

QUARTERLY REPORT: July - September 1986
LIMNOLOGICAL STUDIES AT CRATER LAKE
CA-9000-3-0003
SUBAGREEMENT 12

My objectives last quarter were to continue working on the lake database and to sample the lake during July, August and September. Work on the database included an appraisal of the park weather and lake level data. An evaluation of the relationships between the two parameters was initiated. I am working with the Climatic Center at Oregon State University on this project.

We began our normal sampling regime in late June as mentioned in the last report. Samples include temperature, pH, conductivity, alkalinity, dissolved oxygen, nutrients, photometer, Secchi disk, chlorophyll, phytoplankton and zooplankton. Sampling went according to schedule in July and August, except primary production estimates were made only in August. In September, the lake was rough and the weather cold and snowing. Owing to these conditions we were not able to complete all of the planned work, such as primary production and several water sampling depths.

The results of some of the field work are summarized below. Surface temperature was about 14.1 C in July and reached a maximum of 16.4 C in August. By September the temperature had dropped to 12.8 C. In July the temperature decreased to 11.1 C at 10-m. and continued to decline to 3.6 C at 225-m (the deepest we sampled with the 250-m cabled thermister). By August, however, temperatures of the upper 20-m stratum had increased; e.g., at 10-m it was 14.1 C and 10.0 C at 15-m. The temperature at 250-m was 3.7 C. In September we took a limited temperature profile. The temperature was 12.8 C from the surface to 20-m. It was 5.0 C at 60-m, the deepest we sampled. Other water quality measurements are summarized in the table below. In July, the chlorophyll maximum (1 $\mu\text{g/l}$) occurred at 120-m. Samples taken in August and September have not been processed. Primary production estimates have not been calculated, but the counts per minute were highest at the lake surface and between 40 to 80-m (maximum depth was 180-m). Samples for nutrients, phytoplankton and zooplankton are being analyzed at this time.

Secchi disk transparency measurements ranged from 25.9 to 33.5-m during the quarter (see attached table). The lowest readings occurred in August.

Lake color experiments are still in progress. Based on preliminary evaluations of the data it appears that the lake water (surface) was bluer (fewer particles and perhaps dissolved substances) in June and September than in August.

Lake sediment cores taken last summer have been sectioned and chemical analyses are on schedule. The settling chambers were retrieved and deployed according to schedule in July and September as part of the particle flux study.

Spring 42 had elevated nitrate-nitrogen levels in July (261 $\mu\text{g/l}$) and August (283 $\mu\text{g/l}$). Concentrations in the other springs ranged from 2 to 75 $\mu\text{g/l}$ in July and 2 to 63 $\mu\text{g/l}$ in August. The September samples are being processed.

Water Quality: July to September

Parameter	Date	Depth (meters)*			
		0	100	300	550
Temperature (C)	July 23	14.1	3.9	-	-
	August 20	16.4	4.0	-	-
	September 17	12.8	-	-	-
pH	July 23	7.9	7.8	7.8	7.4
	August 20	7.6	7.7	7.6	7.5
	September 17	7.9	7.8	7.6	-
Conductivity (umhos/cm)	July 23	127.3	123.1	121.0	128.5
	August 20	93.5	79.7	120.7	122.8
	September 17	117.2	117.4	116.2	-
Alkalinity (mg/l)	July 23	27.5	26.2	26.4	26.4
	August 20	26.2	25.7	26.5	26.8
	September 17	26.4	26.4	26.0	-
Dissolved Oxygen (mg/l)	July 23	9.9	8.9	10.8	9.8
	August 20	7.8	10.5	9.9	9.5
	September 17	-	-	-	9.2

*1 meter = 3.28 feet

Secchi Disk Readings: July - September

Month	Day	Reading (meters)	Comments
			Sky Condition/ Lake Surface
July	21	33.5	mostly clear, surface ripple
	22	33.0	clear, surface calm
	23	30.9	high haze, 1 - 2" chop
	31	31.0	clear, surface calm
August	4	28.4	25% clouds, surface calm
	13	26.8	high haze, surface calm
	19	27.8	clear*, surface calm
	20	25.9	high clouds, 1 " chop
	26	31.5	high patchy clouds, surface calm
September	4	31.4	clear*, surface calm
	22	29.0	clear, surface calm

* Some forest fire smoke in caldera