

DYNAMICS OF LIMNETIC FEEDING FISH.
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INTRODUCTION

Analysis of data collected from February 1972 through March 1973 was the primary goal during this year in an attempt to answer the following objectives: (1) seasonal vertical and horizontal distribution of 1971 year class of sockeye; (2) seasonal abundance, growth, mortality, biomass, and production estimates of 1971 year class of sockeye; and, (3) feeding ecology of sockeye-seasonally and in relation to other pelagic fish.

METHODS

Acoustical surveys were conducted at night monthly to bimonthly from February 1972 through March 1973 using the portable hydroacoustic data acquisition system described by Thorne et al. (1972). The lake was partitioned into five areas and four 6-m depth intervals from 6 to 30 m (Figure 1). Density estimates with associated variances were calculated for each area, depth, and size group of fish. These were used for vertical and horizontal distribution and population estimates. Fish size groups were determined through target strength measurements as described in Nunnallee and Mathisen (1971), Nunnallee et al. (1973). Three fish size groups corresponded with (1) age 0 sockeye, (2) age 1 sockeye, and (3) residual chinook, kokanee, and adult salmonids. Two-boat tow-net data confirmed the presence of these three size groups, assuming the importance of pelagic cottids was negligible.

Length and weight measurements were made after 30 days' preservation in 10% formalin. Growth relationships of 1971 year class of sockeye and back-calculated growth of residual chinook and kokanee were obtained.

Enumeration of stomach contents was made.

RESULTS

Seasonal abundance estimates of the 1971 year class of sockeye salmon are shown in Figure 2. These estimates incorporate age 0 kokanee along with age 0 migratory sockeye. Seasonal abundance estimates of resident kokanee and residual (age 1+) chinook combined are shown in Figure 3. Catch data indicated that the 1970 year class of fall chinook, which entered the pelagic zone at least by July, constituted a major proportion of the large fish targets enumerated acoustically throughout the remainder of the year.

Biomass and production estimates of the 1971 year class of sockeye salmon are shown in Table 1 and Figure 4. The resulting biomass and production per hectare were greater than Lake Washington's (Traynor 1973), indicating a large 1971 year class of sockeye in Lake Sammamish. The population approached approximately one-half the density per unit volume of the 1969 year class of sockeye salmon in Lake Washington, the largest year class observed since 1969 when monitoring of the lake began (Thorne et al. 1973).

The sockeye salmon, kokanee, and residual chinook are primarily distributed above 18 m throughout the summer and fall, during which time feeding was extensively on *Daphnia* sp. During the winter and early spring most fish were distributed below 12 m. Then the 1971 year class of sockeye (age 1+) fed primarily on ostracods, while the residual chinook fed on insects.

DATA AVAILABILITY

Data on stomach contents (percent species composition), tow-netting catches, length-weight information, density, population, biomass, and production estimates are on computer cards. All pertinent data will be placed in the information bank soon after completion of the 1973 annual report. Information can be obtained by contacting T. Berggren (206-543-4650), Fisheries Research Institute.

REFERENCES

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Table 1. Seasonal biomass and production estimates for the 1971 year class of sockeye salmon (surface area of lake is 1980 hectares).

Date	Mean wt (g)	Instantaneous growth rate(per mo)	Stock numbers	Biomass		Mean interval biomass (kg)	Interval length (mo)	Production					
				(kg)	(kg/ha)			Monthly (kg)	(kg/ha)	Total interval (kg)	(kg/ha)		
2/20/72	0.45		138,590	62.37	0.032								
		0.377				177.56	1.64	66.94	0.034	109.78	0.055		
4/10/72	0.84		348,506	292.75	0.148								
		0.377				394.94	1.19	148.89	0.075	177.13	0.089		
5/16/72	1.32		376,615	497.13	0.251								
		0.377				1,943.44	1.24	732.68	0.370	908.52	0.459		
6/23/72	2.11		1,606,523	3,389.76	1.712								
		0.377				5,519.04	2.86	2,080.68	1.051	5,950.74	3.005		
9/18/72	6.19		1,235,592	7,648.31	3.863								
		0.377				9,306.16	1.38	3,508.42	1.772	4,841.62	2.445		
10/30/72	10.41		1,053,218	10,964.00	5.537								
		0.081				11,237.79	2.53	910.26	0.460	2,302.96	1.163		
1/15/73	12.88		893,756	11,511.58	5.814								
		0.070				8,552.36	1.18	598.67	0.302	706.43	0.357		
2/20/73	13.99		399,795	5,593.13	2.825								
		0.065				4,335.84	<u>0.98</u>	281.83	0.142	<u>276.19</u>	<u>0.139</u>		
3/22/73	14.91		206,476	3,078.56	1.555								
Total production								13.00			15,273.42	7.71	

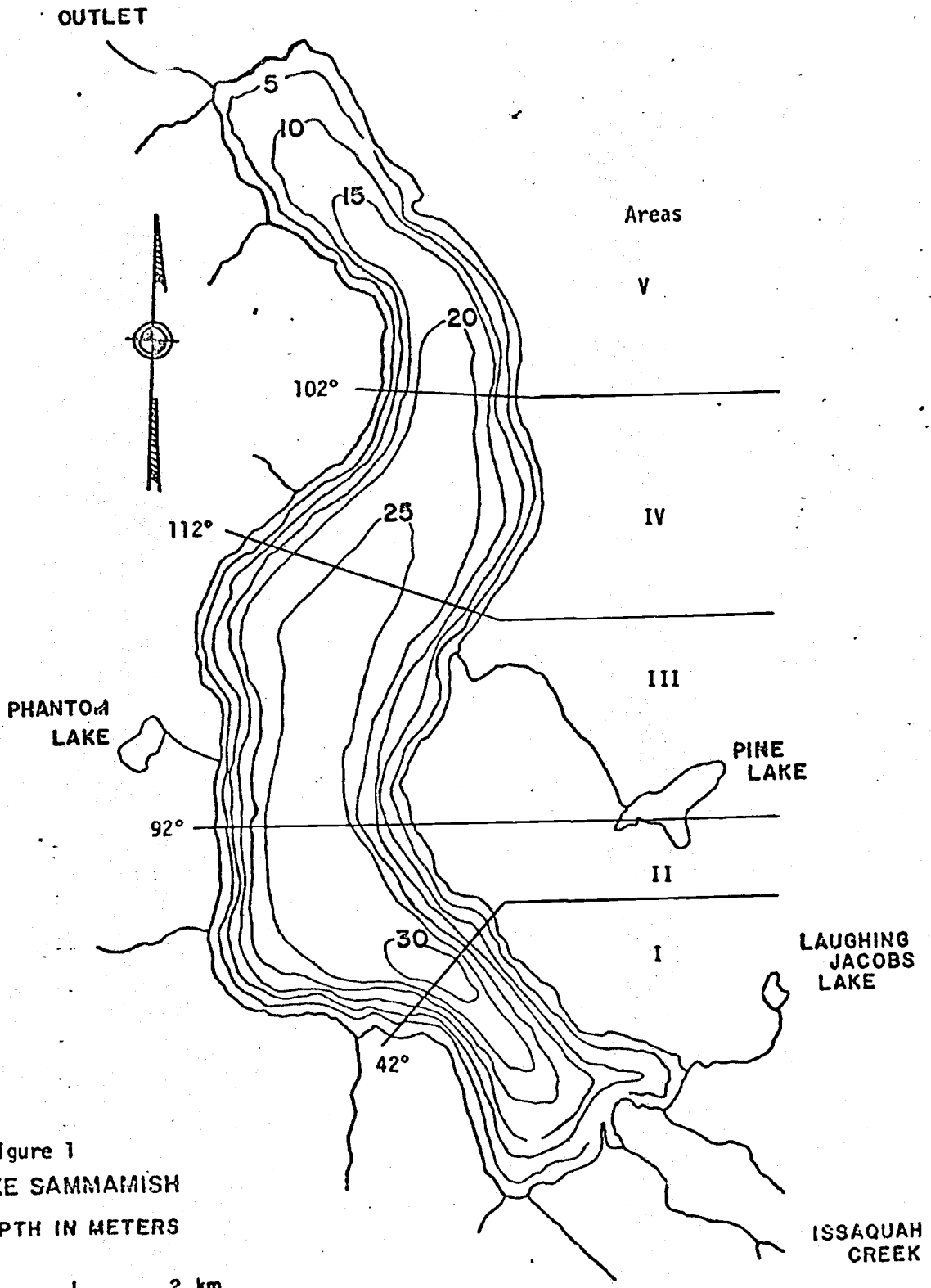


Figure 1
 LAKE SAMMAMISH
 DEPTH IN METERS

0 1 2 km

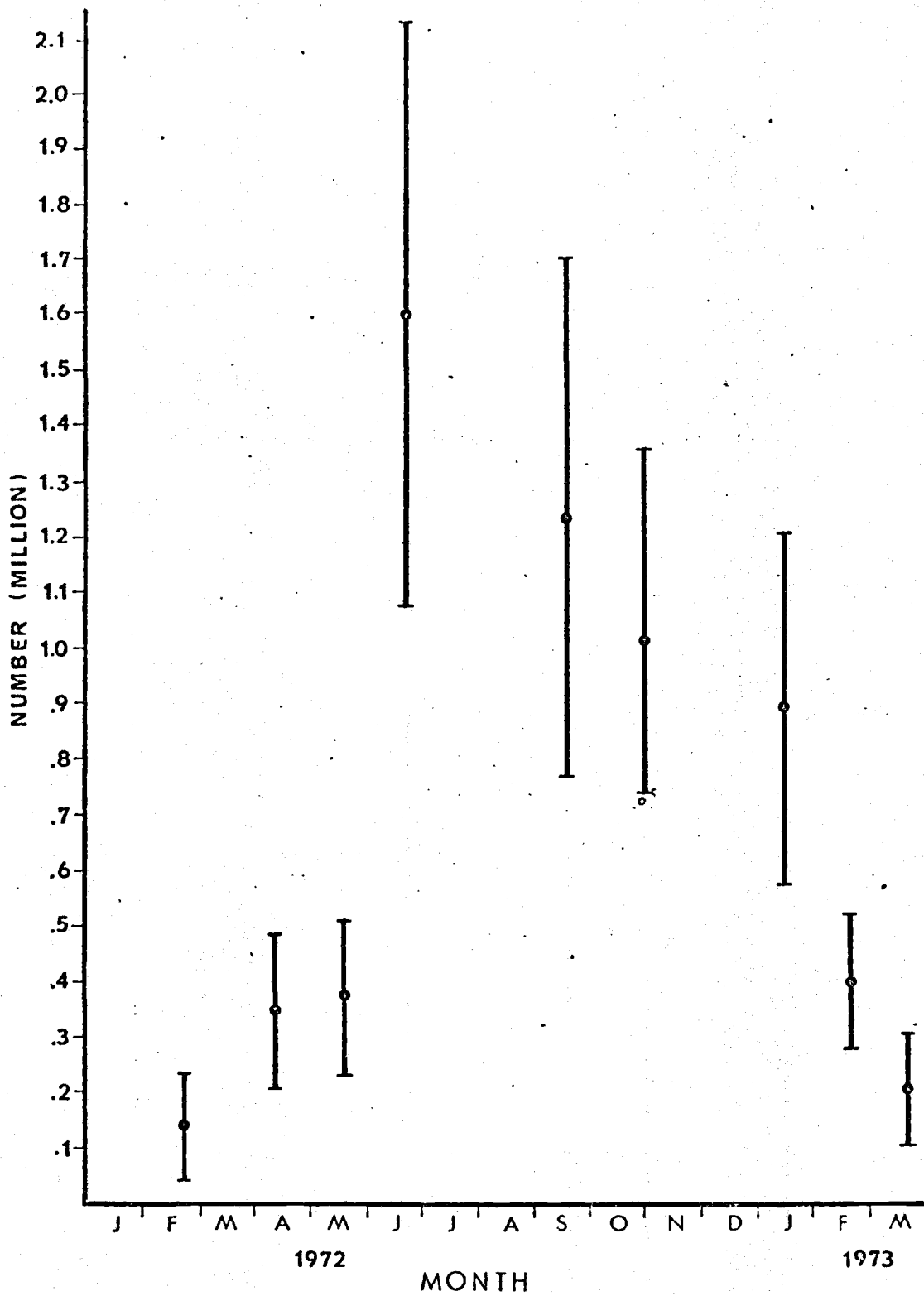


Fig. 2. Population estimate for the 1971 year class of sockeye salmon bounded by a 2σ confidence interval.

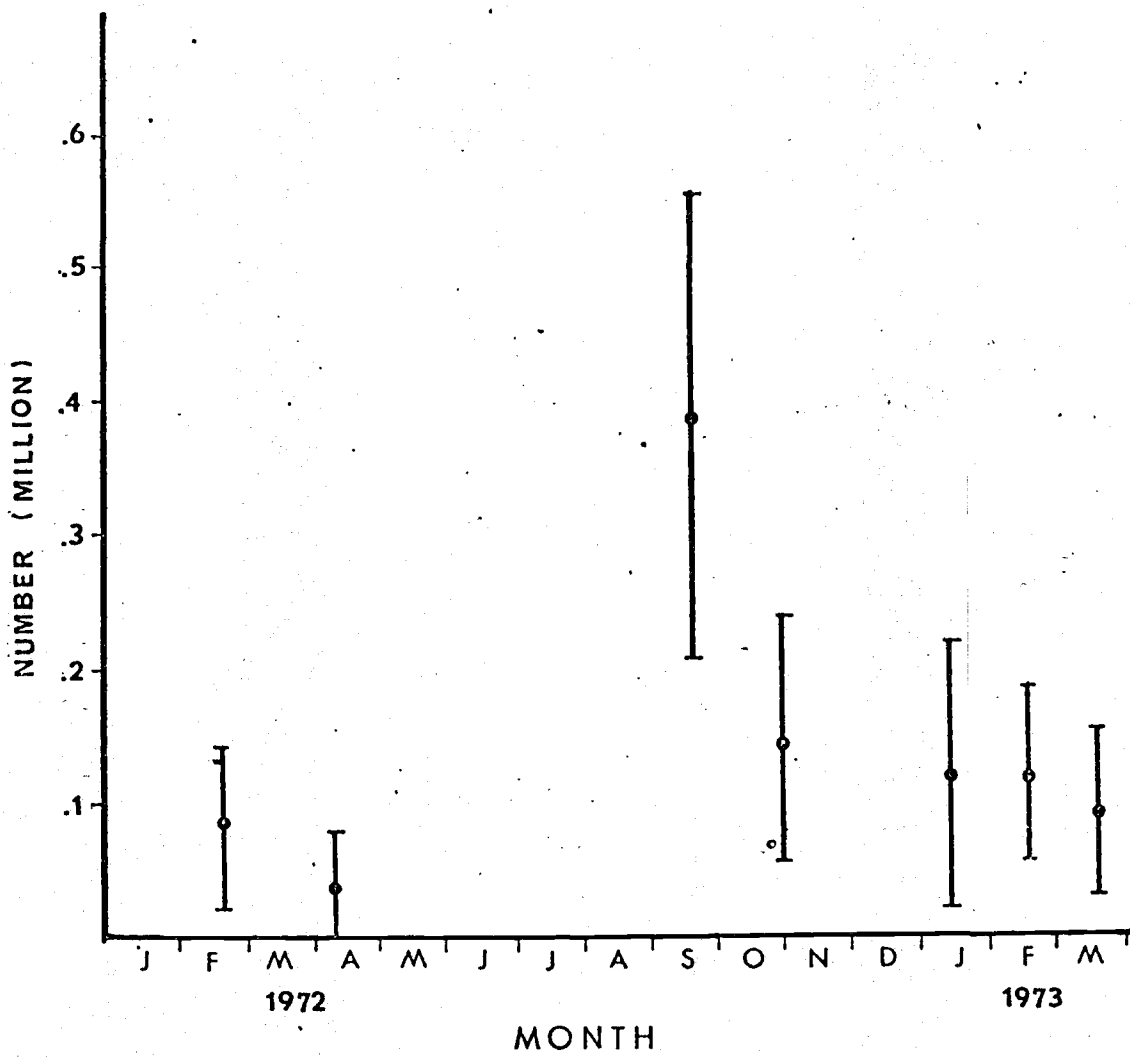


Fig. 3. Population estimate for resident kokanee and residual chinook combined bounded by a 2σ confidence interval.

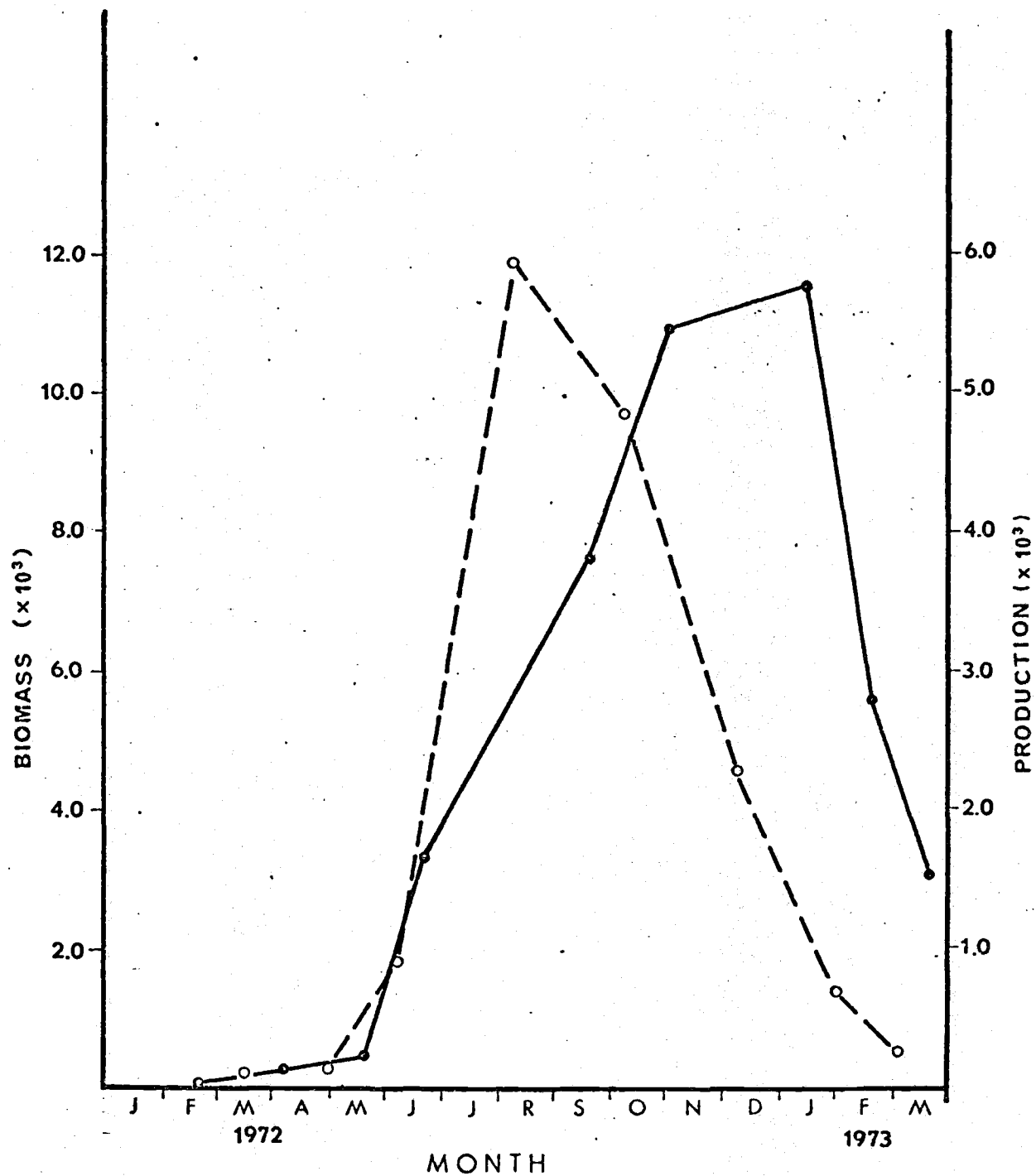


Fig. 4. Biomass (●—●) and production (○—○) estimates for the 1971 year class of sockeye salmon.