

Monitoring of Salmon Smolt Numbers in the Khabarovsk Region

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The Khabarovsk region is divided into seven fishery districts: the Okhotsky district, the Ayano-Maysky district, the Tuguro-Chumikansky district, the Sakhalinsky Bay, the Amur River drainage, the Amur River estuary, and the Northern Primorye (Sea of Japan coast). In five of these districts we count the number of salmon smolts in reference streams. We use a standard method of selective catches with cone-shaped fyke nets, invented in 1939 by a Russian scientist, A.Ya.Taranetz. Our reference streams are the Okhota River in the Okhotsky district, the Iski River in Sakhalinsky Bay, the My River in the Amur River estuary, and the Ulika River, a tributary to the Tumnin River, in Northern Primorye (Fig. 1). In the Amur River drainage the monitoring of smolts is carried out on several of the main spawning tributaries (Fig. 2). In the Amur River, which is the most important salmon drainage of the Khabarovsk region, we count pink salmon and both summer and fall forms of chum salmon.

Fig. 1. The reference rivers for monitoring salmon fry numbers in the Khabarovsk District, Russia.

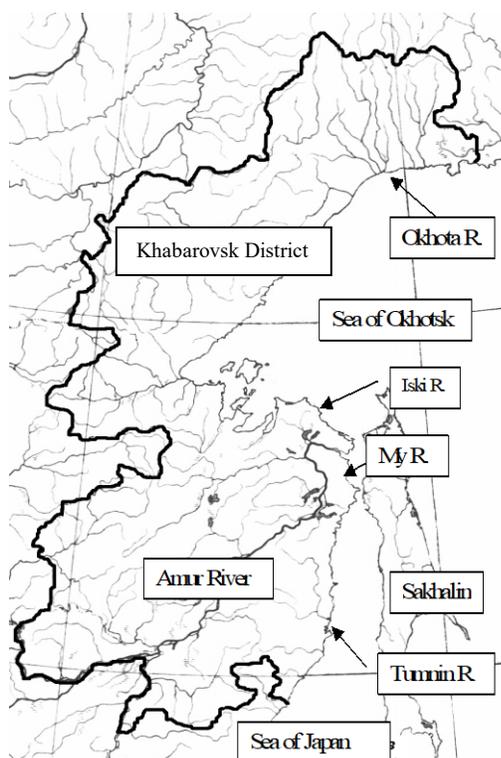
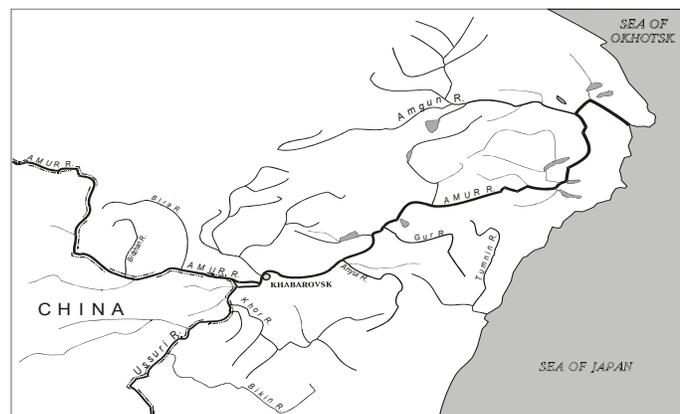


Fig. 2. The lower Amur River and main tributaries.



Some of the fall chum salmon smolts in the Amur drainage are of hatchery origin. There used to be four hatcheries, and a fifth hatchery on the Anui River started operating in 1999. The total number of fish released by these hatcheries over a period of 11 years is insignificant—409 million smolts, which confirms that the hatchery program in the Amur River drainage is not yet effective. We also think that the hatcheries have not affected the population structure and natural dynamics of the numbers of wild salmon smolts in the Amur River (Fig. 3).

Our salmon fry monitoring has highlighted some negative changes in the potential of different Amur River tributaries for natural reproduction of fall chum salmon. Since 1968, the share of natural reproduction of fall chum salmon in the upper tributaries, Bidshan, Bira and Ussury, has seriously decreased. The decrease is caused by very active driftnet fishing by Chinese fishermen in the headwaters of the Amur River drainage. Most of the spawners in these upper tributaries cannot reach their spawning grounds. The problem is serious for fall chum salmon because the Ussury River spawning grounds used to account for 40% of the natural reproduction, and those of the Bidshan, Bira, and some other tributaries of the middle Amur (combined) were 10% of the natural reproduction for the entire Amur drainage (Fig. 2).

The fall chum salmon spawning grounds in Russia, situated downstream from the border-zone with China, are always filled with spawners. The quality of the spawning grounds is high because the territory is not populated, and industries have not developed on spawning tributaries. Therefore, the annual harvest of wild fall chum salmon smolts in the Anui River (393 km long) is between 10 and 35 million fish (Fig. 4).

The spawning streams of the right tributaries to the Ussury River, situated in Russian territory, also are of very good quality for salmon reproduction, but the spawners cannot reach them. The counting of fall salmon chum smolts has shown that the Khor River (453 km long), for example, has an annual harvest of about 0.1 million fish only. The Anui and Khor are neighboring rivers, but their mouths are separated by Russia-China frontier waters.

At present, the most important spawning stream is the Amgun River—the left tributary of the Lower Amur. This river hosts up to 60% of all summer chum fry and up to 60% of all pink salmon fry in the Amur River.

In 2000, we counted pink and chum salmon smolts in the narrowest stretch of the main channel of the Amur River near Susanino, 110 km from the river mouth. The fyke-net was fixed to an anchored boat. The maximum speed of current was 100–120 cm/sec. The water temperature at the beginning of

observations (May 24) was 11.2°C; on June 8—13.7°C; and at the end of the survey (June 17)—17.6°C. Chum salmon smolts were represented mostly by specimens from 35 to 44 mm long (81.4%), and the prevalent weight group was 325–524 mg (69.5%). The average sizes of chum salmon smolts were 38.3 mm FL and 463 mg. The average sizes of pink salmon smolts were 33.2 mm FL and 245 mg. In 1973 the average sizes of chum salmon smolts were 37.1 mm FL and 477 mg, and pink salmon averaged 32 mm FL and 261 mg (Yu. S. Rosly, Khabarovsk Division of TINRO, unpublished data). Therefore, the average length and weight of salmon smolts has actually not changed in last 27 years. The distribution of weight frequencies of chum smolts is normal (Fig. 5).

Fig. 5. Frequency distribution of the weight of the chum salmon smolts in the lower Amur River, May 24–June 17, 2000.

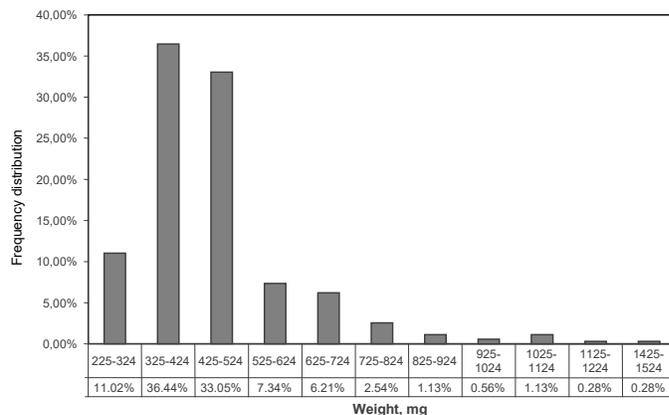


Fig. 3. The numbers of wild smolts of summer and fall chum (A) and of hatchery fall chum smolts (total from all hatcheries) (B) in the Amur River (in millions of fish).

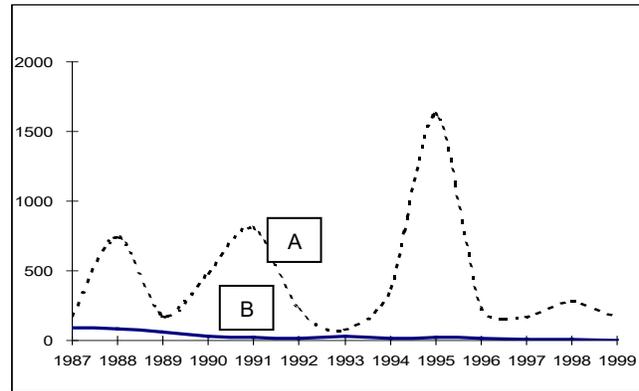
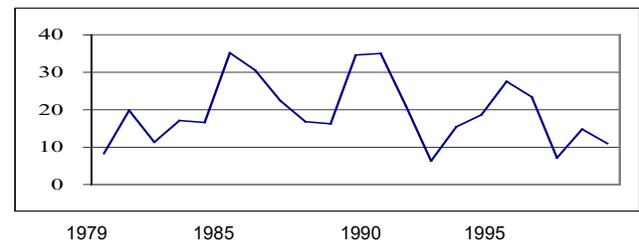


Fig. 4. The numbers of wild fall chum salmon smolts in the Anui River drainage (millions of fish) between 1979 and 1999.



The peak of the downstream migration of chum fry started on May 26 and finished on June 7 with a maximum on June 7. The period of downstream migration of pink salmon smolts was even shorter than that of chum salmon—from May 28 till June 9 only. The maximums of the runs of both species have coincided. The interpolation of smolt catches over the entire migration period gives us an estimate of the total number of Amur River downstream salmon migrants (excluding the Amgun River) of 289,646 million chum salmon and 31,726 million pink salmon.