



Alagnak

Aniakchak

Katmai

Kenai Fjords

Lake Clark

Freshwater Chemistry

Resource Brief
October 2011

Importance

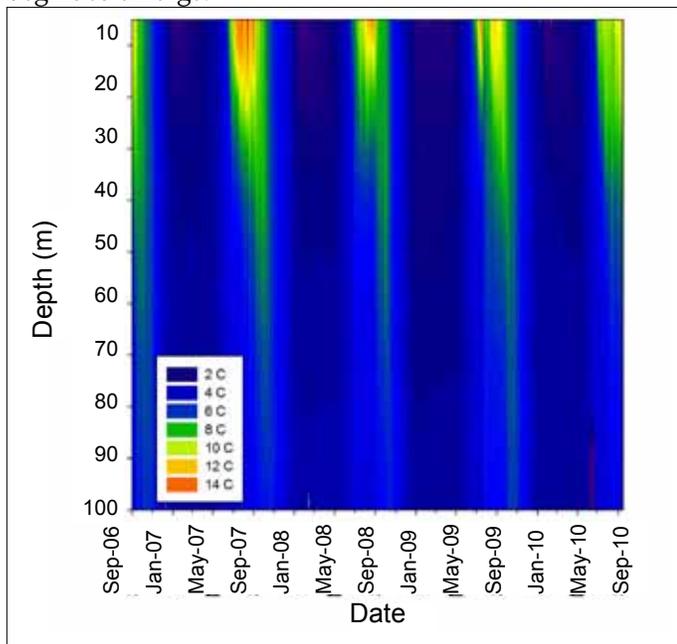
As integrators of water, energy, nutrients, solutes, and pollutants from the landscape and atmosphere, lakes and rivers are interactive components of their environment. As such, monitoring water quality parameters, including temperature, dissolved oxygen, pH, and conductivity, provides an indication of watershed-level changes that may affect lake and riverine processes. Currently, SWAN parks contain some of the larger and more pristine freshwater resources in the national park system, represented by Lake Clark, Naknek Lake, and five designated "Wild Rivers." Despite the remote, wilderness nature of lakes and rivers within SWAN parks, these systems are subject to large-scale anthropogenic influences, such as climate change and atmospheric pollutants. These man-made influences have the potential to impact many aquatic processes that are driven by water quality, such as lake productivity and fish reproductive success.

Long-term Monitoring

The remote, pristine nature of SWAN aquatic systems provides an ideal setting to examine natural variation of intact system and the influences of man-made disturbances upon those systems. To examine human-induced alterations from natural conditions, SWAN has designed a monitoring plan to examine key physical (e.g., temperature, turbidity, dissolved oxygen) and water chemistry (e.g., pH, specific conductivity) components of lake systems of Lake Clark NPP (LACL) and Katmai NPP (KATM). When these monitoring components are combined with other vital signs, such as surface hydrology, lake ice phenology, and glacial extent, a more complete picture of watershed-level dynamics that influence lake productivity begins to emerge.



SWAN ecologist, Claudette Moore, downloading temperature sensors from Lake Clark temperature array. Sensors are incrementally secured to a stationary line to a depth of 100 m and are downloaded in early summer and late fall.



Average daily water temperature in Lake Clark based on data from a moored temperature array.

Discussion

SWAN has monitored water temperature year-round in Lake Clark since September 2006. Continuous monitoring allows us to track freeze-up and break-up dates, lake stratification, and large-scale wind events – all factors that greatly influence lake productivity. Similar monitoring is occurring in Kijik Lake (LACL), Naknek Lake (KATM), and Lake Brooks (KATM). Both targeted and randomly selected locations throughout these lakes are sampled each year using a variety of methods from continuous monitoring with programmed data loggers to synoptic vertical profiles.

Preliminary water temperature monitoring indicates that lakes in SWAN park units are strongly influenced by large wind events during the ice-free period. These events cause mixing between the warm surface water and deep cooler water. Mixing depths can be as deep as 30 meters (~100 feet).