



Big Rivers Monitoring

Importance

In several Northern Colorado Plateau Network (NCPN) national parks, big rivers and their associated riparian zones provide habitat for federally listed terrestrial and aquatic species, are intimately associated with unique geologic features cited in enabling legislation, and are major recreation destinations. As an increasing human population fuels increased demands for Colorado River (CR) water in states across the West, streamflow in virtually all rivers within the CR drainage has been altered by water development projects. In most cases, peak flows have been reduced, resulting in channel narrowing, geomorphic simplification, and loss of riparian structure and related biological diversity. In response to these concerns, the NCPN is implementing a big rivers monitoring program at four network parks: Dinosaur NM, which provides a unique paired experiment with the Yampa River (the longest relatively free-flowing river reach in the CR basin) and Green River (highly regulated by Flaming Gorge Dam); Black Canyon of the Gunnison NP and Curecanti NRA, where the Gunnison flows; and Canyonlands NP, where the Colorado and Green rivers meet.

Long-term Monitoring

Building on past and present monitoring efforts, the NCPN is designing a hypothesis-driven, multi-scalar monitoring protocol that links frequent, field-based rapid assessments; existing independent data sets; and infrequent, quantitative evaluations of broad-scale changes using remotely sensed data.

We hypothesize that with anticipated **climate change** and increasing human demands on regional water resources, streamflow regimes will shift in response to (1) more droughts and bigger floods and (2) more droughts and fewer, smaller floods because of water resource development. These shifts may lead to channel narrowing through vegetation encroachment and stabilization of formerly active channel deposits and the building of new floodplain surfaces by lateral and vertical deposition of alluvial sediments.

To test that hypothesis, we will:

1. At a broad spatial scale, conduct a baseline inventory of sites hypothesized to be very sensitive, sensitive, and insensitive to channel narrowing (or expansion).
2. Via float trips, conduct rapid assessments of the condition of hypothesized sensitive and insensitive sites.
3. Establish sentinel monitoring sites at pre-identified sensitive or very sensitive sites, opportunistically selecting for locations that are logistically easy to access.



Monitoring on the Yampa River, Dinosaur National Monument.

4. Opportunistically integrate elements 1–3 above with legacy monitoring sites established by previous researchers.

The protocol is designed to be agile enough to adapt to new challenges and opportunities, as well as possible fiscal opportunities or constraints.

Management Applications

Early detection and quantification of the channel-narrowing process would allow National Park Service managers to (1) negotiate with water users in the case of human-caused flow depletions and related channel narrowing, and (2) identify reaches sensitive to narrowing so that management actions could be implemented in a more efficient and cost-effective way.

Status and Trends

Because field-testing and preliminary monitoring efforts are in their early stages, status and trends information is not yet available for this protocol.

Contact

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Network park units where big rivers are monitored

Black Canyon of the Gunnison NP	Curecanti NRA
Canyonlands NP	Dinosaur NM

NP = National Park; NM = National Monument;
NRA = National Recreation Area