Level 2: Long-Term Hudson River Fish Surveys (NYSDEC)
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❖ **Background Information:** The Hudson River is a vital resource for a multitude of interconnected ecosystems. Each Hudson ecosystem relies on the biotic and abiotic components within it and on the organisms and materials that enter and leave the river through flowing water. This means that understanding the health of organisms like fish that traverse the river can serve as a model for the health of this crucial watershed.

Fish are also important organisms to study because many people connect to the Hudson River by catching, observing, and learning about fish. Many people like to fish along the riverbanks, which means it is important for managers to know how many fish can be taken from the water without disturbing their various habitats. Studying fish populations is critical to preserving a healthy Hudson River.

The New York State Department of Environmental Conservation uses long-term data to determine the health of the different fish populations in order to distribute fishing permits, among other things. This data ensures that overfishing does not occur, and populations of fishes can remain stable over time.

Data are also needed to help understand the effect of dams on certain populations and ecosystems. Since many species of fishes travel long distances through the Hudson River and its tributaries, it is important to understand the obstacles to their movements.

In order to see these effects, the Long River survey was established in 1974 so that the density of fishes in different ecosystems can be measured along the entire estuary. This is done at different times throughout the year, usually when eggs and larvae are the most abundant. For some fish, different life stages are counted separately. For more detail on these life stages, please see the Dataset Variables section.
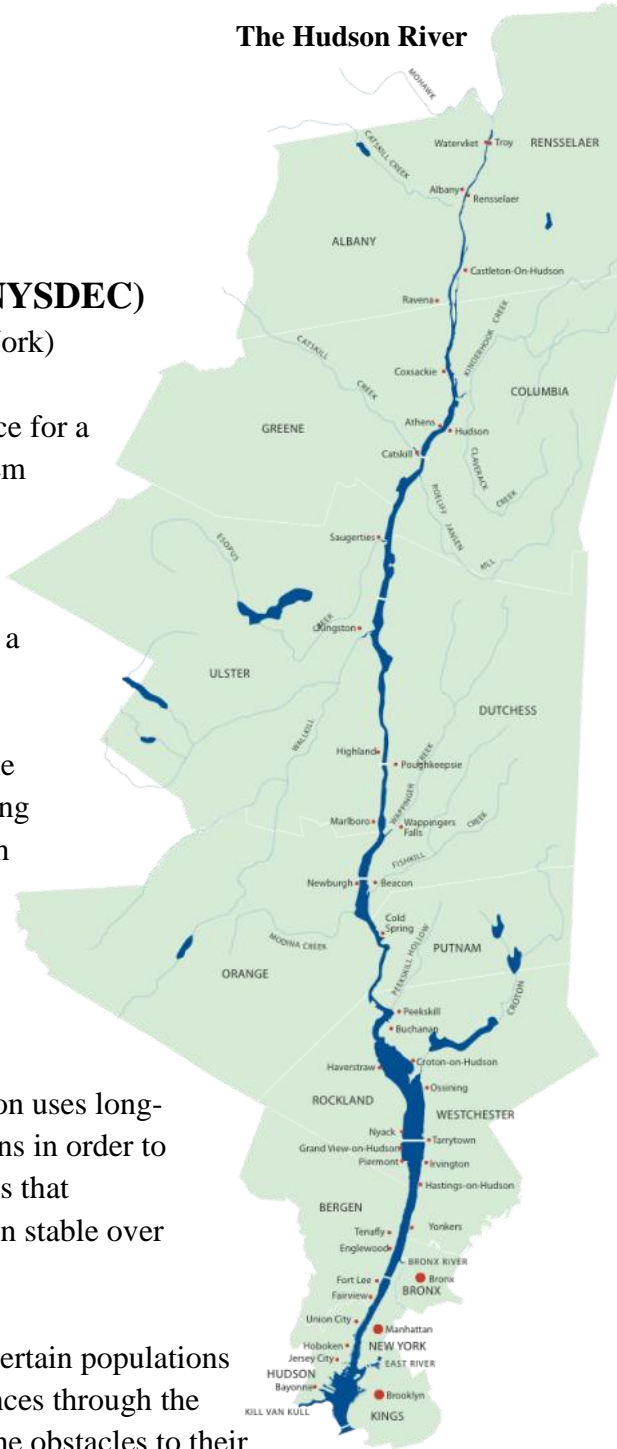
American shad. Artwork by Ján C. Porinchak

❖ **Dataset Timeframe:** 1974-2012

American Tomcod. Artwork by Ján C. Porinchak

❖ **Data Collection Methods:** For the Long River Survey, the DEC collected a variety of fish in the spring, summer, and early fall when eggs, larvae, and juveniles are more plentiful. This dataset shows their results for tomcod, striped bass, rainbow smelt, and American shad. The herring data in this dataset were collected through the Fall juvenile survey in the mid-summer and fall. For both surveys, fish were sampled all the way from the George Washington Bridge up to the Federal Dam in Troy. Most of the sampling was done by seine netting and trawling with nets. The different kinds of nets allowed scientists to survey the river bottom, open water, and shoreline.

❖ **Dataset Variables:**
  ➢ **Index:** a measure of average density of fish per measured volume of water. Data has been manipulated so that different fish species can be compared, even if surveying methods are different.
  ➢ **Yolk-sac larvae:** larvae that have hatched from their eggs, but still continue to receive nutrients from their attached yolk.
  ➢ **Post yolk-sac larvae:** larvae that no longer have a yolk sac and begin to find food on their own; these larvae are not usually fully formed.

A young (approximately one year old) shad found while seining near Catskill in 2011.

  ➢ **Juvenile:** young fish (usually in their first year of life) that have not reached sexual maturity yet.
  ➢ **Adult:** fully formed, mostly fully grown fish that have reached sexual maturity.
  ➢ ***All of our data are for post yolk-sac and juvenile fish *except* the American Shad!

❖ **Source of Datasets:** Yearly report from the New York State Department of Environmental Conservation.

❖ **Inquiry Idea Starters:**
  ➢ *Do any of the fish population densities seem to increase or decrease over time? Did the same species have the highest population density at the beginning and at the end of the survey?*
  ➢ *Do eggs, larvae, and juvenile stages follow the same pattern in population density over time for American Shad?*
  ➢ *Which fish species population density varied the most over the course of this survey?*
  ➢ *Do any of the fish populations seem to follow similar patterns over time? If so, hypothesize about whether they are actually connected to each other, or if another variable, such as fishing or pollution might be causing them to change.*

❖ **Extension Ideas:**

    ➢ How does this data compare with the data collected by the Great Hudson River Estuary Fish Count?

        ○ For this resource, visit: http://www.dec.ny.gov/lands/97891.html

    ➢ What factors might be influencing the changes in a population?

    ➢ Do dams create significant changes to ecosystems for the fishes that live in them?

    ➢ Does Hudson River temperature affect fish populations?

        ○ You can use *Level 1: Hudson River Temperature at Poughkeepsie (1946-2012)* dataset to track annual average changes in Hudson River temperature.

❖ **References:**

    ➢ Fish Sampling Methods: Hudson River utility survey year class reports from 1974-2012.

        ○ They have been prepared by various consultants for the utility companies over the years as a condition of their environmental permits.