



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.

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. As many as 30 water quality parameters are measured at each site visit. At every site, portable sensors are used to measure core parameters (specific conductivity, flow, temperature, pH, and dissolved oxygen) as basic indicators of water quality. Field and laboratory measurements are then compared to state water quality standards to determine if acceptable concentrations are present and if, over time, conditions are changing beyond acceptable normal ranges. NCPN water quality monitoring is a coordinated effort between the network, individual park units, the U.S. Geological Survey, and the State of Utah.



NPS

Measuring flow with a current meter, La Verkin Creek, Zion NP.

Status and Trends

The past year was a time of transition for the NCPN water quality monitoring program. Budget and safety constraints caused us to reduce our sampling from monthly to 10 samples per year, eliminating two months of winter sampling. We also transferred all of our data into a new database that will allow for more timely review of water quality data and more automated reporting. A report of water quality standard exceedances for WY2010–2012 is underway, and data are being prepared for the first trend report, expected in 2014. A notable accomplishment for the year was the first published report on contaminants of emerging concern, such as pharmaceuticals and wastewater indicators, in NCPN waters (see page 2).

Contact

Rebecca Weissinger, rebecca_weissinger@nps.gov

Network park units where the NCPN monitors water quality

Arches NP	Dinosaur NM
Black Canyon of the Gunnison NP	Golden Spike NHS
Bryce Canyon NP	Hovenweep NM
Canyonlands NP	Natural Bridges NM
Capitol Reef NP	Timpanogos Cave NM
Curecanti NRA	Zion NP

NHS = National Historic Site; NP = National Park; NM = National Monument;
NRA = National Recreation Area



NPS

Flumes are used to measure flow in smaller streams, such as Yellow Creek, at Bryce Canyon NP.

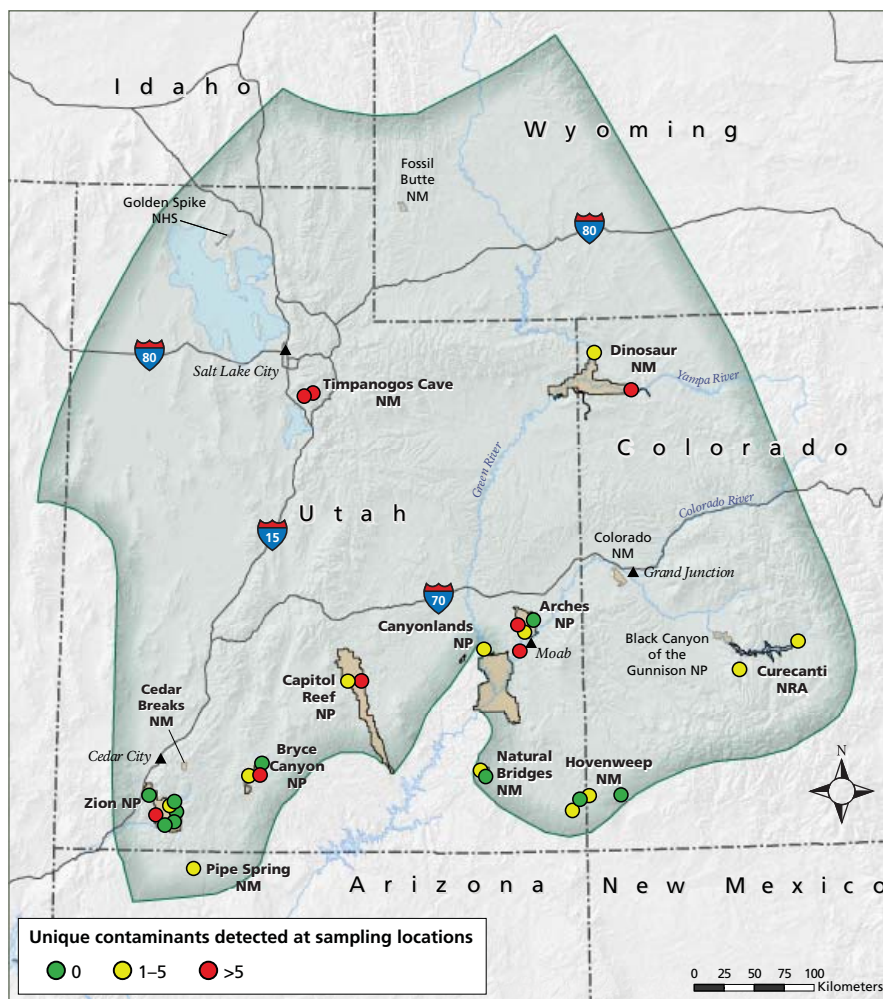
Sampling Results for Contaminants of Emerging Concern, 2010 and 2012

Rivers and streams are the lifeblood of the Colorado Plateau, yet they can also serve to carry contaminants far away from their original sources. So-called contaminants of emerging concern (CECs)—compounds such as pesticides, pharmaceuticals, personal care products, and wastewater indicators—are not removed by traditional wastewater facilities. Some of these compounds are known endocrine disruptors that have been linked to the presence of intersex fishes and even the complete collapse of fish populations. The effects of CECs are often just beginning to be assessed, yet regional studies have shown that these compounds can be found in waters throughout western North America, including remote locations with no direct anthropogenic source.

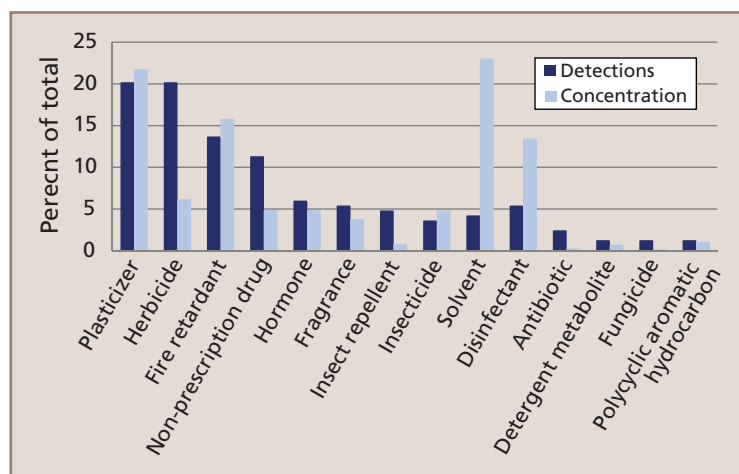
While NCPN parks generally lie far from metropolitan areas, human land-use activities within the parks and their watersheds include oil and gas development, livestock use, cultivated farmland, sparse to moderate human occupation, recreational use, and park management practices. In 2010, in cooperation with the U.S. Environmental Protection Agency Region 8, NCPN and park staff sampled a wide variety of park waters (30 sites selected by park staff in 11 parks) to identify potential hotspots for CECs. Follow-up sampling in 2012 focused on water bodies that were noted as hotspots during the 2010 sampling, either because multiple analytes were detected in a sample or because analytes were detected at levels of concern.

Overall, the majority of EC analytes were never detected in any sampled NCPN water body, and one-third of site visits had no analytes detected. Plasticizers, herbicides, and fire retardants were the most commonly detected types of analytes. Solvents and disinfectants were not detected as frequently, but were detected in higher concentrations than other analyte types. Herbicides, while detected frequently, were found at relatively lower concentrations than other common analyte types.

In comparison to more urbanized watersheds, NCPN waters had fewer analytes and lower total analyte concentrations. However, some sites reported analytes at levels high enough to potentially affect aquatic ecosystems. The Yampa River (Dinosaur NM) remains a priority for NCPN sampling due to the high number of analytes detected despite its paucity of point sources. The Colorado River (Canyonlands NP) has chronic contamination by a few CECs and, in general, had more detections than the Green River (Canyonlands NP, Dinosaur NM). Sampling is continuing in 2013 to further document the presence of CECs in NCPN waters.



Number of unique contaminants found at NCPN sampling locations for contaminants of emerging concern, 2010 and 2012.



Relative frequency of detections and concentrations of analyte categories across 11 sampled NCPN parks, expressed as percents of the total number of detections and total concentration of detected analytes.