Environmental Considerations for Water Management Session Summary
Okanagan Water Stewardship Council Discussion Series
For the meeting of November 9, 2006

In 2006 and 2007, the Okanagan Water Stewardship Council (Council) intends to review the major water resource issues of the Okanagan Basin. The following summary outlines presentations made to the Council, and provides a synthesis of the discussion that followed. The ideas expressed here represent a work in progress, and *do not in any way* signify policy positions of the Council, or of the Okanagan Basin Water Board.

Objective
The objective of this meeting was to better understand environmental considerations for water management in the Okanagan – particularly as they involve kokanee recovery and riparian habitat protection. What policies and programs are needed to support this work?

Presenters
- Andrew Wilson, Senior Fish Biologist, BC Ministry of Environment, Okanagan Region
- Peter Dill, Okanagan College Emeritus Professor
- Paul Kluckner, Environment Canada

Presentations
Slides of all presentations can be viewed on the Okanagan Basin Water Board website at: http://www.obwb.ca/presentations/

I. Andrew Wilson
Andrew Wilson's presentation was focused on the Okanagan Lake Action Plan (OLAP) for kokanee recovery, which is now more than 11 years along, and explaining the relative rolls of the Ministry of Environment (MoE) and the Federal Department of Fisheries and Oceans (DFO). The MoE's Environmental Stewardship Division (Fish and Wildlife Section) is responsible for management of non-anadromous (resident) fish species, compliance and enforcement of the Provincial Water Act and the Federal Fisheries Act, and provides resident species expertise to DFO. MoE does not have the power to authorized the destruction of fish habitat.

The OLAP was put in place to address the dramatic collapse of kokanee in Okanagan Lake over the past 30 years. Before 1970, more than one million kokanee spawned in the lake and tributaries. Kokanee hit their lowest numbers in the late 1990s, and this year there are less than 200,000 spawners. The Plan has a 20 year window of activity, with an objective to "define causal problems" with kokanee production, and "implement innovative solutions". Habitat loss has been a major factor, especially for stream spawners, and development of the lake foreshore has potential to impact lake spawners into the future. Long-term monitoring shows that there is very low in-lake survival,

because of competition for food with *Mysis relicta*, and shifts toward less-nutritious blue-green algae associated with low nitrogen/phosphorus ratios in the lake.

The MoE has a number of programs underway to improve the odds for kokanee recovery, including habitat restoration and protection; improved lake-level management; *Mysis relicta* removal; and potentially, actions to restore the nutrient balance of Okanagan Lake.

a. Habitat Restoration/Protection: The MoE is currently working to map existing kokanee shore-spawning habitat in Okanagan Lake, and creating a Draft Foreshore Habitat Protocol with best management practices to guide developers and planners. They are also working on Water Use Plans for Trout Creek, Mission Creek, and Powers Creek, as well as participating in a Water Management Plan for Trepanier Creek.
b. Improved Lake-level Management: The MoE has formed a partnership with DFO and the Okanagan Nation Alliance to develop a computer-based decision making tool – the "Fish/Water Management Tool." The computer model uses real-time information about kokanee spawning patterns, water temperature, lake levels, and weather conditions to help water and fisheries managers in making the optimum water release decisions to balance all water management priorities. The tool will increase kokanee survival by minimizing the occurrence and severity of drawdown-related mortality from freezing and desiccation.
c. *Mysis relicta* removal: *Mysis relicta* are being managed by establishing a shrimp-fishing industry that seeks to maintain them at a 50% lower population density. The Province has a 10-year agreement with two separate shrimp fishing operations, working under annual scientific collection permits. One of the conditions of the permit is that the licensees are responsible for long-term monitoring of the shrimp and other variables related to kokanee stress or success. Mysis are dried and sold as tropical fish food. They are also being marketed to the pharmaceutical industry as a source of Omega 3 fatty acids.
d. Nutrient Balance: Currently, the lake has very low nutrient levels overall, and a low N/P ratio. This N/P ratio favors blue-green algae over the more nutritious chlorophyte and cryptophyte algae. Biologists hypothesize that shifting the nutrient balance will increase carbon flow through the Okanagan Lake food web. Nutrient conditions are affected by rainfall patterns. A number of nutrient experiments were conducted in the lake, but the timing of the experiments coincided with a run of naturally low-nutrient dry years. Although the results were inconclusive, the MoE has not abandoned the hypothesis, and is waiting for the next run of wet years to repeat the experiments.

The MoE's Environmental Stewardship Division is very interested in having the support of the Okanagan Water Stewardship Council and the Okanagan Basin Water Board for implementing both the research and the solutions identified by the OLAP. Specifically, they would appreciate help with (1) Promotion of the Foreshore Habitat Protocol that is still being developed by the MoE Ecosystem section, (2) Water quality monitoring; (3) Flow monitoring – with re-establishment of the WSC stations; (4) and with Water use

planning – through support and advocacy of the process itself, as well as involvement at roundtables.

Draft Text for Potential Future Recommendation (The following action was proposed within the context of the discussion, and may be considered in the future as a potential recommendation to be forwarded to the OBWB. This does not represent a consensus idea of the Council)**:**

> ***Foreshore Habitat Protocol:*** *The Council strongly endorses the work of the B.C. Ministry of Environment and the Department of Fisheries and Oceans in developing a Foreshore Habitat Protocol for kokanee spawning areas in Okanagan Lake, and recommends that the OBWB support this effort.*

The goal of the Foreshore Habitat Protocol is to develop best management practices, guidelines and standards for development in these sensitive zones. While the Council believes that foreshore development presents many concerns for local governments, we feel that the proposed protocol takes a great step forward in alleviating concerns for the sustainability and recovery of the kokanee fishery.

Along with support for developing a Foreshore Habitat Protocol, a proposal was made to consider supporting the establishment of aquatic preserves in the Lake system.

II. <u>Peter Dill</u>

Peter Dill's presentation outlined a strategy for increasing kokanee spawning success in Mission Creek by increasing September stream flows. There are trade-offs involved with planning these releases, and studies need to be done to evaluate how much water the kokanee will need year-round. Smaller creeks in the Basin likely have much worse temperature and spawning conditions than Mission Creek, which is the largest tributary to the Okanagan Lake – however, strategies developed to increase spawning success on this creek will inform creek restoration efforts on other drainages.

To balance all the conflicting needs, it may be necessary to build more upstream storage, and to establish a computer-based decision-making tool for water releases. The ecological function of streams or rivers is driven by their peak flows. Peak flow determines the width of the channel, the size of the cobble, and the flood risk at different elevations of the floodplain. Other areas are moving away from building or increasing the height of dams because of their ecological impacts. Water management regimes must be designed to mimic natural hydrology, especially if dams are expanded. Some of the cost and effort involved with expanding upstream storage may be offset by developing Hydro-generation plants on these reservoirs.

Draft Text for Potential Future Recommendation (The following action was proposed within the context of the discussion, and may be considered in the future as a potential recommendation to be forwarded to the OBWB. This does not represent a consensus idea of the Council)**:**

> ***Recovery of Stream-Spawning Kokanee:*** *The Council recommends that the OBWB support further research and feasibility studies to aid stream-spawning kokanee survival and reproduction – potentially leading to the development of a Fish-Water Management Tool for Okanagan streams (like that being used to manage flows from Okanagan Lake). As a component of this work, the Council recommends that the Board support the development of a formal Water Use Plan for Mission Creek, scheduled for 2007.*

Mission Creek is the largest tributary to the Okanagan lake-system, and hosts the largest number of kokanee stream-spawners each autumn. These fish are adversely affected by high water temperatures during the month of September. Research by Peter Dill, a member of the Council, suggests that the only effective means to reduce water temperatures in Mission Creek is to increase flows during this critical month.

For long-term recovery of stream-spawners, it will be very important to increase the number of stream flow monitoring stations on salmon-bearing creeks in the Basin. As there is a close correlation between stream flow and temperature, it may be possible to use temperature sensors (which are relatively inexpensive) instead of flow monitors. Other parameters like watershed size or stream gradient can increase the accuracy of flow estimates. It will also be important to evaluate the roll of ground to surface water flows in maintaining stream levels and thermal characteristics of streams.

Overall, it will be essential to put in place rigorous Basin-scale hydrology and water-balance models, not just for healthy stream systems, but for determining the overall sustainability of water supplies in the Basin – and what measures will be needed to sustain population growth rates. Environment Canada has a strong willingness to partner on this work, to fill identified research gaps – such as the need for instruments to measure evaporation from the Okanagan Lake. Fred Wrona, the Council alternate to Paul Klucker, suggested that the OBWB may be able to apply for additional hydrological monitoring funds from Western Economic Diversification.

Long-term commitments will be essential for maintaining hydrological monitoring stations. The current Water Supply & Demand study is a snapshot, but ideally the underlying models can be regularly updated with current information. This is a time of climate change, and we need to be able to track the direction of the change over time, so that local government can respond appropriately. It is possible that the OBWB could incorporate the costs of long-term monitoring into its budget, but a case needs to be made that this is essential for water management in the Basin. Having the OBWB involved will help insure that hydrology data can be accessed and shared by different research groups, ideally on a website such as is being developed by GeoConnections/Environment Canada. The Province and federal governments have taken the position that water-data users should be financially supporting data collection efforts (i.e., Water Highway BC). However, in the Okanagan, all residents are the end-users of this water data.

The Okanagan Sustainability Institute (OSI) is a new proposed research centre at UBC-O, that will involve faculty, researchers, undergraduates, and graduate students. The OSI is a natural partner for long-term data collection and monitoring, providing there is a consistent source of funding and support. Data collected for use by Provincial water managers and water utilities could be collected, stored and used by UBC-O researchers, which could greatly expand the value of the data. Environment Canada has had great success with similar efforts conduct sensitive ecosystem mapping and monitoring (SHIM). They recommend putting together local datasets that are each driven by local needs. For this to work there must first be established data collection methods and quality assurance protocols. When everyone is collecting data in the same way, it is much easier to gather and collate into searchable databases.

III. Paul Kluckner

Paul Kluckner gave a presentation on Environment Canada's efforts to steward the environment (specifically riparian areas) in the context of water resource management. Riparian habitats are fringe areas around water bodies. They are important for flood dissipation, water quality purification, and essential corridors and habitat for wildlife. Up to 80% of South Okanagan and Similkameen terrestrial wildlife species use riparian habitats, and 90% of the riparian habitats in the Basin overall has been degraded. Riparian protections are an important component of Source Area protections for maintaining downstream water quality.

Environment Canada (EC) is leading recovery efforts for 5 riparian bird species: the Yellow-breasted chat, White-headed woodpecker, Sage thrasher, Williamson's sapsucker, and Lewis's woodpecker. They also participate in the recovery team for amphibians and reptiles. EC is also a major funder ($1 million/year) of stewardship initiatives to aid ranchers and conservation organizations to undertake projects such as riparian fencing. They have also participated in partnerships to secure land for habitat protection, particularly focused on wetland, riparian, and antelope brush ecosystems.

There are seven species at risk that use riparian zones in RDOS, including Yellow-breasted chat, Lewis's woodpecker, Western screech-owl, Western red bat, Tiger salamander, Spadefoot toad, and gopher snake. Altogether, there are 63 Okanagan species listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), 49 of which are also listed under the Species at Risk Act (SARA). SARA mandates EC and other agencies to protect endangered species and conserve their habitats. While the Act provides some "sticks" it is mostly based on a "carrot" approach.

The Okanagan valley provides a desert corridor for wildlife from the western US to the grasslands in the north. It is one of the three biodiversity hotspots in Canada, due in part to its varied terrain. Much research has been done regarding wildlife and habitats of the Okanagan, but there are still substantial gaps. For example, a conservation program was developed for RDOS, but this did not include information on the central or north Okanagan. Municipal Districts also need to consider SAR in their land-use decision making. However, progress is being made.

- A low –elevation sensitive ecosystem inventory is complete.

- Sensitive ecosystems are being incorporated into many OCPs.
- CORD and RDOS have hired environmental planners with funding contributions from the federal and provincial government.
- The Canadian Wildlife Service is working with other agencies to develop a model bylaw to help local governments protect habitat.
- RDOS is considering habitat and species in their growth strategy process.
- Local governments in the central and northern Okanagan are taking steps to develop conservation programs.

First Nations' reserves contain important remnants of unfragmented species at risk habitat, and First Nations are essential to recovery efforts. However, First Nations have economic aspirations similar to local governments. EC is working to help First Nations build capacity to conserve species at risk on their own lands, and recognizes the importance of equity issues in applying SAR protections on reserves and neighboring jurisdictions.

Environment Canada is also working with the agriculture community on conserving species, habitats and water quality. They are participating in partnerships to monitor the hydrology, biology and water quality of 15 Okanagan streams. They are also working to define the quality and quantity of habitat required to sustain biodiversity in agricultural areas of the southern Okanagan, and this work will contribute to efforts to validate national agri-environmental standards (NAESI). The goal of NAESI is to establish science-based benchmarks to guide farm practices, and not to establish regulatory instruments.

At a science manager's workshop co-sponsored by Environment Canada in 2005, a group of scientists and community representatives developed the following priorities for science in the Okanagan.

- **Consolidated messages**: Blunt consensus messages based on existing and new information to guide actions on issues facing the Okanagan Basin.
- **Integrated land-use modeling**: Use an integrated land/water modeling approach to understand effects of future scenarios. Collect monitoring and information to support ILUP.
- **Climate variability and change**: Improve understanding of climate variability and change at the regional scale, its impacts and possible adaptation measures.
- **Hydrologic cycle and water quality**: Improve understanding of the whole hydrologic cycle in the basin, including stresses on the condition of the water. Review current projects, e.g., groundwater, water supply and demand analysis, and identify any further gaps in information needs.
- **Ecological integrity of main-stem lakes**: Investigate carrying capacity and possible thresholds for the future ecological integrity of the lakes.
- **Air quality**: Support community air-shed planning. Investigate links between air quality and integrated land-use planning.