PisCES: Pis(cine) Community Estimation Software

Overview

PisCES predicts a fish community for any NHD-Plus stream reach in the conterminous United States. PisCES utilizes HUC-based distributional information for over 1,000 native and non-native species obtained from NatureServe, the USGS, and the Peterson Field Guide to Freshwater Fishes of North America (Page and Burr 2011). In addition to using current geographic distributions, PisCES can alter potential communities to reflect information on species rarity, stream size preferences, and occurrence envelopes for water quality metrics (pH, conductivity, turbidity, dissolved oxygen) and stream characteristics (watershed area, mean width, depth, and slope). PisCES can also create an abundance distribution for a fish community using an approach that associates abundance of a species to its maximum body size.

Data

Stream segmentation was derived from the NHD-Plus dataset (http://www.horizon-systems.com/nhdplus/). The PisCES database of species-specific information was derived from Page and Burr (2011), the online NatureServe Explorer (http://explorer.natureserve.org/), and FishBase (http://www.fishbase.us/), including

- The mapped distribution of species based on collection records
- The stream size (mean width) where species are generally sampled
- The rarity of each species inside its range
- The maximum size each species attains
- Other species-specific habitat preferences

Fish Distributions. PisCES output is based on known geographic distributions of fish species, obtained primarily from two sources:

- 8-digit HUC-based species distributions from NatureServe (2010)
- 8-digit HUC-based distributions of documented species introductions (both native and non-native fishes) from the USGS Nonindigenous Aquatic Species Program.

Larry Page, Florida Museum of Natural History, provided distributional polygons for species detailed in the Peterson Field Guide (Page and Burr 2011) for which the above two sources did not have distributions.

Stream Width. PisCES can filter a predicted fish assemblage using a species stream size preference under mean flow conditions. This information from the Peterson Guide is categorized using narrative terms, and the Guide provides a guideline for relating these terms to a mean stream width metric:

Headwater/Spring: 0-1 m
Creek: 1-5 m
Small River: 5-25 m
Medium River: 25-50 m
Large River: > 50 m

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