WOW: WETLANDS

BASELINE AUDIT, GRADES 9-12

Contact a wetland outreach coordinator (city water department), college or university, or local wetland non-profit. Their involvement is a great way to connect to the community, inspire students, demonstrate career possibilities, and share resource expertise. This is also a fantastic opportunity to engage parents in their child's education.

If you cannot conduct a study at a nearby wetland please determine the best way to gather the data, i.e. a phone call, an email or ideally a SKYPE or Google Hangout with someone who works as a biologist, ecologist, volunteer, etc. at your nearest wetland. Contact the U.S. Fish and Wildlife Service's *National Wetlands Inventory* for contacts.

Before starting the wetland audit or going further, survey your students. On a scale from 1-10, 10 being the most important and 1 being the least important,

- How important is a healthy wetland to wildlife? _____
- How important is a wetland to the local community? _____

TABLE 1. GEOGRAPHIC INFORMATION

1. What is the name of your watershed? https://cfpub.epa.gov/surf/locate/index.cfm	
2. What is the wetland's name and/or classification? https://www.fws.gov/wetlands/data/Mapper.html Most wetlands around the U.S. do not have formal names. For example, the nearest wetland to my location is PEM1A. Hit "decode" to learn what the letters and/or numbers in your wetland name mean. This will be good information to include in the summary.	

TABLE 1. GEOGRAPHIC INFORMATION-CONTINUED

3. What type of wetland are you auditing? https://www.fws.gov/wetlands/data/Mapper.html For example, freshwater pond, freshwater forested/shrub wetland or estuarine and marine wetland. There are many different types.	
4. What are the GPS coordinates for your wetland study site? Use your smart phone's GPS or go to: http://www.whatsmygps.com to find your coordinates.	Latitude N _____ Longitude W _____
5. Eventually water running over your watershed empties into an ocean. Identify the ocean.	☐ Pacific (east coast) ☐ Pacific (Gulf of Mexico) ☐ Atlantic _____ Other

TABLE 2. WETLAND CHARACTERISTICS AND BENEFITS

1. What percentage of students can identify three characteristics that define a wetland? • The hydro period (how long a wetland stays wet) • Soil characteristics • Biodiversity of vegetation	A. _____ 0 characteristics B. _____ 1 characteristic C. _____ 2 characteristics D. _____ All 3 characteristics
2. A wetland is a system and is part of a larger watershed system. What percentage of students can identify one or more system benefits associated with a healthy wetland? • Wildlife habitat • Erosion control • Water filtration • Flood protection Note, there are several benefits under each main benefit. https://www.epa.gov/wetlands/why-are-wetlands-important	_____ %

Think about the following question as you summarize the data in Table 2.

1. How can understanding wetland characteristics and benefits help improve its overall health?

TABLE 3. TEMPERATURE AND PRECIPITATION

1. For today's date, collect the weather data listed to the right. Use your local weather website, application or use the following: • http://www.weatherbase.com/weather/state.php3?c=US • www.weather.com	_____ | _____ Temperature in degrees Fahrenheit and Celsius _____ | _____ Precipitation in inches and millimeters
2. Change Over Time and Patterns How does temperature and precipitation change over the course of the school year? Use your school's weather station, local weather application or one of the sites listed in #1 to collect temperature and precipitation data, a minimum of once a month, throughout the schoolyear. The post audit will ask for your monthly averages and totals. We encourage your team to keep the data posted, so students are more easily able to look for patterns and see how weather changes throughout the school year. Use the discussion questions each time students collect data and/or add to the team/class chart or graph. As always, attach photos or student work to the audit as evidence.	

Think about the following questions as you summarize the data in Table 3.

1. Over the course of your study or schoolyear, be on the lookout for patterns and relationships between temperature, precipitation, soil and water quality and wildlife populations.
2. Why is it important to investigate and collect data in wetlands?
3. How can weather impact wetland wildlife?
4. What actions can the class/team take to help wildlife deal with weather impacts, such as extreme weather events, urban sprawl/development and pollution?

TABLES 4, 5 and 6. Consider contacting a local college or university, or wetland non-profit. Their involvement is a great way to connect to the community, inspire students, demonstrate career possibilities and share resource expertise. If you cannot conduct a study at a wetland, please determine the best way to gather the data, i.e. a phone call, an email or ideally a SKYPE, Zoom or Google Hangout with someone who works as a biologist, ecologist, volunteer, etc. at your nearest water quality or soil quality monitoring station. Wetlands are controlled by your state's EPA. In addition, connect with the U.S. Fish and Wildlife Service's *National Wetlands Inventory* for contacts.

Whether or not you are physically able to go to your nearest wetland area, students can still collect water and soil data from nearby study sites or from samples you bring to the classroom.

Invite parents and community members to participate in the auditing process. Students can take on the role of educator by working with volunteers on citizen science. This experience is a great way to build community.

TABLE 4. SOIL QUALITY

1. Soil Temperature Test 1 _____ °F _____ °C Test 2 _____ °F _____ °C Test 3 _____ °F _____ °C	2. Soil pH Test 1_____ pH level Test 2 _____ pH level Test 3 _____ pH level ◯ Acidic ◯ Neutral ◯ Basic	3. Iron Test 1 _____ Fe ppm (parts/million) Test 2 _____ Fe ppm (parts/million) Test 3 _____ Fe ppm (parts/million)
4. Nitrogen Test 1 ◯ low ◯ medium ◯ high Test 2 ◯ low ◯ medium ◯ high Test 3 ◯ low ◯ medium ◯ high	5. Phosphorus Test 1 ◯ low ◯ medium ◯ high Test 2 ◯ low ◯ medium ◯ high Test 3 ◯ low ◯ medium ◯ high	6. Potassium Test 1 ◯ low ◯ medium ◯ high Test 2 ◯ low ◯ medium ◯ high Test 3 ◯ low ◯ medium ◯ high

TABLE 5. WATER QUALITY

1. Water Temperature	2. Water pH	3. Salinity
Test 1 _____ °F _____ °C Test 2 _____ °F _____ °C Test 3 _____ °F _____ °C	Test 1_____ pH level Test 2 _____ pH level Test 3 _____ pH level ◯ Acidic ◯ Neutral ◯ Basic	Test 1 _____ ppt (parts/thousand) Test 2 _____ ppt (parts/thousand) Test 3 _____ ppt (parts/thousand)

4. Dissolved Oxygen	5. Nitrates
Test 1 _____ ppm (parts/million) Test 2 _____ ppm (parts/million) Test 3 _____ ppm (parts/million)	Test 1 _____ ppm (NO3 parts/million Test 2 _____ ppm (NO3 parts/million Test 3 _____ ppm (NO3 parts/million

6. Ammonia Nitrogen (optional)

Test 1 _____ NH3-N parts per million (ppm)

Test 2 _____ NH3-N parts per million (ppm)

Test 3 _____ NH3-N parts per million (ppm)

Continued on the next page.

1. Transparency – Pick A or B to collect the transparency data.

A1. Secchi disk – distance from observer to:

Test 1 _____ m water surface | _____ m where disk disappears | _____ m where disk reappears

Test 2 _____ m water surface | _____ m where disk disappears | _____ m where disk reappears

Test 3 _____ m water surface | _____ m where disk disappears | _____ m where disk reappears

A2. Secchi disk reaches the bottom and does not disappear – distance from observer to:

Test 1 _____ m to water surface | _____ m depth to the bottom of the water site

Test 2 _____ m to water surface | _____ m depth to the bottom of the water site

Test 3 _____ m to water surface | _____ m depth to the bottom of the water site

B. Transparency Tube

Tube test 1 _____ cm or _____ greater than depth of transparency tube.

Tube test 2 _____ cm or _____ greater than depth of transparency tube.

Tube test 3 _____ cm or _____ greater than depth of transparency tube.

2. Is it raining or has it rained in the last 24 hours? Stormwater runoff from surrounding areas can impact water quality and appearance, including temperature, pH and transparency.	☐ Yes ☐ No

Think about the following questions as you summarize the data in Tables 4 and 5.

1. Why is it important to observe and test soil and water throughout a wetland?
2. What conclusions can you draw about your wetland's health based on this data?
3. Thinking ahead to the post-action audit, will the data change or stay relatively the same? Explain.
4. What actions can the class/team take to be better wetland stewards? Use this information to inform the Eco-Action plan.

TABLE 6. WILDLIFE

1. Collectively, how many different plants and animals are observed on this day? If students know the name of a specific animal and/or the species, it's good practice to make notes in the section below. Also encourage students to draw what they observe. **Never remove animals from a study site.**	_____ amphibians _____ birds _____ fish _____ insects _____ mammals _____ reptiles _____ aquatic plants _____ terrestrial plants
2. Wetlands provide habitat for wildlife. What percentage of students can provide the four required habitat elements? • Shelter • Places to have and/or raise young • As a source of food • As a source of clean water	_____ %
2. Calculate the biodiversity index. the number of species in the area (numerator) _____ = biodiversity index the total number of individuals in the area (denominator) For example, a 4 X 4 meter square area in a carrot patch has 300 carrot plants, all the same species. It has a very low biodiversity index of 1/300, or 0.003. A 4 X 4 meter square area in the forest has 1 pine tree, 1 fern, 1 conifer tree, 1 moss, and 1 lichen, for a total of 5 different species and 5 individuals. The biodiversity index here is high, 5/5 = 1.	

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Think about the following questions as you summarize the data in Table 6.

1. What does the wildlife at the study site tell the class/team about the health of the wetland?
2. What are some of the actions that can be taken to improve or support current wetland programs/initiatives? Use these actions to support your Eco-Action Plan.
3. Optional: Attach photos of your wetland study site to use as a comparison against the post-action audit.

Review of All Data

1. Be prepared in the post-audit to explain **patterns** students have identified through their investigations.
2. Be prepared in the post-audit to explain any **relationships** students identified between wildlife and the health of the soil and water.