require humans to take actions to reduce their negative impacts and how these negative impacts have local, regional, national, and global impacts.
ESE Standard 2: The Natural and Built Environment. Students engage in inquiry and systems thinking and use information gained through learning experiences in, about, and for the environment to understand the structure, components, and processes of natural and human-built environments.	In Activity 1 and 2, students gain an understanding through discussion and modeling how the water cycle has been altered because of human development resulting in more runoff.
ESE Standard 3: Sustainability and Civic Responsibility. Students develop and apply the knowledge, perspective, vision, skills, and habits of mind necessary to make personal and collective decisions and take actions that promote sustainability	The stewardship project is designed to have students take civic action in reducing non-point source pollution from the environment. We also discuss how they can take action outside of school to promote sustainability and because we all contribute to non-point source pollution, we all have a responsibility to help reduce our negative impacts.