RESEARCH SECTION

Oregon Department of Fish and Wildlife

Straying of Fall Chinook Salmon from Elk River Hatchery into Sixes River, 1970-1976
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ABSTRACT

Surveys from 1970 to 1976 disclosed that fall chinook salmon from Elk River Hatchery strayed into Sixes River for spawning. Of 1,784 carcasses sampled over the 7 years, 116 or 6.5% were hatchery fish from adjacent Elk River. The proportion of strays in the samples was variable from year to year, but absolute numbers in the river were not available for analysis of variation in the rate of straying compared to returns back to Elk River. The proportion of strays appeared to increase later in the spawning season possibly reflecting a delay in spawning among strays searching for their natal stream.

INTRODUCTION

Elk River Hatchery was constructed in 1968 to enhance the contribution of fall chinook salmon, *Oncorhynchus tshawytscha* (Walbaum), to Oregon's sport and commercial fisheries. At the same time, a research study was initiated to evaluate the success of the hatchery program. One aspect of this evaluation was to document the possible occurrence of straying of returning adults from Elk River Hatchery into adjacent Sixes River. The mouths of the two rivers are separated by a distance of only 5 km (Fig. 1). This report summarizes 7 years of observation from the first returns of hatchery fish in 1970 to returns in 1976.

METHODS

Information on general timing, distribution, and characteristics of fall chinook salmon spawning in Sixes River was obtained from annual spawning fish surveys. Survey effort was not proportionately distributed throughout all spawning areas and absolute numbers of wild and hatchery fish could not be obtained. However, the occurrence and relative importance of straying was documented from carcasses observed on the surveys.
Surveys were conducted between mid-November and mid-February in the main river and tributaries (Fig. 1). Carcasses were examined for species, sex, length, fin clip, and scales were taken for age determination. Because all smolts released from Elk River Hatchery were fin clipped, stray hatchery fish could be recognized. Marks that were questionable because of possible fin regeneration were confirmed by scale examination.

RESULTS

From spawning year 1970-71 to spawning year 1976-77, a total of 1,968 chinook salmon, 29 coho salmon, *O. kisutch* (Walbaum), and 4 chum salmon, *O. keta* (Walbaum), carcasses was sampled in Sixes River. Surveyors inspected 1,784 chinook salmon for fin clips among the 1,968 carcasses sampled in Sixes River. In early 1974, 184 chinook salmon were not examined for marks and these data were not included in the analysis.

Fin clips were observed on 119 of the 1,784 chinook salmon inspected. A total of 116, or 6.5\% of the total sample, corresponded to marks placed on fall chinook salmon at Elk River Hatchery (Table 1). The remaining three fin clips had been applied to juveniles seined or trapped in lower Sixes River in 1968 and 1969. The fin clips represented 14 of the 18 different groups of Elk River Hatchery chinook salmon returning during the study.

Table 1. Number of dead fall chinook salmon from Elk River Hatchery found in Sixes River, 1970-71 to 1976-77.

<table>
<thead>
<tr>
<th>Spawning year</th>
<th>Chinook salmon sampled</th>
<th>No. of strays</th>
<th>Percent occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970-71</td>
<td>444</td>
<td>2</td>
<td>0.4</td>
</tr>
<tr>
<td>1971-72</td>
<td>135</td>
<td>3</td>
<td>2.2</td>
</tr>
<tr>
<td>1972-73</td>
<td>298</td>
<td>51</td>
<td>17.1</td>
</tr>
<tr>
<td>1973-74</td>
<td>371</td>
<td>16</td>
<td>4.3</td>
</tr>
<tr>
<td>1974-75</td>
<td>137</td>
<td>20</td>
<td>14.6</td>
</tr>
<tr>
<td>1975-76</td>
<td>165</td>
<td>14</td>
<td>8.5</td>
</tr>
<tr>
<td>1976-77</td>
<td>234</td>
<td>10</td>
<td>4.3</td>
</tr>
<tr>
<td>Total</td>
<td>1,784</td>
<td>116</td>
<td>6.5</td>
</tr>
</tbody>
</table>
Peak numbers of carcasses of native and stray fall chinook salmon in Sixes River were found in early January, but strays appeared to spawn slightly later than native stocks (Fig. 2). As time passed, the proportion of stray salmon observed increased compared to native Sixes River chinook salmon (Fig. 3). Stray salmon showed no unusual distributions of sex, age, or length and appeared to spawn successfully.

DISCUSSION

Fall chinook salmon from Elk River Hatchery were found in Sixes River in each year that surveys were made. No absolute estimates of stray and native salmon could be made, but in some years there appeared to be more than in other years. If absolute numbers were available, then an analysis of straying to Sixes River compared to the return to Elk River from various release groups could be done. Whether fish from the natural population in Elk River also stray into Sixes River cannot be documented because wild stocks have not been finmarked. However, because of the close proximity of the two rivers, the populations have probably intermixed for many years. Since 1970, the large runs of hatchery adults in Elk River may have contributed more strays into Sixes River.

The difference in spawning time between stray and native salmon could indicate some difference between the two stocks but, more likely, it was caused by the behavior of individuals that strayed. The peak in spawning occurs from mid-December to mid-January in Elk River (Burck and Reimers, 1977). Most characteristics of the two rivers appear to be similar and were not likely to produce differences in spawning time.

Because spawned-out stray salmon were found throughout the Sixes River, they were assumed to interbreed with the native population. The effect of
Fig. 2. Time when spawning native and stray fall chinook salmon were found as carcasses in Sixes River, 1972-1975
Fig. 3. Proportion of stray fall chinook salmon from Elk River Hatchery found on spawning surveys in Sixes River throughout the spawning periods, 1972-1975.
increased straying on native Sixes River chinook salmon could be insignificant if one assumes the two stocks have previously exchanged enough genetic information to effectively form a common gene pool. However, if intermixing has not previously been extensive, current or increased production at Elk River Hatchery could potentially modify the existing gene pool of fall chinook salmon in Sixes River. More quantitative data are needed to fully assess the situation.

ACKNOWLEDGMENTS

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LITERATURE CITED