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Executive Summary

The following recommendations are in roughly descending order of importance:
The parties who would implement these recommendations are not identified in this report since the Panel assumes that responsibility for implementation would be allocated according to a combination of current government agency mandates and activities, industry permit requirements, and input from citizen or scientific advisory groups (see final recommendation).

Fisheries
Despite heavy recreational activity and industrial use, Lake Wabamun is in moderately good condition. The most serious problem is with the fish community. As a result of commercial fishing, sport overfishing, and destruction of fish habitat, walleye have disappeared from the lake. Few pike survive long enough to reach reproductive age. Lake whitefish have not successfully reproduced for several years.

- We recommend that commercial fishing be eliminated altogether, and that sport fishing be restricted to catch and release until populations recover to more normal age structures.

Past efforts to re-introduce walleye have been unsuccessful. High hooking mortality from catch and release angling is probably responsible.

- We recommend that any future attempts to reintroduce walleye be accompanied by total closure to angling of areas of the lake where walleye congregate, until several age classes are established.

While great efforts have been made to reduce industry-related fish mortalities, they are still significant and in some cases unpredictable in occurrence. They are, however less important than mortalities caused by angling or commercial fishing.

- We recommend continued vigilance to prevent and correct fish mortalities. These mortalities should also be taken into account in management and allocation of the fisheries resource.

Weed harvesting is a relatively insignificant source of direct fish mortality, but it causes a significant loss of fish habitat. Modifications of shoreline properties by cottagers have also resulted in significant loss of fish habitat.

- We recommend that weed harvesting be discontinued, and that other prohibited destruction of fish habitat, including weedbeds, be monitored and enforced according to the Canada Fisheries Act.
Lake level, outlet, and water balance

The outlet of Lake Wabamun has been repeatedly and illegally modified and vandalized since 1912 by different groups wishing to regulate lake levels at either very high or very low levels. As a result, 1.5 km of stream channel has been rendered useless as fish habitat. Stabilization of the lake’s water level has had an adverse effect on fish spawning and nursery habitats.

- We recommend that the weir at the outlet be modified to act as a fish passage to ensure that the upper section of Wabamun Creek can be utilized. This could be done by installation of an appropriate culvert under the roadway that presently acts as a weir, sealing the illegal outlet, and restoring the original channel of the outlet stream, following a qualitative and quantitative assessment of fish habitat. We also recommend that the level of the lake be allowed to fluctuate seasonally and naturally, with the only human intervention being the use of the Wabamun Lake Water Treatment Plant (WLWTP) to replace water that is used or diverted from the lake for industrial activity. The amount used by industry can be accurately predicted from a water balance model, although precipitation measurements need to be improved by making measurements within the watershed of the lake.

- Precipitation collections should be made at two or more locations in the lake Wabamun watershed to improve the performance of the water budget model, which is critical to predicting the water needed from the WLWTP.

- Reclamation of mined land in the catchment of Lake Wabamun should approximate original land cover as closely as possible.

Eutrophication

Although there is some evidence of eutrophication during the 20th century, monitoring records since 1980 indicate that the lake is currently stable. While phosphorus originates from external nutrient input, its recycling between water and sediment can greatly intensify eutrophication. If this “internal loading” from sediments increases, it can be very difficult and take decades to reverse.

- We therefore recommend the implementation of a program designed to prevent further increases in external loading to Lake Wabamun, that would rely on enforcing more stringent guidelines for land-use changes, cottage development, waste disposal and use of fertilizer, as well as public education. We recommend that the lake monitoring program for chemistry and plankton that has been carried out for the last 20 years be reviewed and continued in a consistent manner. Consideration should also be given to monitoring of benthos and fish.

Changes to Lake Chemistry

Lake Wabamun has increased slowly in salinity, as a result of evaporation in the absence of outflow since 1992, and the chemical inputs from the WLWTP. The increase is not rapid enough
to expect major changes to the lake’s biota. The actions recommended above for lake outflow and water level should suffice to protect the lake for the foreseeable future.

**Fecal Coliforms**
The relatively high frequency with which fecal coliform counts on public beaches exceed guidelines for bathing is of some concern.

- *We recommend that further investigations be made to reveal the source of the coliforms. If the source cannot be eliminated, it may be necessary to move some of the beaches, or restrict human use.*

**Trace Metals and PAHs**
Power plants in the vicinity of Lake Wabamun have increased the inputs of several trace metals into the lake. Metal levels in the lake’s water meet CCME Guidelines (CCME 2001a), but some metals in sediments are above guidelines for the protection of aquatic life. Despite this, metals do not appear to have caused detectable changes in the aquatic community. They are not a human health concern for recreational uses of the lake.

Mercury deposition to the lake’s sediments has increased several-fold over background. Comparison with other central Alberta lakes and with earlier sediments indicates that increases are largely the result of regional emissions, in addition to long-range transport of industrial emissions from other areas. Almost all fish in Wabamun Lake are within mercury consumption guidelines for occasional users. Occasional large pike exceed the guidelines, but similar conditions are observed in other Alberta lakes. There is some concern for subsistence consumers, such as the Paul Band, because a moderate number of northern pike exceed consumption guidelines for subsistence use. If the pike population is allowed to recover as recommended, some precautionary measures might be needed if large pike are eaten frequently.

- *We recommend that trace metal studies now conducted by several agencies be coordinated to ensure that consistent sampling and analytical protocols are used, and that metals be included in a revised monitoring program. Mercury concentrations in northern pike should be monitored closely. We recommend the adoption of the recommendations of the CASA November 2003 report for reducing mercury emissions from the power plants as a long-term precautionary measure.*

In addition to natural sources, power plants and other fossil fuel burning activities have caused significant increases in polycyclic aromatic hydrocarbons, some of them known carcinogens, at present these contaminants are well below toxicity thresholds in lake water.

- *Trace metals and PAHs should be periodically assessed by paleoecological sampling, as described in the report.*
**Dredging, Disinfection By-products and Thermal Effluents**

We found that these three topics required no action, for a variety of reasons.

Dredging does not appear to be likely to provide significant benefits to the lake. It would require lengthy and thorough investigations to ensure that fish habitat was not destroyed.

- *We do not recommend dredging at this time.*

Disinfection by-product concentrations for the Wabamun Lake Water Treatment Plant are low, and below thresholds where effects on human or animal health would be expected. Although little is know about effects on aquatic life, concentrations in the discharge are low and vastly diluted by the volume of the lake.

- *Disinfection by-products are not of concern.*

The thermal effluent from the Wabamun Power Plant will cease as the Plant is decommissioned. Appropriate measures have been taken to mitigate the effects of the thermal effluents. However, the loss of the open water region of the lake in winter after the thermal effluent ceases may result in possible oxygen depletion under ice.

- *We recommend that follow-up studies should investigate the possibility that oxygen depletion under winter ice might occur after heated effluents cease.*

**Additional Recommendations**

Many of the past studies of Wabamun Lake have been undertaken by Alberta Environment staff or by consultants hired by TransAlta in response to public perception. Some of the perceptions did not justify scientific study, and some other issues were simply not amenable to scientific investigation. Examples include disinfection by-products and dredging.

At present, there are several stakeholder groups that independently pressure Alberta Environment or TransAlta with their own interests.

- *We recommend that a permanent citizens panel, whose objective it is to protect the health of Wabamun Lake, needs to be established and maintained. This panel must have members who are selected by, and representative of, the community of Wabamun Lake users. Representatives of various interest groups, as well as TransAlta and government agencies should also be included in the membership. A parallel scientific panel, consisting largely of independent scientists but including representation from Alberta Environment and TransAlta should be formed to advise the citizens’ panel on the scientific value of any proposed studies.*