May 11, 2016

Memorandum -- delivered via email

To: Tammy Mackey and Chris Walker, Portland District
US Army Corps of Engineers

SB

From: Stephanie Burchfield, Fisheries Biologist, Willamette Branch
West Coast Region, National Marine Fisheries Service (NMFS)

Subject: NMFS Comments on the Corps' Official Coordination Request for Non-Routine Operations and Maintenance – Cougar Fish Facility Protocols (outplanting/recycling)

The U.S. Army Corps of Engineers (Corps) emailed an Official Coordination Request to the region on April 19, 2016, requesting comments on the proposed change to the adult trapping and transport protocol for spring Chinook salmon at the Cougar Dam trap in 2016. Below are some comments and recommendations from the National Marine Fisheries Service (NMFS) for the 2016 season.

NMFS would first like to thank the Corps for funding the genetic pedigree analyses of the returns of spring Chinook to Cougar Dam in 2014 and 2015. This information continues to be extremely valuable for informing annual management decisions; particularly since there are now four years of data available (2012-2015). This information has shown: 1) the abundance and productivity of Chinook salmon produced above Cougar Dam, 2) the relative reproductive success of natural-origin and hatchery-origin Chinook salmon outplanted above Cougar Dam, and 3) the potential effects of removing natural-origin spring Chinook salmon produced below Cougar Dam. All of this information is essential for management and funding of this study should continue to be a high priority for the Corps.

The goal shared by the co-managers is to put adult Chinook salmon collected at Cougar Dam trap back into their natal habitat. Chinook salmon that were produced above Cougar Dam should be outplanted above the dam. There is also a realization that this will never be entirely perfect; and it should not have to be. However, the issue right now is the pedigree analyses continues to show very poor replacement rates for spring Chinook outplanted above Cougar Dam (Figure 1). This metric is of great concern because, on average, we are only getting 0.25 return from each outplanted female Chinook salmon above Cougar Dam. In order to start rebuilding the salmon run above Cougar Dam, replacement needs to be greater than one for several generations. The issue of poor productivity above Cougar Dam becomes especially important for salmon that may be outplanted above the dam that originated from below the dam (i.e. from the mainstem McKenzie River and the lower South Fork). Pedigree analyses show approximately 35% of the Chinook salmon collected at Cougar trap were produced below the dam (e.g. immigrants or non-Cougar fish; Figure 2). Therefore, there is an important management consideration of "mining" salmon from below Cougar Dam that needs to be factored into Cougar trap operations.

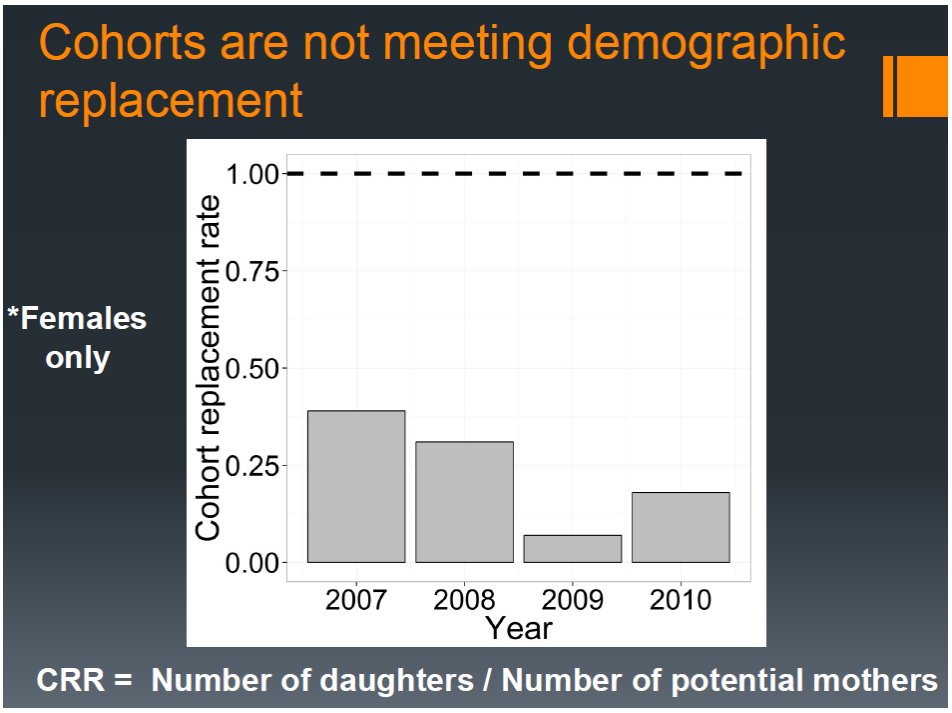

Figure 1. Productivity of spring Chinook above Cougar Dam for brood years 2007-2010. Figure taken from Sard et al. (2016).

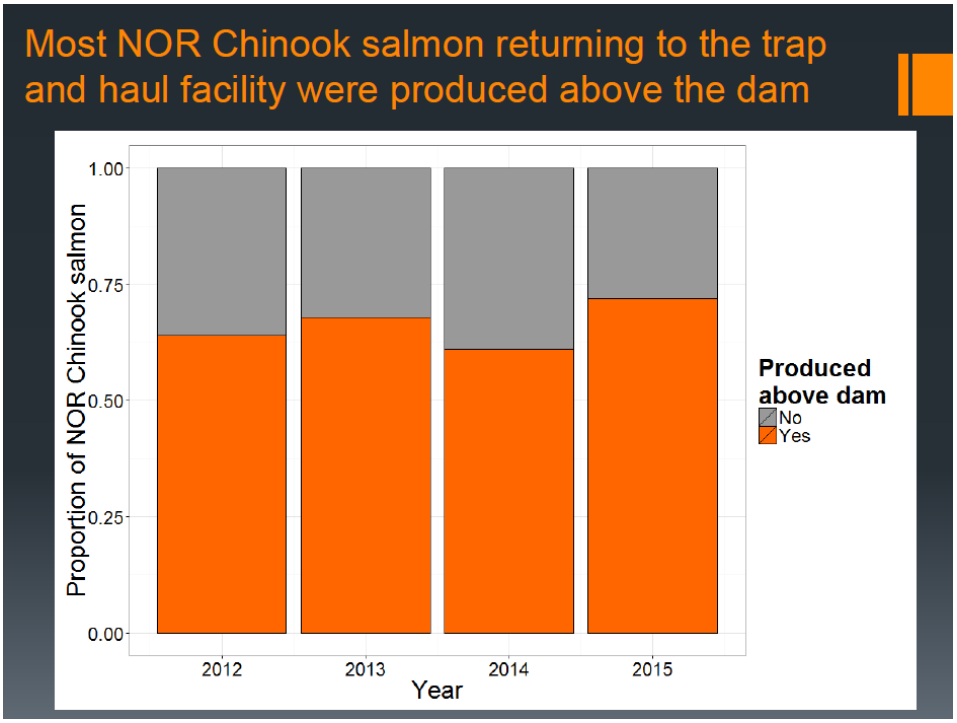

Figure 2. Proportion of natural-origin Chinook salmon collected at Cougar trap that originated above and below Cougar Dam. Figure taken from Sard et al. (2016).

In 2015, Cougar trap operational protocols were changed from 2013-2014 in an effort to minimize the outplanting of Chinook salmon that were not produced from above Cougar Dam. All of the salmon collected at the trap were tagged and then released back downstream of the trap. If a tagged salmon re-entered the trap, then it was outplanted above Cougar Dam. Given the genetic pedigree analyses, this allows comparison of protocols between "recycling through the season" vs "only recycling after September 1st" (protocols used in 2013-14). The results of this comparison is shown in Table 1 from Sard (2016).

The results from 2015 are interesting and provide additional information to help inform management at Cougar trap. Recycling throughout the entire season in 2015 saved 13 Chinook salmon that were not produced above Cougar Dam from being outplanted above the dam (top blue cell in Table 1) that would have otherwise been outplanted above the dam under the protocols implemented in 2013-2014. However, this came at a cost of 46 salmon that originated above Cougar Dam not being outplanted above the dam (top purple cell in Table 1). Consequently, only 71% (113/159) of the Cougar fish that were recycled before September 1st ended up being outplanted above the dam. The results in the lower half of Table 1 (after September 1st recycling) would have occurred under both trap operation protocols, so nothing would change with these fish using full season recycling or after September 1st recycling.

Table 1. Results from "recycling" all spring Chinook captured at the Cougar trap in 2015 compared to "recycling" only after September 1st. Spreadsheet taken from Sard (2016). Return type "yes" means salmon returned to trap a second time and was outplanted above Cougar Dam, "no" means salmon did not return to the trap a second time. Produced above dam means salmon was produced above Cougar Dam based upon pedigree analysis.

Sept.1st	Return Type	Produced above dam		Total	% NOR
		Yes	No		
Before	Yes	113	3	116	97
	No	46	13	59	78
	Total	159	16	175	
Sept.1st	**Return Type**	**Produced above dam**		**Total**	**% NOR**
		Yes	**No**		
After	Yes	9	12	21	43
	No	5	39	44	11
	Total	14	51	65	

Given the results in Table 1, the issue becomes whether it is more important to put "Cougar" fish above the dam, or to operate the trap to minimize the "mining" of salmon produced below Cougar dam. Given the poor productivity currently being experienced by all salmon that are outplanted above Cougar Dam (~0.25 average replacement rate; Figure 1), it is prudent to minimize the mining of Chinook salmon that were produced below the dam. The highest production potential is definitely below Cougar Dam in the South Fork and mainstem McKenzie River. In recent years, the McKenzie River natural-origin returns have been relatively low (~1,500-2,000 fish) and have remained at these low levels even though other populations have increased in abundance during the same period. This is cause for concern. Maximizing successful spawning of salmon below Cougar Dam is a higher priority than outplanting salmon above Cougar Dam (given the poor productivity rates above the dam). The management priority should be to minimize impacts on salmon that would spawn below Cougar Dam.

The Corps requested comments on the Official Coordination Request for Cougar Fish Facility Protocols. The Corps is proposing to revert back to the protocols of 2013-2014, where all Chinook are outplanted above Cougar Dam prior to September 1st. After September 1st, all salmon collected are recycled back downstream. If a tagged salmon is collected a second time after September 1st, then it would be outplanted above the dam. Based upon the above information, NMFS does not support the Corps proposed change for 2016. Our assessment of the data indicates salmon production in the McKenzie River population will likely be higher from recycling all salmon compared to only recycling after September 1st. As of May 5th, counts of spring Chinook salmon crossing Willamette Falls are suggesting a poor return, and therefore, there is an immediate need this season to maximize spawning below Cougar Dam and minimize immigrants outplanted above Cougar Dam. We believe there is also value in repeating the protocol implemented in 2015 for a second year in 2016 and then assessing the pedigree results after the season to help inform management in 2017. Please direct questions or concerns about these comments to Lance Kruzic at lance.kruzic@noaa.gov or 541-957-3381.

Literature Cited:

Sard, Nick, Dave Jacobson, Michael Hogansen, Kathleen O'Malley, Marc Johnson, and Michael Banks. 2016. Chinook salmon reintroduction above Cougar Dam: insights from genetic parentage assignments. Presentation given at the Willamette Science Review. Corvallis, Oregon.

Sard, Nick. 2016. Genetic pedigree assignments for spring Chinook salmon collected throughout the season at Cougar Dam, 2015. Excel spreadsheet file emailed to L. Kruzic from R. Piaskowski, April 27, 2016.