

Petaluma River Watershed Study

Goal: In this exercise, we will be developing our field observation skill as we work toward understand what's happening in an environment and identifying relationships.

Objective: Students will write observations, an inquiry question and a testable hypothesis related to our guiding question, ***"Is the Petaluma River watershed ecosystem healthy?"***

Background:

When we consider the health of this ecosystem it is important to know what ecosystem services healthy wetlands fulfil. Here is an excerpt about some key functions of wetland ecosystems:

WETLANDS – THE KIDNEYS OF THE EARTH

In the past, only the functions and values of the wetland pertaining to fisheries, agriculture and wildlife were well recognised. The role of wetlands in water conservation and management was recognized only in the recent times. Wetlands have a key role in natural flood control, groundwater recharge, water supply and purification. Furthermore, water allocation to wetlands is essential to enable these ecosystems to support the plants, fish and other animal species that, in turn, are often critical to the survival of local human settlements.

The major determinant of a wetland functioning is the hydrological balance between inflows and outflows to the wetland, the soil contours in the wetland and the subsurface conditions. The important functions of wetlands are: groundwater recharge; groundwater discharge; flood storage and de-synchronisation; shoreline anchoring and dissipation of erosive forces; sediment trapping; nutrient retention and removal; food chain support; habitat of fisheries; habitat for wildlife; active recreation; passive recreation and heritage value. It is important to recognize that all wetland types perform the many functions which have been attributed to them while the degree to which any one function is performed varies between wetlands (James).

It is important to keep in mind the way wetland managers monitor and protect a wetland area. Wetlands are managed for environmental protection, water conservation, production of renewable resources, wildlife, recreation, aesthetics and tourism. Making observations about the properties of the Petaluma River watershed which relate to these management topics will help us better understand the overall health of this system.

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If we are to come up with an answer to the question "***Is the Petaluma River watershed ecosystem healthy?***" is important to understand what we mean by "healthy". Here is an excerpt to help us identify what we mean:

River ecosystem health (REH) [...] recognizes that water resource problems involve biological, physical, and chemical as well as social and economic issues, and is therefore considered a useful concept for directing integrated assessments of river conditions (Huijbregts).

Site Observation Procedures:

#1. 5 min. (individually)

You first will do an unstructured observation of your surroundings for 10-20 minutes. In this first part, your task is to make as many concrete observations as you can without filtering them through any interpretive process. For this observation it is best to find a comfy seat away from other students to minimize distractions.

#2 5 min. (individually)

Next, review your observation notes, identify any trends or points of interest. Try to categorize your observations as they relate to the following areas:

1. biological
2. physical
3. chemical
4. social and/or economic issues

Then list as many questions as you can come up with about your environment that are related to the observations you made.

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#3 5- 10 min (individually and in peer groups)

Finally, evaluate the questions you have written down. The following table is one way to begin to organize and evaluate your questions. You could also make check marks next to questions that seem like they might be good inquiry investigation questions. Use your peers to help you make your questions better. Collaborate with a partner to identify a single question that is your best and circle it.

Questions about things I think I know some information about already:	
Questions I have about things I have no prior information about:	

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#4 Water Quality Testing

Water Quality testing - Petaluma River Site	
Testing Date	
<u>Air Temp (°C)</u>	
<u>Weather conditions</u>	
<u>Water Temp (C):</u> Optimal temperatures between 9° C - 12° C	
<u>pH:</u> pH values between 7 and 8 are optimal for supporting a diverse aquatic ecosystem. A pH range between 6.5 and 8.5 is generally suitable.	
<u>Dissolved Oxygen - DO (mg/l):</u> optimal level for salmon is 9 mg/l. A level of 7-8 mg/l is acceptable. Levels below 3.5 mg/l are likely fatal to salmon	
<u>Nitrates (mg/l):</u> Nitrates levels in unpolluted water bodies should generally be below 1 mg/l.	
<u>Phosphates (mg/l):</u> Phosphates in unpolluted water bodies should generally be below .025 mg/l.	

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<p><u>Turbidity (NTU):</u> Since salmon rely greatly on their visual abilities, the lower the turbidity the better. Less than 20 NTU's are optimal. Salmonid displacement occurs at 50 NTU.</p>	
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#5 Going Deeper, Developing a Hypothesis

Based on one of your best inquiry questions that came from your initial observation, you'll be doing a structured observation in which your attention is very narrowly focussed on only a few variables you have decided to observe. In order to know which variables you'll be focusing on, you'll need to develop a testable hypothesis. Brainstorm & write down at least 3 hypotheses and then collaborate with a partner to identify the best one. ***Have your teacher okay the hypothesis you've identified as the one you'll work with.***

#6 Testing Your Hypothesis

Design an experiment you could use to test your hypothesis. Identify the dependent & independent variables.

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References:

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