

FELLOWSHIP BRIEF

Documenting How Outdoor Recreation Influences Stream Ecosystem Components in Northern Utah

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The Need.

As we approach the second quarter of the 21st century, the Intermountain West continues to confront complex environmental challenges across diverse ecosystems and landscapes. Most of these crises involve social and ecological systems because people and nature are closely linked and growingly reliant on one another. The ongoing confrontation of intensifying climate changes influences social issues, like access to recreational resources, exposure to natural environments, and the quality of those spaces. Climate change and expanded mountain resort development threaten the integrity of high-elevation and fast-flowing rivers and streams. These ecosystems play important roles in the retention of freshwater biodiversity and recreational opportunities. A small amount of research explores how outdoor recreational patterns influence or impact flowing streams and riparian ecosystems. It is crucial to assess how individual species and ecological communities respond to recreational behaviors, especially in the age of urbanization, which dispenses more people into natural areas.

The Project.

Joshua deployed field experiments along a tributary flowing from headwaters in the Uinta-Wasatch-Cache National Forest to the Jordan River, situated in a suburban environment. Along Big Cottonwood Creek in Utah, his research orbited around assessing how outdoor recreation patterns and activities influenced stream and riparian attributes. Through individual and group-level observational work, Joshua carefully studied recreational patterns, plant and wildlife composition, and shoreline intactness at eight field sites along the entirety of Big Cottonwood Creek. He recorded and cataloged the wide range of recreational behaviors present while assigning their positions on a resource sustainability spectrum. The spectrum depicts how unique recreational behaviors may affect ecological attributes like native plant composition, wildlife behavior, and shoreline integrity. Joshua compared his observations of the high-elevation National Forest natural areas to those of the parks within the suburban environment.



The Findings.

Joshua cataloged 500 human-stream interactions, in which 460 encounters resulted in plant, wildlife, and shoreline impacts. The most common impact recorded included irregular wildlife behavior, non-native plant domination, and shoreline modification. Each site displayed a unique recreational and ecological story, although National Forest sites with direct stream access received the most visitation. Busier (i.e., more than 10 people per viewing site) trail use limited wildlife movement through stream and riparian habitats. Native wildlife species comprised less than 40% of the wildlife able to pass through study zones. High-elevation recreation activities included shoreline hiking, fly fishing, trail running, wildlife viewing, and picnicking. Walking and hammocking comprised common suburban activities. Shoreline activities and group size were correlated with irregular wildlife behavior and fewer total species present. Picnic and angling areas also aligned with spaces undergoing shoreline integrity changes. Nearby roadways were also common denominators among sites experiencing the most negative ecological impacts.

The Impact.

This research suggests that some recreation patterns may lead to natural area overuse and actively shape ecosystem attributes through chronic (e.g., gradual and ongoing) disturbance. In the context of Big Cottonwood Creek, large group activities, concentrated off-trail utilization, and illicit natural area use (e.g., stepping into restoration zones or sensitive shorelines) often produce environmentally unsustainable outcomes. Learning how to reverse these outcomes might involve behavioral research, in which interviews and surveys probe how and why outdoor recreationists care for their preferred natural areas. Given the abundance of non-native plants and wildlife across all sites, Joshua also recommends intensive and multi-season ecological studies tracking species' composition changes under different recreation scenarios. Although this exploratory study highlights impacts over a short timeframe, these outcomes are expected to increase and occur across other systems with parallel contexts. Analogous ecological communities, visitor-use patterns, and riparian and stream resources near roadways denote key similarities. At this juncture, stream and riparian ecosystem stewards should continually monitor outdoor recreation patterns and note ecological community changes.



The Student.

Joshua Kesling, Western Resource Fellow | Josh is a Master of Environmental Management candidate at Yale School of the Environment, broadly studying conservation ecology, riverine ecosystems, and recreation management. He grew up in Ohio, where the shallowest of the Great Lakes resides and the world's largest walleye fishery persists. Some of the most formative years in Josh's life occurred when he moved to Northern Utah. He began to consider the nexus of contentious environmental water transactions, explosive recreational industries, and mountain dweller ways of life. In his freetime, Josh loves to explore harbors, hike seashores, climb mountains in search of alpine wetlands, and write poetry. [See what Josh has been up to.](#) | [Blog](#)