RC 078

January 13, 2018 Susan Doherty

Dear Chairman Jensen and Board of Fisheries Members:

RE: Proposals 155, 156, 157, 158

It is important that everyone has the same data about the genetic analysis that ADF&G has done on the fishery conducted in Amalga Harbor. This data was used in PC 151 Page 13, Table 10; and was cited as *manuscript* Series No 15-03, when in fact it was from an inter-departmental memo that is included here. Table 1 was excluded to meet the 10 page requirement and only speaks to the source and assay name for the 96 single nucleotiede polymorphisms used in the baseline data. The final page has a summary of percent of wild fish by stock group that this fishery has harvested. On average **43%** of the minimal sockeye harvest was identified as being from wild origin. Annually that has averaged 1162 wild sockeye of which 2.3% or **36 fish** annually are from the Chilkat/Chilkoot system. At the same time harvest of enhanced chum salmon has been just below 500,000 fish annually since the fishery was established six years ago; and in 2017 is estimated to have a value of **$2.8** million dollars. SEAS views any proposals that would not allow the prosecution of this fishery because of any defined 5AAC 33.366 cap be completely severed.

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DATE: April 10, 2014

SUBJECT: Amalga Harbor Purse Seine Sockeye Salmon Harvest Genetic Analysis, 2013

Recently, a project was designed to conduct genetic stock identification (GSI) on sockeye salmon harvested in the Amalga Harbor Special Harvest Area (SHA) common property purse seine fishery targeting Douglas Island Pink and Chum Inc. (DIPAC) enhanced chum salmon. Amalga Harbor has been the site of the DIPAC remote chum salmon release and cost recovery fishery since the early 1990s. With strong chum salmon production and recent high prices, DIPAC no longer requires the entire enhanced chum salmon return to the Amalga Harbor SHA for their cost recovery needs. Beginning in 2012, limited common property commercial purse seine fisheries have been opened in a portion of the Amalga Harbor SHA to harvest these excess enhanced chum salmon. The sockeye salmon harvested incidentally during the common property fisheries has been significantly greater than harvests in the traditional cost recovery fishery. Drift gillnet fleets in nearby districts have expressed concern that these common property seine fisheries have increased the harvest of wild sockeye salmon bound for river systems in other districts, some of which may have conservation concerns in any given year. GSI analysis of the sockeye harvest in the Amalga Harbor SHA common property fisheries will provide a better understanding of the stock composition, and assist in future management decisions. The analysis for this project was completed in the winter of 2014 using the updated 2012 Southeast Alaska sockeye salmon baseline. This baseline now includes 96 single nucleotide polymorphism markers (SNPs; Table 1) analyzed in 20,410 individuals representing 156 populations (Figure 1; Table 2). These markers were examined for conformance to basic genetic

expectations and 91 markers (including one phenotyped mitochondrial marker and one phenotyped nuclear marker) were retained for GSI (Table 1). For the purposes of this analysis, fishery samples were proportionally allocated to eight aggregate groups of populations (reporting groups) defined from the baseline: Northern Southeast, Chilkat/Chilkoot, Taku/Stikine Mainstem, Taku Lakes, Port Snettisham, Tahltan, Southern Southeast, and Other (Table 2).

In 2013, 262 samples were collected from sockeye salmon harvested in the Amalga Harbor SHA (Subdistrict 111-55) commercial purse seine fishery across statistical weeks 27-29 (June 30-July 20, 2013). These samples were obtained by DIPAC in order to determine the contribution of enhanced sockeye from DIPAC's Snettisham Hatchery located in Port Snettisham approximately 60 miles away by water. When the fish were processed, heads from sockeye were collected by plant personnel, frozen, and shipped to DIPAC for otolith extraction and thermal mark analysis. Samples for GSI analysis were collected from the snout of frozen sockeye salmon heads and stored in bulk bottles with 70% ethanol. This tissue was not ideal for high quality DNA extraction: 1) snout is not the standard tissue used at the Gene Conservation Lab (GCL) and; 2) the tissue had gone through a freeze/thaw cycle. As a result, the standard genotyping methods employed at the GCL did not produce quality data. To address this, preamplification PCR methods employed in DeCovich et al. (2012) were used to increase the concentration of template DNA prior to genotyping. This method greatly improved genotype quality for the majority of samples; however 10 samples were ultimately removed for failing to meet minimum quality standards employed by the GCL. Stock composition estimates were computed with the remaining 252 samples using the Bayesian mixed stock analysis approach in the program BAYES (Pella and Masuda 2001). The prior parameter to run BAYES was set to be equal for each reporting group ("flat" prior). A total of 5 independent Markov Chain Monte Carlo (MCMC) chains of 40,000 iterations were run. The first 20,000 iterations were discarded to remove the influences of the initial start values and combined the second half of each chain to form the posterior distribution. The Port Snettisham reporting group including both wild and enhanced fish contributed 59.0% to the sample mixtures, followed by Taku/Stikine Mainstem (18.4%), and Taku Lakes (13.8%) (Figure 2; Table 3).

Literature Cited:

DeCovich, N.A., T.H. Dann, S.D. Rogers Olive, H.L. Liller, E.K.C. Fox, J.R. Jasper, E.L. Chenoweth, C. Habicht, and W.D. Templin. 2012. Chum salmon baseline for the Western Alaska Salmon Stock Identification Program. Alaska Department of Fish & Game, Special Publication No. 12-26, Anchorage.

Pella, J., and M. Masuda. 2001. Bayesian methods for analysis of stock mixtures from genetic characters. Fisheries Bulletin. 99:151-167

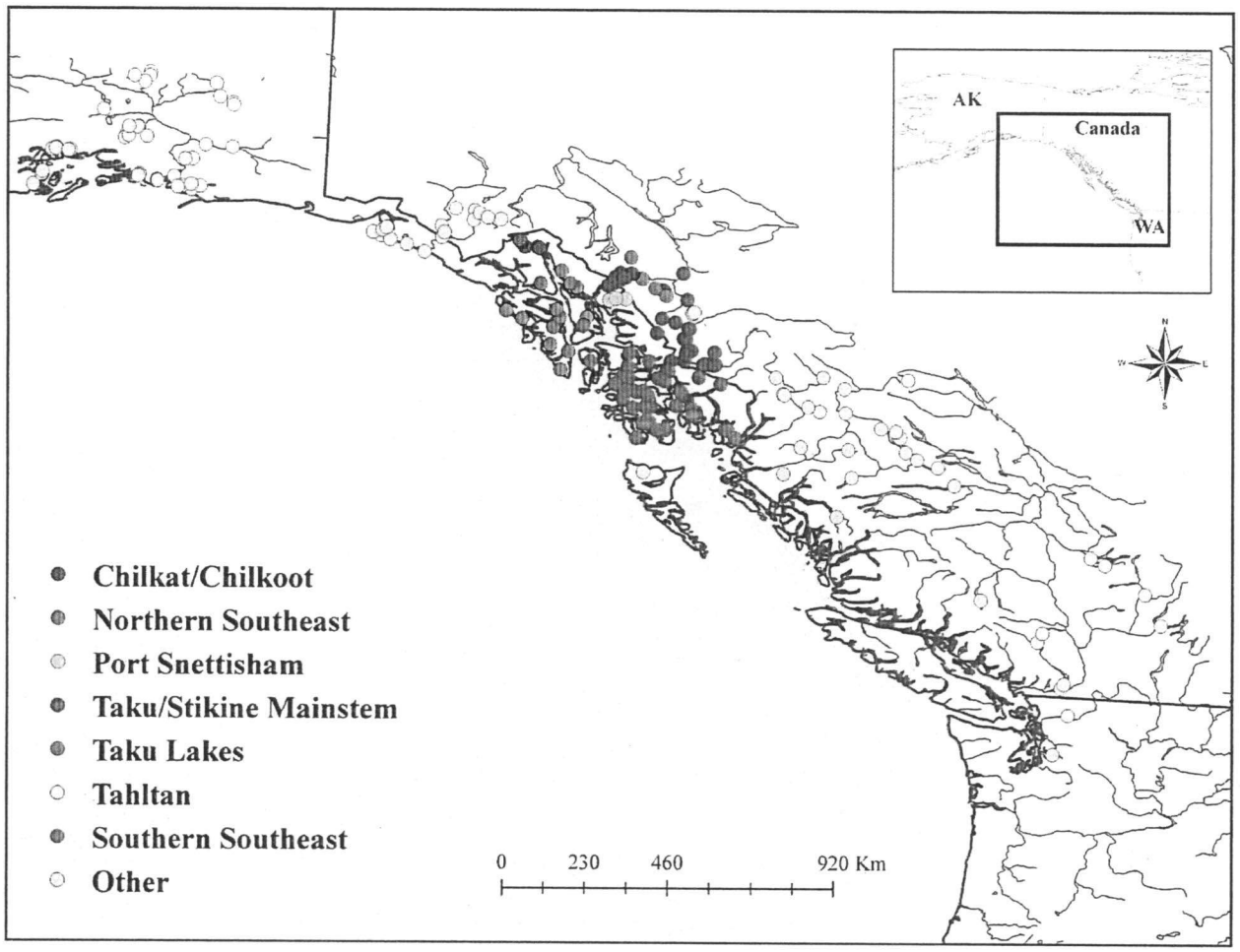

Figure 1. Map of Southeast Alaska sockeye salmon baseline collections used for the 2013 genetic stock identification analysis of harvests in Amalga Harbor SHA commercial purse seine fishery.

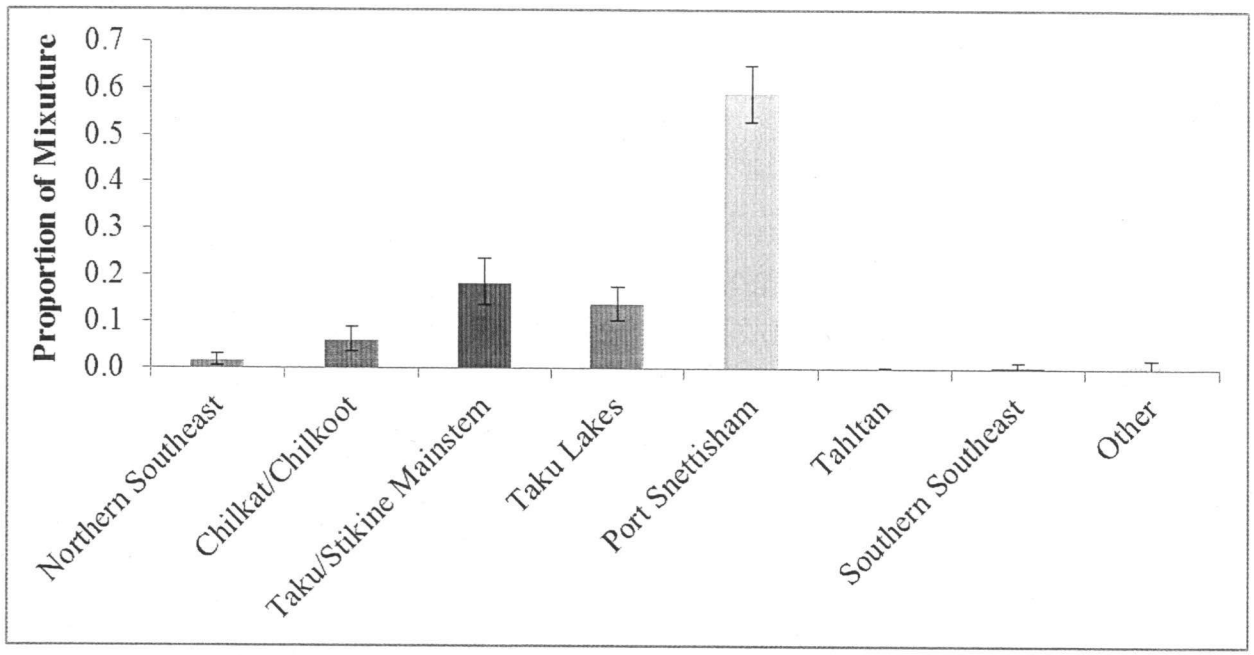

Figure 2. Stock composition estimates of sockeye salmon caught in the Amalga Harbor SHA commercial purse seine fishery, 2013.

Table 2. Reporting groups and collection locations defined for use in genetic stock identification of sockeye salmon caught in the Amalga Harbor SHA commercial purse seine fishery, 2013.

Reporting Group	Collection Location	Reporting Group	Collection Location
Other	Bainbridge Lake	Other (con't)	Dangerous River
	Coghill Lake		East Alsek River
	Coghill Lake - east stream		Lost/Tahwah Rivers
	Eshamy Creek		Old Situk
	Main Bay		Situk Lake
	Miners Lake		Blanchard River
	Bering Lake		Border Slough
	Clear Creek at 40 Mile		Klukshu River
	Eyak Lake - Hatchery Creek		Kudwat Creek
	Eyak Lake - Middle Arm		Tatshenshi/Kwatini
	Eyak Lake - South beaches		Neskataheen Lake
	Gulkana River - Fish Creek		Tweedsmuir
	Gulkana River - East Fork		Vern Ritchie
	Klutina Lake - inlet	Chilkat/Chilkoot	Chilkat Lake - early and late run
	Klutina River - mainstem		Chilkat Mainstem - Mosquito Lake
	Klutina - Banana Lake		Chilkat Mainstem - Bear Flats
	Klutina - Bear Hole		Chilkat Mainstem - Mule Meadows
	Kushtaka Lake		Chilkoot Lake - beaches
	Long Lake weir		Chilkoot Lake - Bear Creek
	Mahlo River	Northern Southeast	Berners Bay
	Martin Lake		Falls Lake - East Baranof Island
	Martin River Slough		Neva Lake weir
	McKinley Lake		Sitkoh Lake
	Bremner - Salmon Creek		Lake Eva
	Bremner - Steamboat Lake		Steep Creek
	Mendeltna Creek		Windfall Lake
	Mentasta Lake		Ford Arm Lake weir
	Paxson Lake - outlet		Klag Bay Stream outlet
	St. Anne Creek		Kook Lake
	Swede Lake		Pavlof Lake
	Tanada Creek weir		Hasselborg Lake
	Tanada Lake - shore		Redfish Lake beaches
	Tebay - outlet (Chitina River)		Salmon Lake weir
	Tokun Lake	Port Snettisham	Crescent Lake
	Tonsina Lake		Snettisham
	Ahrnklin River	Taku Lakes	King Salmon Lake weir
	Akwe River		Tatsamenie Lake

Table 2 (con't). Reporting groups and collection locations defined for use in genetic stock identification of sockeye salmon caught in the Amalga Harbor SHA commercial purse seine fishery, 2013.

Reporting Group	Collection Location	Reporting Group	Collection Location
Taku Lakes (con't)	Little Trapper	Southern Southeast	Red Bay Lake
	Kuthai Lake	(con't)	Salmon Bay Lake
Stikine/Taku	Fish Creek		Unuk River - Gene's Lake
Mainstem	Yehring Creek		Bar Creek - Essowah Lake
	Tulsequah		Fillmore Lake - Hoffman Creek
	Yellow Bluff		Hetta Creek - late run
	Shustahine		Hetta Creek - middle run
	Taku River		Hetta Creek - early run
	Takwahoni/Sinwa		Klakas Lake
	Between Tuskwa and Chunk		Klawock - Half Mile Creek
	Little Tatsamenie		Sarkar - Five Finger Creek
	Hackett River		Shipley Lake
	Nahlin River		Eek Creek
	Shakes Slough Creek		Thoms Lake
	Iskut River	Other	Bowser Lake
	Verrett River		Damdochax Creek
	Scud River		Meziadin Beach
	Chutine Lake		Tintina Creek
	Chutine River		Alastair Lake
	Christina Lake		Four Mile Creek
Tahltan	Tahltan Lake, Little Tahltan		Fulton River
Southern Southeast	McDonald Lk - Hatchery Ck		Kitsumkalum Lake
	Hugh Smith Lake		Lower Tahlo River
	Hatchery Creek - Sweetwater		McDonell - Zymoetz River
	Heckman Lake		Nangeese River
	Helm Lake		Nanika River
	Kanalku Lake		Slamgeesh River
	Kutlaku Lake		Sustut - Johanson Lake
	Kah Sheets Lake		Swan Lake
	Karta River, McGilvery Creek		Upper Babine River
	Kegan Lake		QCI - Naden River
	Kunk Lake - Etolin Island		Central - Kitlope Lake
	P.O.W. Island - Luck Lake		Adams River - Shuswap late
	P.O.W. Island - Big Lake		Birkenhead
	Mahoney Creek		Chilko Lake
	Mill Creek early - Virginia Lk		Gates Creek
	Petersburg Lake		Harrison River

Table 2 (con't). Reporting groups and collection locations defined for use in genetic stock identification of sockeye salmon caught in the Amalga Harbor SHA commercial purse seine fishery, 2013.

Reporting Group	Collection Location
Other (con't)	Horsefly River
	Raft River
	Stellako River
	Weaver Creek
	Baker Lake
	Issaquah Creek - Puget Sound

Table 3. Estimated stock composition (Mean), upper and lower bounds of the 90% credibility intervals, the number of fish analyzed (n), standard deviations (SD), and the probability that reporting group estimate is equal to zero (P=0) for sockeye salmon sampled from the Amalga Harbor SHA commercial purse seine fishery, 2013.

	Statistical Weeks 27-30 (n=262)				
		90% CI			
Reporting Group	Mean	Lower	Upper	SD	P=0
Northern Southeast	0.017	0.006	0.032	0.008	0.00
Chilkat/Chilkoot	0.060	0.035	0.090	0.017	0.00
Taku/Stikine Mainstem	0.184	0.135	0.236	0.031	0.00
Taku Lakes	0.138	0.103	0.177	0.023	0.00
Port Snettisham	0.590	0.530	0.649	0.036	0.00
Tahltan	0.000	0.000	0.003	0.001	0.35
Southern Southeast	0.005	0.000	0.014	0.005	0.00
Other	0.006	0.000	0.020	0.007	0.07

2014 Amalga Sockeye Seine GSI Estimates: 8 Reporting Groups

Stat Wk (sample size)		NSEAK	Chilkat/ Chilkoot	Snettisham Wild	Taku Lakes	Stikine/Taku Mainstem	Enhanced Snettisham	Enhanced Tatsamenie	Other
27 (n=97)	**mean**	**0.199**	**0.025**	**0.182**	**0.211**	**0.119**	**0.143**	**0.000**	**0.122**
	sd	0.044	0.018	0.042	0.042	0.041	0.035	0.001	0.039
	5%	0.131	0.002	0.117	0.146	0.057	0.090	0.000	0.063
	95%	0.275	0.060	0.255	0.284	0.191	0.205	0.000	0.190
	P=0	0.000	0.039	0.000	0.000	0.000	0.000	0.991	0.000
29 (n=234)	**mean**	**0.022**	**0.000**	**0.155**	**0.144**	**0.285**	**0.379**	**0.013**	**0.003**
	sd	0.010	0.002	0.025	0.025	0.032	0.032	0.007	0.004
	5%	0.009	0.000	0.115	0.105	0.233	0.327	0.004	0.000
	95%	0.040	0.002	0.198	0.186	0.339	0.432	0.027	0.010
	P=0	0.000	0.928	0.000	0.000	0.000	0.000	0.003	0.481
30 (n=200)	**mean**	**0.007**	**0.011**	**0.142**	**0.059**	**0.288**	**0.463**	**0.025**	**0.006**
	sd	0.006	0.008	0.027	0.020	0.036	0.035	0.011	0.007
	5%	0.001	0.002	0.100	0.030	0.231	0.405	0.010	0.000
	95%	0.019	0.026	0.188	0.094	0.348	0.520	0.045	0.021
	P=0	0.168	0.033	0.000	0.000	0.000	0.000	0.000	0.367
31 (n=120)	**mean**	**0.010**	**0.034**	**0.075**	**0.086**	**0.218**	**0.537**	**0.033**	**0.006**
	sd	0.013	0.018	0.026	0.026	0.040	0.045	0.016	0.008
	5%	0.000	0.011	0.037	0.047	0.155	0.463	0.011	0.000
	95%	0.037	0.067	0.122	0.133	0.286	0.611	0.063	0.023
	P=0	0.301	0.000	0.000	0.000	0.000	0.000	0.000	0.326

End of Memo Items- Calculations Below Sum Up the Data From 2014 GSI Analysis

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Combining All Weeks For Wild Stocks the 2014 GSI data in Fish and % of Catch Looks Like this

This data was used to calculate the numbers in Table10 - PC 151 Page 13.

Wk	Chilkat/ Chilkoot	Snettisham Wild	Taku Lakes	Stikine/ Taku Main	NSEAK	Other	Totals
27	2	18	20	12	19	12	83
29	0	36	34	67	5	1	143
30	2	28	12	58	1	1	103
31	4	9	10	26	1	1	51
Totals	**9**	**91**	**76**	**162**	**27**	**14**	**380**
%	**2.3%**	**24.0%**	**20.1%**	**42.7%**	**7.1%**	**3.8%**	