Wildlife scientists map fishing resources to assist land managers, anglers

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Paul Angermeier, a professor of fish and wildlife conservation at Virginia Tech, says an ecosystem service approach enables managers to consider recreational fishing in concert with other important ecosystem services that support fishing, such as water quality regulation, and maintaining a pleasurable outdoor experience. Credit: Virginia Tech

Anglers in North Carolina and Virginia who are looking for privacy at good fishing spots should head for the mountains, according to a Virginia Tech study of the capacity, quality, and demand of freshwater

recreational fishing sites in the two states.

"Our objective was to map a cultural ecosystem service by identifying the key features that influence anglers' enjoyment, such as environmental quality, accessibility, and fish abundance," said Amy Villamagna, a research scientist with the College of Natural Resources and Environment's fish and wildlife conservation department. "We hope that the resulting framework can be applied to other cultural services and used to guide landscape-level natural resource and land-use management."

"Of course, savvy anglers will benefit from the map as well," said Paul Angermeier, a professor of fish and wildlife conservation and an assistant leader of the Virginia Cooperative Fish and Wildlife Research Unit. He is also affiliated with Virginia Tech's Fralin Life Science Institute.

"When developing the framework to map freshwater recreational fishing areas, we started with our own preferences on how we enjoy the outdoors, such as clean water, forested areas next to streams and lakes, and uncrowded areas," said Beatriz "Tiz" Mogollon of Bogota, Colombia, a master's degree candidate in fish and wildlife conservation.

"Other cultural ecosystem services include bird watching, canoeing, walking in the woods—basically any activity that you do for recreation and enjoyment in the natural world," Mogollon said. "But, fishing is an important place to begin in terms of mapping services because it is so popular and is important to the economy."

"Recreational fishing is a passion of people in Virginia and North Carolina," said Villamagna. "Clean, fishable waters are a part of this region's heritage and, therefore, incredibly important to recognize and protect."

The team's study was posted online ahead of publication in the October 2014 issue of *Ecological Indicators*.

Freshwater recreational fishing generates income, jobs, and funding for conservation. In 2011, more than 27 million people fished U.S. freshwaters, and Americans spent more than $41 billion on fishing-related equipment, licenses, transportation, and other activities. As a result, every state spends substantial public funds annually to support and manage freshwater recreational fishing.

"An ecosystem service approach enables managers to consider the capacity of and demand for recreational fishing in concert with other important ecosystem services that support fishing, such as water quality regulation, and maintaining a pleasurable outdoor experience," said Angermeier.

Primary benefits to anglers include relaxation, communion with nature, spiritual renewal, food for the table, and social bonding. Ecological properties that contribute most to fishing success are habitat quality and fish abundance. Key management factors for freshwater recreational fishing are boating access, publically accessible areas, advertised fishing spots, and game-fish stocking.

"As a cultural service, freshwater fishing would not exist without the wide array of regulating and supporting services, like water supply and purification," said Villamagna. "We tried to capture these important background functions in this multi-indicator framework while also recognizing the social aspects that contribute to fishing for recreation."

While natural ecological pressures such as climate change can reduce fishing capacity, the researchers focused on pressure attributed to overuse, which can result in soil compaction, vegetation loss, sedimentation, and fewer fish.

Demand for fishing was measured by the number of fishing licenses purchased and the home addresses of the anglers. Previous research has determined that anglers are twice as likely to fish within 10 miles of their home.

The study revealed a decline eastward, from the mountains to the coast, in the capacity to provide a quality fishing experience.

The researchers found that the environmental attributes of water quality, surface water availability, tree coverage, and game-fish abundance were best where there were large bodies of fresh water, such as along the Roanoke River and in the upper portions of watersheds; these attributes were less prevalent in the coastal plain.

"Social capacity—the equal-weighted combination of boat access sites, game-fish stocking, advertised fishing spots, and public use areas—was low throughout most of North Carolina and Virginia," the article reported. The best sites are near the John H. Kerr Reservoir and Lake Gaston on the Virginia-North Carolina border.

Social capacity was relatively high in western Virginia and North Carolina because of substantial trout stocking, extensive public use areas within national forests and parks, and promotion of fishing spots within the mountains of Virginia. Most boating access sites were located along the Roanoke River and New River corridors.

"It is valuable to identify areas that have a higher natural ability to sustain use and continue to provide experiential benefits," said Angermeier, "but areas with high social capacity may warrant greater investment in reforestation along streams, rivers, and lakes as well as habitat restoration and water quality protection."

"Mapping the attributes of good fishing spots facilitates our

understanding of the interactions among ecosystem services and their interface with land management decisions, and stimulates joint management efforts," said Villamagna.

"It also provides a coherent framework for evaluating other wildlife-based recreation services, such as hunting and bird watching," said Mogollon.

"Our framework can also help managers look beyond local demand and historical trends to begin to consider the potential impacts of future shifts in the demographic and geographic features of angler populations," said Villamagna.

"While there are good rivers and lakes close to the big cities, there is the potential for them to be overcrowded," said Angermeier. "Ecological degradation can be avoided by enhancing crowd management, improving habitat quality, or revising advertisements to attract anglers to fishing spots that are more likely to be sustainable."

The researchers say the new framework "provides a powerful tool that can inform conservation and management decisions. It enables scientists and managers to envision connections between biophysical and social capacity, the capacity of ecosystems to meet demand for freshwater fishing, and the potential ecological pressures from overuse."

"Cultural services are inherently important to the well-being of people in this region," said Villamagna. "Therefore, we hope that this framework will help elucidate their value and the importance of a healthy environment to support them."

Provided by Virginia Tech