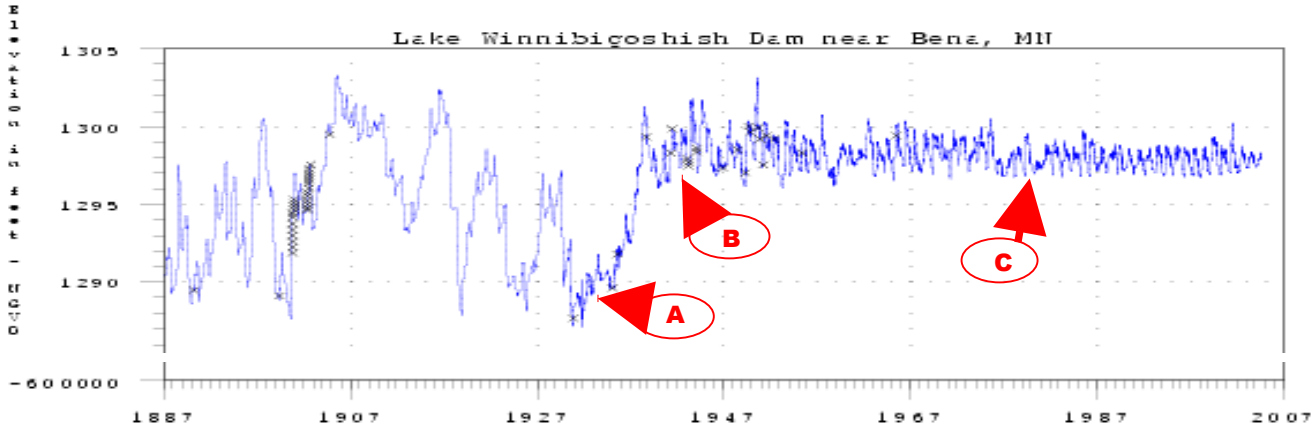
# HISTORIC AND POTENTIAL HEADWATER OPERATIONS




## HISTORIC LAKE LEVELS AND WATER MANAGEMENT

**OVERVIEW:**

The historic operations of the Headwaters have impacted the river, its inhabitants, and the economy. Initially, general rules for the regulation of the Mississippi Headwaters reservoirs were first established by the War Department in 1889. These rules were formally modified in 1931, 1935, 1936, 1944 and 1988, along with numerous minor changes along the way (Note: the graphic above displays changes in historic lake levels for Lake Winnibigoshish since the beginning of Federal operations). Point **A** on the above hydrograph for 1931-1936 illustrates a period when systemwide tighter water level limits were instituted as requested by the Minnesota Lake Levels Association (1931) followed by the completion of most of the 9-foot navigation channel project in 1936. Point **B** shows the timeframe in the mid-1940's when systemwide changes were made because flood control became a more important and recognized mission. Federal operations of the Headwater Reservoir system has changed significantly a few times over the past 100 years due to changing Federal water resource missions. It is also noteworthy that systemwide the lake levels have been increasingly operated for a narrower and narrower band -- over time. There have also been many additional small changes to operations at selected reservoirs. For example, decreasing the normal water level operating limit for Leech Lake 0.5 feet in 1944, Lowering Pokegama Lake's summer band 0.25 feet in 1952, and lowering Lake Winnibigoshish one foot in 1975 in coordinated attempts to reduce shoreline erosion (See Point **C** on the above hydrograph for a display of when this lake change occurred).

**POTENTIAL CHANGES FOR IMPROVED OPERATIONS**

The ROPE study provides an important opportunity to identify and coordinate operational changes that could improve systemwide operations (Note: As the historic hydrograph above shows, there are only a few times every 100 years when it is possible to make significant changes to operations and this ROPE Study offers such an opportunity). The operating plan recommended by ROPE could take the form of small operating adjustments that optimize operations for current users or could be more holistic and recommend major operational changes that would alter the timing of river discharges and lake levels in such a way as to significantly improve natural habitat and focus more on sustainability for future generations. The ROPE Study and EIS will identify, evaluate, and fully coordinate an array of alternative operating plans. Public, interagency, and tribal involvement to help identify the best ways to operate the headwater reservoirs in the future is being actively sought.

**MORE INFORMATION ON HISTORIC FEDERAL OPERATIONS:**

- Initially, the area surrounding the Headwaters lakes was largely undeveloped land and/or reservation lands when the dams were first built in the late 1800's and early 1900's. At that time there were no serious objections to widely fluctuating lake levels and the first regulation governing the operation of the Headwaters dams (dated 1889) did not contain any guidelines or requirements regarding lake water levels. The initial regulation of the Headwaters was fairly limited; It provided the authority to store water for use in downstream navigation and operating levels were determined on physical limitations and safety concerns. This led to large fluctuations in water levels on the reservoirs, up to 8 feet in a given year, because the spring runoff was being stored for the flour mills and commercial navigation. However, as recreation on the reservoirs and downstream agriculture developed in the first quarter of the 1900's, local landowner interests became more important in determining reservoir regulation rules. In addition, the need for supplemental releases from the six Headwaters lakes for navigation, power and water supply was greatly reduced after the turn of the century as milling interests dwindled and the lock and dam system was constructed in the 1930's.

- In 1931, there were public demands for minimum operating levels to provide resort owners and local residents with more reliable conditions. As a result of these demands regulations created both high and low water operating limits as well as minimum discharges for each of the dams and low flow values for St. Paul were specified.

- In 1935, low water levels resulted in changing the minimum discharges to an average annual discharge. These discharge changes did not affect Lake Winnibigoshish or Leech Lake. Changes to those lakes were made in 1936. There were also clarifications to the operational limits which minimized the range of fluctuations in water levels in any reservoir in a single year.

- Moderate to severe floods occurred in the Aitkin area in 1950, 1952, 1953 and 1954 (and earlier). Concerns about flooding resulted in the construction of the Aitkin Diversion Channel (completed in 1956). Additionally in 1956, flood control guide curves were developed to distribute damages between Pokegama Lake, Sandy Lake and Aitkin during flood periods. Lake Winnibigoshish and Leech Lake Dam are operated in conjunction with Pokegama Lake Dam to make an attempt to follow those curves.

- In 1963, the operating rules for the Headwaters reservoirs were published in a master regulation manual. Numerous rules were added or changed to include outflow rate-of-change rules, MDNR minimum and maximum flow guidelines, and additional flood control rules.

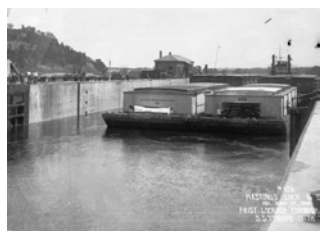
- During the 1976 and 1988 droughts artificial flow fluctuations (flow sags) along the main stem of the Mississippi River were a problem due to hydropower plants conducting "peaking" operations. As a result in 1996, low-flow management rules were established for Winnibigoshish and Pokegama and other dams all the way to the Twin Cities.

- Additional rules for regulating Winnibigoshish for walleye spawning were added in 1981.

- Log Sluice, circa 1880

- Pokegama Falls, 1884 (note dam construction in distant background)

- Sandy Lake Band Members – Helped to Construct the dam at Sandy Lake



1930's – First Lockage on 9ft. Channel

-1980's Recreation Use at Cross Lake