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Report 5360
Native Mussels

August 21, 2016

To: Mr. Chris Lee
Director of Env. Compliance, Permitting and Habitat Conservation
Solano County Water Agency
810 Vaca Valley Parkway, Suite 203
Vacaville, CA 95588

Regarding: Response to PEIR Comments from Mr. Jeff Tenpas

Dear Mr. Lee:
The following are my comments regarding the PEIR Comments from Mr. Jeff Tenpas:

Mr. Tenpas Comment:
"*Loss of mussels. The Program channel reconfiguration activities will destroy any mussel beds currently existing in the project areas. Mussel populations are likely already rare in Putah Creek and are in serious decline in the state. Channel modifications to a large fraction of the stream bed risk extirpating mussel populations entirely from Putah Creek. Channel scarification projects that seem on the surface less impactful, may also be targeting and harming mussel habitat.*"

> **Mr. Tenpas sentence # 1: "*Loss of mussels. The Program channel reconfiguration activities will destroy any mussel beds currently existing in the project areas*"**

Ken Davis Comment # 1:
1. There is no scientific reference, or supportive information supplied by Mr. Tenpas or other individuals or agencies that "mussel beds" exist or ever existed in Lower Putah Creek. I have only encountered one live specimen in the lower creek. To the contrary, I have surveyed many of the areas in the Lower Creek that would support native mussels. Survey protocol, using current EPA standards, and reasonable scientific logic, has been employed. All mussel surveys in Lower Putah Creek have been negative. That result is supported by surveys in Putah Creek completed in 2010 (Howard, 2010) and 2015 (Howard, 2015) at sites considered historical habitat for native mussels.

> ***Mr. Tenpas sentence #2: Mussel populations are likely already rare in Putah Creek and are in serious decline in the state.***

Ken Davis Comment # 2: Mussel populations are rare (Mr. Tenpas has not furnished information on any particular mussel species) and most probably extirpated from Lower Putah Creek. I have only seen one live mussel in the lower creek which was found on 10/5/2011 during the fish rescue process in Phase 1 of the Winters Putah Creek Park. The individual was reallocated to an appropriate area away from the construction area. I routinely monitor that area for any sign of mussels. I have not seen any sign of native mussels since 10/5/2011, possibly due to cementation and other negative habitat considerations that the current projects are attempting to remedy.

Note: I routinely "monitor" the native mussel populations in the tributaries of Lake Berryessa. If the current habitat restoration projects in Lower Putah Creek are completed, I suspect that mussels will recruit into the lower creek - if other requirements are met.

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Mussel populations in Decline: Native mussel populations are declining due to the following factors which all exist in Lower Putah Creek

a. Former channelization of streambeds for flood control (McMahon, 2010)
b. Heavy silt load (McMahon, 2010)
c. Sedimentation (cementation) (Westport, 2010)
d. Artificial impoundments (dams) (Howard, 2010)
e. Elimination of fish glochidal hosts (Howard, 2010)
f. Release of cold hypolimnic water (McMahon, 2010)
g. Pollution from urban waste water effluents such as sewage (McMahon, 2010)
h. Impact of invasive species such as Corbicula (McMahon, 2010)

Mr. Tenpas sentence # 3: Channel modifications to a large fraction of the stream bed risk extirpating mussel populations entirely from Putah Creek.

Ken Davis Comment # 3. Channel modifications have already been done in the past and possibly lead to the lack of native mussel populations in Lower Putah Creek, if they ever existed. I could find no documentation that extensive mussel beds ever existed in Lower Putah creek. Two studies noted that the area upstream for the Winters Car bridge were historic sites of native mussels. No comments concerning the density were found during a recent search.

"Mr. Tenpas sentence # 4: Channel scarification projects that seem on the surface less impactful, may also be targeting and harming mussel habitat."

Ken Davis Comment # 4: Areas of Lower Putah Creek that are permitted for scarification are essentially cemented, a condition that requires mechanical intervention. Such substrates are impossible for burrowing bivalves to enter due to the hardened condition. Contrary to Mr. Tenpas' comment, the scarification process might make an area more acceptable for mussel introduction or recruitment. I have, or will be, surveying all the noted scarification sites and will certainly note any native mussel populations and take the appropriate actions.

Mr. Tenpas Comment:
"26. The environmental assessment should include with a survey and mapping for mussels."

Ken Davis Comment: Due to an interest in native mussels, I can certainly support a reasonable survey in the Lower creek.

Mr. Tenpas Comment:
"27. The Program should include a plan component to protect and even improve mussel populations and habitat."

Ken Davis Comment: We have been noting and reporting native mussel populations to the appropriate individuals and agencies since 2006. In the past I have assisted researchers in locating known areas where I routinely find mussel shells that might support extant populations. We are currently working with Jeremy Tiemann at the University of Illinois - through my association with the Society of Freshwater Science - to supply Native California Mussel specimens (shells) for their collection. Mr. Tiemann is assisting by providing

the current taxonomic determination for the mussels that I am providing to the University collection.

Remnant Mussel Populations in Putah Creek Drainage: I have been casually monitoring the Lake Berryessa tributaries and the lake proper for native mussels during Eurasian Mussel surveys. I routinely find mussel shells of two distinct species, but have never found a live specimen of any size. I suspect there are native mussels surviving on the periphery of the lake or in the tributary arms. Recent information has microscopic images of common objects that occur in my plankton surveys that I have never been able to identify. From the images reviewed, I am convinced they are the microscopic glochidia (larvae) of native mussels. I will review my image records and report any specimens found in the future as they might represent a reservoir of native mussels.

Native Mussel Shell - Capell Creek - 3/10/2008 - K Davis image.

Submitted via e-mail on 8/31/2016

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References:

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