Implementation plan for mobilizing gravel from the inlet to Sven Olbertson side channel on the Trinity River near Lewiston Dam

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Overview

Trinity and Lewiston Dams trap sediment from upper watershed areas and release high flows in spring to aid the river's restoration from centuries of human impacts. The high flows transport sediment, but without an upstream supply for replacement, the river is degraded to the detriment of aquatic life. To avoid this impact, gravel additions are permitted by the Regional Water Quality Control Board and U.S. Army Corps of Engineers at five locations on the Trinity River upstream of Rush Creek, including near Trinity Hatchery and Lewiston Dam (hereafter "Hatchery Reach"). The goal of this implementation plan is to relocate and make a large gravel deposit that blocks the entrance to Sven Olbertson side channel available for fluvial transport, recreate a mass spawning area that previously existed at this location, and increase flow through the side channel complex to improve spawning and rearing conditions (Figure 1).

Figure 1. Site location map showing points of interest in the project location.

Site history and current conditions

Since the Trinity River Record of Decision was adopted in 2000 (ROD, 2000), three gravel additions have been made in the Hatchery Reach. The first two additions were made in 2007 (1,677 cubic yards (cy)) and 2008 (4,483 cy) by placing gravel in the shape of lobate bars located within 600 to 1,800 ft of the entrance to Sven Olbertson side channel (Figure 1). The bars were out of phase with the channel's hydraulics and the bulk of the material mobilized during the 4,250 cfs peak flow event that was released in spring 2009. Deposition of the gravel formed a large mid-channel bar in the lee of a transverse weir constructed of oversized material 350 ft upstream of the side channel entrance. At the time, deposition of the gravel did not impact a mass spawning area that existed at the side channel entrance; this area includes spawning dunes, which have occupied an area of around 4200 ft^2 since at least 2005 (Figure 2).

Figure 2. Clockwise from upper left, aerial photographs showing evolution of the project site from 2005 to 2009, 2011, and 2023.

The Sven Olbertson side channel was reconstructed in 2009 to form a multi-thread channel and expand its length throughout the left bank floodplain. The following year's spring release reached a peak flow of 7,840 cfs that bifurcated the mid-channel bar mentioned above, but it was the record post-ROD flow release of 12,300 cfs from Lewiston Dam in 2011 that mobilized these sediments into the side channel entrance, blocking all but flood flows from the river to a degree that continues at present (Figure 2). The sediment plug also capped about half the mass spawning area and reduced flow in the side channel

outside the spring flow release period (generally April 15 through June) to hyporheic contributions through the plug and surface flows from a several foot wide channel that exists on the far left bank.

The area of the mass spawning area that was not capped by the sediment plug was degraded by perennially low flows that enabled the accumulation of fine sediments, biomatter, and aquatic vegetation that have clogged the gravel bed (Figure 3). In other areas of the side channel, only slack water exists where a lotic channel previously existed. Under these conditions, the sediment plug has expanded further downstream into the side channel since it first deposited (Figure 2). Nonetheless, adult salmon still use the channel for spawning, yet likely experience much lower incubation success than when the side channel received higher floods and spawning flows before the plug was deposited.

The TRRP proposes to relocate the sediment plug to enable it to be captured by the river and transported downstream. In so doing, the following benefits to the river and its fish populations are expected:

1) Sediments in the plug will be available for fluvial transport to help eliminate the deficit of gravel in the Trinity River upstream of Weir hole (Figure 1);
2) High-quality salmonid spawning habitat will be restored near Trinity River Hatchery where adult salmon congregate; and
3) Flow will be increased through the Sven Olbertson side channel to improve spawning habitat quality and increase the availability of juvenile salmonid rearing habitat.

Figure 3. The left panel shows Scooter for scale amongst fine sediments, biomatter, inorganic material, and vegetation colonizing the side channel. The arrow in this figure shows the bank area for entering the channel from the access road. The right panel shows placid water at the upstream end of the side channel complex and the gravel plug that will be removed.

Site Access, land ownership, and project authorization

Access to the site is via Trinity Dam Boulevard to Trinity River Hatchery Road (Figure 1). From this turn off, travel 0.4 miles toward the hatchery to the Sven Olbertson parking area on the left. The Sven Olbertson side channel is then accessible via a road from the Sven Olbertson parking area where equipment will be transported by trailer for offloading (Figure 1). Alternative offload sites are located 0.1 miles up and downstream of the parking area. The access road is blocked by three boulders that will be relocated to provide equipment access to a bench for walking equipment 400 ft in the upstream direction to a low-gradient ramp into the channel. Almost no vegetation will be disrupted in accessing the side channel. Any damage that does occur will be repaired at site close-out. The distance that equipment will be required to travel from the access ramp to the sediment plug via the wetted side channel (Figure 3) is 60 ft to the nearest location of access or 120 ft to the further access location. Steel plates may be used to avoid impacts to inhabitants in the interstitial spaces in the bed within these distances, if required.

The project area is located within the environmental study limits of the Sven Olbertson project area. The land in this area is owned by the U.S. Forest Service. The North Coast Regional Water Quality Control Board and U.S. Army Corps of Engineers have reviewed the project scope and determined it fits within the authority for gravel augmentations made to the Trinity River, as stated above.

Methods for relocating the gravel plug and restoring spawning habitat

Material contained in the gravel plug will be relocated to an area immediately downstream of its current location so that it may be accessed by the river for transport downstream using one excavator and a loader. Work will proceed by using the excavator to make piles of sediment within the area of the plug outlined in black in Figure 4. The front-end loader will then scoop the piles into its bucket and transport and deposit in the area outlined in green (Figure 4). The sediment will be relocated in a manner that provides a working surface above the wetted channel to build the pile in the downstream direction.

After the out of water portion of the sediment plug is relocated, the excavator will be used to adjust the completed elevation of the channel bed below the water surface. This will be done to provide water depths (1-3 ft) that support spawning by Chinook, steelhead, and coho salmon during summer (June through October 15) and winter (October 15 through April 15) baseflow releases of 450 and 300 cfs from Lewiston Dam, respectively. To accomplish this, the excavator will be operated on a dry surface working backwards to pull material and swing it for scooping and transport by the loader. In this way, completing the final surface can occur outside the wetted channel until the last hours of the planned operation.

The area that the sediment plug will be relocated is in a confined portion of the river where velocities will increase from the added material to help disperse the pile into gravel bars that are expected to form on the channel margins downstream. The total estimated volume of sediment that will be relocated is 3,000 cy. This volume was determined by differencing the elevation of the plug surveyed in 2023 from the average elevation of the ambient bed at the base of the plug. Additionally, operators will record load counts as a quality control measure to ensure the accuracy of the quantity of material estimated for relocation.

Avoidance of impacts to fisheries during project work

The targeted area for relocating the sediment plug (see green outlined area in Figure 4) experiences high velocities during baseflow conditions that will occur during construction. The high velocities result from the channel's confinement between the valley wall on the right bank and the steep left bank of the channel. Flow velocities in the reach are expected to exceed the habitat preferences of juvenile salmonids, and this will be confirmed prior to the commencement of in-channel work by a TRRP biologist making a wading survey for juvenile salmonids. The biologist will also inspect the area for salmon redds and flag them for avoidance during in-channel work. However, redd surveys conducted in the river in the past five years have detected no redds in the area where the sediment plug will be relocated so no impacts to incubating salmonids are expected. Two paths are available for travel from the access ramp across the side channel to the sediment plug (Figure 4). The TRRP biologist will inspect both access routes for redds and the presence of juvenile salmonids before work commences. If redds are identified, they will be flagged and avoided. If juvenile salmonids are found, they may be netted and relocated, if required. However, we do not anticipate either to be located due to the poor habitat quality in these areas.

Construction monitoring

Turbidity will be measured in the mainstem Trinity River by the contractor during construction activities. The measurements will be conducted as required by TRRP permits at a location that is up to 500 lineal feet downstream of gravel placement activities. For permitting compliance, the average cross section turbidity cannot exceed 20% above background levels or 20 NTUs, whichever is greater. If turbidity limits are exceeded, construction will cease or slow until turbidity drops below the allowable limit.

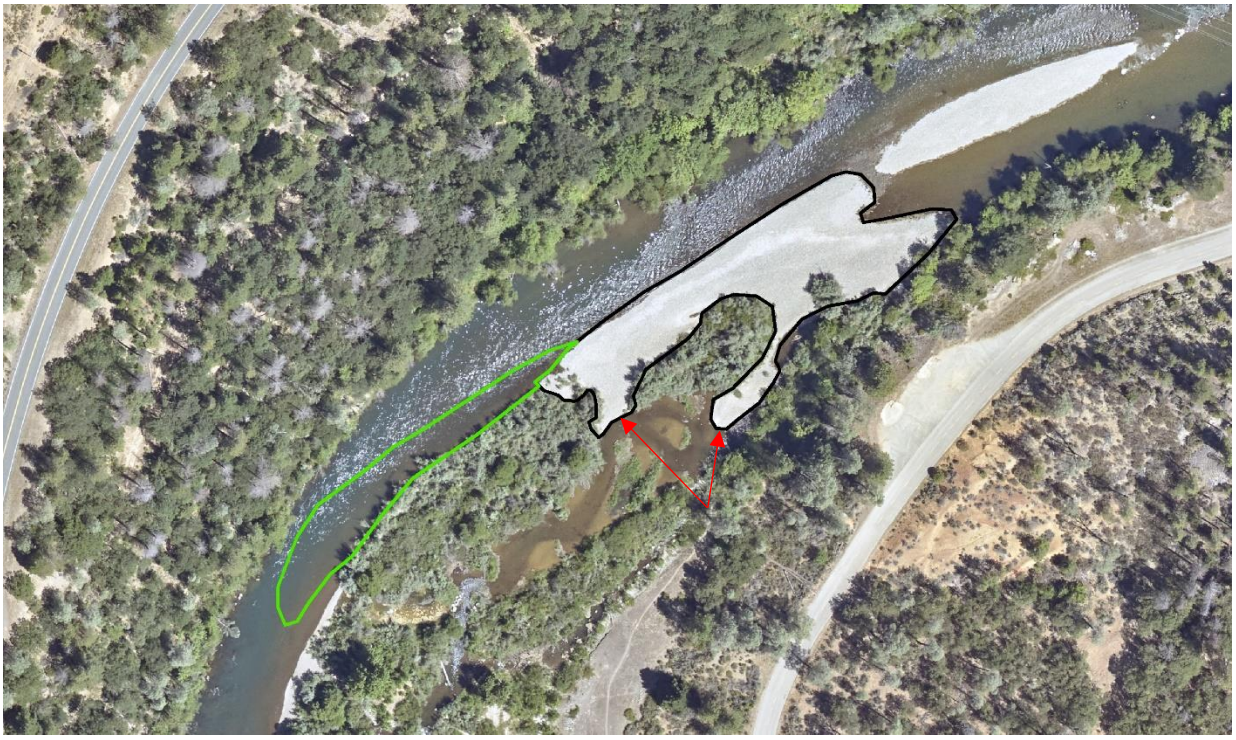

Figure 4. Aerial view of the sediment plug (outlined in black) that will be relocated downstream into the area outlined in green. The red arrows show paths available for accessing the sediment plug. The left access route is 60 ft long and the right access is 120 ft long.

Monitoring will also be performed by the contractor foreman and staff from the TRRP to ensure work proceeds as outlined in this document. Specific areas that would be monitored for compliance with this plan include returning the access road, ramp, and boulders to the same condition and location as before work commences, rejuvenating or repairing damage to vegetation if it occurs, verifying the redeposited gravel is constructed in a configuration that maximizes its transport downstream, and ensuring finished bed elevations provide flow depths that salmonids target for spawning.

Work duration and timeline

Work to relocate the sediment plug will commence in the latter half of March 2024 to avoid impacting anglers in the area around the opening of the 2024 fly fishing season on April 1. The work is expected to be completed in five or fewer days.

Environmental safety

All equipment used for in channel work will be free of external oils and greases and pressure washed clean before accessing the site. Each piece of equipment will additionally have an oil spill kit to mitigate any spills that may occur. Operators and observers will wear high visibility vests or shirts, hard hats, work boots, eye protection as needed and have VHF radios for communication while on site.

References

ROD (Record of Decision) (2000), Record of Decision Trinity River Mainstem Fishery Restoration, Final Environmental Impact Statement/Environmental Impact Report. Available at http://www.trrp.net/library/document/?id=227.