

Porter Creek Streamflow Enhancement Project

Porter Creek, Russian River



Located in Sonoma County, California, Porter Creek is a small tributary to the Russian River. Like many watersheds in the Russian River, Porter Creek historically supported spawning and rearing habitat for coho salmon and steelhead trout, in addition to high-quality habitat for many other aquatic species. However, as in other Russian River tributaries, low summer streamflow has become a primary limiting factor for juvenile salmonid over-summer survival (Obedzinski et al. 2018; Grantham et al. 2012), and low spring streamflow has been identified as a potential bottleneck to coho salmon smolts migrating from tributaries to the Pacific Ocean (Coho Partnership 2015; Kastl et al. 2022). California's recent drought years have exacerbated the impacts of low streamflow on salmonid populations.

Since 2017, Trout Unlimited (TU), Sonoma Resource Conservation District (SRCD), California Sea Grant (CSG), University of California, Berkeley (UCB) and E & J Gallo MacMurray Ranch have been working to create and manage a streamflow enhancement project on Porter Creek. The project has involved installation of a state-of-the-art flow augmentation system, multiple years of intensive physical and biological monitoring, and controlled experiments to guide development of a long-term streamflow enhancement plan and to inform similar efforts throughout the north coast. Water is supplied from an off-stream reservoir and delivered through buried pipes to two outlets into the Creek. The system can release up to 400 gallons per minute (~1 cubic feet per second) to the creek.

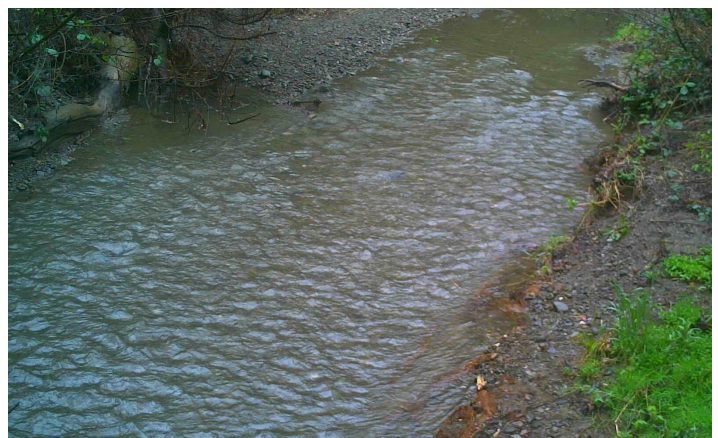


Figure 1. Water release from the E & J Gallo MacMurray Ranch pond into Porter Creek.

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Summary of findings

Water release for spring smolt outmigration

When timed appropriately, flow releases have been successful in establishing and maintaining surface water connectivity between Porter Creek and the Russian River during the spring smolt outmigration period. Photo-monitoring of the mouth of Porter Creek using cellular cameras has been the most effective way to time flow augmentation events during the spring smolt migration. Monitoring of smolt movement with Passive Integrated Transponder (PIT) tags suggest that hundreds of smolts that otherwise would have been trapped were able to successfully outmigrate as a result of the flow augmentation releases.

Water release for oversummering juvenile salmonid survival

Flow augmentation in the dry season generally improved habitat connectivity, elevated dissolved oxygen levels, and increased the movement and survival of juvenile salmonids. However, the benefits of flow augmentation varied by water year type. In wet summers (e.g. 2019), the flow release had a relatively limited effect on habitat quality and connectivity given naturally high ambient surface water availability. In extremely dry years (e.g. 2021), low reservoir levels and dry stream conditions means that only a short stretch of habitat could be sustained by augmentation. The greatest benefits were observed in dry and moderate water year types (e.g. 2020) when survival of coho salmon (+ 24%) and steelhead (+ 20%) was significantly higher in augmented reaches than un-augmented reaches (Rossi et al. 2023 in review).

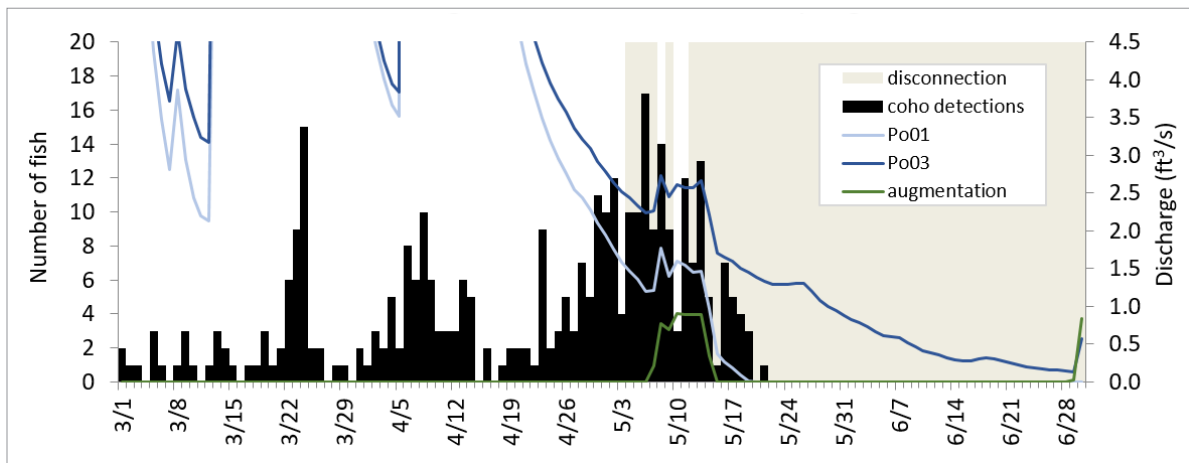


Figure 2. Unique coho salmon smolts detected on Porter Creek PIT antenna array in relation to streamflow, augmentation and disconnection from the Russian River, May 1 – June 30, 2018.



Figure 3. 250-acre foot storage pond on the E & J Gallo MacMurray Ranch property that supplies water to the Porter Creek flow augmentation system.

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Key takeaways

- **Planning and strategy:** The Porter Creek flow release pilot study is a good example of how flow release projects benefit different life history stages of salmonids.
- **Benefit to fish:** Flow releases can be a valuable tool for improving fish habitat and survival probability in altered streams. The timing, duration, and rate of the release will likely vary each year in order to maximize benefits.
- **Monitoring:** Ongoing streamflow and photo monitoring is required to manage the Porter Creek flow release project. Long-term funding support may be needed to reduce burdens on the landowner and to sustain benefits of flow enhancement to salmonids.



Figure 4. Schematic of approximate locations of pipe and water release points to Porter Creek from the E & J Gallo storage pond.



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