# TROUT CREEK WATERSHED

# SUMMARY OF WATER SUPPLY AND DEMAND

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## SUMMARY OF WATER SUPPLY AND DEMAND

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### Objective

To summarize the supply and demand of water resources within the Trout Creek Watershed, and explore alternatives to accommodate in-stream fisheries flows.

### Background

The Trout Creek Watershed, tributary to Okanagan Lake, covers approximately 700 square kilometers. Water flows in an easterly direction from a maximum elevation of 2024 meters down to Okanagan Lake situated at 342 meters. There are approximately 255 km of fish bearing reaches in the watershed based on stream gradients of 12% or less (Anon. 1996). The lower reaches of the mainstem have historically supported a spawning population of Kokanee, although loss of habitat and reduced water flow has resulted in fewer fish. In some years, the lower reaches have experienced nearly zero flow. A Watershed Restoration Project is currently underway to address the problem of specific habitat loss in this area.

Approximately 15,387 acre-feet (AF) of water has been licenced within the Trout Creek Watershed by the province of British Columbia. Most of the licenced water (98%) has been authorized to the District of Summerland (15,074 AF) for the purposes of irrigation, domestic and commercial use. Given the above proportion of licenced water, information given below focuses on water use/demand by the District of Summerland.

### District of Summerland

The District of Summerland relies on two watersheds for their water requirements; namely Trout Creek and Eneas Creek. The Trout Creek system supplies 91.4% of the water while Eneas Creek supplies 8.6% of the demand. It is expected that the Trout Creek water system will supply the projected increase in water demand (approx. 3,000 AF) over the next 20 years. Currently, the District of Summerland supplies domestic water to 4700 residences. Domestic use has increased by 5% per year over the past 10 years. The district's population is currently 10,414 with an average growth rate of 3 %. By the year 2015, the population is expected to reach 18,808 persons.

Watershed Hydrology and Water Supply

A 1989 report entitled "Water Supply Analysis for Trout Creek and the District of Summerland", prepared by R.B. Letvak, Senior Hydrological Engineer, Water Management Branch, forms the basis for assessment of annual runoff. The mean annual recorded runoff from 1970 to 1982 was approximately 65,500 (AF) or 80,760 Mega Litres (ML).

Trout Creek and its tributaries have been developed over the years through a series of dams, spillways and control structures in order to capture a large portion of spring freshet (primarily from May through June). There are nine storage areas with associated control structures including Headwaters (#1, #2, #3, and #4), Whitehead, Crescent, Tsuh, Isintok and Thirsk Lake. At the lower end of the drainage system, flow is diverted from Trout Creek to a reservoir (Trout Creek reservoir) which supplies water to the municipal distribution system. From 1977 to 1994, the average amount of water diverted to the distribution system was 15,104 AF (maximum in 1987 = 19,112 AF; minimum in 1977 = 12,330 AF).

There are three Water Survey Canada gauging stations located in the Trout Creek Watershed; one on Isintok Creek downstream of the dam, one below Whitehead dam, and one situated on Trout Creek below Thirsk reservoir.

Water Demand (maximum)

A study conducted by Associated Engineering (1997) estimates the current annual water use for the District of Summerland as tabulated below: (It is expected that annual water consumption will increase by 14% over the next 20 years).

| | | |
|---|---|---|
| Residential | @10,414 persons | 3750 AF |
| Commercial and Industrial | | 504 AF |
| Agricultural Irrigation | | 16,343 AF |
| **Total** | | **20,597 AF** |

Water Storage and Diversion Licences

According to an information system (Water Licence Information System - WLIS) developed by the Water Management Branch (WMB), the District of Summerland is licenced to store 12,455 AF of water in the nine Trout Creek reservoirs previously mentioned. This figure is confirmed in a 1997 report conducted by Associated Engineering LTD. However, a technical report generated in 1995 by Water Management Branch, describes the District having only 9955 AF of licenced storage with only 9240 AF of storage actually developed. Under "normal" circumstances, licensees are expected to have all storage licences backed up with developed structures (i.e: dam, control

structure). Based on the above figures, it appears that the District of Summerland has anywhere from 74% to 93% of developed storage relative to their licenced quantities.

Based on figures summarized from WLIS (confirmed with WMB technical reports), the District of Summerland is authorized to use 15,074 AF of water for irrigation and domestic use as depicted below:

| | |
|---|---|
| Irrigation Diversion Licences | 13,947 AF (17,197 ML) |
| Domestic Diversion Licences | 1127 AF (1390ML) (306,075.130 GY) |
| Total | 15,074 AF (18,587 ML) |

Note: All licences associated with the District of Summerland on WLIS are "flagged" with specific objections by the Penticton Indian Band.

The study conducted by Associated Engineering (AE) (1997) only accounts for 12,574 AF of licencing; a lesser amount of 2500 AF (for Irrigation Diversion purposes). A conditional licence for 2500 AF (C066455 – as summarized in WLIS) seems to be the cause for discrepancy between the two information sources. Clarification from WMB is required on this matter. Comparing licenced quantities from one source to another is difficult, as licence numbers are not consistent. Also, it is not apparent which information source has the most up-to-date licence number and associated file number.

Depending on which water licence figures are used, licences to divert water exceed licences to store water from a range of 1% to 34%. This range would be greater if compared with developed storage. (Note: Diversion licences that incorporate base flows have not been determined in this summary).

The District of Summerland also holds a water licence on Okanagan Lake for 2150 AF (584 MGPY). According to WMB, the District of Summerland does not normally use this source of water.

On January 11, 1995, the provincial Water Management Branch recommended that a new licence be issued to the District of Summerland for 3000 AF of additional storage on Thirsk Lake. The District of Summerland's application (priority of Jan. 22, 1992) follows a recommendation for application in a 1992 report submitted by UMA Engineering entitled "Additional Water Storage in Trout Creek Watershed". Associated Engineering LTD also recommends expansion of downstream storage on Thirsk Lake in its 1997 report. Arguments for additional storage stem from projected maximum demands relative to chosen design droughts of; three consecutive years at 36% of annual mean flow to simulate the 1929-31 drought period. The probability of a drought return of this magnitude is practically zero.

The objective for reservoir operation in the Trout Creek Watershed is to optimize conservation of stored water with respect to the 3-year drought scenario. The operational strategy is based upon each reservoir's ability to fill. Guidelines for water releases are found in Associated Engineering's 1997 report.

## Flow Requirements for Fish

Current and projected water demand scenarios that incorporate in-stream fisheries flows have been developed by Associated Engineering (1997) and submitted to the District of Summerland. The fisheries flow is defined as the volume of water that should be permitted to pass by the Trout Creek municipal intake and continue downstream to augment low flows towards Okanagan Lake. Minimum stream flows for fish were provided by the Ministry of Environment, Fisheries Branch. It is assumed that the recommended flows consider upper incipient lethal temperatures to fish, particularly during the months of July through to September. The 1997 report, along with various WMB technical reports, acknowledge that having a desired downstream fisheries flow is a "worthy" objective.

In order to provide for a future maximum water demand relative to a design 3 year drought scenario, plus ensure a minimum downstream flow for fish, Associated Engineering proposes expansion of Thirsk reservoir and construction of site 13 phase 1 as described in "Option 2" in its report. Cost estimates for this project total $7,200,000. It should be noted that a WMB (1995) technical report emphasizes that "in all but extreme drought conditions, there is sufficient water available (from natural flow or storage releases) to allow bypass flow at the diversion".

## Recommendations

1. Determine the amount of water available in Trout Creek Watershed based on the standard 1:5 year drought return period normally used by Water Management Branch to determine water licence allowances; and/or determine what method was used by WMB to justify existing licences held by the District of Summerland.

2. To the extent possible, clarify the exact amount of licenced storage vs. developed storage vs. diversion licences held by the District of Summerland. Are licences backed by storage? Are there licences not being utilized (e.g. C066455 – 2500AF, C032615 – 2150 AF - Okanagan Lake)? Compare licenced amounts to diverted quantities.

3. Fisheries Branch should apply for water (conservation purposes) based on arguments of availability and/or non-beneficial use of existing irrigation licences. Quantities to be determined after further analysis of water availability and from results of recommendation #2 with consultation from Water Management Branch.

4. Determine to what extent the District of Summerland plans to incorporate downstream fisheries flows if water licence applications are approved to expand Thirsk reservoir. Can section 5(1) of the Fish Protection Act be used to help negotiate garanteed flows for fish? Any agreements between the District of Summerland and Fisheries Branch on flows that bypass the diversion intake should be set out in a legal document. (District of Summerland contact: Mr. Pete Rodd, Public Works Superintendent).

5. Develop an alternative operating schedule for the District's storage reservoirs that consider downstream fisheries flows for various water years (dry, normal, and above normal years). Prioritize the nine Trout Creek Watershed reservoirs in terms of drawdown impacts in relation to fish and fish habitat (e.g. reduced littoral zone, increased summer/winter fish kill). Consider the impacts of ramped discharges on stream resident fish and habitat below control structures (e.g. juvenile fish displacement, increased suspended sediment).

6. Financial contributions from Fisheries Branch (e.g. HCTF) regarding future legal agreements should focus on specific water conservation strategies that benefit the District of Summerland (e.g. public education program, universal metering program) to reduce future irrigation, domestic and commercial demands for water (see 1997 report by Associated Engineering).

7. Ascertain the position of the Penticton Indian Band regarding enhanced in-stream flows for fish. The Bands lands are extensive and include part of the Trout Creek Watershed. A long range land use plan has been drafted that foresees residential development which would likely utilize water from Trout Creek.

8. Fisheries Branch should submit a formal letter of objection to Water Management Branch regarding any applications to divert water from Pitin Creek.

9. Confirm whether documented minimum fisheries flow requirements are capable of preventing upper incipient lethal temperatures that are toxic to fish during the summer/early fall season. Tom Northcote (personal communication) commented that Jan Dendulk, MELP/FRBC contractor, was monitoring stream temperatures in the lower reaches of Trout Creek this year.

10. In general, there seems to be significant flexibility for securing downstream flows for fish in most water years given the ongoing capability of the District of Summerland to store large volumes of water in relation to their conservative 3-year design drought scenario.

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