

## Forum Notes: Managing for River Health in the Battle River

### Policy & Legislation

- We are obligated under provincial and federal legislation to protect the aquatic environment in the Battle River, including fish and fish habitat.
- Alberta's *Water Act* recognizes that protection of the aquatic environment is essential to sustainable water management. The *Act* (S.8) requires that a *Strategy for Protection of the Aquatic Environment* be developed as part of water management planning.
- The Federal *Fisheries Act* is meant to conserve and protect fish habitat. This *Act* prohibits unauthorized alteration, destruction or pollution of fish habitat, and blockage of fish passage.
- Alberta's *Fish Conservation Strategy* aims to sustain the abundance, distribution and diversity of fish in Alberta.
- The proposed Alberta *Wetland Policy* is intended to conserve slough/marsh wetlands and restore or create slough/marsh wetlands to replace wetlands that have been depleted or degraded.
- The *Navigable Waters Protection Act* prohibits construction of works in any navigable waters without first obtaining approval from the Minister of Transport.

### Ecosystem Services

- There are FIVE inter-related components that make up a *river* ecosystem: biology, connectivity, geomorphology, hydrology and water quality. Hydrology is the central driving component; a river's natural flow, or hydrology, serves as its own unique signature. The biological (or *living*) component of an ecosystem creates stability and resiliency by moderating environmental change. Connectivity refers to the river's hydrological links to its floodplains, groundwater and along its length. Geomorphology refers to the configuration of the river bed, channel and valley.
- The Battle River provides us with **free ecosystem services**. Ecosystem services are the beneficial outcomes for the natural environment and for people that result from ecosystem functions. For example, the Battle River naturally:
  - **Supplies water:** the river carves a channel that concentrates and transports water for the environment, agriculture, industry and households
  - **Purifies water/treats waste:** microorganisms in wetlands and riparian areas filter and breakdown pollutants protecting water quality
  - **Reduces floods:** floodplains and wetlands absorb rain-water and river flows, reducing flood damage
  - **Off-sets drought:** floodplains and wetlands absorb and store rainwater, slow runoff, shade water and reduce evaporation, and help recharge groundwater.
  - **Improves soil fertility:** floods deposit fertile sediments on flood plains
  - **Provides food:** fish, waterfowl, clams, other wildlife
  - **Delivers nutrients to the ocean:** the Battle is part of a network of rivers that carries nutrient rich sediment to deltas and estuaries, an important food source for ocean fisheries.
  - **Provides habitat:** for birds, fish, wildlife, etc.
  - **Provides beauty and recreation opportunities:** scenery, boating, hunting, fishing, etc.
- The ecosystem services provided to us by the Battle River mainstem (tributaries not included) works out to be approximately \$3.5 million USD/year. The Battle River's associated floodplains & wetlands provide us with services worth \$80 million USD/year.<sup>1</sup>
- Different types of flows provide different ecosystem services:

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<sup>1</sup> Based on figures devised by Costanza, et al. 1997.

- **High flows** shape the river (channel, pools, riffles) and its floodplain; flush nutrients, pollutants, & sediments; maintain riparian areas, flood plains and the plant species within them; and trigger emergence of aquatic insects, and fish migration & spawning.
- **Low flows** provide for basic waste assimilation and survival of aquatic life; trigger plants, fish and insects to enter senescence ('hibernation'); trigger germination of certain floodplain plants; and purge some invasive/weed species.

### **Traditional Management of River Flows**

- Traditional water management has focused on providing a predictable year-round supply of water, using dams and weirs to store water and regulate its release. It was largely premised on the belief that engineered structures could improve on the services provided by the river ecosystem.
- Traditionally, water managers may not have considered the large cumulative impact caused by numerous small river diversions or hydrologic alterations that individually would not raise much concern.
- As a result, we have often 'flat-lined' our rivers (altered their natural flow patterns) and disconnected them from their floodplains and along their length. This causes a downward spiral in ecosystem services (declining water quality, water quantity, riparian areas and fisheries).
- As ecosystems services have deteriorated, we have typically responded with more engineering intervention, such as more dams to compensate for lost storage and more intensive water treatment to deal with poorer water quality.
- These interventions often further deteriorate remaining ecosystem services, generating an ever-increasing need for costly engineering intervention.
- The Battle River's health has been impacted by licensed water use, dams, weirs and river crossings. Specifically, natural flows, channel integrity, riparian vegetation, water quality, connectivity and fisheries have been affected. The way water has been managed has affected the Battle River's ability to supply us with ecosystem services.

### **Sustainable Flow Management**

- Modern water management focuses on sustainability. Today's water managers understand that
  - we should manage flows to mimic natural flow patterns
  - water must be allocated to support the river ecosystem
  - there are limits to the available water supply and water resources must be managed within the capacity of individual watersheds.
  - new water demands can be met by getting more benefit out of water already appropriated for human uses – by sharing, recycling, conservation and efficiency.
- Failure to allocate water for ecosystem function may result in short terms gains from new water developments, but in the long run, will cost us by reducing the quality and quantity of available water. This implies a limit on the degree to which we can wisely alter natural river flows.
- Principles for sustainably managing river flows include:
  - 1) mimic the river's natural flow as closely as possible;
  - 2) maintain baseflows and thus aquatic habitats during dry parts of the season;
  - 3) retain flushing flows early in the spring to flush out the river channel and cue spawning and fish migration;
  - 4) retain some floods at full magnitude to ensure riparian vegetation regenerates and large debris is cleaned out.
- We need to find a **balance** of engineering/management that services our needs while still maintaining the ecological functioning of the river so that we continue to receive the benefit of ecosystem services.

### **Additional Resources:**

[www.instreamflowcouncil.org](http://www.instreamflowcouncil.org)

[www.nyas.org/pdfs/Postel\\_Ch1.pdf](http://www.nyas.org/pdfs/Postel_Ch1.pdf)

[www.cowsandfish.org/greenzone.html](http://www.cowsandfish.org/greenzone.html)