



December 16, 2014

To: Richard Marovich
Mark Snyder

From: Ken W. Davis, Aquatic biologist

Re: Lower Putah Creek Scarification - Observations and Images

Report:

This report is in response to your request to *“Provide details related to the scarification activity, including, but not limited to, locations and approximate area of gravel scarification, timing and duration, if gravel was added or removed from the channel, list any vegetation or trees removed, impacts related to ingress or egress, invasive aquatic vegetation control, pre-or post studies/ surveys conducted and any best management practices implemented.”*

General impressions:

I was working in the areas scarified for 5-8 hours a day, from December 5, 2014 through December 9, 2014. Work was directly related to my contract to monitor aquatic invertebrates and document fish populations via subsurface video in Lower Putah Creek. While I did not collect any invertebrates due to the presence of Chinook salmon I did want to observe the potential use of the scarified areas by salmon and eventually aquatic invertebrates. I also wanted to document what habitats the salmon were utilizing, specially the scarified sections and the existing side channels. Both are driven by my long-term interest in reducing benthic cementation and the development of “side channel refugia” for spawning adults and adolescent salmon and trout.

Prior to your request for information, I did mention to you that the riparian sections leading to the scarified sections of the creek showed very little disturbance. In fact, most areas showed no excavator damage. Several of the landowners thought that the in-stream scarified areas were coalesced redds created by the spawning salmon. That was understandable when salmon spawned in every scarified section except Number Two which was claypan and devoid of any gravel. Rainbow trout were also observed spawning in every scarified area that had gravel.



Female salmon moving under the cover of a riparian sedge. Image from video taken 12/8/2014.

Excavator Excellence:

The lack of disturbance to the areas of ingress and egress is due to the exact precision used by Rick Fowler when operating the escalator. I saw no vegetation or trees that were removed or even showed any sign of damage such as bark removal or scrapes. The alders and streamside sedges in the work area are of particular interest due to their canopy use by salmon and trout. The ability to reach over (with the excavator) existing vegetation is probably the reason that there was no significant riparian damage at any of the scarification sites.



Walking Survey on December 10, 2014:

On December 10, 2014, I walked the entire scarification work section, examined each work area, photographed each area and set up photo stations that will allow me to photograph every site in the future for comparison. I also talked with Rick Fowler to make sure I was accurate regarding the location of each site.

Walking Survey on December 13, 2014: Post Major Storm

After the recent storm, I walked the entire scarification area, examined each area, photographed each area to match images captured on December 10, 2014.

Locations: See below for GPS data and images

Approximate area: Accurate data on amount of area scarified should come from Rick Fowler

Timing: Accurate information on timing of the work should come from Rick Fowler

Duration: Accurate information on the duration of the work should come from Rick Fowler.

Gravel added: To my knowledge and observations, there was NO gravel or cobble added to Lower Putah Creek. See image on Page 3 of cobble staged for possible placement in Lower Putah Creek upon approval by DFW. That cobble remains in place.

Gravel removed: From my observations from the day after the scarification operation until 12/10/2014 there was NO gravel or cobble removed from Lower Putah Creek

List any vegetation or trees removed: Based on close observations between November 29, 2014 and December 10, 2014, I saw NO vegetation or trees that were removed.

Impacts related to ingress or egress: Based on close daily observations between November 29, 2014 and December 10, 2014, I saw not significant impact from ingress and or egress. I cannot say that there was no impact, I am claiming that I did not see any impact of concern to the riparian zone of Lower Putah Creek.



Chinook salmon spawning on 12/7/14

Invasive aquatic vegetation control: To my knowledge of the scarification sites which I routinely visit, there was no removal of aquatic vegetation from Lower Putah Creek. Section 1 (control site with no scour) does have a significant population of aquatic vegetation which remains. Aquatic vegetation is visible in the background (middle left) of the image. The spawning salmon did dislodge some vegetation during the redd-building process.

Pre-Studies: I did conduct aquatic invertebrate surveys in the area prior to scarification. I plan on continuing the surveys after the salmon alevin leave the redds (at least 90 days.)

Post studies: I will continue aquatic invertebrate

and NZMS surveys exclusive of the salmon and trout redds. I will photograph the scarification sites for comparison and provide same to the Streamkeeper.

Surveys conducted: Aquatic Invertebrate, New Zealand mudsnails, salmon and trout videos.

Best Management Practices implemented: Accurate and up-to-date information should come from Rick Fowler and Mark Snyder.



LOCATION INFORMATION

Note that the original list of potential scarification sections was reduced from eight to six. Only four were actually scarified during the time period in question. Never-the less, I am going to comment on all six for the sake of documentation.

SECTION NUMBER 1: This section was not scarified and remains as a control site as an area with copious gravel resources. Salmon did spawn in this area after it appeared that available gravel sites were occupied by other salmon. The depth of the redds was significantly less than those redds in the scarified areas.



N: 38.49523

W: 122.00190



All cobble staged near the creek remains in place. To my knowledge, no cobble or gravel was added to the creek during the recent scarification action.



SECTION NUMBER 2: This section was partially scarified but was abandoned due to the lack of gravel. No gravel or cobble was added. Salmon did not use the site for spawning.



N: 38.49617

W: 122.00039





SECTION NUMBER 3: Site was scarified. At least four pairs of salmon and two pairs of trout spawned on this section



**12/10/14
Pre-storm**

N: 38.49681

W: 122.99933



**12/13/14
Post-storm**

High Water Line



SECTION NUMBER 4: Section 4 was not scarified in the recent action. This is the original test site that was visited by Lorie Hammerli and Ryan Watanabe on 8/5/14. At least four pairs of salmon and one pair of trout spawned on this scarified site.



**12/10/14
Pre-storm**

N: 38.49789

W: 122.99797



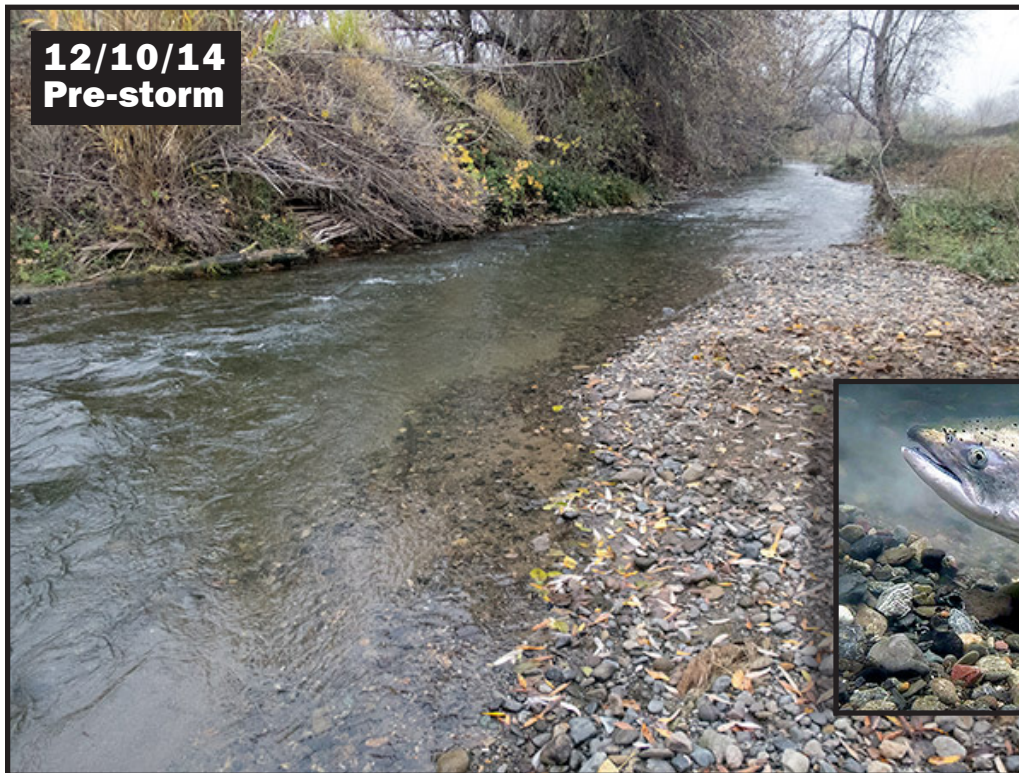
**12/13/14
Post-storm**



Tree that fell on Scarification
Section 4. Image 12/13/14



SECTION NUMBER 5: Site scarified and was used by two pairs of salmon. Image below shows female salmon that spawning at this site.



N: 38.49929

W: 122.99672



Salmon spawning in Scarification Section 5.





SECTION NUMBER 6: Site scarified and used by 2-3 pairs of salmon for spawning. One pair is shown in image below.



N: 38.50002

W: 121.99635



Salmon spawning in Scarification Section 6.





Conclusions / Observations / Recommendations:

1. The scarification process that was undertaken on 11/27/14 caused a minimum of riparian disturbance.
2. I saw no evidence that gravel or cobble was taken from, or added to, Lower Putah Creek.
3. I saw no damage to riparian trees, bushes or other streamside plants such as sedges.
4. In-stream scarifications - when conducted by a professional equipment operator - can be completed with a minimum of riparian disturbance.
5. Salmon in Lower Putah Creek readily spawned in scarified sections that were formerly unusable or at least highly difficult for salmon to use for spawning.
6. Upon approval by DFW, I strongly recommend that the scarification program continue at least in the proposed study area.
7. Based on previous research and experience in Lower Putah Creek, I anticipate that the aquatic invertebrate density and diversity will increase in the scarified sections.
8. It appears that the scarification action in some areas facilitated the storm water to narrow the creekbed. Note comparison images for Scarification Sections 4 and 5.

Submitted 12/16/2014 via e-mail:

Ken W. Davis
Aquatic Biologist
Wildlife Survey & Photo Service
2443 Fair Oaks Blvd. # 209
Sacramento, CA 95825
(916) 747-8537
ken@creekman.com
www.creekman.com