STREAM CONDITION INDEX
IN THE HUDSON RIVER ESTUARY WATERSHED
A Tool to Protect High Quality Waters

Where are high quality streams?

Taking a proactive approach to protecting high quality water bodies before degradation occurs has been difficult, as much of the water quality efforts of state and federal regulators is focused on restoring impaired waterbodies. The EPA released *Identifying and Protecting Healthy Watersheds* in 2012, which seeks to protect healthy waters, including healthy watersheds. It illustrates the benefits of small investments to prevent healthy places from becoming impaired, compared to the large cost and long timeframe required to restore impaired waters. Several states have followed this effort to create state-wide stream health indices. **Identifying high-quality streams fills a municipal need, informing local land use planning decisions and directing conservation efforts to the places providing ecological and community benefits.**

Figure 1: Stream Condition Index for streams of the Hudson River Estuary watershed

Stream Condition Index

Using the *Identifying and Protecting Healthy Watersheds* framework, the NYSDEC Hudson River Estuary Program created a Stream Condition Index (SCI) with help from NYSDEC Division of Water, New York State Water Resources Institute and New York Natural Heritage Program. The SCI tallies eight individual metrics for each stream reach in the Hudson River Estuary watershed, and combines them into a condition between low and highest quality (Figure 1). The SCI compliments existing datasets, including New York State's Waterbody Inventory, by identifying high-quality streams and providing fine-scale, quantitative information that can be tracked into the future.

The following metrics make up the Stream Condition Index:

- **Natural Cover**
- **Agricultural Cover within 200m**
- **Impervious Cover**
- **Brook Trout Habitat Suitability**
- **Hydrological Alteration (Dams)**

- **Habitat Connectedness**
- **Stream Biological Assessment Profile**
- **Geomorphological Constraint**
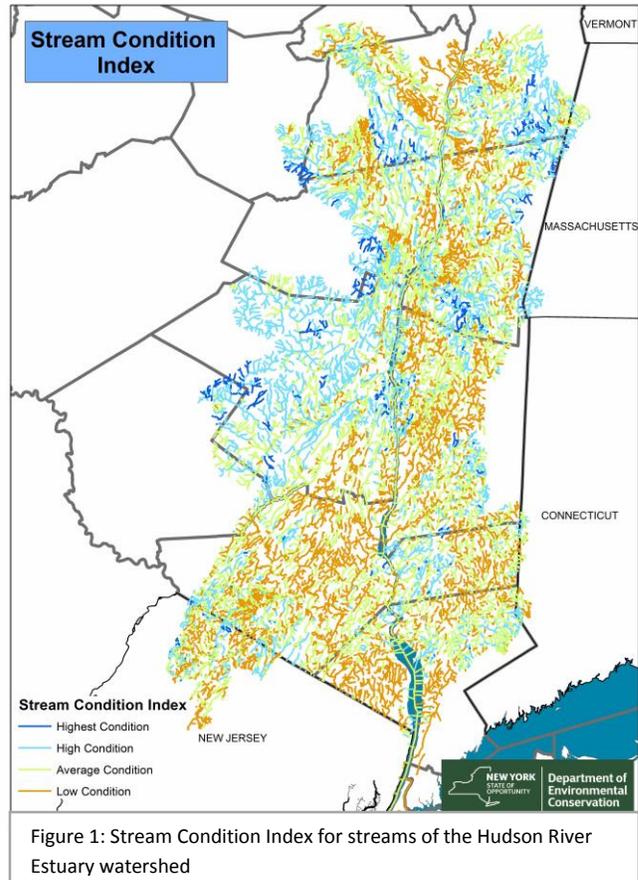
Stream Condition Index Components

The SCI is a GIS-based combination of stream quality data at a fine scale (Figure 2). **Natural cover** is derived from the 2011 National Land Cover Database. The percent natural cover in all upstream catchments is attributed to each stream segment. Similar analyses of **agricultural cover** within 200m of streams and **impervious cover** are included.

The SCI uses USGS' predicted **brook trout habitat suitability**. With cooperation from New Jersey, Connecticut, and Massachusetts, a comprehensive dataset of known dams is used to calculate **hydrological alteration**--dam density per subwatershed. Using the Barrier Analysis Tool, a GIS add-on shared by The Nature Conservancy, aquatic **habitat connectedness** is measured, assessing distances between known barriers. The barriers that divide these functional habitat networks include all known dams within 20 meters of streams, as well as culverts that have been assessed in many subwatersheds.
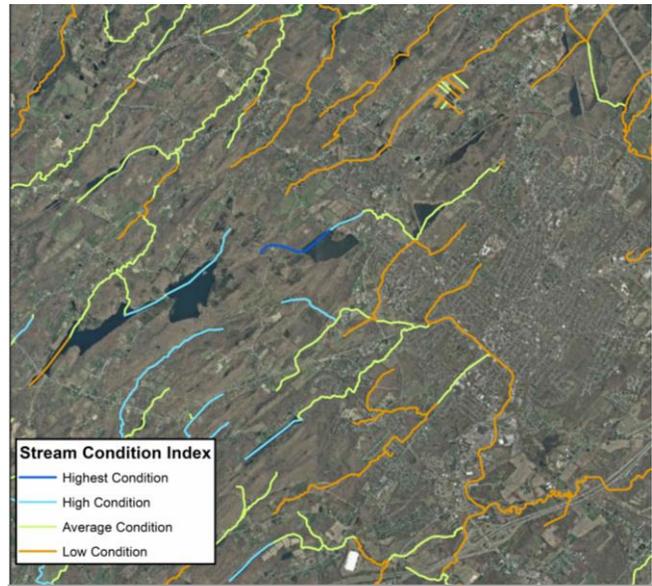

Figure 2. The Stream Condition Index for the Lower Wallkill watershed near Middletown, NY. The resolution of the Index makes it useful for local as well as regional planning and management.

The New York Natural Heritage Program modeled **stream biological assessment profiles** based on biomonitoring samples collected by the NYSDEC Stream Biomonitoring Unit. Finally, the density of railroads and roads within 50 meters of each stream segment and the density of railroad and road stream crossings was calculated. Together, these components comprise the score of **geomorphological constraint**. Each of the metrics are standardized as a value between 0 and 4. For each of 38,888 stream segments in the estuary watershed the individual metric scores and the combined score is available. The SCI uses GIS information to provide a way to compare streams' geomorphology, hydrology, landscape condition, biological integrity, and habitat condition.

Where To Go From Here

The Hudson River Estuary Program is using the SCI in their outreach efforts to synthesize several stream health measures into one value. The SCI also provides fine-scale refinement to the State's water quality information, helping to identify places where conservation efforts will help maintain the ecological and community benefits of high quality streams. Contact the Hudson River Estuary Program for more information and access to the data. The Hudson River Estuary Program will continue to improve the SCI in the coming years and plans to use a natural resource webmap to share the data.

CONTACT INFORMATION

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