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July 28, 2009

Mr. Allen Robertson
California Department of Forestry and Fire Protection
P.O. Box 944246
Sacramento, CA 94244-2460

Re: Comments on Artesa Vineyard Conversion Draft Environmental Impact Report (SCH# 2004082094)

Dear Mr. Robertson,

I provide the comments below on the Artesa Vineyard Conversion Draft Environmental Impact Report (DEIR)(Monk and Assoc. 2009) at the request of the Friends of the Gualala River. The emphasis of my comments will be on cumulative watershed effects from the project activities and likely impacts to coho salmon (*Oncorhynchus kisutch*) and steelhead trout (*Oncorhynchus mykiss*), although I also touch on impacts to other native fish species, the western pond turtle (*Clemmys marmorata*) and the yellow-legged frog (*Rana boylii*).

Summary

While the DEIR for the proposed Artesa Vineyard is quite lengthy, there are major flaws in its scientific assumptions and the discussion of fisheries, water quality, hydrology and cumulative effects lack scientific credibility. Ecological problems and watershed and water quality conditions are more aptly characterized than in earlier drafts (Higgins 2003), but the DEIR falsely states that all problems from the project itself will be eliminated through use of best management practices (BMPs) or implementation of mitigation measures:

> "The DEIR found significant impacts related to air quality, biological resources, cultural resources, geology, hydrology and water quality, hazards, transportation and circulation, and noise. All of these impacts were reduced to a less-than-significant level through the implementation of mitigation measures."

Numerous studies of northern California logging impacts over the last decade (Ligon et al. 1999, Dunne et al. 2001, Collison et al. 2003) point out that on-site mitigation cannot prevent downstream damage when too great a watershed area is disturbed in too short a period, which is the case with the Gualala River and Patchett Creek watershed in which the project is taking place. While the DEIR presents alarming statistics on land use that indicate extremely rapid and extensive disturbance and development (i.e. 28% timber harvest in 10 years, > 6 miles of road/square mile), the cumulative effects significance is never discussed and instead old logging activities are blamed for the current aquatic conditions. Evidence presented regarding Patchett Creek indicates advanced cumulative effects that the project will most certainly exacerbate.

In some cases the actual effects of the project are misrepresented, such as the claim that installation of tile drains and storage of runoff in a 73 acre foot reservoir will not alter groundwater recharge or base flow in Patchett Creek. Similarly, the likelihood that invasive and voracious bullfrogs will colonize their pond and likely extirpate native yellow-legged frogs is also overlooked. The DEIR admits that steelhead use lower Patchett Creek in reaches that have perennial flow, but then stakes out the absurd position that because they cannot access upper reaches due to natural barriers that there will be no impact from the project on the species. Despite five years since the first draft TCP, critical data gaps remain regarding use of Patchett Creek by steelhead, flow levels in the creek, groundwater levels at the project site, connection of groundwater and surface water and whether previous development and vineyard conversions have already depleted flows.

My Qualifications

I have been a consulting fisheries biologist with an office in Arcata, California since 1989 and my specialty is salmon and steelhead restoration. I authored fisheries elements for several large northern California fisheries and watershed restoration plans (Kier Associates, 1991; Pacific Watershed Associates, 1994; Mendocino Resource Conservation District, 1992) and co-authored the northwestern California status review of Pacific salmon species on behalf of the American Fisheries Society (Higgins et al., 1992).

Over the past 20 years I have reviewed over 50 timber harvest plans and written comments on several Total Maximum Daily Load reports (NCRWQCB 2001, U.S. EPA 1998, 1999), that examine timber harvest as a pollution source. My recent comments on the proposed Threatened and Impaired Watershed Rules (Higgins 2009) summarize my findings from all those studies and characterize the current status of coho salmon in the northwestern California, including the Gualala River watershed. I am attaching these comments as an Appendix with several other relevant documents for the record.

My other previous work in the Gualala River basin includes the *Gualala River Watershed Literature Search and Assimilation* (Higgins, 1997), which I compiled for the Redwood Coast Land Conservancy. THP and TCP comments for previous clients include the following that I wish to incorporate into the record by reference. Please let me know if you would like me to retransmit copies of these for your files.

- Artesa Timberland Conversion Permit (TCP) 02-506 and Timber Harvest Plan (THP) 1-01-171 SON (Higgins, 2003a),
- Seaview TCP 02-524 and THP1-01-223 SON (upper South Fork Gualala River) (Higgins, 2003b),
- Hanson/Whistler Timberland Conversion Permit TCP 04-530 and THP 1-04-030 SON (Little Creek) (Higgins, 2004a),
- Negative Declaration for Martin TCP 04-531 and THP 1-04-059) (Little Creek) (Higgins 2004b), and
- THP 1-04-260 MEN (Dry Creek, North Fork Gualala River)(Higgins 2007).

Since 1994 I have also been working on a regional fisheries, water quality and watershed information database system, known as the Klamath Resource Information System or KRIS (www.krisweb.com). This custom program was originally devised to track restoration success in the Klamath and Trinity River basins, but has been applied to another dozen watersheds in northwestern California. The California Department of Forestry (CDF) funded KRIS projects in six northern California watersheds as part of the North Coast Watershed Assessment Planning effort, including the Gualala River (IFR, 2003). Several charts and maps within this report come from KRIS Gualala and the source data and raw data that support my assumptions can be checked on-line (www.krisweb.com/krisgualala/krisdb/html/krisweb/index.htm), including complete metadata that provides contacts for data sources.

Between September 2008 and the present I have been assisting the National Marine Fisheries Service (NMFS) with coho salmon recovery planning in southwest Oregon and have become intimately familiar with scientific literature on Pacific salmon restoration (Reeves et al., 1995, Doppelt et al. 1993, Bradbury et al. 1995). I am also attaching my comments on the *Draft Policy for Maintaining Instream Flows in Northern California Coastal Streams* (SWRCB 2008) prepared for the Redwood Chapter of the Sierra Club because they cover the Gualala River watershed and cumulative effects problems of flow depletion are manifest throughout the region.

Effects of Proposed Artesa Vineyard on Fisheries

Instead of collecting and presenting data on fisheries, such as whether steelhead are using lower Patchett Creek, the DEIR cites the California Natural Diversity Database indicating that they aren't present within ten miles. In fact the NCRWQCB staff has confirmed their presence in the perennial lower reaches of the creek and it must be assumed for discussion that they are present and dependent on continuing summer baseflows. The DEIR cites the same source for location of the Gualala roach (3.3 miles west), but instead should have used North Coast Watershed Assessment Program (NCWAP 2003) data that are readily available in KRIS Gualala (Figure 1).

California Department of Fish and Game (CDFG) pooled September 2001 electrofishing data indicate that the lower Wheatfield Fork Gualala River had steelhead young of the year (0+) and yearlings (1+), but Gualala roach, stickleback and sculpin were more predominant in the sample. This fish community is indicative of a highly perturbed ecosystem with very warm water temperatures, but cold water seeps and springs or small tributaries are likely allowing for steelhead survival. In the middle reach of the Wheatfield Fork, CDFG found no steelhead and instead only the species more adapted to warm water (Figure 2). The Artesa Vineyard project will further deplete flows to Patchett Creek, which is likely also contributing either surface flows or sub-surface groundwater to the lower Wheatfield Fork. The type of exploration the DEIR should have engaged in was to determine whether the NCWAP team found steelhead juveniles at or below Patchett Creek. The patches of cold water in which steelhead are residing are known as refugia and the U.S. Environmental Protection Agency (2003) counsels that all such cold water sources protected as a priority, especially in large river basins with major water temperature problems. Bradbury et al. (1995) also point out that protection of these features is a priority, if Pacific salmon species are to be successfully restored. Although there are no water temperature data for lower Patchett Creek, it must be assumed that it has very cold water temperatures due to the nearness of groundwater and the incised shady canyon through which its lower reaches flow. Also, NCWAP (2003) water temperature data include a small unnamed tributary of the Wheatfield Fork Gualala (Figure 3) that has temperatures that are fully suitable for Pacific salmon and Patchett Creek would have a naturally similar regime.

CDFG habitat typing data show that the Wheatfield Fork lost surface flow during the summer of 2001 in many of its lower reaches (Figure 4). Flow depletion in Patchett Creek from the Artesa

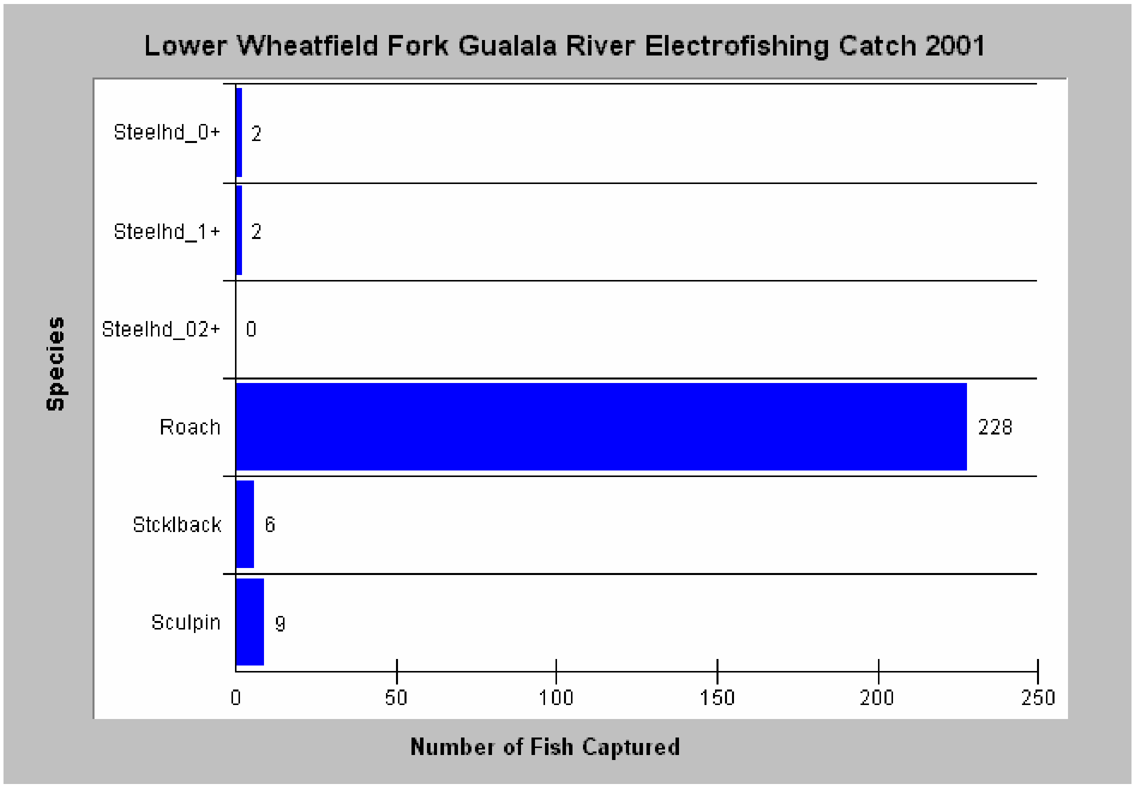

Figure 1. California Department of Fish and Game pooled electrofishing survey data from September 2001 showed that the lower Wheatfield Fork had steelhead but was dominated by warm-adapted fish. Data from CDFG and KRIS Gualala.

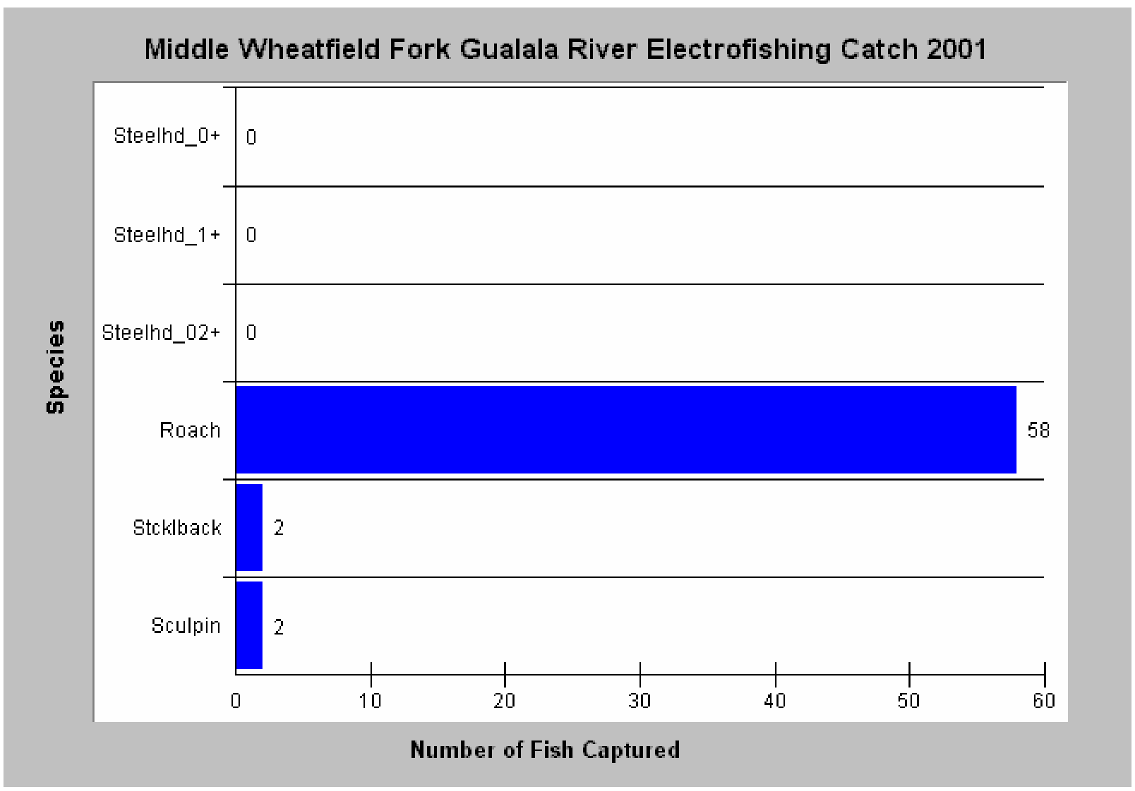

Figure 2. California Department of Fish and Game pooled electrofishing survey data from September 2001 showed that the middle reaches of the Wheatfield Fork Gualala had no steelhead and instead only warm-adapted fish species, particularly the Gualala roach. Data from CDFG and KRIS Gualala.

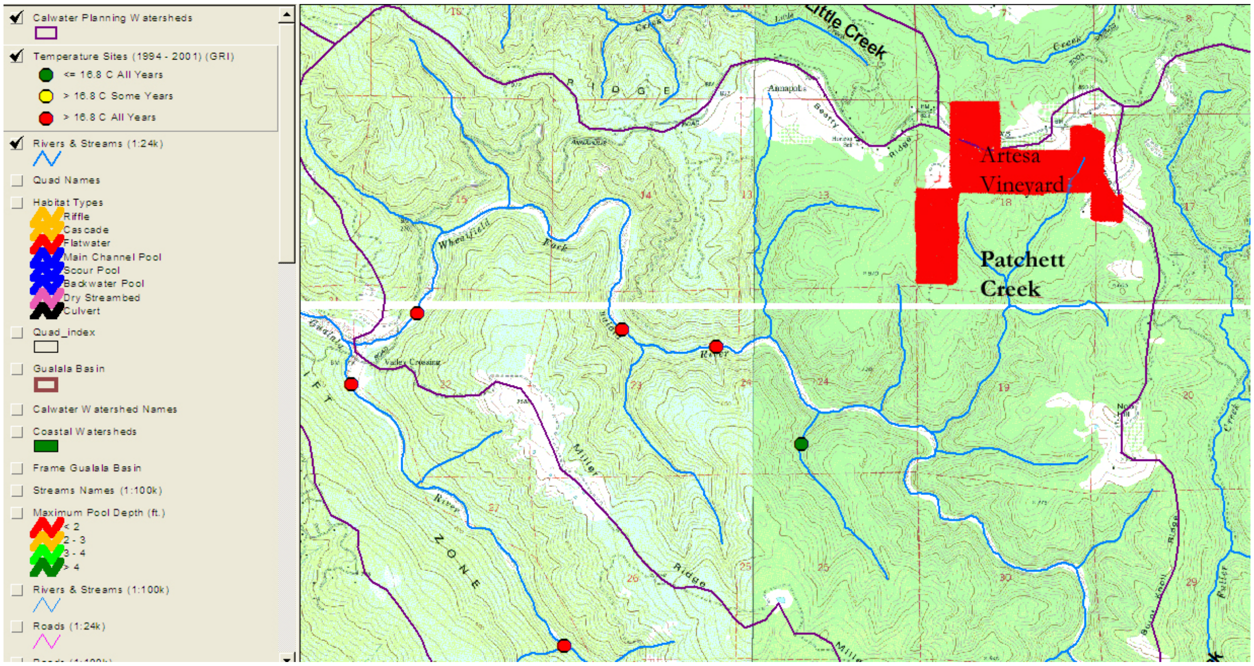

Figure 3. NCWAP (2003) water temperature data indicate the lower Wheatfield Fork Gualala is much too warm for coho salmon or steelhead but the unnamed tributary downstream of Patchett Creek was fully suitable. Data from NCWAP (2003) and KRIS Gualala.

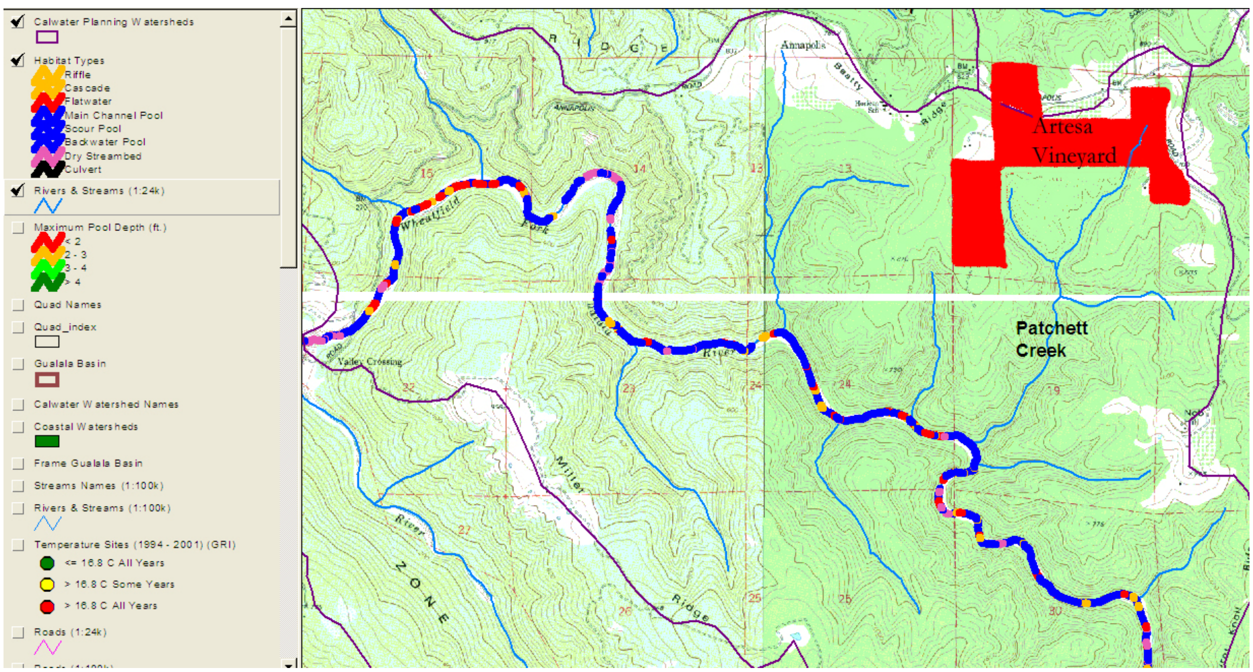

Figure 4. California Department of Fish and Game habitat typing data indicate that numerous reaches of the lower Wheatfield Fork Gualala lacked surface flow. This is indicative of cumulative effects related to aggradation, flow depletion and changes in watershed hydrology. CDFG data from KRIS Gualala.

Vineyard development with its tile drains and 73 acre foot storage reservoir will likely further deplete flows and cause additional reaches of the lower Wheatfield Fork to dry up. As surface flow is lost, even the hardy Gualala roach will decline.

The DEIR does not mention the absence of Sacramento suckers in the Gualala River in all recent surveys, which is likely indicative of a major decline in their population, if not their wholesale disappearance. This fish is somewhat tolerant of sediment and very tolerant of warm water and its disappearance demonstrates the extent to which the Gualala River ecosystem has unraveled. As pointed out in my previous reports and comments (Higgins 1997, 2003, 2007), suckers formerly thrived in the mainstem Gualala after the 1964 flood but flow depletion has now greatly reduced viable summer mainstem habitat. The Gualala River watershed is almost homogeneously disturbed, resulting in a lack of clear water tributaries in winter leaving suckers exposed to high sediment transport levels. Suckers also deposit eggs on the surface of stream gravels and shifting bedload or fine sediment deposits likely limit hatching success.

Coho salmon are "extirpated in the Gualala River or nearly so" according to CDFG (2002), but no further degradation or additive cumulative effects stressors should be allowed if they are ever to be recovered (Kaufmann et al. 1999). DeHaven (In Press) has conducted steelhead spawner and redd counts on the mainstem Wheatfield Fork Gualala River since 2002 and has now compiled trend data for the adult population. His finding is that returns in 2009 were the lowest since surveys began and that it was down by an order of magnitude from the prior year (Figure 5). The estimated return 369 individuals is under the estimate of 500 recognized by Gilpin and Soule (1991) as a critical floor for populations to maintain genetic diversity, although there is likely genetic exchange with populations from other Gualala River sub-basins.

One of the major factors allowing steelhead to survive and for returns to sometimes be in the thousands is the critical role played by the estuary for juvenile steelhead rearing (Higgins 1997). Additional watershed disturbance, including the Artesa Vineyard project that cumulatively deplete flows and contribute sediment will ultimately lead to diminished estuarine volume and carrying capacity for steelhead, if development remains unchecked.

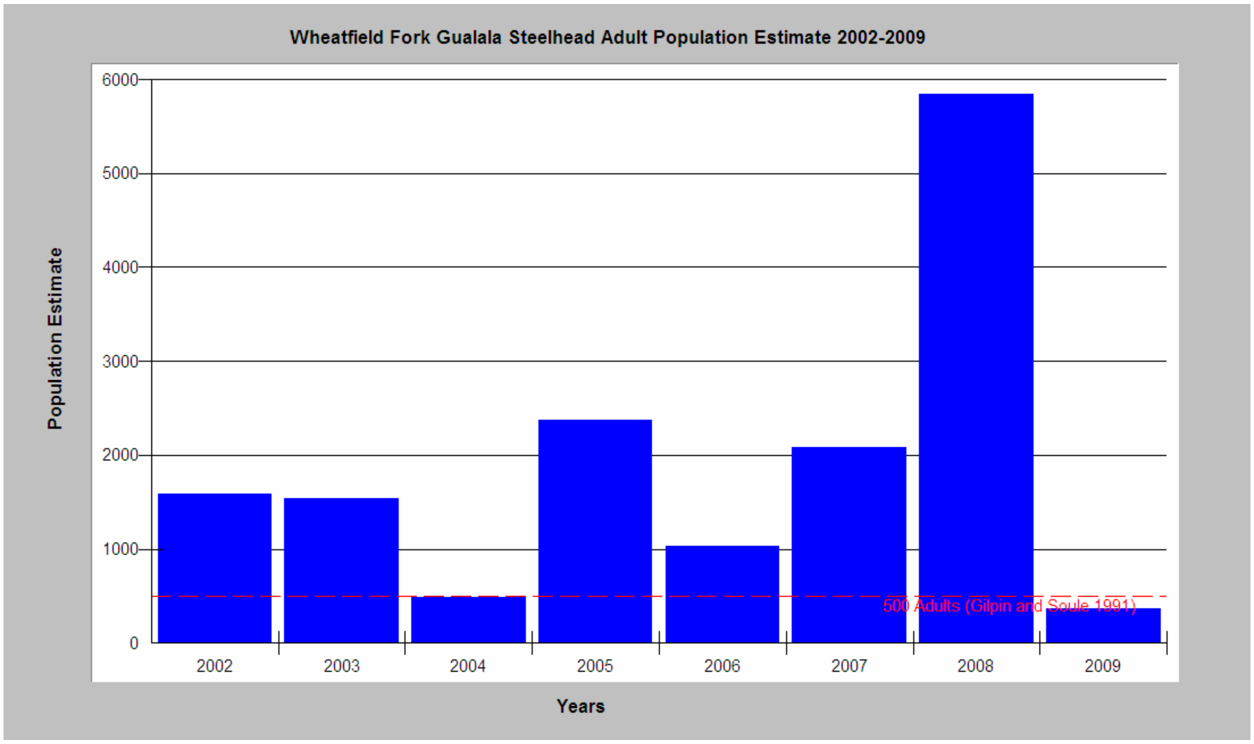

Figure 5. Adult steelhead surveys and redd counts of the Wheatfield Fork Gualala have been conducted by DeHaven (In Press) from 2002 to 2009. Trends indicate substantial fluctuation in returns.

Despite noting that lower Patchett Creek below the proposed Artesa Vineyard has steelhead and agreeing with my assertion that it is likely naturally cold, the DEIR makes the following statement in the Biological Assessment (page 68):

> "The project site does not provide habitat for any fish species, listed or non-listed, since Patchett Creek and the tributaries onsite do not provide suitable flows or water depths for fish. Also, Patchett Creek dries almost completely in the summer months only retaining a few relatively small and shallow pools in the south central reach of Patchett Creek on the project site. While endangered fish species are known to occur in the Gualala River many miles downstream of the project site, the proposed project will not impact these species."

This contrasts with another passage later in the Biological Assessment of the DEIR (p 143):

> "The Fisheries Assessment notes that, according to the North Coast Regional Water Quality Control Board (NCRWQCB), steelhead are found in the lower (Class I) reaches of Patchett Creek commencing about 4,800 feet downstream of the project area. Steelhead are not able to migrate above this point, as there is an impassable area to further upstream reaches."

Steelhead in lower Patchett Creek are not "many miles" downstream of the site, since the stream is only about two miles long. Patchett Creek is already suffering from extensive water extraction and development that the Artesa Project will add to and very clearly diminish if not eliminate carrying capacity for steelhead.

Finally, the DEIR fails to mention another important, endemic anadromous fish that might be impacted by the Project, the Pacific lamprey. Lamprey use a sucking disc to hold fast to rocks and then loosen their grip and wriggle up rock waterfalls. A second order stream such as Patchett Creek would be expected to have smaller median particle size distribution suitable for lamprey spawning. Lower flows in lower Patchett Creek might also disrupt juvenile lamprey or ammocetes that remain in freshwater for up to four years. It is likely that high bedload mobility is also limiting the success of Pacific lamprey spawning and rearing in the Gualala and its tributaries, similar to problems affecting salmonids and the Artesa Vineyard will likely further degrade conditions for this species

Deficiencies of DEIR Discussion of Cumulative Effects

The Cumulative Effects section of the DEIR is riddle with scientific problems and in fact conveys the notion that somehow the Artesa Vineyards mitigation measures are so state-of-the-art that CEQA concerns do not apply:

> The possibility exists that the "cumulative impact" of multiple projects will be significant, but that the incremental contribution to that impact from a particular project (e.g., Fairfax Conversion Project) may not itself be "cumulatively considerable." Thus, CEQA Guidelines section 15064, subdivision (h)(4), states that "[t]he mere existence of significant cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable." Therefore, it is not necessarily true that, even where cumulative impacts are significant, any level of incremental contribution must be deemed cumulatively considerable.

The DEIR claims to be addressing cumulative impacts to fisheries at the Gualala River watershed scale, but in fact there is no candid discussion of the cause and effect relationship of land use and degraded aquatic environments at the scale of Patchett Creek or the Annapolis Calwater Planning Watershed scale let alone basinwide. The framework of the DEIS does not discuss pre-disturbance habitat conditions in Patchett Creek or the Gualala River with which Pacific salmon species like steelhead co-evolved. The historical background offered in the DEIR is telling in this regard: “The project area has historically been a rural/forested environment characterized by small farms and timber operations associated with the logging of the extensive redwood and fir forests.” In fact the Gualala River watershed and this site would have historically been within the old growth redwood forest ecosystem where trees were often over ten feet in diameter (Figure 6) and stream systems profoundly different than their present condition in terms of depth, width, temperature, and habitat complexity. The changes in aquatic habitats in response to upland anthropogenic sources of stress, such as timber harvest and roads, are now well recognized by the scientific community (Reeves et al. 1993, Jones and Grant 1996, FEMAT 1993, Spence et al. 1996, NMFS 1996) and they will be discussed in sections below.

The DEIR admits that coho salmon and steelhead are in decline in the Gualala River basin but then makes repeated unsupported claims that all problems in the Gualala River watershed with regard to changes to the hydrologic regime and increased sediment yield that affect them are from past land use:

> “However, the direct factors that continue to limit the distribution and abundance of steelhead trout in the Gualala watershed, including reduced flow and increased sediment inputs and water temperature, result predominantly from the legacy of historic, improperly conducted land use practices. Present-day timber harvesting and road construction activities are subject to the water quality protection measures incorporated into the California Forest Practice Rules, while vineyards within Sonoma County are required to comply with the County Vineyard Sediment and Erosion Control Act (VESCO). It should further be noted that any future projects in the Gualala watershed and elsewhere in Sonoma County would be subject to CEQA environmental review, in which project-specific and cumulative impacts would be evaluated as part of the planning process.”

Treating “modern” timber harvest practices and vineyard conversions as fully mitigated and not contributing to cumulative effects is a fantasy that has been debunked by numerous, recent northwestern California studies (Ligon et al. 1999, Dunne et al. 2001, Collison et al. 2003). Dunne et al. (2001) noted the California Department of Forestry’s continuing “unquestioning and unverified reliance on mitigation” as a major impediment to recognition and prevention of cumulative effects. The following Dunne et al. (2001) quote argues against the DEIR’s notion that reducing gully erosion will improve sediment conditions in Patchett Creek or that implementation of BMPs can be relied upon to prevent damage to downstream reaches:

> “While there are clear benefits of, say, removing unstable, eroding roads, the notion that such practices coupled with new land-use activities will avoid CWE is unsubstantiated. There has also been a reliance on untested mitigation measures rather than an effort to document CWE processes. The resulting belief that BMPs mitigate or prevent potential problems accounts for the proclivity among many THP applicants to assert that no cumulative effects will occur because they will be mitigated out of existence.”

Figure 6. Gualala supply wagon passing through old growth forest circa 1900 showing large diameter coastal redwoods typical of the pre-disturbance watershed conditions with which salmon and steelhead co-evolved. Fiscus family photo collection from KRIS Gualala.

This pattern exactly describes the DEIR with regard to the cumulative effects issue. Therefore, the DEIR is completely lacking with regard to CEQA compliance in this regard.

Hydrologic Cumulative Effects

The DEIR arguments that hydrologic cumulative effects of the Artesa Vineyard will be beneficial to steelhead is not supported scientifically. Groundwater issues are dismissed cavalierly, but the evidence of likely depletion is also presented that indicates major problems for steelhead and yellow-legged frogs downstream. The hydrologic impact of the 73 acre foot reservoir planned for the site is completely misstated and the ecological impacts are ignored (see Yellow-legged Frog Impacts). The DEIR has little discussion of obtaining an Appropriative Water right from the State Water Resources Control Board (SWRCB) Water Rights Division (WRD) for the project or whether neighboring ponds are permitted. This constitutes a major cumulative effects omission of the DEIR with regard to illegal use of surface water in the region as documented in the *Draft North Coast Instream Flow Study* (SWRCB WRD 2008).

The Artesa Vineyard will construct a system of tile drains that is designed to prevent saturation of the soil and will also disrupt normal processes of percolation into the water table. Approximately 299 feet of upper reaches of ephemeral Patchett Creek tributaries will be filled yet the DEEIR claims that “downstream reaches will remain unaffected” and that “No proposed work in any tributary will impair, impede or obstruct flows in tributaries on the project site.” Flows from the tile drain system are shunted into the agricultural storage reservoir. Based on data from Caspar Creek timber harvest and flow data, O’Connor makes the following claim in the DEIR:

> "Reduced evapotranspiration and canopy interception is the likely cause of increases in both total annual runoff and summer stream flow. Any increase in dry-season base flows would help maintain cooler water and enhance habitat that is critical to steelhead trout survival."

This argument is also hinged on the assumption that watering vineyards during the summer from the storage reservoirs will recharge groundwater throughout the summer:

> "All water captured by this system will be recycled directly onto the vineyards on the project site. Thus, rainfall retention time on the land above the groundwater table will effectively be increased and consequently groundwater recharge will likely be increased from the proposed project."

In fact both these assumptions are not met. Grapes will be watered sparingly to conserve water and the tile drain system under them would prevent groundwater recharge. Runoff captured from the tile drain system in winter would otherwise feed the groundwater aquifer at the headwaters of Patchett Creek that sustains baseflows during late summer and fall. The DEIR acknowledges that "Any substantial change in flow in Patchett Creek would be a significant impact" but such impacts from the Project cannot be prevented.

Band (2008) and McMahon (2008), in comments on the *Draft Policy for Maintaining Instream Flows in Northern California Coastal Streams* (SWRCB WRD 2008), noted that the synergy between diversion impoundments in multiple tributaries causes unintended consequences on flows, fish passage and alteration of substrate quality in downstream reaches. The DEIR does not discuss cumulative effects related to operation of all reservoirs in the Gualala River basin. It notes, however, that the "first flush" of fall or early winter rains will be caught in stilling ponds or the agricultural impoundment. Band (2008) points out that this type of activity in many vineyard impoundments simultaneously may shave off the early peak of the Gualala River hydrograph that typically allowed coho salmon and early steelhead adults passage to spawning beds. McMahon (2008) shared this concern: "Dams on ephemeral streams have the potential to greatly dampen the early fall/winter freshets important for access to the upper reaches of small spawning tributaries by their capture of the entire flow within the stream until the reservoir is filled, potentially resulting in significant dewatering downstream." This is exactly the risk development of the agricultural impoundment for the Artesa Vineyard poses.

The DEIR cites a number of different statutes from the Sonoma County General Plan but never proves sufficiency in terms of the project meeting the stated objectives. Examples are:

- Insure that land uses in rural areas be consistent with the availability of groundwater resources.
- Grading, filling and construction should not substantially reduce or divert any stream flow that would affect groundwater recharge.
- Deny discretionary applications unless a geologic report establishes that groundwater supplies are adequate and will not be adversely impacted by the cumulative amount of additional development.
- Revise procedures for proving adequate groundwater for discretionary projects by adding criteria for study boundaries, review procedures, and required findings that the area's groundwater supplies and surface water flows will not be adversely impacted by the project and the cumulative amount of

The DEIR simply says that the use of groundwater for farm workers is so miniscule that groundwater is simply not an issue:

> “A well will be dug to provide potable water for the farm workers. Well water would not be used to irrigate vineyards. Groundwater supplies are adequate for this minor water use and thus cumulative impacts are expected to be insignificant.”

In lieu of groundwater data from the site, the DEIR provides the following description of groundwater resources in the vicinity of the Project site based on data more than 30 years old:

> “DWR data indicates that wells in the Annapolis area tapping the Ohlson Ranch Formation have reported yields of two to 36 gallons per minute (gpm) with drawdowns ranging from 30 to 125 feet (DWR 1975). Long-term hydrographs or other groundwater trend data are unavailable for the area (DWR 2004).”

In fact the map provided by O’Connor Environmental of well locations and well owners in the DEIR (Figure 7) suggest strongly that groundwater resources are already likely over-demanded. Furthermore, the DEIR disclosed the following:

> “Almost all of the project area is underlain by this sloping shallow aquifer. Groundwater flows are generally from west- northwest to east-southeast, toward Patchett Creek. The geometry of the aquifer and the location of the contact between the Franciscan and the Ohlson Ranch Formations to the west are uncertain. Even if the geologic contact west of the project site dips to the west, the geometry of the rock formations under the project site is relatively well-defined, and groundwater from the project site would still be expected to flow to the east-southeast.”

Therefore, it is possible that some wells west of the Project may already be impacting flows in Patchett Creek. The County of Sonoma should require a full groundwater study prior to development of this project because of the substantial questions related to groundwater use and supply near the Project. CDF should also not allow the DEIR to be approved as final until the Project has a permit for an Appropriative Water Right to develop its reservoir.

Sediment and Water Quality Related Artesa Vineyard Cumulative Effects

The DEIS points out that there are two predominant soil types, including the Hugo and Goldridge Series (Figure 8), and provides the following description regarding the proposed Artesa Vineyard area:

> “The runoff potential for this soil type varies from medium to very rapid and the hazard of erosion ranges from moderate at low slope to high at elevated slopes. The Goldridge Series soils are defined as “highly erodible soils” in the Sonoma County Vineyard Erosion and Sediment Control Ordinance.”

Other portions of the DEIR provide slope maps for Project site and there is a substantial overlap between steeper slopes and the unstable Goldridge Series in the western lobe of the Project development area that poses a high erosion risk that is not duly noted in the DEIR.

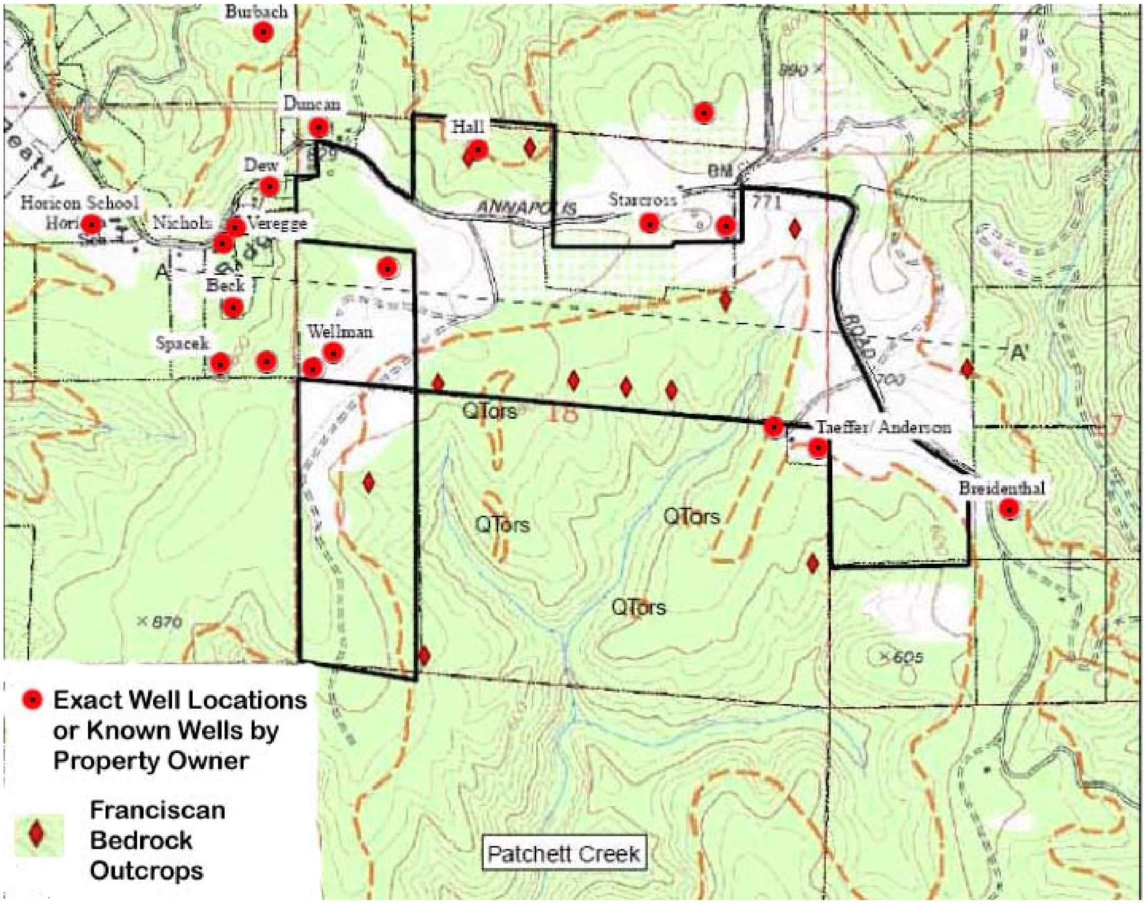

Figure 7. Map of well locations and owners from DEIR with highlights in red so that locations are more visible. Some wells to the west of the Project may be in the zone of influence of Patchett Creek headwaters due to sloping sub-surface bedrock formations.

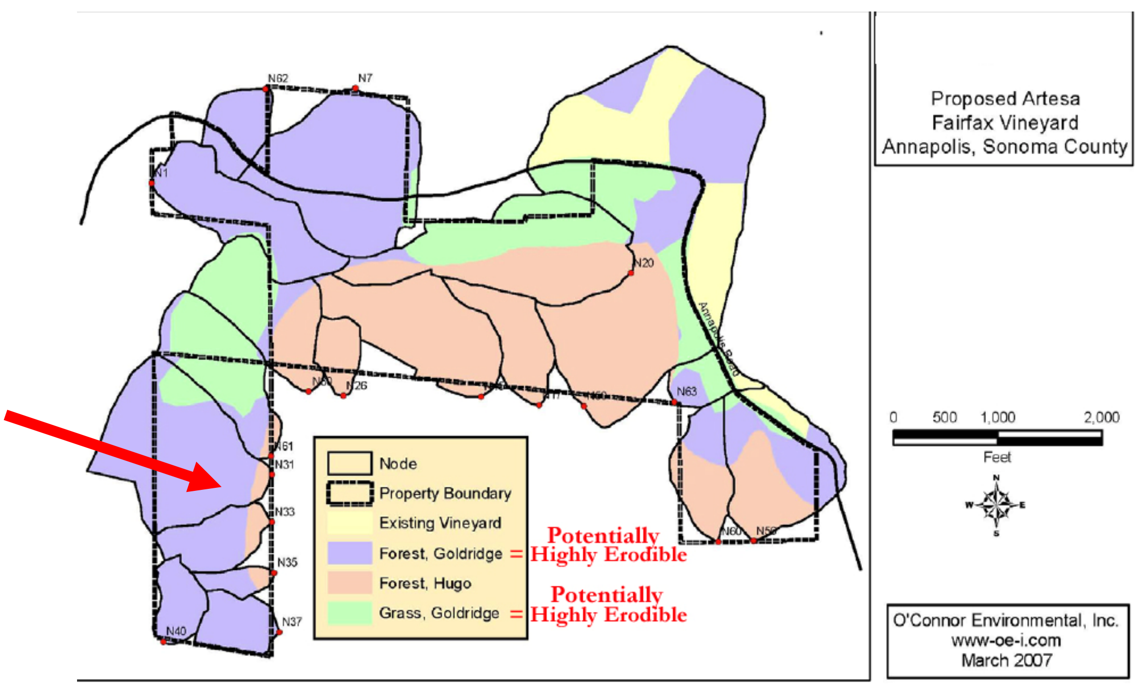

Figure 8. Soil map from DEIR shows that Goldridge Series underlies more than half the Project site with annotation in red added to indicate potential for high erosion. Red arrow highlights steep area.

As with hydrologic effects, cumulative effects related to sediment are treated as fully mitigated. One Freudian slip can be found in the DEIR: “These measures will ensure that siltation of onsite and downstream tributaries are minimized to an imperceptible degree.” I have to agree that the mitigation measures will likely not make a perceptible difference in decreasing sediment that comes from the site after development despite claims in the DEIS:

> “The project also includes post-vineyard construction BMPs including desilting catch basins at the lower ends of all drainage points discharging stormwater from the project site. First flushes from the project site will be captured in these basins and ‘treated.’ These basins will ensure that any silt leaving the project in stormwater flows will undergo ‘stilling’ and desilting prior to flowing off the site.”

In fact when high intensity rainfall persists for a substantial duration basins will over-top and sediment from the project will be released downstream and offsite to the detriment of lower Patchett Creek, the Wheatfield Fork and the lower mainstem Gualala River. The claim in the DEIR that all sediment effecting the Gualala River is from post WW II land use is strongly refuted by data collected in the Gualala River basin by Knopp (1993) and by observation of channel conditions (Figure 9). Knopp (1993) found that aquatic habitat data such as median particle size distribution (D50) of stream beds and the amount of sediment in pools (V*) were strongly related to land use history. His findings with regard to Gualala River V* (Hilton and Lisle 1993)(Figure 10) serve as an example to refute the “old land use” argument.

Grasshopper Creek and Fuller Creek fell within Knopp’s (1993) universe of samples with the former having roughly 59% (V* = 0.59) filled with fine sediment and the latter having a V* score of 37% or a little over one third filled with sediment. The NCRWQCB (2004) and the U.S. EPA (1998) recognize V* values of greater than 0.21 as impaired and Knopp (1993) found that values like those exhibited by Gualala River tributaries represented disturbed and highly disturbed watershed conditions. Northwestern California tributaries that were logged during earlier periods have shown substantial recovery, such as Brandon Gulch (0.18) in Jackson Demonstration State Forest. The latter stream was heavily logged after WW II and yet its channel is no longer sediment rich because it has had watershed rest (Kaufmann et al. 1997. What is actually occurring is that continuing waves of logging and land use such as the Artesa Vineyard are causing channels to remain perturbed. Reeves et al. (1995) and Frissell (1992) point out that it takes about 20-30 years for most stream channels to recover from logging sufficiently to support diverse communities of salmonids and that short rotation logging does not allow such a recovery. Most aquatic habitat data indicate that conditions are far outside the range for suitability of salmonids whether the criteria is pool frequency, pool depth, fine sediment in gravels, water temperature and several other metrics. I am attaching with my comments criteria developed for coho salmon recovery planning (Kier Associates and NMFS 2008) that has useful reference values that CDF should consider adopting for use in the THP/TCP process.

One DEIR illustration (Figure 11) uses a recent aerial photo backdrop indicating substantially elevated risk of sediment yield due to recent and extensive soil disturbance that is not properly addressed in the document. Discussion of impacts of the recent, adjacent vineyard development are avoided because they are considered fully mitigated, but extensive bare soil and subsequent vineyard development likely have yielded and continue to yield excess sediment. The same photo also shows evidence of recent timber harvest and yet increased erosion related to skid trails and landings is unaddressed as are any associated hydrologic perturbations. This land use may also impact water temperature, as discussed below.

Figure 9. Wheatfield Fork Gualala River looking upstream just above convergence with SF Gualala. Note deposits of fine sediment (arrow) that were deposited on the last descending leg of the hydrograph indicating high current supply. Only willows can survive on the mainstem river bars because of constant shifting bedload due to sediment over-supply.

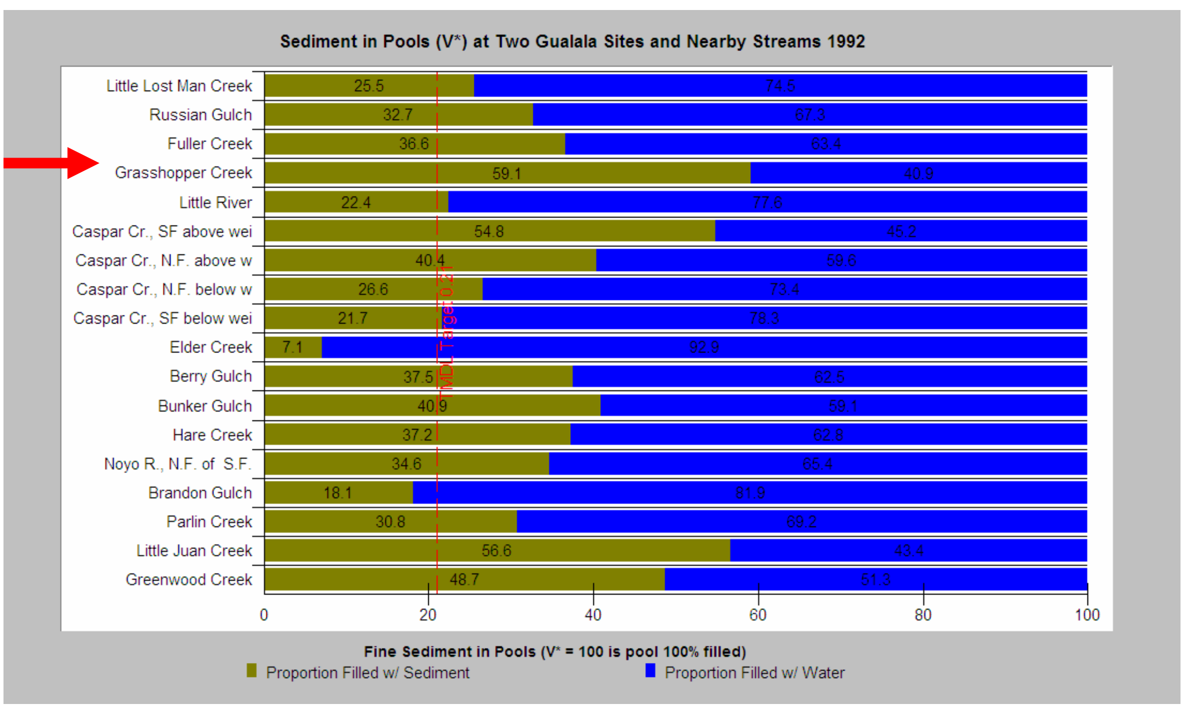

Figure 10. The amount of sediment in pools in Grasshopper and Fuller Creeks measured by Knopp (1993) indicate that Fuller is somewhat recovered from past logging but that Grasshopper Creek has major problems with erosion related to recent land use. Chart from KRIS Gualala. Units are V* X 100.

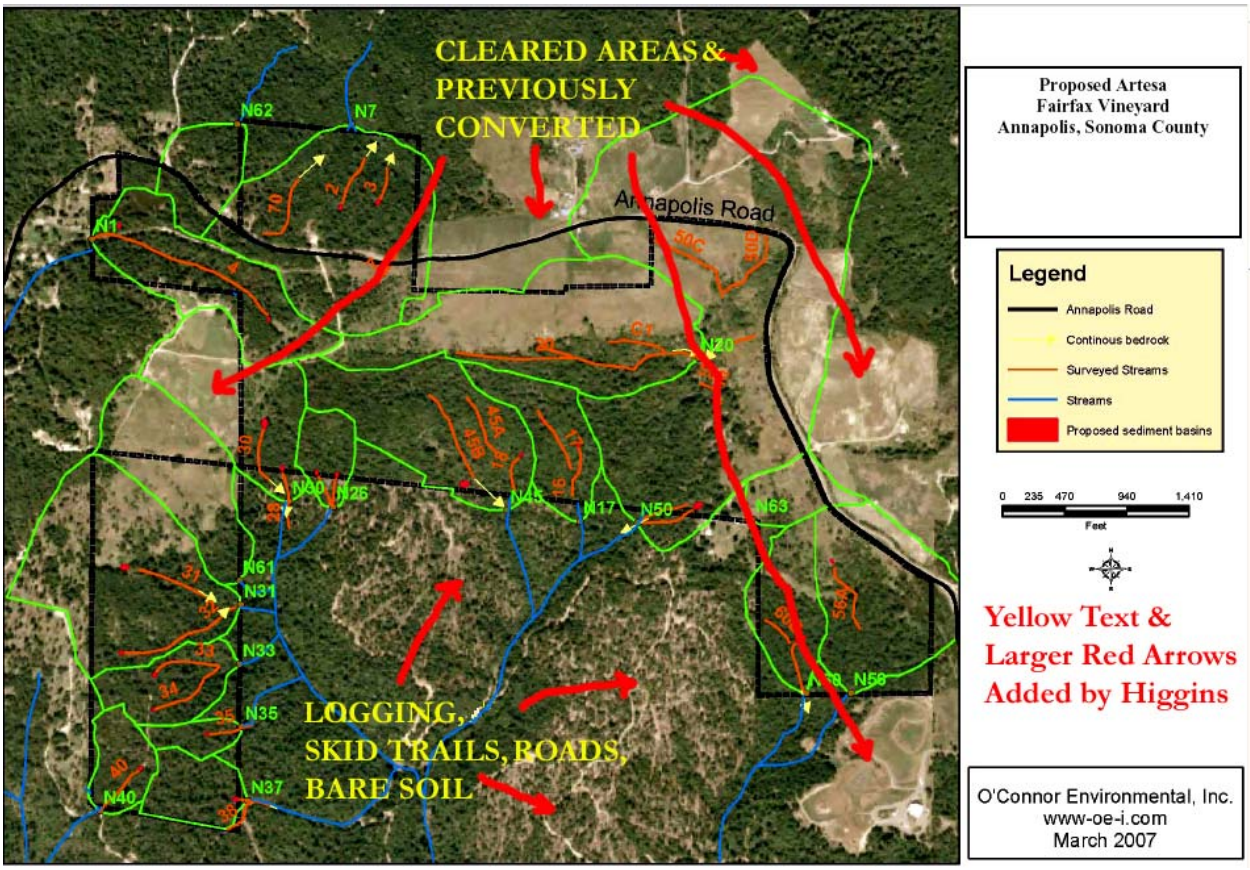

Figure 11. Illustration from DEIR shows intensive land use and yet has no companion discussion regarding issues such as increased sediment from areas cleared for or subsequently converted to vineyards and skid trails, landings and areas of bare soil due to recent logging.

Brosofske et al. (1998) found that logging reducing ground cover in headwater areas warmed stream flows, regardless of whether shade was maintained. The logging activity show in Figure 11 could be having such an effect on Patchett Creek, but the DEIR provides no stream temperature data for evaluation. Claims in the DEIR that water temperature problems in Patchett Creek and in the Wheatfield Fork Gualala are not supported by the argument presented.

The case has been made above that conversion of the Artesa Vineyard site, installation of tile drains and construction of a reservoir will decrease base flows to Patchett Creek. There is a clearly established relationship of water flow volume to flow transit time and the tendency of a stream to warm (NRC 2004). Therefore, reduction of baseflows as a result of the Project will elevate water temperatures with unknown effects to potential refugia in the lower mainstem Wheatfield Fork Gualala River (see Fisheries).

Land Use Discussions Ignore Cumulative Effects Implications

The DEIR provides statistics on timber harvest and road density, but the significance of impact levels is never discussed. Kier Associates and NMFS (2008) provide land use threshold values to gauge likelihood of "stress" being exerted on coho salmon habitat with varying scales of activity and CDF and other reviewers of these comments may go there for more background discussion.

<u>Timber Harvest</u>: The DEIR states that timber harvest has been light compared to the early 1990s then states that "Timber Harvest Plans filed in the Annapolis, Little Creek, and Grasshopper Creek

watersheds…..total of 5,535 acres amounts to approximately 28.8 percent of the 19,202 acres that compose the three watersheds in which the project is located. Reeves et al. (1993) found that watersheds on the Oregon coast harvested more than 25%of their watershed area in 30 years had substantial negative cumulative effects that were manifest in 10-47% loss of pools, substantial reduction of large wood and diminished Pacific salmon diversity.

Timber harvest data from CDF from 1991 to 2001 for the Annapolis, Little and Grasshopper Creek Calwater is available from KRIS Gualala (Figures 12 & 13), and in combination with DEIR provided data, can extend the window for THP related cumulative effects to almost 20 years. Total harvest in the three Calwaters was 37%, 34% and 30%, respectively between 1991-2001. An additional 2882 acres in the three Calwaters have received permits for logging or conversion between 2002 and 2008, or approximately 15% of their combined area. Analysis over the period of 1991 to 2008 indicates that the rate of disturbance for all three Calwaters combined is over 50% or more than twice the threshold recognized by Reeves et al. (1995).

This rate of logging is equivalent to 4% of inventory per year, which is recognized by Klein (2003) as linked to substantial sediment yield to streams. Turbidity levels meet beneficial use levels when harvest rates are 1% POI or less, but over 2% POI (50% harvested in 25 years) levels would limit juvenile salmonid growth. Sigler et al. (1984) found that 25 NTU is the threshold over which steelhead juvenile growth is restricted due to limited capability to see prey items. The streams listed on Klein's chart range from 1% POI or less to more than 4% and have substantial variability of time over critical thresholds for salmonids. Control watersheds and those lightly disturbed (1% POI or less) had only 100-400 hours over 25 NTU, highly disturbed watersheds (>4% POI) exceeded this level for over 1100-1200 hours. Maximum turbidities in the highly disturbed watersheds also exceeded 500 NTU, which may directly injure salmonids and other fish exposed (Newcomb and McDonald 2001).

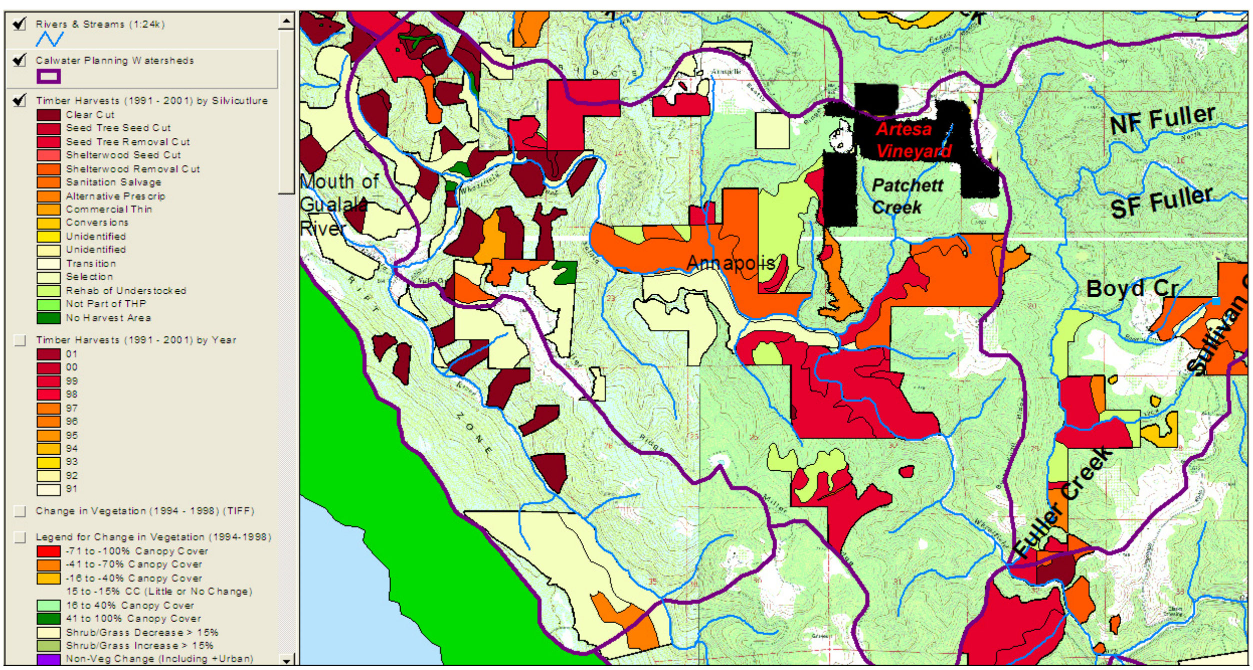

Figure 12. THPs between 1991 and 2001 by year according to CDF data show the 37% timber harvest in the Annapolis Calwater, which is well over prudent risk levels of disturbance known to cause cumulative effects and to degrade channel conditions for salmonids (Reeves et al. 1993). Black area indicating Artesa Vineyard development added for this project otherwise map is from KRIS Gualala.

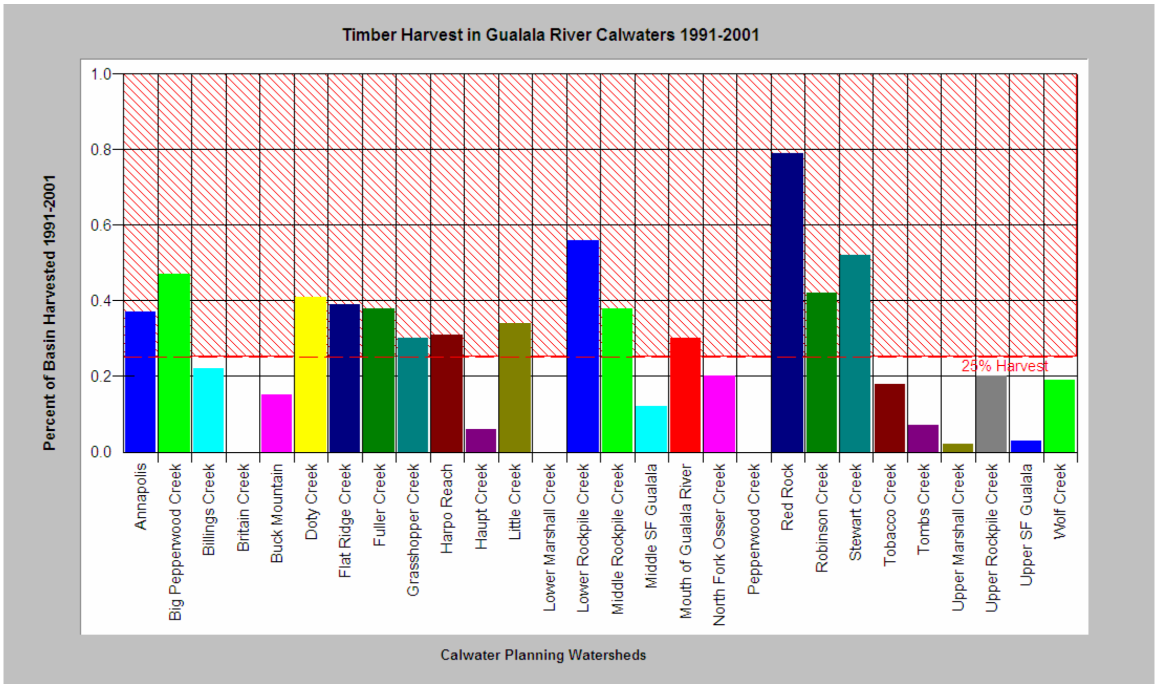

Figure 13. Timber harvest between 1991 and 2001 in the Gualala River watershed is displayed in the chart above and results show that many basins are being harvest at very high rates (>4% POI). Data from KRIS Gualala.

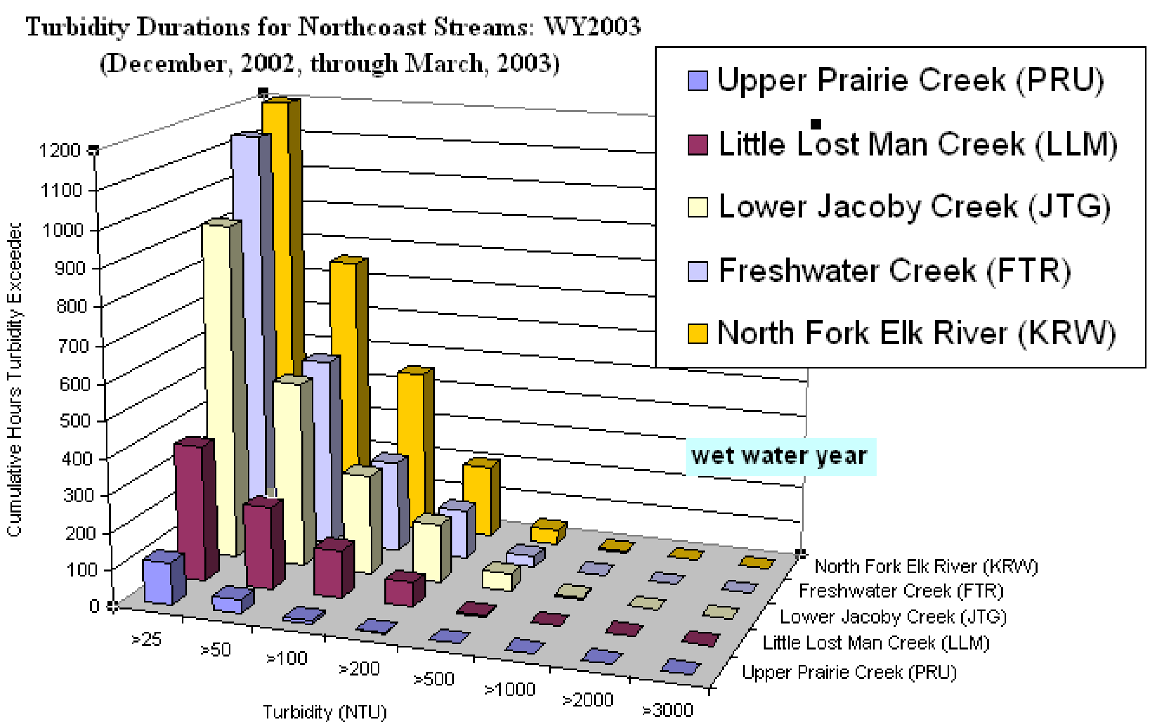

Figure 14. This chart from Klein (2003) shows the total hours over varying turbidity values with 25 NTU the threshold over which steelhead juvenile feeding is impaired (Sigler et al. 1984). Timber harvest rates for basins are as follows: PRU = Control (<1% POI), LLM = Lightly disturbed (1% POI), JTG = Disturbed (2-3% POI), FTR and KRW = Very highly disturbed (4% POI).

Roads Density: The DEIR cites the Gualala River TMDL (NCRWQCB 2003) with regard to roads and erosion: "Road-related erosion is the major portion of the human-caused erosion, and that higher road density in a given area results in greater sediment loading from roads." It also reports that the Annapolis, Little Creek and Grasshopper Creek Calwaters all have road densities greater than 6 miles per square mile of watershed area (6.1, 6.6 and 6.4 mi/mi^2 respectively), but fails to note the significance of this statistic.

U.S. Forest Service (Quigley et al. 1996) studies in the interior Columbia River basin found that bull trout were not found in basins with road densities greater than 1.7 mi/mi^2 and they rate road density of greater than 4.7 mi/mi^2 as extremely high (Figure 16). National Marine Fisheries Service (1996) guidelines for salmon habitat characterize watersheds with road densities greater than 3 mi/mi^2 as "not properly functioning" while "properly functioning condition" was defined as less than or equal to 2 mi/mi^2 with no or few stream aide roads. NMFS (1995) set the target for road density in the Columbia River Basin as 2.5 $mi./mi.^2$ to attain properly functioning watershed condition for sensitive fish species. Just as with timber harvest on the north coast, Klein (2003) found a strong correlation of road density with turbidity levels that would limit juvenile salmonid growth (Figure 17).

The extremely high levels of roads in these three watersheds indicates that CDF and other management authorities should be decommissioning roads and reducing road densities, not allowing new construction. The Artesa Vineyard project will add to sediment loads, as described above, in addition to sediment yield likely coming from roads.

Vineyards and Sediment: The DEIR once again cites the NCRWQCB (2003) with regard to vineyards and erosion: "Viticulture and the associated clearing of vegetation are likely to increase surface erosion through exposure of bare earth to rainfall and runoff. Observations made by Regional Water Board staff in conjunction with the TSD development show that conservation practices used in viticulture (cover cropping, buffer strips, terracing, etc.) have variable effects on erosion prevention." The DEIR falls back on BMPs and mitigations in claiming that highly erodible Goldridge Series soils will not yield additional sediment when converted to vineyards, including on some areas with steeper slopes.

DEIR Attempts to Narrow Agency Authority and Need for Review

The DEIR tries to argue that Regional Water Control Board staff only have "jurisdiction over 3.610 acres of waters of the State on the project site." The DEIR makes this calculation as follows:

> "In summary, impacts to RWQCB regulated areas from grading for vineyard installation total 0.414-acre enumerated as follows: impacts to approximately 0.011-acre of other waters; impacts to 0.106-acre of isolated wetland; and impacts to 0.269-acre of seasonal wetlands (Figure 3.4-7). In addition, there would be impacts to 0.001-acre of other waters and 0.027-acre of seasonal wetland from construction of infrastructural elements of the project."

In fact Pronsolino v. Nastri (F.3d. 7901, U.S. 9th Circuit Court, 2002) makes it clear that authority of the NCRWQCB staff extends to uplands and implementation of measures that prevent sediment and erosion outside wetlands and the stream channel.

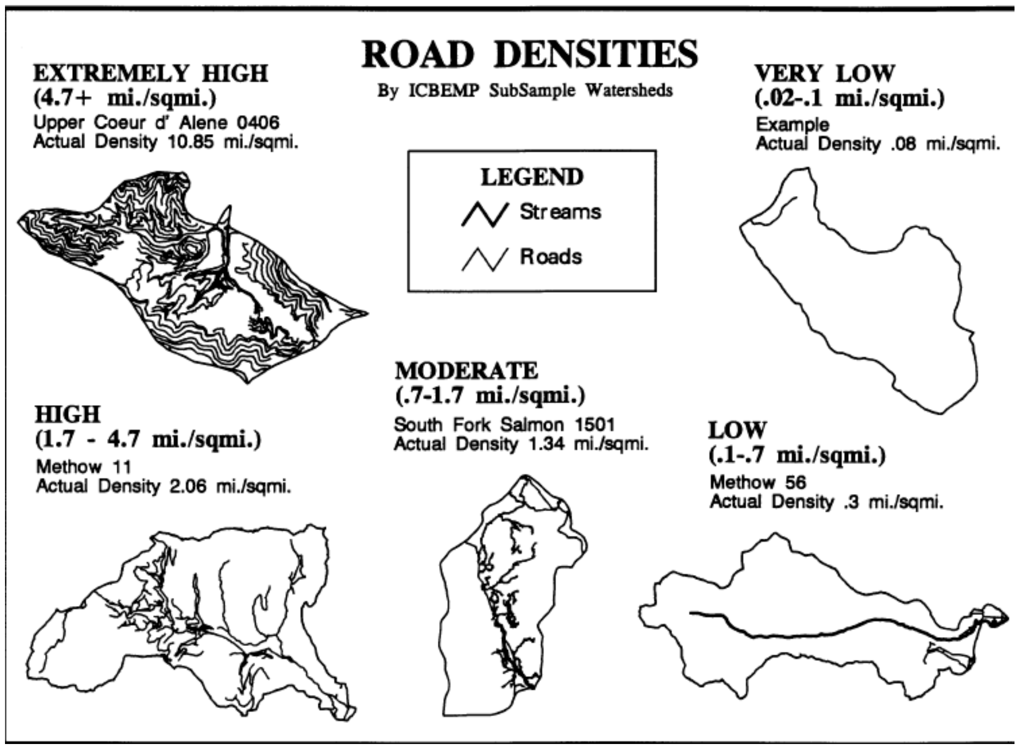

Figure 17. Road density categories from the USFS (Quigley et al. 1996) rating cumulative effects risk.

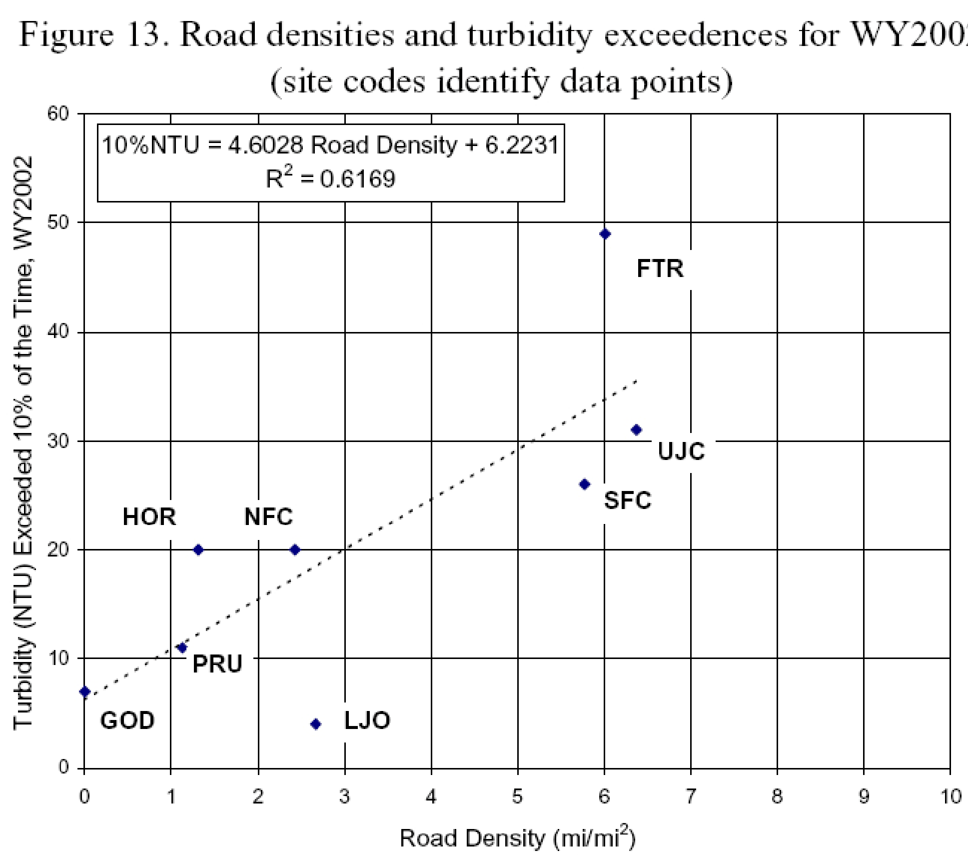

Figure 18. Regression showing string correlation of turbidity and road densities in northwestern California. Turbidities in watersheds with low road densities rarely exceeded 25 NTU while those with higher densities (>5 mi/mi2) did. Taken form Klein (2003).

The DEIR also tries to make the case that no concurrence from NMFS is required because listed steelhead are not on the property, but as explained at length above, the Project will ve3ry likely decrease flows, increase water temperatures and negatively impact steelhead in lower Patchett Creek and possibly the lower mainstem Wheatfield Fork Gualala. Because the potential effect to Patchett Creek is so significant from the Artesa Vineyard, and the functional habitat in the lower Wheatfield Fork Gualala is already so compromised, this Project may rise to the level of a take of that sub-population. The very poor adult return in 2009 (DeHaven In Press) and low juvenile abundance and patchy distribution found in 2001 CDFG NCWAP surveys are also causes for concern. If steelhead do use lower Patchett Creek, their loss from the lower Wheatfield Fork may lead to a loss of connectivity (Williams et al. 2008), and concerns raised above about loss of its function as refugia also have bearing on maintaining salmonids (U.S. EPA 2003).

Potential Project Effects on Yellow-legged Frog and Western Pond Turtle

Although the DEIR admits there are foothill yellow-legged frogs in the Project site, they deny likely impacts from the Project. The decreased baseflows caused by tile drains and reservoirs that I provide evidence for above will decrease yellow-legged frog habitat downstream in Patchett Creek, but the biggest problem is the likely colonization of the Artesa Vineyard reservoir by the invasive and insatiable bull frog (Bury and Whelan 1984). Bury and Whelan (1984) found that man-made impoundments are perfect habitats for the species and recognized the expansion of the bullfrog in the West as having disastrous impacts on native herpetofauna. Bullfrogs can be anticipated to predate upon and out-compete native yellow-legged frogs and could have an equally devastating effect on western pond turtles due to predation on hatchlings. See also Global Invasive Species Database: http://www.issg.org/database/species/ecology.asp?si=80.

Artesa Vineyard Project: Opposite of Needed Actions for Salmon and Steelhead Restoration

Bradbury et al. (1995) point out that preservation can take place without restoration but that restoration of Pacific salmon species cannot take place without habitat protection. CDF's inability to protect aquatic resources by saying no to projects like the Artesa Vineyard is contributing substantially to the decline of Pacific salmon species in northwestern California (Higgins 2009). Reeves et al. (1995) explain that Pacific salmon populations evolved in ecosystems with varying disturbance regimes, but catastrophic habitat changes only occurred in patches or sub-basins, not entire watersheds. Once disturbed, stream channels recovered over decades or sometimes a century to productive salmonid habitat. This "patch disturbance" regime is much different than the extremely high rates of disturbance that take place across much of the landscape and scientists distinguish this as a "press disturbance" regime that is incompatible with salmonid recovery (Collison et al. 2003).

The watershed and hydrologic conditions that salmon and steelhead are now profoundly different than those of the old growth redwood forest. Instead of redwood trees up to 20 feet in diameter, 1994 Landsat data (Warbington et al. 1998) indicate that only 50% are over 24 inches in diameter at breast height (dbh)(Figure 19). This diameter represents mid-seral conditions indicating logging likely after WWI while the other half of the landscape is in smaller trees, brush, grasslands or bare soil. To guide the Gualala River watershed back towards a more normal range of variability and more suitable channel conditions for salmonids, more of the landscape needs to be restored to large trees and a multi-tiered forest canopy. Converting forests and wildland watershed to vineyard will likely eliminate steelhead from lower Patchett Creek instead of helping sustain and restore the species.

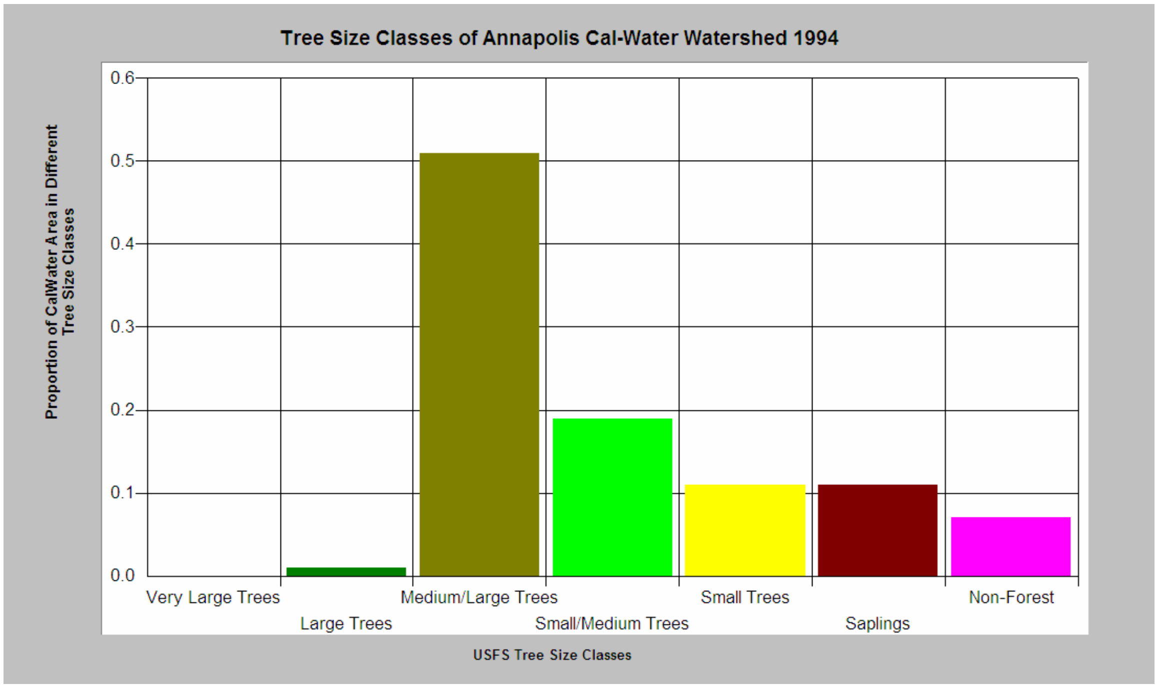

Figure 19. Landsat data analyzed by CDF and the USFS (Warbington et al. 1998) showed that over half of the vegetation in the Annapolis Calwater is less than 20 inches in diameter, indicating harvest in the last 30 years. Vegetation classifications are: Very Large Trees = >40" dbh, Large Trees = Trees 30-39.9" dbh, Medium/Large Trees = 20-29.9" dbh, Small/Medium Trees = 12-19.9" dbh, Small Trees = 5-11.9" dbh, Saplings = Trees < 5"dbh, Non-Forest = No trees, shrubs, grass, bare soil.

Conclusion

The Artesa Vineyard DEIR contradicts itself, adheres to scientifically flawed assumptions and denies impacts by claiming effectiveness of BMPs and mitigation measures. The document clearly fails CEQA tests for use of best available science and for clear analysis of cumulative effects. CDF should reject the DEIR until groundwater issues are resolved and an Appropriative Water Right is obtained by the Project proposers.

Sincerely,

Patrick Higgins

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