



New headgate and fish-friendly "Rock Ramp" irrigation diversion is shown above on Knapp Creek. The old diversion spanned the creek and caused a barrier for endangered salmon and steelhead. The project re-connects 14 miles of high-elevation spawning and rearing habitat for the fish. (photo courtesy Salmon-Challis National Forest)

CUSTER DISTRICT, FOREST SERVICE WORK TOGETHER TO INSTALL FISH FRIENDLY DIVERSION

By Steve Stuebner

A combination of positive forces merged into serendipity in the Stanley Basin this summer as contractors for the Custer Soil and Water Conservation District installed a new fish-friendly diversion in Knapp Creek on the Cape Horn Ranch near Stanley. The project re-connects 14 miles of spawning and rearing habitat for native fish in the mountain stream.

Knapp Creek is a tributary of Marsh Creek in the headwaters of the

National Wild and Scenic Middle Fork Salmon River in the Cape Horn area of the Salmon-Challis National Forest.

The previous diversion structure spanned across the entire stream, impeding access for Snake River Chinook salmon, steelhead, and bull trout, all protected under the Endangered Species Act.

It was especially difficult for the fish to pass through the old wooden check structure, especially during the low-flow months of late summer.

The new fish-friendly diversion was a high-priority project for the Custer District and Salmon-Challis National Forest because it addressed the last remaining diversion in the Marsh Creek watershed, benefitting the ESA-listed native fish species.

Contractors completed the work in July.

"It looks phenomenal – it's completely beyond my expectations," said Kelly Schade, a fisheries biologist for the Salmon-Challis National Forest. "With the



The previous irrigation diversion on the Cape Horn Ranch was difficult for native fish to navigate, especially at low flow. (Courtesy Custer SWCD)

design in hand, it was hard to imagine how it would come together on the ground, but it did!”

The new engineered “rock ramp” diversion elevates the level of Knapp Creek by the new private land diversion for water to flow onto the Cape Horn Ranch.

“It looks pretty natural now,” said Brian Hamilton of BH Water Management, a consultant who has many years of experience designing fish-friendly irrigation diversions in the Upper Salmon River Basin. “Even with the drought this year, the flows were holding up really good up there.”

As part of permitting the project, Salmon-Challis National Forest officials worked out a mitigation agreement with the Flying B Ranch on the Middle Fork Salmon River to create a cash match for the Knapp Creek project.

The Flying B Ranch – a popular destination for backcountry pilots

and Middle Fork rafters and kayakers – needed a permit for ongoing operation and maintenance of their diversion system on Brush Creek. Originally, Forest Service officials asked them to address fish passage and entrainment at their Brush Creek diversion; however, a habitat study identified a natural fish passage barrier just upstream of the diversion structure.

Therefore, any fix in Brush Creek would not result in significant improvements to fish or fish habitat given the presence of the barrier upstream. Rather than focus on Brush Creek, Forest Service officials approached Flying B about assisting with an off-site mitigation option instead.

“We brought them the Knapp Creek project. The agreement was to help fund part of the project, and they get their permit to continue ongoing operation and maintenance of their water system while meeting their obligations under the Endangered

Species Act.” Schade said.

The matching funds helped Karma Bragg, Project Manager for the Custer District, put the rest of the funding package together with Pacific Coastal Salmon Recovery Funds.

“This is one of those win-win projects,” said Robert Sandy, who helps manage the family-owned Cape Horn Ranch. “It’s turned out

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to be a really positive thing for everybody.”

The ranch used to support a sheep operation back in the day, he said. The ranch has been owned by his family since 1922. Nowadays, he uses the irrigation water to water their property.

John Loffredo, a program manager for the Idaho Department of Water Resources in Salmon, is excited about the project because it complements in-stream flows on Knapp Creek currently leased or owned by the Idaho Water Resource Board.

The Knapp Creek drainage ranges in elevation from 9,612 feet at the headwaters to 6,610 feet at the confluence with Marsh Creek.

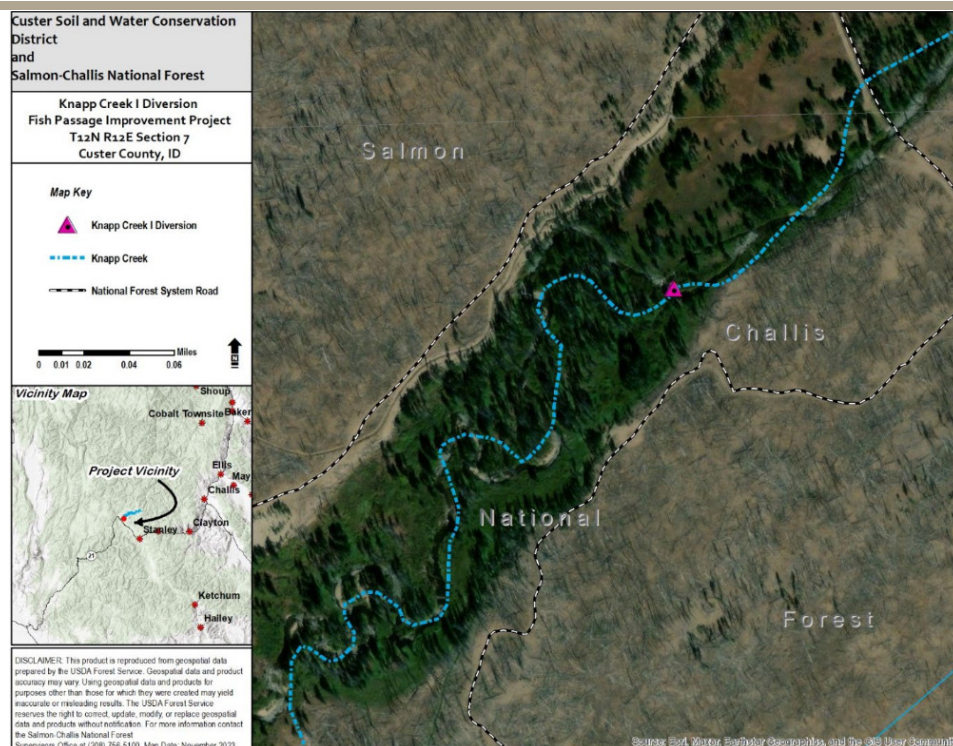
“Knapp Creek has the highest-elevation spawning habitat for Snake River Chinook salmon in the whole Middle Fork watershed,” Loffredo says. “The highest redd is at over 7,200-foot elevation.”

That means the stream has ideal, cold temperatures to benefit salmon, steelhead and bull trout. The Knapp Creek project ensures the delivery of 1.5 cubic feet irrigation water for the Cape Horn Ranch, while another 6 cfs of the landowner’s water rights remain in the stream through a water lease with the Idaho Water Resource Board (IWRB).

Several years ago, the IWRB acquired a different water right on Knapp Creek and closed an irrigation diversion. The two projects combined, result in 11.5 cfs of water saved for in-stream flows on Knapp Creek, Loffredo says.

Project several years in the making

The initial discussions about the Knapp Creek diversion project started about three years ago, officials said. In an ongoing effort to



Project location on Knapp Creek shown by pink triangle. The Cape Horn Ranch used to support a sheep operation in the Stanley Basin. (Courtesy CSWCD)

improve fish passage throughout the Knapp Creek stream corridor, the Custer District, IDWR Board staff and the Salmon-Challis National Forest worked together with the landowner to get approval to replace the existing wooden plank diversion weir with a fish-friendly diversion structure. In addition, the proposed project replaced the old intake structure with a new, steel headgate structure and installed a ramp flume in the irrigation ditch to provide a way to measure flow.

Schade went to work on getting the Knapp Creek project approved through the National Environmental Policy Act (NEPA) for the Salmon-Challis National Forest by advertising the project online, providing a public scoping period, and writing up a detailed project proposal that was approved by the forest supervisor.

Bragg applied for an initial grant from the Pacific Coastal Salmon Recovery Funds for \$30,227 to cover the cost of design and engineering.

She hired QRS Consulting of Boise to complete the design and engineering report so consultation with NOAA National Marine Fisheries Service and U.S. Fish and Wildlife Service could begin.

Information from the QRS Consulting Report: A constructed rock riffle provides hydraulic grade control at the diversion headgate, while providing fish passage across the diversion. The rock riffle comprises a 40-foot-long channel with a 4.1% longitudinal slope that extends from the headgate structure downstream to below the natural rock diversion.

The design consists of imported streambed boulders 18-24 inches in diameter and rock cobbles, blended with native streambed gravels and sediments, to form a dense, void-free channel base. The river boulders serve as channel roughness elements to improve flow conditions for fish passage across the range of fish passage design flows, the report said.

Jake Woodbury, a water resources engineer with QRS, now owned by Morrison-Maierly, who did the project design, said Bragg and Schade were super helpful in laying the groundwork for the project, including gaining the cooperation from the landowner.

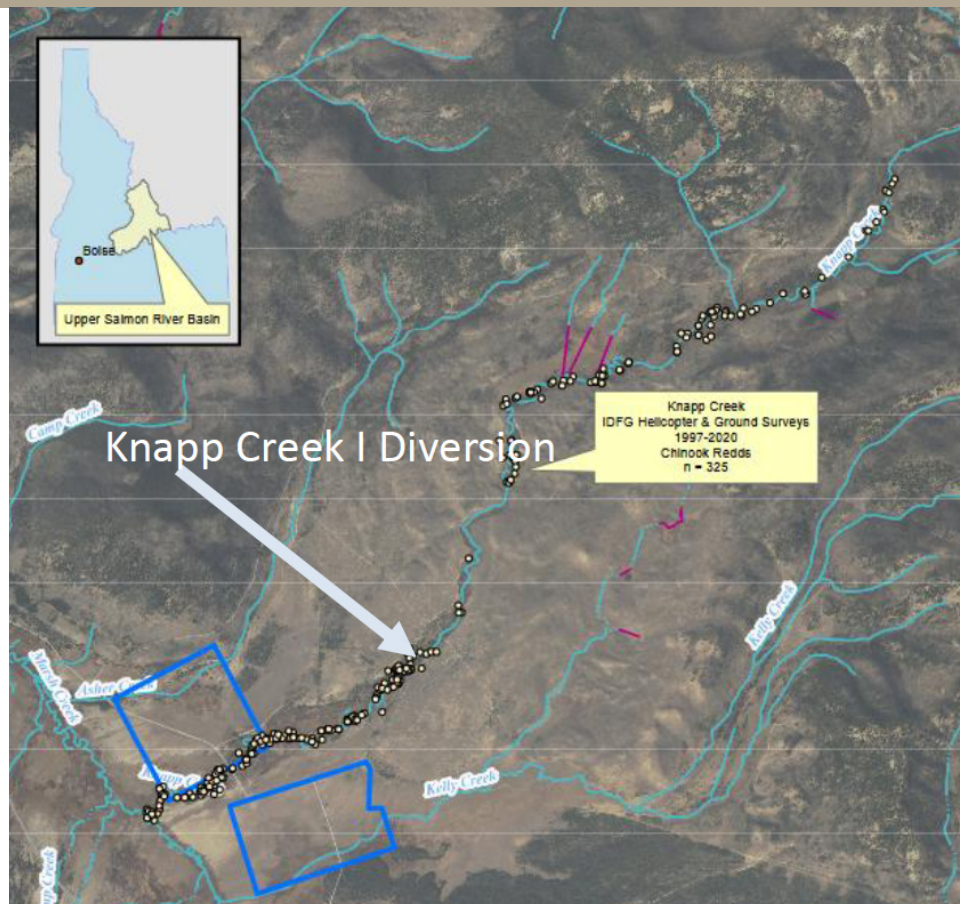
"I was struck by how all of the project partners and stakeholders worked together," Woodbury said. "It was a really effective group, and that's one reason the project turned out so great."

Once the design was approved, Bragg applied for a second grant from the Pacific Coastal Salmon Recovery Funds to cover the full cost of implementing the project, \$204,406. The Flying B matching funds contributed to the total cost of project implementation.

Hamilton worked with the construction contractor, Bret Getty with Getty Excavation in Challis, on site to ensure the design features were all incorporated into the stream.

"Bret and Brian, they work really well together since they've done a lot of other projects in the Basin," Woodbury said. "Brian has so much experience doing that kind of work, we knew that he'd make sure our design was installed correctly in the stream. I didn't see it until they were finished with the project, and it looked great."

Recent spawning counts by the Idaho Department of Fish and Game showed significant numbers of



Idaho Department of Fish and Game redd counts show Knapp Creek to be a productive spawning area with over 325 redds. (Courtesy IDFG)

juvenile and adult fish spawning in the stream.

The Knapp Creek project would not have been possible without Karma Bragg and the Custer SWCD's willingness to work with the Forest Service, and the Flying B's flexibility, cooperation, and cash contribution, Schade said.

"Karma was so helpful in so many ways," she says. "This project could not have happened without her help. She was so vital, and she was so fun to work with."

Projects with strong partnerships

between landowners and agency professionals "are my favorite," Bragg said. "The landowner was thrilled with our team."

She gives special thanks to Sandy, Schade, Hamilton, Getty, Kim Murphy with NOAA fisheries, Abbie Gongoloff with the Governor's Office of Species, Minerals, and Energy Coordination, and the Custer SWCD Board of Supervisors.

Steve Stuebner writes for Conservation the Idaho Way on a regular basis.

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