

Predicting Fish Species Occurrence Using the NHD

The Alaska Department of Fish and Game is studying the relationship between the presence of a fish species at a particular point and the stream characteristics at that point that can be derived from the analysis of the National Hydrography Dataset. The premise is based on the fact that certain fish like certain stream characteristics. So, if those characteristics can be understood and linked to the fish found there, it may be possible to predict that the fish should be found at other locations with similar conditions. If this can be done, it will provide planning tools for management, research, and monitoring programs as well as improve the efficiency of fieldwork. The process works by applying spatial statistical models (Ver Hoef et al.) that look at a hierarchy of GIS-generated landscape attributes on the stream network. GIS derived covariates are generated for parameters on topography, climate, geology, hydrology, vegetation, and land use at region, drainage, catchment, reach, and station scales, and predictive values calculated for each covariate. The high resolution NHD (1:63,360-scale in Alaska) provides the stream network upon which sample and prediction points are added as linear referenced events. A matrix of point-to-point distances and flow direction along the stream network is used to model autocovariance. The NHD is also used to derive hydrography landscape attributes for the sample and prediction points including: (1) flowline density, (2) canal/ditch density, (3) downstream channel length, (4) lake area, (5) channel gradient, (6) upstream glaciers, (7) upstream lakes in glacial systems, (8) Strahler stream order, (9) downstream stream link number using Shreve order, (10) catchment delineation, and (11) stream discharge. A number of applications will need to be developed to calculate some of these parameters. Future work will involve extending these approaches to estimate various indices of fish production. You can find out more by contacting Joe Buckwalter at joseph_buckwalter@fishgame.state.ak.us or Mike Wiedmer at mike_wiedmer@fishgame.state.ak.us.

Upper Neuse Watershed Evaluation Tool

About 450,000 people in North Carolina get their drinking water from a 770-square mile portion of the Upper Neuse subbasin. Multiple local and state agencies have responsibility for water-resource management in this area. To provide a forum for cooperation on water quality protection and water-resource planning and management, eight municipal and six county governments, along with local soil and water conservation districts, voluntarily formed the Upper Neuse River Basin Association (UNRBA) in 1996. The area of interest is upstream from the Falls Lake dam within the Piedmont physiographic province of North Carolina and encompasses nine public drinking-water supply reservoirs that serve people within and downstream of the basin. While water-quality is generally good throughout the basin, the North Carolina Division of Water Quality designated thirteen stream segments totaling 56.8 stream miles as impaired. Population in the basin grew by 21 percent from 1990 to 2000 and is projected to grow by 53 percent over the next 25 years. In the process, rural and agricultural lands will be converted to urban and suburban uses. These changes likely will be accompanied by increased demands for drinking water and could result in additional water-quality degradation.

To provide water-resource management, the UNRBA, individual local governments, and state agencies need a detailed and readily accessible information system regarding stream and watershed characteristics to support planning efforts in the basin. To meet this need, the USGS North Carolina Water Science Center developed the Watershed Evaluation Tool (WET) using the ArcView 3.x NHD toolkit and water-resource and other environmental information. Having access to digital stream maps, waterbody use-support ratings, land cover, locations of pollution sources, and historical monitoring results, can help the UNRBA evaluate different monitoring sites and approaches. Local planners and utilities can use stream-

network and related information to facilitate retrofitting pollution-control practices and developing plans for stormwater management and water supply protection. Information on hydrology, land cover, aerial photography, and watershed-delineation tools can streamline development of local watershed plans and to characterize potential mitigation sites. Unique features of the WET include: (1) Currently 15 layers of local point, line and catchment datasets have been georeferenced to the NHD reaches. (2) Hotlinks to important data holdings have been established so that information can be accessed. Included are links to real-time water levels of streams, water-quality data on monitoring sites, permitted discharge amounts of NPDES sites, and contact information for monitoring sites. (3) Using the georeferenced data and the NHD navigation tools, simple statistics and summaries of data can be performed. Questions such as “How many dischargers are upstream of this surface water intake”, “What acreage of urban land drains to this water quality monitoring site”, “How many miles of impaired streams are within each jurisdiction in the Upper Neuse”, or “How many bridge crossings are downstream of this location” are now easily answered. (4) High resolution LiDAR-derived elevation data was used to generate catchments and flow information for the basin. These catchments were conflated with the NHD attributes, and can also be used for navigation. (5) Basin characteristics were summarized by catchment so many attributes can be calculated by navigating watersheds. Land cover, slopes, impervious surfaces, potential contamination sources, etc., have been tied to the catchments. (6) All local jurisdictions, regional, State and Federal interests in the Upper Neuse have access to the same data, and can now easily coordinate activities.

The final phase of the project is currently underway. This entails finalizing datasets, documenting the datasets and tool, and final delivery to the stakeholders. For more information, contact Mary Giorgino, giorgino@usgs.gov, (919) 571-4087 or Silvia Terziotti, seterzio@usgs.gov, (919) 571-4090.

Minnesota Information Exchange Network

The Minnesota Pollution Control Agency (PCA) and the Minnesota Land Management Information Center (LMIC) were awarded a Challenge grant from the Environmental Protection Agency (EPA) this past year to implement the exchange of integrated surface water quality report information through EPA’s National Environmental Information Exchange Network (the grant is known to some as a “NEIEN Grant”). The project will also implement a Minnesota Reach Address Database that will spatially integrate the stream (NHD reach) locations of assessed waters, impaired waters, monitoring sites, and other water related events. The project team hosted two user requirements sessions in May for interested state organizations. These requirements will guide the development of the project over the 2- year grant period. You can find out more by contacting Cary McElhinney (312-886-4313) or Tommy Dewald (202-566-1178) for additional information. Also, see <http://www.epa.gov/neengprg/> for more information about the NEIEN grant.

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