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# Togiak National Wildlife Refuge Lake Surveys - 1984.

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Key Words: Togiak NWR, Lakes, Water Quality

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Togiak National Wildlife Refuge - Lake Surveys

The King Salmon Fishery Station provided assistance to the refuge in conducting water quality surveys of twenty one lakes. The surveys were conducted on June 4 and June 6, 1984, between 1200 and 1800 hours.

We utilized a Hydrolab 4041 water quality meter to obtain Temperature (degrees centigrade), pH, Conductivity (uS/cm), and dissolved oxygen (parts/million). Secchi disc readings were obtained for each lake, and vertical plankton hauls were made using a 153 micron mesh net at selected lakes.

A Cessna 185 on floats was used for the surveys. The plane landed in what was observed to be the deepest portion of each lake. Taxiing was required on some lakes in order to insure vertical prophiles.

A preliminary review of the data reveals that all lakes surveyed can be classified as having low conductibility, ranging from the low 20's for the Goodnews Lakes to the high 80's for Heart Lake, an alpine landlocked lake. pH ranged from the mid 6's for the Goodnews Lakes to 8.0 for Heart Lake, but in general the waters can be described as neutral. Dissolved oxygen was at or near saturation levels for all waters. Still lakes showed some stratification with regard to temperature, but larger wind blown lakes, Togiak, Kagati, Goodnews, etc., were well mixed. Temperatures on the wind mixed lakes varied less than 2°C. between the surface and 23 meters. Secchi disk readings averaged 8 meters.

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Togiak Lake
6-4-84

| Depth (Meters) | Temp. °C | pH | Conductivity | $O_2$ ppm | Secchi |
|---|---|---|---|---|---|
| Surface | 2.8 | 7.5 | 63 | 12.4 | |
| 2 | 2.7 | | 63 | 12.6 | |
| 5 | 2.7 | | 62 | 12.8 | 7.5m |
| 10 | 2.7 | | 61 | 12.6 | |
| 15 | 2.7 | | 58 | 12.8 | |
| 20 | 2.7 | | 57 | 12.7 | |

Little Togiak Lake
6-4-84

| Depth | Temp. | pH | Cond. | $O_2$ | Secchi |
|---|---|---|---|---|---|
| Surface | 6.2 | 7.2 | 73 | 10.8 | |
| 2 | | | | | |
| 5 | 5.5 | 7.3 | 72 | 12.0 | |
| 10 | 4.9 | 7.4 | 73 | 12.1 | 12m |
| 15 | 3.9 | 7.6 | 70 | 11.9 | |
| 20 | 3.8 | 7.6 | 68 | 11.7 | |
| 25 | 3.7 | 7.7 | 67 | 12.1 | |

High Lake
6-4-84

| Depth | Temp. | pH | Cond. | $O_2$ | Secchi |
|---|---|---|---|---|---|
| Surface | 7.5 | 7.0 | 57 | 11.5 | |
| 5 | 5.4 | 7.1 | 55 | 11.7 | |
| 10 | 4.5 | 7.2 | 56 | 11.8 | 12.5m |
| 15 | 4.2 | 7.3 | 56 | 11.5 | |
| 20 | 4.1 | 7.4 | 54 | 11.4 | |
| 23 | 3.9 | 7.5 | 53 | 11.7 | |
| 2 | 5.6 | 7.1 | 55 | 11.7 | |

Kagati Lake N. Arm
6-4-84

| Depth | Temp. | pH | Cond. | $O_2$ | Secchi |
|---|---|---|---|---|---|
| Surface | 4.6 | 6.9 | 46 | 12.0 | |
| 2 | 4.3 | 6.9 | 46 | 11.8 | |
| 5 | 4.2 | 7.0 | 45 | 12.0 | 8m |
| 10 | 4.1 | 7.1 | 44 | 11.9 | |
| 15 | 4.0 | 7.2 | 42 | 11.9 | |
| 20 | 3.8 | 7.3 | 40 | 11.8 | |
| 23 | 3.7 | 7.3 | 40 | 11.9 | |

Kagati Lake S. Arm
6-4-84

| Depth (meters) | Temp. °C | pH | Conductivity | $O_2$ ppm | Secchi |
|---|---|---|---|---|---|
| Surface | 4.8 | 6.7 | 42 | 12.3 | |
| 2 | 4.0 | 6.9 | 43 | 12.0 | |
| 5 | 3.9 | 7.0 | 43 | 12.1 | 8.5m |
| 10 | 3.7 | 7.1 | 41 | 12.1 | |
| 15 | 3.7 | 7.2 | 41 | 12.2 | |
| 20 | 3.6 | 7.2 | 41 | 12.0 | |
| 23 | 3.6 | 7.2 | 41 | 11.5 | |

N. Kanuktik Lake
6-4-84

| Depth | Temp. | pH | Cond. | $O_2$ | Secchi |
|---|---|---|---|---|---|
| Surface | 6.6 | 6.8 | 44 | 11.3 | |
| 2 | 4.0 | 6.9 | 43 | 11.7 | 9.5m |
| 10 | 3.9 | 7.1 | 41 | 11.6 | |
| 15 | 3.9 | 7.2 | 39 | 11.7 | |
| 20 | 3.8 | 7.2 | 37 | 11.7 | |
| 23 | 3.8 | 7.2 | 36 | 11.7 | |

Kanuktik Lake
6-4-84

| Depth | Temp. | pH | Cond. | $O_2$ | Secchi |
|---|---|---|---|---|---|
| Surface | 5.9 | 6.6 | 26 | 11.9 | |
| 2 | 4.9 | 6.7 | 25 | 11.8 | |
| 5 | 4.7 | 6.8 | 24 | 11.8 | |
| 10 | 4.6 | 6.9 | 23 | 11.8 | 14.5m |
| 15 | 4.3 | 7.0 | 22 | 11.8 | |
| 20 | 3.9 | 7.1 | 20 | 11.7 | |
| 23 | 3.8 | 7.1 | 20 | 7.3 | |

Nagugun Lake
6-4-84

| Depth | Temp. | pH | Cond. | $O_2$ | Secchi |
|---|---|---|---|---|---|
| Surface | 4.2 | 6.5 | 27 | 12.8 | |
| 2 | 4.0 | 6.7 | 27 | 12.7 | |
| 5 | 3.9 | 6.8 | 26 | 12.6 | 8m |
| 10 | 3.6 | 7.0 | 24 | 12.5 | |
| 15 | 3.6 | 7.1 | 21 | 12.6 | |
| 20 | 3.6 | 7.2 | 20 | 12.5 | |

Klak Lake
6-4-84

| Depth | Temp. °C | pH | Conductivity | $O_{2ppm}$ | Secchi |
|---|---|---|---|---|---|
| Surface | 6.7 | 6.8 | 52 | 11.9 | |
| 2 | 6.6 | 6.8 | 51 | 11.8 | |
| 5 | 6.5 | 6.9 | 51 | 11.7 | 8.5m |
| 10 | 5.4 | 7.0 | 50 | 11.7 | |
| 15 | 4.9 | 7.1 | 48 | 11.7 | |
| 20 | 4.2 | 7.0 | 50 | 10.3 | |
| 23 | 3.9 | 6.8 | 51 | 6.6 | |

Amanka Lake
6-6-84

| Depth | Temp. | pH | Cond. | $O_2$ | Secchi |
|---|---|---|---|---|---|
| Surface | 8.9 | 6.8 | 37 | 11.9 | |
| 2 | 8.8 | 6.9 | 36 | 11.6 | |
| 5 | 8.7 | 6.9 | 35 | 11.8 | 7.5m |
| 10 | 5.9 | 7.0 | 34 | 12.6 | |
| 15 | 4.4 | 7.0 | 31 | 12.9 | |
| 20 | 3.9 | 7.0 | 30 | 12.9 | |
| 23 | 3.8 | 7.1 | 27 | 12.7 | |

Ualik Lake
6-6-84

| Depth | Temp. | pH | Cond. | $O_2$ | Secchi |
|---|---|---|---|---|---|
| Surface | 7.0 | 6.7 | 33 | 12.7 | |
| 2 | 6.4 | 6.9 | 32 | 12.2 | |
| 5 | 6.3 | 7.0 | 32 | 12.2 | 8.5m |
| 10 | 6.1 | 7.1 | 30 | 12.7 | |
| 15 | 5.6 | 7.1 | 28 | 12.9 | |
| 20 | 4.8 | 7.2 | 27 | 12.9 | |
| 23 | 4.8 | 7.2 | 25 | 12.9 | |

Kulukak Lake
6-6-84

| Depth | Temp. | pH | Cond. | $O_2$ | Secchi |
|---|---|---|---|---|---|
| Surface | 10.0 | 6.8 | 37 | 12.0 | |
| 2 | 10.0 | 7.1 | 36 | 11.7 | |
| 5 | 9.2 | 7.2 | 36 | 11.7 | 7m |
| 10 | 7.0 | 7.2 | 33 | 12.4 | |
| 15 | 6.0 | 7.1 | 29 | 12.6 | |
| 20 | | | | | |
| 23 | | | | | |

Pungeokpok Lake
6-6-84

| Depth | Temp. °C | pH | Conductivity | $O_2$ ppm | Secchi |
|---|---|---|---|---|---|
| Surface | 14.5 | 7.4 | 55 | 10.5 | |
| 2 | 13.8 | 7.4 | 55 | 10.1 | 4m |
| 5 | 13.3 | 7.4 | 54 | 10.3 | |
| 10 | 10.8 | 7.2 | 52 | 10.5 | |
| 15 | 10.1 | 6.7 | 59 | 6.6 | |
| 20 | | | | | |
| 23 | | | | | |

Gechiak Lake
6-6-84

| Depth | Temp. | pH | Cond. | $O_2$ | Secchi |
|---|---|---|---|---|---|
| Surface | 9.6 | 6.7 | 29 | 11.8 | |
| 2 | 9.4 | 6.7 | 29 | 11.5 | |
| 5 | 9.1 | 6.8 | 28 | 11.4 | 8.0m |
| 10 | 8.1 | 6.9 | 26 | 11.6 | |
| 15 | 7.4 | 6.9 | 24 | 11.7 | |
| 20 | 7.0 | 6.9 | 23 | 11.6 | |
| 23 | 7.0 | 6.9 | 22 | 11.4 | |

Kukaklik Lake
6-6-84

| Depth | Temp. | pH | Cond. | $O_2$ | Secchi |
|---|---|---|---|---|---|
| Surface | 15.0 | 6.7 | 24 | 10.1 | |
| 2 | 15.0 | 6.9 | 24 | 9.9 | |
| Bottom at 3.5 | 15.0 | 6.9 | 23 | 9.2 | 3.5m |

Goodnews Lake-South Middle Fork
6-6-84

| Depth | Temp. | pH | Cond. | $O_2$ | Secchi |
|---|---|---|---|---|---|
| Surface | 11.4 | 6.3 | 24 | 11.3 | |
| 2 | 11.1 | 6.4 | 23 | 11.2 | |
| 5 | 9.4 | 6.6 | 21 | 11.2 | |
| 10 | 6.8 | 6.6 | 19 | 12.1 | 10m |
| 15 | 6.1 | 6.7 | 17 | 12.1 | |
| 20 | 5.6 | 6.7 | 16 | 12.2 | |
| 23 | 5.5 | 6.7 | 16 | 12.2 | |

Goodnews Lake-North Middle Fork
6-6-84

| Depth | Temp. °C | pH | Conductivity | $O_2$ ppm | Secchi |
|---|---|---|---|---|---|
| Surface | 9.5 | 6.5 | 30 | 11.8 | |
| 2 | 9.3 | 6.5 | 29 | 11.6 | |
| 5 | 8.5 | 6.5 | 28 | 11.8 | |
| 10 | 7.1 | 6.6 | 26 | 12.2 | 10m |
| 15 | 6.4 | 6.7 | 25 | 12.3 | |
| 20 | 6.0 | 6.7 | 22 | 12.5 | |
| 23 | | | | | |

Goodnews Lake
6-6-84

| Depth | Temp. | pH | Cond. | $O_2$ | Secchi |
|---|---|---|---|---|---|
| Surface | 8.3 | 6.6 | 31 | 12.4 | |
| 2 | 8.0 | 6.6 | 31 | 12.3 | |
| 5 | 7.5 | 6.6 | 29 | 12.2 | 8.0m |
| 10 | 6.8 | 6.8 | 28 | 12.3 | |
| 15 | 6.0 | 6.9 | 25 | 12.5 | |
| 20 | 4.9 | 6.8 | 24 | 12.4 | |
| 23 | 4.5 | 6.9 | 23 | 12.5 | |

Arolik Lake
6-6-84

| Depth | Temp. | pH | Cond. | $O_2$ | Secchi |
|---|---|---|---|---|---|
| Surface | 5.2 | 6.8 | 39 | 13.0 | |
| 2 | 4.9 | 6.9 | 39 | 13.2 | Rain |
| 5 | 4.4 | 7.0 | 38 | 12.9 | shower |
| 10 | 4.3 | 7.0 | 36 | 13.0 | activity |
| 15 | 3.9 | 7.1 | 34 | 13.2 | during |
| 20 | 3.8 | 7.1 | 32 | 12.9 | test |
| 23 | 3.8 | 7.2 | 31 | 12.9 | 9m |

Canyon Lake
6-6-84

| Depth | Temp. | pH | Cond. | $O_2$ | Secchi |
|---|---|---|---|---|---|
| Surface | 5.0 | 6.8 | 34 | 13.2 | Rain |
| 2 | 4.9 | 7.0 | 34 | 12.7 | shower |
| 5 | 4.4 | 7.1 | 33 | 12.9 | during |
| 10 | 4.3 | 7.2 | 31 | 12.7 | test |
| 15 | 4.2 | 7.3 | 29 | 13.0 | |
| 20 | 4.0 | 7.3 | 27 | 12.9 | 8.5m |
| 23 | 3.9 | 7.4 | 27 | 13.0 | |

Heart Lake
6-6-84

| Depth | Temp. °C | pH | Conductivity | $O_2$ ppm | Secchi |
|---|---|---|---|---|---|
| Surface | 6.3 | 6.9 | 87 | 11.9 | |
| 2 | 6.3 | 7.2 | 87 | 11.9 | |
| 5 | 5.5 | 7.2 | 87 | 11.9 | |
| 10 | 4.4 | 7.5 | 92 | 12.3 | 12m |
| 15 | 4.5 | 7.6 | 90 | 11.8 | |
| 20 | 4.4 | 7.8 | 89 | 12.0 | |
| 23 | 4.5 | 8.0 | 89 | 12.1 | |

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