Surface Hydrology

Resource Brief

Importance

All biophysical interactions within SWAN aquatic systems are heavily influenced by hydrology. Maintaining the natural variation of hydrologic processes is critical to protecting the cultural, ecological, recreational, and economic value of aquatic resources Congress identified in establishing SWAN parks. Large-scale disturbances, such as climate change, can have a profound effects on hydrologic processes, such as increased stream flows from glacial melting or decreased ice cover on lakes. The end result is the potential for impacts to fish and wildlife populations, and associated human activities, in SWAN parks.

NPS

View of the crest staff gage at the outlet of Naknek Lake (KATM). A level logger is mounted at the base of the gage and measures lake level.

Long-term Monitoring

How are the timing and magnitude of peak river discharge and lake level changing in key SWAN glacial and non-glacial systems? To address this question, SWAN will monitor daily discharge into and out of large lake systems as well as lake level fluctuations during the ice-free period. Not only will these measurements allow us to quantify the amount of water flowing into and out of lake systems, and subsequent water storage, but also provide an estimate on concentrations of nutrients, trace metals, and other water quality constituents entering a lake. By comparing glacial to non-glacial systems, we will be able to monitor climate change on hydrologic processes, especially when comparisons are made in conjunction with glacial extent monitoring.

USGS-WRD

USGS-WRD hydrologist measures discharge at the outlet of Lake Brooks, KATM, with an acoustic Doppler current profiler.

Discussion

In 2006 and 2007, the U.S. Geological Survey Water Resources Division developed stage / discharge rating curves for several SWAN lake systems, including Naknek Lake and Lake Brooks in Katmai NPP (KATM), and Lower Twin and Telaquana Lakes in Lake Clark NPP (LACL). A rating curve for Lake Clark was developed through previous research. Based on these studies, SWAN is able to monitor daily lake levels and estimate a corresponding daily lake discharge value (fig. 1). SWAN will develop rating curves for major inflowing tributaries, such as the Tlikakila (LACL) and Savonoski (KATM) Rivers, to quantify the differences between lake inflows and outflows.

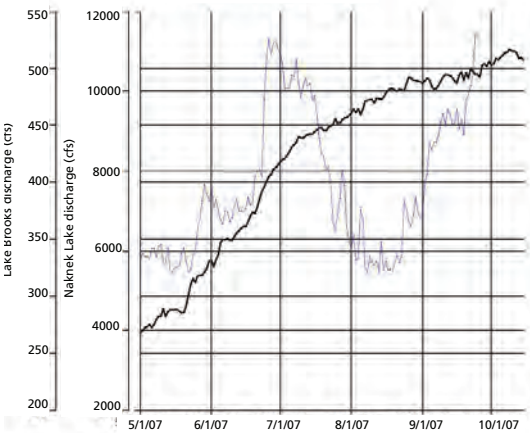

Figure 1. Average daily discharge for Lake Brooks (dashed) and Naknek Lake (black) during the open water season for water year 2007.

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