# APPENDIX C

# ESTIMATED NATURAL HISTORIC INFLOWS

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## ESTIMATED NATURAL HISTORIC INFLOWS

### C.1 INTRODUCTION

One of the first requirements in the development of the Okanagan Basin water quantity computer models was the computation of natural flows from historic records. This has required the addition to the latter of evaporation from the main valley lakes as described in Appendix A as well as the consumptive use in each of the 50 years of the study period between April 1921 and March 1971 inclusive.

### C.2 CONSUMPTIVE USE

When water is diverted for any purpose a portion is lost in conveyance through leakage from a closed pipe system or seepage and evaporation in an open channel. Historically conveyance losses have been high because most water developments prior to 1960 used long, open earth channels and flumes. Allowances for these losses have been estimated to be 30% of the water diverted. This is in contrast with present day conveyance losses in well built water systems which are estimated to be about 10% of the water diverted.

Some of the water applied at the point of use is consumed by plants In the case of irrigation and by man in the case of domestic water or by industry. Normally, municipal water supplies a mix of these requirements.

Unconsumed water may return to its stream or lake of origin, or it may end up in another drainage basin. It may be transmitted through groundwater aquifers reappearing as surface flow further downstream or it may be carried by sanitary and storm sewers directly to a surface water body (Water use Diagram Figure 3.10)

Consumptive use in this report refers to the water diverted less the return flow. Usually the water diverted and that reaching the point of use can be measured reasonably accurately but it is impossible because of the diffuse nature of the return flow to determine its amount or the location where it re-appears as surface water. Hence, historic consumptive use must be based on an estimate of transmission losses which have been set at 30% of the water diverted plus consumptive use at the point of use. The latter is based on evapotranspiration rates in the case of irrigation, human and associated requirements in the case of domestic water and varying rates with respect to industry.

During the past 50 years the predominant water use in the valley has been irrigation which today makes up over 90% of the total consumptive use (Table C.1 and Figure C.1). Studies carried out by the International Columbia River Engineering Board in the early 1950's have indicated that return flow from irrigation varies from 40 to 60% of the water applied.

The Stevenson Brownlee Report of 1970 entitled "Some Estimates of Return Flows from Irrigation Water in the Okanagan Watershed" confirms the above figures. More recent investigations carried out under this study in connection with nutrient removal from waste water irrigation using lysimeters have indicated that return flow over the May to October period of the year may be as low as 15% compared to evaporimeter results in the same area giving values of 45%.

The return flow used in this study assumes that 15% of the water diverted into the conveyance conduit or channel goes directly to return flow while an equal amount is lost through evapotranspiration adjacent to the waterway. Thus, about 70% of the water diverted is available at the point of use half of which goes to consumptive use while the other half appears as return flow.

Because domestic, municipal and industrial water requirements in the past have not been significant when compared to irrigation needs only the latter has been used in estimating the consumptive use that has taken place over the last 50 years. However, these other consumptive uses have been computed with respect to present day and future requirements in accordance with their growing importance.

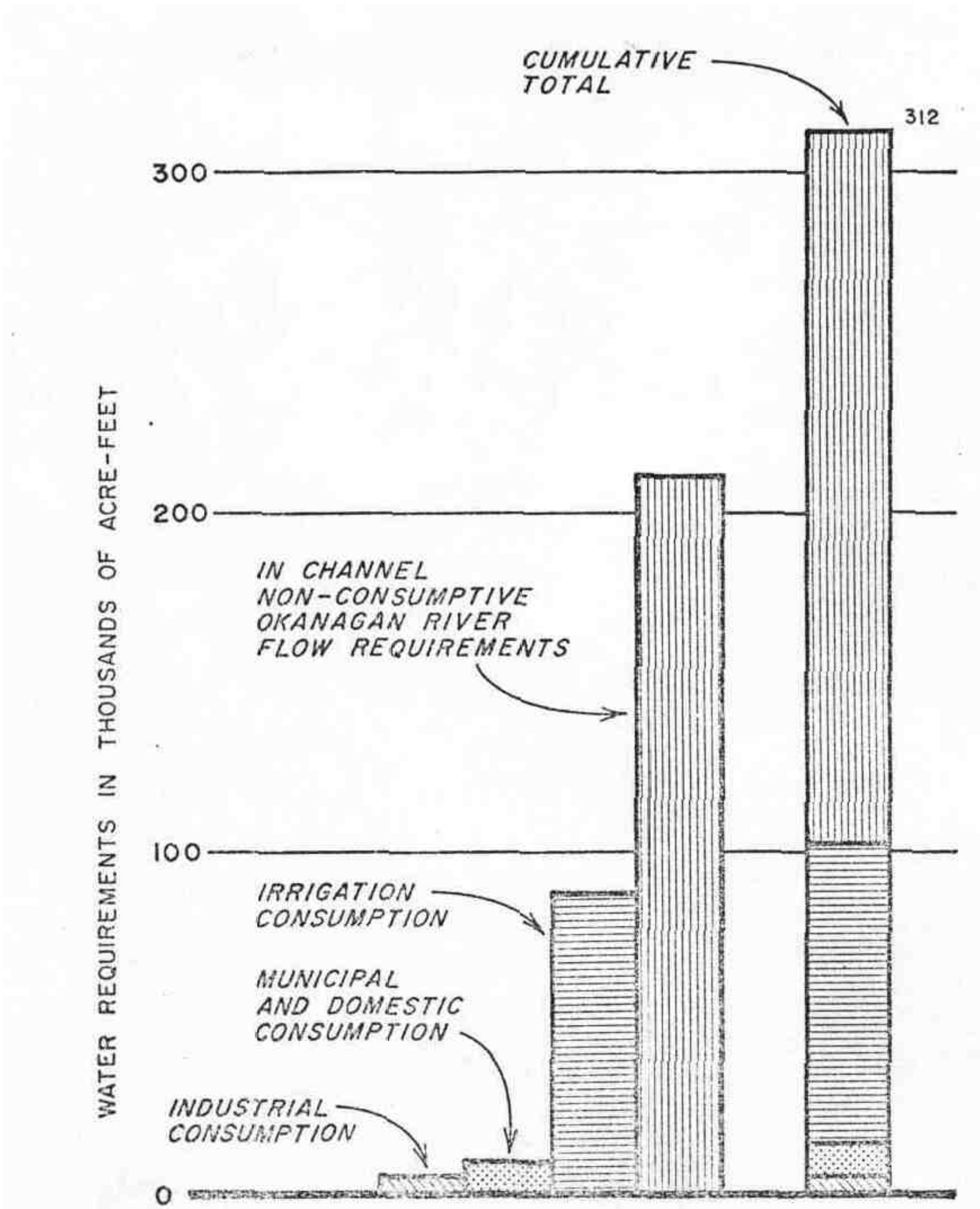
In the case of present and future domestic and municipal water requirements it has been determined that 35% of the water diverted is consumed with the remaining 65% appearing as return flow.

Finally, consumptive use for industry has been estimated at 10% with 90% appearing as return flow.

## C.3 IRRIGATION CONSUMPTION OVER STUDY PERIOD

Irrigation development in the Okanagan Lake Basin from 1921 to 1970 is illustrated in Figure C.2. Farm water requirements are based on British Columbia Department of Agriculture's recommended water duties while irrigated land has been based on information gathered during the study. These water requirements have been increased by 30% to arrive at diversion needs.

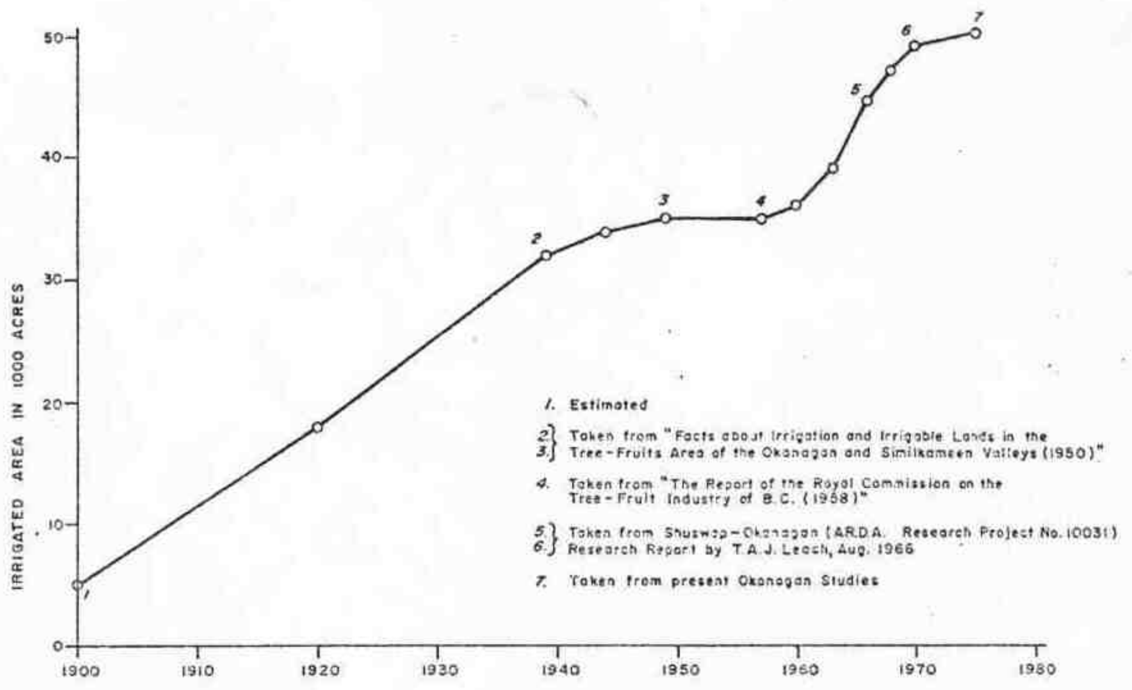
Since all computer modelling has been based on monthly flows annual diversion requirements, return flows and consumptive use have been distributed




NOTE: SEE TABLE C.1 FOR DETAILS.

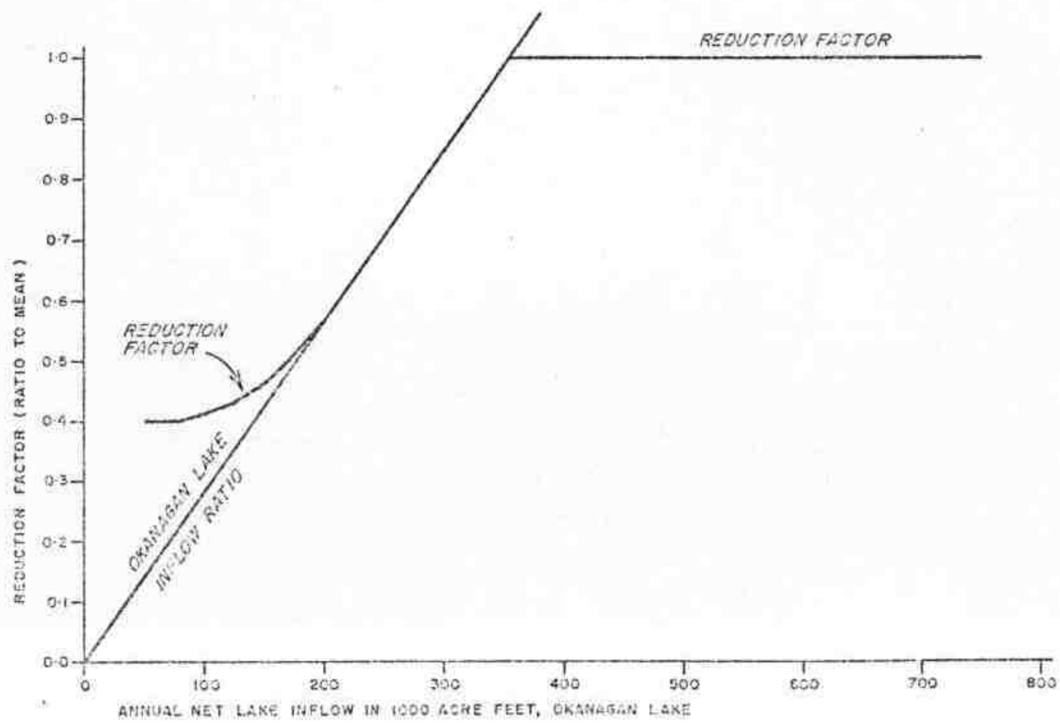
PRESENT (1970) WATER REQUIREMENTS OKANAGAN BASIN IN B.C.

Figure C.1




IRRIGATED AREA, OKANAGAN LAKE BASIN

Figure C·2




REDUCTION FACTOR FOR COMPUTATION OF OKANAGAN LAKE CONSUMPTIVE USE (IRRIGATION)

Figure C.2

accordingly. While the additional data on Municipal, Domestic and Industrial needs are not needed with respect to historic requirements, they have been included in Table C.2 for comparative purposes.

TABLE C.1

PRESENT (1970) WATER REQUIREMENTS WITHIN THE OKANAGAN BASIN IN BRITISH COLUMBIA

| | | | Acre-Feet |
|---|---|---|---|
| 1. | CONSUMPTIVE USE | | |
| | *Okanagan Lake Tributaries and* Directly from Okanagan Lake | | |
| | Consumptive Use | (Irrigation | 56,580 |
| | | (Municipal and Domestic | 7,970 |
| | | (Industrial | 4,180 |
| | Consumptive *Use - Okanagan Lake Portion of* Basin | | 68,730 |
| 2. | WATER REQUIREMENTS | | |
| | Main Okanagan River (*Okanagan Lake Dam* to U.S. Border) | | |
| | (a) Consumptive Use | (Irrigation | 31,430 |
| | | (Municipal and Domestic | 740 |
| | | (Industrial | 230 |
| | Consumptive Use Total | | 32,400 |
| | (b) Minimum Flow Including 1972 Fishery Requirements | | 211,100 |
| 3. | TOTAL CONSUMPTIVE USE in Okanagan Lake Basin | | |
| | Plus | | |
| | WATER REQUIREMENTS in Okanagan River | | 312,230 |

The monthly breakdown of return flow from irrigation as shown in Table C.2 has been based in part on previous studies carried out within the Columbia River Basin in Canada as well as a brief examination of the base flow of some typical streams in the Okanagan Basin. Both irrigation distributions and industrial use have been determined British Columbia Water Resources Service records.

TABLE C.2

DIVERSION (WITHDRAWL), CONSUMPTIVE USE AND

RETURN FLOW OKANAGAN RIVER BASIN

IN PERCENTAGES OF TOTALS

| IRRIGATION | | | | MUNICIPAL AND DOMESTIC | | | INDUSTRIAL | | |
|---|---|---|---|---|---|---|---|---|---|
| Return Flow = 50% Diversion<br>Consumptive Use = 50% Diversion | | | | Return Flow = 65% Diversion<br>Consumptive Use = 35% Diversion | | | Return Flow = 90% Diversion<br>Consumptive Use = 35% Diversion | | |
| | Diversion | Return Flow | Cons. Use | Diversion | Return Flow | Cons. Use | Diversion | Return Flow | Cons. Use |
| | % | % | % | % | % | % | % | % | % |
| April | 0 | 4 | 4 | 6 | 7 | 7 | 7 | 7 | 7 |
| May | 15 | 11 | 11 | 10 | 9 | 9 | 8 | 8 | 8 |
| June | 25 | 14 | 14 | 13 | 10 | 10 | 9 | 9 | 9 |
| July | 25 | 15 | 15 | 16 | 13 | 13 | 10 | 10 | 10 |
| Aug. | 25 | 14 | 14 | 16 | 12 | 12 | 11 | 11 | 11 |
| Sept. | 10 | 12 | 12 | 8 | 10 | 10 | 12 | 12 | 12 |
| Oct. | 0 | 9 | 9 | 7 | 8 | 8 | 8 | 8 | 8 |
| Nov. | 0 | 5 | 5 | 5 | 7 | 7 | 7 | 7 | 7 |
| Dec. | 0 | 5 | 5 | 5 | 6 | 6 | 7 | 7 | 7 |
| Jan. | 0 | 4 | 4 | 5 | 6 | 6 | 7 | 7 | 7 |
| Feb. | 0 | 4 | 4 | 4 | 6 | 6 | 7 | 7 | 7 |
| Mar. | 0 | 3 | 3 | 5 | 6 | 6 | 7 | 7 | 7 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

## C.4 REDUCED CONSUMPTIVE USE IN DROUGHT YEARS

Since a major portion of the historic consumptive use is provided from tributary sources where there is limited storage these areas are the first to suffer from water shortages in drought years. Hence, it has been assumed that the full irrigation requirements would not be met in drought years, and a reduction factor has been applied to the estimated consumptive use requirements which varies with the severity of the drought as illustrated in Figure C.3. The monthly historic consumptive use figures for the study period listed in Tables C.4 to C.7 inclusive contain these modifications. The monthly breakdowns of these figures are in accordance with the April to September distribution previously given in Table C.2 for irrigation diversion requirements.

C.5 TRIBUTARY HEADWATER STORAGE CHANGES

Normally, headwater storages changes over a year are not significant but become important when monthly inflows to the basin are considered. Field enquiries were made regarding the operation of the headwater reservoirs and it was found that in any one year about 50% of the active storage was utilized. It was assumed that this represented the practice over the last 50 years and that headwater storage had increased from about 10,000 acre-feet in 1921 to 113,000 acre-feet today with filling occurring as follows:

TABLE C.3

MONTHLY TRIBUTARY STORAGE CHANGE

| Month | Active Storage Change in % |
|---|---|
| April | +20% |
| May | +30% |
| June | No Change |
| July | -16% |
| August | -18% |
| September | -16% |
| November to March | No Change |

C.6

ESTIMATED NATURAL MONTHLY HISTORIC INFLOWS

The monthly estimated natural historic inflows to Okanagan Lake and River have been computed using the following formula:

a) Estimated Natural Inflow Okanagan Lake Basin in Month X of Year Y

= Historic Inflow to Okanagan Lake in Month X of Year Y.
+ Evaporation on Okanagan Lake in Month X of Year Y.
+ Consumptive Use in Okanagan Lake Basin in Month X of Year Y.
+ Headwater Storage Changes in Okanagan Lake Basin in Month X of Year Y.

b) Estimated Natural Monthly Inflow Okanagan River - Penticton to Oliver In Month X of Year Y

= Historic Inflow to Okanagan River in Month X of Year Y.
+ Evaporation on Skaha Lake in Month X of Year Y.
+ Consumptive Use in Okanagan River Portion of Basin in Month X of Year Y.
+ Headwater Storages in Okanagan River Portion of Basin in Month X of Year Y.

The natural monthly historic inflows provided the basic data in the development of the mainstem water quantity model which extends from Okanagan

Lake downstream to the hydrometric station four miles south of Oliver.

## C.7 DISTRIBUTION OF ESTIMATED NATURAL MONTHLY HISTORIC INFLOWS TO TRIBUTARIES

The natural inflows to Okanagan Lake and River less the direct precipitation on Okanagan and Skaha Lakes can be equated against the inflows from the tributaries. In this way, the natural monthly historic discharges have been derived for some 35 tributaries (Technical Supplement 3 - Appendice B).

Eight of these tributaries within the Okanagan Lake Basin were selected for detailed study based on their heavy utilization as outlined in Part II of this report.

Because of the uncertainty as to the location of groundwater return flow if any, in the eight selected tributaries the assumption has been made that such water does not re-appear in the stream but goes directly to Okanagan Lake.

## C.8 DISCUSSION

The major addition to historic inflows to arrive at natural inflows in the Okanagan Basin is the natural losses which occur within the watershed. The only natural losses which can be estimated with any degree of accuracy are the evaporation losses from the main valley lakes which amounts to 200,000 to 300,000 acre-feet.

Estimates of historic water requirements have been made on the basis of field examination using as a guide water licenced data available in the Water Rights Branch of the British Columbia Water Resources Service. It has been found that the historic consumptive use computed for irrigation is the only one that need by considered since it by itself makes up some 90% of all consumptive use. However, this is relatively small when compared to the evaporation losses from Okanagan Lake.

In using the natural inflows to Okanagan Lake (where about 80% of the water originates) in the mainstem model it was assumed that the return flow from tributary irrigation finds its way back to the lake where it is available for re-use in the lake or in the main Okanagan River downstream. However, in the individual water quantity models for selected tributaries no return flow has been credited to the particular stream because of lack of information on the path of the return flow.

TABLE C.4

MONTHLY AND ANNUAL HISTORIC CONSUMPTIVE USES IN KILO ACRE-FEET. OKANAGAN BASIN

PERIOD: CLIMATIC (APRIL-MARCH) YEAR 1921-1970

| CLIMATIC YEAR | APR. | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | JAN. | FEB. | MAR. | ANNUAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1921 | -1.2 | 5.5 | 10.1 | 9.8 | 10.1 | 2.3 | -2.3 | -1.2 | -1.2 | -1.2 | -1.2 | -0.9 | 28.6 |
| 2 | -1.0 | 5.0 | 9.1 | 8.9 | 9.1 | 2.1 | -2.1 | -1.0 | -1.0 | -1.0 | -1.0 | -0.8 | 26.3 |
| 3 | -1.2 | 5.9 | 10.9 | 10.6 | 10.9 | 2.5 | -2.5 | -1.2 | -1.2 | -1.2 | -1.2 | -0.9 | 31.4 |
| 4 | -0.6 | 2.8 | 5.1 | 4.9 | 5.1 | 1.2 | -1.2 | -0.6 | -0.6 | -0.6 | -0.6 | -0.4 | 14.5 |
| 5 | -0.9 | 4.4 | 8.0 | 7.8 | 8.0 | 1.8 | -1.8 | -0.9 | -0.9 | -0.9 | -0.9 | -0.7 | 23.0 |
| 6 | -0.6 | 2.7 | 4.9 | 4.7 | 4.9 | 1.1 | -1.1 | -0.6 | -0.6 | -0.6 | -0.6 | -0.4 | 13.8 |
| 7 | -1.4 | 6.8 | 12.5 | 12.2 | 12.5 | 2.9 | -2.9 | -1.4 | -1.4 | -1.4 | -1.4 | -1.1 | 35.9 |
| 8 | -1.5 | 7.0 | 12.9 | 12.5 | 12.9 | 3.0 | -3.0 | -1.5 | -1.5 | -1.5 | -1.5 | -1.1 | 36.7 |
| 9 | -0.6 | 3.0 | 5.5 | 5.4 | 5.5 | 1.3 | -1.3 | -0.6 | -0.6 | -0.6 | -0.6 | -0.5 | 15.9 |
| 1930 | -0.6 | 3.0 | 5.5 | 5.3 | 5.5 | 1.3 | -1.3 | -0.6 | -0.6 | -0.6 | -0.6 | -0.5 | 15.8 |
| 1 | -0.6 | 3.1 | 5.6 | 5.5 | 5.6 | 1.3 | -1.3 | -0.6 | -0.6 | -0.6 | -0.6 | -0.5 | 16.3 |
| 2 | -1.7 | 7.9 | 14.5 | 14.1 | 14.5 | 3.3 | -3.3 | -1.7 | -1.7 | -1.7 | -1.7 | -1.2 | 41.3 |
| 3 | -1.7 | 8.1 | 14.9 | 14.5 | 14.9 | 3.4 | -3.4 | -1.7 | -1.7 | -1.7 | -1.7 | -1.3 | 42.6 |
| 4 | -1.7 | 8.3 | 15.3 | 14.9 | 15.3 | 3.5 | -3.5 | -1.7 | -1.7 | -1.7 | -1.7 | -1.3 | 44.0 |
| 5 | -1.8 | 8.5 | 15.7 | 15.3 | 15.7 | 3.6 | -3.6 | -1.8 | -1.8 | -1.8 | -1.8 | -1.3 | 44.9 |
| 6 | -1.8 | 8.6 | 15.8 | 15.4 | 15.8 | 3.6 | -3.6 | -1.8 | -1.8 | -1.8 | -1.8 | -1.4 | 45.2 |
| 7 | -1.9 | 9.0 | 16.5 | 16.0 | 16.5 | 3.8 | -3.8 | -1.9 | -1.9 | -1.9 | -1.9 | -1.4 | 47.1 |
| 8 | -1.5 | 7.2 | 13.2 | 12.8 | 13.2 | 3.0 | -3.0 | -1.5 | -1.5 | -1.5 | -1.5 | -1.1 | 37.8 |
| 9 | -1.1 | 5.3 | 9.8 | 9.5 | 9.8 | 2.2 | -2.2 | -1.1 | -1.1 | -1.1 | -1.1 | -0.8 | 28.1 |
| 1940 | -0.9 | 4.4 | 8.0 | 7.8 | 8.0 | 1.8 | -1.8 | -0.9 | -0.9 | -0.9 | -0.9 | -0.7 | 23.0 |
| 1 | -1.8 | 8.4 | 15.5 | 15.1 | 15.5 | 3.5 | -3.5 | -1.8 | -1.8 | -1.8 | -1.8 | -1.3 | 44.2 |
| 2 | -2.1 | 9.7 | 17.9 | 17.4 | 17.9 | 4.1 | -4.1 | -2.1 | -2.1 | -2.1 | -2.1 | -1.5 | 50.9 |
| 3 | -1.3 | 6.2 | 11.4 | 11.0 | 11.4 | 2.6 | -2.6 | -1.3 | -1.3 | -1.3 | -1.3 | -1.0 | 32.5 |
| 4 | -1.6 | 7.4 | 13.6 | 13.2 | 13.6 | 3.1 | -3.1 | -1.6 | -1.6 | -1.6 | -1.6 | -1.2 | 38.6 |
| 5 | -2.1 | 10.0 | 18.5 | 18.0 | 18.5 | 4.2 | -4.2 | -2.1 | -2.1 | -2.1 | -2.1 | -1.6 | 52.9 |
| 6 | -2.1 | 10.1 | 18.6 | 18.1 | 18.6 | 4.3 | -4.3 | -2.1 | -2.1 | -2.1 | -2.1 | -1.6 | 53.3 |
| 7 | -1.2 | 5.5 | 10.2 | 9.9 | 10.2 | 2.3 | -2.3 | -1.2 | -1.2 | -1.2 | -1.2 | -0.9 | 28.9 |
| 8 | -2.1 | 10.2 | 18.8 | 18.3 | 18.8 | 4.3 | -4.3 | -2.1 | -2.1 | -2.1 | -2.1 | -1.6 | 54.0 |
| 9 | -2.2 | 10.3 | 18.9 | 18.4 | 18.9 | 4.3 | -4.3 | -2.2 | -2.2 | -2.2 | -2.2 | -1.6 | 53.9 |
| 1950 | -2.2 | 10.3 | 18.9 | 18.4 | 18.9 | 4.3 | -4.3 | -2.2 | -2.2 | -2.2 | -2.2 | -1.6 | 53.9 |
| 1 | -2.2 | 10.3 | 18.9 | 18.4 | 18.9 | 4.3 | -4.3 | -2.2 | -2.2 | -2.2 | -2.2 | -1.6 | 53.9 |
| 2 | -2.2 | 10.3 | 18.9 | 18.4 | 18.9 | 4.3 | -4.3 | -2.2 | -2.2 | -2.2 | -2.2 | -1.6 | 53.9 |
| 3 | -2.1 | 9.9 | 18.3 | 17.8 | 18.3 | 4.2 | -4.2 | -2.1 | -2.1 | -2.1 | -2.1 | -1.6 | 52.2 |
| 4 | -2.2 | 10.3 | 18.9 | 18.4 | 18.9 | 4.3 | -4.3 | -2.2 | -2.2 | -2.2 | -2.2 | -1.6 | 53.9 |
| 5 | -2.2 | 10.3 | 18.9 | 18.4 | 18.9 | 4.3 | -4.3 | -2.2 | -2.2 | -2.2 | -2.2 | -1.6 | 53.9 |
| 6 | -2.2 | 10.3 | 18.9 | 18.4 | 18.9 | 4.3 | -4.3 | -2.2 | -2.2 | -2.2 | -2.2 | -1.6 | 53.9 |
| 7 | -2.2 | 10.3 | 18.9 | 18.4 | 18.9 | 4.3 | -4.3 | -2.2 | -2.2 | -2.2 | -2.2 | -1.6 | 53.9 |
| 8 | -2.1 | 10.2 | 18.8 | 18.3 | 18.8 | 4.3 | -4.3 | -2.1 | -2.1 | -2.1 | -2.1 | -1.6 | 54.0 |
| 9 | -2.2 | 10.5 | 19.3 | 18.7 | 19.3 | 4.4 | -4.4 | -2.2 | -2.2 | -2.2 | -2.2 | -1.7 | 55.1 |
| 1960 | -1.9 | 9.1 | 16.8 | 16.4 | 16.8 | 3.8 | -3.8 | -1.9 | -1.9 | -1.9 | -1.9 | -1.4 | 48.2 |
| 1 | -1.8 | 8.5 | 15.7 | 15.3 | 15.7 | 3.6 | -3.6 | -1.8 | -1.8 | -1.8 | -1.8 | -1.3 | 44.9 |
| 2 | -1.8 | 8.5 | 15.7 | 15.2 | 15.7 | 3.6 | -3.6 | -1.8 | -1.8 | -1.8 | -1.8 | -1.3 | 44.8 |
| 3 | -1.4 | 6.8 | 12.5 | 12.1 | 12.5 | 2.9 | -2.9 | -1.4 | -1.4 | -1.4 | -1.4 | -1.1 | 35.8 |
| 4 | -2.5 | 12.0 | 22.0 | 21.4 | 22.0 | 5.0 | -5.0 | -2.5 | -2.5 | -2.5 | -2.5 | -1.9 | 63.0 |
| 5 | -2.6 | 12.5 | 23.0 | 22.3 | 23.0 | 5.3 | -5.3 | -2.6 | -2.6 | -2.6 | -2.6 | -2.0 | 65.8 |
| 6 | -1.5 | 7.0 | 13.0 | 12.6 | 13.0 | 3.0 | -3.0 | -1.5 | -1.5 | -1.5 | -1.5 | -1.1 | 37.0 |
| 7 | -2.2 | 10.3 | 18.9 | 18.4 | 18.9 | 4.3 | -4.3 | -2.2 | -2.2 | -2.2 | -2.2 | -1.6 | 53.9 |
| 8 | -2.9 | 13.8 | 25.4 | 24.7 | 25.4 | 5.8 | -5.8 | -2.9 | -2.9 | -2.9 | -2.9 | -2.2 | 72.6 |
| 9 | -3.0 | 14.1 | 25.9 | 25.2 | 25.9 | 5.9 | -5.9 | -3.0 | -3.0 | -3.0 | -3.0 | -2.2 | 73.9 |
| 1970 | -1.2 | 5.9 | 10.8 | 10.5 | 10.8 | 2.5 | -2.5 | -1.2 | -1.2 | -1.2 | -1.2 | -0.9 | 31.1 |

TABLE C.5

MONTHLY AND ANNUAL HISTORIC CONSUMPTIVE USES IN KILO ACRE-FEET.

OKANAGAN RIVER BETWEEN PENTICTON AND OKANAGAN FALLS

PERIOD CLIMATIC (APRIL-MARCH) YEAR 1921-1970

TABLE C.6

| CLIMATIC YEAR | APR. | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | JAN. | FEB. | MAR. | ANNUAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1921 | -0.1 | 0.6 | 1.2 | 1.2 | 1.2 | 0.3 | -0.3 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | 3.4 |
| 2 | -0.1 | 0.7 | 1.3 | 1.2 | 1.3 | 0.3 | -0.3 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | 3.7 |
| 3 | -0.1 | 0.7 | 1.3 | 1.3 | 1.3 | 0.3 | -0.3 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | 3.8 |
| 4 | -0.1 | 0.7 | 1.4 | 1.3 | 1.4 | 0.3 | -0.3 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | 4.0 |
| 5 | -0.1 | 0.7 | 1.4 | 1.4 | 1.4 | 0.3 | -0.3 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | 4.1 |
| 6 | -0.2 | 0.8 | 1.4 | 1.4 | 1.4 | 0.3 | -0.3 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 3.9 |
| 7 | -0.2 | 0.8 | 1.5 | 1.5 | 1.5 | 0.3 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 4.1 |
| 8 | -0.2 | 0.8 | 1.5 | 1.5 | 1.5 | 0.4 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 4.2 |
| 9 | -0.2 | 0.8 | 1.6 | 1.5 | 1.6 | 0.4 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 4.4 |
| 1930 | -0.2 | 0.9 | 1.6 | 1.6 | 1.6 | 0.4 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 4.6 |
| 1 | -0.2 | 0.9 | 1.7 | 1.6 | 1.7 | 0.4 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 4.8 |
| 2 | -0.2 | 0.9 | 1.7 | 1.7 | 1.7 | 0.4 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 4.9 |
| 3 | -0.2 | 0.9 | 1.8 | 1.7 | 1.8 | 0.4 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 5.1 |
| 4 | -0.2 | 1.0 | 1.8 | 1.8 | 1.8 | 0.4 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 5.3 |
| 5 | -0.2 | 1.0 | 1.9 | 1.8 | 1.9 | 0.4 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 5.5 |
| 6 | -0.2 | 1.0 | 1.9 | 1.9 | 1.9 | 0.4 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 5.2 |
| 7 | -0.2 | 1.0 | 2.0 | 1.9 | 2.0 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 5.5 |
| 8 | -0.2 | 1.1 | 2.0 | 2.0 | 2.0 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 5.7 |
| 9 | -0.2 | 1.1 | 2.0 | 2.0 | 2.0 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 5.7 |
| 1940 | -0.2 | 1.1 | 2.1 | 2.0 | 2.1 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 5.9 |
| 1 | -0.2 | 1.1 | 2.1 | 2.0 | 2.1 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 5.9 |
| 2 | -0.2 | 1.1 | 2.1 | 2.1 | 2.1 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.0 |
| 3 | -0.2 | 1.1 | 2.1 | 2.1 | 2.1 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.0 |
| 4 | -0.2 | 1.1 | 2.2 | 2.1 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.2 |
| 5 | -0.2 | 1.2 | 2.2 | 2.1 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.3 |
| 6 | -0.2 | 1.2 | 2.2 | 2.1 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.3 |
| 7 | -0.2 | 1.2 | 2.2 | 2.2 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.4 |
| 8 | -0.2 | 1.2 | 2.2 | 2.2 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.4 |
| 9 | -0.2 | 1.2 | 2.2 | 2.2 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.4 |
| 1950 | -0.2 | 1.2 | 2.2 | 2.2 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.4 |
| 1 | -0.2 | 1.2 | 2.2 | 2.2 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.4 |
| 2 | -0.2 | 1.2 | 2.2 | 2.2 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.4 |
| 3 | -0.2 | 1.2 | 2.2 | 2.2 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.4 |
| 4 | -0.2 | 1.2 | 2.2 | 2.2 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.4 |
| 5 | -0.2 | 1.2 | 2.2 | 2.2 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.4 |
| 6 | -0.2 | 1.2 | 2.2 | 2.2 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.4 |
| 7 | -0.2 | 1.2 | 2.2 | 2.2 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.4 |
| 8 | -0.2 | 1.2 | 2.3 | 2.3 | 2.3 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.7 |
| 9 | -0.3 | 1.3 | 2.4 | 2.3 | 2.4 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 6.7 |
| 1960 | -0.3 | 1.3 | 2.4 | 2.4 | 2.4 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 6.8 |
| 1 | -0.3 | 1.3 | 2.5 | 2.5 | 2.5 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 7.1 |
| 2 | -0.3 | 1.4 | 2.6 | 2.5 | 2.6 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 7.4 |
| 3 | -0.3 | 1.4 | 2.7 | 2.6 | 2.7 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 7.7 |
| 4 | -0.3 | 1.5 | 2.7 | 2.7 | 2.7 | 0.6 | -0.6 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 7.7 |
| 5 | -0.3 | 1.5 | 2.8 | 2.7 | 2.8 | 0.6 | -0.7 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 7.8 |
| 6 | -0.3 | 1.5 | 2.8 | 2.8 | 2.8 | 0.7 | -0.7 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 8.0 |
| 7 | -0.3 | 1.5 | 2.8 | 2.8 | 2.8 | 0.7 | -0.7 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 8.0 |
| 8 | -0.3 | 1.5 | 2.8 | 2.8 | 2.8 | 0.7 | -0.7 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 8.0 |
| 9 | -0.3 | 1.5 | 2.8 | 2.8 | 2.8 | 0.7 | -0.7 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 8.0 |
| 1970 | -0.3 | 1.5 | 2.8 | 2.8 | 2.8 | 0.7 | -0.7 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 8.0 |

MONTHLY AND ANNUAL HISTORIC CONSUMPTIVE USES IN KILO ACRE-FEET. OKANAGAN RIVER BETWEEN OKANAGAN FALLS AND HYDROMETRIC STATION NEAR OLIVER

PERIOD: CLIMATIC (APRIL-MARCH) YEAR 1921-1970

| CLIMATIC YEAR | APR. | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | JAN. | FEB. | MAR. | ANNUAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1921 | -0.1 | 0.7 | 1.3 | 1.3 | 1.3 | 0.3 | -0.3 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | 3.8 |
| 2 | -0.1 | 0.7 | 1.3 | 1.3 | 1.3 | 0.3 | -0.3 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | 3.8 |
| 3 | -0.1 | 0.7 | 1.4 | 1.4 | 1.4 | 0.3 | -0.3 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | 4.1 |
| 4 | -0.2 | 0.8 | 1.4 | 1.4 | 1.4 | 0.3 | -0.3 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 3.9 |
| 5 | -0.2 | 0.8 | 1.5 | 1.4 | 1.5 | 0.3 | -0.3 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 4.1 |
| 6 | -0.2 | 0.8 | 1.5 | 1.5 | 1.5 | 0.4 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 4.2 |
| 7 | -0.2 | 0.8 | 1.6 | 1.5 | 1.6 | 0.4 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 4.4 |
| 8 | -0.2 | 0.9 | 1.6 | 1.6 | 1.6 | 0.4 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 4.6 |
| 9 | -0.2 | 0.9 | 1.7 | 1.6 | 1.7 | 0.4 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 4.8 |
| 1930 | -0.2 | 0.9 | 1.7 | 1.7 | 1.7 | 0.4 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 4.9 |
| 1 | -0.2 | 1.0 | 1.8 | 1.7 | 1.8 | 0.4 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 5.2 |
| 2 | -0.2 | 1.0 | 1.8 | 1.8 | 1.8 | 0.4 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 5.3 |
| 3 | -0.2 | 1.0 | 1.9 | 1.8 | 1.9 | 0.4 | -0.4 | -0.2 | -0.2 | -0.2 | -0.2 | -0.1 | 5.5 |
| 4 | -0.2 | 1.0 | 1.9 | 1.9 | 1.9 | 0.4 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 5.2 |
| 5 | -0.2 | 1.1 | 2.0 | 1.9 | 2.0 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 5.6 |
| 6 | -0.2 | 1.1 | 2.0 | 2.0 | 2.0 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 5.7 |
| 7 | -0.2 | 1.1 | 2.1 | 2.0 | 2.1 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 5.9 |
| 8 | -0.2 | 1.1 | 2.1 | 2.1 | 2.1 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.0 |
| 9 | -0.2 | 1.2 | 2.2 | 2.1 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.3 |
| 1940 | -0.2 | 1.2 | 2.2 | 2.1 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.3 |
| 1 | -0.2 | 1.2 | 2.2 | 2.2 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.4 |
| 2 | -0.2 | 1.2 | 2.2 | 2.2 | 2.2 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.4 |
| 3 | -0.2 | 1.2 | 2.3 | 2.2 | 2.3 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.6 |
| 4 | -0.2 | 1.2 | 2.3 | 2.2 | 2.3 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.6 |
| 5 | -0.2 | 1.2 | 2.3 | 2.2 | 2.3 | 0.5 | -0.5 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.6 |
| 6 | -0.2 | 1.2 | 2.3 | 2.3 | 2.3 | 0.5 | -0.6 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.6 |
| 7 | -0.2 | 1.3 | 2.4 | 2.3 | 2.4 | 0.5 | -0.6 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 6.9 |
| 8 | -0.2 | 1.3 | 2.4 | 2.3 | 2.4 | 0.6 | -0.6 | -0.3 | -0.3 | -0.2 | -0.2 | -0.2 | 7.0 |
| 9 | -0.3 | 1.3 | 2.4 | 2.3 | 2.4 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 6.7 |
| 1950 | -0.3 | 1.3 | 2.4 | 2.3 | 2.4 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 6.7 |
| 1 | -0.3 | 1.3 | 2.4 | 2.3 | 2.4 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 6.7 |
| 2 | -0.3 | 1.3 | 2.4 | 2.3 | 2.4 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 6.7 |
| 3 | -0.3 | 1.3 | 2.4 | 2.3 | 2.4 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 6.7 |
| 4 | -0.3 | 1.3 | 2.4 | 2.3 | 2.4 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 6.7 |
| 5 | -0.3 | 1.3 | 2.4 | 2.3 | 2.4 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 6.7 |
| 6 | -0.3 | 1.3 | 2.4 | 2.3 | 2.4 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 6.7 |
| 7 | -0.3 | 1.3 | 2.4 | 2.3 | 2.4 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 6.7 |
| 8 | -0.3 | 1.3 | 2.5 | 2.4 | 2.5 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 7.0 |
| 9 | -0.3 | 1.4 | 2.5 | 2.5 | 2.5 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 7.2 |
| 1960 | -0.3 | 1.4 | 2.6 | 2.5 | 2.6 | 0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.2 | 7.4 |
| 1 | -0.3 | 1.4 | 2.7 | 2.6 | 2.7 | 0.6 | -0.6 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 7.5 |
| 2 | -0.3 | 1.5 | 2.8 | 2.7 | 2.8 | 0.6 | -0.7 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 7.8 |
| 3 | -0.3 | 1.5 | 2.8 | 2.7 | 2.8 | 0.7 | -0.7 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 7.9 |
| 4 | -0.3 | 1.5 | 2.9 | 2.8 | 2.9 | 0.7 | -0.7 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 8.2 |
| 5 | -0.3 | 1.6 | 3.0 | 2.9 | 3.0 | 0.7 | -0.7 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 8.6 |
| 6 | -0.3 | 1.6 | 3.0 | 3.0 | 3.0 | 0.7 | -0.7 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 8.7 |
| 7 | -0.3 | 1.6 | 3.0 | 3.0 | 3.0 | 0.7 | -0.7 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 8.7 |
| 8 | -0.3 | 1.6 | 3.0 | 3.0 | 3.0 | 0.7 | -0.7 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 8.7 |
| 9 | -0.3 | 1.6 | 3.0 | 3.0 | 3.0 | 0.7 | -0.7 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 8.7 |
| 1970 | -0.3 | 1.6 | 3.0 | 3.0 | 3.0 | 0.7 | -0.7 | -0.4 | -0.4 | -0.3 | -0.3 | -0.2 | 8.7 |

TABLE C.7

MONTHLY AND ANNUAL HISTORIC CONSUMPTIVE USES IN KILO ACRE-FEET.

OKANAGAN RIVER BETWEEN HYDROMETRIC STATION NEAR OLIVER, B.C. AND OROVILLE, WASH.

PERIOD: CLIMATIC (APRIL-MARCH) YEAR 1921-1970

| CLIMATIC YEAR | APR. | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | JAN. | FEB. | MAR. | ANNUAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1921 | -0.3 | 1.7 | 3.2 | 3.1 | 3.2 | 0.7 | -0.8 | -0.4 | -0.4 | -0.3 | -0.3 | -0.3 | 9.1 |
| 2 | -0.3 | 1.8 | 3.3 | 3.2 | 3.3 | 0.8 | -0.8 | -0.4 | -0.4 | -0.3 | -0.3 | -0.3 | 9.6 |
| 3 | -0.4 | 1.8 | 3.4 | 3.4 | 3.4 | 0.8 | -0.8 | -0.5 | -0.5 | -0.4 | -0.4 | -0.3 | 9.5 |
| 4 | -0.4 | 1.9 | 3.6 | 3.5 | 3.6 | 0.8 | -0.8 | -0.5 | -0.5 | -0.4 | -0.4 | -0.3 | 10.1 |
| 5 | -0.4 | 2.0 | 3.7 | 3.6 | 3.7 | 0.9 | -0.9 | -0.5 | -0.5 | -0.4 | -0.4 | -0.3 | 10.5 |
| 6 | -0.4 | 2.0 | 3.8 | 3.7 | 3.8 | 0.9 | -0.9 | -0.5 | -0.5 | -0.4 | -0.4 | -0.3 | 10.8 |
| 7 | -0.4 | 2.1 | 4.0 | 3.9 | 4.0 | 0.9 | -0.9 | -0.5 | -0.5 | -0.4 | -0.4 | -0.3 | 11.5 |
| 8 | -0.4 | 2.2 | 4.1 | 4.0 | 4.1 | 1.0 | -1.0 | -0.5 | -0.5 | -0.4 | -0.4 | -0.3 | 11.9 |
| 9 | -0.4 | 2.2 | 4.2 | 4.1 | 4.2 | 1.0 | -1.0 | -0.6 | -0.6 | -0.4 | -0.4 | -0.3 | 12.0 |
| 1930 | -0.5 | 2.3 | 4.3 | 4.2 | 4.3 | 1.0 | -1.0 | -0.6 | -0.6 | -0.5 | -0.5 | -0.3 | 12.1 |
| 1 | -0.5 | 2.4 | 4.5 | 4.3 | 4.5 | 1.0 | -1.1 | -0.6 | -0.6 | -0.5 | -0.5 | -0.4 | 12.5 |
| 2 | -0.5 | 2.4 | 4.6 | 4.5 | 4.6 | 1.1 | -1.1 | -0.6 | -0.6 | -0.5 | -0.5 | -0.4 | 13.0 |
| 3 | -0.5 | 2.5 | 4.7 | 4.6 | 4.7 | 1.1 | -1.1 | -0.6 | -0.6 | -0.5 | -0.5 | -0.4 | 13.4 |
| 4 | -0.5 | 2.6 | 4.8 | 4.7 | 4.8 | 1.1 | -1.1 | -0.6 | -0.6 | -0.5 | -0.5 | -0.4 | 13.8 |
| 5 | -0.5 | 2.6 | 5.0 | 4.8 | 5.0 | 1.2 | -1.2 | -0.7 | -0.7 | -0.5 | -0.5 | -0.4 | 14.1 |
| 6 | -0.5 | 2.7 | 5.1 | 5.0 | 5.1 | 1.2 | -1.2 | -0.7 | -0.7 | -0.5 | -0.5 | -0.4 | 14.6 |
| 7 | -0.5 | 2.8 | 5.2 | 5.1 | 5.2 | 1.2 | -1.2 | -0.7 | -0.7 | -0.5 | -0.5 | -0.4 | 15.0 |
| 8 | -0.6 | 2.8 | 5.3 | 5.2 | 5.3 | 1.2 | -1.3 | -0.7 | -0.7 | -0.6 | -0.6 | -0.4 | 14.9 |
| 9 | -0.6 | 2.9 | 5.5 | 5.3 | 5.5 | 1.3 | -1.3 | -0.7 | -0.7 | -0.6 | -0.6 | -0.4 | 15.6 |
| 1940 | -0.6 | 2.9 | 5.5 | 5.4 | 5.5 | 1.3 | -1.3 | -0.7 | -0.7 | -0.6 | -0.6 | -0.4 | 15.7 |
| 1 | -0.6 | 3.0 | 5.6 | 5.5 | 5.6 | 1.3 | -1.3 | -0.7 | -0.7 | -0.6 | -0.6 | -0.4 | 16.1 |
| 2 | -0.6 | 3.0 | 5.7 | 5.5 | 5.7 | 1.3 | -1.3 | -0.7 | -0.7 | -0.6 | -0.6 | -0.4 | 16.3 |
| 3 | -0.6 | 3.1 | 5.8 | 5.6 | 5.8 | 1.3 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 16.3 |
| 4 | -0.6 | 3.1 | 5.8 | 5.7 | 5.8 | 1.4 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 16.5 |
| 5 | -0.6 | 3.1 | 5.9 | 5.7 | 5.9 | 1.4 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 16.7 |
| 6 | -0.6 | 3.1 | 5.9 | 5.7 | 5.9 | 1.4 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 16.7 |
| 7 | -0.6 | 3.1 | 5.9 | 5.8 | 5.9 | 1.4 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 16.8 |
| 8 | -0.6 | 3.2 | 5.9 | 5.8 | 5.9 | 1.4 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 16.9 |
| 9 | -0.6 | 3.2 | 6.0 | 5.8 | 6.0 | 1.4 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 17.1 |
| 1950 | -0.6 | 3.2 | 6.0 | 5.8 | 6.0 | 1.4 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 17.1 |
| 1 | -0.6 | 3.2 | 6.0 | 5.8 | 6.0 | 1.4 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 17.1 |
| 2 | -0.6 | 3.2 | 6.0 | 5.8 | 6.0 | 1.4 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 17.1 |
| 3 | -0.6 | 3.2 | 6.0 | 5.8 | 6.0 | 1.4 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 17.1 |
| 4 | -0.6 | 3.2 | 6.0 | 5.8 | 6.0 | 1.4 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 17.1 |
| 5 | -0.6 | 3.2 | 6.0 | 5.8 | 6.0 | 1.4 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 17.1 |
| 6 | -0.6 | 3.2 | 6.0 | 5.8 | 6.0 | 1.4 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 17.1 |
| 7 | -0.6 | 3.2 | 6.0 | 5.8 | 6.0 | 1.4 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 17.1 |
| 8 | -0.6 | 3.2 | 6.0 | 5.9 | 6.0 | 1.4 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 17.2 |
| 9 | -0.6 | 3.2 | 6.1 | 5.9 | 6.1 | 1.4 | -1.4 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 17.4 |
| 1960 | -0.6 | 3.3 | 6.2 | 6.0 | 6.2 | 1.4 | -1.5 | -0.8 | -0.8 | -0.6 | -0.6 | -0.5 | 17.7 |
| 1 | -0.7 | 3.4 | 6.3 | 6.2 | 6.3 | 1.5 | -1.5 | -0.8 | -0.8 | -0.7 | -0.7 | -0.5 | 18.0 |
| 2 | -0.7 | 3.5 | 6.5 | 6.3 | 6.5 | 1.5 | -1.5 | -0.9 | -0.9 | -0.7 | -0.7 | -0.5 | 18.4 |
| 3 | -0.7 | 3.6 | 6.7 | 6.5 | 6.7 | 1.6 | -1.6 | -0.9 | -0.9 | -0.7 | -0.7 | -0.5 | 19.1 |
| 4 | -0.7 | 3.7 | 7.0 | 6.8 | 7.0 | 1.6 | -1.7 | -0.9 | -0.9 | -0.7 | -0.7 | -0.6 | 19.9 |
| 5 | -0.8 | 3.9 | 7.3 | 7.1 | 7.3 | 1.7 | -1.7 | -1.0 | -1.0 | -0.8 | -0.8 | -0.6 | 20.6 |
| 6 | -0.8 | 4.0 | 7.6 | 7.4 | 7.6 | 1.8 | -1.8 | -1.0 | -1.0 | -0.8 | -0.8 | -0.6 | 21.6 |
| 7 | -0.8 | 4.2 | 7.8 | 7.6 | 7.8 | 1.8 | -1.9 | -1.0 | -1.0 | -0.8 | -0.8 | -0.6 | 22.3 |
| 8 | -0.8 | 4.3 | 8.1 | 7.8 | 8.1 | 1.9 | -1.9 | -1.1 | -1.1 | -0.8 | -0.8 | -0.6 | 23.1 |
| 9 | -0.9 | 4.4 | 8.2 | 8.0 | 8.2 | 1.9 | -1.9 | -1.1 | -1.1 | -0.9 | -0.9 | -0.6 | 23.3 |
| 1970 | -0.9 | 4.5 | 8.4 | 8.2 | 8.4 | 1.9 | -2.0 | -1.1 | -1.1 | -0.9 | -0.9 | -0.7 | 23.8 |