

3-3. Feeding Habits and Trophic Interaction (Oral-26)

GIS Analysis of Potential Trophic Interactions between Pacific Salmon and Their Predators during Marine Life Period

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Correct estimates of predator-related Pacific salmon mortality should take into account total abundance estimates of Pacific salmon and their predators, as well as degree of predator-prey spatio-temporal overlap. Variability in degree of predator-prey spatio-temporal overlap is important for understanding interannual differences in Pacific salmon survival. In this study different GIS techniques were employed to quantify and interrelate carnivorous fish and Pacific salmon distribution and total abundance over the range of spatio-temporal scales. Only fish species, which typically prey upon Pacific salmon, were analyzed. BASIS surveys data for 2002-2007 period (including information on observed injuries), as well as TINRO-Center trawl surveys archival data (over 20 thousand research trawl stations covering entire Russian EEZ) for 1980-2007 period were utilized. GIS analysis was employed to quantify Pacific salmon and their predators total and relative abundance estimates for every season, large-scale geographic domain (Bering, Chukchi, Okhotsk and Japan Seas and adjacent waters off North Pacific), small-scale geographic domain (shelf, continental slope, deep-water basins) and water strata (upper epipelagic, lower epipelagic and mesopelagic layers). Discussion on methodology of GIS techniques for estimating local and total abundance of Pacific salmon and their predators was provided. Different spatio-temporal domains of Russian EEZ were ranked in relation to Pacific salmon and their predators' species composition, abundance and degree of predator-prey spatial overlap. Pacific salmon predators distribution patterns were related to those of salmon and species-specific inferences on resulting spatio-temporal variability in salmon mortality were made. The predation intensity is likely to increase during the periods of lowered Pacific salmon abundance, accompanied by increased abundance and geographic range expansion of their predators. Ratio of total abundance of Pacific salmon species to that of certain predator at a given time period and location may serve as indirect measure of resulting predation intensity. Predator spatial distribution pattern is often a tradeoff between selection of optimal abiotic environment and better feeding conditions. Therefore, density-dependent habitat selection processes and climate-induced changes in spatial distribution of Pacific salmon and their predators should be regarded as important sources of interannual variability in Pacific salmon mortality as the predator-prey spatial overlap might become significantly altered. In many instances spatial distribution of injured Pacific salmon was not a good indicator of spatial allocation of predation intensity (presumably, due to the dispersal of injured individuals), which implies that spatial occurrence of injured Pacific salmon should be treated carefully in the context of predator-prey relationship.