

X. Symposium Review

This symposium has been a successful venue to bring together 29 oral and 32 poster presentations on Pacific Rim salmonid stocks. It is clear from the presentations that salmon science has been examined from the most minute detail to the broad perspective of its ecosystem.

Historical catch records of the fisheries indicate that salmon has been important to the cultural activities and heritage of the people of four major nations that extends in an extensive geographical arc from northern Japan through the Russian Far East, to the entire coastal areas of Alaska, down to western Canada and farther south to northern California. In modern history, the salmon resource continues to feed the world, provides for a thriving commerce, and offers recreational experiences to millions of people.

The present World-wide catch of salmon amounted to 1.5 million metric tons annually, hatchery and wild-run fish combined. The North Pacific Rim catch amounted to almost 1 million metric tons of the total. By country, the percent catch contribution, by weight, averaged 48% by the United States, 27% by Japan, 20% by Russia, and 5% by Canada. Five salmonid species make up the bulk of the catch: pink (34%), chum (30%), sockeye (27%), coho (5%), and chinook (3%). The poster session by Dr. Irina Shestakova puts the gross value of the North Pacific salmon catch at more than \$1 billion annually.

This symposium has illustrated that there is successful hatchery technology to enhance natural runs of salmon stocks. Hatchery-reared salmon are being released into the North Pacific Ocean to augment natural salmon production and to rebuild depleted natural runs. The total number of juvenile salmon estimated to enter the North Pacific ocean system amounted to 20-30 billion fish per year. Hatchery releases accounted for 16-25% of the total. In 1995, hatchery releases were 5.2 billion fish. Forty-one percent of the hatchery releases were from Japan, 39% from the United States, 10% from Canada, and 10% from Russia. These fish went to sea and the survivors migrate back to their natal release areas as adult salmon.

Since the North Pacific ocean is the common grow-out area for juvenile salmon from all the North Pacific rim countries, the question of stock migration, distribution, and intermixing of the stocks has always captured the attention of scientists. During the days when high seas fishing operations were authorized, the subject of fish interception of one stock while fishing another was controversial among the user groups.

Since high seas salmon fishing has been prohibited under the international convention that established the NPAFC, the question of intermixing of

the stocks has remained important from a scientific point of view as more hatchery-raised fish are released into the ocean that would compete with stocks of many natural origins. As release numbers grow, they would affect the growth rates of fish and the overall carrying capacity of the oceans. Thus the distribution and migration of the stocks and research technology to identify fish from different stocks remain important science topics for the Commission.

The symposium also highlights the broader question of carrying capacity of the oceans and effect of environment on fish production. Can we produce more? What will be the impacts? We heard a report of interactions between juvenile chum salmon and fat greenling juveniles. We also heard a report of predation on salmon by salmon sharks. These presentations pointed out that prey-predator relationships are intricate and more research needs to be conducted among the ecologically related species.

Eventually, our studies of the oceans come back to the effects of Mother Nature. How do the various components of the environment affect salmon biology, population dynamics, and production? A speaker at the symposium stated that "Nature knows no bounds". However, mathematicians and computer simulation experts will attempt to simplify and simulate the ocean system. We heard a few reports on computer simulations. The take home message is pretty much the same -- we need more data and more research.

The NPAFC and its predecessor organization, INPFC, has provided the focal point for salmon research and coordination of national research programs on anadromous species in the North Pacific the past 40 years. This symposium indicates that such programs are still pertinent and the scientists have kept learning. We must all contribute freely to the advancement of salmonid science in the North Pacific Ocean because the salmon resource must be maintained to sustain our fish food supply, enhance our fisheries economy, and provide for recreational opportunities.

"Sustainable development" has been a global goal in recent years. In the North Pacific salmon case, such development should refer to the continued development of social and economic benefits to improve the quality of life associated with the use of the Pacific salmon resource. We must apply science to further achievement of this goal.

Loh-Lee Low
Chairman
Committee on Scientific Research and Statistics
1996-1997