Ten Years: Ten Revelations

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Surfing my website (http://www.gualalariversteelhead.info/) reveals a lot of "stuff" has accumulated over 10 years. In fact, someone recently emailed me that he had read *every* word on the site (a first, no doubt), but that it had taken him several days. Fortunately, the salient points or "red meat" of my first decade on the Gualala River chasing steelhead (SH) secrets can be condensed to a handful of "bullets." For visitors with limited time or cursory interest in the subject, here is the big picture (in ascending order of importance)[1]:

- **Restoration efforts on the river to date have failed to increase SH populations.** *More: Past restoration efforts have often been akin to the proverbial dog chasing its tail. For example, considerable effort and funds (mostly public) have been directed at repairing sediment point sources from "bad" roads, while simultaneously, new road "wounds" are opening in other places, from logging and a myriad of other adverse developmental impacts. Such tail-chasing make folks feel good about their efforts, but does little to resolve long-term, ecosystem-level issues (in this case, far too many sediment-spewing roads for a watershed of its size). In addition, many of the more direct stream habitat improvement actions (e.g., woody debris enrichment, sediment removal, habitat-type modifications, riparian re-vegetation, etc.) to date have been on such small, postage-stamp scales as to render them meaningless–not to mention impossible to evaluate–at the ecosystem level. We need to keep true ecosystem-scale improvements to the river in focus, based on what the SH data the past decade has told us. There's a clear message and its not rocket science: Mostly, SH just need good-quality water–summertime water. When they get it, most 'tail-chasing' issues become moot–or at least less significant.*

- **Short-term studies of SH on the river fall short in pursuit of truth.** *More: Many studies of SH have entailed just a year or two (sometimes three) of data collection. But such small snapshots in time are at odds with SH life history, evolved over millennia, with multiple strategies to allow the species' survival during widely varying environmental conditions–including today's rapidly changing conditions. Studies must encompass a truly representative sub-set of 'varying conditions' over time, or conclusions are likely to be biased (to the time period studied) and faulty. My experience is that it takes 5 to 10 years, minimum, for a clear and realistic picture of most population status and life history topics to begin to emerge. By looking through smaller windows in time, we are not only unlikely to find truth, but may only perpetuate more 'feel-good' tail-chasing.*

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[1]Caution: These points pertain to SH. Nothing said should be construed as necessarily applying to the river's coho salmon. Because of the coho's vastly different (from SH) life cycle, especially more restrictive evolutionary adaptations limiting its ability to thrive during periods of environmental change, they are in deep trouble on the Gualala and elsewhere from the impacts of sedimentation, excessive water temperatures, and other development-related issues.

❑ **Most life history aspects of the river's SH are keyed to "going with the flow (of the stream)."** *More: Pick a topic: Where (or for how long) do most juvenile SH reside in the stream before migrating to sea? How long do adult SH remain in the stream when spawning? How important is juvenile SH rearing in the estuary versus upstream reaches? When and where does the best juvenile SH growth occur? When and where does most spawning occur? How long do adult SH remain at sea and what size are they when they return? A "correct" answer to most questions invariably depends on when it is asked and what rainfall, stream flow, and temperatures (both air and water)–all widely variable over time–have preceded it. Thus, in pursuit of knowledge of SH, investigators must be willing to throw away their day-planners and go with the flow too, over a full and representative range of natural variation. This requires that investigators really "know," and carefully monitor, rainfall-flow relationships on the stream being studied. And it means they must be thinking long-term (5-10 years) and not short-term in approaching data collection for any specific issue.*

❑ **Visual counts of adult SH from a small boat, can provide inexpensive population monitoring on this stream under certain conditions.** *More: This survey approach keys on the fact that when SH swim upstream to spawn, there are certain "favored" stopping places they repeatedly use and where they can be counted. Such counts can provide population indices, including total count, average count, and peak count by season. Population estimates are also possible, using modified "Area-Under-the-Curve" techniques. A strict survey prodical, particularly with respect to survey timing, must be followed to generate useful results. Even then, during some spawning seasons with high rainfall and stream turbidity, the generated indices and population estimates may be of limited value. In years with more moderate (or low) rainfall and turbidity, results are generally more useful. Further study should reveal whether this monitoring approach is accurate enough for actual decision-making and whether it can be applied on other uncontrolled coastal streams of similar size.*

❑ **The average annual return of adult SH back to the river today appears to be at least a few thousand fish.** *More: Adult SH indices and population estimates the past 10 years have focused on the largest single branch of the river–the Wheatfield Fork–where from a few hundred (minimum) to several thousand fish appear to have returned annually. Expanding such results to the whole river suggests a total annual return of from a low of about 1-2 thousand fish to a high of about 9-10 thousand fish. Would such a range indicate a healthy and sustainable population? The answer is unclear. However, the apparent wide annual fluctuation in numbers (if real) is both troubling and potentially problematic.*

❑ **The river's estuary provides an important "hedge" for juvenile SH rearing, when drought, excessive temperatures and other adverse stream conditions impact rearing in upstream reaches.** *More: But, although juvenile SH growth in the estuary is often better than growth in upstream areas, estuary rearing is fraught with other risks to juvenile fish. Thus, juvenile SH rearing focused in upstream reaches has evolved as the better survival and production strategy compared to estuary-focused rearing. However, the estuary provides an important hedge in otherwise bad times (for juvenile SH).*

❑ **Quality of summertime rearing conditions for juvenile SH in upstream areas is a main determinant of subsequent (2-3 years later) adult SH spawning returns.** *More: The best summertime rearing conditions occur when stream flows are high and water temperatures remain low. This happens naturally, from abundant seasonal rainfall,*

particularly springtime rainfall, and when summertime air temperatures remain mild. Such ideal summertime conditions elevate juvenile SH production by: (a) increasing overall areal extent of rearing habitat; (b) lowering water temperatures; and (c) keeping rearing focused upstream, rather than in the estuary where there are more risks. Greater juvenile SH production equates with higher adult SH returns, as long as conditions at sea remain roughly constant. Throughout California, we have dozens of examples of essentially dead or dying SH streams, due to man-induced, summertime flow depletion. This phenomenon is underway on the Gualala River, too. Stopping and then reversing it are essential to saving the river's SH.

❑ **Timber harvesting in the watershed today poses a less severe threat to the river's ecosystem and SH than previously.** *More: I began work on the river expecting to record the SH's last hurrah–a slow and painful disappearance, from an array of timber-harvest-related impacts. What I instead discovered is that while the timber industry is indeed seriously impacting this fish, it is today neither the species' primary threat, nor is it now placing the fish's very existence at jeopardy. Moreover, I have come to understand that large, private tracts of timber in the watershed, where public access, urbanization, and land-use conversions have been curtailed and restricted for decades, are a key reason that SH are still swimming back to the river in fairly respectable numbers. Current levels of timber harvesting on the Gualala are thus a proverbial double-edged sword. Nevertheless, giving the watershed a complete "rest" from all logging would allow it to heal naturally and would certainly, in time, bring more wild SH back to the river. Stepping away from logging for a period of 'rest' could be done by purchasing timber lands and timber "no-harvest" easements.*

❑ **Today, grape vineyards pose one of the most serious threats to the river's SH and ecosystem.** *More: Vineyards have a suite of adverse impacts which we are still struggling to understand and quantify, one of the most serious being reduction of summertime stream flows and water quality, especially in dry years–or years with a dry springtime. Reduced stream flows and associated increased water temperatures are highly detrimental to juvenile SH production–and subsequent adult SH returns. In the extreme, de-watering of stream reaches occurs far beyond what would occur naturally (i.e., and without vineyards). Effective mitigation offsetting such impacts is essential and should be required of both new and existing vineyards. One effective form of mitigation could be the use of small, off-stream or uppermost-stream impoundments from which stream flows could be augmented, based on real-time monitoring, during critical summertime rearing periods for juvenile SH, .*

❑ **Preserving any sizeable SH population in the river into future decades will require preserving and protecting summertime stream flows from reductions caused by a myriad of developmental activities, including grape vineyards.** *More: Ten years of SH data on the Gualala River and the legacies of dozens of dead or dying SH streams throughout California all point to the same conclusion: What these fish need most is simply water–good-quality summertime water. When they get it, everything else we believe to be the problems these fish face seem to melt away and take care of themselves. But letting go of past 'tail-chasing' and reuniting behind a common, new focus on water won't be popular with some, nor easy. Nevertheless, such a paradigm shift, founded on public education; new and/or revised laws & regulations; strong enforcement; and possibly direct intervention, using summertime stream flow augmentation, will provide our best hedge for the future–a future in which these magnificent fish are still swimming back "home" to the Gualala River. –RD.*