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Japanese Research Plan in 1999/2000

by

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Japanese Research Plan in 1999/2000

1. SALMON POPULATION DYNAMICS

1-1 Coastal environment

Northern Japan is located in the southern limit of anadromous salmonid distribution, and the coastal environments occupy a significant impact on the survival of juvenile salmon. Salmon habitat environments will be monitored at 14 stations along the coast of Hokkaido, where juvenile salmon migrate in spring season. This monitoring program includes surface water temperature, salinity, and zooplankton biomass.

1-2 Offshore environment

In relation to climate changes such as global warming, oceanographic conditions for salmon habitat including physical and chemical conditions, and phytoplankton and zooplankton biomass will be monitored in the western and central North Pacific, the Bering Sea, and the Gulf of Alaska in summer.

1-3 Biological monitoring of salmon in the North Pacific Ocean

Independently of coastal catch and escapement data, salmon abundance and fish size will be monitored on board the salmon research vessels in the western and central North Pacific, the Bering Sea, and the Gulf of Alaska in summer.

1-4 Biological monitoring of adult salmon

This long-term monitoring research will focus on evaluating salmon stock conditions affected by various factors. Body size, fecundity, and egg size will be examined in adult chum salmon returning to major spawning rivers in Japan. The age structure will be determined in each local salmon population. Genetic variations will be monitored in five hatchery populations of chum salmon and a pink salmon population. Health status will be evaluated for wild and hatchery salmon.

1-5 Survival and growth of salmon

To clarify the survival process and growth history of salmon, the survival and growth rate at each life stage are estimated using mark-recapture experiments, calcified-tissue analyses, and population monitoring of high-seas salmon and returning adults.

2. SALMON LIFE HISTORY

2-1 Coastal life history of juvenile salmon

Major mortality of chum and pink salmon may occur during the initial coastal life. Thus the coastal life history studies are important to understand the survival mechanism of salmon. Feeding, growth and survival of juvenile chum and pink salmon will be surveyed in the Nemuro Strait, eastern Hokkaido. The migration route of thermally marked chum salmon juveniles will be determined by geographically continuous surveys along the coast of Hokkaido.

2-2 Offshore migration and distribution of salmon

To visualize offshore migration and distribution of salmon, abundance and biological data (species, age compositions, and maturity) collected by the salmon research vessels will be analyzed retrospectively. Tagging experiments using archival and disc tags will be conducted in the Bering Sea to investigate Japanese chum salmon migration route and relationship between salmon migration and ocean conditions.

2-3 Feeding and growth of high seas salmon
To clarify ocean life history of Pacific salmon, variation of growth, maturity, and feeding ecology of salmon in the ocean will be analyzed using the data collected by the salmon research vessels.

2-4 High seas interaction
To clarify species interaction such as between chum and pink salmon and to investigate stocks interaction such as between Japanese and other chum salmon stocks, salmon abundance, distribution, prey organisms, and somatic growth obtained from high-seas surveys will be analyzed retrospectively.

2-5 Homing migration and maturing mechanism
To determine the maturing mechanism, endocrinological surveys will be conducted for chum salmon during their feeding and homing migrations. Archival tags will be used for adult chum salmon migrating in the coastal waters to elucidate how they find out the natal river.

3. SALMON STOCK IDENTIFICATION

3-1 Genetic stock identification
The genetic population structure and distribution of chum salmon will be determined by genetic stock identification (GSI). The GSI samples will be collected in the eastern, central and western waters of the North Pacific Ocean, and the central Bering Sea by Japanese research vessels.

3-2 Thermal otolith marking
About 4.5 million chum salmon fry will be released in the Chitose River after thermal otolith markings. Thermally marking techniques and facilities will be developed for further mass markings at Japanese national hatcheries. Thermally marked chum and pink salmon will be monitored in the North Pacific Ocean and Bering Sea.

3-3 Stock identification by scale pattern
To clarify stock composition in the North Pacific Ocean, chum salmon stock identification will be conducted using scale pattern. Cooperative sockeye salmon stock identification using scale pattern will be conducted with scientists of member countries, if possible.

3-4 Stock identification by high seas tagging
To confirm stock distribution in the limited survey area such as in the central Bering Sea and the Gulf of Alaska, tagging experiments will be conducted on board the salmon research vessels.

4. SALMON STOCK ASSESSMENT

4-1 Modeling of salmon population and ecosystem dynamics
Using numerical models, dynamics of salmon population will be simulated and the effects of density dependence, environmental factors, carrying capacity, interaction with other populations, and harvest strategy will be examined and possible future survey will be proposed.

4-2 Salmon stock assessment and forecast
To manage salmon stocks, numbers and conditions of stocks will be assessed and forecasted using monitoring of conditions of released juveniles, survival, growth, environmental factors during freshwater, coastal, and oceanic lives, and population structure of returning adults.