Okanagan Basin Water Board: Water Management Program

A review:

2009 priority projects proposed by the Water Stewardship Council

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Okanagan Basin
WATER BOARD

Purpose of Document

This document builds on the ***Water Management Program (WMP) Review 2006-2009,*** approved by the OBWB and presented to the North Okanagan, Central Okanagan, and Okanagan-Similkameen regional districts in August-October 2008. Unanimous approval by all three regional districts to continue with the WMP demonstrated strong regional endorsement. The WMP includes the implementation of: Phase II of the Water Supply & Demand Project, the Okanagan Water Stewardship Council - a technical advisory committee to the Board, and the Water Conservation and Quality Improvement Grant program.

As part of the WMP Review document, the Board laid out seven (7) objectives for the Water Stewardship Council (Appendix A) that included:

- Advise Board on water issues that require timely action
- Consolidate information and expertise
- Integrate research into water management
- Develop and present position papers to the Board
- Increase public communication and awareness
- Develop programs to support water conservation
- Build and strengthen partnership between stakeholders

These Board objectives and the OBWB's strategic vision have provided guidance to the Water Stewardship Council's 2009/10 Work Plan. Section 3, *Proposed Future Water Management Projects* (pages 43-52 of the WMP Review document), approved by the Board in 2008, also lays the foundation for the projects identified in this document.

The primary direction for the Okanagan Water Stewardship Council given in the Board's WMP Review document was to <u>focus on action</u> – whereas the completion of the *Okanagan Sustainable Water Strategy* established the course, the Council was directed to ensure more projects are developed and delivered. This document provides an update on proposed priority projects for consideration by the Board.

Table 1. Summary of anticipated project outcomes

Pg #	Project Name	Project Outcome	Improving Water Quality	Managing Water Quantity	Improving Water Information Management	Water Governance
5	Community Education & Outreach project	Create a broader awareness of water management issues in the Okanagan. Empower people to participate in sustainable water management.	✓	✓	✓	✓
6	Drinking Water Source Protection Public Awareness Campaign	Source water protection. Increase public awareness about Okanagan drinking water sources.	✓			
7	Integrated Stormwater Management Project	Source water protection. Support implementation of integrated stormwater solutions.	✓			
9	Livestock & Wildlife Watering Infrastructure pilot Project	Source water protection. Construction of pilot livestock and wildlife watering infrastructure to reduce turbidity and fecal coliform.	✓			
10	Okanagan Drought Management Planning	Form an Okanagan Drought Management team and develop an Okanagan Drought Management Plan.		✓		✓
12	Okanagan Water Pricing Assessment Project	Review equity of water pricing in the Okanagan				✓
13	Streamlined Water Use Reporting project	Consistent reporting of all large Okanagan water purveyors (including groundwater)			✓	
14	Hydrometric Monitoring Governance Project	Installation of required hydrometric monitoring equipment in the Okanagan			✓	
16	Water Supply & Demand Project Database and Information Network	Creation of a centralized information portal for water data developed through the Supply & Demand initiative.			✓	
17	Rollout and Implementation of Groundwater Bylaws Toolkit	Local government in the Okanagan develops and implements groundwater bylaws.		✓		✓
19	Groundwater Regulation Pilot Program	Develop a groundwater governance (licensing) pilot in the Okanagan.		✓	✓	✓

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COMMUNICATION & OUTREACH COMMITTEE

This committee has been tasked with identifying strategies to roll-out key messages about sustainable water management to the Okanagan public. The recently developed Sustainable Water Strategy will provide a backdrop to help inform the development of communication solutions.
The general public is becoming increasingly aware of the importance of water and of the need to protect water resources, but for the most part they do not know who the Okanagan Basin Water Board is or understand what role we have in water management. Public activities can strongly influence water conservation, source water protection and other water issues and public opinion can influence water policy. Therefore, it is imperative that the public understands key water issues and is empowered and inspired to participate in sustainable water management.

Community Education & Outreach Project

The project has two priority goals. First, to provide information to the public about water quality and quantity issues, based on research conducted under the auspices of the OBWB Water Management Program (i.e., the Water Supply & Demand Study and the Okanagan Sustainable Water Strategy), in a format that is engaging and can be understood by the general public. The purpose of this goal is to demonstrate that the OBWB is a credible source of science-based water information. Second, to determine key messages for the public and delivery methods that will reach the public and empower them to participate in sustainable water management.

The public outreach campaign may include some or all of the following project components:

- a multi-media communications strategy designed to raise awareness about the Okanagan Basin Water Board and to deliver the key findings of the Sustainable Water Strategy
- piggy backing with other organizations to avoid audience fatigue (e.g., attend pre-scheduled events and meetings instead of scheduling our own workshops)
- utilizing resources and networks already available in the Basin (e.g., distribution lists from other organizations, ads and stories in established newsletters)
- establishing relationships with local media and obtain in-kind support (e.g., public service announcements of presentations, story series)
- developing a recognizable program “brand” that connects with people
- communications methods may include, but are not limited to:
    - four Newsflash Network two minute videos (one for each chapter of the Sustainable Water Strategy) to be posted on the OBWB website and other locations (TBD)
    - 20 minute video that follows water issues in the Okanagan through all four seasons
    - radio announcements
    - commercials on CHBC – look into forming a partnership with RDCO “Living Greener” and “Water Hog” programs
    - story series in local newspapers, ngo newsletters, web blogs, etc.
    - informational brochures (mass mail out, insert in newspapers, email distribution)
    - ad campaign (idea: ad could feature well-known Okanagan celebrities sitting in a bathtub (basin) with the slogan “We All Share the Same Basin”- choose celebrities that represent the north, central, and south Okanagan and the Basin as a whole)
    - utube, facebook, twitter ad campaigns
    - survey or public opinion poll to gauge public opinion about water and about the OBWB (before and after the rollout of the education and outreach project)

Relevant OBWB and provincial supportive statements:

Okanagan Basin Water Board (2009 Goals): Seek out opportunities for public speaking engagements to key stakeholder and user groups and the broader public (Goal II, Action 1B). Further develop websites, brochures, and other outreach materials (Goal II, Action 1C). Pursue a Basin-wide community engagement strategy about the value of water, the interconnection and interdependence of Okanagan water, and the need for water conservation and source protection (Goal II, Action 1E).
Recommendations from Sustainable Water Strategy: Develop a Basin-wide community engagement strategy (Action 4-8). Support and foster collaboration (Action 4-1).
BC Living Water Smart Plan: By 2012, water laws will improve the protection of ecological values, provide for more community involvement, and provide incentives to be water efficient. Government will support communities to do watershed management planning in priority areas. Government will work with the private sector and support communities to conserve and restore stream function.

Anticipated outcome: Increased awareness with the public about the OBWB management program and practical solutions that support sustaining water quality and quantity.

Project leader: OBWB
Proposed project cost: $ 50,000 ($37,500 OBWB contribution)

SOURCE PROTECTION COMMITTEE

Water shapes lands, transports materials, and transforms the environment. It has incredible power – through intense storm events and slow but steady erosion. Because of this power, water also has an enormous ability to transfer contamination from a source to a much larger area. Source water protection, which encompasses land-use, ecosystem protection, and the entire hydrological cycle, is fundamental to reducing or preventing contaminants from entering lakes, rivers and aquifers. The Source Protection Committee has proposed three projects for consideration.

Drinking Water Source Protection Public Awareness Campaign

Upland drinking water reservoirs store approximately 45% of the Okanagan's potable water supply. Recreational activities in the watershed can degrade water quality. Developing a public education program has been identified as a top priority to implement in the near term.

The project consists of developing a four part implementation plan to include:

1. partnership development,
2. development/adoption of Okanagan drinking water source symbol,
3. distributing signs in three pilot watersheds who have completed source protection plans, and
4. development of a complementary media campaign to explain the new drinking water reservoir protection signs.

Proposed partners: Interior Health, Water Purveyors, Ministry of Environment, Okanagan Conservation Officers (RAPP program), Ministry of Forests and Range, Community Futures, Okanagan Rotary, Fish & Game Clubs, DFO, Ministry of Highways, Ministry of Tourism, Culture and the Arts, Ministry of Agriculture and Lands, Media.

Relevant OBWB and provincial supportive statements:

Okanagan Basin Water Board (2009 Goals): Pursue a Basin-wide community engagement strategy about the value of water, the interconnection and interdependence of Okanagan water, and the need for water conservation and source protection (Goal II, Action 1E).
Recommendations from Sustainable Water Strategy: Use best practice land-use bylaws to protect local water sources (2-8). Ensure availability of potable water (3-4). Support and foster collaboration (4-1).
BC Living Water Smart Plan: Government will improve the quality and protection of drinking water sources. By 2012, water laws will improve the protection of ecological values, provide for more community involvement, and provide incentives to be water efficient. Government will support communities to do watershed management planning in priority areas. Government will work with the private sector and support communities to conserve and restore stream function.

Anticipated outcome: Improved Okanagan water quality and change in attitude (activities) about upland drinking water reservoirs.

Project leader: OBWB
Proposed project cost: $ 30,000 ($5,000 OBWB contribution)

Integrated Stormwater Management Project

Health of Okanagan streams are degraded by urban stormwater runoff. Runoff pollution occurs when stormwater or snowmelt picks up a wide variety of contaminants as it runs across rooftops, roads, parking lots, baseball diamonds, construction sites, golf courses, lawns, and other surfaces in our cities and suburbs. The oily sheen on stormwater in roadside gutters is one common example of runoff pollution. [1]

Categories of Principal Contaminants in Stormwater[2]

Category	Examples
Metals	zinc, cadmium, copper, chromium, arsenic, lead
Organic chemicals	pesticides, oil, gasoline, grease
Pathogens	viruses, bacteria, protozoa
Nutrients	nitrogen, phosphorus
Biochemical oxygen demand (BOD)	grass clippings, fallen leaves, hydrocarbons, human, and animal waste
Sediment	sand, soil, and silt
Salts	sodium chloride, calcium chloride

[1] http://www.nrdc.org/water/pollution/storm/chap2.asp
[2] Ibid

In British Columbia, the term *Integrated Stormwater Management Plan* (ISMP)[3] has gained widespread acceptance by local governments and environmental agencies to describe a comprehensive approach to stormwater planning. The purpose of an ISMP is to provide a clear picture of how to be proactive in applying land use planning tools to protect property and aquatic habitat, while at the same time accommodating land development and population growth.

A stormwater component is a requirement of an approved Liquid Waste Management Plan (LWMP). While the Okanagan has been a pioneer and model for LWMP implementation on the municipal point source sector, in most cases the stormwater component of these plans has been limited in scope.

Integrated stormwater solutions require site design practices that provide:

- ***Rainfall Capture for Small Storms*** (runoff volume reduction and water quality control) – Capture the small frequently occurring rainfall events at the source (building lots and streets) for infiltration and/or re-use.
- ***Runoff Control for Large Storms*** (runoff rate reduction and water quality control) – Store the runoff from the infrequent large storms (e.g. a mean annual rainfall), treat, and release it a rate that approximates the natural forested condition.

The Integrated Rainwater Management project will be directed at two levels. First, the project will support a review to determine what an Okanagan Integrated Stormwater Management Planning program would entail. Second, local governments could be encouraged to undertake pilot scale work that would include the planning process on problem drainages and, in later stages, move on to implementation and monitoring. Some communities, like Kelowna, have shown strong leadership in early stage adoption of ISMPs. OBWB support for adaptive management analysis could provide timely feedback to those communities that are ready to implement ISMPs and those that are getting started in the planning process.

Relevant OBWB and provincial supportive statements:

Okanagan Basin Water Board Goals: Make improvements on the ground – support water quality and management goals by channeling resources and political support to key research, restoration and infrastructure improvements. (Goal III)
Recommendations from Sustainable Water Strategy: Use best practice local government land-use bylaws to protect local water sources (2-8). Ensure availability of potable water (3-4). Support and foster collaboration (4-1).
BC Living Water Smart Plan: Government will improve the quality and protection of drinking water sources. By 2012, water laws will improve the protection of ecological values, provide for more community involvement, and provide incentives to be water efficient. Government will support communities to do watershed management planning in priority areas. Government will work with the private sector and support communities to conserve and restore stream function.

Anticipated outcome: Region wide implementation of ISMPs would result in improved Okanagan water quality.

Project leader: OBWB
Proposed project cost: $ 5,000 OBWB Contribution

[3] http://www.env.gov.bc.ca/epd/epdpa/mpp/stormwater/guidebook/pdfs/exec_summary.pdf

Livestock & Wildlife Watering Infrastructure Pilot Project

Animal waste poses a threat to human health. It contains pathogens such as *Cryptosporidium, Giardia lamblia, Salmonella,* and *E. coli* and oxygen-demanding substances that can lead to fish kills and degraded water supply. The erosion of stream banks by animals can also cause increased turbidity in water sources. Appropriate steps must be taken in the Okanagan to manage the risk of contamination of drinking water sources from livestock and wildlife.

Several methods are available to keep livestock and wildlife away from water bodies. ***Fencing*** can be used to prevent damage to stream banks and to keep animals from defecating in or near streams or wells. Fencing designs include standard or conventional (barbed or smooth wire), suspension, woven wire, and electric fences. The height, size, spacing, and number of wires and posts are a function of the landscape topography as well as the animals of concern. Optimum design criteria depend on the specific situation and should be developed through consultation with project partners. Providing ***alternative water sources*** and ***hardened stream crossings*** for use by livestock also lessens their impact on water quality. [4]

The committee recommends the OBWB secure senior government funding to support the construction of livestock and wildlife watering infrastructure. This source protection strategy is anticipated to improve water quality in the Okanagan.

Funding partners: Infrastructure Canada, Ranchers, Ministry of Forest and Range, Okanagan Water Purveyors, Interior Health

Relevant OBWB and provincial supportive statements:

Okanagan Basin Water Board (2009 Goals): Make improvements on the ground – support water quality and management goals by channeling resources and political support to key research, restoration and infrastructure improvements. (Goal III)
Recommendations from Sustainable Water Strategy: Off-stream cattle watering stations (2-1). Use best practice local government land-use bylaws to protect local water sources (2-8). Ensure availability of potable water (3-4). Support and foster collaboration (4-1).
BC Living Water Smart Plan: Government will improve the quality and protection of drinking water sources. By 2012, water laws will improve the protection of ecological values, provide for more community involvement, and provide incentives to be water efficient. Government will support communities to do watershed management planning in priority areas. Government will work with the private sector and support communities to conserve and restore stream function.

[4] http://www.epa.gov/safewater/sourcewater/pubs/fs_swpp_livestock.pdf

Anticipated outcome: Improved water quality – reduced turbidity and fecal coliform counts.

Project leader: OBWB
Proposed project cost: TBD – Depending on design of program

WATER SUPPLY & DROUGHT COMMITTEE

"If we know with certainty that the Okanagan will face an Australian-like drought in the next five years, what management tools do we need to develop to best handle the crisis?"

Drought conditions, such as low streamflows, reduced precipitation, and warmer temperatures, can impact communities and individuals in the Okanagan in many different ways. For example, drought can lead to reduced supplies available for drinking water and household use, lower streamflows and warmer river temperatures for fish and other aquatic life, and can affect the growth of crops in our fields, orchards, and vineyards and limit the water available for irrigation. If adequate storage is not available in a community, it may also lead to insufficient supplies available for fire fighting. In the Okanagan, like many places in the world, during water limited years the problem is water management more so than water scarcity.

The "*Dealing with Drought – A Handbook for Water Suppliers in British Columbia*" published by the BC Government in 2004 provides a good starting point to develop a drought strategy for the Okanagan.

Okanagan Drought Management Planning

The Council recommends as a first step that the OBWB send a letter to Okanagan water utilities encouraging them to develop or update drought management plans based on the BC Government's template: *Dealing with Drought – A Handbook for Water Suppliers in BC* (2004).

Effective implementation of the drought management practices recommended in the *Dealing with Drought* handbook largely relies on the formation of a local drought management team.

The responsibilities of a local drought management team may include:

- Acting as an advisory committee to local politicians and staff regarding water conservation and drought management recommendations,
- Compiling data on water supplies and users in their own watershed,
- Coordinating efforts with various stakeholders (including fisheries, agriculture, industry, and neighboring communities),
- Providing timely information to the public about water supplies, and
- Continually encouraging water conservation and appropriate responses to drought conditions.

Through an Okanagan Drought Management Team, support and foster the development of an Okanagan Drought Management plan. The BC *Dealing with Drought* handbook outlines a number of activities that may be undertaken including:

- Documenting Okanagan water system profiles
- Evaluating the impacts of drought on the region's economy
- Monitoring water supplies (includes hydrometric monitoring) and climate
- Defining drought stages
- Establishing drought responses
- Developing communications
- Evaluating Drought Management Plans

Relevant OBWB and provincial supportive statements:

Okanagan Basin Water Board (2009 Goals): Develop agreements for collaborative water conservation policy, and collaborative action on other basin-wide water management concerns such as coordinated drought response planning (Goal I, Action 2G). Coordinate utility drought response plans to develop a basin-wide drought agreement (Goal III, Action 4Aii).
Recommendations from Sustainable Water Strategy: Coordinate water supply in the Okanagan and increase efficiencies (3-1). Implement drought management plans (3-6). Develop a Regional water conservation strategy (3-9). Apply best practices to the planning and management of Okanagan water supplies (3-14). Implement policies that support coordinated water storage by utilities (3-16).
BC Living Water Smart Plan: Legislation will recognize water flow requirements for ecosystems and species. Government will require all users to cut back their water use in times of drought or where stream health is threatened. By 2020, water use in B.C. will be 33 percent more efficient.

Anticipated outcome: Improved drought readiness by local government. Improved coordinated approach to managing water resources during water limited years in the Okanagan. Harmonizing water conservation bylaws throughout the Okanagan.

Project leader: OBWB and the Province of BC
Proposed project cost: TBD

WATER ECONOMICS COMMITTEE

Water is a common good that is essential to the survival of people and ecosystems. The consumptive and non-consumptive values of water should be recognized and respected in all water management decisions. There is a need to provide sufficient resources for local water management initiatives. An Okanagan water pricing assessment project will help inform water professionals on how to support better use of water supplies, improve and refine management practices, and develop useful information to support policy development.

Every resident in the Okanagan should have access to a basic "lifeline" volume of clean water for drinking and sanitation at a reasonable price and ensure water is available and priced to support agriculture in the Okanagan.

The committee proposes focusing on the identified need to collect and analyze information about water pricing and funding mechanisms for the supply of water in the Okanagan.

Okanagan Water Pricing Assessment Project

Canadians are just beginning to understand that freshwater is both precious and scarce. Renewable freshwater is approaching full allocation in many regions of the Okanagan. This has prompted debate on reforming water allocation policies to promote the long-term sustainability of our renewable freshwater resources.

In 1994, the Okanagan Valley Tree Fruit Association commissioned a report titled ***Water Supply and Management issues Affecting the BC Tree Fruit Industry*** wherein the authors developed a revenue and cost analysis for some Okanagan water purveyors (see Appendix B). The water economics committee has explored several important questions including: "How do water purveyors ensure funding is available today and in the future to pay for the necessary infrastructure to provide safe drinking water and ensure agriculture and industrial water needs are met?" and "What is the progress on full cost accounting of infrastructure and preparation of rate changes?"

The Okanagan Water Pricing Assessment project may include valuable up-to-date information about water supplier rates including a breakdown of agricultural rates, serviced area and domestic services. The assessment will provide a frame of reference to act as a guide for water pricing options in the Okanagan as well as an opportunity to identify mechanisms to support the payment for necessary water works infrastructure.

Relevant OBWB and provincial supportive statements:

Okanagan Basin Water Board (2009 Goal): Make improvements on the ground – support water quality and management goals by channeling resources and political support to key research, restoration and infrastructure improvements. (Goal III)
Sustainable Water Strategy: Conduct a Basin-wide domestic pricing assessment to determine an appropriate water rate for basic "lifeline" volumes and appropriate block rates for increasing metered use (3-12). Where appropriate, maintain affordable agricultural water rates by splitting systems, increasing use of treated wastewater, implementing education and incentive programs, and other mechanisms (3-13). Undertake an economic analysis of appropriate funding mechanisms to support Okanagan water governance base funding (Action 4-6).
BC Living Water Smart Plan: By 2020, water use in B.C. will be 33 percent more efficient. By 2012, government will require all large water users to measure and report their water use.

Anticipated outcome: Informed Okanagan water governance policy. More equitable and workable pricing strategy for water in the Okanagan. Support affordable water for agriculture.

Project leader: OBWB
Proposed project cost: $35,000 ($15,000 OBWB contribution)

WATER INFORMATION MANAGEMENT COMMITTEE

Without accurate information on water use, water and infrastructure planners, water utilities, and large independent water users cannot effectively manage increased demand stemming from climate change and population growth. The measurement and reporting of water use in British Columbia is outmoded, lacks automation, is prone to error or omission, and lacks temporal resolution. An improved data recording system is needed. In addition, water supply and demand data are lacking in the Basin – there is a pressing need for more hydrometric stations to measure water quantity and for a data information network to disseminate existing data and identify gaps. In addition to the projects identified in more detail here, the committee is actively working on two other important water information projects: *Identification of groundwater monitoring network information needs* and *Okanagan mainstem lake evaporation information requirements for the Supply & Demand initiative*.

Streamlined Water Use Reporting Project

> *This project was the subject of a proposal approved by the OBWB and submitted to the Building Canada infrastructure grant program in April 2009. The application is pending.*

Currently, water licensees report their *annual* water use once a year on paper forms to the BC Ministry of Environment when it is a condition of their water license permit. Other ministries often independently request water use information from water suppliers at different intervals, creating duplication, inefficiencies and confusion.

The current system has many specific drawbacks. First, the data is not electronically organized and there is no mechanism to check data accuracy. Second, there is a perception among water suppliers that the data submitted on paper forms is used only for billing purposes, which reduces their motivation to submit information accurately. Third, it is difficult for water managers, infrastructure planners and researchers to find and retrieve useable information from the submitted data for other needs. Fourth, the current system does not help water users track their own or others water use trends and improve their water use efficiency. Fifth, public water purveyors only state the estimated percentage of water derived from groundwater sources, but otherwise there is no obligation and no system for independent water users to report (unlicensed) groundwater extractions. Without integrated and uniform reporting of large extractions from both surface and groundwater, it will be impossible to manage them as a single resource.

The objective of this project is to develop a simple, streamlined, web-based system for reporting and accessing water use information for all medium to large water users in the Okanagan (licensed and unlicensed, public and private, surface and groundwater). It will apply to licensees that are currently required to use the paper-based reporting system, and will also apply to large groundwater extractors who do not now report their water use. It will not apply to small domestic users. The information will be used for long-term water management planning in a time of change, infrastructure planning, reconciling water use with license volumes, reviewing water allocations, and tracking improvements in efficiency. If successful, this pilot project will be a model for water use reporting throughout British Columbia, and will assist the government in meeting its goal of creating a State of Water report for BC in 2012 and beyond.

The core outcomes of this pilot project are:

1. Better management and delivery of Okanagan water use information to BC Ministries and the Okanagan Basin Water Board; eliminate duplication of effort, systems, and costs. Eliminate repetitive requests by and to Ministries for the same information;
2. Better data quality, better auditing of water user reporting;
3. Provide a better (more efficient, user-friendly, fast, easy, streamlined, not restricted to paper forms), modernized way to input and manage water use records;
4. Increase the reporting interval to monthly in order to reveal important trends in seasonal water use, and
5. Explicitly incorporate groundwater into the water use reporting landscape, which is currently limited to surface water supplies.

Relevant OBWB and provincial supportive statements:

Okanagan Basin Water Board (2009 Goals): Engage in long-term strategic planning and studies for future projects and programs to build the Okanagan's water information infrastructure and increase water sustainability (Goal 3, Objective 4).
Sustainable Water Strategy: Create a streamlined on-line data reporting system for water quality and suppliers (2-14). Develop an Okanagan Basin Information Network (4-4). Identify knowledge gaps and support research to strategically fill gaps (4-5). Develop water management reporting tools (4-9).
BC Living Water Smart Plan: By 2020, water use in B.C. will be 33 percent more efficient. By 2012, government will require all large water users to measure and report their water use.

Anticipated outcome: The successful completion of this project will increase the accurate data reporting by large and moderately-sized water users – including surface and groundwater extractions. The new system will help track which users have reported, and make possible comparisons of reported volumes with calculated demands from the Okanagan Water Demand Model being developed by the BC Ministry of Agriculture and Agriculture Canada for the Okanagan Water Supply and Demand Project.

Project leader: OBWB
Proposed project cost: $285,000 ($77,154 OBWB contribution)

Hydrometric Monitoring Governance Project

Hydrometric monitoring refers to measuring and reporting streamflow. Hydrometric data are fundamental to understanding the spatial distribution and variability of natural runoff and the impacts of a changing climate in the Okanagan. The following is a list of some of the primary uses of hydrometric data:

- Water licence management,
- Reservoir operations planning and implementation,
- Water supply planning and management,

- Regional flood and drought frequency analysis,
- Design of highway and road infrastructure,
- Climate change assessment,

In 2007 the Water Survey of Canada (WSC - a branch of Environment Canada) operated 25 hydrometric stations within the Okanagan Basin. There were also 39 locally operated stations in the basin.

After extensive review and discussion with experts and stakeholders, Dobson Engineering (2008) identified that meeting the needs of all users would require 150 stations in the Okanagan basin, and 10 more stations just outside the boundaries of the basin on the eastern and western highlands, for a total of 160. This list includes 27 active WSC stations, 32 of the locally operated stations, 73 currently discontinued WSC stations, and 28 new stations. The sites that are locally operated (usually by water purveyors) would be identified as hydrometric data stations and the data collected and archived to Resources Inventory Standards Committee (RISC) standards. The new stations would meet the same standards. The Dobson report further recommended that the OBWB lead the expansion of the hydrometric network in the Basin. The costs to reestablish 73 discontinued stations and establish 28 new stations are significant:

- Capital and related upfront costs: $1,010,000 (estimated at $10,000 per station)
- Annual operating costs (including the first year) are estimated at $757,500/year (estimated at $7,500 per station for 101 stations).

This project involves exploring strategies and partners to construct needed new hydrometric stations and support the operation of the recommended 160 hydrometric stations.

Relevant OBWB and provincial supportive statements:

Okanagan Basin Water Board: Participate in the governance process for the Okanagan Hydrometric Monitoring Network. Ensure senior governments met commitments or expanding the network (Goal I, Action 2H).
Sustainable Water Strategy: Maintain and expand the network of hydrometric and climate stations (3-17).
BC Living Water Smart Plan: By 2012, all land and water managers will know what makes a stream healthy, and therefore be able to help land and water users factor in new approaches to securing stream health and the full range of stream benefits. Legislation will recognize water flow requirements for ecosystems and species. Government will require all users to cut back their water use in times of drought or where stream health is threatened. Government will support communities to do watershed management planning in priority areas. Government will secure access o water for agricultural lands. Government will work with the private sector and support communities to conserve and restore stream function.

Anticipated outcome: Develop governance and financing system to support the long-term, integrated requirements for hydrometric data in the Okanagan basin – ensuring adequate information is available to make appropriate water management decisions.

Project leader: OBWB
Proposed project cost: $10,000 ($5,000 OBWB contribution)

Water Supply & Demand Project Database and Information Network

The Okanagan Basin Water Board, in partnership with the BC Ministry of Environment and with significant contributions from the BC Ministry of Agriculture, the BC Ministry of Community Services, Environment Canada, Agriculture Canada, Fisheries and Oceans Canada, and the Okanagan Nation Alliance, is working to establish better systems to track natural water flows, establish water use patterns, and estimate how these will change in the future. The goal of the Okanagan Water Supply & Demand Project is to provide a best estimate of present and future water need and availability, taking into account population growth, climate change, land use change, preservation of the environment, and other factors. This project is generating a significant amount of data and information that requires a home. The Okanagan Water Information Network, in part should meet the need of matching data with those that require it to make decisions or develop policy.

Relevant OBWB and provincial supportive statements:

Okanagan Basin Water Board (2009 Goals): Engage in long-term strategic planning and studies for future projects and programs to build the Okanagan's water information infrastructure and increase water sustainability (Goal 3, Objective 4).
Sustainable Water Strategy: Create a streamlined on-line data reporting system for water quality and suppliers (2-14). Develop an Okanagan Basin Information Network (4-4). Identify knowledge gaps and support research to strategically fill gaps (4-5). Develop water management reporting tools (4-9).
BC Living Water Smart Plan: By 2020, water use in B.C. will be 33 percent more efficient. By 2012, government will require all large water users to measure and report their water use.

Anticipated outcome: The successful completion of this project will provide for a single source water information portal – linking known information with water managers and scientists.

Project leader: OBWB
Proposed project cost: $60,000 ($20,000 OBWB contribution)

GROUNDWATER MANAGEMENT COMMITTEE

Groundwater is an integral component of the hydrologic cycle, and can function as a long-term storage reservoir that can be recharged during wet periods and managed for use in times of need. Sustainable groundwater use is typically only possible when the groundwater resource is closely linked to one or more surface recharge sources. Therefore it is critical for linked surface water and groundwater resources to be managed together as one resource.

Groundwater is critically important for sustaining baseflows in creeks and streams during low flow periods and as such, it is essential to the health of aquatic habitats and fisheries. Riparian zones

and associated ecosystems are especially sensitive to and dependent upon groundwater surface water interactions that display a great deal of variability in both time and space. Groundwater also serves as a ready supply of domestic and irrigation waters in areas where surface water supplies are either compromised or not available.

Substantial threats to groundwater quantity and quality exist in the Okanagan Basin. Groundwater demand is increasing steadily with population growth and associated intensification of land uses that includes new housing, industrial developments, and new/expanded agricultural production. As allocation limits on surface waters are reached, new wells are being drilled on a continual basis. Due to the hidden nature of the groundwater resource, it is still not widely understood how vulnerable groundwater can be to the effects of over exploitation (mining), contamination from inappropriate land uses, and poor wellhead protection measures.

The Okanagan Basin faces a number of groundwater management challenges that have been experienced in other growing, semi-arid regions where limits to the resource have been approached or exceeded, and government response has been largely reactive. Current water management governance lacks mechanisms to deal with linked surface water and groundwater systems in a coordinated manner, and this has had several consequences. Foremost among these is the lack of groundwater use regulation (licensing). The lack of regulation in turn has led to an under-reporting of well records, little or no monitoring or measurement of groundwater use, and no systematic means to proactively manage the resource on a regional or watershed scale. Superimposed on this unstructured governance are numerous local government groundwater protection bylaws that need to be modernized in recognition of the fact that water management requires a watershed-based approach involving multiple jurisdictions and stakeholders.

While there have been a number of commendable efforts in recent years to raise awareness and scientific knowledge about groundwater resources in the Okanagan, there remains a high degree of uncertainty regarding hydrogeological conditions in most Okanagan sub-basins. Data are needed to understand aquifer connectivity, sustainable yields, recharge rates, water quality, possible contamination issues, and other management/science related concerns.

The Groundwater Committee has prioritized the following projects to begin addressing these issues and challenges.

Rollout and Implementation of Groundwater Bylaws Toolkit

This project is already underway: The Groundwater Bylaws Toolkit (Toolkit) is in its final stages of preparation and is nearly ready to be disseminated within the Okanagan Basin and also broadly across the province of BC. The purpose of the Toolkit is to provide local governments with practical land-use management tools to support the judicious use and protection of groundwater resources.

Key reasons for local governments to become involved in the oversight and coordination of groundwater resources include:

1. Local land use and development can have significant impacts on groundwater

2. Impacts on groundwater resources are experienced locally, not regionally or provincially, in most cases
3. Local government suppliers of drinking water derived from groundwater have a duty to protect the resource
4. Groundwater supports ecological functions that are local in scope (e.g., riparian habitats, wetlands)
5. Regional scale data on aquifers (hydrogeology) are useful but limited in their utility to address local challenges such as well draw-down interference and impacts on streams during dry periods. Localized data are necessary.
6. Local regulations, if implemented and effective, can support and strengthen provincial regulations in the future.

This project is designed to make local jurisdictions in the Okanagan aware of the Toolkit and assist these jurisdictions in implementing various bylaws recommended in the Toolkit, as appropriate. The rollout effort is largely a communication, outreach and local government support project given that the Toolkit is basically complete and ready for publication, distribution and use by local governments.

Relevant OBWB and provincial supportive statements:

Okanagan Basin Water Board (2009 Goals): Finalize the Groundwater Bylaws Toolkit, develop and promote other water conservation and quality improvement bylaws, and initiate an outreach program to local government to facilitate their adoption (Goal I, Action 2C).
Sustainable Water Strategy: Develop and implement a groundwater bylaws toolkit and harmonize groundwater bylaws (2.9).
BC Living Water Smart Plan: By 2012, water laws will improve the protection of ecological values, provide for more community involvement, and offer incentives to be water efficient. Legislation will recognize water flow requirements for ecosystems and species. The Groundwater Protection Regulation will protect the quality and quantity of our groundwater. This regulation has set established standards for well drilling and construction, and certification requirements for well drillers and pump installers. Consultation for Phase II of the regulation is underway. By 2012, government will regulate groundwater use in priority areas and large groundwater withdrawals. By 2012, new approaches to water management will address the impacts from a changing water cycle, increased drought risk, and other impacts on water caused by climate change. Government will improve the quality and protection of drinking water sources.

Anticipated outcome: Implementation of various groundwater protection bylaws, as appropriate, throughout the Okanagan in: Regional Growth Strategies, Official Community Plans, Zoning Bylaws, Development Permit Areas, and Subdivision Servicing Bylaws.

Project leader: OBWB
Proposed project cost: $15,000 ($5,000 – OBWB cash contribution plus additional in-kind contribution of staff time and travel)

Groundwater Regulation Pilot Program

The Province of BC is revising and expanding the scope and authority of the Groundwater Protection Regulation (http://www.env.gov.bc.ca/wsd/plan_protect_sustain/groundwater/) in recognition of the fact that government needs to expand its role in protecting and sustaining groundwater supplies for present and future needs. As noted in the introductory backgrounder, B.C. remains the only province in Canada without some form of groundwater permitting (licensing) in that the current *Water Act* has no provisions or mechanisms that control, regulate or monitor the development and use of groundwater, or any legislation mandating that groundwater use be measured and reported in a systematic manner.

To date, Phase 1 of the Groundwater Protection Regulation has been implemented by the Ministry of Environment, and a pending Phase 2 Regulation has been developed for Cabinet consideration by the Ministry. Both Phases 1 and 2 fall under Part 5 of the Water Act and focus mainly on the regulation of the water well drilling and well pump servicing industries, through the enactment of requirements for registration of qualified well drillers and pump installers, and by providing minimum standards for well construction, well testing, floodproofing, well capping, well closure, and general well protection measures. The regulation of the groundwater industry forms an important first step toward a broader and more comprehensive regulation of the groundwater resource to achieve multiple objectives.

Based on initiatives such as the Langley Groundwater Management Planning process as well as the province's Living Water Smart strategy, it appears that more stringent groundwater regulations are now on the horizon, and the Okanagan has an opportunity to develop regionally-tailored solutions and to influence the provincial process if we are proactive. The first step in this process occurred in early 2008 when OBWB requested that the Minister of Environment consider the Okanagan as a pilot region to implement a groundwater (use) regulation program.

Along with the process of developing legislation and regulations to protect and manage groundwater resources, considerable investment has been made in recent years to improve scientific understanding of groundwater resources within the Okanagan Basin. In collaboration with the BC Ministry of Water, Land and Air Protection (now Ministry of Environment), a regional groundwater assessment project was initiated in 2004 and is known as the Groundwater Assessment in the Okanagan Basin (GAOB) project.

The GAOB objectives were to assess groundwater resources within the Basin and to map the major unconsolidated and bedrock aquifers. This is consistent with federal and provincial goals to increase current groundwater knowledge in populated regions and to assist with sustainable groundwater management and protection. Such information and data will assist local governments in developing and implementing groundwater protection and management plans. Building on the momentum of the GAOB project, the OBWB in partnership with the province and other stakeholders is completing Phase 2 of the Okanagan Basin Water Supply and Demand project, which includes a component groundwater study that examines water balance relationships for all mapped and unmapped groundwater resources in the Basin.

The pilot groundwater regulation project will convene a new steering committee to examine the implementation of an Okanagan regulatory program to protect the groundwater resources of the Okanagan. The pilot will be developed in partnership with the Province and other senior levels of government. A first task of the steering committee will be to develop guiding principles for the pilot program and to identify major components of the regulatory pilot.

Potential guiding principles that the committee may explore include but will not be limited to the following:

- The entire Okanagan Basin will see some mandatory form of groundwater use regulation;
- Minimum regulation may involve mandatory registration of existing groundwater uses, that will include one-time reporting of well location, type of use, well depth, date use began, and other details;
- The regulatory program will be designed to protect existing users through a grandparenting framework, with more stringent controls being placed on future development;
- Regulatory processes for existing and new users will be defined, with phase-in dates for both;
- Regulatory requirements will vary according to priority area, and the type and volume of groundwater use;
- Types of uses to be regulated and tentative definitions for types of use will be identified (e.g. private domestic, municipal, irrigation, etc);
- In addition to minimum mandatory (reporting) regulation, appropriate volume thresholds will be considered and proposed that will involve further regulation and reporting of extraction rates and metered use; such thresholds will be based in part on how other jurisdictions regulate larger groundwater users as compared to small, private domestic users;
- Mandatory use reporting may include such provisions as a simple, sworn affidavit from private domestic users indicating use is less than the regulated volume threshold that defines the upper limit of private domestic use; and for larger users, mandatory metering and (annual) reporting of groundwater uses;
- A permitting system for new groundwater uses will be developed and phased in, and will include mandatory requirements to support new applications, and the ability of conditions to be placed on new permits during an extended impact evaluation stage prior to the full requested use being permitted;
- Pilot regulations may be tested in one or more priority locations as deemed appropriate by the steering committee, OBWB and the province; and
- Technical studies that are needed to support determinations of priority areas will also be a component of the pilot program.

Major components of the groundwater regulation pilot may include the following:

1. A proposed mapping effort to delineate groundwater-limited areas of the Okanagan, possibly in partnership with GAOB and local government initiatives. Examination of what further groundwater uses, if any, should be permitted in such areas.
2. Other technical studies needed to gather the information necessary to test one or more pilot regulatory schemes.

3. Consideration of how to effectively coordinate surface and groundwater licensing for all larger regulated extractions, in keeping with the notion that surface and groundwaters are integrated components of the hydrologic cycle.
4. Consideration of a process of grandparenting existing users to protect those users' continued access to groundwater, without compromising the ability to effectively regulate the future use and development of the resource.
5. Public consultation and public involvement process identification and communication and outreach strategies.
6. Economic studies to identify and assess funding mechanisms to support a regulatory program so that it is sustainable within the regulated area(s)s; Fee structures and user pay concepts will be among the issues to be explored.
7. Governance studies to examine how to effectively manage groundwater resources on a regional scale;
8. Identification of pilot areas or sub-basins in which initially test application of a system of regulations governing groundwater withdrawal, with the following possible components:
    a. The type of groundwater withdrawals subject to regulation;
    b. A threshold amount or amounts of groundwater withdrawal subject to regulation;
    c. Groundwater users exempt from all but the minimum mandatory (reporting) aspects of regulation;
    d. Financial models determining appropriate administrative fees to be charged for regulated groundwater withdrawal;
    e. Monitoring, reporting, or recordkeeping requirements for regulated groundwater withdrawal;
    f. Application and administrative enforcement procedures; and
    g. Any other issues deemed relevant by the committee.

In summary, the pilot program will explore and test mechanisms to regulate the development and use of the groundwater resource and how such a regulation program would work by considering surface water-groundwater connectivity using policies that are achieved on the basis of temporal and spatial relationships between groundwater and surface water, as such relationships can be defined on a watershed, sub-basin or catchment scale.

Relevant OBWB and provincial supportive statements:

Okanagan Basin Water Board: Work with Ministry of Environment staff to improve provincial water policies for the Okanagan, including pilot groundwater regulations and updates to the *Water Act* (Goal I, Action 2B). Initiate a groundwater management planning process (Goal III, Action 4Ai).
Sustainable Water Strategy: Develop a groundwater regulation pilot program (3-20).
BC Living Water Smart Plan: By 2012, government will regulate groundwater use in priority areas and large groundwater withdrawals. By 2012, new approaches to water management will address the impacts from a changing water cycle, increased drought risk, and other impacts on water caused by climate change. Government will improve the quality and protection of drinking water sources. By 2012, water laws will improve the protection of ecological values, provide for more community involvement, and offer incentives to be water efficient. Legislation will recognize water flow requirements for ecosystems and species. The Groundwater Protection Regulation will protect the quality and quantity of our groundwater. This regulation has set established standards for well drilling and construction, and certification requirements for well drillers and pump installers. Consultation for Phase II of the regulation is underway.

Anticipated outcome: A system of regulating and tracking groundwater extraction from groundwater users, particularly larger users, within the Okanagan. Identification of groundwater limited areas impacting "proof of water" requirements for zoning and subdivision bylaw applications. A system of allocating groundwater licenses to existing users and permitting groundwater use in the future, in priority areas, which will lead to sustainable resource use.

Project leader: OBWB
Proposed project cost: TBD – depending on the design of the project

Appendix A. Okanagan Basin Water Board – review of goals & objectives[5]

Table 1. Assessment of Objectives

Objective	Description	Measurement	Objectives Met
Advise Board on water issues that require timely action	Reservoir Lots	No sales of public reservoir frontage have been announced to date.	☒ Yes ☐ No
Consolidate information and expertise	Sustainable Water Strategy	Strategy is under development. Final document will be launched on October 23rd, 2008.	☒ Yes ☐ No
Integrate research into water management	Groundwater Bylaws Toolkit	Development of Groundwater Bylaws Toolkit (underway).	☒ Yes ☐ No
Develop and present to Board position papers	1. Policy on Metering and Monitoring 2. Groundwater policy (3) 3. Groundwater Action Plan 4. Privatization of Reservoir Lease Lots – threat to future strategic water storage.	Hydrometric monitoring letter resulted in new provincial initiative to support local governance of monitoring network. New groundwater policies/tools have been developed by the WSC. Collection of over 100 letters from local government and water purveyors opposing privatization of Reservoir Lease Lots.	☒ Yes ☐ No
Increase public communication and awareness	1. Develop Okanagan Water website on Waterbucket with timely and useful information. 2. Encourage media participation at Council meetings. 3. Support and development of CWRA/OBWB One Watershed – One Water Conference. 4. Strengthen communication between Okanagan post- secondary institutions and OBWB.	Okanagan Water website is a community of interest on Waterbucket.ca and provides important and timely water information. Media participation and print articles have been significant over the past 2 years. The conference will be held on October 21-23 in Kelowna. Tours with faculty at UBC O and OC were organized and well attended.	☒ Yes ☐ No
Develop programs to support water conservation	1 Okanagan Water Conservation Professional roundtable 2. Water Conservation Tools (website info)	Creation of water conservation round table. Toolkit developed and launched on obwb.ca website.	☒ Yes ☐ No
Build and strengthen partnership between stakeholders	1. Water Stewardship Council (WSC) 2. CWRA/OBWB One Watershed – One Water Conference	The WSC meets monthly, sharing water related information between partners.	☒ Yes ☐ No

[5] Water Management Program Review 2006 – 2009. p 99. Okanagan Basin Water Board

Appendix B. Comparison between water purveyors revenues and expenses (1994)

TABLE 9
PURVEYOR REVENUES AND EXPENSES

No.	Irrigation/ Improvement Districts	Levies				1992 (or 93) Revenue			1992 (or 93) Expenses		Net Revenue	Capital Expenditure Charges	Total Reserve Funds
		Irrigation $/acre	Residential $/lot	Ind./Com $/	Conn. Fee $/	Irrigation $	Other $	Total $	Irrigation $	Other $	Total $	$/	$
1	Black Mountain Irr.D.	$43.00	$168.00		$300.00			$1,140,934			$891,128	$249,806	$2,750	$2,614,259
2	Boundary Line Irr.D.	$121.00	$242.00			$11,243	$3,837	$15,080			$20,976	($5,896)		$7,085
3	Cawston Irr.D.	$14.00				$1,004		$1,004			$1,168	($164)		
4	Covert Irr.D.	$40.00	$262.00		$50.00			$22,772	$1,168		$20,199	$2,573		
5	Erickson I.D.	$16.00	$93.00	$56.40		$26,470	$165,373	$191,843			$192,866	($1,023)	$5,500	$1,746,555
6	Fairview Heights Irr.D.	$96.00	$160.00		$150.00	$65,000	$15,000	$80,000			$80,000	$0	$1,000	$8,910
7	Glenmore-Ellison I.D.	$30.00	$138.00			$102,600	$379,902	$482,502		$587,101	$587,101	($104,599)	$1,500	$1,512,062
8	Grand Forks Irr.D.	$98.00	$168.00			$122,500	$59,720	$182,220			$168,910	$13,310	$1,500	$89,310
9	Kaleden Irr.D.	$86.80	$196.90	varies	20%/CP	$33,658	$135,290	$168,948			$167,800	$1,148	$3,500	$426,625
10	Kelowna, City of	$70.00	$121.00	Metered		$1,975	$1,930,399	$1,932,374		$1,625,894	$1,625,894	$306,480	$3,000	
11	Keremeos Irr.D.	$80.00				$98,000	$126,975	$224,975			$222,648	$2,327	$750	$334,381
12	Lakeview Irr.D.	$56.50	$100.00	$1,000.00	$200	$30,228	$566,076	$596,303		$190	$331,472	$264,831	$3,440	$779,570
13	Lower Nipit I.D.						$94	$94			$190	($96)		
14	Meadow Valley Irr.D.	$54.67				$2,992		$2,992	$894		$894	$2,098		$88,900
15	Naramata Irr.D.	$110.00	$275.00	Tolls	$300	$110,110	$276,219	$386,329			$379,031	$7,298	$3,200	$580,816
16	North Canyon I.D.	$50.00	$160.00		$150	$19,100	$18,633	$37,733			$28,984	$8,749	$1,000	$18,438
17	Okanagan Falls Irr.D.	$86.50	$120.00	Meter	$250		$156,201	$156,201			$130,746	$25,455	$1,000	$182,494
18	Oliver, Town of	$104.65	$158.75	$234.25		$332,000	$526,000	$858,000			$851,000	$7,000	$2,800	
19	Osoyoos Irr.D.	$114.61	$127.34		$250	$70,000	$8,207	$78,207			$68,121	$10,086		$27,941
20	Osoyoos, Town of	$88.20	$161.10	$179.00		$275,800	$48,500	$324,300	$238,900	$48,500	$287,400	$36,900	$1,500	
21	Oyama Irr.D.	$66.00	$284.00	$930.00	$50	$93,000	$44,000	$137,000			$118,000	$19,000	$3,000	$5,931
22	Peachland, Township							$0			$0	$0		
23	Penticton, Corp.of	$77.00	$226.00	Metered		$142,450	$1,982,000	$2,124,450	$210,000	$930,000	$1,140,000	$984,450		
24	Slon I.D.	$60.50	$148.60		$150	$45,980	$50,800	$96,780			$106,255	($9,475)	$1,500	$210,150
25	S. E. Kelowna Irr.D.	$60.00	$156.00	Metered	$4,000	$328,304	$388,701	$717,005			$700,000	$17,005	$800	$532,376
26	Skaha Estates I.D.	$110.00	$88.20		$300			$25,000			$26,000	($1,000)		$6,883
27	Similkameen I.D.	$0.25/AF				$1,352		$1,352	$969		$969	$383		
28	South Ok.Mission I.D.	$119.00				$25,485		$25,485	$21,471		$21,471	$4,014	$0	
29	South Vernon Irr.D.	$47.00	$144.00		$100	$7,674		$7,674	$5,582		$5,582	$2,092	$135	
30	Summerland, Corp.of	$76.30	$151.20	$0.18/cu.m		$241,490	$1,018,793	$1,260,283		$1,260,277	$1,260,277	$6		
31	Sun Valley I.D.	$97.00	$287.00			$23,000		$23,000	$22,000		$22,000	$1,000		
32	Vernon, City of		$205.40	Metered		$3,641	$1,880,000	$1,883,641			$1,096,871	$786,770		$512,108
33	Vernon Irr.D.	$51.42	$177.00	varies	$300	$440,000	$850,000	$1,290,000			$1,412,000	($122,000)	$2,400	$612,197
34	Westbank Irr.D.	$55.63	$179.00		$600			$707,507			$597,759	$109,748	$4,500	$107,551
35	West Bench Irr.D.	$60.00	$225.00		$375	$12,000	$142,391	$154,391			$127,580	$26,811	$3,000	$2,007,547
36	Winfield & OK Cen.Irr.D.	$40.70	$138.00		$200	$81,400	$256,142	$337,542			$295,800	$41,742	$900	$128,455
37	Wood Lake I.D.	$46.00	$222.00		$150	$98,000		$98,000	$86,000		$86,000	$12,000	$1,500	$12,540,544
	AVERAGES/TOTALS:	$68.43	$176.08			$2,846,456	$10,873,052	$15,771,921	$586,984	$1,565,791	$13,073,092	$2,698,829	$2,138	

Source: Ministry of Municipal Affairs, Victoria and Questionnaires (see Appendix 1)