Using Results of Genetic Identification of Juvenile Pink Salmon for More Accurate Forecast of Spawning Runs in the Okhotsk Sea Basin

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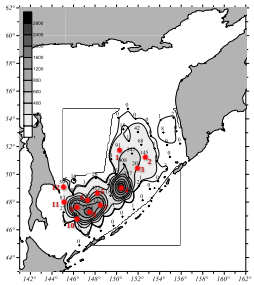
ABSTRACT

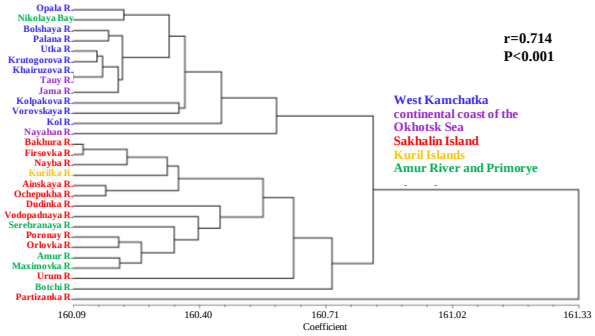
The Okhotsk Sea is the area of aggregating juvenile pink salmon in early marine period after their emigration from streams of West Kamchatka, continental coast of the Okhotsk Sea, Sakhalin, Kuril Islands, the Amur River and Primorye. Estimation of the juvenile stock abundance for all mentioned regions is provided on the base of annual trawl surveys; materials for genetic researches have been collected in the course of these surveys. In this paper we demonstrate results of regional composition genetic identification for mixed aggregations of juvenile pink salmon in the Okhotsk Sea surveyed by the RV *TINRO* in October and November 2013. According to the results we have obtained, the part of the «northern» group of populations of the Okhotsk Sea basin, including West Kamchatka and northern continental coast of the sea, in mixed aggregations of juvenile pink salmon is relatively small – about 24%. The main part (58%) of the juvenile aggregations was identified as Sakhalin-Kuril stock. The part identified as populations of the Amur River and Primorye is about 17%, and the part of «unknown origin» – less than 1%. It should be noted, that the results we have obtained for 2013 did not comply to existing regional ratio for pink salmon runs of even generations in the Okhotsk Sea basin. For instance, in recent years the part of West Kamchatka pink salmon in even years was similar to (or even exceeding) the part of Sakhalin-Kuril pink salmon, whereas believing to the results of the identification we have provided for juvenile mixed aggregations during early period of feeding at sea in 2013 the part of the West Kamchatkan juvenile fish is visibly lower. The runs of pink salmon in 2014 to the regions of spawn within the Okhotsk Sea basin, confirmed the significant reduction of the West Kamchatkan stock we have revealed.

Location, period of collection, and number (N) of juvenile pink salmon samples collected during cruises in October and November 2013:



№	Date	Latitude/Longitude	N
1	27 October	51°83'/150°23'	50
2	29 October	51°30'/152°65'	49
3	30 October	50°51'/151°92'	50
4	31 October	49°09'/150°43'	50
5	01 November	48°76'/148°17'	50
6	02 November	48°20'/147°23'	50
7	02 November	47°87'/148°43'	50
8	02 November	47°30'/147°41'	49
9	03 November	47°71'/146°22'	48
10	03 November	46°82'/146°34'	50
11	04 November	48°04'/145°08'	47
12	05 November	49°16'/145°02'	49
Total			592

WPGMA-dendrogram was created using genetic chord distances and based on the frequencies of 41 composite haplotypes of 29 even-year Asian pink salmon populations:



Average percent (SD in parentheses) correct and incorrect allocations (read vertically) by region for simulated mixtures based on the number of even-year pink salmon regional groups. Expected value for estimates shown in bold is 100%:

№	Region	1	2	3	4	5
1	West Kamchatka	**86,2**$_{(10,1)}$	21,2	16,4	8,6	2,7
2	continental coast of the Okhotsk Sea	3,9	**69,8**$_{(14,9)}$	6,0	1,8	2,5
3	Amur River and Primorye	5,4	2,0	**61,2**$_{(12,7)}$	7,0	1,8
4	Sakhalin Island	4,1	5,4	15,8	**79,4**$_{(10,4)}$	42,3
5	Kuril Islands	0,0	0,5	0,2	3,1	**50,7**$_{(13,8)}$
	Unknown	0,4	1,1	0,4	0,1	0,0

№	Region	1	2	3
1	«Northern populations» (West Kamchatka and continental coast of the Okhotsk Sea)	**90,2**$_{(6,5)}$	9,2	22,4
2	«Southern populations » (Sakhalin Island and Kuril Islands)	4,7	**83,0**$_{(8,9)}$	16,0
3	Amur River and Primorye	4,5	7,6	**61,2**$_{(12,7)}$
	Unknown	0,6	0,2	0,4

Estimated stock compositions (percentage, SD in parentheses) of mixed-stock samples of pink salmon sampled in Okhotsk Sea during October and November 2013:

№	Northern populations	Southern populations	Amur River and Primorye	Unknown
1	11,3$_{(37,09)}$	31,0$_{(25,58)}$	57,7$_{(37,78)}$	0,0
2	100,0$_{(0,00)}$	0,0$_{(0,00)}$	0,0$_{(0,00)}$	0,0
3	75,8$_{(23,09)}$	24,2$_{(25,58)}$	0,0$_{(0,00)}$	0,0
4	17,8$_{(33,03)}$	82,1$_{(33,01)}$	0,1$_{(0,07)}$	0,0
5	0,1$_{(0,17)}$	60,8$_{(31,13)}$	39,1$_{(31,13)}$	0,0
6	30,0$_{(28,59)}$	63,7$_{(20,45)}$	6,3$_{(24,41)}$	0,0
7	00,0$_{(0,00)}$	9,5$_{(9,78)}$	86,5$_{(9,78)}$	4,0
8	69,2$_{(16,59)}$	26,7$_{(16,59)}$	0,1$_{(0,12)}$	4,0
9	20,4$_{(29,59)}$	75,4$_{(23,99)}$	4,2$_{(21,43)}$	0,0
10	1,5$_{(8,11)}$	98,4$_{(8,31)}$	0,1$_{(0,26)}$	0,0
11	30,0$_{(34,79)}$	43,7$_{(18,73)}$	26,3$_{(36,28)}$	0,0
12	23,2$_{(17,31)}$	76,8$_{(17,31)}$	0,0$_{(0,00)}$	0,0
All samples	23,7$_{(10,88)}$	58,3$_{(8,95)}$	17,3$_{(11,57)}$	0,7