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From: Homer T. McCrary

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Subject: **Addendum to Memorandum Concerning Recovery Strategy for California Coho Salmon (CDFG, 2003) With Regard To Coastal Streams South of San Francisco Submitted to the California Fish and Game Commission on December 18, 2003**

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Introduction

Since submitting my comments on the CDF&G document Recovery Strategy for California Coho Salmon (CDFG, 2003), new information has come to light that bears on my earlier discussion. For that reason, I respectfully submit this addendum to my December 18, 2003 memorandum to your Commission (McCrary, 2003).

The new information in the form of several archived specimens of salmonid (possibly coho) that appear to have originated in four streams of the Santa Cruz Mountains in 1895 has been under study since coming to our attention. If confirmed, these specimens may present an exception to our earlier remarks that there are no valid reports of coho in streams south of San Francisco prior to their artificial introduction in 1906. However, even if the specimens should prove valid as to identification and origin, they do not negate our conclusion concerning the improper endangered listing of coho in this locality. Our current information and thoughts on this subject are summarized herein.

1895 Specimens

Our memo stated that “all valid coho sightings and reports in this area post-date the 1906 introduction of the species and can only be hatchery-planted fish, their descendents, or occasional strays” (McCrary, 2003). Since submittal of the memo we have become aware of several fish specimens reportedly collected at some Santa Cruz County streams in 1895 (Rutter and Pierson,

1895; Rutter and Scofield, 1895a; Rutter and Scofield, 1895b; Rutter and Seale, 1895). We are making an effort to evaluate them.

The first thing we found was that the original Stanford labels and the Stanford accession log identify them as chum and Chinook specimens, *not coho*. One of the four samples is missing but the remaining three all have a second label identifying them as coho with no name or date on the second tag so there is no obvious way to trace the accountability. The accession log appears to be less than a professional job and is somewhat confusing, leading to questions about the chain of custody. The fish specimens are not in particularly good shape (no surprise after 109 years in a bottle) but they do look like juvenile coho. We have taken samples for genetic study and are continuing the investigation.

While there are still many unanswered questions it would appear these specimens are possible evidence of coho salmon south of San Francisco that pre-dates the 1906 importation of Washington State coho salmon by the Brookdale Fish Hatchery. Even if these data are shown to be valid we must be cautious how we interpret them. Certainly they are not evidence of permanent populations. It is likely these specimens are the result of an ephemeral colony established by strays.

“Populations in reaches with poor habitat became extinct during periods of low marine survival. With favorable marine survival, high productivity reaches served as sources for recolonization of lower quality reaches through straying of spawners. Consequently, both population size and distribution expanded and contracted through time” (Nickelson and Lawson, 1998).

Although our understanding of the ocean phase of the coho life history is very limited, the significance of the ocean environment and its effect on salmon populations is undisputed. A growing body of literature has linked oceanic factors such as sea surface temperatures and upwelling, to year-class strength of salmonids. Scarnecchia (1981) reported a significant positive relation between upwelling and catch of coho salmon the following year. According to the National Oceanic and Atmospheric Administration’s final rule on the threatened status for central California coast coho salmon evolutionary significant unit (Wingert, 1996), research shows that coho along the California coast may be particularly sensitive to upwelling patterns due to a lack of extensive bays, straits, and estuaries, which are common along the Washington, British Columbia, and Alaskan coasts. The document also finds that near shore conditions during spring and summer months along the California coast may dramatically affect year-class strength of salmonids. Our continuing research shows that in the years preceding 1895, ocean conditions were especially favorable for salmon in California. The twelfth biennial report of the California State Board of Fish Commissioners describes an enormous statewide salmon run in 1892:

“...the run of the present season is out of all proportion to that of any other preceding year within the last decade, and does not appear to be the natural increase from work of the commission in hatching and depositing these fish in the streams enumerated” (Redding et al., 1892).

Similarly, the Santa Cruz Surf, a local newspaper of the time, makes note of the same phenomenon (Staff, 1894a; Staff, 1894b). Climate data from 1870 to 1910 indicates a shift to colder surface temperatures occurred in the early 1890s (Figure 1). A parallel shift in oceanic conditions could have contributed to the establishment of temporary colonies by strays from more northern waters or even strays from a prior local ephemeral colony that had endured a generation or more.

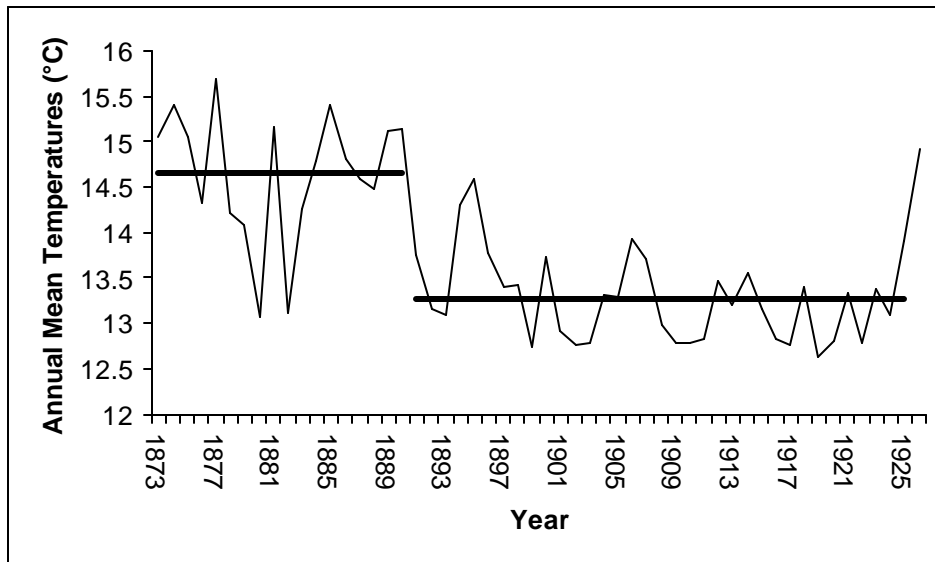


Figure 1: 1873-1926 Annual Mean Surface Temperatures for Santa Cruz (37.0 °N, 122.0 °W). Temperatures averaged 14.65°C from 1873 to 1890, but only 13.26°C from 1891 to 1925. Source: NASA GISS (Hansen, 2003).

Most importantly, we cannot rule out the possibility that these coho were the result of plantings. We know fish importations to the Santa Cruz Mountains from northern California and elsewhere were occurring at least as early as 1878 (Staff, 1878). At this time we cannot responsibly conclude the relation, if any, of these fish to current stocks. That Frank A. Shebley, superintendent of the Brookdale Fish Hatchery, believed in 1906 that he was introducing coho to the streams of Santa Cruz County would suggest that any previous ephemeral year classes of coho were inconsequential by the time the Brookdale Hatchery was operating. Drought conditions in 1898-99 probably had a lethal effect on any possible local coho populations (Water Resources, 2003). Certainly, low rainfall has the frequent and predictable effect of preventing the spawning of fish by not generating winter flows necessary to breach the sandbars at the creek mouths that form in the summer months (Figure 2).

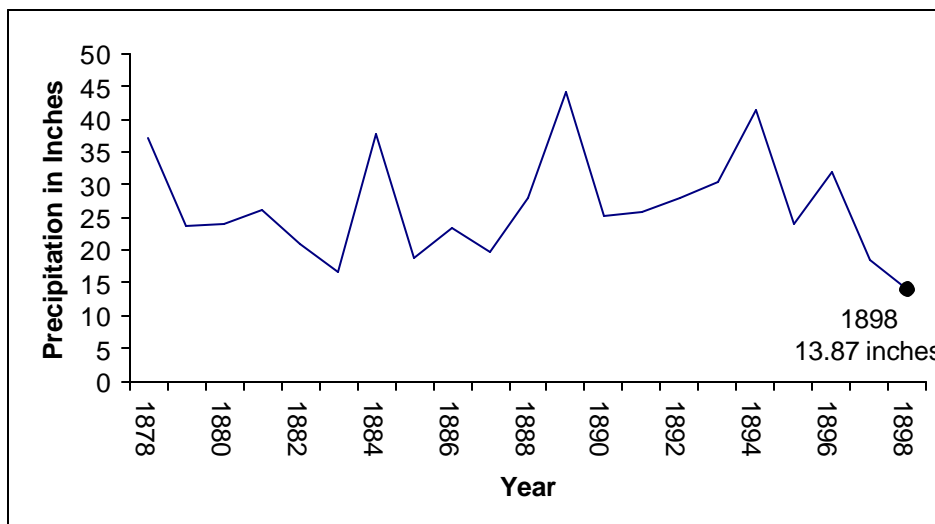


Figure 2: 1878-1898 precipitation data in inches reported from 25 Garfield St (36.97 °N, 122.02 °W), Santa Cruz, Ca. The 13.87 inches of precipitation recorded in 1898 represents a 20 year low. Available records extend only as early as 1878. (Collett, 2004).

Even if valid research (or hasty presumptions) concluded that these specimens denote a native, permanent population of coho salmon south of San Francisco, clearly the size and extent of that population has already been grossly overestimated, leading to an erroneous listing as endangered (CCR, 1995; Hope, 1993). For a permanent population of native coho to elude the archaeological record, several scientific surveys, generations of anglers, two newspapers, a popular angling journal, and a fish culturist operating a fish trap on Scotts Creek, it could not have been a very large population. While many layman could not have distinguished between a coho salmon and a steelhead trout, it is very unlikely that David Starr Jordan and Charles Henry Gilbert would have made that mistake repeatedly. Certainly Frank A. Shebley was familiar with coho, yet he continued to import hundreds of thousands of coho from Washington State.

It is essential that decision makers determine realistic historical population estimates before moving forward with restoration efforts. If “endangered” describes a situation wherein a species once flourished (without human intervention) but is now experiencing significant declines compared to that original state, then we cannot conclude that coho salmon south of San Francisco are actually endangered. The scientific and historical record gives every indication that the species never thrived here prior to hatchery assistance. It bewilders the critical thinker, how one can “restore” anything with little or no legitimate knowledge of its original state. It is a great error to make expensive decisions before providing for the type of baseline information that responsible policy making is based on. Considering that suitable coho habitat on Scotts, Waddell, and Gazos Creeks goes unused in many years (Smith, 1999; 2001), it would seem that inland habitat restoration efforts in this area are misplaced. Without even a cursory understanding of what is preventing this species from thriving in this area or why we should expect it to do so, coho restoration efforts south of San Francisco will continue to be a sadly misguided waste of resources with potentially disastrous consequences to fish¹ and people.

Some of The Facts Regarding Coho Salmon South of San Francisco

Facts regarding 1895 specimens²

- Specimens of fish were reportedly collected in 1895 from four coastal streams south of San Francisco by Rutter et al. for Stanford University.
- The specimens were originally identified as chum and Chinook salmon.
- The specimens were re-tagged as coho salmon at an undocumented date, by an anonymous person.
- The re-identification of the specimens was not noted in the Stanford accession log.
- From the acquisition of the specimens by the California Academy of Sciences, approximately thirty years ago, until 1999, the coho re-identification went unnoticed.
- The specimens in imperfect condition (as befits a 109 year old fish) but visual inspections are consistent with their identification as coho salmon.
- Genetic material extracted from these specimens will be tested but may be too degraded for DNA analysis.

Facts that must be considered before the status of coho salmon south of San Francisco can be determined

- As opposed to steelhead remains, the archeological record has uncovered no trace of coho remains in the refuse of the prehistoric native people of the central California coast. Both coho and steelhead remains have been found in the archaeological record north of San Francisco.³
- The best available scientific and historical data, including but not limited to Skinner (1962), Behnke and Tomelerrri (2002), and Brown et al. (1994), present no valid scientific evidence of coho salmon south of San Francisco prior to the establishment of the Brookdale Hatchery.⁴
- Early ichthyologists repeatedly reported an absence of coho salmon south of San Francisco prior to 1912.⁵
- Fish have been imported into Santa Cruz County for the purpose of planting in local streams at least as early as 1878.⁶
- The Brookdale Fish Hatchery was established in 1905 as a *steelhead* hatchery.⁷
- No authenticated records have been found showing that any coho salmon were collected at the Scotts Creek Egg Collecting Station prior to 1929.⁸
- United States Bureau of Fisheries documents, two local newspapers, and popular magazine articles report the importation of coho salmon to Santa Cruz Mountain streams beginning in 1906. The information conveyed to these newspapers by Shebley demonstrates that those involved in hatching, raising and planting these fish in the streams of the Santa Cruz Mountains believed (as did David Starr Jordan, Charles Gilbert and other scientific observers) that coho were not native to this locale, but were a new, previously absent species being introduced for the first time with the intent of offering a new type of game fish for local sportsmen.⁹
- The first credible mention in scientific literature of coho in the streams south of San Francisco is a secondhand account by ichthyologist John Otterbein Snyder of an anonymous sighting in the San Lorenzo River in 1912.¹⁰
- Since 1906 or earlier, the streams of the Santa Cruz Mountains have been frequently re-supplied with hatchery-produced coho from various origins.¹¹
- In contrast with the streams and rivers to the north of San Francisco, the relatively short, steep, “flashy” streams of the Santa Cruz Mountains (in a setting with widely fluctuating precipitation, a highly erodable mudstone, sandstone, and weathered granitic substrate, and ongoing tectonic uplift) are subject to frequent weather and geologic events that impact coho habitats.¹²
- Year-class strength of coho salmon in Scotts and Waddell Creeks is predominantly affected by stochastic events (floods and droughts).¹³

- "...weakened year classes [of coho salmon in Scotts and Waddell creeks] have a poor chance of recovery and extirpation is likely, even if spawning and rearing habitat are sufficient to support a viable coho population."¹⁴
- The rigidity of the coho life cycle (as opposed to steelhead) seriously diminishes interbreeding between generations.¹⁵
- During parts of their life cycle, coho salmon and steelhead trout in Waddell and Scotts Creeks compete for a common, limited spawning bed as well as a common food supply.¹⁶
- Coho salmon population size and distribution expand and contract through time.¹⁷
- Fluctuations of salmonid populations are closely linked to climatic and oceanic conditions.¹⁸
- With favorable marine survival, coho salmon strays are known to temporarily recolonize streams that do not accommodate permanent populations of coho salmon.¹⁷
- Coho salmon ephemeral populations established by strays during periods of favorable marine survival can become extirpated during periods of low marine survival.¹⁷

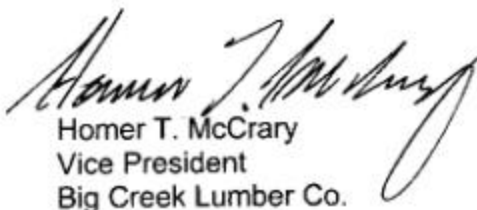
Conclusions and Recommendations

Our multidisciplinary research presents a coherent and cohesive scenario concerning the origins of coho salmon in the streams of the Santa Cruz Mountains. While many questions remain in the historical account, our findings have continually complemented and strengthened our skepticism concerning the basis on which coho salmon south of San Francisco were listed as an endangered species.

The specimens ostensibly collected in 1895 at four Santa Cruz County streams represent an unexplained anomaly. Presently, they remain inconclusive. A thorough examination of the specimens and accession records associated with them is imperative in developing a reasonable level of confidence regarding what they are and what they indicate. Regardless of what we may learn about these specimens in the future, they do not negate the data we have presented.

If a sound understanding of coho salmon south of San Francisco is to be gained, the information and concerns offered here and in our December 18, 2003 memo, must be addressed. The uninformed basis for listing revealed in our discourse analysis, combined with the potentially detrimental consequences of the proposed recovery strategy, demands immediate delisting of coho salmon south of San Francisco. Any future status review of coho salmon south of San Francisco should reflect a rational synthesis of *all* available valid scientific and historical data and exclude the guesswork and pseudoscience.

Respectfully Submitted,


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Endnotes

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- ¹ The artificial maintenance of coho deleteriously impacts steelhead, a native species occupying a similar ecological niche. "High coho abundance appears to suppress steelhead on Scott Creek" (Smith, 2002).
- ² (Rutter and Pierson, 1895; Rutter and Scofield, 1895a; Rutter and Scofield, 1895b; Rutter and Seale, 1895)
- ³ (Gobalet et al., 2003)
- ⁴ (Alvarado, 2003; McCrary, 2003)
- ⁵ (Jordan, 1892a; Jordan, 1892b, pg. 10; Jordan, 1894, pg. 131; Jordan, 1904a, pg. 154; Jordan, 1904b; Jordan, 1907; Jordan and Evermann, 1896; Jordan and Evermann, 1905; Jordan and Gilbert, 1876-1919, pg. 39; Jordan et al., 1882, pg. 308; Smith, 1895, pg. 236)
- ⁶ (Staff, 1878)
- ⁷ (Shebley and Gillis, 1911, pg. 525)
- ⁸ Streig (1991) reports 1,400,000 coho eggs were taken at the Scotts Creek Egg Taking Station in 1909, yet he provides no source, citation, or reference for this claim. Curiously, he also reports no coho eggs were taken in 1908 or 1910.
- ⁹ (B., 1909; Bowers, 1906; Bowers, 1907; Bowers, 1908; Bowers, 1909; Bowers, 1910; Bowers, 1911; Leinald, 1906; Staff, 1905a; Staff, 1905b; Staff, 1906a; Staff, 1906b; Staff, 1907; Welch, 1907)
- ¹⁰ (Snyder, 1914, pg. 70)
- ¹¹ (Streig, 1991)
- ¹² (Smith, 1994, pg. 1; Smith, 1996, pg. 1; Smith, 1998, pg. 1; Smith et al., 1997, pg. 14; Spittler, 1998)
- ¹³ (Smith, 1994, pg. 1; Smith, 1996, pg. 1; Smith, 1998, pg. 1; Smith et al., 1997, pg. 14)
- ¹⁴ (Smith, 1994, pg. 1)
- ¹⁵ (Shapovalov and Taft, 1954; Smith, 1994, pg. 1)
- ¹⁶ (Smith, 2002)
- ¹⁷ (Nickelson and Lawson, 1998)
- ¹⁸ (Wingert, 1996)