

Summary of Findings and Recommendations

1. GENERAL FINDINGS OF THE OKANAGAN STUDY

The Okanagan Valley at present has a strong economic base and a generally high quality natural environment. Continuation of the recent rapid pace of economic growth could threaten this desirable balance and lead to a decline in the quality of natural and urban environments. Only through careful planning and integrated management of the basin's water, land and human resources can the present economic and environmental harmony of the basin continue.

Due to the recent program of industrial incentive, the Okanagan economy is well diversified and can be expected to grow steadily over the next fifty years. However, as there is some uncertainty about the rate of growth, the Study developed three alternative projections of economic growth to the year 2020. One projection involved the continuation of existing economic policies, a second assumed that the rate of economic growth would be quickened through new industrial incentive programs after 1980 and a third projected a slowing down in the rate of economic growth, compared to that expected under current economic policies, through controls on industrial expansion. The main features of these three projections (to 2020) are compared to present (1970) conditions in the following table, which indicate that all economic indices such as population, employment, tourism and valley income should increase between 2.5 and 3.5 times during this planning period.

EXAMPLES OF THE RANGE OF ECONOMIC GROWTH THAT MAY OCCUR IN THE OKANAGAN BASIN TO 2020

PROJECTION	DESCRIPTION	POPULATION	EMPLOYMENT	IRRIGATED ACRES	NUMBER OF TOURISTS
Present Situation		115,000	29,800	60,000	700,000
Projection I	Continuation of Present Economic Policies	391,000	105,000	59,600	2,300,000
Projection II	High Economic Growth	430,000	118,000	56,600	2,300,000
Projection III	Low Economic Growth	290,000	76,000	73,700	1,800,000

Under good water management there is enough water in the basin to supply all projected withdrawals and meet proposed fishery and recreation requirements in the main valley and in the tributary sub-basins. This assumes the withdrawal of larger volumes of water from Okanagan Lake during prolonged drought periods, than has occurred in the past. Additional headwater storages will be required, and in selected streams reservoir operations will be modified to serve the multiple uses

of sport fisheries and irrigation. There is no need for the large scale importation of water under any of the economic growth projections made in this study, provided that a greater range of operating levels is recognized for Okanagan Lake. This range should normally not exceed four feet in any one year, but a total variation of nine feet may occur between an extreme flood level in one year and an extreme low lake level following a succession of drought years.

Phosphorus has been identified as one of the major nutrients promoting undesirable algal blooms and rooted aquatic plant growth in the main valley lakes, and also as the nutrient which can be most successfully controlled to reduce this growth and improve or maintain the quality of water in these lakes. Major waste management programs are therefore proposed over the next ten years to ensure the maintenance of lake water quality by reducing these phosphorus loadings. The capacity of tributary streams to assimilate pollutants is considered even more limited, due to extreme variations in flows, and complete removal of all direct polluting discharges to stream waters will be necessary if stream water quality is to be improved. With appropriate waste management, the quality of all major surface waters in the basin can be maintained to support both withdrawal and recreational requirements.

Water-based recreation - swimming, boating, fishing - is dependent upon good water quality in the lakes and shoreline planning. It will continue to play an important role in the economic and social life-style of tourist and residents of the Valley. The preservation of crown and public lands around the shorelines of the main lakes will allow the development of public beaches to meet projected recreation demands with little need to obtain private properties.

Water resources management, though an important component in planning the valley's future, will not by itself ensure that the present desirable balance between economic growth and high environmental quality will continue over the next fifty years. Other resources should also be carefully managed, on a valley-wide basis, as forecast population growth will undoubtedly place pressure on such important factors as land, transportation and urban environments. In particular, land use will have a significant impact on future water quality, water-based recreation and fisheries. Planning these resources must be integrated with water management to ensure a continuation of the current prosperous economic and environmental balance in the basin.

A number of citizen 'task forces' representing a wide range of public interests were established during the Okanagan Study to develop a consensus regarding the preferred future 'life-style' for the valley community. In their final report to the Okanagan Study Committee (entitled "To Our Children's Children"), these task forces unanimously supported Projection III involving a lower pace of economic growth, protection of agricultural lands and maintenance of a high quality environment. The primary recommendation of this valley consensus is that:

"Future planning in the Okanagan should place primary emphasis on environmental protection, giving due emphasis to maintaining the economic viability of the valley."

Consequently, it is upon this premise, in concert with Projection III. (Low Economic Growth Rate) that the framework plan outlined in this report is recommended.

Economic benefits (or costs) in this report refer to those that can be expressed directly in monetary terms such as increased or more efficient agricultural and industrial production, land value enhancement, expenditures of recreationists, etc. Social and environmental benefits refer to those benefits that do not have a market value, such as employment opportunities, availability and enjoyment of beaches, water quality, etc. Some of these can be expressed in quantitative units however, and have been assigned dollar values based on opinion surveys.

It should be emphasized that the framework plan is designed to improve the social and economic well-being of the Okanagan community. Consequently, not all the recommendations can be justified on the basis of economic benefits only, though the plan does become viable when quantifiable social and environmental benefits are included. This reflects the high value placed by the valley community on such benefits. Because the inclusion of social and economic values is a relatively new concept in comprehensive basin planning, it has not been possible to quantify all such values associated with various components of the plan. Attempts at expressing values placed on a day at the beach or a day fishing were made through the use of questionnaire surveys. However, values associated with benefits that may accrue from such factors as aesthetic enhancement, landscape diversity and decreased health hazards have not been assessed.

It is not possible to total all benefits and costs of the framework plan as the implementation of some components is somewhat uncertain being dependent upon economic projections over 20 years into the future. However, a number of recommendations require immediate action (prior to 1980) to maintain good water resource management in the Okanagan. The major costs and benefits of these recommendations are summarized below and have been discounted to present (1970) values for comparison purposes. Phosphorus removal is only effective where sanitary sewers and conventional waste treatment facilities have been established. The costs of these have not been included in the following table as such facilities are required to protect the health of the valley communities. The additional capital cost of this program to 1985 has been estimated at \$17 to \$22 million dollars.

SUMMARY TABLE OF COSTS & BENEFITS FOR IMMEDIATE ACTIONS
All values Discounted to 1970 Dollars

ACTION	CAPITALIZED COST	ECONOMIC BENEFITS	SOCIAL AND ENVIRONMENTAL BENEFITS
1. Water Quantity-Structural Improvements in Mainstem System	\$1,000,000	\$ 500,000	significant values not quantifiable
2. Waste Treatment-Phosphorus Removal Facilities to 1985	\$3,800,000	\$4,100,000	\$9,200,000
3. Sport Fishery Management - Tributary Storage and Reproduction Requirements	\$1,140,000	\$ 500,000	\$ 800,000

2. BASIC RECOMMENDATIONS

The following basic recommendations are made to establish a framework for developing the comprehensive plan for water resource management in the Okanagan Basin.

One
Regional
District
For
Basin

1. *"That the boundaries of the present Regional Districts of North Okanagan, Central Okanagan and Okanagan-Similkameen be redrawn to create a single Okanagan Basin Regional District having boundaries coincident with those of the watershed, to be responsible for those water resource management functions that pertain to the Valley as a whole and in particular the implementation of those recommendations in this report that are Valley-wide in scope, especially waste treatment, the orderly development of shoreline recreation facilities, and flood-plain zoning.*

Good water management is essential to the maintenance of desirable life-styles of the Okanagan community. Because all parts of the basins are linked by the flowing nature of water, it is important to avoid actions in one part that will adversely affect the environment in another or reduce the future potential of valley-wide economic activities, for example the attraction of tourists. As this feature of common interest throughout the valley affects many aspects of planning, a number of recommendations in this report cut across existing jurisdictions and apply to the basin as a whole.

This valley-wide approach applies in particular to recommended upgrading of existing waste treatment facilities, and the provision of new ones where the benefits of improved lake quality are valley-wide and treatment on a regional basis is feasible in meeting objectives. It is considered unfair that under a particular scheduling program, certain communities could be asked to bear the major portion of the costs of a waste management program which benefits the basin as a whole.

It appears to be the consensus of the Okanagan Community that a single authority be established to coordinate the implementation of the framework plan. As much use as possible should be made of existing institutions, for neither the public nor the senior governments desire the creation of a new intervening level of government. The success of the task forces during the study in bringing together people from all parts of the basin verifies that valley-wide consensus on water management problems is possible.

Provincial legislation is available to establish a regional district for the watershed. While the process of setting up such an authority normally provides for the assignment of a number of functions, it is felt that certain characteristics and functions essential to the success of this new body should be identified in the documents establishing it, for example, in the letters patent. These are:

(i) that all residents within the watershed be required to share in the burden of costs, or to undertake necessary common actions, that clearly affect the valley as a whole, for example, upgrading the quality of the main lakes.

(ii) that standards set by governments for such things as water quality be considered as minimum standards for the Basin and may need upgrading to provide a superior quality of the environment, in specific locations.

(iii) that the Regional District should be supported by a technical resource advisory committee representing the resource agencies concerned. The establishment of such a group is now provided for in provincial legislation.

(iv) that continuing public participation, which has been a principal feature of this study, be imbedded in the future planning process and be built into the institutional arrangements proposed herein.

Finally, this study has not examined all the implications outside the Valley that would be incurred in creating a single valley authority for the Okanagan watershed. A wider examination may reveal other alternatives for the boundaries of a Regional District more suitable for this broader multiple watershed region. In working out these boundaries, however, it is important to keep in mind the four characteristics listed above. To repeat, it is the opinion of the Board and the results of opinion surveys in the valley that a single valley authority is clearly the best option for the Okanagan Basin itself.

The above recommendation was the subject of considerable discussion after release of the DRAFT report with local political leaders, in particular, taking the position that such a major re-organization of local government was at least premature and would raise very difficult administrative problems.

The Board has reconsidered this matter and now puts forward two alternatives recommendation #1, either of which could achieve the same objectives.

Alternative 1(a) takes care of certain local administrative problems arising from separation of certain communities, by selecting an appropriate boundary for the new Regional District.

Alternative 1 (a):

"That the boundaries of the present Regional Districts of North Okanagan, Central Okanagan and Okanagan-Similkameen be redrawn to create a single Regional District, including within it's boundaries the total area of the Okanagan Basin watershed in Canada; to be responsible for those water resource management functions that pertain to the Valley as a whole and in particular, the implementation of the recommendations in this report that are Valley-wide in scope, especially Waste Treatment, the orderly development of shoreline recreational facilities and flood plain zoning."

The second alternative based on a proposal developed by the three Regional Districts is as follows:

Alternative 1 (b):

"That the Okanagan Basin Water Board be reconstructed and Letters Patent amended to give the Board authority to carry out water resource management functions described above, in Alternative 1 (a)."

The success of this alternative would depend upon the willingness of the Regional Districts to delegate powers to the Water Board and to work together in achieving Valley-wide aims clearly defined in this report.

2. *"That to ensure continuity from planning to implementation of the framework plan, Canada and British Columbia establish - on or before 31 March, 1974 - an Implementation Task Force which has local representation."*

Implementation
Task
Force

The Task Force is to advise and recommend to the federal and provincial governments and to local governments, actions required to implement the comprehensive plan and to submit on or before 30 June 1974 a draft implementation agreement. This agreement shall take into consideration the actions on recommendation of this report that may be taken by local government, and by either senior government. Where joint action is required the agreement shall include provisions for equitable cost-sharing as developed by the senior governments.

Nothing in this recommendation should inhibit on-going programs presently in progress and the implementation of recommendations where responsibilities are clear.

Water
Quantity
Management
System

3. *"That the water available be managed such that, without large scale importation of water, all present and projected future water uses around Okanagan Lake and along Okanagan River are satisfied; recognizing that during a prolonged drought cycle, increased drawdown of Okanagan Lake and some cut-back in releases to Okanagan River for non-consumptive uses may be necessary."*

Through implementation of water conservation measures within the Okanagan, and water requirements can be met. Large scale importation of water into the Okanagan is not necessary based on present studies. In extreme drought conditions Okanagan Lake would have to be drawn down from time to time below the present minimum elevation of 1118.8 feet and fishery flows for sockeye salmon reduced. Such drawdowns should not create severe problems provided that a program of adjustments to water intakes around Okanagan Lake and along Okanagan River is undertaken immediately and the public is made fully aware of the consequences of such lake drawdowns.

Water
Quantity
Management
Streams

4. *"That major conflicts in water use between irrigation and fishery requirements in tributary streams be avoided by managing Mission Equisis and Trepanier Creeks for fisheries and irrigation purposes, and developing other major creeks primarily for domestic and agricultural water use."*

Some 4,300 acre-feet of headwater storage should be licenced and developed to meet fishery requirements on Mission and Equisis Creeks. An additional 25,000 acre-feet of headwater storage are available on these and other major tributaries to meet a possible expansion of 9,000 acres of agricultural land. Such agricultural expansion was given high priority by the valley community to enhance the economic and social environment of the basin. On certain creeks additional water will have to be obtained from other sources to supply potential agricultural demands, (e.g. Kelowna Creek).

Capital costs of this storage development for agriculture, exclusive of water distribution costs are estimated at 6.9 million dollars, with capitalized economic benefits of 3.25 million dollars. The social benefits related to agricultural development have not been estimated. The costs and benefits of a sport fishery program are included in Recommendation 10.

Water
Quantity
Floods

5. *"That potential flood damage around Okanagan and Osoyoos Lakes and along Okanagan River be minimized through the institution of flood plain zoning and emergency protection measures."*

Flooding in the Okanagan, other than on Osoyoos Lake occurs about once every 15 years. On Osoyoos Lake major floods occur about once every 10 years. Large-scale structural measures for flood control cannot be economically justified in Canada alone and thus occasional flooding will continue to occur around these two lakes. Flood plain zoning will avoid potential increases in shoreline property damage while implementation of protective measures on an emergency basis will reduce flood damage to existing properties.

On Okanagan Lake the 200 year flood elevation has been estimated at 1125.5 feet and on Osoyoos Lake at 919.25 feet. Two feet of freeboard over and above this maximum flood elevation is also required for protection against wave action.

It is therefore recommended that the flood plain zone for all undeveloped areas shall include all lands up to an elevation of 1127.5 feet for Okanagan Lake and up to elevation 921 feet for Osoyoos Lake. Land use within these flood plain zones would be limited to agricultural cropland, parkland for recreation and wildlife sanctuaries.

An information brochure on emergency protective measures and flood proofing should be issued to all occupants on the flood plain as a measure of reducing the damage to properties already existing in the flood plain zone.

6. *"That the Governments of Canada and British Columbia immediately take the necessary steps to refer a study of Osoyoos Lake Level regulations to the International Joint Commission."*

I.J.C.
Reference
Osoyoos
Lake

Adjustments to intakes along Okanagan River will allow reductions in flows in the river to conserve water but these flow reductions may create problems of maintaining desirable lake levels on Osoyoos Lake during drought periods unless control at the outlet of Osoyoos Lake is improved. Thus, this study should determine what measures need to be taken either in Canada or the United States to;

- (a) maintain Osoyoos Lake levels during drought periods.
- (b) reduce flood damage around the lake.

7. *"That a program of pollution control for tributary streams be established by instituting strict regulations on feedlot and septic tank developments, removing all direct discharges to streams of industrial and municipal wastes causing pollution and protecting streams with appropriate green strips in areas where logging or cultivation is practiced or where there are concentrations of cattle, horses, or other livestock."*

Water
Quality
Tributary
Streams

High coliform counts, oxygen deficiencies, turbidity and concentrations of iron, manganese and phosphorus in certain tributary creeks affect the quality of water supplies for drinking, fish propagation and other uses. The origin of these pollutants is primarily from industrial and municipal waste effluents, septic tank sources, concentrations of livestock and erosion. The prevention of pollution from these sources through appropriate pollution control programs, is required to improve the quality of water in tributary streams to meet the standards outlined in this report.

Water
Quality
Main Valley
Lakes

8. *"That a waste management program aimed at reducing phosphorus loadings to control rooted aquatic plant and algae growth in the main valley lakes to be undertaken immediately by the regional authority."*

Phosphorus was identified as one of the key nutrients promoting undesirable aquatic plant and algal growth in the main valley lakes, and the nutrient which may be most successfully controlled to reduce this growth and the resulting deterioration in water quality. The valley consensus stated that it is of prime importance to arrest this decline and reverse the process wherever possible. Consequently, the framework plan has established a waste management program for reducing the amount of phosphorus discharged from municipal, industrial and domestic sources, to control the growth of algae and rooted plants in the main valley lakes. The capital costs of this program over and above that required to protect the health of the valley community is estimated at 2.0 to 2.3 million dollars by 1985, with annual costs estimated at \$490,000. In comparison, economic benefits associated with the maintenance of a high level of quality in the main valley lakes total \$265,000 annually with social benefits estimated at \$1,100,000 annually.

Phosphorus removal is possible only where conventional waste treatment facilities are available. The additional capital cost of conventional treatment to 1985, including sanitary sewers and secondary treatment plants, has been estimated at 17 to 22 million dollars. The year 1985 was considered the limit to which meaningful projections could be made for waste treatment costs based on existing technology and water quality data.

Programs for financial assistance to local governments for implementing waste management projects are available under the following acts:

Federal National Housing Act
Provincial Municipal Treatment Plant Assistance Act
British Columbia Taxation Act

Water
Based
Recreation

9. *"That shoreline recreation be enhanced through the protection and development of shorelines for beach recreation and maintenance of high levels of water quality."*

Due to trends towards increased leisure time and the unique recreation potential of the Okanagan, the valley community placed second priority (after human and agricultural consumptive use) in water and related resource management, to recreation planning. To meet the expected four-fold increase in demands for beach recreation, all public and Crown lands with good recreational potential should be preserved for that use. Some 40,000 linear feet of additional shoreline must be developed for public recreation by 2020 together with 4,000 linear feet of additional public access to the lakeshore and 10 to 12 new boat launching facilities.. The economic value of these additional facilities totalled over the fifty year planning horizon is estimated at \$13 million with social values totalling \$47 million.

- Fisheries
10. *"That sport fishery resources (kokanee and rainbow trout) be enhanced by protecting existing habitat and improving both natural and artificial reproductive facilities."*

The valley community supports a sport fishery enhancement program for the headwater and main valley lakes. In addition to supplying water in selected tributaries, spawning beds should be rehabilitated and artificial stocking of headwater lakes increased. The total costs of this program are estimated at \$3 million by 2020 (including the storage shown in Recommendation 4) with minimum economic and social benefits of \$2.9 million and \$4.6 million respectively for sport fisheries.

- Monitoring
the
Framework
Plan
11. *"That the response of water resources to management measures implemented under the framework plan be monitored continuously, with a full review of the plan to be undertaken by 1980 to ensure that the plan continues to met the social and economic goals of the valley community."*

Despite the large investment involved in preparing the comprehensive plan, there are many uncertainties in the development of water management alternatives, especially in waste treatment requirements to reduce phosphorus loadings to the main lakes (for example, technological advances in waste treatment may improve opportunities for waste management in the future). Consequently, it is important to monitor how the water resource responds to management measures implemented under the plan on a continuing basis, with a full review by 1980 to make necessary corrections to the plan.