

## Variability in growth and survival of Korean chum salmon in relation to climate changes during the 1980s-1990s

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### Introduction

Climatic or oceanic events could affect salmon growth through changes in seawater temperatures and the availability of food organisms. The changes in abundance of chum salmon rapidly increased in the 1980s and the early 1990s in the North Pacific Ocean, and survival of the early stage is the most important factor for determining biomass. A relationship between chum salmon growth, homing success, and environmental conditions in the subarctic Pacific Ocean was investigated.

### Material and methods

Adult chum salmon were caught in the east coast of Korea between Sept. and Dec. in 1984-1998, except 1995. We selected three habitat areas (off the east coast of Korea, the Okhotsk Sea, and the Bering Sea) for a study of Asian chum salmon growth. We divided into several age groups, and determined growth conditions of their past using scales. For example, the distances ( $r_2-r_1$ ), ( $r_3-r_2$ ), and ( $r_4-r_3$ ) from age-5 salmon likely reflect past growth conditions in the Bering Sea and the open sea at age 2, 3, and 4, respectively. Distances  $r_c$  and ( $r_1-r_c$ ) indicate salmon growth in Korean coastal areas and in the southern Okhotsk Sea, respectively. Also, based on age composition of Korean chum salmon between 1984-1994, we estimated the return rate.

### Results and Discussion

In estuarine and coastal areas, growth rates of fingerling salmon were higher in the 1990s than in the 1980s. Concurrently, zooplankton abundance off the east coast of Korea increased after the late 1980s. Growth of juvenile chum salmon during the first summer in the Okhotsk

Sea was relatively stable, and neither SST nor zooplankton biomass (Shuntov & Dulepova, 1996) fluctuated significantly during the study period. In the Bering Sea, salmon growth rates between age-2 and age-4 were higher in the 1980s than in the 1990s. Variability in salmon growth in the Bering Sea was correlated to zooplankton biomass from Sugimoto & Tadokoro (1997). We have shown through this research that food availability is more important than seawater temperature in chum salmon growth in the North Pacific, although it is not easy to decouple the effects of these factors on fish growth. It is evident that ecosystem responses were different with respect to the locations of the marine ecosystems that chum salmon inhabit at various life stages, but the results of this study have the signs of a bottom-up process. In this research, we can say the homing success of Korean chum salmon in the 1980s was dependent on the early growth during first summer through winter.

## Reference

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