

**MANAGEMENT OF SPRUCE RIVER DIVERSION PROJECT
ANGLIN/EMMA/CHRISTOPHER LAKES**



Saskatchewan
Watershed
Authority

Floods, drought and the operation of control structures directly affect citizens in the Spruce River /Little Red River watershed. This information sheet has been prepared to explain the management and operation of the Spruce River Dam and Diversion Project.

The Spruce River Watershed

The Spruce River Watershed is the area of land that contributes water to the Spruce River (see attached watershed map). The Spruce River is also known as the Little Red River after it passes through the Little Red River Reserve. This watershed extends from just north of McPhee Lake and the height of land south of Waskesiu to the confluence with the North Saskatchewan River just east of Prince Albert, an area of 1668 km². The Spruce River Watershed includes several sub-watershed areas and tributaries including Bitter Creek, Christopher Creek, McKenzie Creek and Bell Creek. The three major water bodies within the watershed are Anglin, Emma and Christopher Lakes.

The Spruce River and Anglin, Emma and Christopher Lakes have long experienced extreme variations in seasonal water flow and levels. The alternating cycles of drought and flood impacted property owners and tourists. In the past this variation limited development in the area and led to the construction of works to control water flows and levels.

The main stream of the Spruce River starts at the height of land known as the Waskesiu Hills and drains south until it reaches the North Saskatchewan River. The portion of the watershed upstream of the existing Spruce River Dam is 383 km². Under natural conditions the Spruce River had no direct connection to, nor did it supply water to, Emma or Christopher Lakes. During high flow periods Anglin Lake would spill water into the Spruce River, but otherwise they were not connected. As water travels along the Spruce River, additional tributaries add water to the river. The largest of the tributaries are McKenzie and Bell Creeks, which enter the Spruce River between the dam and the southern edge of the Little Red River Reserve.

Prior to any water control structures being constructed, what is now known as Anglin Lake consisted of several water bodies each separated by channels. These water bodies included Little Anglin Lake (now Christie Bay), Anglin (now East Anglin) and the water body now known as Jacobsen's Bay. They are part of the 286 km² Bitter Creek sub-watershed area which starts upstream of McPhee Lake and ends when the creek joins the Spruce River at the western portion of Anglin Lake. This watershed, including Anglin Lake, was completely separate and had no direct connection to, nor did it supply water to, Emma or Christopher Lakes. In a median year 247 km² of this watershed contributes flow to the creek.

Emma Lake has a smaller watershed area that naturally started at a height of land between Gladys and Blanche Lakes. This watershed has an area of 161 km², of which only 53 km² contributes in a median year.

Christopher Lake has no major creeks supplying water to the lake. It has a very small watershed area of 25 km², all of which contributes in a median year.

History

In the early 1900's the first dam(s) were constructed on the Spruce River to impound water to help the annual spring log drive down to the lumber mills at Prince Albert. In 1938-1939 the first major dam was constructed on the Spruce River, for flow regulation and fire fighting purposes. This dam, built about two and a half kilometers upstream of the present dam, backed water from the Spruce River into Jacobsen's Bay and

East Anglin Lakes. Three incarnations of the Tower Road Dams were also constructed at the outlet of Jacobsen's Bay in 1936, 1940 and 1954 to regulate levels on Jacobsen's Bay and East Anglin.

The 1938-1939 dam was plagued with a history of washing out. This fact, coupled with a growing interest in using water from the Spruce River to supplement water levels in Emma and Christopher Lakes, resulted in a new Spruce River Dam and pump house being constructed in 1960 at their present locations. After the 1960 dam was completed, the Tower Road dam was breached.

Spruce River Dam

The present dam was constructed in 1960 by the Government of Canada's Department of Northern Affairs and National Resources to regulate flow on the Spruce River and provide additional water for diversion into Emma and Christopher Lakes. The structure also created an additional body of water between the old and new dam which joined and raised Anglin Lake approximately .4 metres (16 inches) over the water level normally held behind the Tower Road Dam and approximately one metre (40 inches) above its natural water level. This rise in the water level allowed the area known as Christie Bay to become part of Anglin Lake. The earth filled dam is situated in the south-east corner of Prince Albert National Park. It is presently owned by Parks Canada. The dam is 243 metres (797 feet) long by 6.1 metres (20 feet) high. It has a concrete spillway with four 2.47 metres (9 feet) wide stop-logged bays to regulate flow. A gated culvert in the structure is operated from April 1 to Oct 31 to allow a riparian flow downstream at a rate of .14 m³/sec (5 ft³/sec). A hydrometric station at the dam has been collecting daily water level data for Anglin Lake since 1961. Flows on the Spruce River downstream of Anglin Lake have been recorded since 1947. The desirable operating range for Anglin Lake is currently 515.26 metres – 515.42 metres.

Emma Lake Diversion Project

The Emma Lake Diversion project includes: a pump house and diversion works between Anglin Lake and Emma Lake; diversion works and a control structure on the outlet of Emma Lake; and a control structure and diversion works from Christopher Lake to the Little Red River Reserve. These works were completed between 1961 and 1975 to provide more efficient conveyance of water and to stabilise water level fluctuations on Emma and Christopher Lakes.

Works to Divert Water into Emma Lake

The Emma Lake diversion works were constructed in 1959 and 1960 by the Saskatchewan Department of Natural Resources (now Saskatchewan Environment). A pump house was constructed on the edge of Anglin Lake approximately one kilometer to the North East of the Spruce River Dam. The original pump plant was replaced with the existing structure in 1997. The pump lifts water 8 metres (26 feet) through a 284 metres (866 feet) long pipe into a channel leading to Gladys Lake. The capacity of the pump is .65 m³/sec (23 ft³/sec). After entering Gladys Lake water flows by gravity by means of a series of ditches and natural channels through Blanche and Mae Lakes, before outletting into the north end of Emma Lake.

Pumping can reduce the water level of Anglin Lake by 2.5 cm (1 inch) every 6 days and increases Emma and Christopher Lakes 2.5 cm (1 inch) every 11 days.

The first pumping into Emma Lake began on June 23, 1961, and over the next few years water levels rose approximately 1.8 metres (5.9 feet) from their 1960 levels. The annual average volume of water diverted to Emma Lake is about 3,000 dam³ (2430 acre feet). Emma Lake water level records began in 1960. The present desirable operating range for Emma Lake is 515.42 to 515.57 metres.

Works to Divert Water into Christopher Lake

Christopher Lake diversion works were constructed between 1965 and 1975 by the Saskatchewan Department of Natural Resources. A 900 mm (3 feet) gated culvert control structure located through Hwy 953 controls the release of water from Emma Lake into Christopher Lake and regulates the water level of Emma Lake. The channel upstream and downstream of the structure was improved to provide adequate conveyance capacity. The first release of water into Christopher Lake occurred in 1965, and over the next few years water levels were increased approximately 2.2 metres (7.3 feet). The Christopher Lake water level records began in 1960. The present desirable operating level for Christopher Lake is 514.65 to 514.81 metres.

Works to Divert Water out of Christopher Lake

Christopher Lake water levels and downstream releases are regulated by a two-bay stop-log structure controlling flow into two 1.07 metre (3.5 feet) culverts. The structure is designed to allow simultaneous drawdown from both Christopher and Emma Lakes. Christopher Creek is partially a natural run and partially a constructed channel until it reaches the confluence with the Spruce River just south of the Little Red River Reserve.

Ownership & Operations Management

The Spruce River Dam is owned by the Government of Canada. The Province, by agreement with the Federal government, operates and maintains the dam in accordance with an agreement originally signed in 1960. Despite the agreement's expiry in 1995, the Province continues to operate and manage the dam in accordance with the intent of the original agreement. A new agreement is being developed. The Saskatchewan Water Corporation, now the Saskatchewan Watershed Authority (SWA), assumed ownership of the Emma Lake Diversion Project from Saskatchewan Environment in 1994 and presently operates and maintains the diversion works from the pump house at Anglin Lake to the outlet works downstream of Christopher Lake. The RM of Lakeland No. 521 continues to be responsible for the electrical costs associated with the operation of the pump on Anglin Lake. Decisions on the timing of pumping are made by SWA.

SWA is ultimately responsible for the management of water flow on the Spruce River and maintenance of water levels on Anglin, Emma and Christopher Lakes. This management recognizes and tries to balance the needs of various stakeholders as well as environmental impacts. SWA recognizes the need for stakeholder input for consideration by SWA in its decision making process. The Spruce River Diversion Operations Advisory Board provides a mechanism for this input. The board, set up in 1986, has representation from various stakeholder groups and government departments. These include the Rural Municipalities of Lakeland, Paddockwood and Buckland, Jacobsen Bay Outfitters, Anglin Lake Cottage Owners Association, Emma Christopher Lakes Association (2 members), Little Red River First Nation (2 members), Little Red River property owners, Parks Canada, Indian and Northern Affairs Canada, Fisheries and Oceans Canada, Saskatchewan Environment and SWA. The board generally meets twice a year: in the spring to review and discuss the proposed operation for the upcoming year and in the fall to review the past summer's operation.

The Spruce River Dam and the Emma Lake Diversion Project continue to provide flow regulation and flood protection for residents in the watershed as well as providing an increased supply of water for recreational purposes on Anglin, Emma and Christopher Lakes. The water in this watershed is a valuable resource that is available for all users to share in a responsible manner.

Inquiries involving the management of this project can be directed to the SWA office in North Battleford by contacting Don Dill at 446-7456 or Ron Crush 446-7457.

