GREEN LAKE

Limnological information was collected on Green Lake in 1974 by Alaska Department of Fish and Game and U.S. Geological Survey. Area of the lake at 230-foot elevation is 173 acres. Water volume is 6,990 acre feet. Drainage area of the lake is about 29 square miles.

Upon completion of impoundment and subsequent filling of the Green Lake reservoir, surface area at 390-foot elevation will be approximately 1,000 acres. Surface area at maximum drawdown of reservoir (280 feet msl) will be 390 acres. Useable storage capacity between 390 feet and 280 feet msl will be 74,000 acre feet.

Water quality and nutrient analysis of Green Lake and Blue Lake (Schmidt, 1974) shows nearly identical ionic concentration.

Zooplankton populations in Green and Blue lakes are very dissimilar. Blue Lake has an abundance of copepods and cladocera, while these organisms are scarce in Green Lake. Concentrations of total zooplankton biomass in Blue Lake is about 25 times that of Green Lake. This is likely to change upon impoundment of Green Lake. Increased water depth and more stable thermal profiles will likely promote increased zooplankton production in Green Lake.

A population estimate of catchable brook trout in Green Lake reservoir was completed in 1979 (Hughes, unpublished). This estimate was 1,457 fish (946 to 1,968 at 95 percent confidence level) or 8.4 fish per acre. Salmon Creek reservoir near Juneau had a similar population estimate done in 1976. Population of brook trout in this 192-acre reservoir was estimated at 1,250 (1,042 to 1,562 at 95 percent confidence level) or 6.5 fish per acre. Length frequency distribution of brook trout captured by 10-mm increments for Green Lake and Salmon Creek reservoir are presented in Figures 1 and 2.

Condition factors of brook trout from Green Lake and Salmon Creek reservoir are presented in Tables 1 and 2. Mean condition factors for 45 fish sampled from Green Lake was 0.94 with range of 0.64 to 1.43 and standard deviation of 0.16. Mean condition factor of 67 fish from Salmon Creek reservoir was 1.06 with range 0.61 to 1.26 and standard deviation of 0.11.

Age-length-weight relationship of brook trout in Green Lake and Salmon Creek reservoir are shown in Figures 3 and 4. Growth rates are much faster in Green Lake.

There are several factors to consider in deciding what management action to take for the sport fishery of the new Green Lake reservoir.

1. Green Lake now has a higher population and better growth rates for brook trout than does Salmon Creek reservoir in Juneau. Salmon Creek reservoir now maintains an active sport fishery.

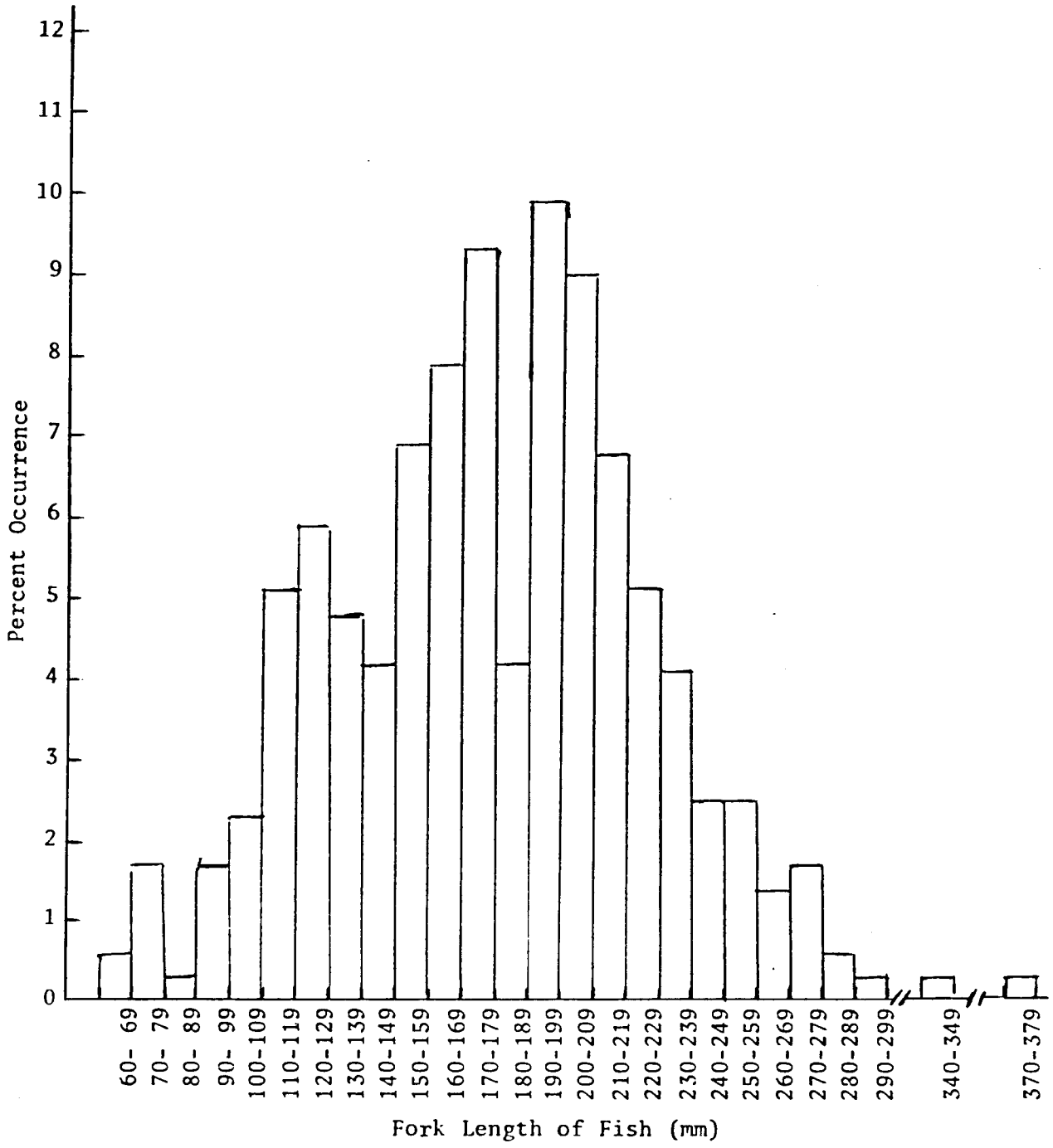

Fig. 1. Percent occurrence of brook trout captured by 10-mm increment, Green Lake, 1979.

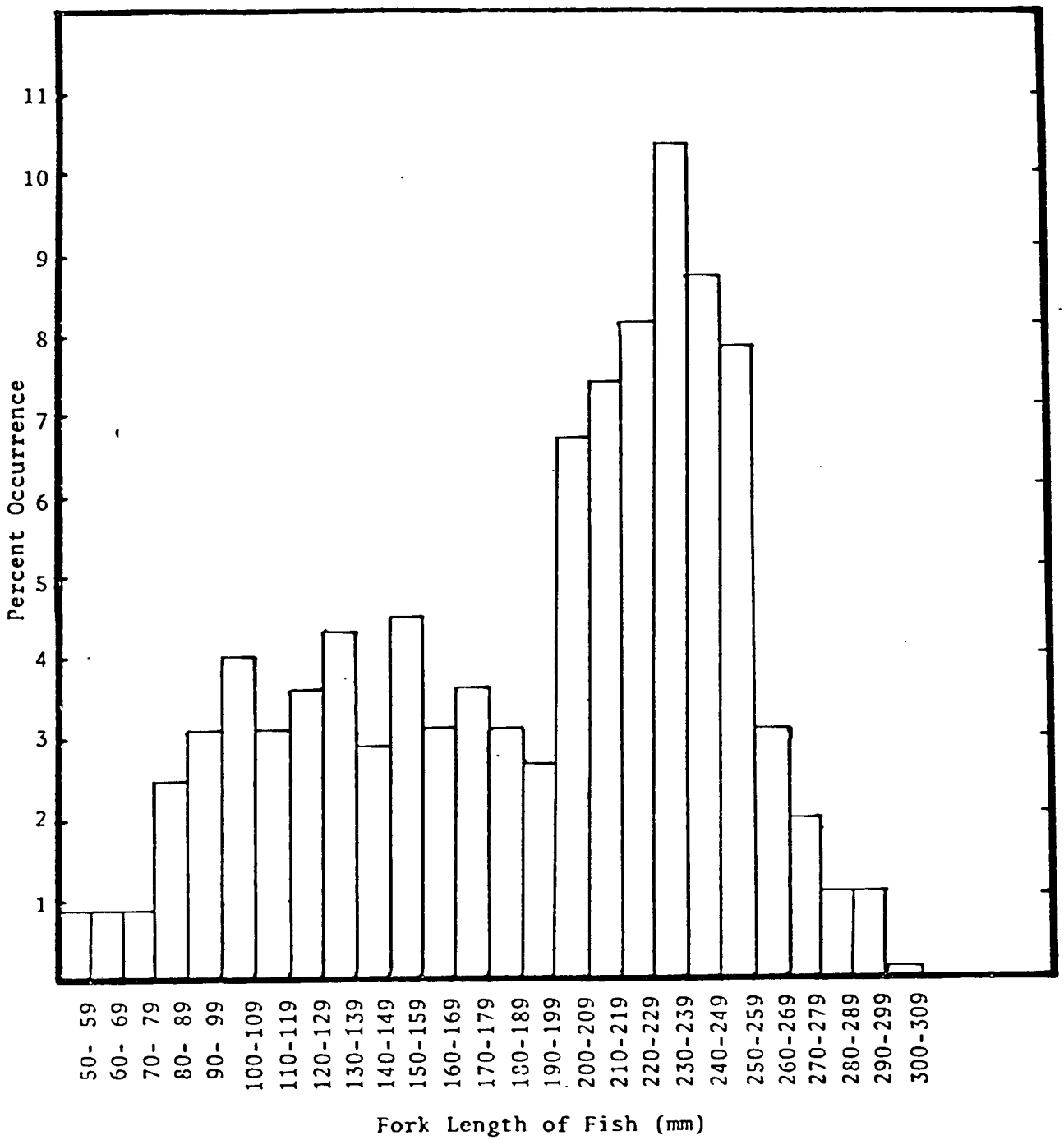

Fig. 2. Percent occurrent of brook trout captured by 10-mm increment, Salmon Creek reservoir, 1976.

Table 1. Condition factor (K)* of brook brout by age class, Green Lake, September 8-14, 1979.

Age	Number	Mean Total Length (mm)	Mean Total Weight (g)	Condition Factor	
				Mean	Range
0+	0				
1+	13	121	17	0.86	0.64-1.43
2+	21	169	47	0.96	0.77-1.43
3+	6	232	123	0.98	0.87-1.09
4+	3	267	183	0.96	0.88-1.02
5+	1	296	292	1.12	
6+	0				
7+	1	378	670	1.24	

*$K = \frac{100 \times \text{weight (g)}}{\text{Total length (cm)}^3}$

Table 2. Condition factor (K)* of brook trout by age class, Salmon Creek reservoir, September 22-25, 1976.

Age	Number	Mean Total Length (mm)	Mean Total Weight (g)	Condition Factor	
				Mean	Range
1	1	59	2		
2	1	117	18	1.12	
3	8	168	50	1.04	0.61-1.20
4	12	191	81	1.11	0.95-1.27
5	11	226	135	1.13	0.97-1.23
6	15	240	143	1.00	0.91-1.17
7	9	253	170	1.03	0.87-1.23
8	3	263	189	1.04	0.97-1.11
9	1	301	309	1.13	

*$K = \frac{100 \times \text{weight (g)}}{\text{Total length (cm)}^3}$

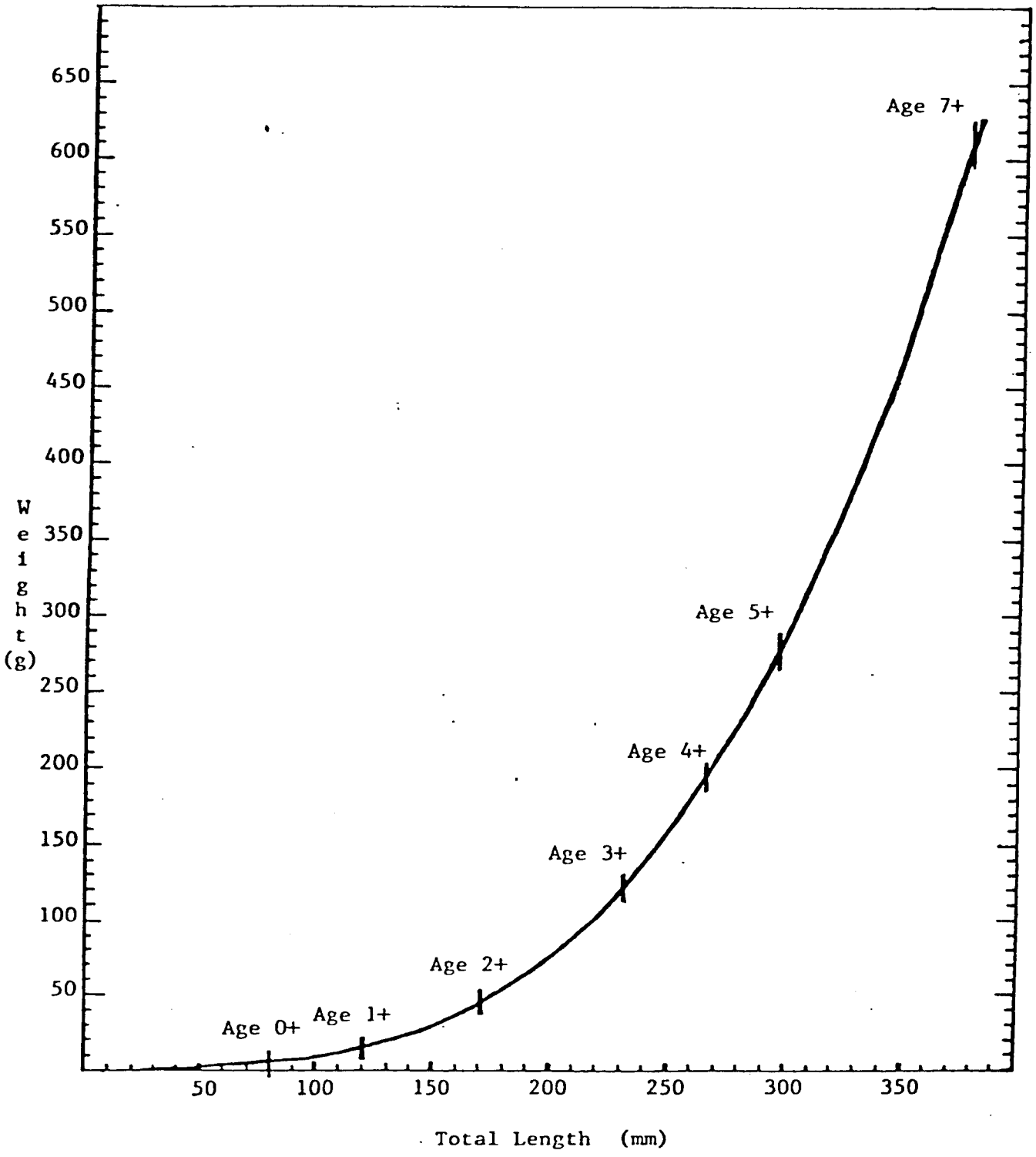

Fig. 3. Length-weight-age relationship of brook trout in Green Lake, 1979.

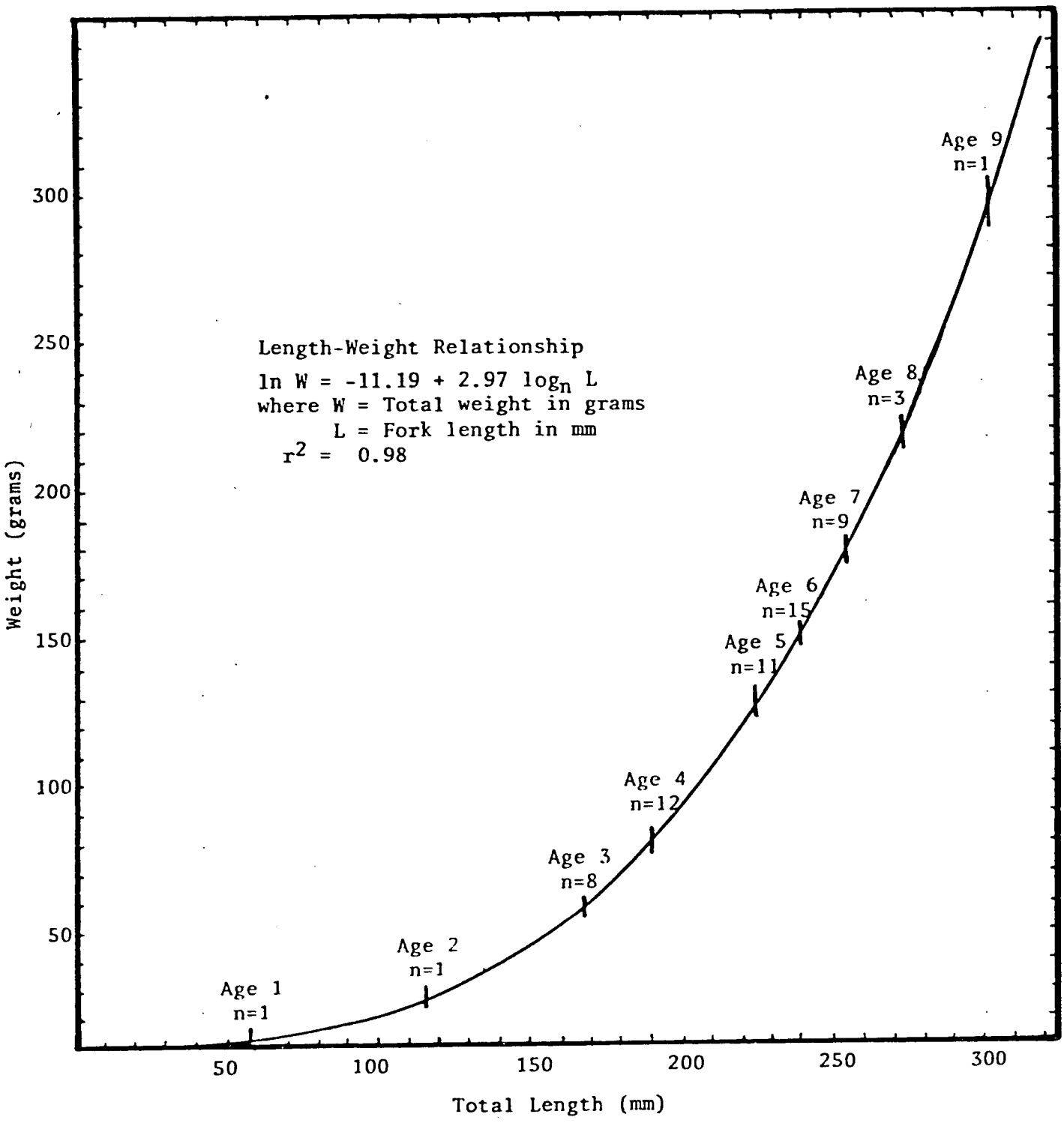

Fig. 4. Length-weight-age relationship of brook trout in Salmon Creek reservoir, 1976.

2. Green Lake has in the past produced fish weighing in excess of two pounds, and growth rates of brook trout now show no indication of stunting.

3. A population estimate of Green Lake has just been completed as a base for future evaluation and comparison.

4. Zooplankton populations in Green Lake are very low as compared with Blue Lake, a nearby rainbow trout system.

5. The only creek spawning area which will be available after impoundment will be marginal substrate during reservoir drawdown periods. Brook trout have demonstrated their ability to spawn and rear successfully in reservoirs and lakes without inlet spawning areas.

6. The City of Sitka is not enthralled with the idea of trying to increase the public use of Green Lake because of potential vandalism to an unmanned hydroelectric station (R. Guiterrez, pers. comm., March 12, 1980).

7. Green Lake is the only good population of brook trout in Sitka.

After considering the above factors, I recommend leaving the brook trout alone. An analysis of the population should be attempted five years after impoundment (Schmidt, 1979, in press).

I realize a political decision may be made to favor rainbow trout but personally believe that unwise. Spawning and rearing limitations will likely require a continued periodic planting to maintain a rainbow trout population.