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To: Mr. Rodney McInnis
Acting Regional Administrator
NOAA – Fisheries, Southwest Region
501 W. Ocean Blvd., Suite 4200
Long Beach, CA 90802-4213

From: Homer T. McCrary

Cc: William Hogarth, Director, National Marine Fisheries Service
Donald L. Evans, Secretary, U.S. Dept. of Commerce
Jack Dunnigan, Director, Sustainable Fisheries Division, NOAA
Rob Rivett, Pacific Legal Foundation
Mark Rentz, California Forestry Association
Pam Giacomini, California Farm Bureau Federation

Subject: **Addendum to the Petition to Redefine the Southern Extent of the Central California Coho ESU, Submitted to NOAA Fisheries on November 6, 2003**

Date: 2/6/2004

Dear Mr. McInnis,

This Addendum presents new, important information that was discovered by our research staff since the subject Petition was submitted to your office on November 6, 2003. These additional facts will clarify the Petition and facilitate its evaluation. NOAA-Fisheries' consideration of the Addendum together with the Petition will be greatly appreciated.

If you or your staff have any questions, regarding the Petition or this Addendum, I will respond with my top priority.

Sincerely,

Homer T. McCrary
Vice President
Big Creek Lumber Co.

ADDENDUM TO THE

PETITION TO REDEFINE THE SOUTHERN EXTENT OF THE CENTRAL CALIFORNIA COHO ESU,

SUBMITTED TO NOAA FISHERIES ON NOVEMBER 6, 2003

CONTENTS

Introduction

Since submitting my Petition to Redefine the Southern Extent of the Central California Coho ESU, new information has come to light that bears on my earlier discussion. For that reason, I respectfully submit this addendum to my November 6, 2003 petition to NOAA Fisheries (McCrary, 2003b).

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 threatened listing of coho in this locality. Our current information and thoughts on this subject are summarized herein.

Also, our continuing research shows that historical population estimates in the current body of literature are based on no valid data. A critical discourse analysis reveals that the basis for listing is actually a chain of misinformation rooted in anecdotes and assumptions.

Lastly, no genetic study to date has definitively determined that coho salmon south of San Francisco are genetically distinct and thus constitute *an important component in the evolutionary legacy of the species*, (56 FR 58612, Nov. 20, 1991). Recent attempts to show such a distinction rely on a distortion of facts and a blatant misrepresentation of data.

1895 Specimens

Our petition stated that "there were no coho present [in coastal streams south of San Francisco] prior to their introduction as a game stock in 1906" (McCrary, 2003b). Since submittal of the petition 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 the central California coast coho salmon evolutionary significant unit (Matlock, 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.

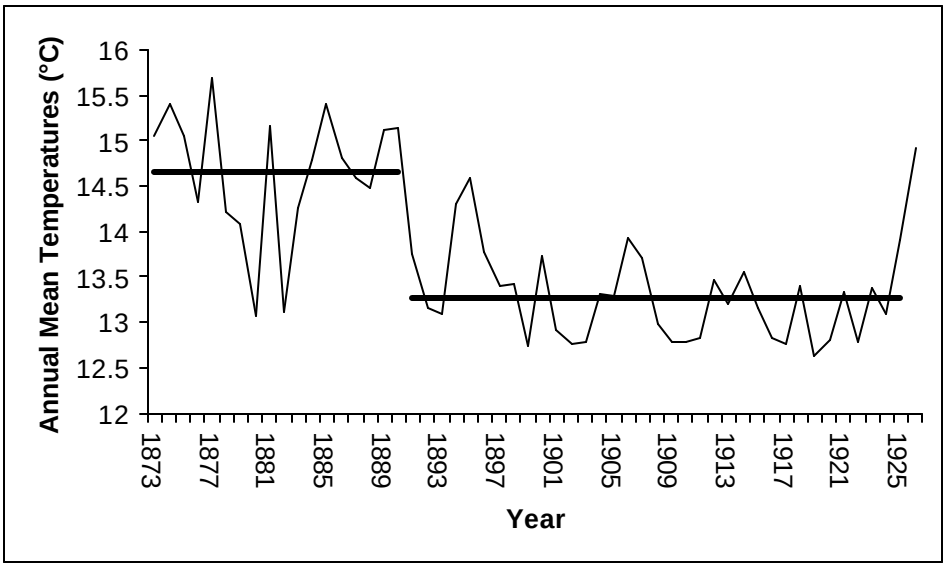

Figure 1: 1873-1926 Annual Mean Surface Temperatures for Santa Cruz (37.0 °N, 122.0 °W). Temperatures averaged 14.65°C from 1873 to 1890, but only 13.26°C from 1891 to 1925. Source: NASA GISS (Hansen, 2003).

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 reducing rearing habitat as well as instream migration, and not generating winter flows necessary to breach the sandbars at the creek mouths that form in the summer months (Figure 2).

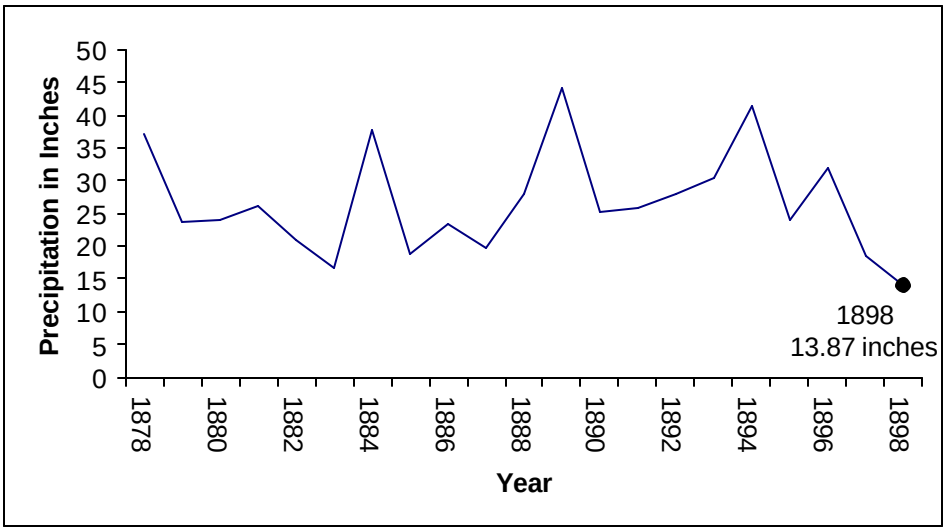

Figure 2: 1878-1898 precipitation data in inches reported from 25 Garfield St (36.97 °N, 122.02 °W), Santa Cruz, Ca. The 13.87 inches of precipitation recorded in 1898 represents at least a 20 year low. Available records extend only as early as 1878. (Collett, 2004).

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** (Bryant, 1994; CDFG, 2003; Hope, 1993), leading to an erroneous listing as threatened (Matlock, 1996). 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.

Facts **regarding 1895 specimens**[1]

- 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 are 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.

Critical Discourse Analysis

The prevailing belief is that coastal streams south of San Francisco historically[a] teemed with native coho (Anderson, 1995; Brown and Moyle, 1991; Brown et al., 1994; Bryant, 1994; CDFG, 1994; CDFG, 2002; CDFG, 2003; Hassler et al., 1988; Hassler et al., 1991; Hope, 1993; Streig, 1991; Weitkamp et al., 1995). Unfortunately, in the forum of public discourse, it is easy for casual observations, hearsay, and misunderstood or misstated facts to take on the aura of truth. Confusion is created by the overuse of *gray material* in lieu of valid citations. Soft sources such as anecdotal stories, hearsay and personal communications, are sometimes considered reasonable in matters of stated speculation or when used to add support to hard, properly cited data. Many scholars and scientists consider the use of this material unacceptable under any circumstances, because it has not been peer-reviewed and may contain erroneous information. Once researchers introduce aberrations into the literature of public or scientific discourse, peers are free to cite it in subsequent publications strengthening the appearance of hard fact with each iteration. As the chain of misstatements grows, it can be very difficult to find the original distortion and even harder to correct the record.

In order to determine the validity of a particular document, the assumptions must be drawn out through a deconstructive process that traces every relevant declaration to its source. By isolating all occurrences of a specific conjecture, it is possible to map the causal vector to its origin.

> "Discourse Analysis will, thus, not provide absolute answers to a specific problem, but enable us to understand the conditions behind a specific 'problem' and make us realize that the essence of that 'problem', and its resolution, lie in its assumptions; the very assumptions that enable the existence of that 'problem'" (Palmquist, 2001).

In the present study, only a surface deconstruction is necessary to reveal the morass of assumptions. Indeed, in the case of coho salmon south of San Francisco, the disclosure of just one basic erroneous assumption (vast populations of native coho south of San Francisco prior to 1900) negates the entire question of recovery.

Table 1 traces the sources and paths of the misinformation which has obfuscated the science of coho salmon in these streams. These sources are the basis of the assumption that native coho

[a] For the purposes of this discourse analysis, "historical" can be defined as predating 100 years. It should be noted that other authors have not been clear with their use of this word.

historically maintained significant populations south of San Francisco. The listing as threatened of coho salmon south of San Francisco is founded on this assumption.

Document	Statements Made With No Reference Cited	Personal Observations or Communications	Invalid Citations [b]	Citations of Erroneous Information [c]	Legitimate Citations
Recovery Strategy for California Coho Salmon (CDFG, 2003)	X	-	-	X	-
Status Review of California Coho Salmon North of San Francisco (CDFG, 2002)	-	-	X	X	-
A Status Review of Coho Salmon (*Oncorhynchus kisutch*) in California South of San Francisco Bay (Anderson, 1995)	X	X	-	X	-
Status Review of Coho Salmon from Washington, Oregon, and California (Weitkamp et al., 1995)[d]	-	-	-[c]	X[c]	-[c]
Petition to the Board of Forestry to List Coho Salmon (Oncorhynchus kisutch) as a Sensitive Species (CDFG, 1994)	-	X	-	X	-
Historical Decline and Current Status of Coho Salmon in California (Brown et al., 1994)	X	-	X	-	-
Status Review of Coho Salmon Populations in Scott and Waddell Creeks, Santa Cruz County, California (Bryant, 1994)	X	X	X	X	-
Petition to List Coho Salmon South of San Francisco Bay as a Threatened Species (Hope, 1993)	X	X	X	X	-
History of Fish Cultural Activities in Santa Cruz County with Reference to Scotts and Waddell Creeks (Streig, 1991)	X	-	X	-	-
Status of Coho Salmon in California (Brown and Moyle, 1991)	-	-	X	X	-
Distribution of Coho Salmon in California (Hassler et al., 1991)	X	-	-	X	-
Distribution of Coho Salmon in California (Hassler et al., 1988)	X	-	-	X	-
Anadromous Salmonid Genetic Resources (Berger, 1982)	X	-	-	X	-
The Distribution of Six Selected Species from the Genera *Oncorhynchus*, *Salmo*, and *Salvelinus* in California (Lucoff, 1980)	-	-	X	-	-
Hereditary and Environmental Factors Affecting Certain Salmonid Populations (Ricker, 1972)	-	-	X	-	-

Table 1: Sources and types of misinformation regarding the extent of native coho salmon south of San Francisco that permeate the current body of literature.

Figure 3 (below) presents the invalid citations [a] and citations of erroneous information [b] used to substantiate the misperception that significant native coho populations historically inhabited coastal streams south of San Francisco. The circles represent literature of current public or scientific discourse that incorrectly alleges that the historical southern extent of significant permanent populations of native

[b] These are instances where the source does not support the cited assertion concerning the native origin of coho south of San Francisco.
[c] These are indirectly invalid citations, or instances where the source cited appears to substantiate the assertion concerning the extent of native coho south of San Francisco, yet, when traced to its origin, the claim has no basis.
[d] Weitkamp et al. cite several documents that we were unable to obtain and review, including the petitions for listing. Generally Weitkamp et al. are very cautious about jumping to conclusions regarding the historical situation of coho salmon south of San Francisco. Thus Weitkamp et al. (1995) may represent the one possible exception in our discourse analysis.

coho salmon is south of San Francisco. The arrows indicate the material referenced to substantiate these claims. For more details see Table 1.

Figure 3: The invalid citations [a] (red dashed lines) and citations of erroneous information [b] (blue solid lines) used to substantiate the misperception that coho are native south of San Francisco.

CDFG cite Snyder (1931) and Fry (1973). Snyder (1931) does not discuss the southern extent of coho salmon, while Fry (1973) only describes the distribution of coho salmon in 1973, not historically. CDFG (2002) also cite Sandercock (1991) for a map they title "Native range of coho salmon" whereas Sandercock's (1991, Figure 1, pg. 398) caption reads, "Figure 1 Coastal and spawning distribution of coho salmon". He states, "Endemic populations of coho are found throughout the North Pacific basin (Figure 1)…" The resolution and scale of the original map is such that the southern range boundary is unclear in detail, but it appears to end at San Francisco Bay. Further, Sandercock (1991) gives no source, reference, nor citation for this statement and he does not discuss the historical distribution of coho.

Brown, et al. cite Snyder (1908). Snyder's 1908 document titled "The Fishes of the Coastal Streams of Oregon and northern California" does not concern anything south of the Sacramento River and makes no mention of any fish anywhere south of San Francisco.

Bryant changes Streig's words giving the false impressions that the Scott Creek egg taking station was established in 1905 to collect coho eggs, and that it was ever the goal to produce 3 million coho eggs. Neither is the case, which is evident in several California Fish and Game Commission Biennial Reports: (Newbert et al., 1918; Newbert et al., 1923; Newbert et al., 1913; Van Sicklen et al., 1910)

Hope cites Waples (1991). Waples (1991) does not comment on the coho south of San Francisco.

For the San Lorenzo River, Brown and Moyle cite a CDFG report (Johansen, 1975). This report contains only census figures for the early 1970s and does not comment on the native origin of any fish.

Streig cites only Shapovalov and Taft (1954). Shapovalov and Taft (1954) do not discuss the native origin of coho or steelhead in Scott and Waddell Creeks.

This document is a geography Master's thesis written by Lucoff (1980) at CSUH. He avers that Hallock ("1877, pp. 976, 756-57") mentioned silver salmon fishing in the Santa Maria River in Santa Barbara County and cites this as his source for a map showing the distribution of coho in 1900. Hallock (1877) does not contain a page 757. Furthermore, Hallock (1877) does not mention silver salmon fishing nor the Santa Maria River. Hallock does state the following: "Their [all known varieties of pacific salmon] range is from Sacramento northward…" (Hallock, 1877, pg. 365). Lucoff's map also shows coho as far south as the Santa Ynez River, for which he has no source, reference, citation, or other justification.

Ricker cites Shapovalov and Taft (1954). Shapovalov and Taft (1954)do not discuss the native origin of coho or steelhead in Scott and Waddell Creeks.

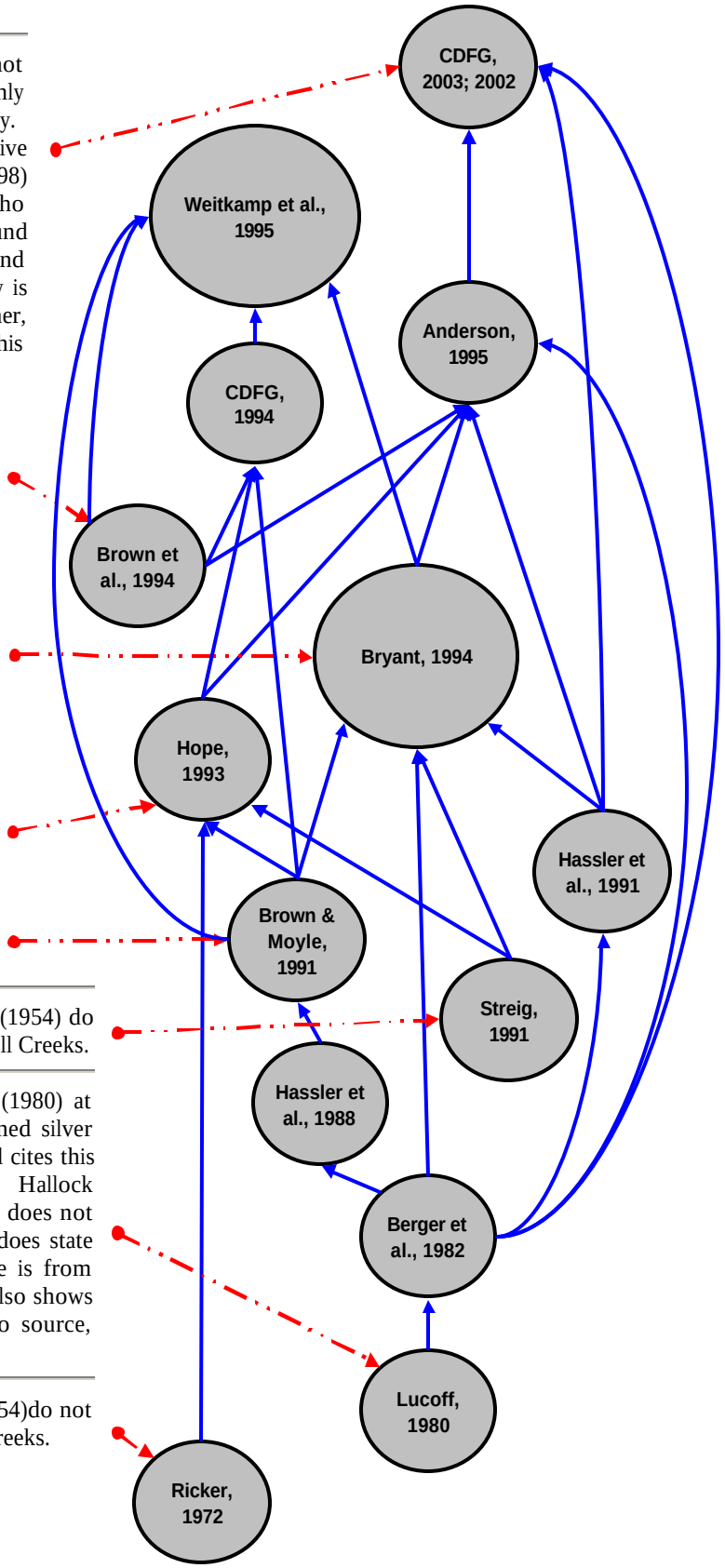

Figure 4 (below) shows the sources used in this study to substantiate the nonnative origin of coho salmon in streams south of San Francisco. Although there are many more sources that add credibility to our conclusions, only primary references or references correctly citing primary references are shown here.

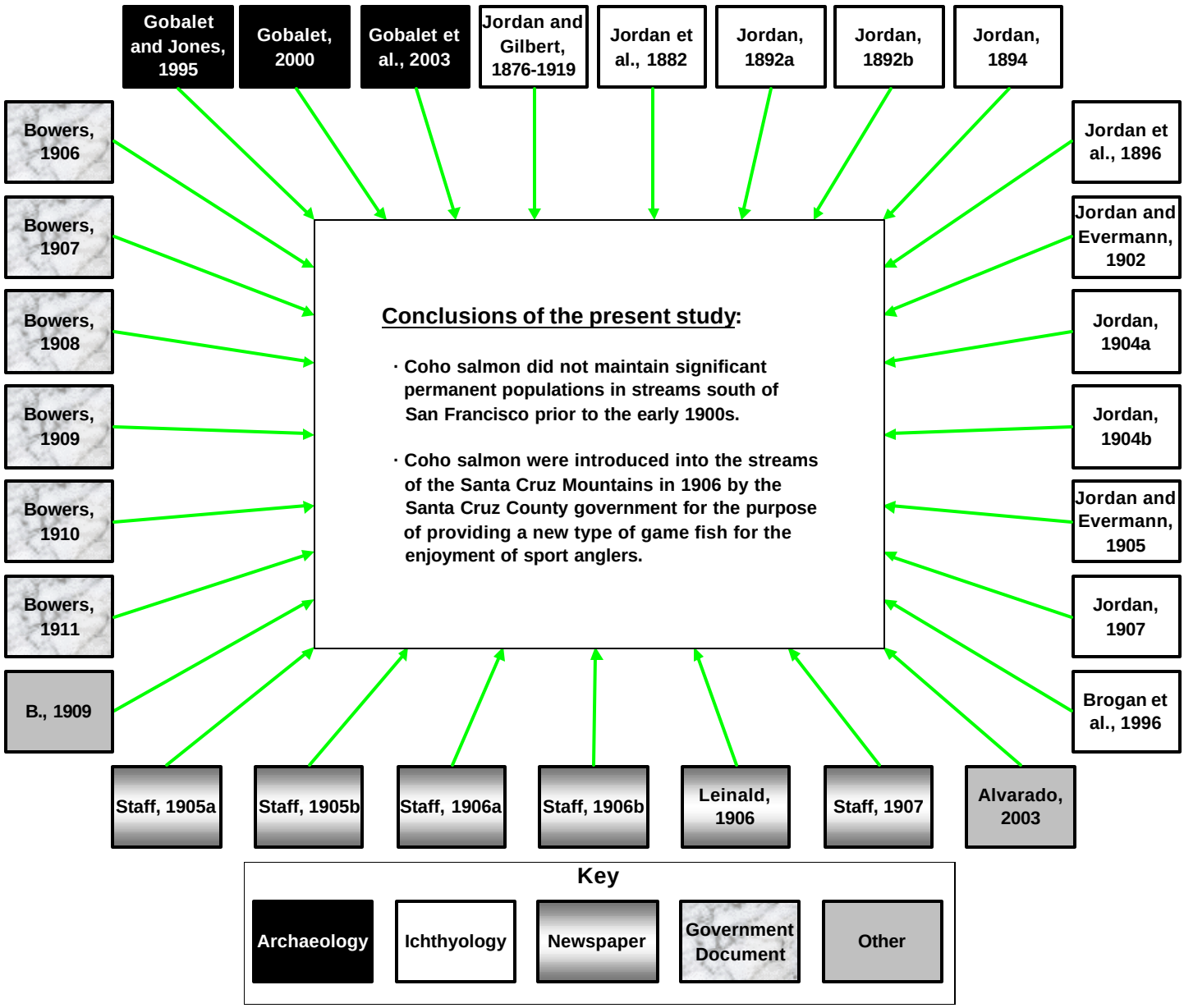

Figure 4: Legitimate citations used to substantiate the nonnative origin of coho salmon in s treams south of San Francisco.

Flawed Conclusions = Inaccurate Assessments

Historical population estimates

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 California Department of Fish and Game (CDFG) would have us believe that populations estimates for the last 40 - 50 years justify listing even though **coho salmon have been artificially planted in Santa Cruz County intermittently at least 46 of the last 97 years, representing a minimum of 3.7 million coho planted**[e, 2]. CDFG statewide coho salmon plantings since 1928 exceed 76 million fish, ranging from none planted to nearly 4.5 million planted in a single year.[d, 3]

> "...there is virtually no definitive data regarding historical coho abundance. Consequently, historical estimates of statewide coho salmon abundance are essentially educated guesses based in limited data, much of which are only occurrence records, hatchery records and personal observations ... Irrespective of the speculative nature of the estimates that have been made regarding historical coho salmon abundance in California, the DFG and most fishery experts believe coho populations have experienced a dramatic and significant decline in the past 40 - 50 years" (CDFG, 1994, pg. 5-6)

In trying to understand the pre-artificial condition of coho salmon south of San Francisco, population estimates for the last 40 - 50 years are irrelevant. The scientific and historical record (which CDFG and NOAA have chosen to ignore) 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.

Factors affecting the species given by NOAA (Matlock, 1996) include every possible influence from disease to ocean conditions. Why some of these are given priority over others has yet to be justified. 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 fish[f] and people.

An important component in the evolutionary legacy of the species?

NOAA has relied heavily on CDFG data and conclusions (Bryant, 1994; Weitkamp et al., 1995). Unfortunately, many of CDFG's assessments are categorically unsound. For instance, in an attempt to rationalize the listing of coho salmon south of San Francisco, CDFG[g] has argued that despite low genetic differentiation among coho stocks in California, coho south of San Francisco show unique adaptations, evident of genetic distinctiveness specific to the area.

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[e] Records are incomplete or missing for most years. Actual figures are almost certainly much higher.

[f] 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).

[g] Interestingly this petition to the California Board of Forestry to list coho salmon as a sensitive species was filed nearly two years before the California Fish and Game Commissioners decided the species warranted listing.

"...historical introductions may explain the overall lack of genetic differentiation of coho salmon from different California streams" (CDFG, 1994, pg. 7).

"Fish in these two streams [Waddell and Scott Creeks] have a rigid 3-year cycle and late run and spawning times ... these fish apparently show unique adaptations to this southernmost region of the species' range and likely constitute a distinctive segment of the gene pool of the species despite the introgression of genes from imported stocks" (CDFG, 1994, pg. 78).

First, coho salmon everywhere normally spawn on a rigid 3-year cycle. Second, late run and spawning times have nothing to do with the fish themselves.

"At Waddell Creek (and Scott Creek) some silver salmon [coho] have entered the stream whenever the first opening of the bar has been of sufficient extent to enable them to do so" (Shapovalov and Taft, 1954, pg. 34).

"Both run and spawn timing of coho salmon in this region [Central California coast] are very late (both peaking in January), with little time spent in freshwater between river entry and spawning. **This compressed adult freshwater residency appears to coincide with the single, brief peak of river flow characteristic of this area** [emphasis added]" (Weitkamp et al., 1995, pg. 73)

That coho do not enter Waddell and Scott Creeks sooner is due to the fact that the creek mouths do not usually open until late December or early January (Dave Streig, Monterey Bay Salmon Trout Project, personal communication). Indeed, on the occasional year that the river mouths open prematurely, returning coho have been observed in these streams as early as November (Shapovalov and Taft, 1954, pg. 34). Weitkamp et al.'s inference that this is merely a coincidence is a hasty dismissal of an obvious fact. We will not speculate to what end CDFG is so intent on spinning the data to list coho salmon in spite of reality. However, we urge NOAA to stand on the side of rational thought.

***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.[4]

- The best available scientific and historical data, including but not limited to Skinner (1962), Behnke and Tomelerri (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.[5]

- Early ichthyologists repeatedly reported an absence of coho salmon south of San Francisco prior to 1912.[6]

- Fish have been imported into Santa Cruz County from northern waters for the purpose of planting in local streams at least as early as 1878.[7]

- The Brookdale Fish Hatchery was established in 1905 as a *steelhead* hatchery.[8]

- No authenticated records have been found showing that any coho salmon were collected at the Scotts Creek Egg Collecting Station prior to 1909.[9]

- United States Bureau of Fisheries documents, two local newspapers, and popular magazine articles report the importation of nearly half a million coho salmon to Santa Cruz County Brookdale Fish Hatchery from 1906 to 1910. 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.[10]

- 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.[11]

- Since 1906 or earlier, the streams of the Santa Cruz Mountains have been frequently re-supplied with hatchery-produced coho from various origins.[12]

- 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.[13]

- Year-class strength of coho salmon in Scotts and Waddell Creeks is predominantly affected by stochastic events (floods and droughts).[14]

- "...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."[15]

- The rigidity of the coho life cycle (as opposed to steelhead) seriously diminishes interbreeding between generations.[16]

- 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.[17]

- Coho salmon population size and distribution expand and contract through time.[18]

- Fluctuations of salmonid populations are closely linked to climatic and oceanic conditions.[19]

- 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]

- Although there is little consensus among geneticists, no study to date has shown definitive genetic data that confirm that coho salmon south of San Francisco are morphologically different from northern coho or constitute an important component in the evolutionary legacy of the species.

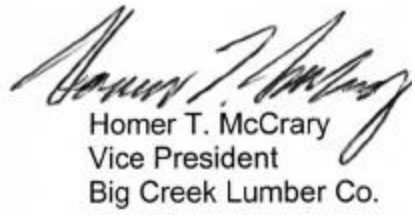
Conclusions and Recommendations

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 November 6, 2003 petition, must be addressed. In addition, NOAA should review the imprudent and irresponsible CDFG recovery strategy (CDFG, 2003), recently approved by the California Fish and Game Commission. The uninformed basis for listing revealed in our discourse analysis, combined with the potentially detrimental consequences of the proposed CDFG recovery strategy (CDFG, 2003), demands immediate delisting of coho salmon south of San Francisco followed by a review of the basis for listing coho salmon statewide. Indeed, coho salmon merit delisting on the basis of the reprehensibly uninformed listing alone. 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 all guesswork and pseudoscience.

Respectfully Submitted,



Homer T. McCrary
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Endnotes

[1] (Rutter and Pierson, 1895; Rutter and Scofield, 1895a; Rutter and Scofield, 1895b; Rutter and Seale, 1895)
[2] (Anderson, 1995; Bowers, 1906; Bowers, 1907; Bowers, 1908; Bowers, 1909; Bowers, 1910; Bryant, 1994; Gordon et al., 1958; Streig, 1991)
[3] (Bruley, 1975a; Bruley, 1975b; Bruley, 1976; Bruley and Horton, 1978; Bruley and Horton, 1980; Bruley and McClendon, 1973; Bruley and McClendon, 1974; Bruley and Pollard, 1977; CDFG, 1986-2001; Gentry et al., 1932; Gentry et al., 1934; Gordon et al., 1956; Gordon et al., 1954; Hastain et al., 1950; Hastain et al., 1948; Krueger and Urrutia, 2003; Macklin and Tharratt, 1957; Macklin and Tharratt, 1958; McCormack and Carpenter, 1982; McCormack et al., 1984; Milnor et al., 1940; Milnor et al., 1944; Milnor et al., 1945; Moore et al., 1936; Moore et al., 1938; Payne et al., 1946; Staff, 1963; Staff, 1964; Staff, 1965; Staff, 1966; Staff, 1967; Staff, 1968; Staff, 1969; Staff, 1970; Staff, 1971; Staff, 1974; Staff, 1975; Staff, 1976; Staff, 1977; Staff, 1978; Ward, 1960; Ward et al., 1961; Ward and Kier, 1959; Ward and Macklin, 1963; Yamashita, 1988; Yamashita and Carpenter, 1984a; Yamashita and Carpenter, 1984b; Yamashita and Carpenter, 1985; Zellerbach and Fernald, 1930)
[3] (Gobalet et al., 2003)
[5] (Alvarado, 2003; McCrary, 2003a)
[6] (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)
[7] (Staff, 1878)
[8] (Shebley and Gillis, 1911, pg. 525)
[9] 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.
[10] (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)
[11] (Snyder, 1914, pg. 70)
[12] (Streig, 1991)
[13] (Smith, 1994, pg. 1; Smith, 1996, pg. 1; Smith, 1998, pg. 1; Smith et al., 1997, pg. 14; Spittler, 1998)
[14] (Smith, 1994, pg. 1; Smith, 1996, pg. 1; Smith, 1998, pg. 1; Smith et al., 1997, pg. 14)
[15] (Smith, 1994, pg. 1)
[16] (Shapovalov and Taft, 1954; Smith, 1994, pg. 1)
[17] (Smith, 2002)
[18] (Nickelson and Lawson, 1998)
[19] (Matlock, 1996)