Levels of Lakes in the North Kenai Area, Alaska 1970 to 1992

By Bonnie J. Bailey *and* Jacqueline A. McIntire

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ROBERT M. HIRSCH, Acting Director

For additional information write to:

District Chief
U.S. Geological Survey
4230 University Drive, Suite 201
Anchorage, Alaska 99508-4664

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
inch (in)	25.4	millimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
acre	0.4047	hectare

Sea level:

In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)--a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

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INTRODUCTION

The communities of Kenai and Nikiski have undergone rapid industrial, commercial, and residential development since the discovery of oil on the Kenai Peninsula in the early 1960's. The water resources of these communities are used for industrial, commercial, domestic, and recreational uses. The U.S. Geological Survey, in cooperation with the Alaska Department of Natural Resources, collects water-resources data to provide a better understanding of the area's hydrologic environment. Previous reports prepared in cooperation with the Kenai Peninsula Borough have described the ground-water conditions in the north Kenai area (Anderson, 1971; Anderson and Jones, 1972; Bailey, 1983; Nelson, 1981). The purpose of this report is to describe the water-level fluctuations of selected lakes in the north Kenai area (fig. 1), to help determine seasonal and long-term changes in water storage.

LAKE LEVELS

The water-surface elevations of 12 lakes (table 1) near Kenai and Nikiski were measured periodically from 1970 through 1992 using differential leveling techniques. Water-level elevations plotted as a function of time are shown on figures 2-13 for the 12 lakes. Variations in the water levels of the lakes are related to water recharge and discharge. Recharge occurs when water from rain, snowmelt, streams, or ground water flows into a lake. Discharge occurs when water from a lake flows into a stream, seeps into the ground, or evaporates. The water-surface elevations of these 12 lakes were measured once or twice a year, typically just after icemelt, before freezeup, or at both times. The water-surface elevation of Bernice Lake was measured continuously from June 1977 through September 1979 (fig. 9) using a pressure measuring device. Water levels for all lakes, except Shadura and Konovalof (figs. 2 and 3), are in feet above sea level. Water levels of Shadura and Konovalof Lakes are both referenced to an arbitrary elevation datum.

Precipitation at Kenai Municipal Airport is shown on figure 14. Precipitation data were obtained from monthly and annual summaries from National Oceanic and Atmospheric Administration's National Climatic Data Center.

The cooperation of homeowners who allowed access to the lakes is gratefully acknowledged.

REFERENCES CITED

Anderson, G.S., Ground-water exploration, Beaver Creek valley near Kenai, Alaska: U.S. Geological Survey Open-File Report, 27 p.

Anderson, G.S. and Jones, S.H., 1972, Water resources of the Kenai-Soldotna area, Alaska: U.S. Geological Survey Open-File Report, 81 p., 2 plates.

Bailey, B.J., 1983, Hydrologic data stations and lake levels, Kenai-Nikiski area, Alaska: U.S. Geological Survey Open-File Report 83-938, 1 sheet.

Nelson, G.L., 1981, Hydrology and effects of industrial pumping in the Nikiski area, Alaska: U.S. Geological Survey Water-Resources Investigations Open-File Report 81-685, 22 p.

Table 1. Description of selected lakes in the North Kenai area

Lake	Tributary to	Location where lake level was measured	Surface area of lake (acres)
Shadura	Closed lake	Lat 60°42'17", long 151°00'12", in NE$^1/_4$ sec.15, T. 7 N., R. 10 W., at north shore, 13 mi northeast of Kenai.	258
Konovalof	Closed lake	Lat 60°39'49", long 151° 09'52", in SW$^1/_4$ sec. 26, T.7 N., R.11 W., at south shore of island near north shore of lake, 8.5 mi northeast of Kenai.	256
Kidney	Closed lake	Lat 60°39'48", long 151°15'35", in SW$^1/_4$ sec. 29, T. 7 N., R. 11 W., at east shore, 0.2 mi north of Lamplighter Holt Road, and 7.5 mi north of Kenai.	71
Cabin	Closed lake	Lat 60°40'30", long 151°19'15", in NE$^1/_4$ sec. 26, T. 7 N., R. 12 W., at east shore, 0.2 mi west of Miller Loop Road, and 8.5 mi north of Kenai.	53
Island	Closed lake	Lat 60°42'19", long 151° 19'05", in SE$^1/_4$ sec. 11, T.7 N., R.12 W., at west shore, 0.1 mi east of Island Lake Road, and 10.7 mi north of Kenai.	272
Dogbone	Closed lake	Lat 60°41'42", long 151°17'35", in SE$^1/_4$ sec. 13, T. 7 N., R. 12 W., at the western shore, 0.9 mi east of Island Lake Road, and 9.7 mi north of Kenai.	27
Unnamed lake	Closed lake	Lat 60°40'56", long 151°20'54", in SW$^1/_4$ sec. 23, T. 7 N., R. 12 W., at south shore, 0.4 mi north of Miller Loop Road, and 9.4 mi north of Kenai.	8.6
Bernice	Bernice Creek	Lat 60°41'33", long 151°21'48", in SW$^1/_4$ SE$^1/_4$ sec. 15, T. 7 N., R. 12 W., at campground on south shore and 10 mi northwest of Kenai (station number 15266895).	150
Douglas	Closed lake	Lat 60°40'27", long 151°13'20", in NW $^1/_4$ sec. 28, T. 7 N., R. 11 W., at north shore, 0.8 mi east of Lamplighter Holt Road, and 8.3 mi north of Kenai.	90
Wik (formerly Wick)	Closed lake	Lat 60°43'06", long 151°14'35", in NE $^1/_4$ sec. 8, T. 7 N., R. 11 W., at north shore, 0.2 mi south of Lamplighter Holt Road, and 11.4 mi north of Kenai.	173
Georgine (formerly Laura)	Closed lake	Lat 60°43'44", long 151°13'15", in NW $^1/_4$ sec. 4, T. 7 N., R. 11 W., at northwest shore, 0.3 mi southeast of Halbouty Road, and 12.1 mi north of Kenai.	41
Daniels	Bishop Creek	Lat 60°44'25", long 151°10'27", in SW $^1/_4$ sec. 34, T. 8 N., R. 11 W., at northwest shore, 1.2 mi east of North Kenai Road, and 13 mi north of Kenai. Dam installed at outlet in 1988.	602

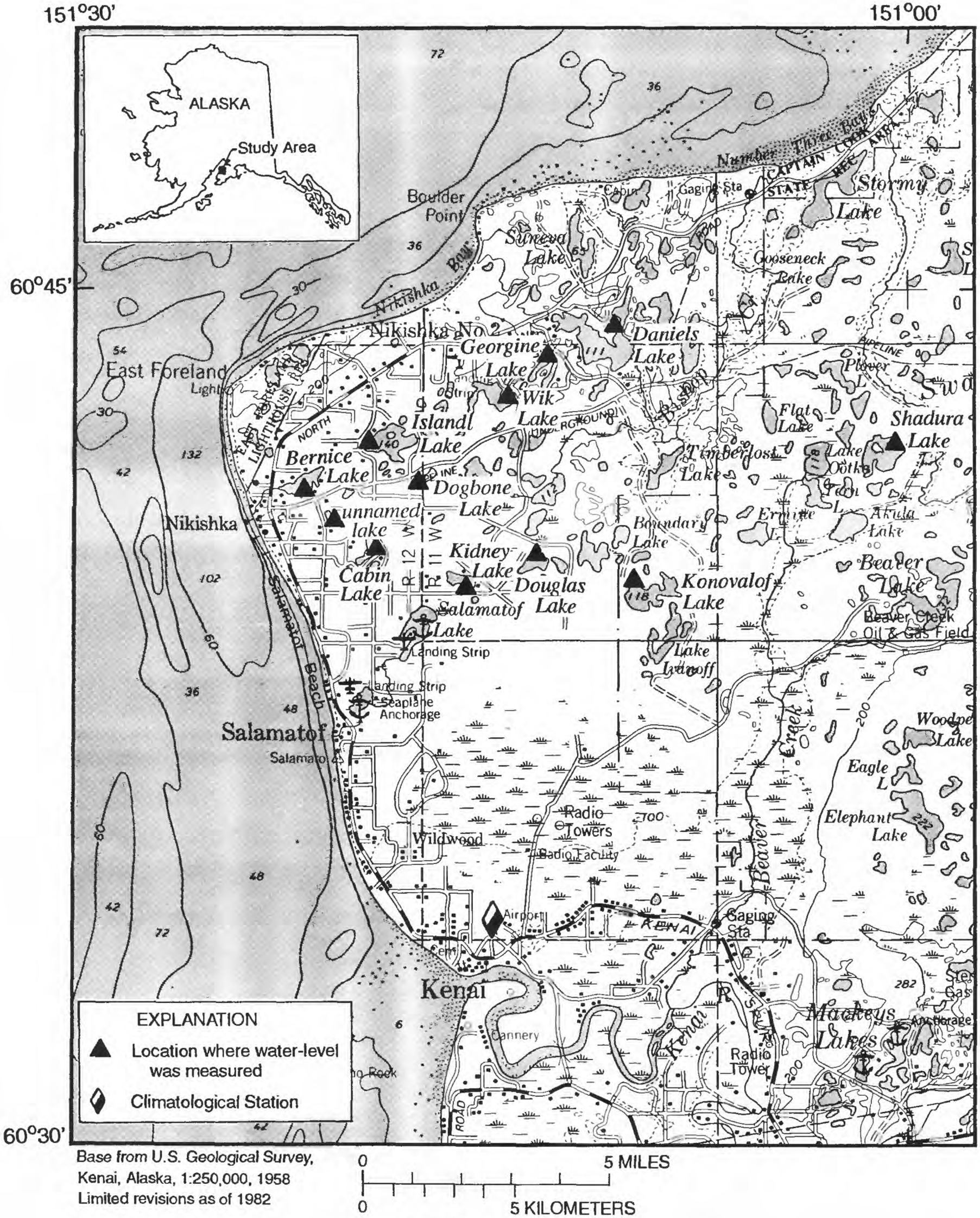
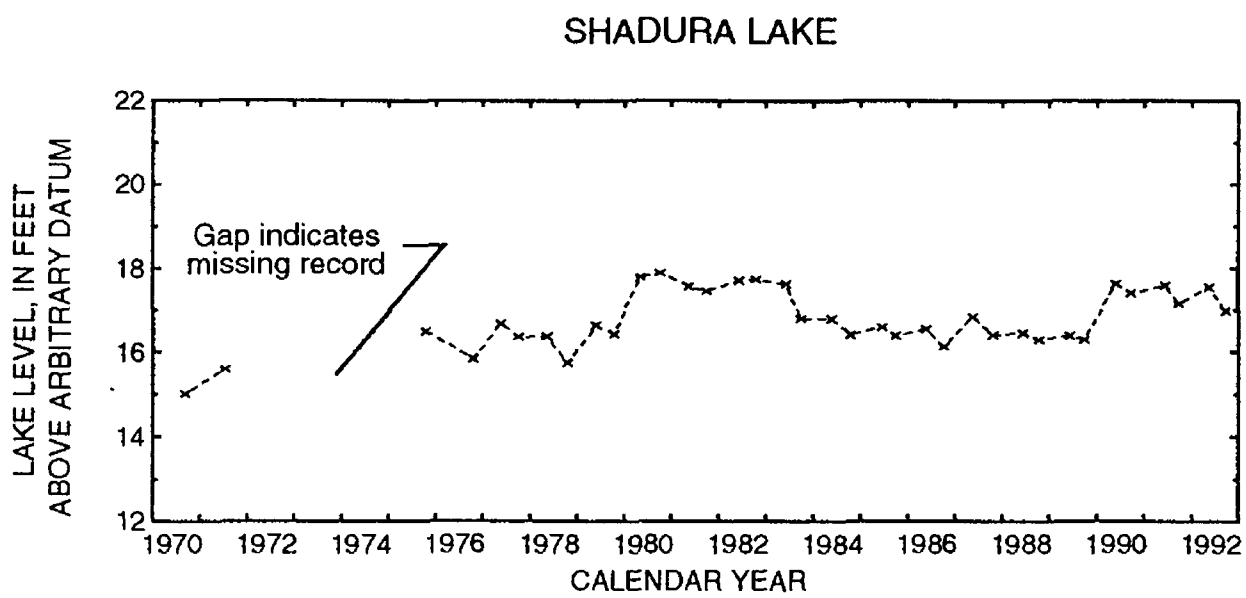


Figure 1. Location of lakes and water-level measurement sites.

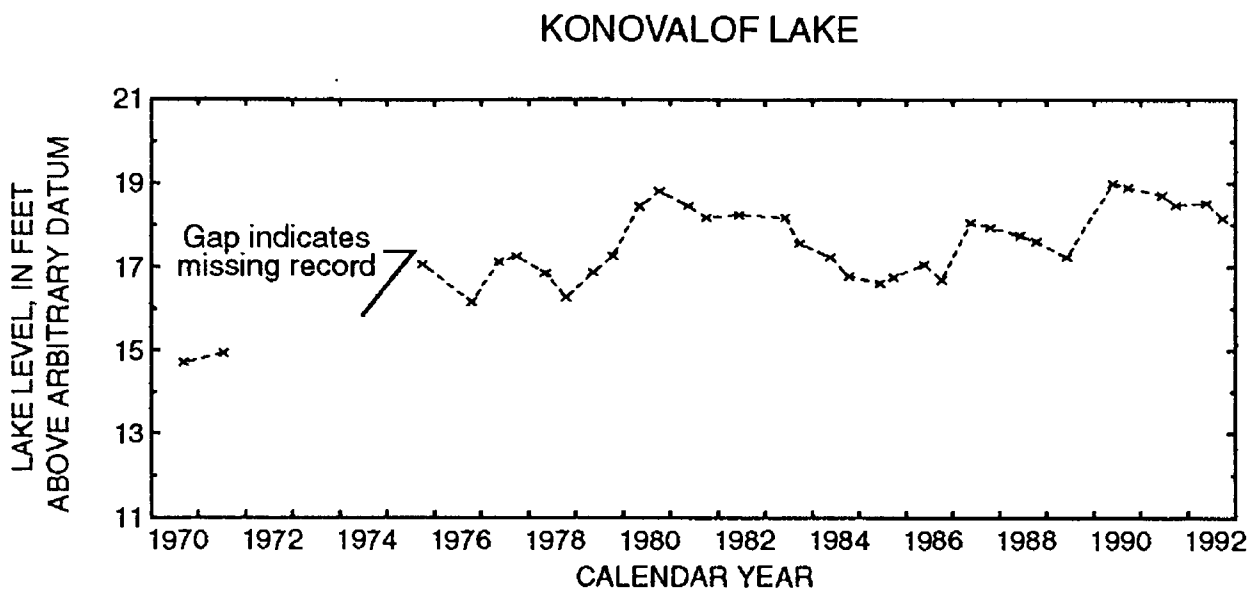


Shadura Lake

[lake level in feet above arbitrary datum]

Date	Lake level	Date	Lake level	Date	Lake level	Date	Lake level
9-9-70	15.02	10-15-79	16.44	5-21-84	16.80	10-13-88	16.30
7-14-71	15.59	5-6-80	17.79	10-15-84	16.42	6-7-89	16.39
10-14-75	16.50	10-9-80	17.89	6-12-85	16.60	9-27-89	16.30
10-20-76	15.85	5-19-81	17.58	9-25-85	16.39	5-30-90	17.63
5-20-77	16.68	10-2-81	17.46	5-20-86	16.55	9-24-90	17.41
10-5-77	16.36	6-9-82	17.72	10-8-87	16.14	6-11-91	17.59
5-11-78	16.37	10-18-82	17.75	5-17-87	16.85	9-26-91	17.16
10-19-78	15.74	6-6-83	17.63	10-20-87	16.41	5-21-92	17.56
5-21-79	16.62	9-27-83	16.81	6-11-88	16.46	9-25-92	16.98

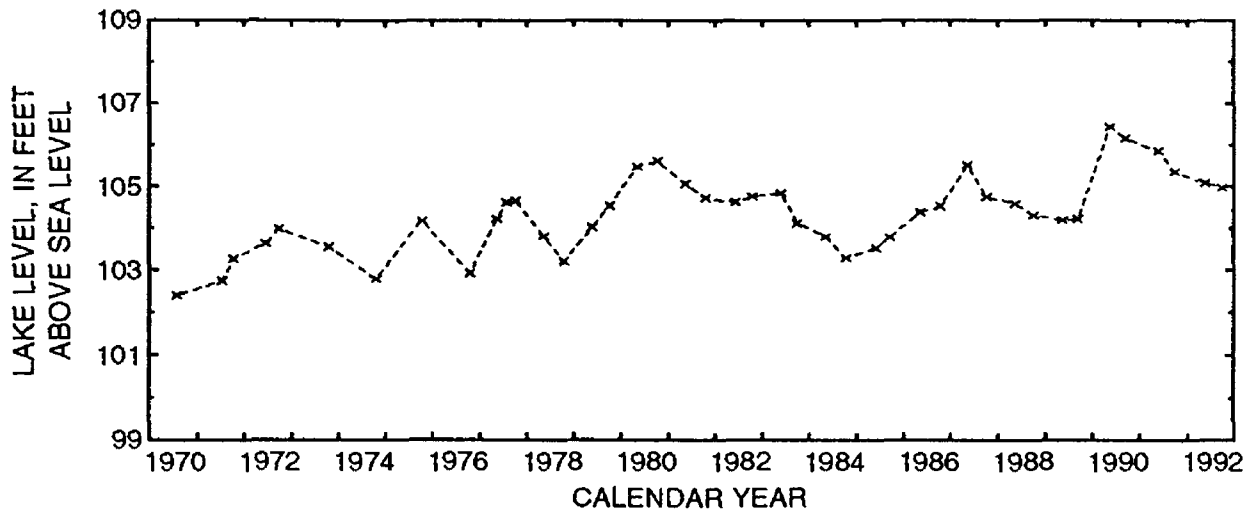
Figure 2. Water-level elevations of Shadura Lake, 1970-92.



Konovalof Lake
[lake level in feet above arbitrary datum]

Date	Lake level	Date	Lake level	Date	Lake level	Date	Lake level
9-9-70	14.72	10-15-79	17.27	10-15-84	16.78	10-13-88	17.62
7-14-71	14.95	5-6-80	18.45	6-12-85	16.61	6-7-89	17.24
10-4-75	17.07	10-9-80	18.82	9-25-85	16.76	5-30-90	19.00
10-20-76	16.17	5-19-81	18.46	5-20-86	17.07	9-24-90	18.90
5-20-77	17.13	10-2-81	18.19	10-8-86	16.70	6-11-91	18.72
10-5-77	17.26	6-9-82	18.24	5-17-87	18.06	9-26-91	18.48
5-11-78	16.85	6-6-83	18.18	10-20-87	17.94	5-21-92	18.52
10-19-78	16.27	9-27-83	17.56	6-11-88	17.76	9-25-92	18.16
5-21-79	16.87	5-21-84	17.24				

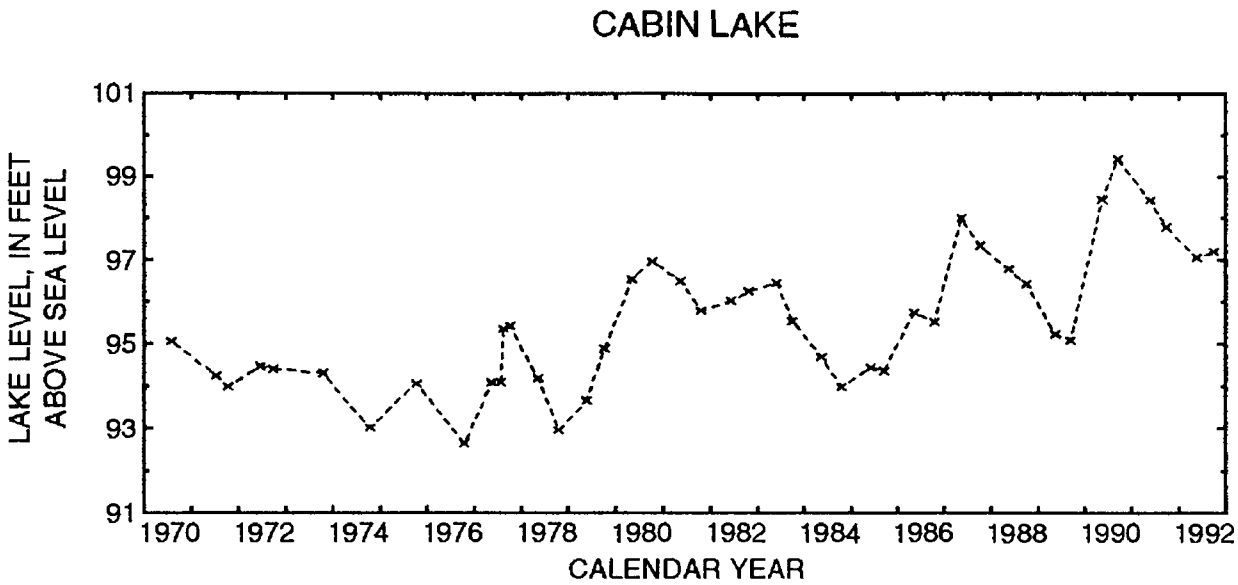
Figure 3. Water-level elevations of Konovalof Lake, 1970-92.



Kidney Lake
[lake level in feet above sea level]

Date	Lake level	Date	Lake level	Date	Lake level	Date	Lake level
7-30-70	102.39	10-4-77	104.65	6-1-83	104.85	5-16-88	104.60
7-13-71	102.74	5-11-78	103.81	10-4-83	104.13	10-4-88	104.32
10-13-71	103.27	10-20-78	103.21	6-15-84	103.81	5-15-89	104.20
6-22-72	103.63	5-22-79	104.02	10-17-84	103.30	9-12-89	104.23
9-28-72	103.98	10-9-79	104.54	6-5-85	103.54	5-15-90	106.44
10-18-73	103.56	5-6-80	105.48	9-16-85	103.79	9-11-90	106.17
10-15-74	102.79	10-8-80	105.61	5-14-86	104.39	5-22-91	105.86
10-13-75	104.18	5-18-81	105.06	10-15-86	104.53	9-23-91	105.36
10-19-76	102.93	10-21-81	104.74	5-12-87	105.52	5-19-92	105.09
5-18-77	104.22	6-7-82	104.63	10-5-87	104.76	9-28-92	104.97
7-28-77	104.61	10-20-82	104.77				

Figure 4. Water-level elevations of Kidney Lake, 1970-92.

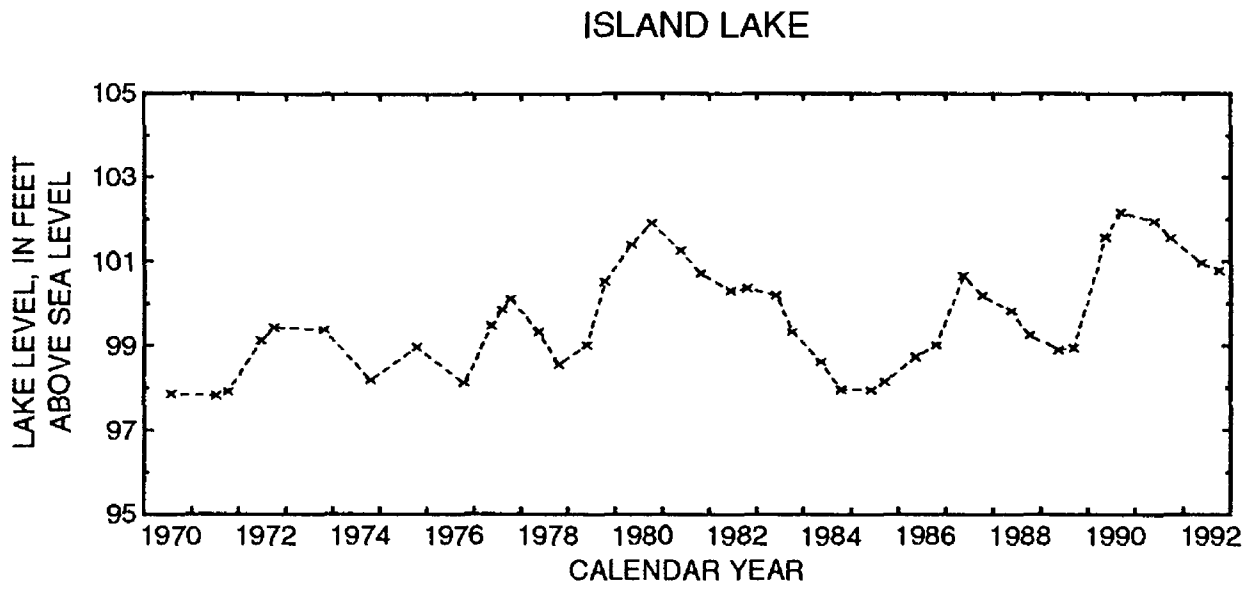


Cabin Lake

[lake level in feet above sea level]

Date	Lake level	Date	Lake level	Date	Lake level	Date	Lake level
7-30-70	95.06	8-17-77	95.34	10-21-82	96.25	5-17-88	96.79
7-13-71	94.24	10-5-77	95.41	6-1-83	96.45	10-5-88	96.43
10-13-71	93.99	5-11-78	94.18	10-4-83	95.54	5-16-89	95.23
6-22-72	94.45	10-20-78	92.96	5-15-84	94.68	9-12-89	95.09
9-28-72	94.40	5-22-79	93.66	10-18-84	93.99	5-16-90	98.45
10-18-73	94.29	10-10-79	94.88	6-5-85	94.43	9-12-90	99.43
10-15-74	93.02	5-6-80	96.54	9-17-85	94.36	5-22-91	98.44
10-13-75	94.06	10-9-80	96.96	5-14-86	95.75	9-24-91	97.79
10-19-76	92.64	5-18-81	96.49	10-16-86	95.52	5-19-92	97.06
5-18-77	94.09	10-21-81	95.79	5-13-87	98.00	9-28-92	97.20
7-27-77	94.09	6-8-82	96.02	10-6-87	97.35		

Figure 5. Water-level elevations of Cabin Lake, 1970-92.

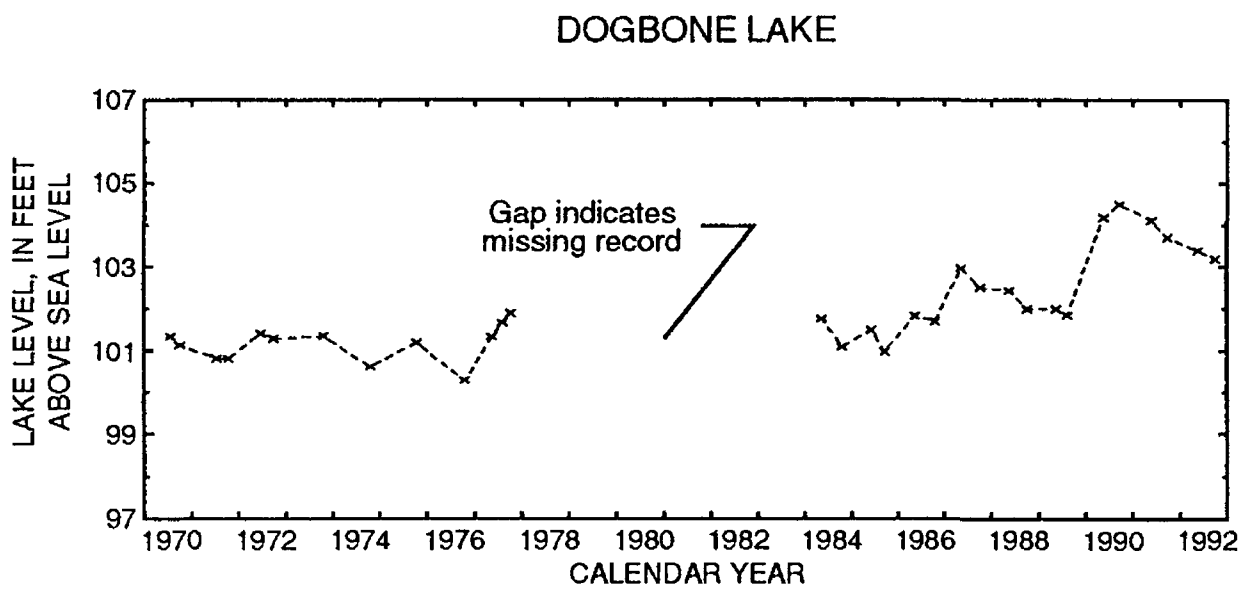


Island Lake

[lake level in feet above sea level]

Date	Lake level	Date	Lake level	Date	Lake level	Date	Lake level
7-30-70	97.87	10-4-77	100.12	6-1-83	100.21	5-17-88	99.83
7-14-71	97.82	5-11-78	99.33	10-4-84	99.45	10-4-88	99.27
10-13-71	97.92	10-19-78	98.56	5-15-84	98.63	5-15-89	98.91
6-22-72	99.13	5-21-79	99.02	10-17-84	97.97	9-12-89	98.95
9-28-72	99.43	10-10-79	100.51	6-5-85	97.96	5-16-90	101.55
10-18-73	99.38	5-6-80	101.38	9-16-85	98.15	9-11-90	102.16
10-15-74	98.18	10-8-80	101.90	5-14-86	98.74	5-23-91	101.95
10-13-75	98.96	5-19-81	101.25	10-16-86	99.02	9-24-91	101.54
10-19-76	98.12	10-22-81	100.71	5-13-87	100.65	5-20-92	100.96
5-18-77	99.48	6-7-82	100.31	10-5-87	100.21	9-28-92	100.78
8-5-77	99.85	10-20-82	100.37				

Figure 6. Water-level elevations of Island Lake, 1970-92.

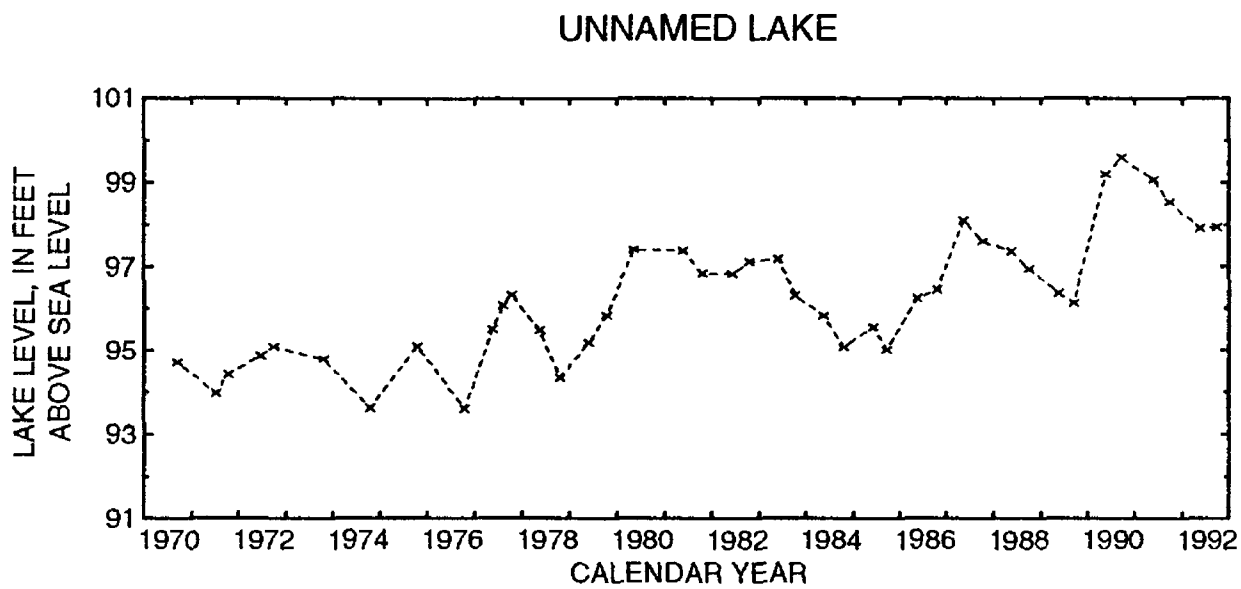


Dogbone Lake

[lake level in feet above sea level]

Date	Lake level	Date	Lake level	Date	Lake level	Date	Lake level
7-21-70	101.34	10-13-75	101.20	9-16-85	100.99	8-12-89	101.85
9-30-70	101.14	10-19-76	100.30	5-15-86	101.84	5-16-90	104.18
7-13-71	100.83	5-18-77	101.34	10-16-86	101.70	9-12-90	104.50
10-13-71	100.82	8-4-77	101.67	5-13-87	102.97	5-22-91	104.12
6-22-72	101.42	10-4-77	101.90	10-5-87	102.52	9-24-91	103.71
9-28-72	101.29	5-15-84	101.77	5-17-88	102.44	5-20-92	103.39
10-18-73	101.35	10-18-84	101.10	10-5-88	102.01	9-28-92	103.18
10-16-74	100.63	6-5-85	101.49	5-16-89	102.00		

Figure 7. Water-level elevations of Dogbone Lake, 1970-92.

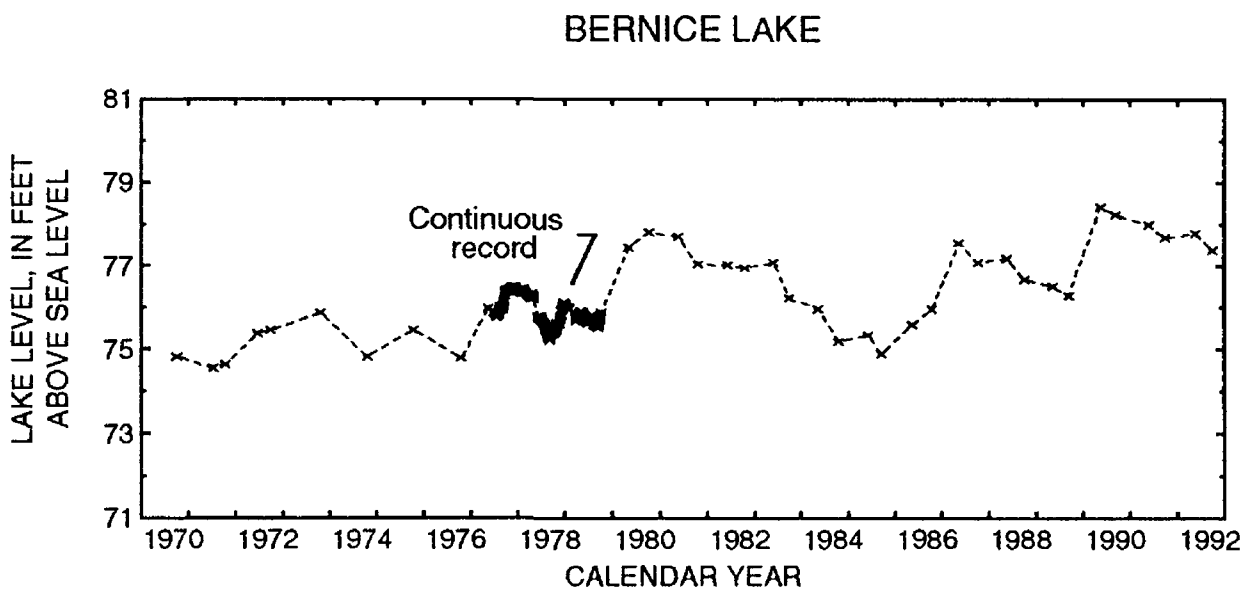


Unnamed lake

[lake level in feet above sea level]

Date	Lake level	Date	Lake level	Date	Lake level	Date	Lake level
9-11-70	94.71	10-5-77	96.32	6-1-83	97.18	5-17-88	97.37
7-13-71	93.97	5-11-78	95.47	10-4-83	96.31	10-5-88	96.95
10-13-71	94.41	10-20-78	94.33	5-15-84	95.83	5-16-89	96.37
6-22-72	94.87	5-22-79	95.18	10-18-84	95.08	9-13-89	96.14
9-28-72	95.08	10-10-79	95.83	6-4-85	95.56	5-16-90	99.19
10-18-73	94.79	5-6-80	97.40	9-17-85	95.02	9-12-90	99.59
10-15-74	93.62	5-19-8	97.38	5-14-86	96.25	5-23-91	99.07
10-13-75	95.09	10-21-81	96.84	10-16-86	96.45	9-24-91	98.54
10-19-76	93.60	6-8-82	96.83	5-13-87	98.11	5-19-92	97.92
5-18-77	95.50	10-20-82	97.12	10-6-87	97.60	9-29-92	97.94
8-5-77	96.07						

Figure 8. Water-level elevations of unnamed lake, 1970-92.



Bernice Lake

[lake level in feet above sea level]

Date	Lake level	Date	Lake level	Date	Lake level	Date	Lake level
9-30-70	74.83	10-10-79	75.89	5-15-84	75.97	10-5-88	76.67
7-13-71	74.56	5-6-80	77.45	10-17-84	75.18	5-12-89	76.51
10-13-71	74.64	10-8-80	77.82	6-4-85	75.34	9-11-89	76.29
6-22-72	75.37	5-19-81	77.71	9-17-85	74.90	5-16-90	78.43
9-28-72	75.45	10-22-81	77.04	5-14-86	75.59	9-11-90	78.24
10-18-73	75.87	6-8-82	77.02	10-15-86	75.96	5-23-91	78.00
10-15-74	74.82	10-20-82	76.95	5-13-87	77.56	9-24-91	77.69
10-13-75	75.46	6-1-83	77.08	10-6-87	77.08	5-19-92	77.79
10-20-76	74.79	10-4-83	76.23	5-17-88	77.19	9-28-92	77.39
5-18-77	75.98						

Figure 9. Water-level elevations of Bernice Lake, 1970-92.

Bernice Lake mean daily lake levels

[lake levels in feet above sea level; EOM, end of month]

June to September 1977

Day	June	July	Aug.	Sept.
5		75.85	75.80	75.95
10		75.84	75.92	76.05
15		75.81	75.96	76.14
20		75.77	75.99	76.16
25	75.87	75.85	75.98	76.36
EOM	75.86	75.80	75.98	76.42

October 1977 to September 1978

[lake was ice affected November 5 to May 10; ---, missing record]

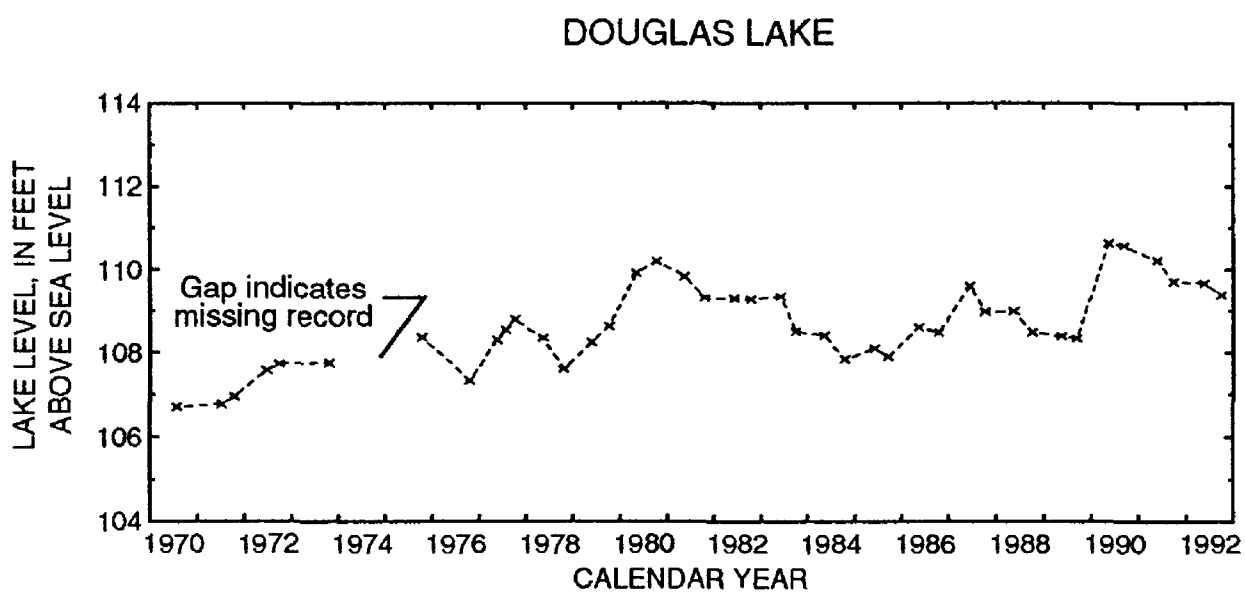
Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
5	76.39	76.41	76.47	76.36	76.35	76.30	76.22	---	---	75.71	75.48	75.24
10	76.39	76.42	76.48	76.38	76.45	76.30	76.23	---	75.76	75.68	75.44	75.33
15	76.35	76.45	76.48	76.34	76.43	76.28	76.23	---	75.77	75.64	75.41	75.38
20	76.40	76.49	76.39	76.36	76.39	76.26	76.30	---	75.80	75.61	75.38	75.38
25	76.38	76.49	76.40	76.41	76.39	76.28	76.32	---	75.77	75.63	75.31	75.38
EOM	76.46	76.47	76.39	76.38	76.36	76.26	76.25	---	75.72	75.57	75.28	75.36

October 1978 to September 1979

[lake was ice affected during winter; ---, missing record]

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
5	75.35	75.63	75.83	76.05	---	---	75.81	75.90	75.78	75.64	---	75.53
10	75.41	75.62	75.98	76.02	---	---	75.80	75.91	75.70	75.70	75.57	75.54
15	75.38	75.62	75.95	75.99	---	---	75.80	75.88	75.64	75.73	75.60	75.57
20	75.47	75.62	76.06	75.97	---	---	75.81	75.86	75.64	75.76	75.63	75.62
25	75.52	75.74	76.10	75.99	---	75.76	75.86	75.84	75.67	75.82	75.61	75.74
EOM	75.63	75.80	76.09	75.97	---	75.72	75.91	75.82	75.65	---	75.57	75.80

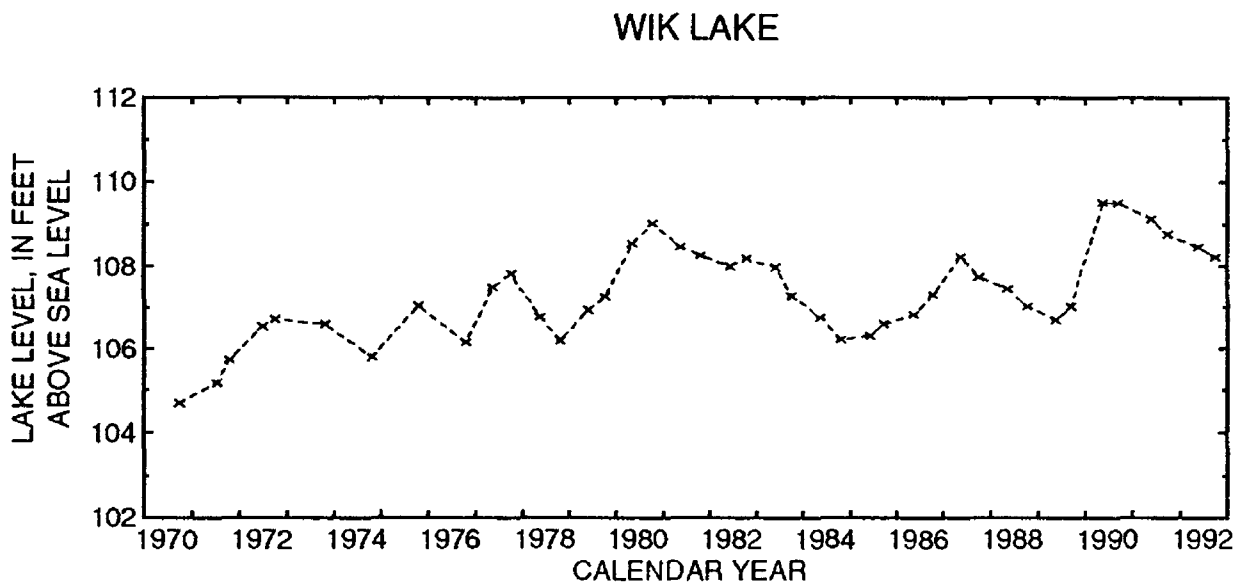
Figure 9. Water-level elevations of Bernice Lake, 1970-92--Continued.



Douglas Lake
[lake level, in feet, above sea level]

Date	Lake level	Date	Lake level	Date	Lake level	Date	Lake level
7-30-70	106.70	5-11-78	108.36	6-6-83	109.36	5-16-88	109.00
7-13-71	106.77	10-20-78	107.61	10-4-83	108.52	10-4-88	108.50
10-13-71	106.95	5-22-79	108.25	5-15-84	108.42	5-15-89	108.40
6-23-72	107.58	10-9-79	108.64	10-17-84	107.84	9-12-89	108.34
9-28-72	107.73	5-6-80	109.92	6-5-85	108.11	5-15-90	110.64
10-18-73	107.76	10-8-80	110.20	9-17-85	107.90	9-11-90	110.58
10-13-75	108.37	5-18-81	109.84	5-14-86	108.62	5-22-91	110.23
10-19-76	107.34	10-21-81	109.32	10-15-86	108.49	9-23-91	109.72
5-19-77	108.31	6-7-82	109.31	6-13-87	109.62	5-19-92	109.68
7-28-77	108.55	10-20-82	109.29	10-5-87	108.98	9-29-92	109.39
10-4-77	108.80						

Figure 10. Water-level elevations of Douglas Lake, 1970-92.

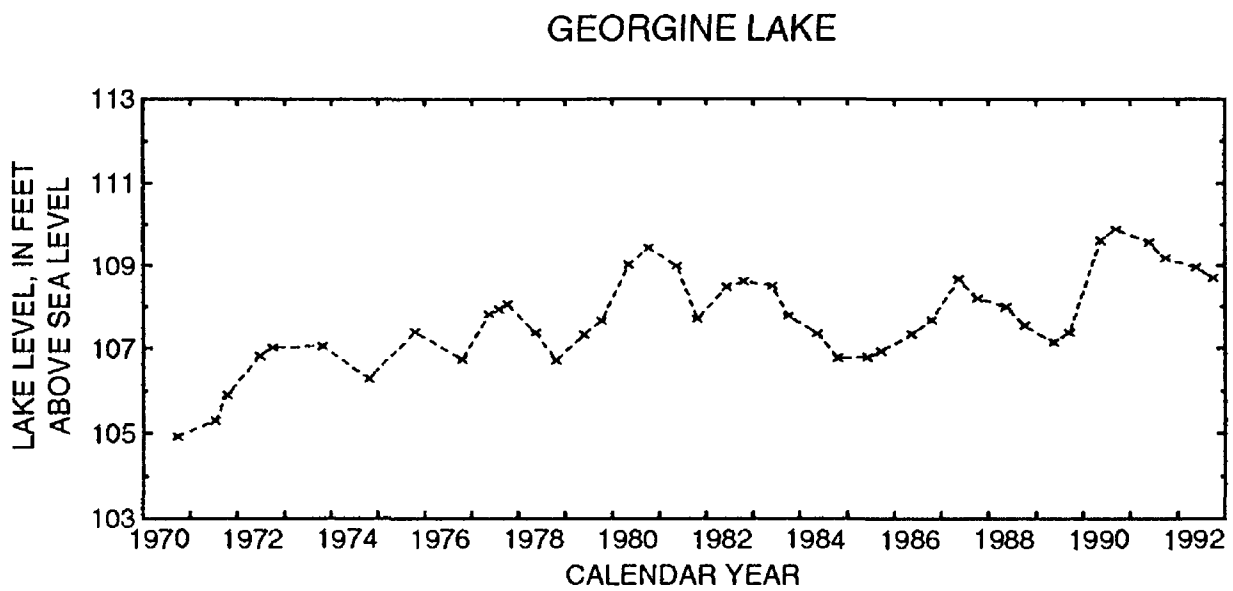


Wik Lake

[lake level in feet above sea level]

Date	Lake level	Date	Lake level	Date	Lake level	Date	Lake level
9-30-70	104.71	5-11-78	106.77	6-1-83	107.98	5-16-88	107.46
7-13-71	105.17	10-19-78	106.19	10-4-83	107.29	10-4-88	107.06
10-13-71	105.73	5-21-79	106.95	5-15-84	106.77	5-15-89	106.70
6-23-72	106.54	10-10-79	107.26	10-17-84	106.22	9-12-89	107.02
9-28-72	106.72	5-6-80	108.54	6-4-85	106.31	5-15-90	109.52
10-18-73	106.60	10-8-80	109.03	9-16-85	106.59	9-11-90	109.50
10-15-74	105.81	5-18-81	108.46	6-14-86	106.83	5-22-91	109.12
10-13-75	107.04	10-21-81	108.26	10-15-86	107.32	9-23-91	108.76
10-19-76	106.16	6-7-82	108.01	5-16-87	108.24	5-20-92	108.46
5-18-77	107.50	10-20-82	108.18	10-5-87	107.74	9-28-92	108.22
10-4-77	107.82						

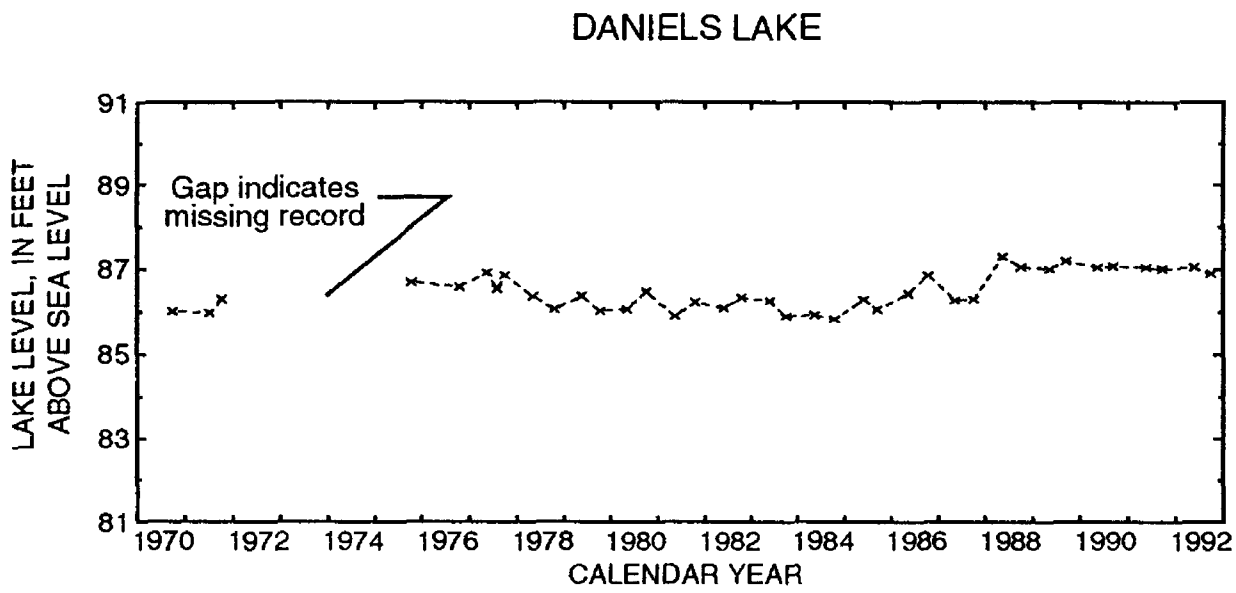
Figure 11. Water-level elevations of Wik Lake, 1970-92.



Georgine Lake
[lake level in feet above sea level]

Date	Lake level	Date	Lake level	Date	Lake level	Date	Lake level
9-20-70	104.93	10-4-77	108.06	6-2-84	108.50	5-16-88	108.01
7-13-71	105.30	5-11-78	107.38	10-4-83	107.79	10-4-88	107.55
10-13-71	105.91	10-19-78	106.72	5-15-84	107.36	5-15-89	107.15
6-23-72	106.83	5-21-79	107.33	10-17-84	106.78	9-12-89	107.38
9-28-72	107.02	10-10-79	107.66	6-4-85	106.80	5-15-90	109.62
10-18-73	107.05	5-6-80	109.02	9-16-85	106.94	9-11-90	109.89
10-15-74	106.29	10-8-80	109.43	5-14-86	107.35	5-22-91	109.57
10-13-75	107.39	5-18-81	108.99	10-15-86	107.69	9-23-91	109.19
10-19-76	106.74	10-21-81	107.71	5-13-87	108.67	5-20-92	108.96
5-18-77	107.83	6-7-82	108.47	10-5-87	108.21	9-29-92	108.69
8-4-77	107.95	10-20-82	108.61				

Figure 12. Water-level elevations of Georgine Lake, 1970-92.



Daniels Lake

[lake level in feet above sea level]

Date	Lake level	Date	Lake level	Date	Lake level	Date	Lake level
9-30-70	86.02	5-21-79	86.38	5-15-84	85.94	10-4-88	87.06
7-13-71	85.98	10-10-79	86.04	10-17-84	85.84	5-15-89	87.00
10-13-71	86.30	5-6-80	86.08	6-4-85	86.31	9-12-89	87.20
10-14-75	86.69	10-8-80	86.49	9-16-85	86.08	5-15-90	87.04
10-20-76	86.59	5-18-81	85.90	5-15-86	86.44	9-11-90	87.07
5-20-77	86.92	10-21-81	86.24	10-18-86	86.86	5-22-91	87.04
8-4-77	86.54	6-7-82	86.10	5-13-87	86.29	9-23-91	87.01
10-4-77	86.86	10-20-82	86.34	10-5-87	86.31	5-20-92	87.05
5-11-78	86.37	6-1-83	86.27	5-16-88	87.31	9-29-92	86.90
10-19-78	86.07	10-4-83	85.90				

Figure 13. Water-level elevations of Daniels Lake, 1970-92.

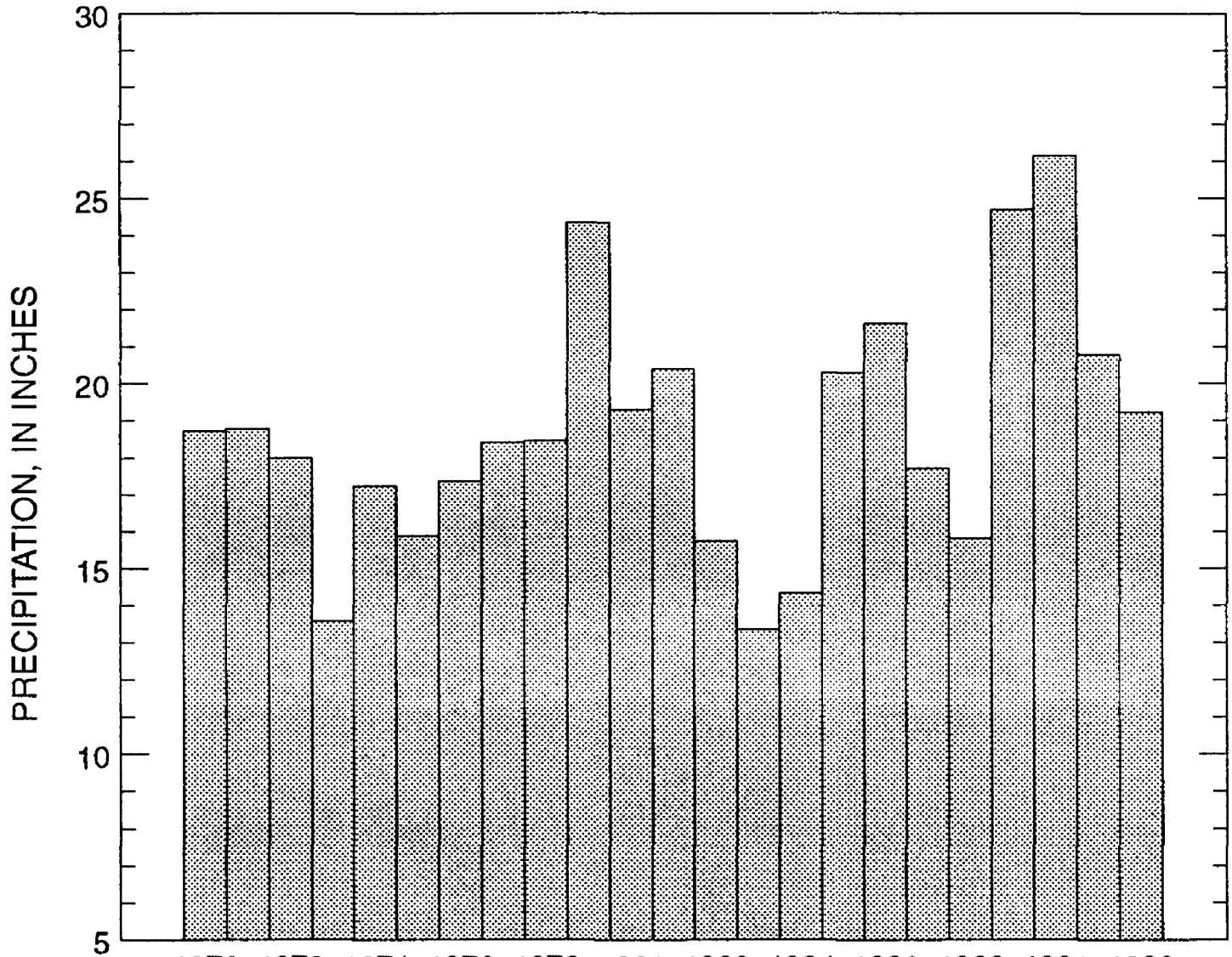


Figure 14. Annual precipitation at Kenai Municipal Airport (Data from National Oceanic and Atmospheric Administration's National Climatic Data Center, annual summaries.)