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**From:** Sarah Gallagher - NOAA Federal <sarah.gallagher@noaa.gov>  
**Sent:** Tuesday, May 28, 2019 9:19 AM  
**To:** Rupert, Derek  
**Subject:** Re: [EXTERNAL] Total amount of injection gravel in Clear Creek to date

Thank you for taking the time, Derek. I agree with you on the other factors that make good spawning habitat.

**Sarah Gallagher | Fish Biologist**  
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On Tue, May 28, 2019 at 9:12 AM Rupert, Derek <[drupert@usbr.gov](mailto:drupert@usbr.gov)> wrote:

Also, attached are two reports from my time on the Trinity. I think this info is particularly informative as it shows that some riffles have significantly different hyporheic flow temperatures. Sheridan Riffle of the Trinity River is the river's best riffle for spawning, because (presumably) it has consistently cool hyporheic flow (warmer in winter, colder in summer). My point being that even though riffles look similar or map-out as good habitat, there are other forces that make up consistently great spawning riffles.

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On Tue, May 28, 2019 at 9:00 AM Rupert, Derek <[drupert@usbr.gov](mailto:drupert@usbr.gov)> wrote:

Attached are a few papers on redds and hyporheic flow.

Enjoy!

On Tue, May 28, 2019 at 8:42 AM Sarah Gallagher - NOAA Federal <[sarah.gallagher@noaa.gov](mailto:sarah.gallagher@noaa.gov)> wrote:

Thanks Derek, one other thing I am hoping you can help me with- do you have a reference handy for interstitial flow changes in salmon redds -mechanisms that cause it?

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On Tue, May 28, 2019 at 8:34 AM Rupert, Derek <[drupert@usbr.gov](mailto:drupert@usbr.gov)> wrote:

Thus far we have added 175,798 tons of gravel (1996-2018). This is for standard augmentations only. There was substantial amounts added during channel rehab, too.

On Tue, May 28, 2019 at 8:25 AM Sarah Gallagher - NOAA Federal <[sarah.gallagher@noaa.gov](mailto:sarah.gallagher@noaa.gov)> wrote:

Can you provide me with the number? My recollection is 200,000 tons (this would include the floodway rehab channels~30K tons). Thanks.

**Sarah Gallagher | Fish Biologist**

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