NPAFC Doc. 376

Rev.

The genetic estimations of stock composition in chum salmon catches in the Russian 200-miles zone of the Northern Pacific ocean in 1997

by

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submitted to the
North Pacific Anadromous Fish Commission

by
Russia

November 1998

THIS PAPER MAY BE CITED IN THE FOLLOWING MANNER: N. V. Varnavskaya. 1998. The genetic estimations of stock composition in chum salmon catches in the Russian 200-miles zone of the Northern Pacific ocean in 1997. (NPAFC Doc.376). 7p

Introduction

The species-wide baseline of genetic data collected in several laboratories of USA and Russia (Winans et all., 1994, Wilmot et a., 1994; Kondzela et al., 1994, Varnavskaya et al., 1996; Seeb et al., 1997) was used to identify local chum salmon stocks from North America, Japan and Russia in mixed fisheries catches in Russian 200-mile zone of Pacific ocean in 1997. The twenty high polymorphic loci were selected to make estimations (table 1) using the Conditional Maximum Likelihood Estimator (MLE) (Pella and Milner, 1987). The precision and accuracy of selected dataset were analyzed in the previous document submitted to NPAFC this year (Varnavskaya, 1998).

Thus, the object of this study was to estimate the stock composition and the origin of chum salmon in mixed-stock fisheries catches in the 200-miles Russian zone of the Northern Pacific ocean.

Material and methods

The mixed-fisheries samples were collected in 1997 in the Kamchatsko-Commander subzone of the Russian 200-miles zone of the Pacific Ocean at 51-52° of Northern latitude and 158-164° of West longitude. The samples of tissues (muscle, heart, liver, eye) totally of 320 fish were collected and analyzed by the standard electrophoretic procedure (Aebersold et al., 1987) in genetic laboratory of Alaska Department of Fish and Game in 1998.

Table 1. High polymorphic enzyme and loci used for stock identification in chum salmon mixed-fisheries in 1997.

Enzyme	IUBNC number	Loci	Tissue	BS
Aspartate aminotransferase	2.6.1.1	***sAAT1,2****	МС	6
		mAAT1*	МС	6
		mAH3*	МС	4
		mAH4*	МС	4
Alanine aminotransferase	2.6.1.2	***ALAT****	МС	2
Esterase D	3.1.*.*	***ESTD1****	М	2,5
Glycerol-3-phosphate dehydrogenase	1.1.1.8	***G3PDH2****	С	4
Glucose-6-phosphate isomerase	5.3.1.9	***GPIA****	МС	3
		GPIB1,2*	МС	3
Glutathion reductase	1.6.4.2	***GR****	Г	1
L-идитолдегидрогеназа	1.1.1.14	***IDDH1****	П	3
		IDDH2*	П	3
Isocitrate dehydrogenase	1.1.1.42	***sIDHP2****	П	4
		mIDHP1*	М	4
Lactate dehydrogenase	1.1.1.14	***LDHA1****	М	3
		LDHB2*	МПГ	3
Malate dehydrogenase NAD	1.1.1.37	***sMDHA1****	П	6
		sMDHB1, 2*	М	6
Malate dehydrogenase NADP	1.1.1.40	***sMEP1****	М	1
		mMEP2*	МС	1
Mannose-6-phosphate isomerase	5.3.1.8	***MPI****	С	2
Peptidases	3.4.*.*			
Glycyl-leucine(GL, DPEP)		***PEPA****	М	3
Leucyl- glycyl-glycine(LGG, TAPEP)		***PEPB1****	МПГ	5,6
6-Phosphogluconate dehydrogenase	1.1.1.44	***PGDH****	МСПГ	4

BS -- buffer systeme: 1 - TRIS - citrate buffer, pH 5.8 (TC-4), 2 - TRIS-EDTA-borate buffer, pH 8.5 (TBE), 3 - TRIS-citrate-lithium-borate buffer, pH 8.0 (TBCL), 4 - N-(3-aminopropyle)-morpholine-citrate-EDTA buffer, pH 6.1 (ACE), 5 - TRIS-Glycine buffer, pH 8.9 (0.04M TRIS, 0.12M glycine for gel and electrode buffer), 6 - N-(3-aminopropyle)-morpholine-citrate buffer (AC).

Results and discussion

Our estimations showed that there were mainly chum salmon originating from Russia (77%) in mixed-fishery catches in the Russian 200-miles zone in 1997 which included about 30% of the Magadan Coast, 11% of the Anadyr River, 56% of the Kamchatka chum salmon populations. The local stocks from Northern America were less then 10% for each region (Table 2), and Japanese populations were less or equal to 5% for each region (Table 2).

We made a comparison with previously reported estimations made by Winans and co-authors (Winans et al., 1998). They showed that in the central parts of the Northern Pacific ocean (178-179° W. Long.) the mixed-fisheries catches consisted of 50% of chum salmon originating from Japan. That means that Japanese chum salmon dominated in high sea areas of Northern Pacific ocean, but did not come so close to the Russian shores as 158-164° W. Long. In the same paper the authors had analyzed the mixed-fisheries catches at 165° W. Long. and revealed the estimations of stock composition similar to ours (1.9% of Japanese, 86.1% of Russian and others – of American chum populations). This confirms our conclusion that in the Russian 200-mile zone the chum salmon originating from Russia dominated in mixed stock fisheries.

Table 2. The estimations of stock composition in chum salmon mixed-fisheries catches in the 200-miles Russian zone in 1997.

Region	Estimations%	Normal Distribution		Standard error	C. V.
Okhotsk Sea of Japan	1.4	0.0	5.0	2.2	1.50
Japan Sea	5.0	0.2	9.7	2.9	0.58
Russia	77.1	67.7	86.5	5.7	0.74
Northwest Alaska	4.9	0.0	10.4	3.4	0.69
Yukon River	0.1	0.0	0.8	0.4	4.00
Kodiak Island and Alaska Pen.	6.8	0.0	13.8	4.2	0.62
Prince William Islands	2.8	0.0	5.8	1.8	0.67
Southeast Alaska, North British Columbia	1.4	0.2	2.5	0.7	0.51
South British Columbia, Washington st.	0.0	0	0	0.0	0.00

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