



November 6, 2013

Science Advisory Board Review Panel
Attn: Dr. Thomas Armitage, Designated Federal Officer (DFO)
EPA Science Advisory Board Staff Office (1400 R)
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue NW
Washington, DC 20460

Re: Trout Unlimited Comments on *Connectivity of Streams and Wetlands to Downstream Waters*: Docket ID No. EPA-HQ-OA-2013-0582

Trout Unlimited is writing today to comment on the Environmental Protection Agency's draft report titled *Connectivity of Streams and Wetlands and Downstream Waters*. Trout Unlimited and its 153,000 members work to protect, reconnect, and restore trout and salmon habitat across the country. Understanding the connectivity of headwater streams, particularly ones which flow only in limited times of the year, is essential to protecting the highest quality fish habitat as well as providing benefits for downstream waters.

The report accurately reflects the importance of smaller headwater streams as the largest component of our water systems, and as the building blocks of watersheds. At least 80% of the stream miles in the country are headwater streams, with 53% of total stream length categorized as first-order streams. The report correctly emphasizes the enormous aggregate influence these streams have on downstream habitat and ecosystems, as well as their disproportionately-large influence on baseflows because of their sensitive response to precipitation and intimate connections to groundwater storage. These streams disperse, infiltrate and filter flows from storm events, the benefits of which can be clearly seen in flood-prone areas where natural headwaters have been disrupted by human development. The report also describes the role that headwater streams play in storage and transportation of sediment, as well as providing critical inputs of woody debris to other bodies of water. The report commendably documents the ecosystem services these streams provide by filtering chemicals, nutrients, ions, and contaminants such as ammonium, nitrogen and phosphorous, sodium and sulfates, and arsenic, a process which contributes greatly to improved water quality. For instance, if these streams are unaltered and functioning naturally, they can reduce downstream nitrogen delivery by 20-40%. Furthermore, the organic carbon in these streams is cycled many times before reaching larger bodies of water, supporting metabolic processes throughout the network.

In addition, we commend the report for its treatment of biological connectivity of headwater streams. One study cited by the report estimated that drifting insects and detritus from small, fishless headwater tributaries in Alaska supported between 100 and 2,000 juvenile salmon per kilometer in a large, salmon-bearing stream. Anadromous species migrating from the ocean also bring nutrients upstream into high elevation habitats, providing benefits to terrestrial ecosystems. These biological interactions connect, land, headwater streams, rivers, and oceans. Also included in the report is the notion that complex branching of headwater streams promotes genetic diversity, which for many aquatic organisms can be higher in headwaters than anywhere else in their distribution. Headwater

stream populations that are somewhat isolated from each other in upper drainages, but still connected via the downstream system, act as reservoirs of unique genetic diversity. Isolation is known to decrease genetic diversity in populations, and can cause selection *against* migratory forms and increase extinction risk.

Given the numerical value of small streams reviewed early on in the stream section of the report, the authors necessarily reviewed details of how headwaters themselves provide a significant portion of available aquatic habitat for freshwater species. For trout, salmon and many other fishes, higher elevation streams provide irreplaceable cold-water habitats for spawning and rearing; for what are called broadcast spawners that release eggs directly into the water, they provide important sheltering habitat and connectivity for the growth of drifting eggs. Another aspect that is perhaps less widely appreciated, but critically important, is that small interconnected stream systems provide refuge from stressors or disturbance. The ability to access refuge habitats in small streams is often the only way fish and other organisms survive the more frequent and intensive fires, heat waves, droughts and floods being experienced across the United States.

Finally, Trout Unlimited strongly supports the report's treatment of the importance of intermittent and ephemeral streams in providing essential and varied forms of connectivity to downstream waters. These non-perennial streams are the *large* majority of streams supporting biodiversity in the west: at least 94 percent of stream miles in Arizona are intermittent or ephemeral, and two-thirds of Nevada's streams are in what are called 'terminal basins'. Lahontan cutthroat trout, for instance, exist entirely in terminal waters in the Great Basin Desert. Having already been extirpated from 90% of its stream habitat, over 70% of the remaining populations occupy only the highest headwater streams less than 5 miles long and less than 10 feet wide, many of which dry up before reaching mainstem rivers. In short, TU cannot understate the importance of small, healthy headwater streams for unique and threatened species like the Lahontan cutthroat trout, and we commend the report authors for a thorough assessment of intermittent and headwater streams.

EPA has done an excellent job synthesizing the existing relevant science on the hydrological and biological importance of headwater streams for downstream bodies of water. We commend the EPA for this report, and ask that they use it as a rigorous scientific document for restoring Clean Water Act jurisdiction to bodies of water that have lost protections over the last decade, including ephemeral and intermittent streams. This report, along with TU's own research, indicates these streams are extremely important for the continued survival of trout and salmon species, but without the essential protections offered by the Clean Water Act, the most important habitats could be at the greatest risk for loss.

Thank you for considering our comments,

Steve Moyer
Vice President of Government Affairs
Trout Unlimited

Helen Neville, PhD.
Research Scientist
Trout Unlimited