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Estimates of Ocean Mortality of Northeast Kamchatka Pink Salmon

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Abstract

The ocean mortality of six broods of Northeastern Kamchatkan pink salmon was estimated. The estimates show considerable year-to-year variability in ocean mortality - in coastal waters ranging from 53.1 to 94.4% in the first weeks (40-45 days), and from 55.4 to 95.8% in the last period of ocean life (~360 days).

Introduction

The highest mortality of pink salmon is thought to occur early in their marine life (Manser and Shepard 1962; Parker 1962, 1968; Ricker 1964, 1976; Shershnev 1973; Karpenko et al. 1994). The abundance of other species of Pacific salmon may also be established during this period (Ricker 1966, 1976; Shershnev 1973; Mathews and Buckley 1976; Kulikova and Rosly 1978). Estimates of early ocean mortality of Pacific salmon can be used to forecast the returns of adults from each brood. Pink salmon is a convenient species for studies of ocean mortality because of its short life cycle.

After direct estimation of the abundance pink salmon juveniles in the Lithke Strait began in 1987, it was possible to estimate ocean mortality of Karaginskii region pink salmon. In this report, estimates of the ocean mortality of Northeastern Kamchatkan pink salmon are calculated from direct estimates of the abundance of fry, juveniles, and spawners.

Methods

Data for this report were collected during annual field investigations at shore stations and on vessels in the coastal region of Northeastern Kamchatka. Abundance was estimated from helicopter surveys of adult salmon on the spawning grounds, counts of fry at traps in the Khayljulia and Kichiga Rivers, and purse seine catches of juveniles at standard stations in the Lithke Strait. Total run size includes estimates of escapement of adults to the spawning grounds and total commercial catch. All of the foregoing data apply only to Karaginskii region pink salmon. Abundance estimates are from the annual reports of scientists of the salmon laboratories of KamchatNIRO, who are

working on investigations to forecast runs of adult salmon (L.E. Grachev, A.G. Ostroumov, K.Y. Nepomnjaschii, I.V. Tiller, A.N. Khodko, A.N. Smetanin, S.A. Sinjakov, pers. comm.).

For estimation of pink salmon abundance at different life history stages standard methods were used (Karpenko 1992). The abundance of pink salmon juveniles in Lithke Strait was estimated by the squares method, based on distribution of catches (Mayskii 1940). In this method, the squares with equal catches were used.

Results

The catches of pink juveniles varied considerably from year to year (Fig. 1). In coastal waters, the mortality of low-abundance broods (even years) was usually lower than that of high-abundance broods (odd years), which was very high (Table 1). An exception was the 1991 brood. In 1992, juvenile pink salmon inhabited the littoral zone for a very short period, and migrated early into Lithke Strait, where there were dense concentrations of pink juveniles (see Fig. 1). In 1992, the largest catches of pink salmon juveniles in Lithke Strait were eight times higher than in 1988, when abundance of juveniles of the 1987 brood was high. I think that the high mortality of the 1991 brood in offshore waters was connected to poor environmental conditions, and this was confirmed by biological and biochemical indices of fishes (Karpenko et al. 1994). In offshore waters, the rates of pink mortality in both generations (even and odd years) were similar, and ranged from 55 to 96%.

The results show significant pink salmon mortality in the sea in both the coastal and offshore period. Total ocean mortality ranged from 83.6 to 98.7%. Similar rates of mortality were estimated by R. Parker (1968) for three broods of pink salmon from the Bella Coola River, B.C. (59-77% in the first 40 days and 78-95% in the last 410 days).

The causes of year-to-year variability in ocean mortality of Karaginskii district pink salmon will be discussed in a later report.

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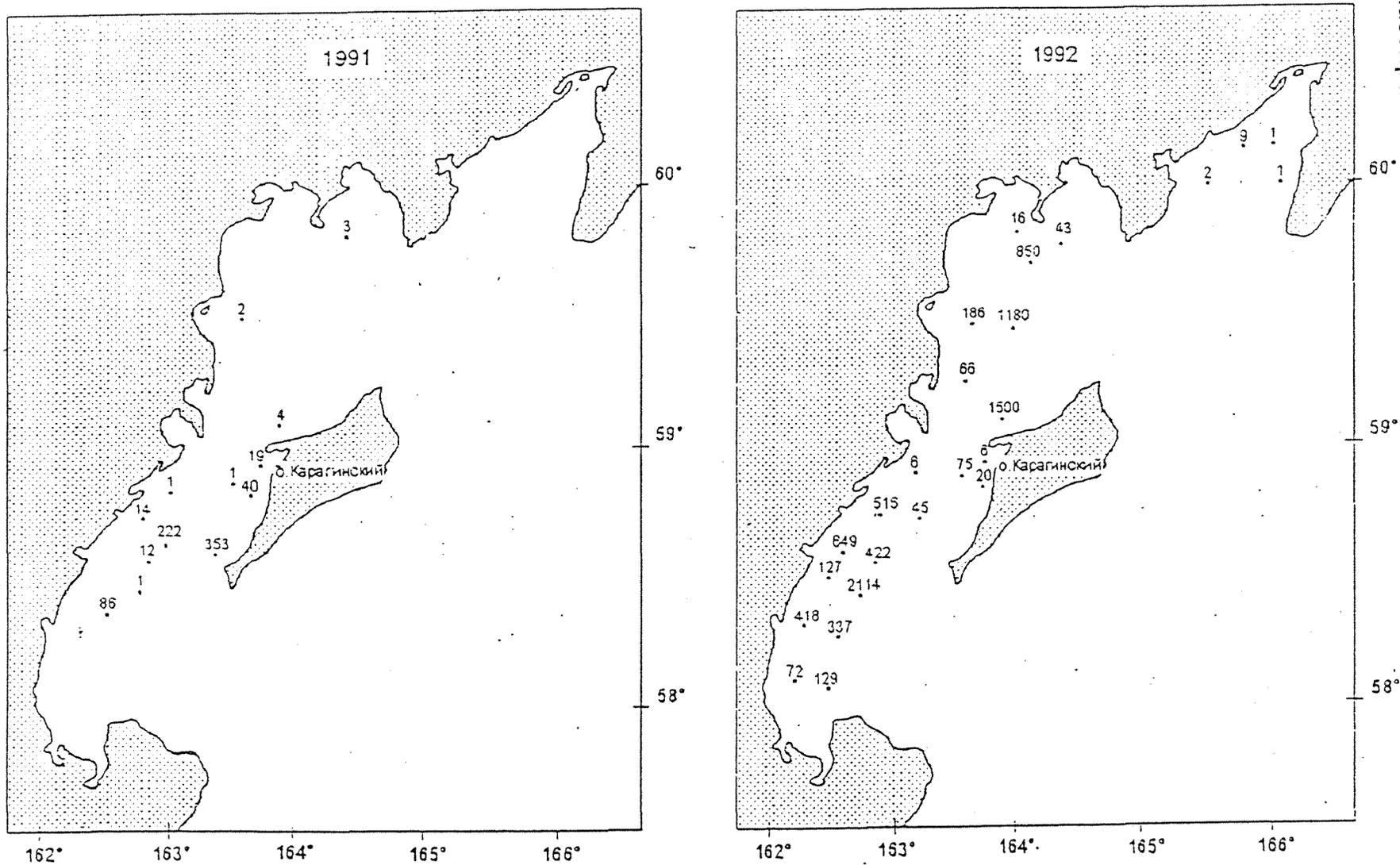


Fig.1. Catches pink salmon juveniles by purse seine in the Lithke Strait, Karaginskii Bay (July-August, 1991-1992).

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Table 1. Abundance estimates (millions of fish) and ocean mortality of Karaginskii region pink salmon

Brood	Abundance (millions of fish)				Mortality (%)		
	Spawners	Fry	Juveniles	Run size	Coastal	Offshore	Total
1986	1.34	33.5	12.3	5.5	63.2	55.4	83.6
1987	28.50	4104.0	231.7	62.5	94.4	73.0	98.7
1988	1.83	295.5	99.6	21.3	66.3	78.6	92.8
1989	18.90	1631.3	-	86.7	-	-	94.7
1990	8.80	328.2	153.8	6.4	53.1	95.8	98.0
1991	29.30	2105.2	432.6	41.8	79.5	90.3	98.0