Hudson River Volunteer Pre-Quiz

Clearwater Facts

1) **Whose idea was it to build *Clearwater*?** What book influenced him/them? Where was the boat built? How did it get its name? **When was the boat launched?**

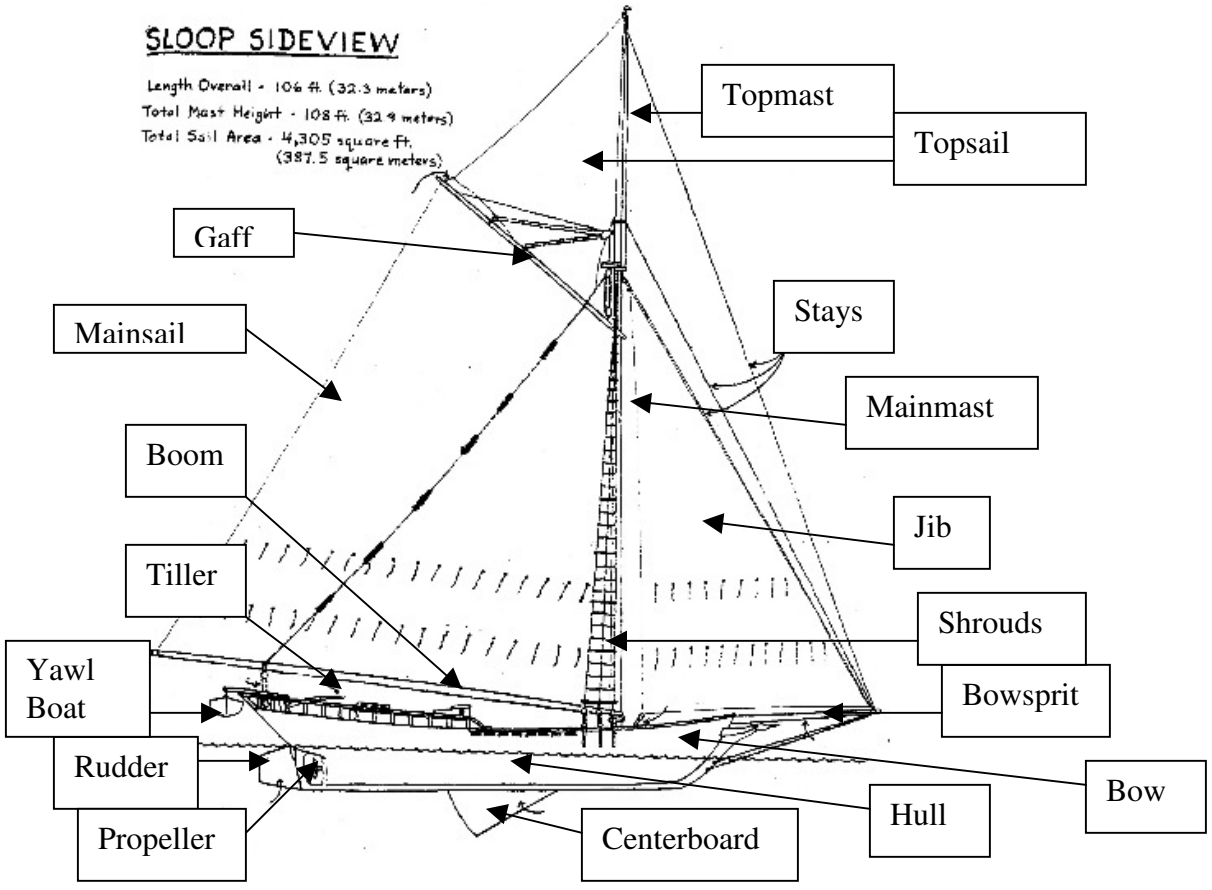
   Vic Schwartz gave a book called *Sloops of the Hudson*, to Pete Seeger. Master shipwright Harvey Gamage built the boat in South Bristol Maine, the keel was laid in 1968 and the boat was launched in May 1969. The community of folks building the boat was torn between calling the boat, *Heritage*, and focusing on historical preservation, or calling it *Clearwater*, and focusing on environmental issues. There was a vote, and *Clearwater* won!

2) How did they raise money to build the sloop? How do we raise money for the boat today?

   Pete Seeger and his folk musician buddies organized benefit concerts to raise money to build the boat. Today, some education programs are funded by the Great Hudson River Revival. In addition, support comes from grants, public sail revenue, personal donations, membership dues and other Clearwater fundraising events.

3) **What is the organizations official mission?**

   The mission of Clearwater is to preserve and protect the Hudson River for the benefit of its eco-system and human communities while creating new environmental leaders for a sustainable future.



General River Facts

1) **How long is the river? Where does it begin?** What are the characteristics of the northern half vs. the southern half?

   The Hudson is 315 miles long. It begins in Lake Tear of the Clouds, on Mount Marcy in the Adirondacks. The northern half (from river mile 315- 153) rushes down the mountain range, twisting and turning, until it meets the Troy Dam. The southern half of the river (river mile 153 – 0) experiences only 4 feet of elevation change between NYC and Albany, so the entire southern half is tidal and therefore an estuary.

2) **What is a watershed?** How many square miles is the Hudson River watershed? What states are included in the watershed?

   A watershed is the area of land where all of the water that is on or under it eventually flows to the same place. The Hudson River watershed is approximately 13,000 sq. mi. and includes New York, New Jersey, Connecticut, Massachusetts, and Vermont.

3) Name three ways that global climate change will affect the Hudson River*:

   1) Much of the railroad infrastructure will be affected by sea level rise
   2) Shorter, warmer winters and longer, hotter summers will affect local farmers & winter recreation, & may increase diseases carried by insect populations as they shift northward.
   3) Rising sea levels and strong storms will cause localized floods and threaten shoreline infrastructure and development.
   4) Rising summer air temperatures will increase pollution-related asthma & heat exhaustion, especially in urban areas.
   5) Invasive species & nuisance plants will thrive under elevated atmospheric CO2 levels. (* = Answers taken from this DEC webpage: http://www.dec.ny.gov/lands/39786.html)

4) **What is the Hudson's largest tributary?** Name three other tributaries.

   The largest tributary of the Hudson River is the Mohawk River. Others tributaries include the Rondout, the Esopus, Opalescent Brook, Moodna, Fishkill, Wallkill, etc.

5) What is the significance of Storm King?

   In 1962, Consolidated Edison proposed to build a pumped storage generating plant there to provide New York with electricity. This sparked a battle between environmental advocates and Con Ed that reinvigorated an interest within the community to preserve the Hudson Valley. After many years of debate, Con Ed agreed to give up Storm King in exchange for an extension on building cooling towers. This success is often credited as the beginning of the environmental movement! More info.

6) Give an example of local history AND local ecology in the area where you will be sailing.

   See one of these sites for a start:
   1) http://hudsonriverhistory.com/
   2) http://www.dec.ny.gov/lands/25606.html

History

1) **Who were the first people we know of living in the Hudson Valley?** How did they get around? What natural resources did they use (What did they live in/eat/make boats out of)?

   The native population were various Algonquin peoples. The Lenape tribe, of the Algonquin language group, lived along the banks of the Hudson River. For food, they hunted and gathered, fished and farmed the valley and navigated the river in dugout canoes. They lived in wigwams and thrived until the Europeans settled in the 1600s.

2) **When did Henry Hudson get here?** What was his nationality? Who employed him? What was his goal?

   Henry Hudson passed through the Verrezzano Narrows in 1609 in a ship known as the Half Moon. He was a captain from England but employed by the Dutch East India Company (then later by the Dutch West India Company). He was looking for the Northwest Passage, a shortcut to Asia.

3) **When did cargo sloops reign supreme on the Hudson River?** What are some examples of goods that went up and down? How many crewmembers did it generally take to run a sloop? What nation did the designs/most of the captains come from? Who were the Black Jacks?

   Sloops were the main transporters of goods up and down the Hudson River during the 18th and 19th centuries. The sloops brought raw materials downriver – including food crops, lumber, bluestone, bricks, ice, and livestock – and brought manufactured or imported goods upriver – including furniture, clothing, spices, and tools. Crews were made up of approximately 3 to 6 people. The sloops were largely based on canal ships used in the narrow, shallow canals of the Netherlands. Black jacks were "free" African Americans or Africans who worked as mariners, many were accomplished captains.

4) **What steamboat was the first to travel from NYC to Albany?** What year? What fuel was used? Why were sloops still competitive? What led to the decline of steamships on the Hudson?

   In 1807, Fulton's Clermont (officially named the North River Steamboat) traveled to Albany. It used coal for fuel. Sloops were still competitive because they were faster, could maneuver well, and did not explode (a typical problem with steamboats). Railroads took a large chunk of the freight and passenger business steamboats used to enjoy on the Hudson. Automobiles and the great depression also contributed to the decline of steamships.

5) **What do Tugs and Barges carry today?** What fuel do they use?

   They carry raw materials, gravel, fuels, sugar, and waste. They use diesel.

6) **The Hudson River Valley is a fjord. Why is that so?** When did it become a fjord?

   The lower part of the Hudson Valley is known as a fjord because a glacier carved the land deep below sea level in Worlds End, near the West Point Academy. The last glacial period lasted from about 110,000 to 10,000 years ago, with the greatest glaciations occurring 18,000 years ago. More info.

Life

1) **Where do most food chains on the Hudson begin?** What is bioaccumulation vs. biomagnification?
   - Phytoplankton and other green plants that convert the sun's energy into food, are the base of many food chains However, *dead* plants (known as detritus) provide a significant amount of the food eaten by primary consumers (bacteria, zooplankton, and macroinvertabrates). Dead plants have much of the carbon and some other nutrients important in the food web. Detritus enters the river by falling to the river bottom from its shores, accumulating in riverside marshes, or flowing in from tributaries.
   - Bioaccumulation is the increase of a substance within an organism. Biomagnification is the increase of a substance as it moves up a food chain. These terms are important in studying PCB pollution in the Hudson River. PCBs bioaccumulate in an organism's fatty tissues. As bigger organisms eat smaller organisms contaminated with PCBs, the bigger organisms become disproportionately more contaminated. This is why it is dangerous for Humans to eat contaminated fish, especially fish that eat other fish!

2) **What is the definition of plankton?** Name three species of plankton. What are benthic creatures?
   Plankton is alive and cannot swim against a current. Examples: copepods, scuds, jellies (jelly fish and ctenophores), and larval (baby) fish. Benthic creatures dwell at the bottom of a water body.

3) **What is catadromous vs. anadromous?** Why do fish like to live in the estuary?
   Catadromous – Species who live in salt water, but spawn in fresh water.
   Anadromous – Species who live in fresh water, but spawn in salt water.
   An estuary is an excellent habitat, safe place to breed, and there is lots of food.

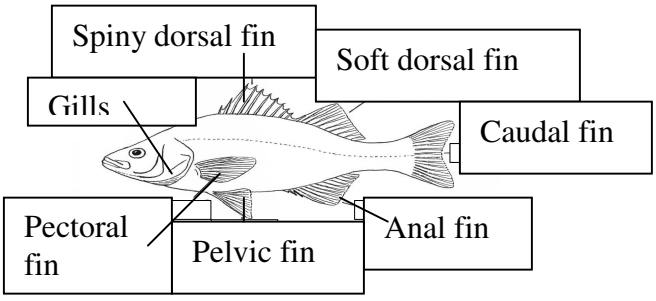
Name five species of fish that live in the Hudson River.
Some of the 210+ species: Striped Bass, American Eel, White Perch, Pipefish, Hogchoker, Atlantic Tomcod, Channel Catfish, Smallmouth Bass, Sunfish, etc.

4) **What is an invertebrate?** Name three types of invertebrates that live in the Hudson River.
   An organism without a backbone. Copepod. Shrimp. Crawdad. Blue Crab. Caddisfly. Worm. Clam. Snail. Comb Jelly (Ctenophore). Moon Jelly. Mussel.

5) **What are indicator species?** Give an example of an indicator species in the Hudson River.
   Certain species can only survive in healthy habitats. The presence of these species can act as an indication of the health of the water. Oysters, damsel flies, mayflies, trout etc.

6) **What are invasive species?** Name three invasive species in the Hudson River.
   Invasive organisms are those who are introduced to an area from somewhere else and are harmful to the ecosystem. Zebra mussels, Chinese mitten crabs, Water chestnuts.

Label the parts of the fish



Navigation

1) **How far north is the river navigable?** How far north can Clearwater sail? How far north is the river tidal?

   The Hudson River is navigable and tidal up to the Troy Dam, which is quite close to the historic head of tide. Clearwater can sail up to the Dunn Memorial Bridge in Albany/Rensselaer, which is not high enough for the Sloop's 108-foot total mast length to fit under (the Clearwater has an 84.5-foot main mast and a 37-foot topmast that overlap).

2) **What is the difference between a chart and a map?**

   A map tells you where to go on land. Usually a map shows fixed routes (e.g. roads, highways) and excludes clues to safe navigation. A chart tells you where to go, and where not to go, over water. A chart helps mariners plot their own courses and avoid non-visible features. More info.

3) **What is a lead line?** What are its uses?

   A lead line is a tool used to measure the depth of the water. Electronic depth sounders are used more frequently today (including on the Sloop), but a lead line may still be used. A lead line was also usually amended with a sticky substance such as tallow (animal fat) in order to stick to and thus sample the bottom sediments of the water body, i.e. shells, sand, or rocks. That information is now included on modern nautical charts.

4) Explain the difference between the current & the tide. What are ebb tide, flood tide, & slack tide.

   Tide is the change in water levels due to the gravitational pull of the earth and moon. Currents are the movement of water (generally either North or South on the Hudson). When the tide is rising, we are experiencing the *flood tide*. When the tide is falling, we are experiencing the *ebb tide*. In between rising and falling, there is a time known as *slack tide*. Though the shifting tides have a big impact on the direction of the currents, other factors play a role as well. These include the speed and volume of water entering the Hudson, local topography, bathymetry (the Hudson is wider/shallower and deeper/shallower in different locations, varyingly freeing or stemming the flow of water), and wind.

5) When are the spring and neap tides?

   Spring tides occur during full and new moons. The moon and the sun align and there gravitational pulls are combined. This causes a greater difference between high and low tides. Neap tides are during the half moon phase. The moon and the sun counter each other's gravitational pull, lessening the difference between high and low tides.

Knots

1) **What is a rope called on a boat?**

   A line. And, depending on its purpose may also be called a halyard, sheet, painter, rode, vang, downhaul, outtull, stop, nettle etc. More info.

Practice these knots at home before coming to the boat:

- Round Turn-2 Half Hitches
- Bowline
- Highwayman's Hitch

You might want to check out these knot-tying animations!

Water Quality

1) **What is an estuary?** What is the definition of the salt front? Where is it in the Spring vs. Summer? How can you find out where it is?

   An estuary is a partially enclosed body of water that connects to the sea. Because estuaries usually form where rivers meet oceans, they tend to have brackish water. The salt front is the barrier between fresh and brackish water. Typically, the salt front is further south during the Spring and further north during the Summer. Click here for up-to-date maps of the location of the Hudson River salt front. Also see this summary of the Hudson River estuary: http://www.dec.ny.gov/lands/4923.html.

2) **What is deceiving about calling the boat CLEARwater?** Explain attenuation vs. turbidity:

   "Clear" water doesn't necessarily mean clean water. The Hudson is naturally turbid and many organisms depend on that turbidity to survive. Turbidity is a measure of total suspended solids (TSS) in the water. Attenuation is the reduction of the strength of light through a water column.

3) **What is dissolved oxygen?** What is the minimum ppm of DO needed for fish to survive? What affects the level of DO in the water?

   Dissolved Oxygen is gaseous oxygen (O2) in an aqueous solution, like water. Fish respiration: Fish take water into their mouths and push it over their gills, which help move the oxygen into the bloodstream and send oxygen-depleted water out. Some fish can survive on as little as 4ppm, but others need more. Temperature, nutrient enrichment from runoff, and invasive plants such as water chestnuts all affect the levels of DO in the water.

4) What causes acid rain?

   Acid rain is the result of a chemical reaction between water, oxygen, and other chemicals with compounds like sulfur dioxide and nitrogen oxides, which are released into the atmosphere via exhaust pipes and the burning of fossil fuels.

5) **What are the parameters tested by our HRECOS sonde?**

   The water quality-testing device collects rea-time data on surface water temperature, salinity, turbidity, and dissolved oxygen. HRECOS site.

Environmental Action

1) **What's been a great success story for Clearwater's EA Department?**

   Clearwater was instrumental in getting GE to clean up PCBs in Hudson River. Success came after long legal battles and public education campaigns. More info.

2) What is a major new EA project?

   One important EA project is The Green Cities Initiative. Click here for more info. Another is the Indian Point Campaign. Click here for more info.

3) Name a couple of the projects of the Green Cities program.

   Green infrastructure implementations integrated with watershed management. Environmental justice and climate justice—insuring that environmental action benefits all people, including minorities and poor communities.

4) What is *Clearwater's* official stance on Indian Point?

   Clearwater's stance is that Indian Point is not safe, secure, or necessary. Numerous accidents at Indian Point and other nuclear power plants, a risk of earthquakes, terrorist attacks, and system failures at Indian Point, make it too dangerous. It poses a serious ecological challenge to fish by trapping larval and young of the year species in intake screens or drawing them through the plant. Water charge from the plan is significantly warmer than the natural Hudson and results in lowering dissolved oxygen levels. Also, Indian Point disproportionately threatens people of color and/or low income in the local community. Finally, alternative energy sources could meet New York's energy needs. More info.

5) What is Hydrofracturing?

   Hydrofracturing or "Fracking" is inserting pressurized liquid chemicals and water deep into the Earth's crust to crack the bedrock and release natural gas. There are numerous ecological and health risks involved, including polluted (even flammable) drinking water, livestock deaths, and explosions. More info.