# APPENDICES

# APPENDIX A

# LAKE EVAPORATION

# APPENDIX A

# LAKE EVAPORATION

## A.1 INTRODUCTION

The net historic monthly inflows to Okanagan Lake as determined by change in lake storage and outflow corrected for precipitation falling directly on the lake and a relatively minor amount of consumptive use show significant negative values following the end of the freshet period. This is indicative of the heavy evaporation which approaches 50% of the gross annual inflow.

In order to arrive at the natural flows for water quantity modelling It was necessary early in the study to determine the historic evaporation occurring over the standard study period (1921-1970)

The only published information available upon which the estimated historic evaporation could be made is available in volumes of Monthly Record Meteorological Observations in Canada and consisted of:

a) Monthly pan evaporation in inches and the equivalent lake evaporation

at the Federal Department of Agriculture Experimental Station at Summer-land for the period 1962 to 1969.

b) Monthly mean temperatures in degrees °F at Summerland for the 50 year study period.

From 35 concurrent data of pan evaporation versus estimated lake evaporation and 49 concurrent data of mean temperature versis pan evaporation, the following equation was derived:

$$YE\text{-}L = 0.17X_T - 5.14$$

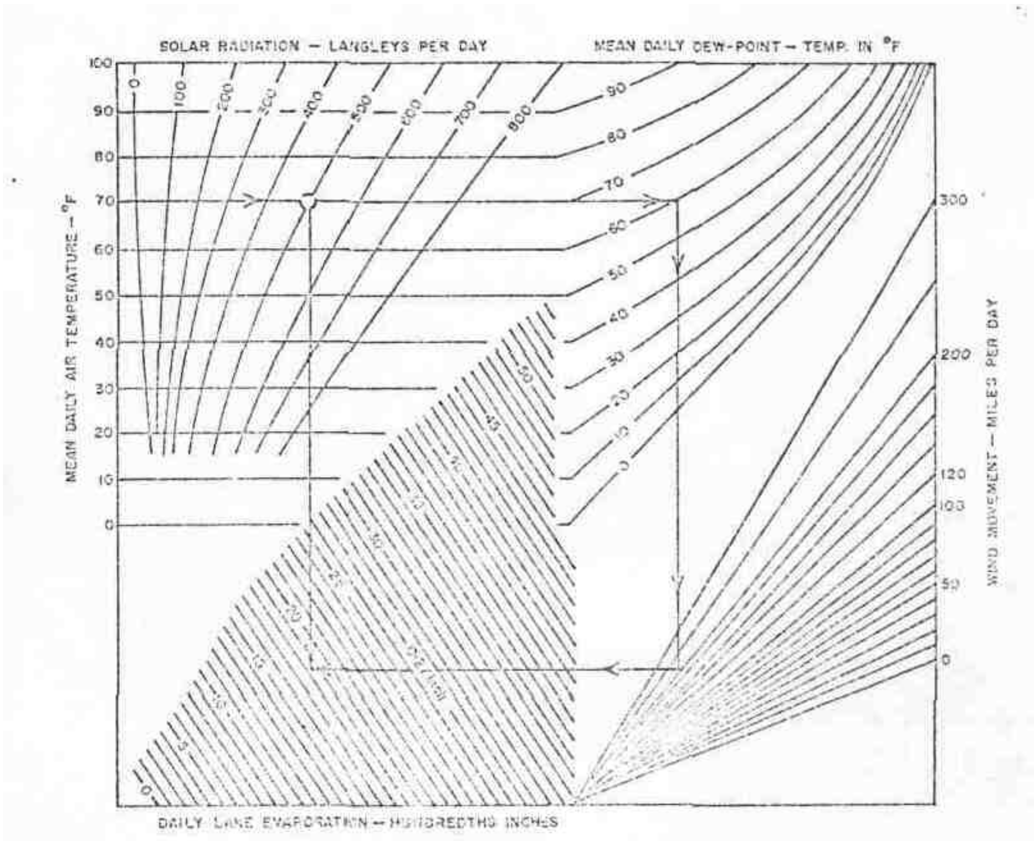
where YE-L = Lake evaporation in inches per month

$X_T$ = Monthly mean temperature in °F

The above formula was used to derive the monthly historic evaporation on Okanagan Lake for the standard study period 1921 to 1970.

A check of the published lake evaporation data for the period 1962 to 1969 in (1) was made using the "Nomograph for Computing Lake Evaporation" published in "New Methods for Determining Lake Evaporation Loss" by John S. Stale and Wynotham J. Roberts - Journal AWWA - June 7, 1967.

This nomograph shown in Figure A.1 required the following information which was available for a 17 month period at Summerland:




NOTE: Taken from "new Methods for Determining Lake Evaporation Lose" by J.B Stall and W.J. Roberts (Journal of American Waterworks Ass'n. Oct. 1967).

NOMOGRAPH FOR

COMPUTING LAKE EVAPORATION

FIGURE A.1

Monthly Mean Temperature in °F.

Monthly Mean Solar Radiation in Langley per day.

Monthly Mean Dew Point Temperature in °F.

Monthly Mean Wind in miles per day.

The published lake evaporation for the 17 month period was correlated with the information derived from the nomograph with the following results:

$\bar{X}$ = 4.75 (Mean of X's)

$\bar{Y}$ = 3.91 (Mean of Y's)

$S_X$ = ±1.88 (Standard deviation of X)

$S_Y$ = ±1.66 (Standard deviation of Y)

R = 0.98 (Coefficient of correlation)

Sylx = 0.38 (Standard error of estimate)

Y = 0.86X – 0.17 (Regression equation of Y on X)

X = 1.11Y + 0.41 (Regression equation of X on Y)

## A.2 DISCUSSION

The estimates of monthly historic evaporation for Okanagan Lake based on air temperature are admittedly crude but subsequent detailed studies by the Atmospheric Environment Service would indicate that they are reasonably good. With a continuation of the newly established climatic stations it is expected that more accurate data should become available in the ensuing years. Moreover, even with the corrections for evaporation as computed by the above method there are still some negative inflows in certain months indicating these estimates may be too low.

The application of the monograph in checking Okanagan Lake evaporation estimates is also open to question since the nomograph was prepared with respect to much smaller lakes in the United States.

The basic formula YE-L = 0.17 $X_T$ - 5.14 has also been used in deriving the historic evaporation over the 50 year study period on Skaha and Osoyoos Lakes which values are shown together with Okanagan and Kalamalka-Wood Lake in the tables which follow.

It will be noted that the Kalamalka-Wood Lake evaporations were derived as follows:

a) The daily lake evaporations for computed at "Kelowna A" and ."Vernon SM" meteorological stations for the period May to September 1972 were averaged.

b) The 153 values computed in (1) were multiplied by 30 or 31 depending upon the particular month to arrive at equivalent monthly values.

c) The 153 hypothetical monthly evaporation values were correlated against the corresponding daily temperatures at meteorlogical station "Vernon CR" and the following regression equation derived:

$$YE\text{-}L = 0.1533\ X_T - 5.154$$

where YE-L = Lake evaporation in inches per month

$X_T$ = Monthly mean temperature in °F at Vernon CR Station

(Correlation coefficient = 0.68)

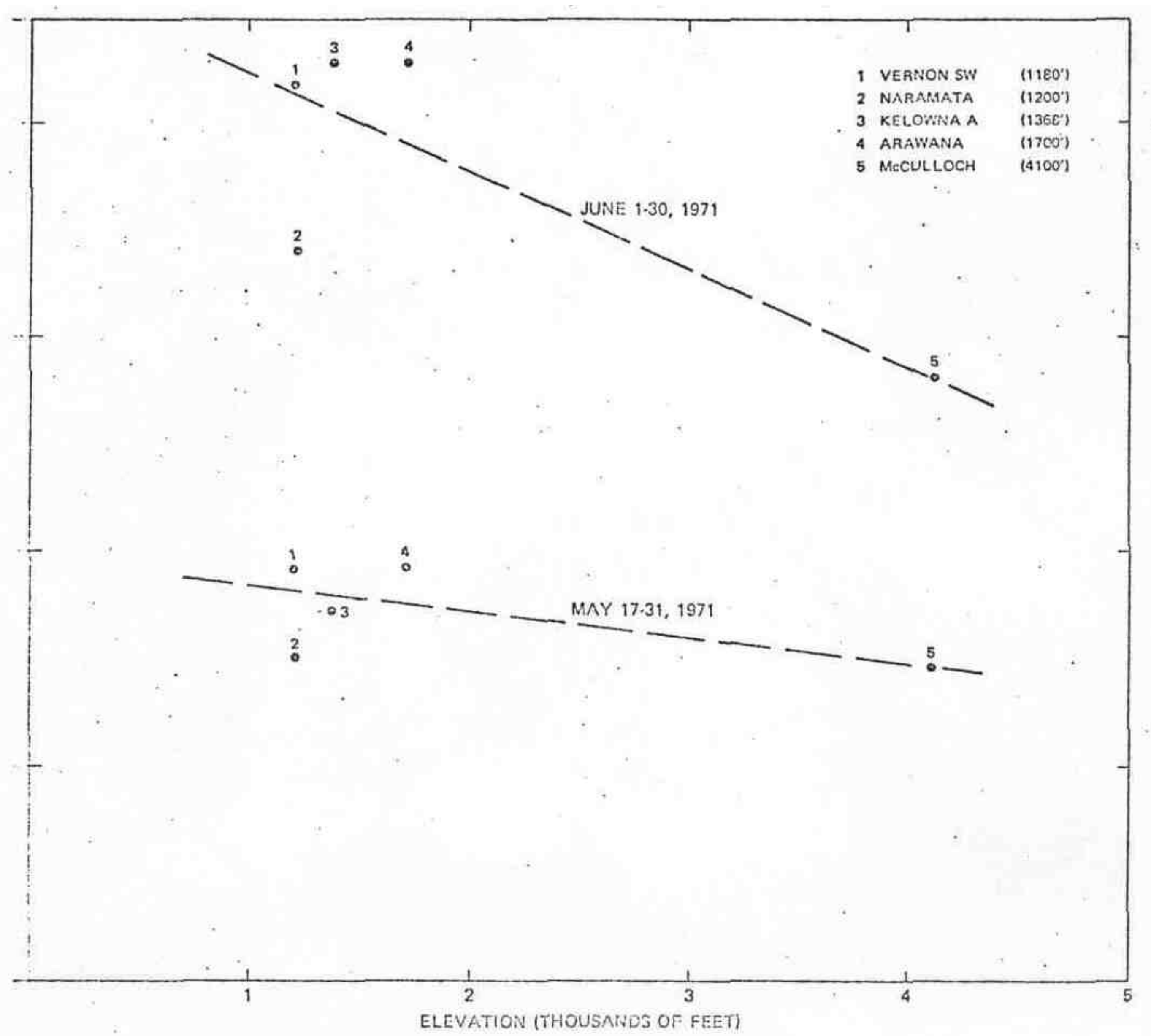
d) The monthly lake evaporation from Kalamalka-Wood Lake were computed from "Vernon CR" station monthly air temperatures over the 50 year study period utilizing the regression equation above.

All the above lakes are referred to as main valley lakes and are within an elevation range of 900 to 1,200 feet. Similar data has not yet been derived for the headwater lakes which are for the most part above elevation 4,000 feet. However, some tentative relationships have been derived between elevation and lake and pan evaporation by the Atmospheric Environment Service as shown in Figures A.2 and A.3 taken from Technical Supplement II. Since the headwater lakes in total are only about 10,000 acres this high elevation is not too significant compared to the main valley lakes which in total have about 10 times the surface area. However, headwater lake evaporation may be a important factor with respect to individual tributary flows.

The derived monthly historic evaporation for the main valley lakes are available in the following tables:

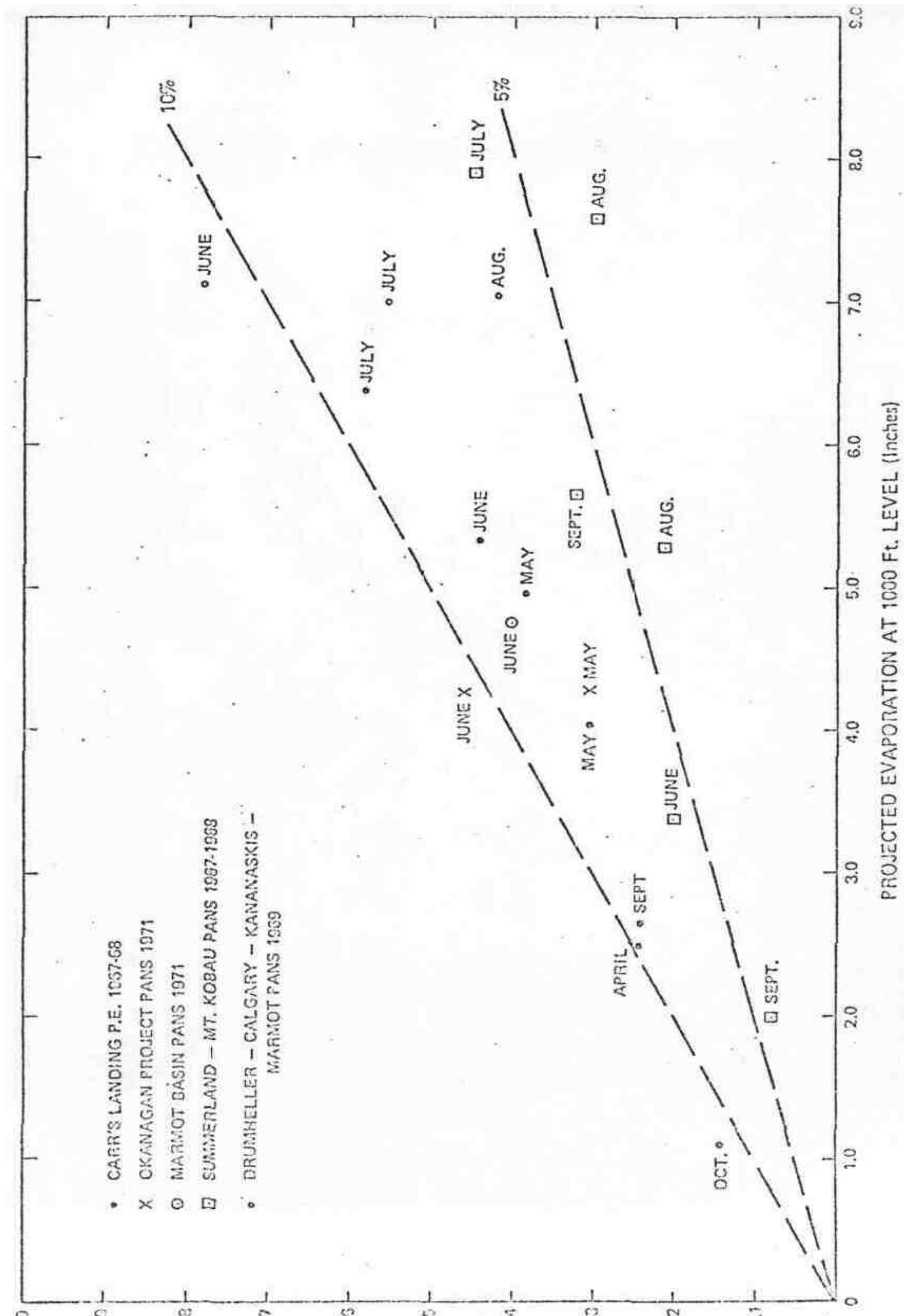
| | |
|---|---|
| Kalamalka-Wood Lake | Table A.1 |
| Okanagan Lake | Table A.2 |
| Skaha Lake | Table A.3 |
| Osoyoos Lake | Table A.4 |

Finally, in Table A.5 a further tabulation taken from "Atlas of Climatic Maps" shows the formulae used by the Atmospheric Environment Service, for lake evaporation as determined from pan evaporation and climatological data in the preparation of mean evaporation maps.




VARIATION OF LAKE EVAPORATION WITH ELEVATION AT OKANAGAN PROJECT STATIONS IN MAY AND JUNE, 1971, BASED ON CLASS A PAN DATA.

Figure A.2




Variation of evaporation with elevation in southern Alberta and British Columbia. Values represent potential evapotranspiration (P.E.) or lake evaporation determined from Class A pan data. The lines represent percentage decreases in evaporation with elevation from a projected base level of 1000 ft. above sea level.

DECREASE IN EVAPORATION WITH ELEVATION

(Inches per 1000ft)

Figure A. 3

# TABLE A.1

## MONTHLY AND ANNUAL EVAPORATION IN KILO ACRE-FEET

## KALAMALKA-WOOD LAKE

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

| CLIMATIC YEAR | APR. | MAY | JUNE | JULY | AUG. | SEPT | OCT. | NOV. | DEC. | JAN. | FEB. | MAR. | ANNUAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1921 | 1.5 | 2.2 | 2.9 | 3.6 | 3.4 | 2.4 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 17.3 |
| 2 | 1.0 | 2.0 | 3.3 | 3.7 | 3.4 | 2.6 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 17.7 |
| 3 | 1.5 | 2.2 | 3.0 | 3.7 | 3.4 | 2.5 | 1.3 | 0.2 | 0.0 | 0.0 | 0.0 | 0.4 | 18.2 |
| 4 | 1.3 | 2.7 | 3.0 | 3.7 | 3.3 | 2.7 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 18.6 |
| 5 | 1.6 | 2.7 | 3.1 | 3.9 | 3.2 | 2.5 | 0.9 | 0.2 | 0.0 | 0.0 | 0.0 | 0.8 | 18.9 |
| 6 | 1.8 | 2.2 | 3.1 | 3.9 | 3.2 | 1.8 | 1.4 | 0.3 | 0.0 | 0.0 | 0.0 | 0.3 | 18.0 |
| 7 | 1.1 | 2.0 | 3.2 | 3.6 | 3.4 | 2.2 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 17.3 |
| 8 | 1.3 | 2.7 | 3.1 | 3.8 | 3.3 | 2.6 | 0.9 | 0.3 | 0.0 | 0.0 | 0.0 | 0.6 | 18.6 |
| 9 | 1.1 | 2.4 | 2.9 | 3.6 | 3.7 | 2.4 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 17.8 |
| 1930 | 1.9 | 2.1 | 2.8 | 3.6 | 3.7 | 2.6 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 18.3 |
| 1 | 1.6 | 2.5 | 2.9 | 3.6 | 3.4 | 2.2 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 17.3 |
| 2 | 1.6 | 2.4 | 3.2 | 3.2 | 3.4 | 2.2 | 1.3 | 0.4 | 0.0 | 0.0 | 0.0 | 0.3 | 18.0 |
| 3 | 1.1 | 2.0 | 2.9 | 3.4 | 3.7 | 2.1 | 1.3 | 0.5 | 0.0 | 0.0 | 0.0 | 0.7 | 17.7 |
| 4 | 2.0 | 2.5 | 3.0 | 3.4 | 3.4 | 2.1 | 1.5 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 18.5 |
| 5 | 0.9 | 2.2 | 3.0 | 3.3 | 3.0 | 2.6 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 16.1 |
| 6 | 1.6 | 2.7 | 3.1 | 3.3 | 3.6 | 2.1 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 18.1 |
| 7 | 1.3 | 2.2 | 3.3 | 3.8 | 3.1 | 2.8 | 1.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 18.1 |
| 8 | 0.3 | 1.0 | 1.9 | 2.4 | 1.8 | 1.8 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.7 |
| 9 | 0.4 | 1.0 | 1.6 | 2.1 | 1.9 | 1.4 | 0.4 | 0.0 | 0.0 | 0.0 | 0.9 | 1.8 | 11.5 |
| 1940 | 2.9 | 4.0 | 5.0 | 5.4 | 5.1 | 4.6 | 2.6 | 0.0 | 0.0 | 0.0 | 0.0 | 1.1 | 30.7 |
| 1 | 2.0 | 2.5 | 3.1 | 4.1 | 3.6 | 2.1 | 1.4 | 0.4 | 0.0 | 0.0 | 0.0 | 0.6 | 19.8 |
| 2 | 1.7 | 2.4 | 3.0 | 3.7 | 3.6 | 2.7 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 18.6 |
| 3 | 1.8 | 2.0 | 3.0 | 3.8 | 3.3 | 2.7 | 1.6 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 18.6 |
| 4 | 1.6 | 2.4 | 3.2 | 3.7 | 3.2 | 2.7 | 1.6 | 0.4 | 0.0 | 0.0 | 0.0 | 0.4 | 19.2 |
| 5 | 1.1 | 2.5 | 2.9 | 3.8 | 3.7 | 2.2 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 18.3 |
| 6 | 1.5 | 2.7 | 2.9 | 3.6 | 3.6 | 2.6 | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 18.4 |
| 7 | 1.7 | 2.7 | 2.9 | 3.6 | 3.2 | 2.6 | 1.4 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 18.3 |
| 8 | 1.1 | 2.5 | 3.4 | 3.3 | 3.1 | 2.2 | 1.1 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 16.9 |
| 9 | 1.7 | 2.7 | 2.9 | 3.4 | 3.3 | 2.6 | 0.9 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 18.2 |
| 1950 | 1.1 | 2.0 | 3.3 | 3.7 | 3.4 | 2.8 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 17.6 |
| 1 | 1.4 | 2.5 | 2.9 | 3.7 | 3.3 | 2.6 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 17.5 |
| 2 | 1.6 | 2.2 | 2.8 | 3.6 | 3.4 | 3.0 | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 19.1 |
| 3 | 1.3 | 2.5 | 2.8 | 3.4 | 3.4 | 2.5 | 1.5 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 18.0 |
| 4 | 0.9 | 2.4 | 2.7 | 3.3 | 3.1 | 2.5 | 1.0 | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 16.8 |
| 5 | 1.0 | 2.0 | 3.1 | 3.6 | 3.2 | 2.5 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 16.8 |
| 6 | 1.7 | 2.7 | 2.9 | 3.9 | 3.6 | 2.6 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 19.0 |
| 7 | 1.6 | 2.9 | 3.1 | 3.3 | 2.9 | 2.7 | 1.0 | 0.2 | 0.0 | 0.0 | 0.4 | 0.7 | 18.8 |
| 8 | 1.5 | 3.1 | 3.7 | 4.1 | 4.0 | 2.5 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 20.7 |
| 9 | 1.5 | 2.0 | 2.9 | 3.7 | 3.1 | 2.2 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 16.6 |
| 1960 | 1.5 | 2.0 | 3.0 | 4.1 | 3.3 | 2.2 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 18.2 |
| 1 | 1.4 | 2.5 | 3.6 | 3.9 | 4.0 | 2.2 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 18.7 |
| 2 | 1.7 | 2.1 | 2.9 | 3.4 | 3.2 | 2.6 | 1.5 | 0.5 | 0.0 | 0.0 | 0.0 | 0.7 | 18.6 |
| 3 | 1.5 | 2.4 | 3.0 | 3.3 | 3.7 | 3.2 | 1.8 | 0.3 | 0.0 | 0.0 | 0.0 | 0.2 | 19.4 |
| 4 | 1.3 | 2.1 | 3.0 | 3.6 | 3.0 | 2.1 | 1.4 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 16.7 |
| 5 | 1.6 | 2.1 | 3.1 | 3.9 | 3.7 | 2.0 | 1.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 18.4 |
| 6 | 1.3 | 2.2 | 2.8 | 3.2 | 3.3 | 2.9 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 17.3 |
| 7 | 1.1 | 2.1 | 3.4 | 3.7 | 4.1 | 3.3 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 20.0 |
| 8 | 1.1 | 2.2 | 2.8 | 3.7 | 3.1 | 2.5 | 1.1 | 0.2 | 0.0 | 0.0 | 0.0 | 0.3 | 17.0 |
| 9 | 1.6 | 2.7 | 3.8 | 3.4 | 3.4 | 2.6 | 1.1 | 0.4 | 0.0 | 0.0 | 0.0 | 0.5 | 19.5 |
| 1970 | 1.1 | 2.2 | 3.6 | 3.9 | 3.7 | 2.0 | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 17.4 |

<u>TABLE A.2</u>

<u>MONTHLY AND ANNUAL EVAPORATION IN KILO ACRE-FEET</u>

<u>OKANAGAN LAKE</u>

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

| CLIMATIC YEAR | APR. | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | JAN. | FEB. | MAR. | ANNUAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1921 | 17.6 | 30.7 | 40.3 | 45.0 | 45.0 | 29.5 | 22.4 | 5.7 | 0.0 | 0.0 | 0.0 | 4.5 | 240.7 |
| 2 | 17.6 | 28.3 | 43.9 | 48.6 | 45.0 | 35.5 | 22.4 | 4.5 | 0.0 | 0.0 | 0.0 | 9.3 | 255.1 |
| 3 | 21.2 | 29.5 | 37.9 | 48.6 | 46.2 | 36.7 | 22.4 | 10.5 | 0.9 | 0.0 | 10.5 | 10.5 | 274.9 |
| 4 | 21.2 | 37.9 | 40.3 | 48.6 | 45.0 | 37.9 | 22.4 | 4.5 | 0.0 | 0.0 | 8.1 | 12.8 | 278.7 |
| 5 | 23.6 | 35.5 | 42.7 | 52.2 | 43.9 | 35.5 | 20.0 | 8.1 | 6.9 | 0.0 | 10.5 | 16.4 | 295.3 |
| 6 | 27.2 | 30.7 | 42.7 | 52.2 | 45.0 | 28.3 | 22.4 | 11.6 | 0.0 | 0.0 | 0.0 | 11.6 | 271.7 |
| 7 | 20.0 | 28.3 | 42.7 | 48.6 | 47.4 | 33.1 | 22.4 | 5.7 | 0.0 | 0.0 | 3.3 | 14.0 | 265.5 |
| 8 | 18.8 | 35.5 | 40.3 | 49.8 | 46.2 | 37.9 | 20.0 | 9.3 | 0.0 | 0.0 | 0.0 | 14.0 | 271.8 |
| 9 | 18.8 | 33.1 | 39.1 | 47.4 | 48.6 | 34.3 | 24.8 | 8.1 | 0.0 | 0.0 | 5.7 | 10.5 | 270.4 |
| 1930 | 26.0 | 29.5 | 36.7 | 47.4 | 47.4 | 35.5 | 23.6 | 5.7 | 0.0 | 3.3 | 3.3 | 14.0 | 272.4 |
| 1 | 22.4 | 34.3 | 39.1 | 48.6 | 46.2 | 33.1 | 21.2 | 3.3 | 0.0 | 0.0 | 0.0 | 8.1 | 256.3 |
| 2 | 22.4 | 31.9 | 42.7 | 42.7 | 46.2 | 34.3 | 22.4 | 11.6 | 0.0 | 0.0 | 0.0 | 9.3 | 263.5 |
| 3 | 21.2 | 27.2 | 37.9 | 46.2 | 48.6 | 30.7 | 21.2 | 11.6 | 2.1 | 3.3 | 4.5 | 14.0 | 268.5 |
| 4 | 29.5 | 34.3 | 42.7 | 45.0 | 46.2 | 31.9 | 23.6 | 12.8 | 0.0 | 0.0 | 3.3 | 6.9 | 276.2 |
| 5 | 16.4 | 30.7 | 37.9 | 43.9 | 41.5 | 36.7 | 18.8 | 3.3 | 2.1 | 0.0 | 0.0 | 6.9 | 238.2 |
| 6 | 23.6 | 35.5 | 40.3 | 47.4 | 47.4 | 33.1 | 26.0 | 4.5 | 0.0 | 0.0 | 0.0 | 10.5 | 268.3 |
| 7 | 20.0 | 30.7 | 41.5 | 47.4 | 41.5 | 39.1 | 24.8 | 8.1 | 2.1 | 0.0 | 0.0 | 11.6 | 266.8 |
| 8 | 23.6 | 34.3 | 45.0 | 51.0 | 42.7 | 40.3 | 23.6 | 5.7 | 0.0 | 3.3 | 0.0 | 10.5 | 280.0 |
| 9 | 26.0 | 33.1 | 35.5 | 47.4 | 48.6 | 36.7 | 22.4 | 11.6 | 9.3 | 0.0 | 4.5 | 16.4 | 291.5 |
| 1940 | 26.0 | 34.3 | 45.0 | 49.8 | 46.2 | 41.5 | 27.2 | 2.1 | 4.5 | 2.1 | 5.7 | 18.8 | 303.2 |
| 1 | 27.2 | 31.9 | 40.3 | 51.0 | 46.2 | 30.7 | 22.4 | 11.6 | 3.3 | 0.0 | 4.5 | 11.6 | 280.7 |
| 2 | 23.6 | 30.7 | 37.9 | 48.6 | 47.4 | 37.9 | 23.6 | 5.7 | 0.0 | 0.0 | 3.3 | 6.9 | 265.6 |
| 3 | 23.6 | 28.3 | 37.9 | 48.6 | 45.0 | 36.7 | 22.4 | 10.5 | 0.0 | 0.0 | 0.9 | 8.1 | 262.0 |
| 4 | 22.4 | 31.9 | 42.7 | 48.6 | 42.7 | 37.9 | 23.6 | 9.3 | 0.0 | 0.0 | 3.3 | 10.4 | 272.8 |
| 5 | 18.8 | 31.9 | 37.9 | 47.4 | 47.4 | 31.9 | 22.4 | 4.5 | 0.9 | 0.0 | 2.1 | 12.8 | 258.0 |
| 6 | 21.2 | 35.5 | 35.5 | 46.2 | 45.0 | 35.5 | 17.6 | 0.9 | 0.0 | 0.0 | 2.1 | 12.8 | 252.3 |
| 7 | 24.8 | 35.5 | 37.9 | 45.0 | 42.7 | 34.3 | 22.4 | 8.1 | 3.3 | 0.0 | 0.0 | 8.1 | 262.1 |
| 8 | 18.8 | 29.5 | 45.0 | 42.7 | 40.3 | 33.1 | 18.8 | 8.1 | 0.0 | 0.0 | 0.0 | 8.1 | 244.4 |
| 9 | 24.8 | 35.5 | 37.9 | 45.0 | 43.9 | 35.5 | 17.6 | 11.6 | 0.0 | 0.0 | 0.0 | 8.1 | 259.9 |
| 1950 | 18.8 | 29.5 | 41.5 | 47.4 | 45.0 | 37.9 | 20.0 | 5.7 | 4.5 | 0.0 | 0.0 | 3.3 | 253.6 |
| 1 | 21.2 | 33.1 | 40.3 | 48.6 | 45.0 | 36.7 | 20.0 | 6.9 | 0.0 | 0.0 | 2.1 | 10.5 | 264.4 |
| 2 | 23.6 | 31.9 | 36.7 | 46.2 | 46.2 | 39.1 | 27.2 | 6.9 | 4.5 | 4.5 | 6.9 | 14.0 | 287.7 |
| 3 | 20.0 | 30.7 | 35.5 | 46.2 | 43.9 | 34.3 | 23.6 | 12.8 | 5.7 | 0.0 | 6.9 | 6.9 | 266.5 |
| 4 | 17.6 | 30.7 | 34.3 | 42.7 | 41.5 | 34.3 | 18.8 | 16.4 | 2.1 | 0.0 | 0.0 | 2.1 | 240.5 |
| 5 | 16.4 | 24.8 | 37.9 | 43.9 | 43.9 | 34.3 | 20.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6.9 | 228.1 |
| 6 | 23.6 | 34.3 | 36.7 | 48.6 | 47.4 | 36.7 | 21.2 | 4.5 | 0.0 | 0.0 | 0.0 | 9.3 | 262.3 |
| 7 | 22.4 | 36.7 | 40.3 | 42.7 | 40.3 | 39.1 | 17.6 | 8.1 | 5.7 | 4.5 | 9.3 | 11.6 | 278.3 |
| 8 | 21.2 | 40.3 | 46.2 | 53.4 | 52.2 | 34.3 | 22.4 | 4.5 | 2.1 | 0.0 | 0.0 | 11.6 | 288.2 |
| 9 | 21.2 | 27.2 | 37.9 | 47.4 | 41.5 | .31.9 | 20.0 | 2.1 | 3.3 | 0.0 | 3.3 | 11.6 | 247.4 |
| 1960 | 22.4 | 28.3 | 40.3 | 53.4 | 43.9 | 33.1 | 23.6 | 8.1 | 0.0 | 0.9 | 9.3 | 12.8 | 276.1 |
| 1 | 21.2 | 30.7 | 45.0 | 48.6 | 57.0 | 31.9 | 18.8 | 3.3 | 0.0 | 0.0 | 2.1 | 5.7 | 258.3 |
| 2 | 24.8 | 28.3 | 37.9 | 45.0 | 41.5 | 34.3 | 21.2 | 11.6 | 5.7 | 0.0 | 6.9 | 14.0 | 271.2 |
| 3 | 20.0 | 31.9 | 40.3 | 42.7 | 46.2 | 40.3 | 26.0 | 9.3 | 0.0 | 2.1 | 3.3 | 10.5 | 272.6 |
| 4 | 20.0 | 29.5 | 39.1 | 46.2 | 40.3 | 30.7 | 22.4 | 9.3 | 0.0 | 0.0 | 4.5 | 5.7 | 247.7 |
| 5 | 22.4 | 30.7 | 41.5 | 49.8 | 47.4 | 30.7 | 27.2 | 10.5 | 0.9 | 0.0 | 5.7 | 12.8 | 279.6 |
| 6 | 21.2 | 31.9 | 36.7 | 43.9 | 43.9 | 37.9 | 22.4 | 10.5 | 5.7 | 4.5 | 9.3 | 9.3 | 277.2 |
| 7 | 17.6 | 29.5 | 43.9 | 47.4 | 53.4 | 42.7 | 23.6 | 9.3 | 0.0 | 0.0 | 4.5 | 14.0 | 285.9 |
| 8 | 20.0 | 29.5 | 37.9 | 48.6 | 41.5 | 34.3 | 20.0 | 9.3 | 0.0 | 0.0 | 0.0 | 10.5 | 251.6 |
| 9 | 22.4 | 34.3 | 47.4 | 45.0 | 43.9 | 34.3 | 18.8 | 10.5 | 2.1 | 0.0 | 5.7 | 11.6 | 276.0 |
| 1970 | 18.8 | 30.7 | 45.0 | 49.8 | 47.4 | 30.7 | 18.8 | 3.3 | 0.0 | 0.0 | 3.3 | 6.9 | 254.7 |

TABLE A.3

MONTHLY AND ANNUAL EVAPORATION IN KILO ACRE-FEET

SKAHA LAKE

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

| CLIMATIC YEAR | APR. | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | JAN. | FEB. | MAR. | ANNUAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1921 | 1.0 | 1.7 | 2.3 | 2.5 | 2.4 | 1.7 | 1.3 | 0.4 | 0.0 | 0.0 | 0.0 | 0.4 | 13.7 |
| 2 | 1.1 | 1.7 | 2.5 | 2.6 | 2.4 | 2.0 | 1.3 | 0.4 | 0.0 | 0.1 | 0.0 | 0.5 | 14.6 |
| 3 | 1.3 | 1.7 | 2.2 | 2.7 | 2.5 | 2.0 | 1.3 | 0.7 | 0.2 | 0.0 | 0.7 | 0.6 | 16.0 |
| 4 | 1.2 | 2.1 | 2.3 | 2.6 | 2.5 | 2.1 | 1.3 | 0.4 | 0.0 | 0.0 | 0.6 | 0.9 | 16.0 |
| 5 | 1.3 | 2.0 | 2.4 | 2.7 | 2.4 | 2.0 | 1.1 | 0.5 | 0.5 | 0.1 | 0.7 | 0.9 | 16.6 |
| 6 | 1.5 | 1.8 | 2.5 | 2.8 | 2.4 | 1.7 | 1.3 | 0.7 | 0.1 | 0.0 | 0.2 | 0.8 | 15.8 |
| 7 | 1.1 | 1.7 | 2.5 | 2.7 | 2.6 | 1.9 | 1.3 | 0.4 | 0.0 | 0.0 | 0.3 | 0.9 | 15.4 |
| 8 | 1.1 | 2.0 | 2.3 | 2.7 | 2.5 | 2.0 | 1.1 | 0.6 | 0.1 | 0.0 | 0.0 | 0.8 | 15.2 |
| 9 | 1.1 | 1.9 | 2.2 | 2.5 | 2.5 | 1.8 | 1.3 | 0.4 | 0.1 | 0.0 | 0.4 | 0.7 | 14.9 |
| 1930 | 1.5 | 1.7 | 2.1 | 2.6 | 2.5 | 1.9 | 1.1 | 0.5 | 0.1 | 0.3 | 0.3 | 0.9 | 15.5 |
| 1 | 1.3 | 1.9 | 2.2 | 2.7 | 2.5 | 1.9 | 1.2 | 0.1 | 0.1 | 0.0 | 0.0 | 0.5 | 14.4 |
| 2 | 1.3 | 1.7 | 2.3 | 2.3 | 2.4 | 1.8 | 1.2 | 0.7 | 0.0 | 0.1 | 0.0 | 0.6 | 14.4 |
| 3 | 1.1 | 1.5 | 2.1 | 2.5 | 2.5 | 1.7 | 1.1 | 0.7 | 0.1 | 0.3 | 0.3 | 0.8 | 14.7 |
| 4 | 1.5 | 1.8 | 2.3 | 2.3 | 2.4 | 1.7 | 1.2 | 0.7 | 0.1 | 0.0 | 0.3 | 0.4 | 14.7 |
| 5 | 0.9 | 1.7 | 2.1 | 2.5 | 2.3 | 2.0 | 1.1 | 0.3 | 0.2 | 0.1 | 0.0 | 0.5 | 13.7 |
| 6 | 1.3 | 1.9 | 2.3 | 2.7 | 2.5 | 1.8 | 1.3 | 0.3 | 1.1 | 0.0 | 0.0 | 0.6 | 14.8 |
| 7 | 1.2 | 1.7 | 2.3 | 2.7 | 2.3 | 2.0 | 1.3 | 0.4 | 0.2 | 0.1 | 0.1 | 0.7 | 15.0 |
| 8 | 1.3 | 1.9 | 2.5 | 2.8 | 2.3 | 2.1 | 1.3 | 0.4 | 0.1 | 0.3 | 0.0 | 0.7 | 15.7 |
| 9 | 1.4 | 1.8 | 2.0 | 2.5 | 2.5 | 1.9 | 1.2 | 0.7 | 0.6 | 0.1 | 0.4 | 0.9 | 16.0 |
| 1940 | 1.4 | 1.9 | 2.4 | 2.7 | 2.4 | 2.2 | 1.4 | 0.2 | 0.3 | 0.1 | 0.3 | 0.9 | 16.2 |
| 1 | 1.4 | 1.7 | 2.2 | 2.7 | 2.5 | 1.7 | 1.2 | 0.7 | 0.3 | 0.0 | 0.3 | 0.7 | 15.4 |
| 2 | 1.3 | 1.6 | 2.0 | 2.6 | 2.3 | 1.9 | 1.3 | 0.5 | 0.1 | 0.0 | 0.2 | 0.4 | 14.2 |
| 3 | 1.3 | 1.5 | 2.0 | 2.6 | 2.4 | 1.9 | 1.2 | 0.6 | 0.1 | 0.0 | 0.1 | 0.5 | 14.2 |
| 4 | 1.3 | 1.7 | 2.3 | 2.5 | 2.4 | 2.0 | 1.4 | 0.6 | 0.0 | 0.1 | 0.3 | 0.7 | 15.3 |
| 5 | 1.0 | 1.8 | 2.1 | 2.5 | 2.5 | 1.7 | 1.2 | 0.4 | 0.1 | 0.1 | 0.1 | 0.7 | 14.2 |
| 6 | 1.2 | 1.9 | 2.0 | 2.5 | 2.4 | 1.9 | 1.0 | 0.1 | 0.0 | 0.0 | 0.2 | 0.7 | 13.9 |
| 7 | 1.3 | 1.9 | 2.1 | 2.5 | 2.3 | 1.9 | 1.3 | 0.5 | 0.3 | 0.0 | 0.0 | 0.5 | 14.6 |
| 8 | 1.0 | 1.7 | 2.4 | 2.3 | 2.3 | 1.8 | 1.1 | 0.5 | 0.0 | 0.0 | 0.5 | 0.5 | 14.1 |
| 9 | 1.3 | 1.9 | 2.1 | 2.4 | 2.4 | 1.9 | 1.0 | 0.8 | 0.0 | 0.0 | 0.1 | 0.4 | 14.3 |
| 1950 | 1.0 | 1.6 | 2.3 | 2.5 | 2.4 | 2.0 | 1.1 | 0.5 | 0.4 | 0.0 | 0.1 | 0.2 | 14.1 |
| 1 | 1.1 | 1.8 | 2.1 | 2.5 | 2.4 | 1.9 | 1.1 | 0.5 | 0.0 | 0.0 | 0.1 | 0.6 | 14.1 |
| 2 | 1.3 | 1.7 | 2.1 | 2.5 | 2.5 | 2.1 | 1.3 | 0.5 | 0.4 | 0.5 | 0.4 | 0.8 | 16.1 |
| 3 | 1.1 | 1.7 | 2.0 | 2.5 | 2.5 | 1.9 | 1.2 | 0.8 | 0.4 | 0.0 | 0.5 | 0.4 | 15.0 |
| 4 | 1.0 | 1.7 | 1.9 | 2.3 | 2.2 | 1.9 | 1.0 | 0.9 | 0.2 | 0.0 | 0.0 | 0.2 | 13.3 |
| 5 | 0.9 | 1.5 | 2.1 | 2.4 | 2.3 | 1.9 | 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 12.8 |
| 6 | 1.3 | 1.9 | 2.1 | 2.7 | 2.5 | 1.9 | 1.1 | 0.4 | 0.1 | 0.0 | 0.0 | 0.6 | 14.6 |
| 7 | 1.3 | 2.1 | 2.1 | 2.3 | 2.2 | 2.1 | 1.1 | 0.5 | 0.4 | 0.4 | 0.6 | 0.7 | 15.8 |
| 8 | 1.3 | 2.1 | 2.3 | 2.9 | 2.8 | 1.9 | 1.2 | 0.3 | 0.2 | 0.0 | 0.0 | 0.7 | 15.7 |
| 9 | 1.3 | 1.6 | 2.1 | 2.6 | 2.3 | 1.6 | 1.1 | 0.2 | 0.3 | 0.0 | 0.3 | 0.7 | 14.1 |
| 1960 | 1.2 | 1.6 | 2.4 | 2.9 | 2.4 | 1.7 | 1.3 | 0.5 | 0.0 | 0.1 | 0.5 | 0.8 | 15.4 |
| 1 | 1.2 | 1.7 | 2.2 | 2.7 | 2.7 | 1.8 | 1.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.3 | 13.9 |
| 2 | 1.3 | 1.7 | 2.1 | 2.5 | 2.3 | 1.9 | 1.2 | 0.7 | 0.4 | 0.0 | 0.4 | 0.8 | 15.3 |
| 3 | 1.2 | 1.7 | 2.2 | 2.4 | 2.5 | 2.1 | 1.4 | 0.6 | 0.0 | 0.2 | 0.3 | 0.6 | 15.2 |
| 4 | 1.1 | 1.7 | 2.2 | 2.5 | 2.2 | 1.7 | 1.1 | 0.5 | 0.0 | 0.1 | 0.3 | 0.3 | 13.7 |
| 5 | 1.3 | 1.7 | 2.2 | 2.7 | 2.6 | 1.7 | 1.4 | 0.6 | 0.1 | 0.0 | 0.3 | 0.7 | 15.3 |
| 6 | 1.1 | 1.7 | 2.1 | 2.5 | 2.4 | 2.1 | 1.3 | 0.2 | 0.5 | 0.3 | 0.6 | 0.6 | 15.4 |
| 7 | 1.1 | 1.7 | 2.5 | 2.6 | 2.8 | 2.3 | 1.3 | 0.5 | 0.1 | 0.1 | 0.3 | 0.8 | 16.1 |
| 8 | 1.0 | 1.7 | 2.1 | 2.6 | 2.3 | 1.9 | 1.1 | 0.5 | 0.0 | 0.0 | 0.0 | 0.5 | 13.7 |
| 9 | 1.2 | 1.9 | 2.5 | 2.5 | 2.4 | 1.9 | 1.1 | 0.7 | 0.2 | 0.0 | 0.4 | 0.7 | 15.5 |
| 1970 | 1.0 | 1.7 | 2.5 | 2.7 | 2.5 | 1.6 | 1.1 | 0.3 | 0.0 | 0.0 | 0.3 | 0.5 | 14.2 |

# TABLE. A.4

MONTHLY AND ANNUAL EVAPORATION IN KILO ACRE-FEET

OSOYOOS LAKE

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

| CLIMATIC YEAR | APR. | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. | JAN. | FEB. | MAR. | ANNUAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1921 | 1.3 | 2.5 | 3.2 | 3.5 | 3.3 | 2.5 | 1.8 | 0.5 | 0.0 | 0.0 | 0.0 | 0.5 | 19.1 |
| 2 | 1.5 | 2.4 | 3.4 | 3.6 | 3.3 | 2.8 | 1.8 | 0.5 | 0.0 | 0.2 | 0.0 | 0.8 | 20.3 |
| 3 | 1.8 | 2.5 | 3.1 | 3.8 | 3.5 | 2.8 | 1.8 | 0.9 | 0.3 | 0.0 | 0.9 | 0.9 | 22.3 |
| 4 | 1.5 | 2.9 | 3.0 | 3.6 | 3.3 | 2.6 | 1.7 | 0.5 | 0.0 | 0.0 | 0.7 | 1.2 | 21.0 |
| 5 | 1.9 | 2.6 | 3.1 | 3.8 | 3.3 | 3.1 | 1.4 | 0.6 | 0.5 | 0.0 | 0.7 | 1.2 | 22.2 |
| 6 | 1.9 | 2.3 | 3.3 | 3.8 | 3.3 | 2.0 | 1.5 | 0.8 | 0.0 | 0.0 | 0.1 | 0.8 | 19.8 |
| 7 | 1.4 | 2.1 | 3.0 | 3.5 | 3.3 | 2.5 | 1.4 | 0.4 | 0.0 | 0.0 | 0.3 | 1.0 | 18.9 |
| 8 | 1.4 | 2.6 | 3.0 | 3.6 | 3.3 | 2.6 | 1.3 | 0.5 | 0.0 | 0.0 | 0.0 | 1.0 | 19.3 |
| 9 | 1.3 | 2.5 | 3.0 | 3.5 | 3.4 | 2.4 | 1.8 | 0.5 | 0.1 | 0.0 | 0.5 | 1.1 | 20.1 |
| 1930 | 2.1 | 2.5 | 2.9 | 3.7 | 3.6 | 2.6 | 1.5 | 0.5 | 0.1 | 0.3 | 0.4 | 1.1 | 21.3 |
| 1 | 1.8 | 2.7 | 2.9 | 3.8 | 3.5 | 2.5 | 1.6 | 0.5 | 0.0 | 0.0 | 0.0 | 0.6 | 19.9 |
| 2 | 1.8 | 2.4 | 3.3 | 3.3 | 3.5 | 2.6 | 1.6 | 0.9 | 0.0 | 0.0 | 0.0 | 0.9 | 20.3 |
| 3 | 1.8 | 2.1 | 3.0 | 3.6 | 3.7 | 2.4 | 1.7 | 0.9 | 0.1 | 0.3 | 0.5 | 1.3 | 21.4 |
| 4 | 2.4 | 2.7 | 3.3 | 3.6 | 3.5 | 2.5 | 1.8 | 1.1 | 0.1 | 0.0 | 0.5 | 0.8 | 22.3 |
| 5 | 1.4 | 2.5 | 3.0 | 3.3 | 3.3 | 3.0 | 1.5 | 0.4 | 0.2 | 0.1 | 0.0 | 0.8 | 19.5 |
| 6 | 2.0 | 2.8 | 3.1 | 3.8 | 3.6 | 2.7 | 2.1 | 0.5 | 0.1 | 0.0 | 0.0 | 0.9 | 21.6 |
| 7 | 1.7 | 2.5 | 3.1 | 3.8 | 3.2 | 2.9 | 2.0 | 0.7 | 0.3 | 0.2 | 0.1 | 1.0 | 21.5 |
| 8 | 1.9 | 2.7 | 3.5 | 4.0 | 3.3 | 3.1 | 1.9 | 0.5 | 0.0 | 0.3 | 0.0 | 0.9 | 22.1 |
| 9 | 2.0 | 2.6 | 2.9 | 3.7 | 3.7 | 2.8 | 1.7 | 0.9 | 0.7 | 0.1 | 0.5 | 1.4 | 23.0 |
| 1940 | 1.9 | 2.7 | 3.4 | 3.8 | 3.5 | 3.2 | 2.1 | 0.4 | 0.4 | 0.4 | 0.6 | 1.4 | 23.8 |
| 1 | 2.1 | 2.5 | 3.0 | 3.8 | 3.4 | 2.4 | 1.7 | 0.9 | 0.6 | 0.0 | 0.5 | 0.9 | 21.8 |
| 2 | 2.0 | 2.2 | 2.7 | 3.5 | 3.3 | 2.7 | 1.7 | 0.5 | 0.1 | 0.0 | 0.3 | 0.6 | 19.6 |
| 3 | 1.9 | 2.2 | 2.6 | 3.5 | 3.2 | 2.5 | 1.6 | 0.8 | 0.1 | 0.0 | 0.2 | 0.5 | 19.1 |
| 4 | 1.8 | 2.4 | 3.0 | 3.5 | 3.2 | 2.6 | 1.8 | 0.7 | 0.0 | 0.2 | 0.4 | 0.9 | 20.5 |
| 5 | 1.4 | 2.5 | 2.9 | 3.6 | 3.4 | 2.4 | 1.6 | 0.5 | 0.1 | 0.1 | 0.1 | 1.0 | 19.6 |
| 6 | 1.8 | 2.6 | 2.7 | 3.3 | 3.3 | 2.5 | 1.3 | 0.2 | 0.0 | 0.0 | 0.4 | 1.1 | 19.2 |
| 7 | 1.9 | 2.6 | 2.9 | 3.3 | 3.0 | 2.5 | 1.6 | 0.6 | 0.3 | 0.0 | 0.1 | 0.8 | 19.6 |
| 8 | 1.4 | 2.3 | 3.2 | 3.0 | 2.9 | 2.3 | 1.3 | 0.6 | 0.0 | 0.0 | 0.0 | 0.9 | 17.9 |
| 9 | 1.9 | 2.5 | 2.7 | 3.2 | 3.0 | 2.5 | 1.3 | 0.9 | 0.0 | 0.0 | 0.1 | 0.7 | 18.8 |
| 1950 | 1.4 | 2.2 | 2.9 | 3.3 | 3.2 | 2.5 | 1.3 | 0.5 | 0.5 | 0.0 | 0.1 | 0.5 | 18.4 |
| 1 | 1.6 | 2.5 | 2.8 | 3.3 | 3.0 | 2.4 | 1.4 | 0.5 | 0.0 | 0.0 | 0.2 | 0.8 | 18.5 |
| 2 | 1.8 | 2.4 | 2.7 | 3.2 | 3.1 | 2.6 | 1.7 | 0.5 | 0.4 | 0.5 | 0.6 | 1.1 | 20.6 |
| 3 | 1.5 | 2.2 | 2.6 | 3.3 | 3.0 | 2.3 | 1.5 | 0.9 | 0.4 | 0.0 | 0.6 | 0.6 | 18.9 |
| 4 | 1.4 | 2.3 | 2.5 | 3.2 | 3.0 | 2.4 | 1.3 | 1.1 | 0.1 | 0.0 | 0.0 | 0.2 | 17.5 |
| 5 | 1.3 | 2.0 | 2.9 | 3.1 | 3.2 | 2.5 | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 16.9 |
| 6 | 1.8 | 2.5 | 2.6 | 3.5 | 3.2 | 2.5 | 1.5 | 0.5 | 0.0 | 0.0 | 0.0 | 0.9 | 19.0 |
| 7 | 1.7 | 2.7 | 2.9 | 3.1 | 2.9 | 2.7 | 1.4 | 0.6 | 0.4 | 0.3 | 0.8 | 1.0 | 20.5 |
| 8 | 1.6 | 2.8 | 3.2 | 3.6 | 3.5 | 2.4 | 1.6 | 0.3 | 0.1 | 0.0 | 0.0 | 0.9 | 20.0 |
| 9 | 1.7 | 2.1 | 2.8 | 3.3 | 2.9 | 2.2 | 1.4 | 0.2 | 0.1 | 0.0 | 0.2 | 0.9 | 17.8 |
| 1960 | 1.6 | 2.0 | 2.9 | 3.8 | 3.0 | 2.3 | 1.7 | 0.5 | 0.0 | 0.1 | 0.6 | 0.9 | 19.4 |
| 1 | 1.6 | 2.2 | 3.1 | 3.4 | 3.5 | 2.4 | 1.6 | 0.3 | 0.0 | 0.0 | 0.3 | 0.6 | 19.0 |
| 2 | 1.9 | 2.2 | 2.9 | 3.3 | 3.1 | 2.6 | 1.7 | 0.9 | 0.5 | 0.0 | 0.5 | 1.1 | 20.7 |
| 3 | 1.6 | 2.4 | 2.9 | 3.1 | 3.3 | 2.9 | 1.8 | 0.9 | 0.0 | 0.1 | 0.1 | 0.9 | 20.0 |
| 4 | 1.6 | 2.3 | 2.8 | 3.2 | 2.9 | 2.2 | 1.6 | 0.7 | 0.0 | 0.0 | 0.3 | 0.6 | 18.2 |
| 5 | 1.7 | 2.2 | 2.9 | 3.4 | 3.3 | 2.2 | 1.9 | 0.9 | 0.1 | 0.0 | 0.3 | 0.9 | 19.8 |
| 6 | 1.7 | 2.5 | 2.7 | 3.1 | 3.1 | 2.8 | 1.6 | 0.9 | 0.5 | 0.4 | 0.8 | 0.9 | 21.0 |
| 7 | 1.7 | 2.2 | 3.1 | 3.4 | 3.7 | 3.0 | 1.7 | 0.7 | 0.0 | 0.0 | 0.5 | 1.3 | 21.3 |
| 8 | 1.5 | 2.2 | 2.8 | 3.4 | 3.0 | 2.5 | 1.4 | 0.8 | 0.0 | 0.0 | 0.0 | 0.7 | 18.3 |
| 9 | 1.7 | 2.5 | 3.3 | 3.3 | 3.2 | 2.5 | 1.4 | 0.7 | 0.2 | 0.0 | 0.5 | 0.9 | 20.2 |
| 1970 | 1.5 | 2.3 | 3.2 | 3.5 | 3.3 | 2.1 | 1.4 | 0.4 | 0.0 | 0.0 | 0.2 | 0.5 | 18.4 |

# TABLE A.5

## MEAN EVAPORATION MAPS

(From Atlas of Climatic Maps - Atmospheric Environment Service)

The mean maps of lake evaporation represent averages of evaporation from small, natural open-water bodies having negligible heat storage. The analyses are based on 5-year Class A Evaporation Pan data from 22 stations supplemented by estimates from climatological data at 100 stations for the 10-year period 1957-1966.

Estimates of evaporation from pan data were based on the equation suggested by Kohler, Nordenson and Fox (1955):

$$E_L = 0.70\,[E_p + 0.005\,P\,\gamma_p\,(0.37 + 0.0041\,U_p) \times (T_o - T_a)^{0.88}]$$

where $E_L$ = daily lake evaporation in inches

$E_p$ = daily measured pan evaporation in inches

$P$ = the station pressure in inches of mercury

$\gamma_p$ = the fraction of energy advected into the pan that is used in evaporation

$U_p$ = the daily wind movement above the pan, at the 2 ft. level, in miles

$T_o$ = the mean daily water surface temperature in °F

$T_a$ = the mean daily air temperature

Monthly values were obtained by summing. Finally, monthly means $\bar{E}_m$ were derived.

Estimates of evaporation from climatological data were based on the Christiansen formula (Christiansen, 1966):

$$E_c = 0.328\,R\,C_T\,C_W\,C_H\,C_S\,C_E\,C_M$$

where $E_c$ = mean daily lake evaporation for the month in inches

$R$ = extra terrestrial radiation in evaporation units

$C_T = 0.1532 + 0.00374T + 0.0000546T^2$

$C_W = 0.79 + 0.0037W - 0.00000333W^2$

$C_H = 1.202 - 0.00353H - 0.0000381H^2$

$C_S = 0.402 + 0.019S - 0.00028S^2 + 0.0000017S^3$

$C_E = 0.9654 + 0.0362E - 0.0016E^2$

$C_M$ = a monthly coefficient

$T$ = mean monthly temperature (°F)

$W$ = mean wind velocity at pan level in miles per day

$H$ = mean daytime relative humidity for the month in percent

$S$ = percentage of possible bright sunshine for the month

$E$ = station elevation in units of 1000's of feet

Mean monthly values $\bar{E}_c$ were obtained and these estimates were then adjusted for all stations based on the ratio of pan estimates to Christiansen estimates representative of the region and month considered.

A complete description of the method is provided by Ferguson, O'Neill and Cork (1970).

It is important to note that these maps are not meant to indicate evaporation from larger, deeper lakes, such as the Great Lakes.

### REFERENCES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