



MEMORANDUM

TO: Tom Brookover, Director
Division of Sport Fish

DATE: February 1, 2017

And

Scott Kelley, Director
Division of Commercial Fisheries

THROUGH: Tim McKinley, Research Coordinator
Division of Sport Fish, Region I

SUBJECT: Susitna River Chinook and coho
salmon mark-recapture project,
2010-2015

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And

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This memo summarizes estimates of Susitna River coho salmon abundance from 2010 to 2015, Chinook salmon abundance from 2013 to 2015, and Chinook salmon abundance by major tributary grouping in 2014 and 2015.

Chinook and coho salmon abundance and distribution was studied in 2013 through 2015 as part of the Susitna-Watana Hydro studies conducted by the Alaska Department of Fish and Game (ADF&G) in partnership with LGL Alaska Research Associates Inc. (LGL) and the Alaska Energy Authority (AEA). Adult abundances were estimated for both species using mark-recapture techniques for Mainstem Susitna River spawning fish for 2013 through 2015, and for the Yentna River for 2014 and 2015. Spawning distribution was also described for both species in each year of this study for both coho and Chinook salmon. For Chinook salmon, these abundance estimates were used in conjunction with radio telemetry data to estimate the contribution of major tributary groupings to the total abundance (results presented here). For further results from the radio telemetry portion of these studies, please see AEA 2014 – 2015.

Previous mark-recapture and distribution studies (2010 through 2012) were conducted for Susitna River coho and chum salmon, funded by the Alaska Sustainable Salmon Fund (AKSSF). Coho salmon abundance was estimated for the Mainstem Susitna and Yentna rivers for the years 2010 – 2012. Although the design of the mark-recapture experiment differed slightly compared to years 2013 – 2015, the results are directly comparable and provide the context of a longer time series of estimates.

Methods-

The experimental design changed in each year of these studies, however, the approaches can be divided into two major designs. The first design consisted of a lower Susitna River tagging site located at river mile 22 (the “Flathorn” site), and recapture sites on both the Yentna River (RM 6) and the Mainstem Susitna River (RM 34). An array of fixed radio-telemetry tracking stations was also used. This design was used to estimate the abundance of coho salmon in 2010 – 2012. For a complete explanation of these methods see Cleary et al. 2013, 2016a, and 2016b.

The second design used the camps located on the Yentna River (RM 6) and Mainstem Susitna River (RM 34) as tagging sites, added recapture sites on the Yentna River at river mile 18, and various recapture sites on the Mainstem Susitna River. Radio-telemetry tracking stations were also used. This design was used to estimate the abundance of Chinook and coho salmon in the Mainstem Susitna and Yentna rivers in 2013 – 2015. Each year there was variation in the lower level aspects of the experimental design, primarily in the types of tags used and the recapture locations used for the Mainstem Susitna River. For a complete explanation of the study design please see Cleary et al. 2014a, 2014b, and 2015 (Table 1).

Results-

Detailed information including the number of fish caught, marked, and recaptured, as well as thorough explanations of the statistical analyses used can be found in the references cited below.

The point estimate of the abundance of Chinook salmon in the Mainstem Susitna River varied from a low of 68,225 in 2014 to a high of 89,462 in 2013. In the Yentna River, only two years of data were collected, 2014 and 2015, and the abundance estimates were 22,267 and 48,416 respectively.

The point estimate of the abundance of coho salmon in the Mainstem Susitna River varied from a low of 73,640 in 2010 to a high of 152,500 in 2015. Yentna River coho abundance varied from a low of 73,819 in 2014 to 122,777 in 2010. As with Chinook salmon, Yentna River abundance was not estimated in 2013 (Table 2).

Radio telemetry data was used to partition the abundance of Chinook salmon by major tributary groupings. In the Mainstem Susitna River, the largest contributor of abundance was the Talkeetna River in 2013 (27%), the Chulitna River in 2014 (24%), and the Eastside Susitna River drainages in 2015 (31%). We divided the Yentna River into 5 tributary groups, and the total abundance was spread fairly evenly in both years with available abundance estimates, 2014 and 2015. The largest change was the increase from 8% in 2014 to 19% in 2015 for the Talachulitna River drainage (Table 3).

In 2016, a mark-recapture radio telemetry study was done similar to 2014 and 2015 on Mainstem Susitna and Yentna River chinook salmon. That analysis is still underway at the time of this memo. The same study is scheduled for 2017, and a final comprehensive report of these studies is scheduled to be written in the winter of 2017/18.

References-

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- AEA 2014- LGL Research Associates, Inc., and Alaska Department of Fish and Game, Division of Sport Fish. 2014. Initial Study Report Part A: Sections 1-6, 8-10. Susitna-Watana Hydroelectric Project, Anchorage.
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Table 1 - Summary of experimental design by year for mark-recapture projects on the Mainstem Susitna and Yentna rivers for adult coho salmon (2010-2015), and adult Chinook salmon (2013-2015).

First Event (tagging site)		Second Event (recapture site)	
Year	Location	Tag Types (Purpose)	Location
2010	Susitna RM 25	Fish wheels	Susitna RM 34
		Fish wheels	Yentna RM 6
2011	Susitna RM 25	Fish wheels	Susitna RM 34
		Fish wheels	Yentna RM 6
2012	Susitna RM 25	Fish wheels	Susitna RM 34 ^a
		Fish wheels	Yentna RM 6
2013	Susitna RM 34	Fish wheels and gill nets	Deshka River
		Fish wheels and gill nets	Montana Creek
		Fish wheels and gill nets	Middle fork Chulitna River sonar
2014	Yentna RM 6	Fish wheels and gill nets	Talachulitna River ^b
	Susitna RM 34	Fish wheels and gill nets	Deshka River
		Fish wheels and gill nets	Montana Creek
2015	Yentna RM 6	Fish wheels and gill nets	Yentna RM 18
	Susitna RM 34	Fish wheels and gill nets	Deshka River
		Fish wheels and gill nets	Montana Creek
	Yentna RM 6	Fish wheels and gill nets	Sunshine RM 80
	Yentna RM 6	Fish wheels and gill nets	Yentna RM 18

^aAlso used to deploy radio tags funded through AEA - distribution only.

^bThe Talachulitna River Sonar was operated in 2013 only. Issues with reliability of the counts at this site made it impossible to produce abundance estimates for Yentna River Chinook and coho salmon.

Table 2- Mainstem Susitna and Yentna rivers Chinook and coho salmon abundance estimates, corresponding credibility intervals (CI), and citation for run years 2010 – 2015, calculated by mark-recapture techniques.

Species	Run Year	Abundance Estimate							Report
		Mainstem Susitna R.	95% CI	Yentna River	95% CI	Total	95% CI		
Coho Salmon	2010	73,640	(42,590 - 139,753)	122,777	(89,067 - 178,817)	196,417	(153,498 - 281,020)	FDS 13-05	
	2011	131,878	(100,712 - 193,164)	84,677	(67,473 - 106,704)	216,555	(182,995 - 281,825)	FDS 16-35	
	2012	90,397	(46,672 - 173,872)	93,919	(75,101 - 116,974)	184,316	(139,469 - 267,485)	FDS 16-52	
	2013	130,026	(100,411 - 193,403)	No Project				AEA 2014	
	2014	84,879	(68,799 - 106,083)	73,819	(61,120 - 87,004)	158,698	(137,817 - 183,294)	AEA 2015	
	2015	152,500	(120,552 - 184,448)	110,321	(97,157 - 123,869)	262,821	(228,128 - 297,514)	FDS <i>In prep.</i>	
Chinook Salmon	2013	89,463	(77,720 - 114,954)	No Project				AEA 2014	
	2014	68,225	(53,473 - 94,240)	22,267	(17,466 - 28,701)	90,492	(74,498 - 116,748)	AEA 2015	
	2015	88,580	(77,500 - 101,100)	48,416	(39,500 - 60,400)	136,996	(122,207 - 153,764)	FDS <i>In prep.</i>	

Table 3- Chinook salmon abundance and spawning distributions in the entire Susitna River drainage, 2014 and 2015, obtained using mark-recapture (abundance) and radio telemetry (distribution) methods.

Location	2013			2014			2015		
	Total Abundance	Tributary Group Abundance	Percent of Total	Total Abundance	Tributary Group Abundance	Percent of Total	Total Abundance	Tributary Group Abundance	Percent of Total
Susitna River above the mainstem tagging site	89,463			68,225			88,580		
RM 34-102.4 mainstem Susitna River ^a		2,432	3%		2,098	3%		5,600	6%
Deshka River		18,469	21%		14,024	21%		25,454	29%
Eastside Susitna River		16,867	19%		15,073	22%		27,490	31%
Talkeetna River		24,408	27%		14,024	21%		13,236	15%
RM 102.4-153.4 mainstem Susitna River ^b		7,680	9%		6,609	10%		6,109	7%
Chulitna River		19,607	22%		16,397	24%		10,691	12%
Yentna River above tagging site	No estimate			22,267			48,416		
Lake Creek drainage					5,163	23%		10,805	22%
Kahiltna River drainage					4,195	19%		7,481	15%
Talachulitna River drainage					1,721	8%		9,351	19%
Skwentna River drainage, other than the Talachulitna River					4,303	19%		11,221	23%
Remaining Yentna River drainage, other than the areas above					6,885	31%		9,558	20%

^a PRM 34 upstream to the Chulitna River Confluence

^b Chulitna River Confluence to Devils Canyon