

## Student Edition

### Script for the Tideline Power point Slides

This script is meant for student readers (generally 4<sup>th</sup> grade level) and may be read verbatim, or changed as you or your students wish. The numbers will correspond to the slide numbers on the Powerpoint slides and the words in bold will describe the section of the program and the picture you should be seeing.

#### **I. The Hudson River- an overview**

**1. Graphic of Estuary** – What is going on in this picture. An “estuary”. Everybody say estuary! Fresh water from the north mixing with salt water from the south. An estuary is a body of water freely connected to the sea and partially surrounded by land, in which salt water is diluted by fresh water running off the land. How does it mix? The tides. If you are in an area that is a mixture of fresh and salt water and there are tides, you are in an estuary.

**2. Lake Tear of the Clouds with Mt. Marcy in the background-** In the Adirondacks, on the highest peak in NY state is Lake Tear of the Clouds. This is where the Hudson River begins. This is fresh water.

**3. New York Harbor-** This is where the Hudson River ends, from here the river feeds into the Atlantic Ocean. It is salt water.

**4. Split screen showing tide differences at a dock-** What is the difference between these two pictures? Answer- The change in water level. The tides rise and fall approximately every 6 hours. The height of the tides is influenced by the phase of the moon, as the gravitational force of the moon pulls the skin of water covering the earth towards it. This picture is eighty miles from the ocean yet there are still tides- must be an estuary.

**5. Hudson River Watershed-** (over 13,000 square miles)- A watershed is an area of land that drains into a body of water. Ever heard of the Delaware river? That is the major watershed to our west. What is the dividing line? The high ground and mountains of the Catskills. Because water always flows downhill, higher elevations are what separate watersheds.

#### **II. The physical River- what it passes, how it changes.**

**6. Rapids on the Opalescent River-** This is technically the beginning of the Hudson, although it is not called that in the Adirondacks. Look how skinny it is. Only 8 feet across.

**7. Hudson River at Blue Ledge Narrows-** Look at all the rapids- a lot different than the Hudson we see in Ulster County. The river is only flowing in one direction-downhill, the more downhill the more rapids. This is not an estuary.

**8. Troy Dam-** this is the southernmost dam on the Hudson and has a large impact on the water flow. South of here the river is an estuary and is influenced by the tides. Even though it is still fresh water there are tides and bingo!(say it loud) ESTUARY! 150 miles from the ocean. The Troy Dam is at a natural barrier to this tidal flow. It is also where the locks begin to take boats farther up-stream.

**9. Catskills from Clermont-** The Catskill Mountains.

**10. Esopus Meadows Lighthouse-** This is the lighthouse we will see on our field trip, and behind it on the left is the Esopus Meadows Environmental Center. This lighthouse in particular is warning against extremely shallow water on the far side- 3 to 4 feet at low tide).

The lighthouse was constructed in 1839 and rebuilt in 1872 (on a new man-made island). Up until the early 1960's a family would live in the lighthouse, maintaining the light to warn vessels. Electricity replaced the light keepers and now the Coast Guard has installed a solar powered light. Renewable resources – awesome!

**11. Mid-Hudson Bridge-** This bridge connects Ulster and Dutchess counties at Poughkeepsie. This is also where you begin to find the salt front. That is the line where salt water reaches no further up into the river. It changes with the seasons. In spring the salt front moves south due to all the snow melt from the mountains. In late summer and times of drought the salt front moves north.

**12. Bannerman's Castle on Pollepel Island-** Frances Bannerman bought the island in 1900, and designed and built a Scottish/Moorish style castle in which he collected and sold military explosives and arms. After his death in 1918, his family continued to use the island as an arsenal until they sold the island to the state and subsequently to the Taconic State Park Commission in 1968. Tours were given for a short time until a fire ravaged the island in 1969. The castle has been abandoned ever since.

**13. Close-up of castle.**

**14. Storm King Mountain-** Still moving south we are now near Newburgh, close to the deepest point in the river (216 feet).

**15. Bear Mountain Bridge-** This is the first highway bridge built over the Hudson. By 1920 ferries could no longer meet the demand from people wishing to travel between New York City and Albany. It was decided that a highway bridge must be built, and the entrance to the highlands (the narrowest part of the river) was chosen as the best spot. At the time it was the world's longest suspension bridge, and a major technological advance of the time.

**16. The Palisades-** A geologic formation that is the result of shifting plates, cooling magma, and erosion. The Hudson actually follows an inactive fault line. At one point the area where the Palisades now stands was pushed up. This rising, mixed with constant erosion, revealed a platform of rock that was formed by hot magma that slowly tried to press its way to the earth's surface. As it pushed upward, it cooled in the most efficient shape it could- hexagonal pillars. This shape made it so that the pillars had the most surface area possible and still fit together. (If they had round or octagonal pillars, they would probably fit together, but they'd have large gaps of air between them.) The rock is called columnar basalt.

**17. George Washington Bridge and Little Red Lighthouse-** The little red lighthouse is at Jeffrey's Hook on Manhattan Island. It is the southernmost lighthouse on the Hudson River. The book by Hildegard H. Swift "The Little Red Lighthouse and the Great Grey Barge" made it a popular landmark for children. In fact, the outcries of children and their advocates helped save the lighthouse from being torn down when it was decommissioned.

**18. New York Harbor-** The Verrazano Bridge in the distance connects Brooklyn and Staten Island. Beyond that is the Atlantic Ocean.

### III. Inhabitants

**19. Seahorse-** Now we will start from the south and move north with creatures in the Hudson. The Seahorse is a salt-water creature. It is found in New York Harbor. They do not come much farther north than the GW Bridge. Why? (not enough salt)

**20. Blue Claw Crabs-** These crabs are found throughout the brackish water areas of the river. We sometimes catch them at Esopus Meadows, but that is the extreme north of their range in the estuary. They are usually much smaller.

**21. Sturgeon Drawing-** Oh My! There couldn't be a fish that big living in the Hudson. Are they dangerous? Only if you are trying to catch a 20-foot sturgeon with a 15-foot rowboat. Which they did.

**22. Atlantic Sturgeon-** There are fish this big in the Hudson. The Atlantic Sturgeon lives in the Hudson River for its first year of life and then returns later to spawn. They are really cool fish in that they are like a dinosaur fish. They are described as a cross between a Stegosaurus and a Shark. Sturgeons have bony plates called scutes along their sides for protection. Atlantic Sturgeons have been over-fished, and there is now a ban on catching them. These fish live for a very long time and the females do not spawn until they are 18-20 years old. This makes it hard to replenish their numbers. The deeper water near Esopus Meadows is one place these animals spend their winter, but we will not catch any because they and their cousins the Short-nosed Sturgeon prefer the deep water in the channels of the river. We will be fishing near the shoreline. Check out that shirt in the back, do you think this is an old slide?

**23. Plankton-** Sturgeon may be the largest fish in the river but they eat some of the smallest creatures in the Hudson...plankton and macroinvertebrates. In this slide you will see a couple of different types of macroinvertebrates you will see at EMEC. Phytoplankton (plants) are present, and an amphipod (a scud- looks like a shrimp- both crustaceans), a copepod (center) and a daphnia (bottom right). The smaller stuff is phytoplankton.

**24. Largemouth Bass-** This is a popular sport fish, bass are voracious eaters and are said to eat anything that moves. They are fresh water fish, so you will not find them in the brackish water south of the salt front.

**25. Bald Eagle-** Bald Eagles are an indicator species. This means that they have a very low tolerance for pollution. If a river is too polluted and the quality of the environment declines, they're part of the group that's the first to pack up and leave. For a long time there were no eagles on the Hudson but as we clean up the river they are returning. You may even see one at EMEC.

#### **IV. History and Human Uses**

**26. Cargo transport, Anthony's Nose and Sloops-** Sailboats like these used to be the major way goods were transported. Think of the river as the original NY State Thruway.

**27. Cargo Transport, Barge and Tug-** This is the way most things on the river are now transported. This is an oil barge.  
Is it empty or full? (empty)

**28. Aid to Navigation-** This red buoy helps show boats where the channel is. The channel is like the road on the water- it is where the deepest water is so that ships will not hit the bottom. The other side of the channel is marked with green buoys.

**29. Revolutionary War chain-** This chain was strung across the river to stop British ships from bringing soldiers upstate. The entire chain was 600 yards long and weighed 65 tons- this is just a section. The area of West Point was chosen for the chain because it was a narrow and twisting part of the river.

**30. Brick Barge-** People used the abundant supply of clay in the Hudson Valley to make bricks. This was a very large industry during the Industrial Revolution.

**31. Commercial fishermen in dory-** American Shad- This was an important commercial fish on the Hudson. There are a few fisherman left who take shad to sell at market, but their numbers are declining. People also sport fish for shad.

**32. Man sawing ice-** Before refrigeration, people on the river (usually fisherman, and bargemen out of work due to the weather) would harvest ice during the winter and store them in icehouses until springtime when they would sell the ice for iceboxes, sno-cones and lemonade.

This is a former Clearwater captain clearing ice away from the vessel. That saw is about ten feet long.

**33. White river rafting-** The Hudson has a huge recreational industry; fishing, boating, swimming and of course, white water rafting on the northern parts of the river. Are they having fun? The guy in the center- maybe not.

**34. Sailboat in foreground-** The first famous group of painters in the United States, the Hudson River School brought attention to the wonderful scenery and beauty of the river. They were part of the Romantic Movement in art, which displayed the splendor of the natural world. They were in some ways the first environmentalists, because they appreciated the beauty of the natural world and before the Industrial Revolution.

**35. Power Plant-** Would this have inspired the Hudson River School? Doubtful, but we all need electricity. This is a General Electric power plant in Hudson Falls. This plant was one source of PCB's in the Hudson River, a toxic material that has caused much controversy in the area. A clean-up is planned. If you want to find more information on this subject please go to our website [www.clearwater.org](http://www.clearwater.org)

**36. Garbage-** Things we don't want to see in our river- oil, floatable debris, litter from runoff, and toxic chemicals. How do these things get into the river? This is an example of non-point source pollution (not one specific source where this gets into the river).

**37. Effluent into River-** Pipes like this are not as common on the river anymore thanks to greater awareness and stricter regulations. This is a type of point source pollution.

**38. Sloop Clearwater-** America's environmental flagship. The organization began by building this sloop in 1969 to educate people about the river.

**39. Schooner Mystic Whaler-** Our sister ship that helps with our spring season.

**40. Watershed/Estuary sign-** These sturgeon signs have been placed near local streams and rivers to remind us that they lead to the Hudson and are part of the estuarine ecosystem.

Let's keep them clean!

**41. Esopus Meadows Environmental Center-** This is where you will be on your field trip.

**42. Sculpture project at Esopus Meadows.**

**43. The Beach-** Here are some students down at the beach modeling proper footwear. You should bring clothes and shoes to get dirty in- and don't forget to dress in layers, especially if it is cold. Bring a re-usable water bottle and maybe a raincoat too. If it rains the field trip will continue- we just call it liquid sunshine.

**44. Water Chestnuts-** Friend or foe? These are an invasive species from Asia brought to this country in the 1800's. They were accidentally introduced to the Hudson River, and because they have no natural predators on this continent they have taken over certain areas of the river. The sharp, black "cow-heads" are the seeds of this plant.

**45. Fishing-** Using a seine net we will see what we can catch. The people out there fishing could be your parent or teacher when you come. Do you want to see them get wet? Luckily we have waders to protect them.

**46. Happy Kids-** Did they enjoy their field trip?  
I think so!  
See you on the river.

**47. Lunchtime-** Don't forget to bring yours!