



Water Quality Monitoring

Importance

Most Northern Colorado Plateau Network (NCPN) parks are located in semi-arid to arid environments where water is a major factor in determining the distribution of flora, fauna, and historic human habitation. Additionally, the abundance and quality of water resources reflect human activities and land use in and near parks, and are a primary factor influencing park visitation and recreational activities. Water bodies in national parks are protected by the Clean Water Act and other policies that prevent unacceptable levels of pollution and establish acceptable values for other water-quality measures. Park managers need information on status and trends in surface-water quality and quantity to comply with the Clean Water Act and to mitigate historic and future impacts to park water resources that may have ecological and social significance.



NATIONAL PARK SERVICE

View of the Yampa River at Harding Hole in Dinosaur National Monument.

Long-term Monitoring

Water quality monitoring sites are selected based on historic impacts, perceived threat, current monitoring by others, or to determine baseline status as a starting point for long-term trend detection. In a coordinated effort between 10 park units, the U.S. Geological Survey, and the State of Utah, 53 sites were monitored in 2006 and 2007.

As many as 30 water-quality parameters are measured at each site visit. At every site, the core parameters (specific conductivity, flow, temperature, pH, and dissolved oxygen) are measured as basic indicators of water quality using portable water-quality sensors. Measurements are then compared to standards to determine whether water-quality goals are being met and if, over time, conditions are changing beyond acceptable normal ranges.

Status and Trends

An examination of core-parameter data for a subset of six NCPN streams provides a look at natural seasonal patterns compared to numeric standards (see graphs, next page). Seasonal patterns and extreme events (such as floods) are expected, but if core parameters consistently exceed established water-quality criteria, managers may investigate the causes and implement management actions that will improve water quality. The data indicate that:

- Flow in spring 2007 was lower than in 2006, due to a drier winter in which snowfall was consistently less than

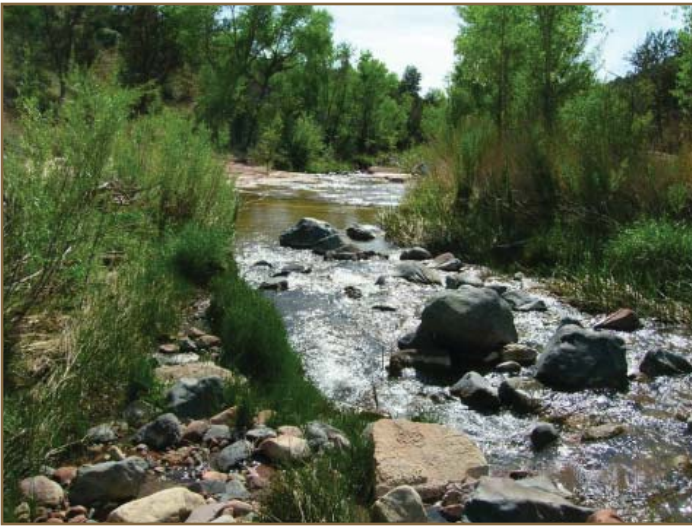
75% of average upstream of most parks and as little as 25% of average in some parks (Figure 1a, next page). More information about increasing temperatures and decreased snowpack can be found in the NCPN Climate Monitoring brief.

- Core parameter values varied within normal ranges and rarely exceeded water-quality criteria (Figure 1b–f, next page). This indicates that core parameters for most streams were within normal expected ranges. Seasonal variations were readily apparent in water temperature and dissolved oxygen.
- A June 2006 wildfire on North Creek in Zion National Park had significant environmental effects. An increase in pH (Figure 1e, next page) may have been the result of ash influx to the stream. Flash floods, in addition to high dissolved-oxygen concentrations caused by an algae bloom after the fire, removed and/or killed fish from the

Network park units where water quality is being monitored

Arches NP	Curecanti NRA
Black Canyon of the Gunnison NP	Dinosaur NM
Bryce Canyon NP	Hovenweep NM
Canyonlands NP	Natural Bridges NM
Capitol Reef NP	Zion NP

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



North Creek in Zion National Park, before and after the June 2006 Kolob fire and subsequent floods.

creek, including two species that are managed under conservation agreements.

The National Park Service's management response to this loss of fish has been to allow natural recolonization in the park; three species of native fish were observed upstream of the fire-affected reach in May 2007. Downstream of the park, the Utah Division of Wildlife Resources restocked native fish. Monitoring on North Creek will continue in order to determine how the stream chemistry responds.

- A July 2006 flood in the Halls Creek watershed in Capitol Reef National Park significantly altered channel morphology and washed organic matter into the channel, which may have caused a short-lived dissolved-oxygen depletion (Figure 1f).

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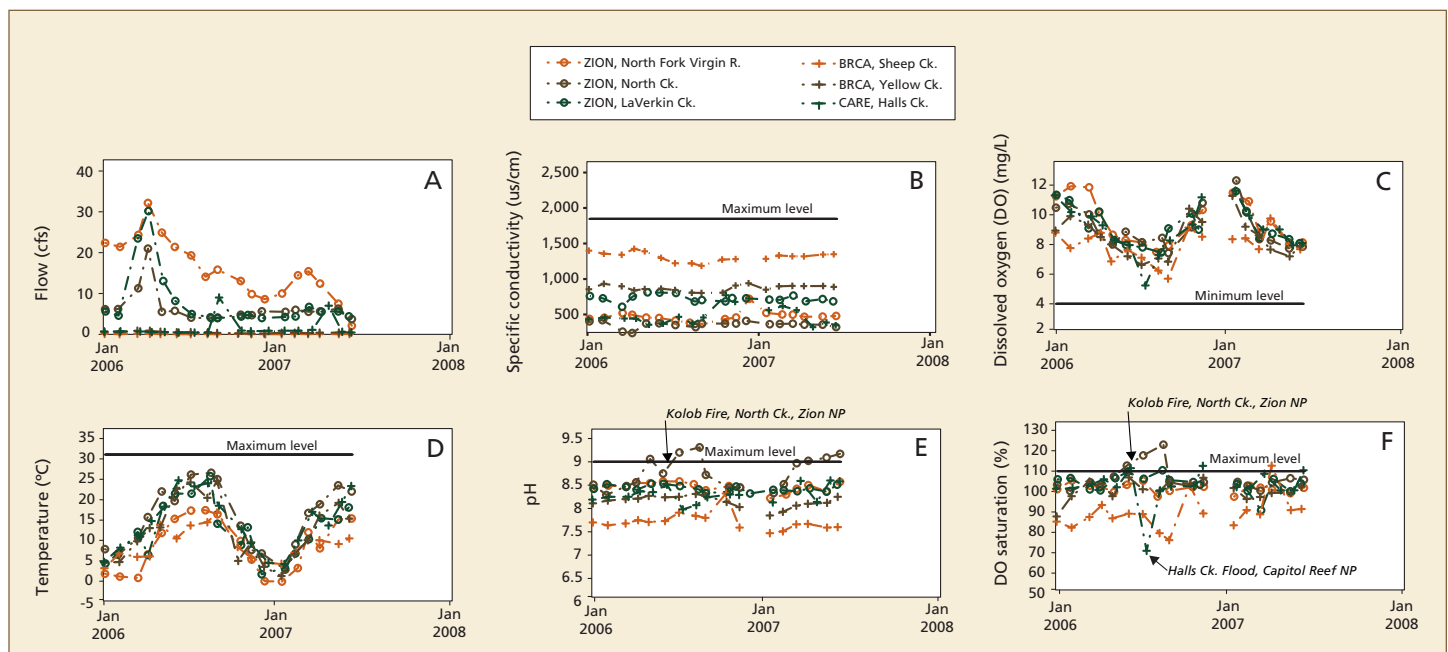


Figure 1. Time-series graphs of core water-quality parameters collected monthly on six NCPN streams. The graphs indicate natural variation and response to significant environmental change in the form of floods and wildfire. Specific results are interpreted in the above text.

Note: DO (mg/L) is a measure of the concentration of dissolved oxygen in the water. %DO is a ratio of measured DO relative to what the water could hold if saturated at the given temperature, pressure, and salinity at the time of measurement.

Internet: <http://science.nature.nps.gov/im/units/ncpn/index.cfm>

Intranet: <http://www1.nrintra.nps.gov/im/units/ncpn/>