The Wadeable Streams Assessment: A Collaborative Survey of the Nation's Streams

Background

The Wadeable Streams Assessment (WSA) is a first-ever, statistically-valid survey of the biological condition of streams throughout the U.S. Wadeable streams—streams and rivers that are shallow enough to sample without boats—were chosen for study because they are a critical natural resource, because we have a well-established set of methods for monitoring them, and because they are frequently under-sampled in traditional monitoring programs. This project was a collaborative effort involving states, EPA and other federal agencies, tribes, universities and other organizations.

Purpose

Report on the condition of wadeable streams of the US.

Help build State capacity for monitoring and assessment.

Promote collaboration across jurisdictional boundaries in the assessment of water quality.

The WSA was designed using modern survey techniques; 1,392 random sites were sampled to represent the condition of all streams in regions that share similar ecological characteristics. Participants used the same standardized methods at all sites, to ensure results that are comparable across the nation. A rigorous quality control program included training all field crews, auditing field crews and labs, and re-sampling 10% of the sites. The sampling began with pilot work in the West in 2000 and was completed nationwide in 2004.

The WSA used *benthic macroinvertebrates* to determine the biological condition of streams. Benthic macroinvertebrates are small creatures that live in streams attached to rocks and woody debris, or burrowed into the stream bottom. They include aquatic larval stages of insects such as flies and dragonflies; crustaceans such as crayfish; and worms and snails. These organisms are found everywhere, even in the smallest streams that cannot support fish. Since some benthic macroinvertebrates are more sensitive to pollution than others, information on the abundance of the various types of organisms tells us whether a stream is healthy.

The WSA supplemented information on the biological condition of streams by measuring key chemical and physical indicators that reveal stress or degradation of streams. The WSA reports on four chemical indicators (phosphorus, nitrogen, salinity, and acidity) and four physical condition indicators (streambed sediments, in-stream fish habitat, riparian vegetative cover, and riparian disturbance).

The WSA was designed to provide regional and national assessments of stream quality, and findings are presented using three different reporting levels. The first level is the conterminous U.S. or lower 48 states; Alaska and Hawaii were not included in this assessment, but pilot projects are underway in those states. The second level is three major climate and landform regions (the Eastern Highlands, Plains and Lowlands, and West). The third level is the nine ecological regions that further divide the three major climate and landform regions. There were not enough sites in the survey to allow statistically-valid assessments of water quality at the state level.

Findings

The WSA found that 28% of U.S. stream miles are in good condition compared to the best available reference sites in their regions, 25% are in fair condition, and 42% are in poor condition. Another 5% were not assessed.

Stream quality varies widely across the diverse ecological regions of the U.S. Of the three large climate and landform regions, the West is in the best condition, with 45% of the length of wadeable streams and rivers in good condition. In the Eastern Highlands region, 18% of stream length is in good condition and more than half is in poor condition. The quality of streams in the Plains and Lowlands region falls between the other two regions, with almost 30% of stream length in good condition and 40% in poor condition. (Figure 1)

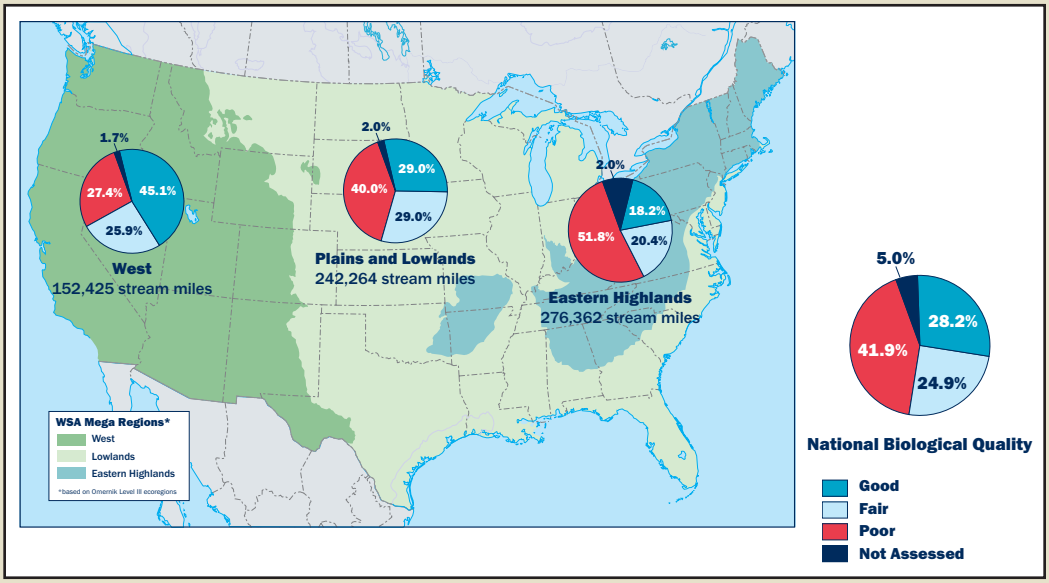

Figure 1. Condition of wadeable streams

The most widespread stressors observed across the country and in each of the three major regions are nitrogen, phosphorus, streambed sediments, and riparian disturbance. These stressors can degrade stream conditions for fish and other aquatic life. Nitrogen and phosphorus are nutrients that can increase the growth of algae, decrease levels of dissolved oxygen and water clarity, and degrade stream habitat. Excess streambed sediments can smother habitat for aquatic organisms. Riparian disturbance is evidence of human activity alongside streams, such as pipes, pavement and pastures.

Conclusion

The WSA indicates that our current focus on understanding and reducing levels of nutrients and sediments in the nation's waters should yield important gains in water quality in coming years. EPA is working together with the states to develop water quality criteria and implement pollution control practices to reduce the amount and impacts of nutrients and sediments in the Nation's waters.

The WSA establishes a national baseline we can use to compare to results from future studies. This information will help us evaluate the successes of our national efforts to protect and restore water quality. Along with upcoming studies of other water resource types—coastal waters, lakes, large rivers and wetlands—the WSA responds to criticisms that the nation's monitoring programs are not providing key answers about water quality. The WSA also provides funding and expertise that will enhance each state's ability to monitor and assess the quality of its waters in the future.

The Wadeable Streams Assessment report is available at *www.epa.gov/owow/streamsurvey*. Additional technical information is also available at this website.

Visit *www.epa.gov/owow/monitoring/reporting.html* for information on other statistically-valid surveys of the Nation's Waters.

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For more information visit:
www.epa.gov/owow/streamsurvey

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