Snapshot Day Definitions & Activities

What is a Watershed? A watershed is the area of land whose water drains into a body of water, such as a river, lake, or sea. Rain that falls anywhere within a watershed will eventually drain into that body of water. Pollution anywhere within the watershed can potentially affect life anywhere downstream from it.
Extra Discussion Item: Did you know that there can be watersheds inside of watersheds – these are called sub-watersheds. Find out for your area what sub-watershed you are in. If you are in New York City, what is different about your "watershed"?

What is an Estuary? An estuary is the area of a river where it meets the sea. It is an area where salt water and fresh water mix.
Extra Discussion Item: The Hudson River Estuary is not defined only by where salt water and fresh water mix. What other ways can an estuary be defined?

What does Lake Tear of the Clouds have to do with the Hudson River? Lake Tear of the Clouds is the **source** of the Hudson River. It is on Mount Marcy, and is the highest lake in New York State.
Extra Discussion Item: The Hudson River is a 'drowned river valley' created by glacier melt. Lake Tear of the Clouds is described as a small 'tarn' - or a bowl like mountain lake formed in a valley excavated by a glacier. How can this small tarn be the source of the great Hudson River?

What causes the Tides? Tides are the daily rising and falling of the sea level. They are caused by the gravitational pull of the sun and the moon. In most places there are 2 high tides and two low tides every 24 hours.
Extra Discussion Item: Does high tide occur at the same time each day on the Hudson River? If it is high tide in the New York harbor is it high tide in Albany?

What is Dissolved oxygen and why is it important? ? DO, or dissolved oxygen is the amount of oxygen gas that is found in water. It is usually measured in parts milligrams per liter (m/L) or per million (ppm). Aquatic organisms need DO to survive; if it gets low, these organisms begin to die off. The DO count of an aquatic ecosystem is an indicator of how healthy that water is. Oxygen gets into the water through photosynthesis, or by mixing of the water with air (as in wave activity).
Extra Discussion Item: There are several factors that can impact the amount of DO in the water including salinity, temperature, and the number of submerged aquatic plants. What impact does each of these items have on DO?

What is Turbidity? Turbidity is the cloudiness of water that is caused by small particles such as clay, plankton, and dirt that are suspended in it. The more turbid the water, the less light that can get through.
Extra Discussion Item: Turbidity can be considered a negative impact on a healthy water system, but in some instances it represents a positive measurement. Can you explain when it would be considered positive?

What is Salinity? Salinity is a measure of the amount of salt in water. Ocean water has a high salinity.
Extra Discussion Item: What causes water to get less saline as it moves north into the estuary?

What are Phytoplankton? Microscopic aquatic organisms that float in the currents and carry out photosynthesis. They are the basis of most aquatic food chains.
Extra Discussion Item: Phytoplankton is extremely important to the Hudson River. Can you come up with a hypothesis (explanation) that would explain why?

Based on definitions contributed by Johanna Tomik, Teacher
Activities Annotated by HBRW/LDEO

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How long is the Hudson River? The Hudson River is 315 miles long. It goes from Lake Tear of the Clouds in the Adirondack Mountains to New York City Harbor where it meets the Atlantic Ocean.
Extra Discussion Item: If the Hudson River is 315 miles long why is the estuary only half that long?

What are Zooplankton? Microscopic aquatic organisms that float in the currents, and do NOT carry out photosynthesis.
Extra Discussion Item: If zooplankton don't carry out photosynthesis how do they survive?

What is "brackish water"? Brackish water is between the salinity of ocean water and fresh water. The lower portion of the Hudson River is brackish.
Extra Discussion Item: Brackish waters are highly productive areas, and are excellent fish nurseries, yet species diversity is often lower than rivers or the ocean. Can you 'hypothesize' why this would be?

What are Zebra mussels? Zebra mussels are aquatic animals that came, by mistake, to the United States in the 1980's. They have become invasive in many freshwater ecosystems of the US. They attach to any hard surface and eat both phytoplankton and zooplankton by filtering them out of the surrounding water. By eating large quantities of plankton (which are the basis of most aquatic food chains) zebra mussels starve the other organisms that are native to the area. Zebra mussels have not been found in salty environments to date.
Extra Discussion Item: Given the information provided above where would you expect to find zebra mussels in the Hudson River? What effect would you expect to find on the turbidity of the river where you find zebra mussels?

What is photosynthesis? Using sun as a catalyst, photosynthesis is a process of converting light energy into food energy. It occurs in green plants and other organisms that contain chlorophyll. Photosynthesis involves 6 molecules of water plus 6 molecules of carbon dioxide recombining to form one molecule of sugar (or energy) and six molecules of oxygen.
Extra Discussion Item: Chlorophyll 'a' is green pigment found in all photosynthetic organisms that allows plants to conduct photosynthesis? During Snapshot Day we look at the amount of chlorophyll 'a' which we sampled as a proxy for productivity. Looking at a 24 hr. clock, when would you expect the highest amount of photosynthesis to take place?

What does pH measure? pH is a measure of how acidic or how alkaline a solution is. A pH scale goes from 0 to 14. Acidic solutions have a pH of below 7, alkaline (or basic) solutions have a pH of above 7, and neutral solutions have a pH of 7.
Extra Discussion Item: Some substances release hydrogen ions (H^+), or cause hydrogen ions to be formed when they dissolve in water, others release or create hydroxyl ions (H^-). The pH is the balance sheet of which one has the most present at any time. What are some items that effect the pH balance sheet in the Hudson River?

What is an invertebrate? An invertebrate is an animal that doesn't have a backbone. Crabs, insects, sponges, mussels, worms and crayfish are all examples of invertebrates.
Extra Discussion Item: The river's invertebrates can be classified by their habitat: Benthic (river bottom dwelling); and water column inhabitants. List some invertebrates of each type.

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Water Chestnut (Trapa natans): Trapa natans is the scientific name for the water chestnut. It is an aquatic plant found in the Hudson River and also many other freshwater ecosystems in the northeast. It originally came from Eurasia and was brought to the United States in the late 1900's. It has become an invasive species here.
Extra Discussion Item: What makes something an invasive species? Are all introduced plants invasive species? Why or why not? What are some of the issues or concerns with Water Chestnut?

Why do we study the movement of sediments in the Hudson: We study the deposition (collecting) and erosion (removal) of sediments in the river, as well their grain sizes. Where sediments collect or erode can influence what habitat is available for marine life, both plant and animal. Sediments also have surface areas where contaminants can attach. A river bottom composed of lots of small grain sized sediments has more surface areas to combine with contaminants than a river bottom composed of fewer larger grain sized sediments.
Extra Discussion Item: If contaminated sediments become buried by other sediments do we need to be concerned about them any longer?