Forest Practices
California Department of Forestry
135 Ridgeway
Santa Rosa, CA 95401

COMMENTS - THP 1-04-059 SON Martin (Sleepy Hollow) Timber Conversion Permit/Timber Harvest Plan (Brushy Ridge, Annapolis, Sonoma County)

June 2, 2004

To the California Department of Forestry:

Please consider the following comments on THP 1-03-059 SON (Martin Conversion, Sleepy Hollow, Annapolis, Sonoma County TCP/THP).

I am a research scientist at the University of California, Davis and have been investigating bottlenecks to anadromous fish stocks on the North Coast of California since 1998. Most of my research has been conducted in the Navarro River watershed, a small coastal watershed very similar to the Gualala. I wish to convey my concerns on the conversion of timber to vineyards with respect to the potential effects on anadromous fish species in the watershed. My three primary concerns are increased delivery of sediment to streams, increased delivery of nutrients, and increases in temperature from clearing the landscape and reduction of flows due to withdrawal of ground water. My concerns are the result of research conducted on steelhead trout and coho salmon over the last several years.

Sediment Delivery
Removal of native vegetation and planting vineyards on steep slopes undoubtedly will deliver additional sediment to the streams. This delivery can come in either of two forms, mass wasting or gullying and delivery of fine sediment. When the natural root system is removed from the landscape, the area is susceptible to mass wasting. Large amounts of sediment can be delivered to the stream and a small setback of riparian vegetation will do essentially nothing to stop the flow. It is my experience that fine sediment from gullies and rills find their way into stream channels, even if the vineyards are located some distance from the stream channel. Fine sediment removed from hillsides is moved downhill until it comes into contact with some feature. That feature is often a road (either improved or unimproved) and water is moved alongside these roads carrying the sediment until eventually it reaches a stream channel. It is simply going to be true that removing native vegetation, ripping the soil, and planting grapes is going to generate significant additional sediment loads to local stream channels.

Nutrient Delivery
Addition of nitrates (or compounds converted to nitrates soon after application) as fertilizer is a common practice. It has been well documented across the entire country

that nitrogen fertilizers easily enter ground water and are transported to surface waters where the channels intersect the shallow ground water. A large portion of the upper Chesapeake Bay and a large area in the Gulf of Mexico have become anoxic as a result of the addition of nitrates, the subsequent bloom of algae, and the resultant decrease in dissolved oxygen as a result of respiration of the algae and the bacterial decomposers. The movement of nitrates to the ground water and their movement to the stream channels will certainly occur in the Gualala watershed. Along the North Coast, the primary nutrient pulse occurs in the winter when deciduous trees drop their leaves and spawning salmon leave their carcasses in the stream channel. During the late spring and summer, the systems are exceptionally nutrient poor. However, the ecosystems have evolved to accommodate high nutrient loads in the winter and low loads in the summer. The addition of nitrates to the system in the summer is undoubtedly going to be seen as a major perturbation to the system with results not dissimilar to the Gulf of Mexico. Increased production of algae will occur all of the way downstream including the estuary. Our research has found that the estuary of the Navarro River, which is closed by a sand bar similar to the Gualala, is critical summer and early fall habitat for juvenile steelhead. The addition of nutrients in the upstream portions of the watershed could cause decreases in dissolved oxygen in the estuary that render useless this critical habitat. Consequently, movement of nitrates through ground water to the stream channel is expected to have adverse effects throughout the entire watershed.

Flows and Water Temperature

While the effects of sediment nutrient delivery are expected to adversely impact the watershed, the effects of reduced flow and elevated water temperature could prove to be devastating to the remaining anadromous fish in the watershed. After several years of research in the Navarro River watershed, we have arrived at the conclusion that elevated water temperature is the primary stressor on anadromous fish. We have recently completed a preliminary analysis of the flows along several rivers on the North Coast including the Gualala and found that despite the fact that winter rains have remained the same over the last 50 years, summer flows have declined significantly. These declines are correlated with the increase in ground water wells in these watersheds, clearly establishing a link between removals and summer flows. In general, we have a reduced amount of water in the streams during the critical late summer months prior to outmigration of coho and steelhead. The reduced flows are coupled with an increase in the volume of the hyporheic zone due to the inputs of sediment over the last 150 years of timber harvest. This increased volume means more water moves underground and less stays at the surface as fish habitat. Reduction of flow is a problem for the obvious reason that simply stated fish need water. And the second reason is that a larger mass of water resists heating, remains cooler and provides adequate habitat for the cold-water anadromous fish. It is generally acknowledged that as water moves across the landscape in the shallow ground water zone, it assumes the temperature of the soils through which is passes. If native vegetation is removed, the exposed soil becomes hotter and warmer water moves to the stream channel. Replanting with grape vines will not replace native vegetation in maintaining sufficient cover over the soil to keep the temperature low enough that water will remain cool prior to entering the stream channel. Our recent research in the Navarro demonstrates that hyporheic water, long assumed to be cooler

than surface water, is in fact warmer than water in the stream channel. We performed sophisticated statistical analyses to determine if increasing the shading over specific pools would be sufficient to reduce water temperature in these pools. The results clearly indicate that the main factor controlling water temperature in critical downstream pools is upstream hyporheic and surface water temperature, and that water is drawn from the shallow ground water that intersects the stream channel farther upstream. Leaving a riparian setback as shade will be insufficient to insure that water temperatures are sufficiently low to support viable populations of anadromous fish. Also, because flows are so low, residence time in pools upstream is high, resulting in no substantial cooling as the water moves downstream. Consequently, removing native vegetation and replacing with vineyards will be expected to result in two compounding effects, reduction of flows due to pumping of ground water for irrigation, and warming what water does reach the stream by exposing the soil to direct sunlight.

Cumulative Effects

Cumulative effects must be viewed from two perspectives: the accumulated stresses from several modifications of the landscape at any one time, and the accumulated stresses that have occurred over time from these modifications. In order to adequately assess the cumulative impact of timber harvest and replacement with vineyards, it is necessary to keep the entire watershed in focus. Clearly, each time a vineyard is placed in the watershed, there will be an incremental decrease in flow, increase in water temperature, and increase in nutrient loading at the wrong time of year. These effects can be expected at all locations downstream. Because the current situation in watersheds along the North Coast is so tenuous with respect to water temperature, flow, and nutrient loading, it is not valid to examine each project as a single, small (based on the ratio of project size to watershed size) independent project and conclude no impact. Lack of documentation of these effects in the Gualala specifically does not change these conclusions. Our findings have been developed after several years of intensive study on a watershed along the North Coast that is in close proximity and is remarkably similar in size and geomorphology to the Gualala River watershed. I believe these conclusions can be generalized across dozens of watersheds on the North Coast. At the very least, it should be incumbent upon any proposed vineyard conversion project to perform a detailed cumulative effects analysis incorporating all of the proposed projects in the region and basing the analysis on the current precarious state of the anadromous fish stocks in the watershed.

Respectfully submitted

Michael L. Johnson, Ph.D.