



# Integrated Riparian Monitoring

## Importance

Riparian ecosystems are potentially sensitive indicators of landscape-level change because they are linked to both aquatic and upland systems, perform important ecological functions, and are biologically diverse. Riparian systems face a number of anthropogenic threats, including stream-flow damming or diversion, channel-stabilization structures, invasive exotic species, livestock grazing, timber harvesting, agricultural clearing, groundwater pumping, and trail creation. These disturbances can alter watershed conditions and directly or indirectly influence downstream riparian ecosystems. Developing credible, efficient monitoring approaches will help in assessing riparian-system health and provide early warning of system degradation.

## Long-term Monitoring

Integrated riparian monitoring involves the collection of both biological and physical measures. The NCPN monitors vegetation, hydrology, and geomorphology in wadeable streams and big rivers. In previous years, this brief has included information on both monitoring types. However, because the protocols have evolved to be different enough to warrant separate reporting, this brief focuses only on wadeable streams.

The NCPN monitors wadeable streams with perennial (year-round), intermittent (surface flow during certain times of the year and a shallow water table in at least portions of the stream), or ephemeral (surface flow for relatively short periods in direct response to precipitation) flow regimes. Park staff select individual streams for monitoring based on management priorities. Wadeable streams are monitored at four sites in four park units: Courthouse Wash (Arches NP), the Fremont River (Capitol Reef NP), Armstrong Canyon (Natural Bridges NM), and the East Fork of the Virgin River (Zion NP).

Repeat sampling of permanent transects allows us to track changes in the cover and species composition of riparian vegetation, including the relative abundance of native and non-native species. Measures of physical drivers, including stream flow, alluvial groundwater dynamics, and changes in channel form, are used to assess whether observed changes are primarily the result of natural variability or anthropogenic stressors.

Information gathered from this protocol will provide park managers with (1) a baseline against which to gauge the long-term status and trends of riparian resources relative to natural processes and anthropogenic stressors; and (2) information for evaluating the effectiveness of management interventions aimed at protecting or restoring these ecosystems.



Fremont River, Capitol Reef National Park.

## Status and Trends

The NCPN began monitoring wadeable streams in 2008, and monitoring efforts have expanded each year since. In 2012, network staff established one new reach each in Arches and Capitol Reef national parks and Natural Bridges NM. Reaches in Zion NP were revisited in 2012 in order to capture changes that occurred from the December 2010 flood on the East Fork of the Virgin River. At each park, vegetation was sampled at two reaches. In addition, cross-sections of the channel and the location of the thalweg were surveyed at two reaches each in Arches and Zion national parks and Natural Bridges NM. Hydrologic monitoring equipment has been installed at one reach each in Arches, Capitol Reef, and Zion national parks. The NCPN is currently exploring options to monitor flood frequency and magnitude in Natural Bridges NM; we plan to install this equipment in 2013.

## Contacts

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### Network park units where integrated riparian systems are monitored

Arches NP  
Capitol Reef NP

Natural Bridges NM  
Zion NP

NP = National Park; NM = National Monument