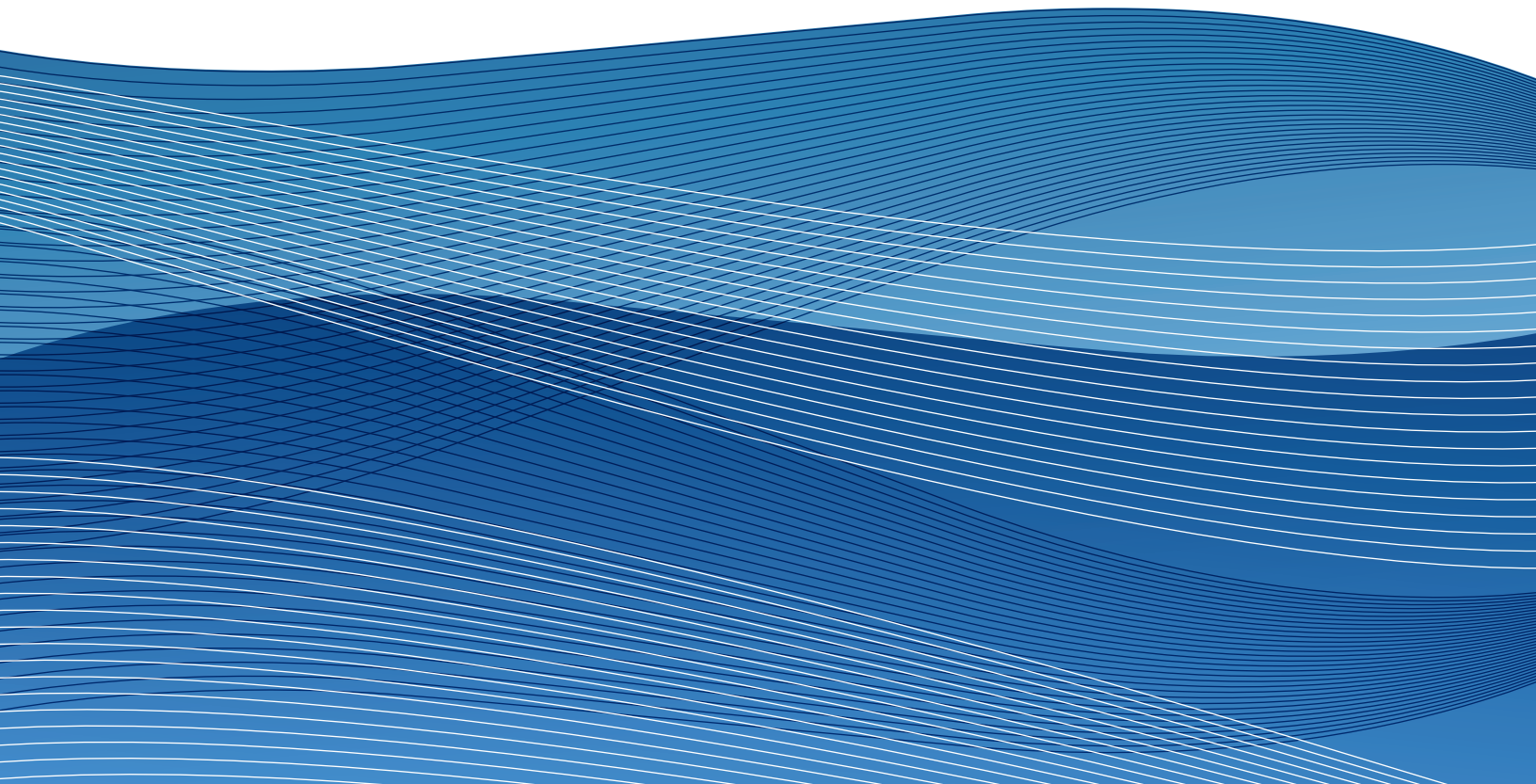
Bow River Project
Summary Report

Prepared by | The Bow River Project Research Consortium

December 2010

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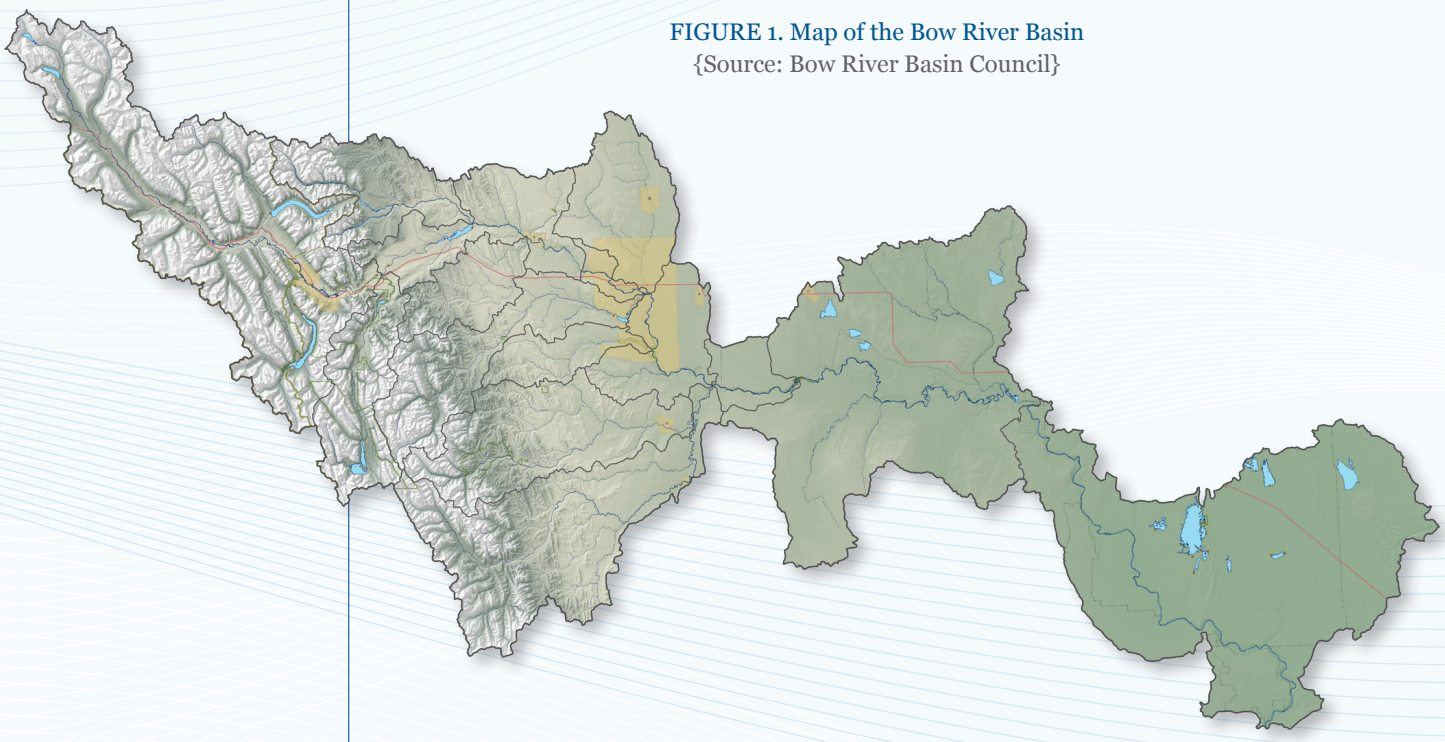
THE BOW RIVER PROJECT

CONCLUSIONS AT A GLANCE

- The Bow River System can and should be managed differently.
- Stakeholder collaboration to model the river and identify options shows that integrated management of the Bow River System from headwaters to confluence is realistic and achievable, with potential economic, environmental and social benefits throughout the Bow Basin.
- The proposed changes can be implemented for relatively modest cost.

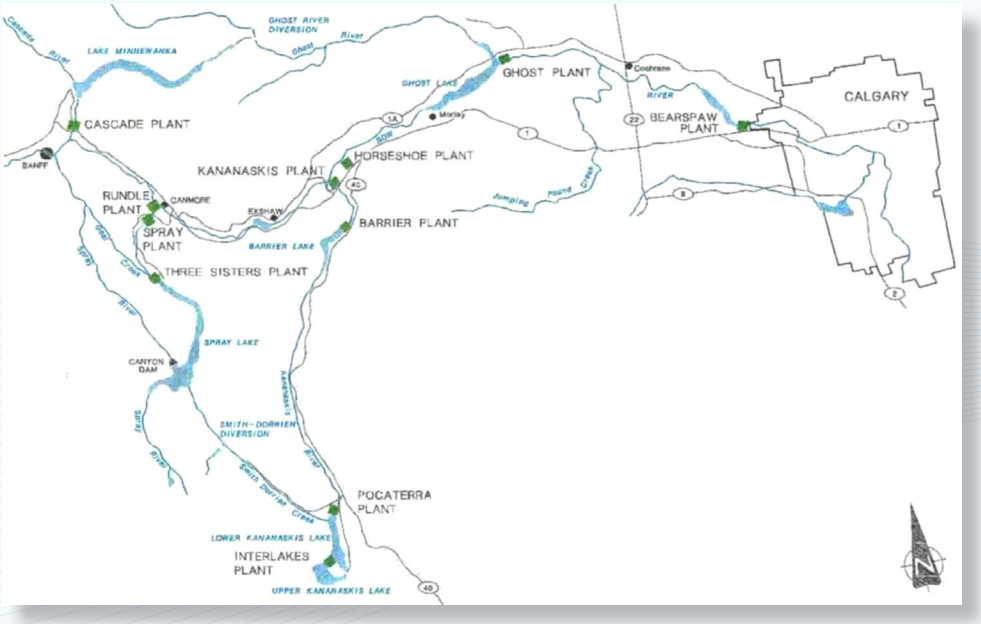
The Bow River is one of Alberta's most historically, economically and environmentally significant waterways. It flows through the most populous river basin in the province, where more than one-third of Alberta's residents live. A growing population, a thriving economy and the fact that the Bow River Basin is closed to new licence applications are placing ever-increasing pressure on water supplies in the region.

FIGURE 1. Map of the Bow River Basin
{Source: Bow River Basin Council}



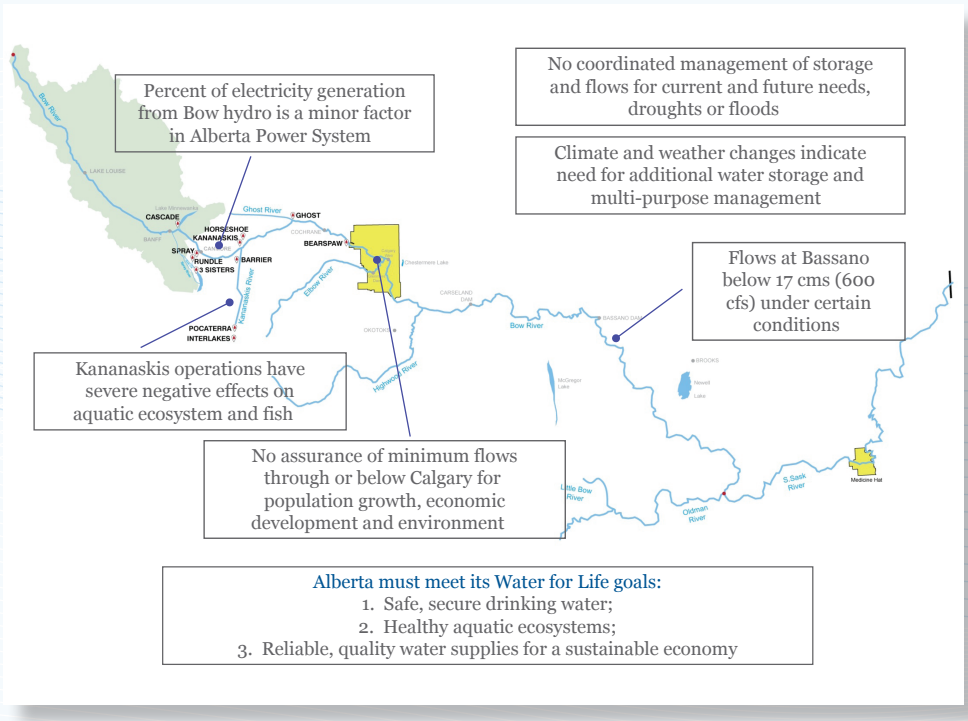
For the past 100 years the flow of the Bow River has been controlled by dams and reservoirs and by the operating rules established by the owners of these facilities. Since 1911, TransAlta has been the main influence on the storage and release of water in the river and its tributaries. Given that the timing and flow rate of the Bow are already being managed, there is a unique strategic opportunity to change the way decisions are made and make water available to more users when and where it is needed most.

FIGURE 2. Map of TransAlta Facilities
{Source: TransAlta}



The figure below reflects various aspects of current management of the Bow River as well as some of the key impacts of those management decisions.

FIGURE 3. BRP Base Case Summary (Current Situation)



The Bow River Project identified potential options to mitigate these impacts and manage the river system in a more integrated manner, with economic, environmental and social benefits to water users across the basin. The current situation formed the "base case" for the model, described in the next section. The modelling work and results are described in detail in the full project report.

MODELLING THE BOW RIVER SYSTEM

The Bow River Project Research Consortium (the Consortium) was formed in May 2010. It is a collaborative group of water users and managers whose members control approximately 95% of all water allocations and estimated water use in the Bow River Basin. Participants used an interactive hydrologic simulation model to create the Bow River Operational Model (BROM). The BROM was the basis for all subsequent work and is a valuable and timely legacy tool that will be useful to all those interested in the way Alberta's rivers are managed.

Data for the model came from a number of sources including TransAlta, Alberta Environment's Water Resources Management Model, In-stream Objectives, the Irrigation Demand Model, the Alberta Electricity System Operator, and Alberta's Water Conservation Objectives. Using the BROM, participants established a base case that reflects current operations of the river system, and then developed scenarios for management alternatives. More than 30 economic, environmental and social performance measures were compiled to assess the impacts of the scenarios.

Four scenarios were developed; one of these became the Preferred Scenario in which:

- Lower Kananaskis Lake is stabilized at 1663.5 metres—3.5 metres below the current 1667-metre full supply level—with a fluctuation of ± 0.5 metre; this is a significant change from current annual fluctuation of up to 13.5 metres.

- Discharge flows into the Kananaskis River from the Pocaterra power plant are held steadier, with the objective of ensuring that within-day instantaneous flows vary by no more than a factor of three, maximum day-to-day instantaneous flows vary by no more than a factor of two, and minimum day-to-day instantaneous flows vary by no more than a factor of 0.5.

- A "water bank" is created with a combined volume of 74,000 dam^3 (60,000 acre feet) taken from TransAlta reservoirs above Ghost reservoir, in proportion to reservoir size.

- The capacity of Langdon reservoir is doubled from 8,340 dam^3 to 16,700 dam^3 (6,750 acre feet to 13,500 acre feet).

This Preferred Scenario could be enhanced to provide additional potential benefits by restoring Spray Lakes Reservoir to its original design specifications. This would provide storage and managed access to another 75,200 dam^3 (61,000 acre feet) of water. This option was also modelled but further work is needed to assess how it might be implemented and the extent of additional benefits that would accrue.

A semi-final version of the data was used to test the water quality impacts of one scenario using Alberta Environment's Bow River Water Quality Model. The tested scenario did not include the water bank but did include a restored Spray reservoir. The results showed essentially no differences in water quality for any of the parameters tested.

POTENTIAL BENEFITS OF INTEGRATED RIVER MANAGEMENT

The Preferred Scenario reflects a shift to integrated management of the Bow River System. This scenario, which could be implemented without affecting Alberta's existing priority water allocation system, could add considerable value to the region and the province in the following ways:

Bow Glacier at Bow Lake

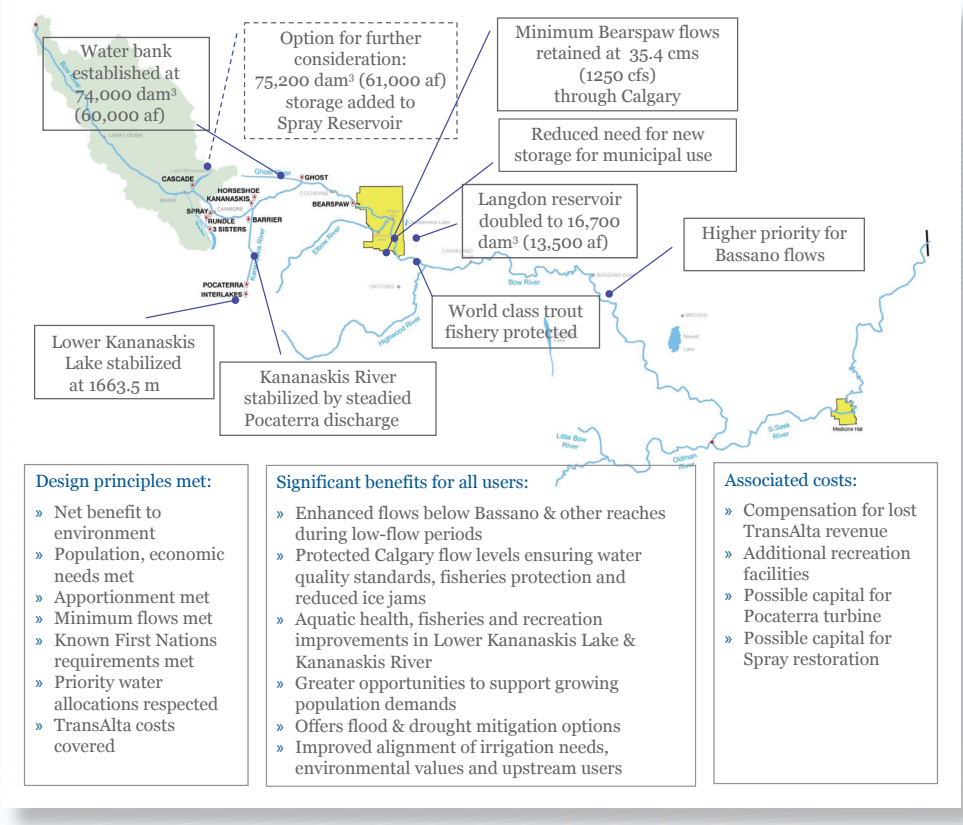
- Cost-effectively meet the forecast water demands of a growing population in the Calgary region and provide opportunities to better manage waste discharges to the Bow River System.
- Enhance and expand recreation opportunities in the Calgary-Kananaskis area for rafters, kayakers, canoeists and anglers as well as those who support the recreation and tourism industry (hotels, restaurants, retailers, fishing guides, travel operators and the nearby casino/hotel).
- Reduce the peak of moderate flood events.
- Mitigate drought through the carry-over of water storage for emergency human supply under certain drought conditions. Drought mitigation planning by all users of the Bow System could also be valuable for food production in the irrigation districts.
- Substantially increase biological productivity, including fisheries, in Lower Kananaskis Lake and substantially improve aquatic ecology in the Kananaskis River by altering the operating criteria for the Pocaterra power plant, with modest impact on capital costs for hydro operations. There is also significant potential value associated with the creation of fish habitat units for the purpose of offsetting the loss of fish habitat in other places.
- Potentially expand irrigation, which more than doubles the value and yield of crops compared to dryland farming, while maintaining environmental flows in the Bow.

The figure below illustrates the impacts of the Preferred Scenario in various reaches of the Bow River.

Time constraints prevented the Consortium from quantifying all of the potential costs and benefits, and further work is needed in this area. Based on previous studies, capital costs to replace the Pocaterra turbine to accommodate steadied flows into the Kananaskis River are estimated at $5-6-million.

If the option for restoring Spray Lakes Reservoir were considered, preliminary capital cost estimates range from $20-million to $100-million. Preliminary estimates to compensate TransAlta for lost revenue from implementing the preferred scenario range from $2-million to $2.5-million. Other capital and operating costs may also be identified.

FIGURE 4. BRP Preferred Scenario Summary



CONCLUSIONS FROM THE BOW RIVER PROJECT

The results of this project clearly show that:

» The Bow River System can and should be managed differently,

» Proposed changes to improve water management are realistic and achievable, with potential benefits throughout the Bow Basin, and

» The proposed changes can be implemented for relatively modest cost and in a way that does not significantly diminish economic returns from power generation.

The foundation for the proposed changes is a move to integrated adaptive management of the Bow River System from headwaters to confluence—an approach that considers all users as well as economic, environmental and social impacts. This opportunity represents a significant shift in thinking and action and reflects the approach that is emerging through Alberta's Land-use Framework to place-based management.