

Informational Leaflet 38

FORECAST OF THE CHIGNIK RIVER RED SALMON RUN IN 1964

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INTRODUCTION

Chignik sockeye salmon runs during the past ten years have ranged in size from 515,000 to 1,425,000 and averaged approximately 940,000 annually. The Fisheries Research Institute first began forecasts of these runs in 1958 and was joined by the Alaska Department of Fish and Game in 1961 in an effort to consolidate the collection and evaluation of existing data. The method of prediction outlined herein is based upon age composition of the adult run in 1963 and age and return relationships since 1955.

PREDICTION

The adult sockeye salmon runs returning to Chignik consist predominately of fish which have spent three winters in the ocean (designated .3 fish) along with a much smaller number which have spent two winters in the ocean (.2 fish). The relationship between the ratios of returning .2 fish and .3 fish of each parent year class for which we have data appears to exhibit a linear trend. The prediction is based on estimating the best linear equation to fit the data and then using this equation to obtain the predicted return for the next year. Generally speaking, the return of a large number of .2 fish one year has been a good indication of a sizable return of .3 fish the next year. A comparison of previous forecasts and actual returns is outlined in Table 1.

Table 1. Chignik forecasts, 1958-1963

Year	Predicted return	Actual return
1958	621,000	646,000
1959	834,000	827,000
1960	1,900,000	1,285,000
1961	795,000	721,000
1962	940,000	801,000
1963	1,348,000	906,000

An estimated total return of 245,000 age .2 fish in 1963 was calculated from scale samples collected in the Chignik Lagoon fishery during 1963. The mean return of .2 fish since 1955 is 85,000 not including this year's return. In view of this abnormally large return of .2 fish and the large error in the 1963 forecast a modified approach was taken to predict the 1964 run.

The prediction for the 1964 run has been split into two segments based upon our knowledge of time of entry of the two major spawning groups: (1) the early run (through June 30) which is destined largely for the spawning tributaries of Black Lake and (2) the late run (after June 30) which is bound mainly for the spawning areas of Chignik Lake. (Tagging in 1962 and 1963 showed that time of entry between Black Lake and Chignik Lake fish may vary up to 10 days between years, thus June 30 is an approximate date.)

Early Run: Through June 30

Simple linear regression analysis, which is based on the relationship of the number of .2 fish to .3 fish returning one year later, gives a prediction of 740,000 age .3 fish for the early run (Figure 1). To this is added the average number of .2 fish (28,000) which have returned annually in this same period since 1955 for a total prediction of 770,000 (rounded off) fish through June 30.

This is a larger number than has been experienced in any postwar year, but it is smaller than a few large runs which occurred during the 20's and 30's.

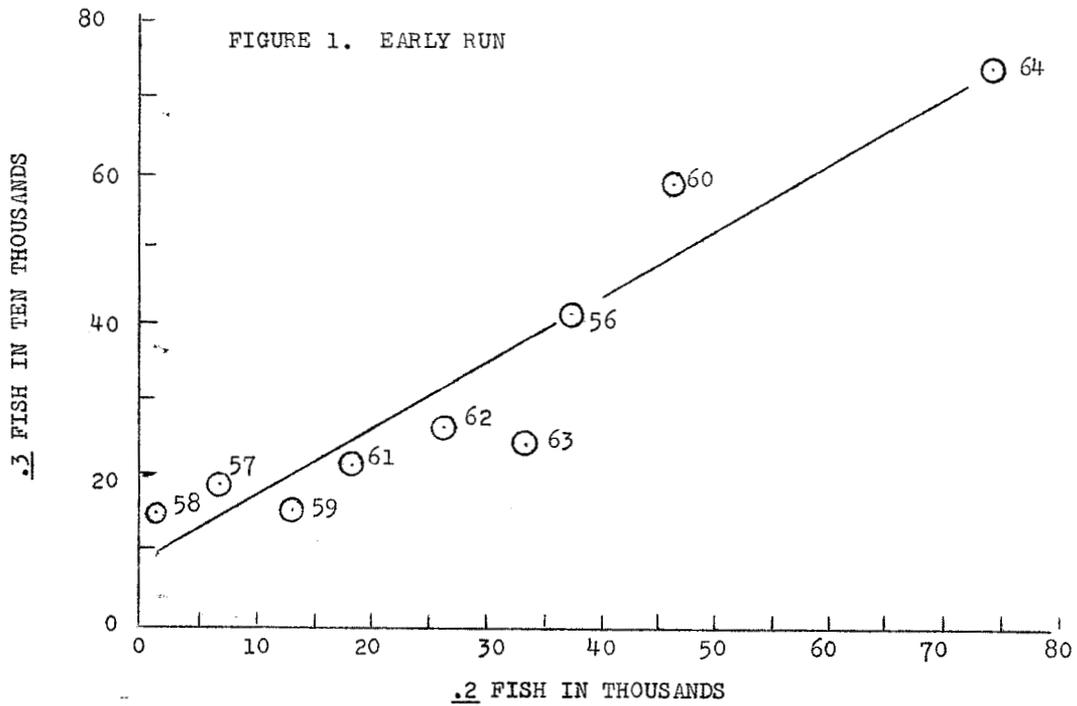
Late Run: After June 30

There appears to have been no relationship between the .2 fish returning one year and the .3 fish returning the following year since 1955 (Figure 2). The total late run of all ages during these years has ranged from a low of 354,000 in 1955 to 675,000 in 1960 except for the year 1956 when the return was 916,000. Thus, it seems reasonable to expect simply an average return for this period which (rounded off) is 570,000.

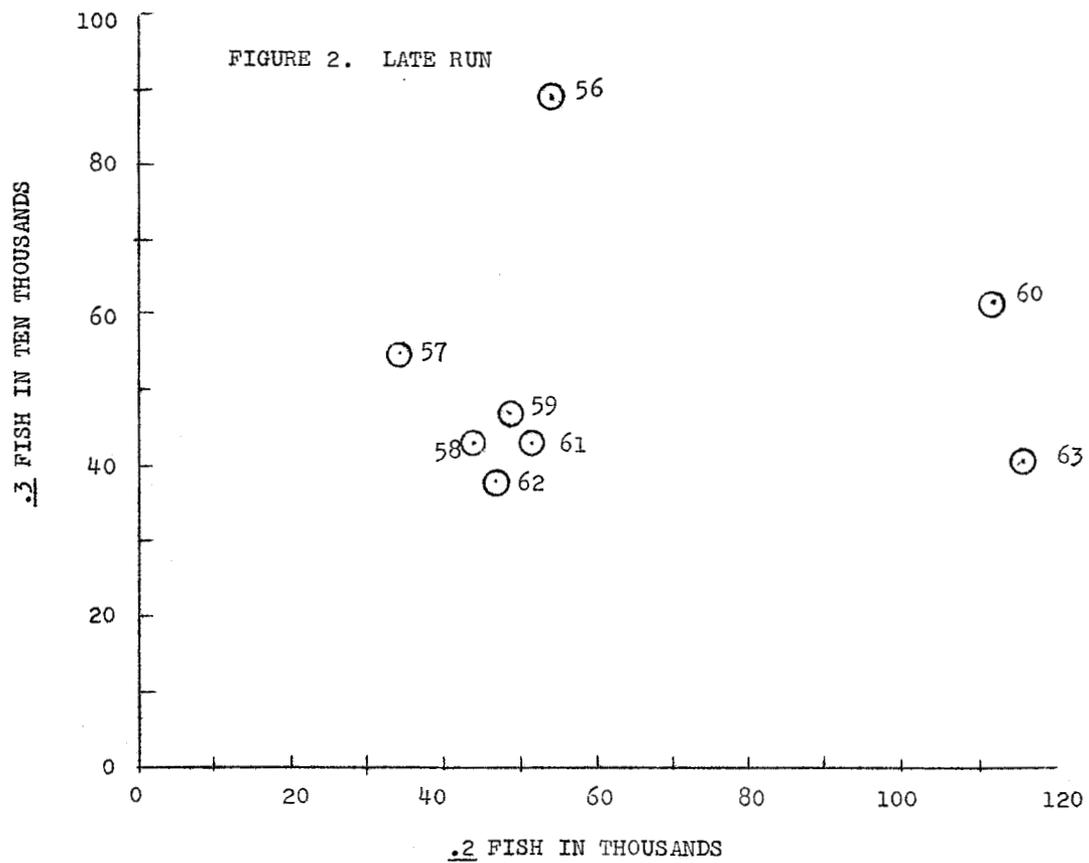
DISCUSSION

The most probable run which we expect would thus be 770,000 through June 30 and 570,000 after June 30 or a total of 1,340,000. We regard this forecast as not very reliable for the following reasons:

- (1) The escapement in 1959 to Black Lake, which should produce the principal early return in 1964 was poor and if a large return does occur it means unusually high freshwater and marine survival rates. Unfortunately observations of abundance of young fish in the lake were not obtained in 1960, but the growth rate of these fish was high indicating a low population consistent with the escapement.
- (2) Previous forecasts of larger-than-average runs based on larger-than-average returns of the .2 fish have not developed as well as expected. The regression system which we have used does include the lower rate of returns with these previous larger observations, but the numbers of .2 fish observed in 1963 was greater than we have previously experienced. Hence the forecast based on the larger-than-average returns of .2 fish is extrapolated well beyond the range of previous observations.



(Numbers beside points refer to year of .3 fish)



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- (3) Another serious source of error is the incidental harvest of sockeye salmon bound for Chignik at other places along the Alaska Peninsula. From tagging studies and records of the Stepovak Bay and the Cape Kumlik catches for the years 1958 through 1963 it would seem that a portion of the Chignik run is taken prior to reaching the Chignik Bay area.

Harvesting and processing problems may occur with a large early run because a peak can be expected within a 10-day period and cannot be handled unless fishermen and cannery are ready. A substantial fluctuation in the late run poses less operational problems because it extends over several weeks.

SUMMARY

We consider the regression estimates of 770,000 fish for the period through June 30 and 570,000 fish for the balance of the season to be the best estimates. However, we regard the early run estimate as quite uncertain and suggest that the industry expect a run larger than average (about 300,000) but try to be prepared for the possibility of a very large run.

The forecast for the late run appears to be subject to much less possibility of error but because of the unusually large return of 2-ocean fish in the later part of 1963 this run may also be somewhat larger than the average of recent years of 570,000.

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