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April 18, 2009

To: Assembly Member Jared Huffman, Chair
Assembly Committee on Water, Parks & Wildlife
Attn: Diane Colborn, Consultant
1020 N Street, Suite 160
Sacramento, CA 94249

Re: Background information for Assembly Bill 1253 (Fuller) - Striped Bass
(Sent via email to Diane Colborn & US mail on 4/20/09)

Chairman Jared Huffman, Members of the Committee & interested parties:

I would like to provide some background information regarding predation by striped bass on salmon and delta smelt in regards to potential population level impacts (predation that would affect the population size and or viability) on these endangered species.

Following please find information I feel important for the committee to understand when evaluating the merits of this legislation:

1) Predation on early life stages of fish with reproductive strategies such as Chinook salmon, Steelhead and striped bass is a normal, a natural part of the food web, and part of ecosystem checks and balances in a healthy environment. For a young salmon to survive it must grow as fast as it can because the larger it gets the likelihood of predation becomes less, and then it must get to the ocean as fast as possible. This requires good water quality, appropriate habitat and adequate food supplies. Current river flows and water quality has been shown to be poor, habitat has deteriorated/been destroyed and food for salmon smolts is much less abundant now that in the past when the population and the Delta ecosystem was healthy.
2) Striped bass, Chinook salmon & Steelhead populations co-existed and thrived in this Estuary/ecosystem for over a hundred years together. It was not until multiple stressors beginning with water project operations in the 1970s followed by contaminants, introduced invasive clams and zooplankton, poor river flows and extensive habitat deterioration that all of the species concurrently began and continue to decline. Striped bass and salmon populations on the East Coast of the US have co-existed and thrived for thousands of years. So to conclude that striped bass

in this ecosystem are causing the decline of salmon and other species has no credible scientific basis and in my opinion is absurd.

3) Recently an array of receivers has been placed from the upper reaches of the rivers to the Golden Gate Bridge such that radio tagged fish movements can be tracked in real time (http://californiafishtracking.ucdavis.edu/index.html). Results from the 2007 tagging of late fall Chinook smolts and juvenile Steelhead indicate survival estimates of approximately 20% from the release point at Coleman Hatchery (near Red Bluff) to ORD Bend near Chico where striped bass are not typically present (see figure taken from the above listed website at the end of this document). However, the native Sacramento pike minnow inhabits these sections of the river and are know to congregate and feed on Salmon smolts and juvenile Steelhead. In 2008 to attempt to avoid pike minnow & other predator aggregations, tagged fish were released at 3 sites downriver of the hatchery and the survival to ORD Bend was similar (personal communication with Dr. Pete Klimley on 4/20/09). This suggests the vast majority of mortality is occurring in areas where striped bass are not present and that other factors such as other predators (e.g. pike minnow, other fish and birds…), water quality, river flows and food are responsible for the vast majority of salmon smolt and Steelhead mortality seen in recent years.
4) I have been involved in electro-fishing for adult striped bass for laboratory spawning and research during the spring spawning runs almost every year since 1989. In examining the gut contents of hundreds of adult male and female striped bass I have never found a salmon smolt, delta smelt or adult salmon. The gut contents of striped bass during the spring spawning run are made up almost exclusively of American Shad. Striped bass prefer much larger prey than salmon smolts and the shad run the river at the same time as striped bass.
5) It's been brought to my attention that one specific paper and several quotations from other papers form the foundation of evidence for those supporting this bill. The paper entitled "Modeling the Effect of Striped Bass (*Morone saxatilis*) On the Population Viability of Sacramento River Winter Run Chinook salmon (*Oncorhynchus tshawytscha*)" is an example of how in my opinion literature is being misrepresented. The purpose of producing the model & hence this paper was to try and determine what would happen if the current striped bass population was **artificially enhanced/tripled** using various mitigation techniques. There are no current efforts to mitigate the decline of the striped bass population, a population in continual decline since the 1970s. This paper is a mathematical exercise and based solely on the population abundances of the two species. It is not based on nor does it contain any information on real predation rates of striped bass on Chinook salmon nor does it report any information on the gut contents (defined as food found in the stomachs of fish) of striped bass that indicate any real rate of consumption of Chinook salmon by striped bass. The problem with this type of modeling is with the assumptions used being based solely on population level estimates of both fish populations (striped bass and salmon). They state at the beginning of the paper that their approach to this model is to "**use simple models of predator and prey population dynamics and estimate the unknown parameters from time series of predator and prey abundance within the statistical framework**". They also state that there are better models to address this but it would require more money and time to produce the better more realistic models. **One of many "unknown parameters" they estimate is the 9% predation rate of striped bass on salmon.** The estimated

9% predation rate does not adequately take into account that striped bass are not dependent on salmon for any portion of their diet (and they admit this within the paper). They based their 9% predation rate as being reasonable by **comparing it to predation rates estimated for squawfish in the Columbia River system**. The Columbia River system is very different and not comparable to the San Francisco estuary and squawfish are not related to striped bass filling a completely different ecological niche in their ecosystem. A more realistic predation rate based on what is known by scientists who've worked in the system for a long time is approximately 3%. If that rate (3%) was used in their model striped bass predation would have no effect on salmon quasi-extinction (defined as three consecutive spawning runs of fewer than 200 adults). They also don't take into account the variability of the population of striped bass and the variable consumption/estimated consumption on salmon. River flows and the variability it would cause in both salmon and striped bass populations are also not considered in this model. In addition, a large portion of their assumptions are based on information in the papers written by Stevens (1966) & Thomas (1967). These references are **over 40 years old.** Any population-based or other estimates from information in these references are inappropriate to be used in a model to predict current outcomes and are highly inaccurate. In their own analysis (Table 2 & Figure 6) they determined **that at current striped bass population levels there is no statistical difference between the quasi-extinction of Chinook salmon as compared to zero striped bass in the model/San Francisco estuary.** This is further stated in the second last line of the paper **"The predicted decline of the adult striped bass population from 700,000 to 512,000 contributes a smaller effect to increase survival probability than does the effect of conservation measures."** Therefore this paper supports the notion that the striped bass population at current and estimated future levels does not have any significant effect on the quasi-extinction of Chinook salmon.

6) I believe the citation and quote from the Nobriga & Feyrer paper (2007) is being used out of context implying that striped bass are the most significant predator on salmon in natural situations. The entire quote is " For instance, striped bass likely remains the most significant predator of Chinook salmon, *Oncorhyncus tschawytscha* (Lindley and Mohr2003), and threatened Delta smelt, *Hypomesus transpacificus* (Stevens 1966), due to its ubiquitous distribution in the Estuary **and its tendency to aggregate around water diversion structures where these fishes are frequently entrained** (Brown et al. 1996)." The take-home message of this quote is that in their opinion striped bass feed on salmon and Delta smelt at water diversion structures where the endangered fish are entrained and because the way these structures are built and operated. **This is man-made predation not natural predation.** This opinion is not based on any gut contents or predation rate evidence. In fact in a subsequent paper by the same authors in 2008, they do examine the gut contents of striped bass from 1963-2003 and find that striped bass rarely eat salmon and almost never eat delta smelt. This is further corroborated by the fact that in the recent years since the POD crisis of 2000 no delta smelt have been found in the gut contents of any striped bass (CA DFG data).

7) Another quote taken out of context is from the American fisheries Society regional chapter newsletter Pices (not a peer-reviewed publication): "striped bass (*Morone saxatilis*), of the aquatic fish predators, have the greatest potential to negatively effect the abundance of juvenile salmonids." **The full quote is: Sacramento pikeminnow (*Ptychocheilus grandis*) and striped bass (*Morone saxatilis*), of the aquatic fish predators, have the greatest potential to negatively affect the abundance of juvenile salmonids.** These are large, opportunistic predators that feed on a variety of prey and switch their feeding patterns when spatially or temporally segregated from a commonly consumed prey. Striped bass are among of the top predatory fishes in the Sacramento-San Joaquin Estuary and exert a lot of pressure on juvenile salmon (Yoshimaya *et al.* 1998). Catfish also have the potential to significantly effect the abundance of juvenile salmonids. Prickly (*Cottus asper*) and riffle (*C. gulosus*) sculpins, sturgeon, and larger salmonids also prey on juvenile salmonids (Hunter 1959; Patten 1962, 1971a, 1971b)." Here the author describes the **"potential"** of several species including striped bass to negatively affect the abundance of juvenile Salmonids. There is no data in the literature to back up this statement. I could not even find one of the references they cite in the newsletter article; Yoshimaya *et al.* 1998. As mentioned previously striped bass prefer larger prey than juvenile salmon found in the estuary and likely only prey heavily on salmon in artificial man made scenarios according to the best data and science available.
8) Other quotes from Moyle 2002, a 1998 study on a red Bluff diversion dam, and the US Fish and Wildlife Service biological opinion on delta smelt are misrepresentations of what is contained in those papers/documents. All of these papers/documents discuss predation on entrained or salvaged salmon or Delta smelt. These are artificial man-made scenarios of predation. Although it is possible that striped bass and other predators eat salmon and delta smelt from diversions, Clifton Court Forebay and salvage this is not natural predation and has not been demonstrated to affect population levels of salmon and delta smelt. In the case of the red Bluff diversion dam this is not an area where any significant numbers of striped bass live. There are a few resident striped bass, but certainly not enough to impact population numbers of salmon. In fact the analysis of gut contents of approximately 2000 striped bass from Clifton Court Forebay conducted by the Department of Fish and Game in 1995 when salmon, delta smelt and striped bass were significantly more abundant **showed no delta smelt in the stomachs of striped bass and only one salmon.**
9) To put this in simple perspective predation in these artificial man-made scenarios such as Clifton Court Forebay, diversion dams & salvage are no different than what happens when you feed your home aquarium and the fish come to the area of the tank where the food is being distributed. If you provide a food source of disoriented, stressed fish to predators in a confined area, they will readily eat the food provided. **This is not natural predation on salmon or delta smelt, it has not been shown to effect population levels and to restate; all of these fish populations thrived together for over 100 years when this estuary was a suitable habitat for all of these fish.** What we have now is an estuary severely altered by man that has become very similar to a huge Arkansas lake suitable for the fish and plant life found in such a habitat. We no longer have an estuary with appropriate river flows, tidal influences, salt marshes and the natural habitat required for salmon, delta smelt and striped bass to survive and thrive. This along with other stressors such as contaminants and introduced invasive clams & zooplankton is why all of these fish populations have

concurrently declined to extremely low levels some bordering on extinction. The population declines of salmon and delta smelt are not in any way due to striped bass predation.

If you require any additional information or clarification please don't hesitate to contact me.

Sincerely,

David J. Ostrach Ph.D.

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The figure below is from the website: http://californiafishtracking.ucdavis.edu/index.html

It is a portion of the poster titled: Survival & Migratory Patterns of Central Valley Juvenile Salmonids: Overview (McFarlane et al., 2007)