



# WOW: OCEANS

## BASELINE AUDIT, GRADES 9-12

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It is understood that not all schools will be able to conduct coastal and marine studies. However, all waters inland flow downstream and eventually lead to an ocean. Therefore, if you are not able to conduct your studies along the coast, coastal plain or bar-built estuary, or offshore, then it is expected you will conduct your studies at a waterway within your watershed. Your reflections and summarizations will allow you to make connections between what you find and their potential impacts along the coast and into the ocean.

Consider contacting local, regional or state non-profits, NOAA office, or U.S. Fish and Wildlife Service Center for assistance conducting your audit. 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 the coast and/or offshore, please determine the best way to gather the data, using technology such as Google Earth, phone calls, emails, SKYPE or Google Hangouts with resources specialists are both beneficial ways to collect information from a distance.

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 projects. This experience is a great way to build community.

### **Before starting the ocean 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 ocean to wildlife? \_\_\_\_\_
- How important is it to address climate change in order to improve ocean health? \_\_\_\_\_
- How important are healthy ocean systems to communities? \_\_\_\_\_
- How important are healthy oceans systems to the national economy? \_\_\_\_\_
- How important are a school's actions to ocean conservation and stewardship? \_\_\_\_\_



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**TABLE 1. GEOGRAPHIC INFORMATION**

<p>1. What is the name of your watershed?  <a href="https://cfpub.epa.gov/surf/locate/index.cfm">https://cfpub.epa.gov/surf/locate/index.cfm</a></p>	
<p>2. What are the GPS coordinates for your study site? Use your smartphone's GPS or go to: <a href="https://www.whatsmygps.com">https://www.whatsmygps.com</a> to find the coordinates.</p>	<p>Latitude N _____          Longitude W _____</p>
<p>3. The ocean study site is...</p>	<p>_____ on the coast/beach          _____ on land or inland          other _____</p>
<p>4. Eventually water running over your watershed empties into an ocean. Identify the ocean.</p>	<p>_____ Pacific          _____ Atlantic (Gulf of Mexico)          _____ Atlantic (East Coast)          other _____</p>
<p>5. Using observations or Google Earth (for those students who are inland), describe the ocean study site. Check all that apply.</p> <p><b>Optional, but encouraged:</b> take a screen shot, a set of 4 in person shots or a panoramic, in-person picture and include the images below this table.</p>	<p>_____ sandy coastline      _____ tide pools          _____ rocky coastline      _____ dunes          _____ white sands      _____ coastal grasses/shrubs/plants          _____ brown sands      _____ mangroves or forests          _____ black sands      _____ cliffs</p>

**Insert photos here.**



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**TABLE 2. OCEAN CHARACTERISTICS AND BENEFITS**

<p>1. What percentage of students can identify the following characteristics that help define an ocean?</p> <ul style="list-style-type: none"> <li>• Salinity</li> <li>• Temperature</li> <li>• Currents</li> <li>• Topography</li> <li>• Biodiversity</li> </ul>	<p>A. _____ 0 elements</p> <p>B. _____ 1-2 elements</p> <p>C. _____ 3-4 elements</p> <p>D. _____ 5 elements</p>
<p>2. An ocean is a system. What percentage of students can identify one or more system benefits oceans provide?</p> <ul style="list-style-type: none"> <li>• Ecosystem benefits and services</li> <li>• Economic benefits, including tourism, sport/commercial fishing</li> <li>• Physical and mental health benefits</li> </ul>	<p>_____ %</p>

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

1. How can understanding ocean characteristics and benefits help improve or support its overall health?
2. Ocean benefits are as plentiful as they are diverse. How can understanding the perspectives and relationships people and cultures have with the ocean improve conservation and stewardship?



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**TABLE 3. WATER QUALITY**

<b>1. pH</b>  _____ pH Level  _____ Acidic _____ Neutral _____ Basic		<b>2. Salinity</b>  Time of High Tide _____   Time of Low Tide _____  Method used: ( ) hydrometer ( ) titration ( ) probe  Test 1   Time of day before test _____   _____ ppt (parts/thousand)  Test 2   Time of day before test _____   _____ ppt (parts/thousand)  Test 3   Time of day before test _____   _____ ppt (parts/thousand)			
		<b>3. Temperature</b>  Test 1 _____ F°   _____ C°  Test 2 _____ F°   _____ C°  Test 3 _____ F°   _____ C°	<b>4. Conductivity</b>  Test 1 _____ μS/cm  Test 2 _____ μS/cm  Test 3 _____ μS/cm	<b>5. Alkalinity</b>  Test 1 _____ CaCO <sub>3</sub> mg/L  Test 2 _____ CaCO <sub>3</sub> mg/L  Test 3 _____ CaCO <sub>3</sub> mg/L	<b>6. Dissolved Oxygen</b>  Test 1 _____ mg/L  Test 2 _____ mg/L  Test 3 _____ mg/L
		<b>7. Transparency – Choose method A or B.</b>			
		<b>A1. Secchi disk – distance from observer to:</b>  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  <b>A2. Secchi disk reaches the bottom and does not disappear – distance from observer to:</b>  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>B. Transparency Tube</b> 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.			



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

1. Why is it important to observe and test water quality of water systems, such as an ocean, bay, inlets, estuary, etc.?
2. What impact does stormwater runoff have on coastlines and ocean waters?
3. How does water quality impact plant and animal life along coasts, in tide pools, on reefs, etc.?

**TABLES 4 and 5.** Consider contacting a coastal/ocean outreach coordinator (local non-profits) college or university. 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 along the coast/shore/beach 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 the nearest water quality monitoring station. Contact your regional EPA, NOAA and/or state-based fish and wildlife office for resource specialist contacts, resources or recommendations.

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**TABLE 4. LITTER**

1. Percentage of students who can define an ocean gyre.	_____ %		
2. Percentage of students who can explain the roles ocean gyres play in the oceans great garbage patches.	_____ %		
3. Percentage of students who know 90% of the contents within the ocean's garbage patches are plastic.	_____ %		
<p>4. Conduct a litter audit using the items most commonly found in and around coastal and marine ecosystems. First weigh the collection of litter. Next sort the collection by type and insert the total number of each item found. Safety is of utmost importance. Please ensure teams have access and use/wear proper safety gear, including, but not limited to gloves, litter grabbers/pinchers and appropriate recycling and trash receptacles.</p> <p>Total weight to the nearest pound and kilogram, diverted from coastal and marine ecosystems. _____ pounds   _____ kilograms</p>			
_____ cigarette butts	_____ fishing line/nets	_____ can tabs	_____ tires
_____ bottle caps	_____ balloons	_____ lighters	_____ straws
_____ 6-pack rings	_____ cans	_____ plastic bottles	_____ Styrofoam
_____ sandwich bags	_____ plastic ware	_____ plastic lids	_____ grocery sacks
_____ micro-plastics	_____	_____	_____

**Think about the following questions as you summarize the information in Table 4.**

1. How does litter impact marine and coastal wildlife (both plants and animals)?
2. Besides wildlife, what impact does litter have on coastal and marine ecosystems?
3. Who/what are the top sources of the litter?
4. What are some of the actions the Eco-Action Team/class can take to improve or support current coastal and/or ocean cleanup programs/initiatives? Use these actions to support the Eco-Action Plan?



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TABLE 5. WILDLIFE

<p>1. Collectively, how many different plants and animals are observed on this day?</p>	<p>_____ amphibians      _____ birds</p> <p>_____ fish                _____ insects</p> <p>_____ mammals        _____ reptiles</p> <p>_____ marine or brackish plants</p> <p>_____ coastal plants</p>
<p>2. Percentage of students who can identify <b>more than one local</b> plant and animal who rely on healthy coastal and/or marine ecosystems.</p>	<p>_____</p>
<p>3. <b>MIGRATORY BIRDS</b></p> <p>Research migratory bird species in your community, paying close attention to their migration paths. Use Cornell's <i>All About Birds</i> to begin researching. <a href="http://www.birds.cornell.edu/">http://www.birds.cornell.edu/</a>. <b>Before beginning the study</b>, have the team look at the questions being asked in the post-audit, which will include data collected from bird observations.</p>	
<p>4. Migratory birds in the United States use one of four main flyways. Identify the flyway migratory birds use in your state. <a href="https://tpwd.texas.gov/huntwild/wild/birding/migration/flyways/">https://tpwd.texas.gov/huntwild/wild/birding/migration/flyways/</a></p>	<p>( ) Pacific Flyway      ( ) Central Flyway</p> <p>( ) Mississippi Flyway    ( ) Atlantic Flyway</p>
<p>5. Use Audubon's, The Flyways, <a href="http://www.audubon.org/central-flyway">http://www.audubon.org/central-flyway</a>, to locate specific species considered "priority birds". List the four priority species listed. The team will need to pick one of the four migratory species to study (or another state migratory species). Questions regarding this species will be posed in the post audit.</p>	<p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p>
<p>6. All wildlife require four basic habitat elements. What percentage of student can identify all four habitat elements: food, water, shelter and a place to raise young?</p>	<p>_____</p>
<p>7. Do team members or other grade levels participate in any migratory bird citizen science projects, such as eBird, Neighborhood Nestwatch, GLOBE's Arctic Bird Migration and/or Journey North's Hummingbird Migration? <a href="https://www.fws.gov/birds/get-involved/citizen-science.php">https://www.fws.gov/birds/get-involved/citizen-science.php</a></p>	<p>_____ Yes      _____ No</p>
<p>8. Our school has 1 or more National Wildlife Federation Certified Schoolyard Habitats®.</p>	<p>_____ Yes      _____ No</p>

Continued on the next page.



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**TABLE 5. WILDLIFE, CONTINUED**

<p>9. Our school has garden(s) and design features that support migratory birds, but is not certified as a National Wildlife Federation Schoolyard Habitats®.</p>	<p>___ Yes ___ No</p>
<p>10. Take a student survey. <b>Record the average score.</b> On a scale from 1-10 where 10 is very critical and 1 is not critical, how critical are coastal and marine ecosystems to migratory bird species?</p>	<p>___</p>

**Think about the following questions as you summarize the data in Table 5.**

1. What role do migratory birds play in coastal and/or marine food webs?
2. What role do migratory birds play in a state's economy?
3. What are some of the actions that can be taken to improve or support migratory bird habitat and/or migratory bird programs? Use these actions to support the Eco-Action Plan.

**Review of All Data**

1. Based on what is known and has been learned, what claims can be made based on the data and other evidence?
2. Be prepared in the post-audit to explain **patterns** students have identified through their investigations.
3. Be prepared in the post-audit to explain any **relationships** students identified between wildlife and data sets collected.