Restoring Coho Salmon in the Klamath River, One Beaver At A Time

By Will Harling, Executive Director, Mid Klamath Watershed Council

After a sleepless full moon night with our 18 month old daughter, Rory, (a night where my wife bore the brunt of her midnight antics and our guests sleeping in the living room must have been guessing who was torturing who), I bundled our girl onto my back and walked down to the Klamath River in the pre-dawn light. To say I altruistically wanted everyone to sleep in would be a half-truth given the fishing pole in one hand, balancing out the diaper bag in the other. I had a spot in mind, just downstream of the Orleans Bar River Access, where the river slides over a broad riffle so shallow the fish are forced into a narrow slot that one could cast across, even with a groggy, grumpy, sleep-deprived toddler strapped to their back.

The relatively wide Orleans Valley gives the river a chance to meander a little here, reclaiming its sinuousity stolen over the past six million years as the Klamath Mountains began to rise from underneath, forcing it into steep sided canyons tracing fault lines in the uplifted bedrock just upstream and downstream of the valley. Fall chinook salmon moving upstream to spawn left wakes in the glassy water as they navigated up through the shallows, and the Klamath's famed half-pounder steelhead run was coming in with them. Across the river, I noticed a furry head moving slowly upstream. The light brown tuft of hair visible above the water looked like what I thought a beaver would look like, but couldn't be sure.

Just then I heard a rustle of grass and a swish of a tail on the near shore and backed into the willows to watch. Sure enough, a beaver was swimming up towards us along the edge of the river just 20 feet away. As it cleared the riffle, it moved out into the river and I slowly followed it upstream. Big whiskers and a large black snout, those dark beady eyes and two cute little ears quickly disappeared when it spotted me, and a loud thwack of its tail as it dove alerted it's kin that danger was near. Walking home, giddy with excitement from this rare close encounter, I noticed all the stripped willow sticks along the shore, even a clump of uneaten willow shoved under an algal mat, possibly left for a mid-day snack.

Beaver are slowly coming back to the Klamath, recovering from intense trapping that began in the mid-1800's and continuing for nearly a century after until they were almost extinct. In 1850 alone, famed frontiersman and trapper Stephen Meek and his party reportedly trapped 1800 beaver out of Scott Valley, which at the time was called Beaver Valley. The last beavers in Scott Valley were trapped out by Frank C. Jordan in the winter of 1929-1930 on Marlahan Slough[1]. Beaver throughout much of the Klamath basin suffered the same fate, and even today as they return to less inhabitated areas along the mainstem river and its tributaries, they are still shot and trapped in streams where their dams pose a perceived risk to residential and agricultural property.

It is no coincidence that fisheries biologists looking to restore threatened coho in the Scott River and the larger Klamath system, have identified Marlahan Slough as a key habitat to restore. Low gradient sloughs, blind channels, off-channel ponds, braids, and other low velocity habitats are ideal for rearing coho, and beavers just make them better. Recent studies from Washington and

Oregon by Michael Pollock and others are further defining the intimate relationship between beaver, beaver ponds, and coho smolt production[2]. A recent multi-year study being prepared for publication by the Karuk Tribe, Yurok Tribe, Larry Lestelle, and others, on the ecology of coho in the Klamath River identifies the lack of low velocity habitats, primarily during winter flood events, as a major potential limiting factor to coho distribution and abundance[3]. Further studies are needed to relate the loss of beaver and associated habitats to the loss of coho in the Klamath River.

Coho, out of all the salmon in the Klamath River, have born the brunt of human development. Low gradient valleys and deltas that provide the best farm and ranch lands, and ideal places to build homes, are also the very same habitats that coho require for spawning and rearing. In addition to the loss of beaver, coho have been impacted by channelization for flood protection and floodplain development, excessive temperatures and disconnected habitats resulting from overallocation and use of surface flows, dams that create environments conducive to the production and spread of fish diseases in the the mainstem, and nutrient-loading from fertilizers, and loss of wetlands that lead to poor water quality (low dissolved oxygen, unstable pH, etc.). Further impacts include historic mining (channelized, simplified instream habitats), logging (excessive sedimentation and decreased input of wood), road construction (excessive sedimentation, instream barriers, disrupted groundwater flow), and disrupted fire regimes (decreased input of wood).

A recent study by Pollock et al. summarized the specific affects of the loss of beavers and the dams they are famous for on fishes[4]:

> Beaver dams alter the hydrology and geomorphology of stream systems and affect habitat for fishes. Beaver dams measurably affect the rates of groundwater recharge and stream discharge, retain enough sediment to cause measurable changes in valley floor morphology, and generally enhance stream habitat quality for many fishes. Historically, beaver dams were numerous in small streams throughout most of the Northern Hemisphere. The cumulative loss of millions of beaver dams has dramatically affected the hydrology and sediment dynamics of stream systems. Assessing the cumulative hydrologic and geomorphic effects of depleting these millions of wood structures from small and medium-sized streams is urgently needed. This is particularly important in semiarid climates, where the widespread removal of beaver dams may have exacerbated effects of other land use changes, such as livestock grazing, to accelerate incision and the subsequent lowering of groundwater levels and drying of streams.

With coho numbers critically low througout the basin, restoration actions are being planned and implemented to improve coho habitat by the Yurok Tribe, Karuk Tribe, Mid Klamath Watershed Council (MKWC), US Forest Service, and others. Many of these projects replicate habitats that would have been created historically by beavers. This spring, MKWC proposed a project near

the mouth of Boise Creek, a tributary to the Klamath near Orleans on property owned by the Coates Vineyard and Winery, that would have used an engineered log jam to re-route the creek around a bedrock cascade barrier at the mouth through a series of existing ponds maintained by several families of beavers (Figure 1). However, before the project could be implemented, the beavers constructed a five foot tall dam across the creek at the exact location of the proposed log jam, diverting a portion of Boise Creek through their ponds, and into the Klamath River at a location that provides adult and juvenile fish access (Figure 2). MKWC and Karuk Tribe biologists have observed thousands of juvenile chinook and coho utilizing these ponds through the summer, and moving through the ponds into Boise Creek above the barrier! This fall and winter, we will see if the beavers have also effectively redesigned the creek to allow for adult spawning chinook and coho salmon to access more than three miles of high quality spawning habitat above the barrier.

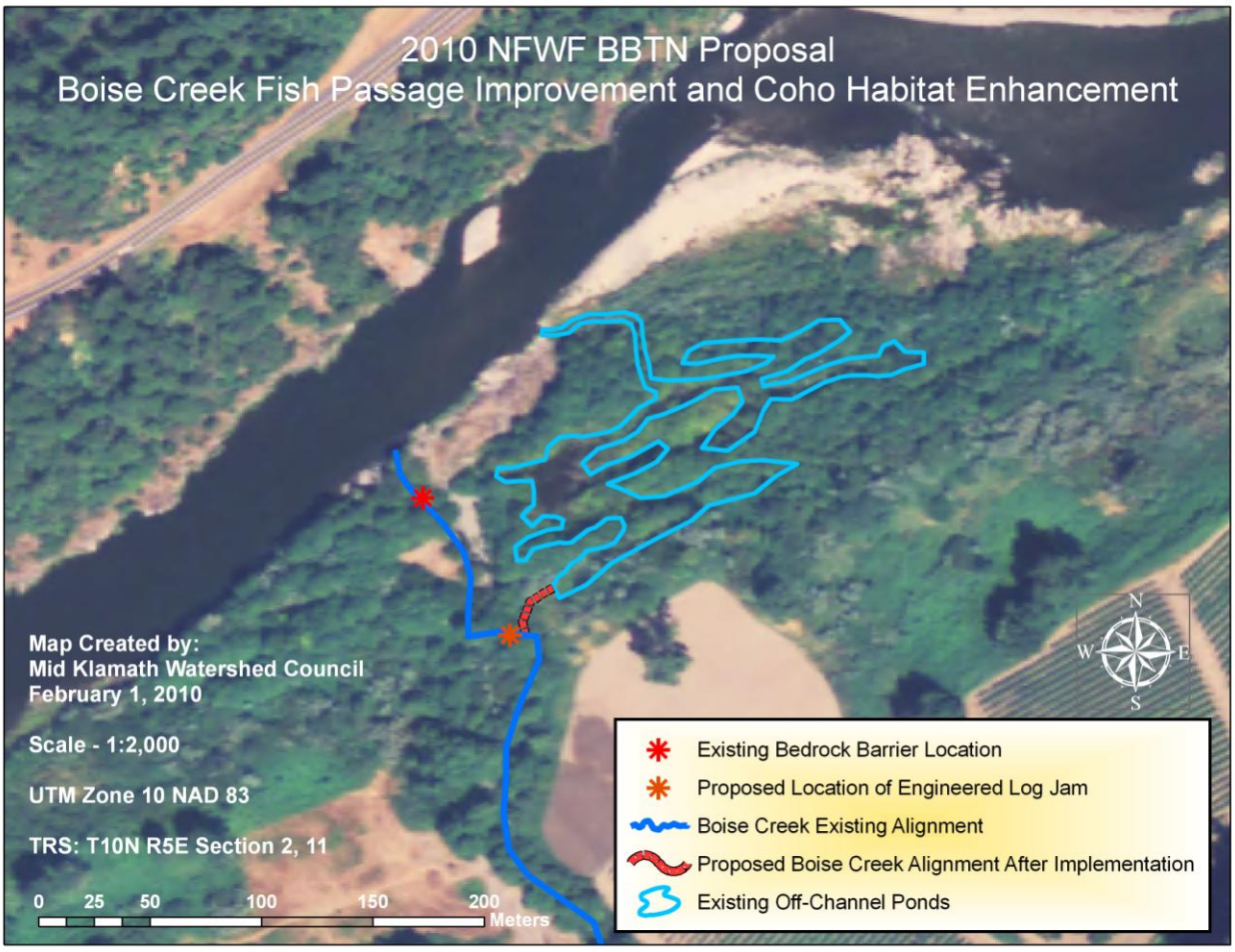

Figure 1. Map of proposed engineered log jam project near the mouth of Boise Creek. Beavers evidently received the proposal but decided to implement it in-house.

Figure 2. Beaver dam across Boise Creek at the exact location of a proposed engineered logjam project. The beaver dam routed a portion of Boise Creek around an adult salmon barrier through a series of beaver ponds to the Klamath River, restoring fish passage to over three miles of good coho spawning habitat. Photo: Brock Dolman, Occidental Arts and Ecology Center.

In other areas we are working to create high quality off-channel pools that will provide winter and summer rearing habitat in low gradient Klamath tributaries. MKWC, through funding from the US Fish and Wildlife Service and the PacifiCorp Coho Enhancement Fund, is currently implementing a series of off-channel ponds along Seiad Creek, a tributary to the Klamath River that has small but stable runs of spawning coho. Seiad Creek is unique in that it has a large alluvial floodplain for three miles upstream of its mouth that has been constrained by flood control berms to allow for settlement (Figure 3). Historically, Seiad Creek would meander more than a mile upstream or downstream in relation to the Klamath River, creating complex slow water habitats preferred by coho salmon. Based on anecdotal information from landowners along the creek, beaver dams played a major role in damming Seiad Creek and flooding off-channel habitats along the creek.

Figure 3. Flood control berms along lower Seiad Creek currently constrict the historic floodplain, blocking fish access to important rearing habitat. A collaborative project between the Karuk Tribe, MKWC and landowners would remove these berms and restore connectivity to these habitats, while protecting community resources at risk. Photo: Will Harling, MKWC.

With cooperation from several landowners along Seiad Creek, MKWC is currently completing excavation of two ponds, and will complete one more this year and one next year as part of a larger floodplain reconnectivity project in coordination with the Karuk Tribe (Figure 4). When designing off-channel habitat projects, having more ponds along a longer section of creek is better than planning fewer larger ponds. Only a certain percentage of fish will encounter the pond entrance, so having more ponds increases the potential for fish finding and occupying created off-channel habitats (Figure 5). Garnering landowner support along prioritized tributaries is critical to the success of habitat restoration projects.

Figure 4. Panoramic view of off-channel pond at Stender property on Seiad Creek. The pond connects to Seiad Creek on the left and is fed by a perennial stream that goes subsurface 200 meters upslope of the pond. We anticipate beavers may inhabit this and other created ponds over time. Photo: Will Harling, MKWC.

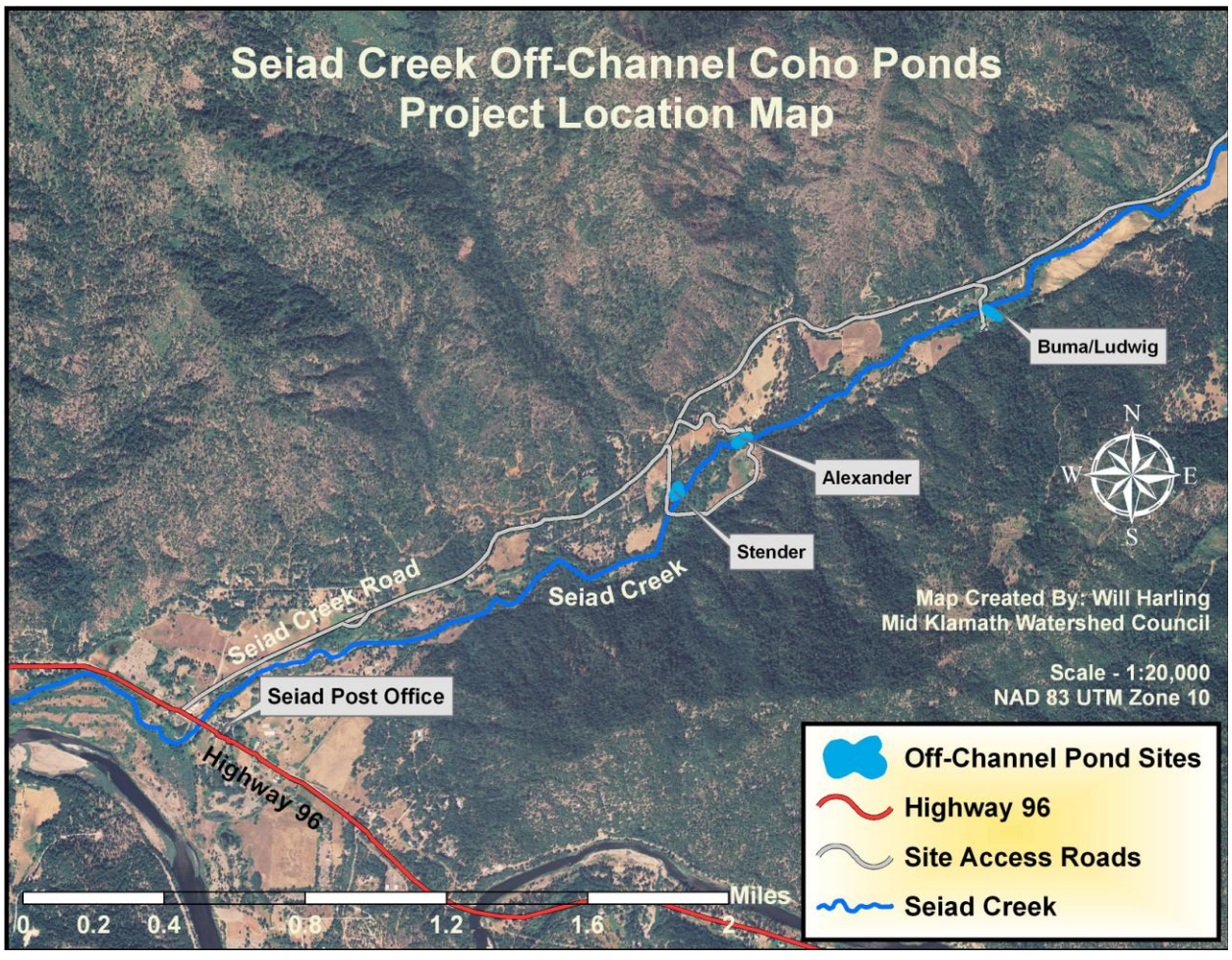

Figure 5. Map of off-channel ponds currently being built on Seiad Creek. Having multiple ponds along a larger reach of a tributary vs. individual larger ponds gives migrating fish more opportunities for migrating fish to find and use them. Map: Will Harling, MKWC.

Seiad Creek provides an example of what can be accomplished on larger tributaries, such as the Scott River (once called Beaver River) which has also been degraded through channelization, dewatering, beaver extirpation, and upslope management. Work by Michael Pollock on a small

tributary to the John Day River in Eastern Washington show how degraded streams can be restored to their historic function relatively quickly by working with beavers to aggrade streams, connect off-channel habitats, restore groundwater and increase stream sinuosity. At a presentation in Whitethorn organized by Tasha McKee from the Sanctuary Forest this past September, Mr. Pollock showed how posts pounded into the stream channel allowed beavers to recolonize sections of the stream (Figure 6), achieving noticeable results in increased off-channel habitat, decreased erosion, and aggradation of the stream channel.

In summary, the restoration of threatened coho salmon in the Klamath River system may be intricately tied to enhanced beaver populations and restoration projects that mimic the positive benefits of beaver dams. Educating the public about the critical role of beaver in restoring coho salmon populations in the Klamath River and other coho salmon streams in Northwest California will also help to decrease take of beaver as a nuisance species and allow them to reclaim their role as an ecological process shaping our streams and valleys.

Bibliography

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