

SASK WATER REPORTS

JACKFISH LAKE

Draft Water Management Plan released

High rates of evaporation and low runoff lead to fluctuating water levels in Jackfish and Murray lakes. This newsletter summarizes the draft Jackfish River Basin Management Plan which has been developed by Sask Water. The purpose of the plan is to identify and address basin hydrology, new water projects, lake level regulation, land control, water quality and shoreline use and development.

Most water use in the Jackfish River basin is centred on Jackfish and Murray lakes and includes domestic, municipal, agricultural, wildlife and recreational uses. Water levels on the lakes have been regulated since 1932 by a control structure on the south end of Jackfish Lake. The Jackfish Lake Watershed Association has been responsible for the operation of the structure since 1970.

In April 1990, at the request of the Watershed Association, Sask Water began an investigation of the water management issues surrounding Jackfish and Murray lakes. The corporation released its report, the *Report on Lake Management Issues*, in November 1992. Sask Water then began the process of developing a basin water management plan.

Since 1992, three other studies of Jackfish and Murray lakes have been conducted. In 1992-93, Saskatchewan Environment and Resource Management (SERM) carried out a Recreational Lake Water Quality Assessment of the two lakes in cooperation with the Watershed Association. Through 1993 and

1994, Sask Water resurveyed the benchmarks used to measure the lake levels of Jackfish Lake over the past 30 years. (A benchmark is a brass plate fixed to a building foundation or to an iron bar driven into the ground. Once the elevation of the benchmark is known, it is used by surveyors to determine the elevations of other landscape features such as roads, buildings, dams, water levels, and ground levels.)

And, during the winter of 1994-95, Sask Water reviewed the suitability of using water from Jackfish Lake for irrigation.

Over the years, recreational water users have expressed their desire for the Watershed Association to maintain the lakes above the current licensed Full Supply Level (FSL). The FSL is the maximum water level for a lake or reservoir allowed by Sask Water. Determining a desirable FSL and operating range for the lakes was a primary issue. Other issues and concerns were: flooding of hay land around the lakes, lake water quality, growth of aquatic plants, control of new recreational development around the lakes, and boating concerns.

Basin hydrology

Jackfish and Murray lakes are fed by a combination of surface and ground water from a drainage area of 3,320 square kilometres. Average annual surface inflow is about 32,700 cubic decametres (dam^3), while groundwater inflow may be as high as 18,100 dam^3 per year. The combined surface area of Jackfish and Murray lakes at the licensed maximum level is 9,730 hectares, or 97.3 square kilometres. Net evaporation losses from the lakes are substantial, averaging 37,500 dam^3 . As a result, in many years the inflow is only enough to replace water lost to evaporation. During droughts, the lake levels fall because inflows are insufficient to replace evaporation loss. Years of above average runoff restore lake levels.

Licensed water use in the basin is small compared to the evaporation from Jackfish and Murray lakes (4,300 dam^3 versus 37,500 dam^3). However, when evaporation and the existing uses are considered, there is little surface water available within the basin for new water uses.

New water projects

The draft water management plan makes several recommendations regarding potential water developments in the Jackfish basin. The draft plan recommends that:

- new allocations in the effective drainage area of Jackfish Lake and directly from Jackfish and Murray lakes should not exceed 1,000 dam^3 . Based on rainfall, runoff and evaporation patterns, some water is still available for future allocations in the Jackfish basin. This recommendation would limit negative effects on lake levels during the recreation season while allowing the economic benefits of new water-based developments. The draft plan also recommends a review of the basin hydrology as the sum of new allocations approaches 1,000 dam^3 , or as the need arises.
- Sask Water restrict withdrawals when lake levels fall below 529.13 metres. Sask Water would attach a condition to Approvals for new irrigation, industrial, and wildlife projects taking water directly from Jackfish or Murray lakes. This would limit the impact on lake levels during droughts and on recreational use of the lakes while providing full allocation to those projects in about 70 per cent of years.
- water supply/use agreements between the Watershed Association and proponents of projects taking water from either lake continue to be required. Sask Water has observed this requirement concerning new applications for surface water use from Jackfish or Murray lakes.

- new raw water sources to supply Jackfish Lake be further investigated when sufficient local support is displayed. The North Saskatchewan River is the only source that can supply sufficient water. A raw water system delivering between 0.25 and 1.0 cubic metres per second (m^3/s) could maintain recreational water levels during dry years. However, such a system is likely not economical at this time.
- regional treated water utility options to supply communities around Jackfish and Murray lakes be investigated when demand for potable water warrants. The number of permanent residents around Jackfish and Murray lakes is expected to grow over the coming decades. At some point, a treated water system serving this population may become viable. A system serving the domestic demands along the Jackfish River could eliminate the need for releases from the Jackfish Marsh project and/or Jackfish Lake. Possible system extensions could serve Glaslyn and/or Edam, and individual customers along the pipeline route.

Lake level regulation

The draft management plan examines several lake level management alternatives. Alternatives include leaving the licensed FSL at 529.44 metres, raising the FSL to 529.59 metres, and raising the FSL with options to allow springtime surcharge above 529.59 metres.

Raising the FSL to 529.59 metres would best balance the recreational and agricultural interests around the lakes. This is not expected to significantly improve water quality or reduce weed growth. However, it may improve conditions in sheltered, near-shore areas.

Raising the FSL would improve navigation along Lehman Creek and in other shallow areas of the lakes. Allowing a surcharge above 529.59 metres would increase the risk of flood damage and erosion around the lakes and would delay haying operations and reduce hay yield and quality.

To raise the FSL, the Watershed Association would have to acquire satisfactory land control around Jackfish and Murray lakes. Most existing easements on agricultural properties around the lakes are satisfactory. (An easement is a right of way or a similar right held over another's land. A flood easement allows the owner of a dam or water control structure the right to permanently or temporarily flood another person's property.) However, additional land control is required on some agricultural and all lakeshore recreational properties. In addition, consents would be required from the Moosomin and Saulteaux First Nations, and from Saskatchewan Environment and Resource Management, which operates the Battlefords Provincial Park.

At the same time the hydrology and land control investigations were being conducted, Sask Water also resurveyed the benchmarks around Jackfish Lake used to determine lake levels. The survey found a cumulative error of 11 centimetres from benchmarks that were either incorrectly established or had shifted over the years since they were established. Corrections to the benchmarks have the effect of raising the FSL by 11 centimetres over the level that has been used in the past.

The draft management plan recommends that the year-round FSL of Jackfish Lake remain at elevation 529.44 metres. The analysis of the water level options was based on the incorrect benchmarks. Correcting the benchmarks by 0.11 metre will result in most of the advantages offered by raising the FSL by 0.16 metre, using the incorrect benchmarks.

Water quality

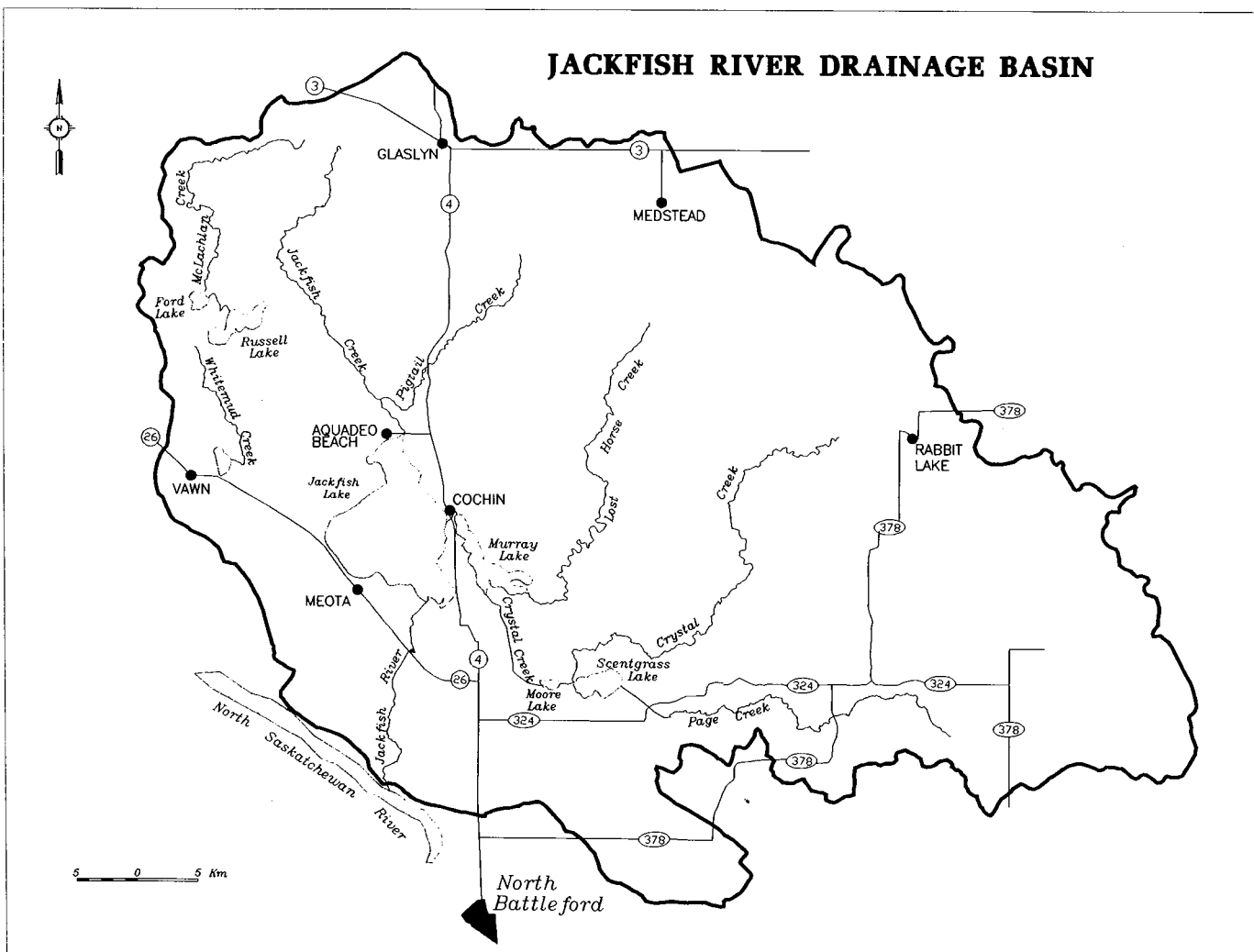
The *Report on Lake Management Issues* identified water quality as a major concern. It recommended that the Watershed Association ask SERM to conduct a recreational lake

assessment. With the assistance of Watershed Association members, SERM collected water samples during 1992 and early 1993. The final report issued by SERM in 1993 found water quality in Jackfish and Murray lakes met Saskatchewan's surface water quality objectives for contact and non-contact recreation and for the protection of aquatic life.

The report noted that salinity levels in Jackfish Lake, although acceptable for recreational use, could affect uses such as irrigation. During the winter of 1994, Sask Water reviewed the suitability of water from Jackfish Lake for irrigation. It found the water to be suitable only for use on well-drained soils and salt-tolerant crops. Sask Water officials met with Jackfish irrigators in March 1995 to discuss these findings and to advise them that Sask Water would monitor Jackfish salinity levels until lake levels recovered.

While the water quality of Jackfish and Murray lakes was found to be generally quite good, the draft management plan contains two recommendations carried forward from the *Report on Lake Management Issues*. First, the draft plan recommends that the Watershed Association and/or local

continued on page 4



municipalities initiate a public awareness program dealing with the adverse effects of fertilizer overuse, shoreline alteration, and sewage and grey water discharge on lake water quality. Second, the draft plan recommends that local municipalities and Saskatchewan Health continue to monitor and enforce compliance of bylaws and regulations governing sewage works.

Land control

The draft management plan recommends that the province review the existing easement agreements to determine if they should be retained, transferred to the Watershed Association, or extinguished. There are 83 separate easements between individual landowners and the provincial crown represented by Saskatchewan Agriculture and Food.

When the control structure was reconstructed in 1966-67, provincial policy was to obtain land control in the name of the crown. This policy was changed in the early 1970s. However, the existing easements have remained with the province.

The draft plan recommends that the Watershed Association acquire outstanding land control around Jackfish and Murray lakes. Acquisition of the required land control would reduce the liability of the Watershed Association in case of a major flood. Under current Sask Water policy, the Watershed Association would be responsible for obtaining and paying for the easements. Sask Water can provide technical assistance to the Watershed Association under its Water Control Assistance Program.

Shoreline use and development

Two of the recommendations contained in the plan reinforce previous reports' recommendations on land use planning of shoreline areas around Jackfish and Murray lakes. First, the draft plan recommends that local municipalities enact flood zoning bylaws to reduce the risk of flood damage to new lakeshore developments. Second, it recommends that municipalities around Jackfish and Murray Lakes review land use policies and plans with reference to a consultant's report completed in 1984 (Marshall Macklin Monaghan Western Ltd.).

WANT MORE INFORMATION?

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What's next?

The draft *Jackfish River Basin Management Plan* can be seen at the Rural Municipality of Meota office, Cochin Village office and Sask Water's North Battleford office. Additional copies of the draft plan are available from the Sask Water office in North Battleford at a cost of \$5.

Sask Water welcomes your comments on the draft water management plan and/or on the information presented in this newsletter. Please forward your comments to Sask Water's North Battleford office by September 30, 1995. The plan is expected to be finalized by the end of 1995.