



2007-2008 Redwood Creek Coho Salmon Briefing

Importance

Coho Salmon (*Oncorhynchus kisutch*), a native anadromous salmonid are State and Federally listed as endangered in the Central California Coast ESU. In Redwood Creek, annual spawning is observed in many locations from the adjacent trail. With a strict three-year lifecycle, coho salmon are highly susceptible to short-term fluctuations in condition. The coho population in Redwood Creek represents a genetically intact population, and has been described as the southernmost stable population within the Central California Coast ESU. The endangered status of these species is indicative of dramatic changes to the watersheds and habitat supporting these species. Because of their anadromy, and year-round residence requirements in both freshwater and ocean habitats, coho salmon are an important indicator of overall watershed health, and are also responsive to ocean conditions. Coho salmon are one of the most recognizable and charismatic aquatic species in the Redwood Creek watershed.

PROBLEM STATEMENT

Winter 2007-08 marked the first spawning season where coho salmon have not been observed in Redwood Creek. Additional studies are necessary to determine the appropriate response, however, it is important to note that potential recovery planning may include broodstock to supplement or restart the lost year class.



Juvenile coho salmon captured during spring monitoring efforts in 2007.

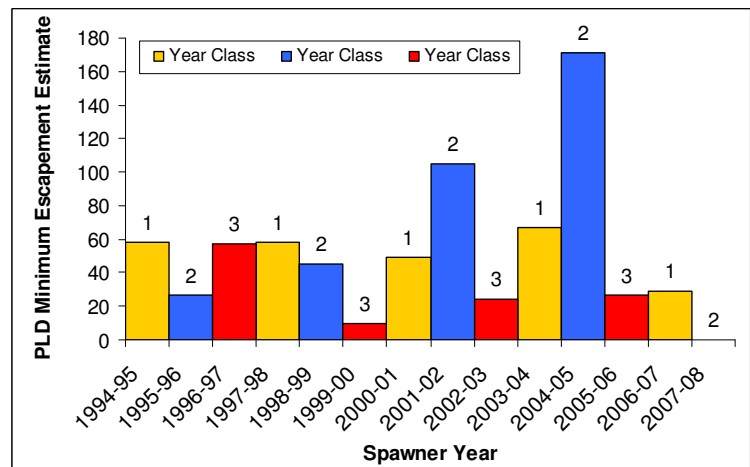


Figure 1. Redwood Creek coho salmon minimum adult escapement estimates for winters 1994-95 to 2007-08.

Trends

Since monitoring was started in 1994, NPS staff has documented the presence of three coho salmon cohorts, also known as year classes, residing in Redwood Creek. By tracking these year classes over the last 14 years, biologists are able to describe the strength of each year class and fluctuations in the population (Fig. 1). Adult returns are compared from year to year using a Peak Live Plus Accumulative Dead (PLD) minimum escapement index. The PLD index for Redwood Creek has ranged from a high of 171 adult coho observed during the winter of 2004-2005 to a low of zero observed during the winter of 2007-2008 (Fig. 1). There are currently two year classes that are in low numbers and may be in decline. One year class, year class 2, was steadily increasing in population size until this last winter when a complete crash of the population was observed.

Discussion

Since adult returns alone do not provide enough information to make inferences on what caused the elimination of year class 2, data collected from earlier life stages were utilized to find the cause of this anomaly. Figure 2 describes

the events that took place through each life stage of the year class, starting from the returning adults during the winter of 2004-2005 and ending with the return adults during the winter of 2007-2008. It should be noted that during the winter of 2006-2008 one coho jack, also known as a precocious male, returned to Redwood Creek. This fish marks the only surviving progeny from the 2004-2005 spawner year. In general, figure 2 demonstrates the survival rate that occurs between each life stage. Although there is a drastic reduction in the population in the early life stage of this year class, this is normal when compared with other years and watersheds. What doesn't track with other years and watersheds is the drastic decrease in survival from smolt outmigration in the spring to returning adult during the following winter. While $3,253 \pm 542$ smolts left the watershed during the spring of 2006, our data shows that no adults returned to spawn in the current winter. Preliminary investigations show that there was an 80% reduction in coho salmon returns across the California and Oregon coast (McFarlane et. al. 2008). McFarlane and others have identified extremely poor ocean conditions correlating with outmigration in 2006, which persisted through most of the summer. While additional investigations of ocean conditions are warranted, it is reasonable to speculate that while a severe reduction in spawners, a return rate similar to other local watersheds would have yielded a return of 20-25 adults. Other anthropogenic factors, such as the presence of oil offshore during the migratory period, may have played a supporting role in the demise of the 2004-2005 year class.

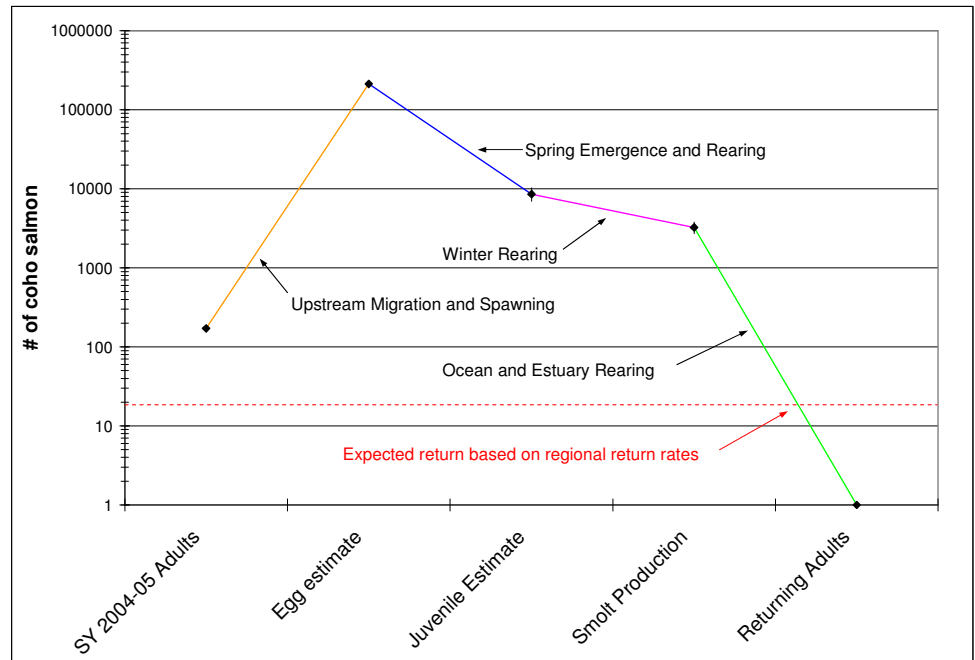


Figure 2. Number of coho salmon estimated in Redwood Creek at multiple life stages for the current winter year class.

Next Steps

The complete lack of coho returns in Redwood Creek has raised concern about how to maintain and rebuild the current year class. Additional Information is necessary for managers to understand the overall condition of this year class, and what should be done. The Fisheries Monitoring Program proposes continued smolt trapping to document latest condition of Year class 3 (outmigration), as well as to determine if there are any 2 year old outmigrants. Second, intensive summer monitoring should be conducted to determine if any coho returns may have occurred without detection. Documentation of juveniles would be valuable to assist with recovery planning. NPS staff will continue to consult with various agencies about potential options to protect the Redwood Creek coho salmon population.

MacFarlane R.B., S. Hayes, B. Wells. 2008. Coho and Chinook salmon decline in California during the spawning seasons of 2007/08. Unpublished document from the National Oceanic and Atmospheric Administration Southwest Fisheries Science Center, Santa Cruz, Ca.

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