



**April 29th, 2008**

**Richard Ely, Davis Hydro  
27264 Meadowbrook Drive  
Davis CA 95618**

**RE: Fishery evaluation for South, Old Cow Creek Hydroelectric Facilities**

On January 29<sup>th</sup>, 2008 Cramer Fish Sciences biologists Joseph Merz and Bradley Cavallo visited various sites related to the Kilarc-Cow Creek Project, FERC Project No. 606 (Project). Pacific Gas and Electric (PG&E) began a FERC relicensing effort for the Project in 2002, but later decided to surrender and decommission the project. Ostensibly, PG&E and resource agency staff determined that benefits to aquatic ecosystems (particularly endangered anadromous fish) outweighed any societal benefits of continued Project operations.

The purpose of our visit was to: 1) examine probable fishery effects of the Project (whether decommissioned or left operational) and 2) evaluate potential for Project related waters to provide suitable habitat for fish, particularly endangered anadromous salmonids (steelhead trout *Oncorhynchus mykiss* and Chinook salmon *Oncorhynchus tshawytscha*).

The Project encompasses separate but adjacent hydroelectric facilities in Old Cow Creek and South Cow Creek basins. The summary of our observations and recommendations which follow is not intended to provide a complete description of the project area or its resources (readers are directed to PG&E 2007 for a detailed background).

**SOUTH COW CREEK**

South Cow Canal diverts a maximum of 55 cfs at the upstream end of Wagoner Canyon. South Cow Canal water is discharged (after passing through Cow Creek Forebay, penstocks and Cow Creek Powerhouse) into Hooten Gulch. The Tetrick Ranch Powerhouse diverts water from Hooten Gulch downstream of the Cow Creek Powerhouse for generation of power. The water is returned to Hooten Gulch a short distance (~1/2 mile) downstream until it reaches a second diversion dam that diverts a maximum of 13.4 cfs (which services a significant local agricultural canal, Abbott Ditch), and then rejoins the South Cow Creek.

Observations

- Our assessment of fish habitat below Hooten Gulch is consistent with fishery studies indicating that fall-run Chinook salmon spawning occurs almost exclusively in this reach. However, removal of South Cow Creek hydroelectric project would likely not provide sufficient supplemental flows to improve fall spawning habitat quality or accessibility.
- Several fisheries studies (e.g. Mook and Steitz 1984) indicate that anadromous *O. mykiss* populations in South Cow Creek are well documented. However, these studies

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seemed to be based solely on observations of redds or of larger adult *O. mykiss*. In light of recent investigations demonstrating that anadromous forms of rainbow trout can only be definitely identified (and distinguished from resident forms) by otolith chemical analysis (e.g. Zimmerman 2008), previous observational studies should be viewed with some skepticism. If the South Cow Creek truly supports an anadromous *O. mykiss* population, this should be definitely documented so that the stream can be appropriately managed.

- Given anadromous *O. mykiss* are adapted to migrating upstream during winter high flow events, removal of the South Cow Creek hydroelectric project would likely have negligible benefits for the migratory adult life stage.
- Supplemental flows provided by removal of the South Cow Creek hydroelectric project may improve summer suitable rearing habitat and water temperatures within the bypass reach. However, it appears that no studies have been conducted to document and quantify potential benefits.
- The presence of an *O. mykiss* population within the South Cow Creek bypass reach suggests that with-Project conditions are at least suitable (though perhaps not ideal) for species of interest.
- Diversion of South Cow Creek waters may act to conserve cold temperatures, such that when waters return to Hooten Gulch they may provide suitable habitat where it might not exist in absence of the Project.
- The Hooten Gulch diversion dam appears impassible but could be easily modified to facilitate fish passage. Improved fish passage at Hooten Gulch, screening at Abbot Ditch canal, and some physical habitat improvements could make the Hooten Gulch reach a potentially productive spawning and rearing habitat for salmonids.
- Abbott Ditch canal appears to have very limited potential (even with direct physical enhancement) as rearing or spawning habitat for salmonid species.
- Though we were unable to visit the South Cow Canal, we speculate (based on visits to similar canals in the area) that parts of it could probably be modified to provide rearing habitat for *O. mykiss*. However, such habitat improvements would best be viewed as incremental rather than a significant increase in carrying capacity for *O. mykiss* populations.
- Flood irrigation and poor grazing practices in South Cow Creek (downstream of Hooten Gulch) could be ameliorated by improved management practices and better canal flow management.
- Removal of the South Cow Creek hydroelectric project would eliminate source water for the Hooten Gulch canal. Consequently, a new diversion dam and canal would be required on the South Cow Creek mainstem as a condition of Project decommissioning. Depending on its placement and design, this new diversion structure would inhibit passage and reduce supplemental instream flows gained by Project decommissioning. Purchasing water rights or providing off-channel water sources might also be options.



## OLD COW CREEK

### Observations

- A very significant natural barrier to upstream fish passage, Whitmore Falls is present downstream of the reach affected by Project operations. Steelhead generally require a 1.25:1 pool-to-jump ratio in order to jump a barrier; with sufficient pool depth, an adult steelhead can jump up six to nine feet (Gunther et al. 2000). We viewed the falls during our site visit and judged that it was most-likely impassable at this flow and probably is similarly impassable at significantly higher flows.
- We concur with NOAA and CDFG biologists assessment that Whitmore Falls probably does become passable for migratory salmonids during extremely high flow events. The management significance of this observation is questionable however (see recommendations section).
- However, even if Whitmore Falls were fully passable, given anadromous *O. mykiss* penchant for migrating upstream during winter high flow events (which overwhelm the relatively small amount of water diverted to Kilarc Canal), it is unclear how removal of the Old Cow Creek hydroelectric project would significantly improve upstream migratory fish passage.
- Supplemental flows provided by removal of the Old Cow Creek hydroelectric project may improve suitable rearing habitat and water temperatures within the bypass reach. However, it appears that no studies have been conducted to document and quantify potential benefits.
- The presence of a strong *O. mykiss* population with the Old Cow Creek bypass reach suggests that with-Project conditions are at least suitable (though perhaps not ideal) for *O. mykiss*.
- Diversion of Old Cow Creek waters may act to conserve cold temperatures, such that when waters return downstream of Kilarc Powerhouse they may provide suitable habitat where it might not exist in absence of the Project.
- We walked approximately ½ mile of the Kilarc Canal and observed several dozen trout between 6 and 12 inches total length. Habitat could be further improved by addition of in-stream objects (boulders, woody debris) and overhead cover (riparian vegetation). These enhancements would primarily provide additional rearing habitat for *O. mykiss* (and other trout species). From our cursory inspection, we foresee extensive physical modifications would be required to even develop potential *O. mykiss* spawning habitat within the Kilarc Canal.
- Kilarc Forebay and Kilarc Canal provide a significant recreational and informal handicapped angling resource to the area. Current decommissioning plans for the Project would eliminate these well-known and accessible fishery resources. Improvements to Old Cow Creek fisheries resulting from Project removal might offset these losses, but apparently no studies have evaluated



### Recommendations

Based on our findings, as well as concerns raised previously by other stakeholders, we strongly recommend that PG&E and fishery resource agency staff carefully and objectively review and reconsider current plans to decommission the Project.

During this review, a number of key points and informational deficiencies should be addressed.

- While “natural conditions” generally are best for fish, this is a case where the benefits of Project removal may be small relative to the loss of existing fish habitats (Kilarc Forebay, Kilarc Canal, South Cow Canal, South Cow Forebay, Hooten Gulch), loss of a significant green energy source, loss of existing diversion waters and structure (Abbot Ditch canal and diversion dam) and the related need to construct replacement diversion structures elsewhere on South Cow Creek. Available information suggests that these factors have not been given due consideration.
- Studies should be conducted to determine water temperature effects of Project operations (or Project removal).
- Studies should be conducted to quantify and contrast bypass reach fish habitats under with-Project and without-Project conditions or suggested modifications – such as canal screening and fish return bypasses. These studies could be based on PHABSIM methodology, or more economically by a mesohabitat based model assessment.
- Provide review and consideration of scientific literature related to influence of habitat condition on relative residency and anadromy among *O. mykiss* populations. If the goal of Project decommissioning is to improve anadromous *O. mykiss* populations, then management decisions must reflect and be grounded in a thorough understanding of latest relevant scientific findings.
- Conduct a thorough analysis of fish passage at Whitmore Falls. If possible, document by direct observation (e.g. video monitoring), conditions under which Whitmore Falls are passable for anadromous fishes. Determine the frequency with which fish passage will occur under with-Project and without-Project conditions.
- *O. mykiss* anadromy in Project waters should be determined more definitively by sampling and analyzing *O. mykiss* otoliths.
- Evaluation of the Project should include alternatives other than complete decommissioning. For example, studies may suggest that a 25% reduction in South Cow Creek diversions during July and August may be sufficient to support significant additional *O. mykiss* rearing habitat.
- Evaluation of the Project should include consideration for beneficial actions, improvements, or new project features and operations which could be funded and supported and maintained as conditions of a new Project license (i.e. regulatory authorities including Federal Power Act (FPA) section 18, FPA section 10(j), FPA section (10a) and ESA reasonable and prudent measures). If the Project is decommissioned, then there will be no obligation or funding source for fishery, wildlife, recreational, or water quality enhancement and management actions.



## References

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Zimmerman, C.E., G.W. Edwards, and K. Perry. 2008. Maternal Origin and Migratory History of *Oncorhynchus mykiss* captured in rivers of the Central Valley, California. Final Report Prepared for California Department of Fish and Game Contract P03853006 March 2008.

Signed respectively,

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