

Evaluation of the Santa Ana River through BOD and water flow as a habitat for Santa Ana sucker

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Question to be addressed:

This experiment seeks to gather information on the water quality of a section of the Santa Ana River and use this data to help answer the questions: Are the biochemical oxygen demand (BOD) levels healthy for the sucker, and do differing levels affect the abundance of individuals in certain sections of the river? and Are the flow levels in this section of the river optimum for sucker populations, and do high- or low-flow areas affect the number of individuals in the stream? Because the river is regulated by a water treatment facility, we believe that BOD levels will be very low, increasing with distance from the facility. Because of this, we also expect high dissolved oxygen (DO) content. We additionally hypothesize that larger populations of the sucker will concentrate in low-flow areas that are nearby high-flow sections. Through this experiment, we aim to inform Santa Ana sucker conservation efforts and hope to inform action by the nearby water treatment facility.

Approach

We will measure biochemical oxygen demand (BOD) and water flow in at least two areas of the stream, one upstream location and one downstream location. Likewise, three water samples each will be taken from one upstream and one downstream location and brought back to the laboratory for a 5-Day BOD Test. For this test, we require:

1. Incubation bottles
2. Lightless air incubator or water bath
3. BOD probe
4. Reagents
5. Water flow device
6. Seed capsules
7. Nitrification inhibitor
8. Cooler

Samples will then be cross-referenced with peer data showing individual sucker presence in selected locations. This will allow us to compare BOD and water flow levels with Santa Ana sucker presence.

Cited Methods

Rice, Eugene W. "(5210) 5-Day BOD Test." *Standard Methods for the Examination of Water and Wastewater*. 22nd ed. Washington, D.C.: American Public Health Association, 2012. 5-5--9. Print. This source is a widely-used standard for biochemical oxygen demand testing in water sources. This chapter essentially details the methods that we intend on using. Because this work is a reference work rather than a research paper, it does not address a hypothesis or question. This resource is relatively recent and so is well updated to current methods. Additionally, it explains calculations that can be done after data collection, such as calculation of BOD₅ in mg/L.

Brittin, Christine. "Ensure Accurate and Successful BOD Measurements with Electrochemical or Optical Sensors." *Tech Note (2010): n. pag.* YSI. YSI Environmental, 2010. Web. 25 Sept. 2016. This source by YSI Environmental was useful as an introductory overview to the process of BOD measurements. It clearly explains the relationship between BOD and dissolved oxygen, though compared to our primary methods source, focuses more on the operation of the physical probe as opposed to the entire process. For example, we were unable to gather information about the chemicals required for the incubation process, or much about seeding except that "compensation must be from 0.6 to 1.0 mg/L." Likewise, our "Standard Methods" source gave little information about calibration, cleaning, standardization, and troubleshooting of the hardware.