



# Salmonid Restoration Federation

## **Overview and Status Report: Salmonid Restoration Federation Redwood Creek Flow Enhancement Planning Efforts Focus on the Marshall Ranch in the South Fork Eel River**

Since 2013, Salmonid Restoration Federation has been conducting low-flow monitoring in Redwood Creek, a critical tributary to the South Fork Eel River. With funding from the Wildlife Conservation Board and the California Department of Fish and Wildlife, SRF and Stillwater Sciences have been exploring the feasibility of various streamflow enhancement opportunities in Redwood Creek. Stillwater Sciences conducted a feasibility study in a segment of the watershed that helped to identify priority projects that could improve summer flows. Stillwater Sciences also prepared conceptual designs for off-channel rainwater catchment ponds that could improve water security for individual parcels but would require wide and coordinated participation in order to measurably improve flows. After much research and reconnaissance, the SRF and Stillwater project team determined that the greatest opportunity to improve streamflows was to work cooperatively with the Marshall Ranch, the largest private parcel in the watershed that has been stewarded by the Marshall family since the 1800s and is now fully protected under conservation easement.

The Marshall Ranch, where the proposed project is situated, is a rare example of a large, contiguous land in the Redwood Creek watershed. The 2,942-acre ranch comprises 34 legal parcels all under one family ownership, which has been managed sustainably for timber production and livestock since the 1880s while also providing extensive habitat for fish and wildlife as evidenced by the presence of coho, Chinook and steelhead.

**The proposed Marshall Ranch Flow Enhancement Project is being designed to significantly improve Redwood Creek dry-season conditions. A 15.3 million gallon off-channel pond is proposed to store winter runoff and release approximately 50 gpm of cool clean water into 5.5 miles of Redwood Creek during the five-month dry season.** This water input is expected to have a significant and measurable benefit to salmonids and other aquatic habitat in Redwood Creek. A fire suppression component is also being designed into the project. The pond will be accessible for helicopters to dip their buckets and a fire hydrant gravity fed from the pond will be available for access by fire engines during emergencies. Additionally, a 7.5 KW solar array grid intertie system and associated infrastructure to offset annual power use and ensure that the project itself including valves, sensors, internet connection, etc. will be operational in a power outage.

Selection of the off-channel pond site has been guided by office- and field-based assessments of a significant portion of the Redwood Creek watershed. Based on these assessments, the proposed pond location is uniquely suited for the project due to the following factors: 1) the project area is comprised of a broad area with gentle topography, 2) the site is not within the Redwood Creek floodplain or within the potential Redwood Creek channel migration corridor, 3) there are no watercourses, wetlands, trees or other sensitive plant species within the proposed pond footprint so environmental impacts are minimal, 4) the pond site is located at an elevation with enough pressure head to deliver the entire pond volume to Redwood Creek by gravity, and 5) the Marshall Ranch LLC (landowner) is fully supportive of the project.

Due to the size of the project and nearby downslope neighbors, a detailed analyses of site conditions, pond design features, and potential failure mechanisms is required. To support the project design process, further in-depth analyses of the site and its surroundings were conducted to ensure that the pond would be stable for the long-term. The site is a unique geomorphic feature within the Redwood Creek watershed since it is a Pleistocene fluvial terrace (between 10,000 to 2 million years old). The geotechnical evaluation for the project confirmed this finding with boreholes consisting of hard shale bedrock overlaid by sandy gravel deposits (old sediment from when Redwood Creek was flowing on the terrace approximately 80 ft higher in elevation than the current creek level). On top of the pre-historic creek deposits, 10 to 20 feet of alluvial fan material has been slowly deposited over the last >10,000 years from the up-gradient hillslope and small swale. These multiple lines of scientific evidence supporting terrace stability provided the basis for the pond design prepared in September 2019 and accompanied initial CEQA application documents.

During the CEQA public comment period in Fall 2019, concern was raised by downslope landowners that the proposed pond and associated grading and infrastructure may not meet the desired level of long-term safety, especially during the rare case of a large rainfall event coupled with a large magnitude earthquake. Based on these concerns, additional analyses have been conducted including further assessment of potential pond failure mechanisms and seismic slope stability analyses under worst-case current and proposed conditions. Based on these analyses, several significant design revisions are being considered that will greatly reduce risk associated with pond berm and spillway failure. The design modifications include:

- **Lowering the pond elevation by eight feet** will significantly reduce the weight on the existing terrace below current conditions. Now the vast majority of pond volume will be created by excavating a large trough in the terrace.
- **Relocation of the pond spillways** and changing the initial culvert spillway (in the previous design phase) to a rock-lined spillway will increase longevity and reduce long-term maintenance costs.
- **Installation of a pond liner, French drain, and subsurface restrictive barrier** to reduce seepage concerns.
- **Grade control structures** in the central gully
- **Installation of a backup energy system** to provide capability to operate and monitor project even during a power outage.

The proposed design modifications are expected to lower the risk of slope instability that could impact the downslope landowners compared to current conditions, as indicated by slope stability analyses. This is a result of the proposed project significantly lowering the water table within the upper terrace and stabilizing the central gully. According to the lead Stillwater Sciences engineer, Joel Monschke, “The pond is set back a significant distance from the slope break and is primarily constructed through excavation into the terrace. There is no plausible mechanism for massive pond failure.” This finding is supported by geologists from Stillwater Sciences and an engineering geologist and geotechnical engineer from SHN who have analyzed the proposed project.

Proposed design modifications have been reviewed by technical advisors from the California Department of Fish and Wildlife, North Coast Regional Water Quality Control Board, NOAA Fisheries, and the State Water Board. Revised project documents have been submitted to Humboldt County Planning Department in September 2020. The County will officially notify downstream neighbors of a 30-day public comment period this fall and all project documents will be available on the State Clearinghouse website. After that 30-day comment period, there will be a public hearing scheduled for any interested parties to attend via Zoom. SRF

will do our due diligence to notify downstream landowners and the Redwood Creek community about the public comment timeline and the significance of this project.

The South Fork Eel River is considered one of the highest priority watersheds in the state for flow enhancement projects. Forested tributaries like Redwood Creek provide refugia habitat for threatened juvenile coho salmon but suffer from the cumulative impacts of legacy logging and unregulated water diversions. “This project could help save the coho salmon population in this watershed, improve fire safety conditions, and build climate change resilience during this this era where we are experiencing longer dry seasons,” stated Dana Stolzman, Executive Director of Salmonid Restoration Federation.

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**[PSA: Working to Restore Water – Latest Strategies in the Mattole and Redwood Creek Watersheds](#)**

*KMUD Public Affairs Radio Show, Thursday, October 8, 2020, 5-6pm PST*

Sanctuary Forest and the Salmonid Restoration Federation invite you to join us as we discuss outcomes from Mattole pilot water projects and current strategies for restoring flows. Tasha McKee, Water Program Director for Sanctuary Forest, and Dana Stolzman, Executive Director for the Salmonid Restoration Federation will be joined by Joel Monschke, Engineer/Geomorphologist Stillwater Sciences. Both Tasha and Joel grew up in Southern Humboldt and bring a lifetime of learning from the rivers and communities as well as their technical knowledge. Dana Stolzman is a resident of the Redwood Creek watershed and was moved to take on the work of restoring flows after witnessing extreme low flows over the last decade.

Topics will include lessons learned from this extreme drought and fire year of 2020 as well as the past 20 years of research and experimentation in the Mattole headwaters. The Salmonid Restoration Federation will discuss their proposed Marshall Ranch Streamflow Enhancement Project and provide background on the studies that informed the design.