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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,

What follows are comments on the Artesa Vineyard Conversion Draft Environmental Impact Report (DEIR) prepared for the Friends of the Gualala River. The emphasis of my comments will be on Biological Resources, Cumulative Effects and Water Quality aspects of this project.

Authors' qualifications

Registered Professional Forester # 2614
Certified Professional Sediment and Erosion Control Specialist #466

20 years -Watershed Manager/ Forester/ Senior Resource Planner
County of Santa Cruz

10 years -Senior Environmental Scientist
North Coast Regional Water Quality Control Board.

I have reviewed over 1,000 Timber Harvest Plans in the field as a member of the State Timber Harvest Review Team and have consulted on THPs as a private forester. I am the sole author of two CESA and ESA Petitions to list coho salmon (*Oncorhynchus kisutch)* as endangered species. I have held positions for 30 years that have dealt with evaluation of watershed conditions and the development of mitigations to address both past present and proposed impacts on individual parcels of land and entire watersheds. I have extensive background and experience in all aspects of forestry and logging as I grew up on TPZ lands and my father was an RPF and UC Berkeley Forestry Graduate. I preformed all aspects of timber harvesting for 5 years in Mendocino County and have extensive experience in instream and watershed restoration. I also have on the ground knowledge of the Artesa Vineyard property and the Gualala River Watershed.

It must be first noted

The entire process that CAL FIRE has taken to get to the Draft Environmental Impact Report for the Artesa Vineyard Project has been long and disconcerting. This past performance is followed by reading the "NOTICE OF AVAILABILITY OF THE FAIRFAX CONVERSION PROJECT ENVIRONMENTAL IMPACT REPORT (SCH# 2004082094)" and seeing "The California Department of Forestry and Fire Protection (CAL FIRE) has **prepared** a Draft Environmental Impact Report (DEIR) to consider the potential environmental effects of approving a Timberland Conversion Permit and Timber Harvesting Plan for the proposed Fairfax Conversion Project." (Bold added). What should be of further concern to the issue of fair and impartial review is later in this same notice Cal Fire has taken upon itself to predetermine this projects effect by stating "All of these impacts were reduced to a less-than-significant level through the implementation of mitigation measures."

This is noted as CAL FIRE made an initial determination that the project could be approved with a negative declaration because it did not pose significant impacts, while "The DEIR found significant impacts related to air quality, biological resources, cultural resources, geology, hydrology, water quality, hazards, transportation and circulation, and noise.". For CAL FIRE to state all the above and not heed the concerns of significant environmental effects noted by other California State resource protection agencies after their review of this proposed project is very problematic.

The Project

The Artesa Vineyard Project (AVP) is located on Beatty Ridge between Grasshopper Creek and the Wheatfield Fork of the Gualala River, approximately 0.5 to 0.75 miles southeast of the town of Annapolis and five miles east of the Pacific Ocean. This project proposes permanent removal of all trees, stumps and roots throughout 171 acres of mixed redwood and Douglas-fir forest. While 135 acres will be permanent vineyard another 55 acres will consist of lined ponds, a corporate yard, roads and driveways and a graded perimeter with exclusionary fencing.

Significant issues with the evaluation and proposed mitigations.

This dramatic conversion of a forest is being compared throughout the DEIR to an average timber harvest that allows a forest to grow back again. This comparison and the choice of mitigations appear in numerous places throughout the DEIR. The Forest Practice Rules buffers chosen by the DEIR have been shown to be less than effective for logging and in this case are being used to reduce the impacts of not only forest removal but intensive land conversion and constant human intervention. Additionally studies of past timber harvest are being used to give the impression that water quantity will increase. Other issues arise as the DEIR states that no impacts will occur from sedimentation as existing Basin Plan violations will be controlled to nullify the ongoing inputs of at least 10 tons per year of vineyard caused sediment.

This 190-acre conversion of forest land is a very significant impact as major changes will occur both on and offsite after the conversion of a natural forest into intensively regulated agricultural lands. In the conversion of the land all trees will be cut, all stumps excavated out of the ground and all roots grubbed out of the soils. This process will permanently alter a living system of soils that now regulate water infiltrations so effectively that virtually no rainfall flows overland. Now water infiltrates into the ground while the existing pores and soil pipes regulate water through soils and the matrix mycorrhizae, shallow and deep roots that absorb most nutrients, so that the net effect in the watercourse is the slow and regulated delivery of clear clean water. After conversion no soil pipes few pores and no mycorrhizae will exist, water will not effectively infiltrate and nutrient flushes will be common and intense (Bormann and Likens 1979). Harvey et al. (1980) found onsite no soil mycorrhizae exist after removal of the forest, and this effect extends, extended 25 feet into adjacent, uncut stands. This impact is a very serious impact to water quality and quantity available to buffer trees as the mycorrhizae benefit of root extension and health are lost after the conversion.

Mycorrhizal fungi increase nutrient uptake in plants by increasing the surface adsorbing area, by excreting compounds that help take up immobile nutrients, or by modifying the soil microflora. Some ectomycorrhizal species, for example, release oxalic acid, which can mobilize phosphorus in calcareous soils where it would otherwise be sparingly soluble. Ectomycorrhizae in particular have been shown to assist in the acquisition of phosphorus, nitrogen, and potassium. Studies on ectomycorrhizae have also shown that they protect their host plants from excessive uptake of copper and zinc in soils high in heavy metals (Marschner, H. and B. Dell. 1994).

Logging and site preparation had the greatest impact on soil organisms. By destroying large pores in the soil (important for oxygen and water movement), soil compaction drastically changes microbial activity. Loss of organic layers of the soil adversely affects ectomycorrhizae, which are primarily in these layers. Additionally "micorrhizal fungi" grow around tree roots. The trees and the fungi are both dependent on each other for certain nutrients. If the tree is cut down, the fungi strands around its roots die. If a new tree is then planted in the same spot, it will not grow as well because the soil now lacks this important fungus. Erosion and loss of topsoil have been shown to result in a loss of mycorrhizae and a decline in site productivity (Amaranthus 1989).

Harvey et al. (1980) found that all soil mycorrhizae in clearcut areas were dead by summer following harvest, except in areas within 15 feet of a living tree. Soil compaction and the disturbance of organic layers of the soil due to logging activities alter soil microbial activity and adversely affect mycorrhizal populations. Logging and site preparation have the greatest impact on soil organisms. By destroying large pores in the soil (important for oxygen and water movement), soil compaction drastically changes microbial activity. Erosion and loss of topsoil have been shown to result in a loss of mycorrhizae and a decline in site productivity.

What does the DEIR have to say about this issue?

Soils and Hydrology

> "The proposed timberland conversion project is not expected to diminish annual water yield, summer stream flows, or groundwater supplies. Annual water yield and summer stream flows can be expected to increase due to **increase infiltration capacity** of soils and increased groundwater recharge with removal of forest." (Bold underline added)

The simplistic hydrological review of this project treats this permanent conversion as if it were a cable operation clearcut that would be left undisturbed for 50 years to recover. This might occur if one was proposing a standard timber operation, but this conversion will treat the ground in quite a different manner, destroying the capacity of the soil matrix to carry the significantly increased groundfall of rain when the tree canopy is removed, thus making the assumption of increased groundwater worth discussing.

Soil surface conditions determine whether rainfall will run off as surface flow or whether it will infiltrate and travel through the subsurface. Infiltration capacities for soils in the coastal redwood belt exceed the maximum rainfall intensities so much that overland flow is almost never seen. The only common infiltration limitations in this region result from bedrock outcrops or soil compaction associated with road building, landings (corporate yard), and other constructed surfaces. Over the vast majority of forested landscapes, rainfall infiltrates into the soil and flows through the subsurface to streams via springs. Studies on clearcut logging showed a dramatic increase in subsurface pore water flow and soil pipeflow, which are larger underground pipe like features. An indication of how much more water is generated after a forest is cut was shown as peak soil pipeflow response to clearcutting was increased 400 percent in Casper Creek immediately after logging. These results suggest that the soil pipes are a critical component of subsurface hillslope drainage (E. Keppler 1998).

The AVP project tree removal would greatly increase rainfall on the soil surface but depending on how soils are treated this effect may have dramatically different effects but all will be negative. In areas where all trees are grubbed out increases in groundwater will not occur but nutrient flushes will occur. The loss of soil pipes and compaction of soils will greatly reduce infiltration and surface runoff will be greatly increase. Where trees and roots where not disturbed there will be either serious increases in subsurface pore pressures, increasing erosion and transportation of soil in soil pipes or collapse and disruption of pipes and subsurface pores resulting in a dramatic increase in overland flow and transport of surface soils. It should be noted that none of these effects were mentioned in the DEIR. All which will result in sedimentation and increase erosion of downstream channels along with an increased input of pesticides and nutrients.

All these impacts are unmitigated by the AVP with the exception of the 1250 feet of Class III watercourse diverted to a pond, which is clearly not adequate to reduce 190 acres of 400% increase in subsurface flow or the great increases in groundfall due to tree loss. The problem with stating that the net effect of the project will be increase groundwater is that it is only accurate if trees are cut and stumps and underground water porosity are maintained, which is the case in the studies cited by the DEIR, but is not the case with this project. Simply stated the AVP will not leave redwood trees stump systems intact nor will it leave most of the ground undisturbed or unroaded and uncompacted, all of which leaves a very different hydrology from the case study used to compare the impacts of this project.

Water Quality

As mentioned few nutrients are lost from healthy forest ecosystems directly to stream channels. These systems are very efficient at recycling nutrients. Young forests rapidly soak up nutrients from the soil as they grow (Bormann and Likens 1994, Scoles and others 1996). The sudden removal of vegetation through conversion, however, will increase the nutrient transport to streams by increasing leaching and erosion of soils (Scoles and others 1996).

Additionally with the loss of canopy and deep root systems, more rain will fall directly on soils, roads, driveways and the corporate yard increasing the leaching of soil nutrients which is magnified by the lack of deep root uptake capacity. It is well documented that clearcuts/conversions increase the outflow of nutrients from forest soils (Knight et al. 1985), which promulgate algae blooms and degraded water quality. With the additional use of fertilizers, herbicides, fungicides, and nemicides combined with loss of deep roots to trap and recycle this increased input to groundwater, this conversion will seriously degrade water quality (Bormann and Likens 1979, Kimmins 1987, Maser 1994).

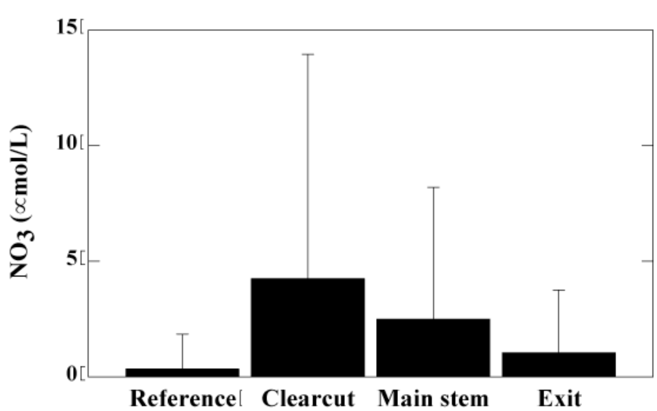


Figure 6— Cumulative effects of nitrate concentrations (mean±standard deviation) in stream waters of the North Fork, Caspar Creek experimental watershed (Dahlgren 1998).

Removal of canopy or disturbance to the forest floor allows rainfall to directly impact soils which leads to soil displacement and transport of soil to the stream channel. Additionally alteration of riparian vegetation can also increase nutrient loadings to streams and allow chemical (e.g., pesticides, fertilizers) and biological (e.g., bacteria) contaminants associated with land-use practices to enter the stream. This purposed vineyard will completely alter the underlying hydrology delivering significant nutrient and agricultural compounds effectively into the 303d listed water bodies.

Confusion over impacts and mitigation

The AVP conversion must be viewed as lands where existing surface tree canopy will be removed and subsurface drainage will be permanently disturbed and will never be reestablished forests, not other less drastic changes. But by all accounts in the DEIR this site will be treated as though they are forest that will recover. "The timber harvesting activities on the site would adhere to the California Forest Practice Rules and are described in detail in a Timber Harvest Plan (THP) prepared for the applicant by a state-licensed Registered Professional Forester (RPF). The actual logging would be performed by a state-certified Licensed Timber Operator (LTO)." None of the Forest Practice Rules are designed to deal with anything other than standard forest operations. This all begs the question of why is CALFIRE the lead agency in a forest removal project. The Forest Practice Rules were never designed to account for the total and permanent removal of a forest in its guidelines.

Sediment offsets

The gullies mentioned on the property are existing ongoing human caused sediment inputs that were noted by Regional Water Quality Control Board (RWQCB). "OEI identified three additional locations where gully erosion exist on the project site under current conditions. Project mitigation for erosion at these sites will be implemented to correct inadequate drainage conditions and erosion, thereby reducing mean annual sediment yield by 10.6 to 13.3 t/yr for the low and high range estimates, respectively."

These anthropogenic sources of sediment were noted by past inspections by agency staff and no effort has been taken to correct this known pollution of a "303d Impaired Waterbody". These poor land practices should have been corrected, but were allowed to exist for 4 years in violation of the Basin Plan. The lack of treatment of these existing sediment sources indicates poor land management practices by the landowner. The work to control these gullies and drainage does not require permits and in most cases and is considered as standard maintenance of roads and drainage features. In the intervening period these controllable man made sediment sources have allowed (by their own calculations) from 40 to 60 tons of sediment to be delivered to watercourses that can not be retrieved. No credit can be taken for sediment reduction by sediment from human caused sediment source. This is not the background condition, lest landowners create prior significant problems to offset any proposed project. The net production off the property must be considered in light of what the land would naturally produce (minus manmade gullies and roads). Therefore the net production for the project of is still 11 tons per year.

The bold text items from the DEIR are anthropogenic sources of sediment and are not considered background. The DEIR list these as "Voluntary **Mitigation of Existing Erosion".**

"The estimated net increase in sediment yield from proposed vineyard areas with the incorporation of sediment basins is approximately 11 t/yr (OEI, 2007; Table 1)".

1. Elimination of a degraded ATV trail under power lines caused by unauthorized site users. This will redeveloped as vineyard and drainage within Unit 1.

2. Rock armored outfall on an Annapolis Road culvert outside the vineyard. Hand placed rock armor will mitigate and prevent further enlargement of a small channel scour area in an area with negligible tributary area from roadside drainage.

3. Seepage control in abandoned skid road that has eroded and formed a semi-naturalized channel. A subsurface intercept drain will be placed in or near the perimeter vineyard avenue to minimize saturation-based gully enlargement below the reservoir site.

4. Groundwater and seepage control in an existing gully. A subsurface intercept drain will be placed in or near the perimeter vineyard avenue to minimize saturation-based gully enlargement downslope in a normally dry Ordinary Water reach below Unit 2.

5. Groundwater and seepage control in a second existing gully. A subsurface intercept drain will be placed in or near the perimeter vineyard avenue to minimize saturation-based gully enlargement downslope in a normally dry Ordinary Water reach below Unit 2.

6. Abandoned skid trail repairs below Unit 5. An overgrown and gullied skid trail will be shaped and outsloped. Surface water will be diverted from the entering the site by shaping and periodic rolling dips or water bars installed to prevent accumulation of surface runoff on the trail.

7. Roadside ditch dewatering and armoring. Surface runoff from the SE corner of Unit 8 will be routed through detention basins to a more appropriate swale location. An existing roadside ditch will be armored.

Most of the 7 listed erosion sources are listed as "voluntary sediment control measures" are again listed as items that the landowner has in its magnanimity decided to control.

Excepting for the water discharged by the Annapolis Road culvert these are all maintenance of existing man caused erosion sources.

The statement “The vineyard improvements are expected to reduce erosion potential over existing conditions which would be a benefit to steelhead trout. Therefore, with mitigation measures presented in the OEI (2007) report and summarized above, impacts to aquatic resources from erosion and sedimentation would be less than significant.” This statement from the DEIR is clearly not supported and steelhead resources are harmed by past inputs and will continue to be harmed by 10 to 11 tons per year of man caused sediment.

Forest Edge Effect Myth

Science indicates that the forest edge created by conversions bears little resemblance to edges of natural forest openings typified by gradual transitions and high levels of available cover (Rosenburg and Raphael 1986). Research has discovered that hard edges left behind by conversions make nesting birds more susceptible to predators than more gradual natural edges (Ratti and Reese 1988, Rufenacht and Knight 2000). High-contrast edges interfere with migrations and dispersal of some salamanders (deMaynardier and Hunter 1998). Rufenacht and Knight (2000) found that 22% of bird species in forests that used only edge habitats surrounding natural openings were not found along conversion opening. Hard edges created by conversions allow light and wind to penetrate into the adjacent forest, causing changes in forest microclimate in terms of sunlight, temperature, but it is the plant community that changes too.

Clearcut/conversion Edge Effects

Conversions and road building dissect forests, creating edges around the perimeter of disturbances that result in changes in local climate, soil moisture, and diversity of plants and wildlife. Air and soil temperatures, wind speed, and amount of sunlight are significantly higher for edges than for forest interiors, and soil and air moisture are substantially lower in edge environments (Chen et al. 1993, Vaillancourt 1995). This can affect plant productivity. Because conversion edges are especially vulnerable to strong winds, edge areas experience windthrow along manmade forest edges (Chen et al. 1992, Vaillancourt 1995). Because of changes to the forest microclimate, species composition of forest understory is significantly different in edge areas than in interior forests (Vaillancourt 1995, Dillon 1998). As a result of fundamental ecological changes rendered by edge creation, stands immediately adjacent to roads or convesrions lose their interior forest characteristics.

Historically, wildlife managers believed that edges enhanced wildlife habitat (e.g., Leopold 1933). Modern research, however, reveals a number of negative ecological consequences due to increasing forest edge: Edge areas experience higher rates of nest predation (Paton 1994, Rufenacht and Knight 2000) and nest parasitism (Paton 1994) for songbirds. Doherty and Grubb (2002) concluded that a consequence of forest fragmentation is an increase in edge habitat, contributing to increased nest destruction by many edge-favoring species who join cowbirds in parasitism, as deleterious edge effects impact the reproductive success of forest-dwelling songbirds. Cowbird nest parasitism occurred in 48% of nests and declined with increasing distance from the forest edge according to Brittingham and Temple (1983). Brown-headed cowbirds avoid mature forests (Carter and Gillihan 2000). Brown-headed cowbirds commonly utilize cut-over areas within forests (Crompton 1994). King et al. (1998) found that nest-predation rates for Ovenbirds (*Seiurus aurocapillus)* in a heavily forested landscape were higher near clearcut edges than in the interior forest.

Negative impacts of edges on wood frogs and some salamanders extend 80 to 115 feet into the forest from edges (deMaynardier and Hunter 1998). Increases in avian nest predation and parasitism extend 165 feet (Paton 1994) to 250 feet (Vander Haegen and DeGraaf 1996) into uncut forests from edges. Dillon (1998) found edge effects on understory vegetation composition extend 260 feet into the forest. Edge effects for large mammals may be much greater – Edge and Marcum (1985) demonstrated a decrease in elk use within a mile of open roads. Other various effects include changes in climate or other physical factors; changes in biota due to increases in aggressive edge-adapted species; and increased rates of invasion of noxious weeds.

Forest Fragmentation: Effects on ecosystems

The cumulative effects of vineyard conversion and timber harvest in the watersheds nearby are a very serious impact that is understated by the DEIR.   Human caused fragmentation of a forest has effects that are far reaching and result in dysfunctional habitat islands that soon fail to sustain themselves. The change from a continuous forest with a few natural disturbances to a landscape with isolated remnants of undisturbed forest degrades habitats by many methods. The first is easy to understand as small fragments of forest have limited shelter and food to carry wildlife which leads to starvation and limited shelter will either cause direct predation or movement out of the habitat if possible.

The principle of biogeography recognizes that smaller habitat fragments experience more population extinctions, and the distance to other suitable habitat patches will limit recolonization in the future if the habitat recovers (MacArthur and Wilson 1963). The other issue for other large isolated sites is if populations do survive they are subject to inbreeding and its unfavorable effects (Schaeffer and Kiser 1993). The reason for this issue is that forest-adapted animals often live in metapopulations that are divided into sub-populations between which individuals can emigrate and immigrate. While open–country or generalist species form wide ranging contiguous populations (Beauvais 2000), all species that form metapopulations are subject to local extinctions by fragmenting forests and are especially in danger as floods fires or other random events stress the limited habitat (Wilcox and Murphy 1985).

A local example is the American marten in the Pacific Northwest, which has suffered widespread population extinction due to forest fragmentation (Buskirk and Ruggiero

1994). Fragmentation has also been linked as a major contributor to insect extinctions (Schaeffer and Kiser 1993). Extinctions caused directly by fragmentation continue for years after the fragmentation event (Tilman et al. 1994).

In general, with the increase in fragmentation, forest interior species decrease, edge species increase, and generalist species show little change (Rosenburg and Raphael 1986, Bender et al. 1998). Specialist species are poorly adapted to colonizing new habitats, and are the first to succumb to fragmentation as a result (Tilman et al. 1994). Territorial species having large home ranges, such as martens, goshawks, and forest owls need large tracts of mature forest containing less than 25% of unsuitable habitat (such as conversions or young stands). Bakker and Van Vuren (2003) state that forest-associated species in fragmented landscapes must traverse potentially inhospitable gaps in an effort to move between habitat patches, Keller (1987) demonstrated that fragmentation had significant negative impacts on interior-forest birds such as red-breasted nuthatch, brown creeper, and hermit thrush. Struempf et al. (2000) found that most passerine birds nested in interior locations greater than 300 feet from the forest edge.

- Neimala et al. (1993) has shown that fragmentation adversely impacts insect fauna.
- Flowering plants have lower diversity in fragmented habitats, and seed production for flowering plants may be depressed in fragmented areas because of the lower diversity of pollinating insects (Jennersten 1988, Rathcke and Jules 1993, Spira 2001).

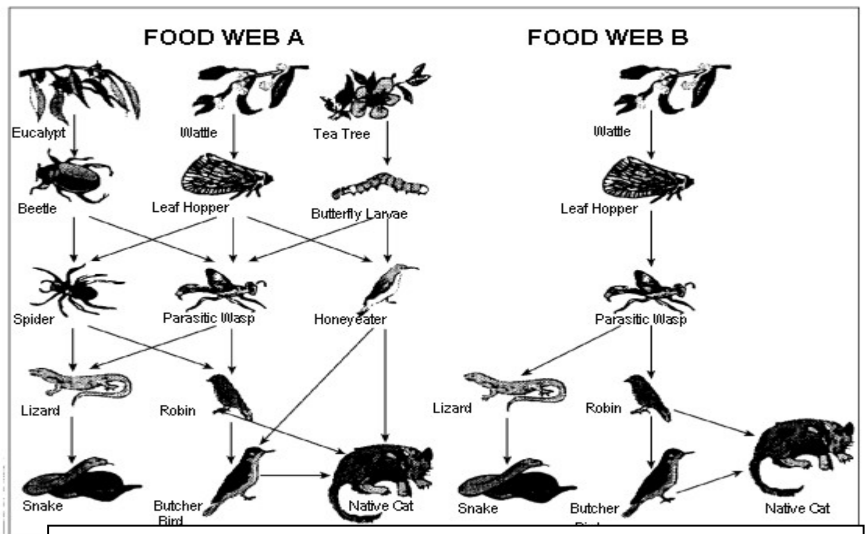
Many wildlife species require interior forest habitats or show strong preferences for them.

<u>Examples are:</u>

- Northern goshawk (Reynolds et al. 1983, Squires and Ruggiero 1996, Graham et al. 1999).
- Red-breasted nuthatch (Keller and Anderson 1992, Carter and Gillihan 2000, Rufenacht and Knight 2000, Hansen and Rotella 2000)
- Brown creeper (Keller and Anderson 1992, Crompton 1994, Hansen and Rotella 2000, Carter and Gillihan 2000).
- Yellow-rumped warbler (Keller and Anderson 1992, Crompton 1994, Carter and Gillihan 2000); mountain chickadee (Keller and Anderson 1992, Carter and Gilliahn 2000); ruby-crowned kinglet (Carter and Gillihan 2000, Ruefenacht and Knight 2000)
- American marten (Buskirk 1994, Romme et al. 1992)
- Red-backed vole (Romme et al. 1992); red squirrel (Romme et al. 1992, Bakker and Van Vuren 2003)
- Wood frog (deMaynardier and Hunter 1998).

And Marbled Murrelet.

The AVP DEIR preparers should consider the two food webs shown in the diagram. The arrows point from the organism that gets eaten to the one that eats it. These food webs are highly simplified compared with food webs in real ecosystems, but they still illustrate a key difference between more diverse and less diverse ecosystems. Food web B represents a situation with very low biodiversity, where at some levels the food path involves only a single type of organism. Food web A represents a more diverse ecosystem with, as a result, many more alternative feeding pathways. The loss of biodiversity is always a serious issue, not only because the organisms that have become extinct represent a loss for genetic diversity that reduces possibilities for useful benefit and ethical reasons, but also because the organisms that remain have become more vulnerable (exposed) to extinction in the future. Take away the leaf hopper in Food Web B and the whole system collapses, not so with the Food Web A.



Source: Adapted from Steve Malcolm: 'Biodiversity is the key to managing environment', *The Age*, 16 August 1994.

Buffers

Conversions Effect on the Riparian Zone

Conversions cause alterations in aquatic ecosystems or riparian processes, including changes in sedimentation, stream temperatures, hydrologic regimes, channel structures, floodplain processes, amounts of woody debris, aquatic plant production, terrestrial litter inputs, and invertebrate, fish and wildlife populations. These interactions have been evaluated and synthesized in several major symposia, reports and books (Krygeir and Hall 1971, Iwamoto et. Al. 1978, Newbold et.al. 1986, Murphy et. al. 1986, Salo and Cundy 1987, Raedeke 1988, Murphy and Koski 1989, Meehan 1991, Nauman 1992, Peterson et. Al. 1992, FEMAT 1993 Murphy 1995). These Reports provide detailed reviews of the effects of forest practices on aquatic ecosysems and variation in watersheds and ecological responses across the Pacific Northwest." (Kohm and Franklin 1997).

All onsite wildlife will be removed and migration of forest related wildlife that has already been impacted by other nearby vineyard conversions will be greatly restricted, and these serious changes are given only light mention and dismissed. Well that is not sufficient and what follows is a detailed reasoning to show the regulatory body why this has not been done by the DEIR.

The previous discussion on fragmentation of habitat is given first to set the stage for what a buffer from the conversion needs to consider for the level of protections required for protection of species. Here we discuss what a true buffer alone must posses to be effective. As here again the DEIR shows a lack of true scientific investigation to develop appropriate buffers that represent the site and the resources that are to be protected. The buffers for the AVP are chosen based on generalized Forest Practices Rule standards instead on any logical attempt to size buffer to account for site conditions or biological resources to be protected. Additionally the chosen buffers from the Forest Practice Rules are not appropriate as they are buffers for average timber harvest that again do not take into account that a forest will not grow back. Additionally these Forest Practice Act buffer distances are for temporary protection of the stream bank and do not consider impacts to functioning riparian corridors. Pesticides and herbicide discussion states that any likely problems will be muted by proper use and handling and again uses buffers not designed for pesticide use. Cal Fire forest practice standards are clearly not designed for herbicides, pesticides use near streamside environments.

Riparian habitat supports over three quarters of the amphibians and half of the reptiles in California (Warner and Hendrix 1984). Cederholm (1994) has suggested that maintenance and protection of riparian ecosystems can only be accomplished by first defining riparian areas from a functional perspective, meaning what species and functions must the ecosystem support, then design the widths to protect those species , and then maintain buffers around these ecosystems. The riparian zone itself must be protected to insure both its' survival and its' properly functioning condition for all wildlife. "If the goal is to maintain natural microclimatic conditions within the riparian zone as well as large wood for nurse logs and nutrient contributions-conditions that are essential for long-term (decades to centuries) maintenance of natural species composition and production of riparian vegetation as well as a number of wildlife species-then buffers need to be substantially wider (MANTECH 1996).

Riparian zones are in and of themselves very important habitats and they should not be looked at as only buffering agents for radical changes in their neighboring forested landscapes. If a riparian zone is next to a conversion it must be protected against the impacts and it must be more robust to mitigate for the additional impacts. This is due to the fact that many of the features of a riparian corridor and its ability to function as a migration corridor are completely disrupted by conversions; shading and moisture control ; large wood for streams for fish and downed wood supplyfor amphibians; filtering/buffering of sediment and nutrients that are greatly increased by conversions.

It must be stated again riparian corridors are greatly dependent on and have a symbiotic relationship with forests and therefore they cannot be expected to function without the other, Oddly enough, although riparian zones need to be viewed as multidimensional ecosystems, when considering differing widths necessary for protection of a stream, the effectiveness of riparian buffers can be best evaluated within the context of specific protection goals and needs of dependent wildlife. Designed protections within the riparian zone are often do not consider the nearby forest canopies or canopy removal levels proposed by timber harvests. For example, riparian standards designed to protect only salmonid habitats with a lightly harvested forest stand near the riparian zone, would differ substantially from standards to protect all riparian dependent species, including amphibians, birds, mammals, and reptiles and fisheries from a conversion of a forest.

The DEIR states “Riparian habitats and the associated aquatic species, including the foothill yellow-legged frog, are the primary area of concern on the project site with regard to potential adverse impacts from pesticide use. The project site contains both Class II and III drainages. Many aquatic species are very sensitive to pesticides, and as shown in Table 3.8-2, pesticides that may be used on the project site are highly toxic to aquatic species. However, the Class II and Class III watercourses on-site would be protected by Watercourse and Lake Protection Zones (WLPZs), as per Forest Practice Rules guidelines. WLPZ buffer widths are designated according to side slope. For Class II watercourses with side slopes under 30 percent, the buffer is 50 feet; for those with side slopes between 30 and 50 percent, the buffer is 75 feet; and for those with side slopes greater than 50 percent, the buffer is 100 feet. For Class III watercourses with a side slope less than 30 percent, the buffer is 25 feet, and for those with slopes greater than 30 percent, the buffer is 50 feet. In addition, all Class III watercourses near conversion areas would be protected by variable Equipment Exclusion Zones (EEZs) ranging in width from 25 feet to 50 feet. Trees and brush will not be removed from any portion of the WLPZs or EEZs.”

9 chemicals known to be toxic to fish will be used in this operation. Without deep root systems these chemicals will easily soak down below vine roots to the lower groundwater

zone and be delivered via minimum depth 30 inch deep permanent trench drains proposed.

It is unfortunate that here we are using streamside habitats and riparian areas as buffers for serious conversion of forests and activities that will deliver many impacts to the riparian corridor and the watercourse. Riparian zones in forested environments are not as effective at maintaining themselves or providing benefits to their dependent plants, birds, retiles, amphibians, or mammals without an adjoining forest. Forests provide a buffer for riparian zones as they provide shelter to the riparian zone from winds and excess solar exposure. Forests in turn supply large woody debris for riparian benefit, protection from open land predators and control of climate and moisture while improving the function of the riparian corridor as a habitat corridor for migration.

Removal of the forest from neighboring riparian zones will destroy this interrelationship and limit ability of the riparian zone to function. The relationship of the forest to the riparian zone can be simply thought of as The forest vastly improves the function and utility of the riparian corridor. Without the forest the landscape becomes simplified. One of the hidden damages is biodiversity loss from patch conversions. Biodiversity is the key to managing the environment, an ecosystem that retains, a wide variety of living things (biodiversity) is much more likely to adapt to human-caused environment change than is one that has little (Malcolm 1994).

Poorly planned land use practices disrupt/impair key environmental variables and ecological processes that will in turn impair the ability of stream and wetland systems to perform key water quality functions and provide beneficial uses. Projects on land can significantly influence watershed processes, including the transport and storage of water, sediments, nutrients, organisms, and other chemicals and materials, which directly affect the water quality of streams and wetlands and other aquatic habitats. In turn if forests are removed the reliance on the riparian zone by the remaining wildlife can and will overload that habitat and very likely lead to a total collapse of both the riparian and aquatic environments. A limited riparian buffer with no adjoining timberlands is a perfect example of a poorly planned land use practice that will severely impact the streamside habitat and the adjoining wetland and aquatic habitat.

Specific recommendations for buffer widths can only be made with a clear definition of riparian management goals and protections. If the goal is to maintain only *instream* processes over a few years, then a no touch protected riparian buffers of 200 to 300 feet will maintain 90%-100% of most key functions, including shading, LWD recruitment (excluding trigger trees, upslope wood and upchannel wood), small organic litter inputs, nutrient regulation, and (unchannelized or unroaded) sediment control for surface erosion in the riparian zone (MANTECH 1996). This is not afforded by 30 to 100 foot buffers.

However, an instream process-oriented management approach can only be effective in the short term, as the riparian zones are not self maintaining and can not survive at a given width without the buffering effects of a forest, nor are they alone robust enough to provide functioning habitat for wildlife. Riparian zones must be afforded protection, in effect they need their own buffer, which in fact acts like the original forest next to a riparian zone.

The Issue

Research today is giving us and understanding of how wide-ranging the impacts of conversions are, and more precisely how severe onsite impacts are to remaining habitat. Small patches provide poorer habitat than contiguous areas because of edge effects, which can diminish effective habitat area by as much as two tree-lengths into a stand (FEMAT 1993).). Large-scale empirical studies all show that fragmentation has major documented effects that cause degradation of habitat quality within fragments. There is good reason to be cautious of any claim that (riparian) corridors or the spatial configuration of remaining habitat can compensate for the overall loss of habitat (Harrison and Brunha 1999). Conversions make the nearby terrestrial habitats and wildlife more dependent on a robust and even larger undisturbed habitat riparian habitat.

But it must be reiterated that any recommended buffer widths for nutrient and pollution control on lands must be tailored to specific site conditions, including slope, degree of soil compaction, vegetation characteristics, and intensity of land use. For the goal of maintaining instream processes over a the short term, a fully protected riparian buffer of approximately one site potential tree or 200 to 300 feet will likely maintain 90% plus of the key functions, Any timber harvest within established riparian zones further diminishes the capacity of the riparian zone to provide all of the functions of LWD recruitment, microclimate protection, shading nutrient buffering and all other functions of the riparian zone (MANTECH 1996).

Riparian zones that have not been disturbed by land-use activities provide the greatest level of protection for aquatic habitats and should generally not be disturbed until a significant percentage of riparian areas across the landscape has been restored (MANTECH 1996). Removal of canopy or disturbance to the forest floor allows rainfall to directly impacts soils which leads to soil displacement and transport of soil to the stream channel. Alteration of riparian vegetation can also increase nutrient loadings to streams and allow chemical (e.g., pesticides, fertilizers) and biological (e.g., bacteria) contaminants associated with land-use practices to enter the stream (MANTECH 1996).

Undisturbed forests with adjoining riparian vegetation can effectively remove nutrients and other dissolved materials as they are transported through the riparian zone by surface or near-surface water movement. However, the relationship between buffer width and filtering capacity is less well understood than other riparian functions. Those studies that have been published indicate substantial variability in the effectiveness of buffer strips in controlling nutrient inputs (reviewed in Castelle 1992; Johnson and Ryba 1992). These characteristics are existing vegetation, quantity of organic litter, infiltration rate of soils, slopes, and other site-specific characteristics. Therefore specific studies need to be conducted on the lands to be converted to determine buffer width, not depending on generalized setback designed for other purposes.

Buffer discussions to date by the Board of Forestry have only considered if the watercourse edge is protected from forest removal, no attempt has been made to consider how much impact forest removal makes on the riparian corridor. Never have discussions considered the larger impact of conversions on wildlife or wildlife corridors and how fragmentation of habitat by clearcutting brings about the need for even larger buffers. Using Riparian Corridors to buffer the impacts of forest removal on watercourses ignores the critical wildlife values of the riparian zone itself. Therefore using a standard Forest Practice Act buffer width is totally inappropriate.

To simplify the impacts of forest removal by naming a short distance were you think impacts stop is pure folly. Woodland riparian zones can not function properly without a nearby forest, just as a stream can not function without neighboring riparian corridor. In order for riparian buffers/corridors to be fully functional the DEIR must define the beneficial uses associated with a functional forest, riparian zone and aquatic community and then set the buffer to accommodate all these elements. Riparian zones are in fact the zone of direct interaction between terrestrial and stream systems, you can not just remove the forest and say this remaining strip of land will function by itself, buffer silt and pesticides and maintain itself with out its neighboring forest.

With the removal of the neighboring forest, riparian vegetation is seriously compromised. This proposed forest removal will significantly alter shade to stream channels, contribution of large woody debris and small organic matter to streams, all not mitigated for in this DEIR. Controls of sediment inputs will not be successful if bare soils exist near insufficient buffers. Roads, tilled and compacted soil and trench drains will increase sediment and nutrient inputs from surface erosion and subdrains. A comprehensive look at soils and slope are a minimum necessary step in creating sufficient buffers for this impact.

Matters to Consider for Proper Buffer Width

The sizing of riparian buffers is dependent on many factors including local climatic conditions, topography, geology, native vegetation community and the relationship between this existing functioning system and any neighboring forest or native vegetation community. Not the set limits that are generally given under the Forest Practice Rules. If an EIR is intended to deal with the impacts of a conversion then a full and complete analysis of the afore mentioned factors must be completed. These factors set what is the relationship of the native riparian to a future health and related nearby conditions that are affected by development and possible future and features of the riparian area. The width and characteristics of a proper buffer need to factor in for both location, dependent wildlife and then for the existing conditions proposed changes to the neighboring lands.

If the AVP buffers are truly intended to protect the stream and insure an intact and functional riparian corridor exists near the proposed vineyard then the width of the buffer would have a “leave zone” outside of the buffer that would protect a robust self maintaining riparian corridor of a width commensurate with the goal is to maintain natural microclimatic conditions within the riparian zone as well as large wood for nurse logs and nutrient contributions-conditions that may be essential for long-term (decades to centuries) maintenance of natural species composition and production of riparian vegetation as well as a number of wildlife species. If that were ever the goal of the AVP, then buffers need to be substantially wider than 30 feet to 100 feet.

Buffers *Depth of Edge Influence*

Just how far from the vineyard will effects of forest conversion intrude? Much scientific study has been done regarding Depth of Edge Influence, measuring the distance that ecological impacts from edge effect extends into the neighboring forest. Vaillancourt (1995) studied Depth of Edge Influence on forest and found the following distances for climate and ecological impacts:

- 300 feet for temperature Ledwith 1996, FEMAT 1993
- 165 to 450 feet for humidity Ledwith 1996, FEMAT 1993
- 100 to 165 feet for sunlight intensity
- 100 to 165 feet for tree density
- 100 to 165 feet for canopy cover
- 65 to 100 feet for wind-throw (blow down of trees vulnerability to wind).

Rudolph and Dickson (1990) reported amphibian and reptile populations were significantly lower in aquatic habitats with narrow buffer widths (<30 meters) than those with wider buffer strips due to greater shading (i.e., less solar radiation and lower air temperatures) and open understory vegetation. In addition to these functions that directly influence aquatic habitats, riparian areas are critical habitats for a variety of terrestrial and semiaquatic organisms and serve as migration or dispersion corridors for wildlife species (FEMAT 1993). Many of these benefits derive from the availability of water and unique microclimates in these zones. Long-term conservation of salmonids requires protecting not only the immediate functions that riparian vegetation provides, but the ecological conditions within the riparian zone needed to maintain natural vegetation communities (e.g., soil productivity, microclimate) as well. Baker and Dillon (2000) concluded from numerous studies that the typical depth of edge influence for vegetation effects was 200 feet, regardless of location. Harvey et al. (1980) as mentioned found negative effects to soil mycorrhizae, extended 25 feet into adjacent, uncut stands. Mills (1995) found that mycorrhizal truffles were significantly less plentiful within 50 feet of the edge, and red-backed voles were less abundant within 150 feet of the edge.

Negative impacts of edges on wood frogs and some salamanders extend 80 to 115 feet into the forest from edges (deMaynardier and Hunter 1998). Increases in avian nest predation and parasitism extend 165 feet (Paton 1994) to 250 feet (Vander Haegen and DeGraaf 1996) into uncut forests from edges. Dillon (1998) found edge effects on understory vegetation composition extend 260 feet into the forest. Edge effects for large mammals may be much greater – Edge and Marcum (1985) demonstrated a decrease in elk use within a mile of open roads.

A functional definition and view of riparian zones and stream networks will provide a basis for making management decisions within the context of full drainage basins. The conceptual framework developed by Gregory, et al, and Lamberti, et al, using ecosystem and basin geomorphology perspectives could provide a useful point to begin from (Gregory e. al., 1991, Lamberti et.al. 1991).

Buffers and Windthrow

The buffer widths chosen the AVP must also take into consideration blowdown. Trees within riparian buffers that are immediately adjacent to clearcuts have a greater tendency to topple during windstorms than trees in undisturbed forests. Extensive blowdown can affect aquatic ecosystems in a number of ways, recruitment of large wood pieces that are key to maintaining channel stability and that provide habitats for vegetation and wildlife within the riparian zone. In addition, soil exposed at the root wads of fallen trees may be transported to the stream channel, increasing sedimentation. Other riparian functions, including shading, bank stabilization, and maintenance of riparian microclimates may also be affected. Rhodes et al. (1994) suggest that buffers need to extend to a distance of two site-potential tree heights (or > 91 m) to protect riparian buffers from windthrow; however, local site conditions dictate vulnerability of stands to windthrow and appropriate buffer widths would vary accordingly (MANTECH 1996).

Microclimate wind and solar radiation

With forests in mind we can now look at what is the proper size of the riparian zone when we consider what it needs to do for the stream, what is the size of the riparian zone when it must maintain itself/function by itself. In riparian zones near a clearcut in the Mad River changes in air temperature and relative humidity were found up to the 150 meters into the riparian corridor. This indicates that buffer widths greater than 150 meters may affect riparian microclimate (Ledwith 1996). *Chen (1991)* recorded changes in air temperature, relative humidity, and wind velocity up to 240 meters into an upland forest from the edge of a clearcut, while solar radiation, soil temperature, and soil moisture were influenced up to 90 meters.

Fish-bearing streams are influenced not only by the condition of adjacent riparian areas, but conditions of upstream reaches as well, including Class III and Class II streams. Sediments generated from unprotected upstream reaches are transported and deposited downstream, filling pools and decreasing channel stability. Removal of large trees from headwater areas may reduce recruitment of wood to downstream areas. Temperature increases caused by canopy removal in small streams can also affect downstream reaches. Because these influences of land management propagate downstream, protection of riparian zones Class III and Class II watercourses is also needed to maintain salmonid habitats.

For the goal of maintaining instream processes over a the short term, a fully protected riparian buffer of approximately one site potential tree or 200 to 300 feet will likely maintain 90% plus of the key functions, including shading, near stream LWD recruitment, small organic litter inputs, nutrient regulation, and sediment control (for surface erosion in the riparian zone only). But this does not mean that the riparian zone is healthy and able to sustain itself or maintain the wildlife that is dependent on it.

Establishing a buffer width necessary to maintain a functioning riparian ecosystem is the critical question, not what width of riparian buffer is necessary to protect a stream from a conversion. Decreased riparian widths increase direct and indirect solar radiation into the riparian zone which increase air temperature and decrease relative humidity in that area (Ledwith 1996). If we do not protect the integrity of the riparian zone by designing it to be too small we risk changes in microclimate conditions that alter riparian ecosystem function. If any aspect of the riparian corridor is altered only slightly beyond the tolerance levels of terrestrial riparian flora and fauna, these species may perish or be forced to find other habitats forcing competition for limited habitat. *Rudolph and Dickson (1990)* reported amphibian and reptile populations were significantly reduced in all aquatic habitats neighboring buffer widths of 100 or less, compared to nearby wider buffer strip. This was due to due to the greater shading (i.e., less solar radiation and lower air temperatures) and robust understory vegetation within the wider riparian buffers.

Smaller riparian buffers have been proven to increase evapotransporation rates and raise air temperature which all can contribute to lowering groundwater tables and soil moisture content. This may prematurely dry up intermittent streams, depriving flora and fauna of an important water source during the dry season (Ledwith 1996). Increased solar radiation and air temperature may also raise the water temperature in a stream to sublethal or lethal levels for resident aquatic life.

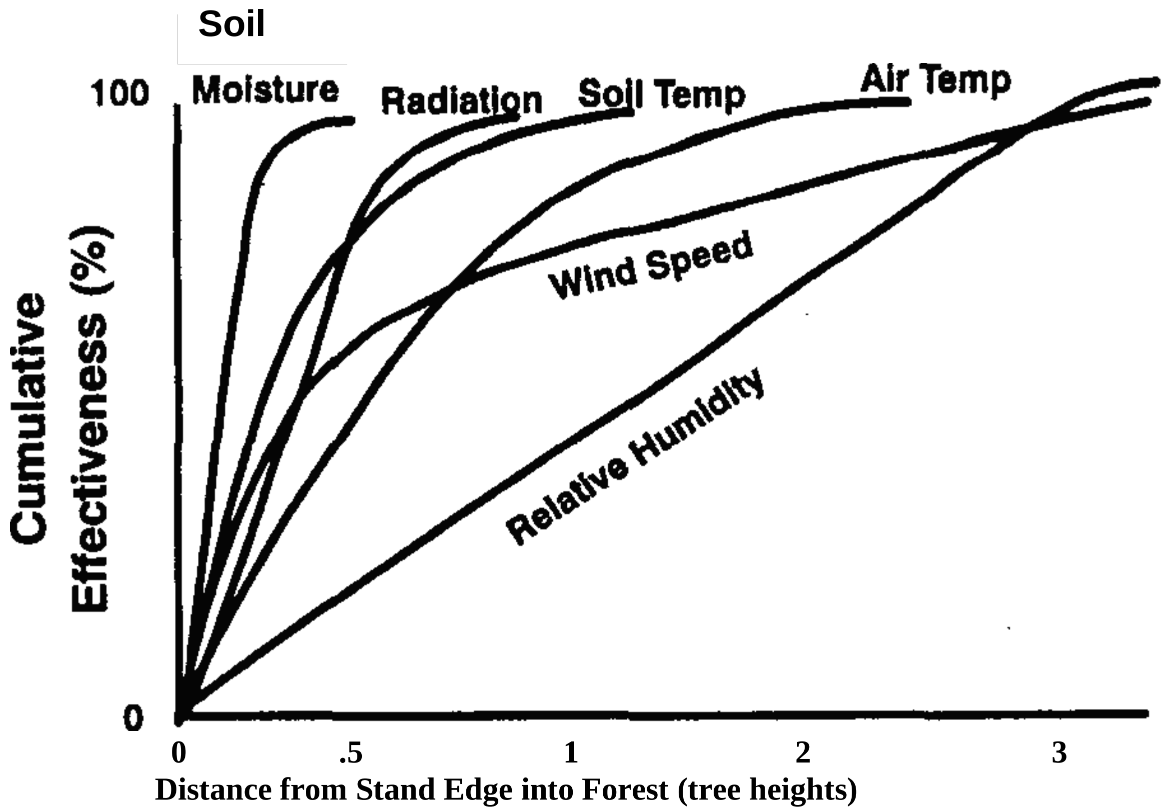


Figure A Riparian buffer effects **on** microclimate. From FEMAT (1993).

<u>Figure A indicates that buffer widths needed to protect most physical aspects of a riparian corridor is in the range of 600 to 900 feet.</u>

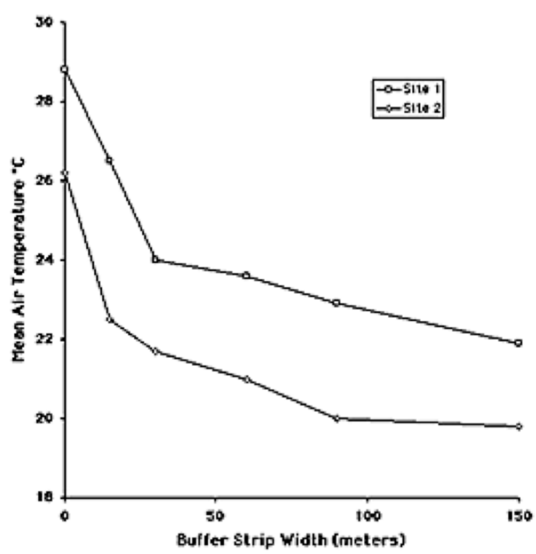


Figure 1. Change in Mean Air Temperature in a Stream Riparian Zone with Varying Buffer Widths during the Study Period Ledwith 1996.

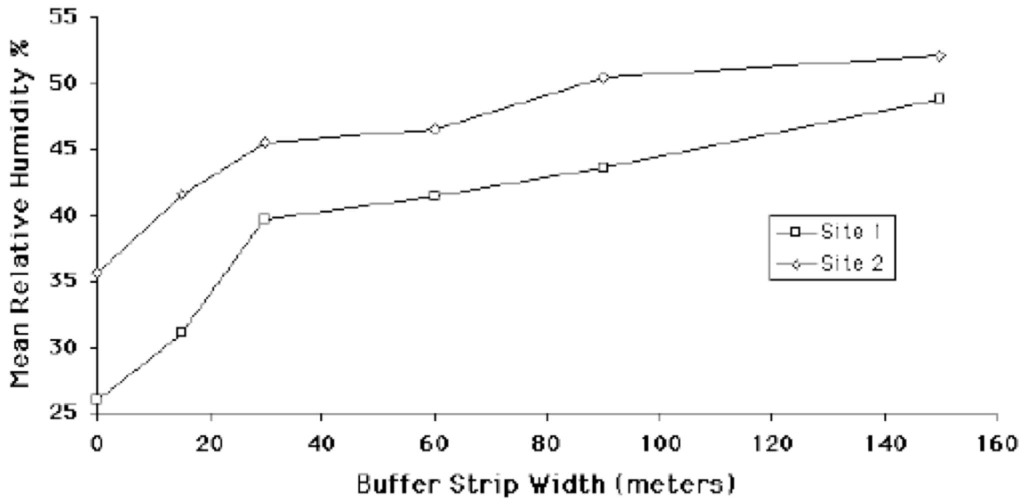


Figure 2. Change in Mean Relative Humidity in a Stream Riparian Zone with Varying Buffer Widths during the Study Period Ledwith 1996.

The microclimatic conditions within the riparian zone are drastically altered by conversions. This change can has long-term impacts to a variety of critical ecological processes within that effect the integrity of riparian ecosystems. FEMAT (1993) presented very useful curves showing the distance and effect of microclimatic variables relative to distance from stand edges into forests (Figure A). These curves suggest that buffers need to be extended an additional one-to-two tree heights outside of the riparian zone to maintain natural levels of soil moisture, solar radiation, and soil temperature within the riparian zone and even larger buffers (up to three tree heights) to maintain natural air temperature, wind speeds, and humidity. The FEMAT (1993) recommendations were based on studies in upland forests in the Cascades (Chen 1991), but their applicability to riparian zones in this region was confirmed by Ledwith 1996.

The long-term productivity of riparian habitats are critically tied to and affected by management in adjacent upland forests. Germination of many types of vegetation are tied to decaying logs in the riparian zone because they retain moisture and tend to shed leaf litter that can bury seedlings (reviewed in Harmon et al. 1986). An important riparian function of maintenance of moist soil refugia for amphibians and other animal and insects is also critically dependent on downed wood and rotting logs in forests. Nutrients and organic matter in riparian forests are also dependent on large downed wood. Large downed wood is also a significant source of the total nitrogen, potassium, and phosphorous found on the forest floor. Maser et al. 1988 found that about 30% of all soil organic matter in two old-growth Douglas-fir forests was contained in downed trees of 500 years age or older. Sollins et al. (1981) found that proportion of soil organic matter from LWD was four-fold higher than in other forms of forest litter. These studies and more suggest that long-term integrity of riparian are dependent on retention and recruitment of large wood to the forest floor from within the riparian zone and adjacent uplands. Maintaining recruitment of wood to the riparian zone (not just the stream channel) would require extending buffer zones beyond the edge of the defined riparian zone (MANTECH 1996).

None of the aforementioned considerations have been made by the DEIR in considering buffers for the conversion of forest and the permanent installation of vineyards, fencing, roads, cooperate yard and other facilities associated with this operation. All of which is a very important omission in this DEIR. Placing a vineyard next to a construction yard or previously developed site might allow this DEIR to be sufficient but placement within a forested environment is quite a different issue.

Biological Resources

The DEIR states "To ensure that the proposed project does not result in adverse effects to fisheries, the proposed project has been designed to ensure that the project results in a decrease in sedimentation." The information provided by this report shows that this is not supported by facts or on the ground conditions. The DEIR states "In addition, mitigation has been included in the proposed project to ensure that monitoring of water quality is conducted to ensure that the estimated net decrease in sedimentation occurs. Therefore, the proposed project's incremental contribution to the cumulative impact would not be cumulatively considerable." There will be a constant input of sediment from these ongoing agricultural practices that must be mitigated within the project. Standard maintenance on roads and skid trails to remove the footprint of man will only give the property its background sediment production rate and can not be considered as an offset for poorly controlled agriculturally produced sediment.

Removal of the forest and destruction of the existing forest ecology will disrupt groundwater infiltration and soil root interactions will itself greatly increase sediment production and nutrient inputs to the stream, all unaccounted for in the DEIR. Adding ongoing sediment nutrient and pesticide inputs from the vineyard operations is again another source of impacts to water quality that has not been mitigated. Therefore the following statement in the DEIR is unsupported "Furthermore, as pointed out in Impact Statements 3.4-8 and 3.4-11 of Chapter 3.4, Biological Resources, the proposed project has the potential to enhance downstream conditions by reducing erosion and increasing summer base flow. Therefore, the proposed project would not only avoid adverse impacts to fisheries, but could also result in beneficial impacts related to sedimentation and summer base flow. For these reasons, the proposed project's incremental contribution to cumulative impacts to fisheries in the Gualala River watershed would not be cumulatively considerable, and the project would have a *less-than-significant* impact on fisheries."

The following statement from the DEIR is also unsupported as the violations of the Basin Plan for having not maintained drainage on the property from roads and skid trials would be required for cleanup by the North Coast Regional Water Quality Control Board and is not dependent on this project.

<u>Chapter 1 – Introduction, Scope, and Summary of EIR (Page 1 – 17)</u>

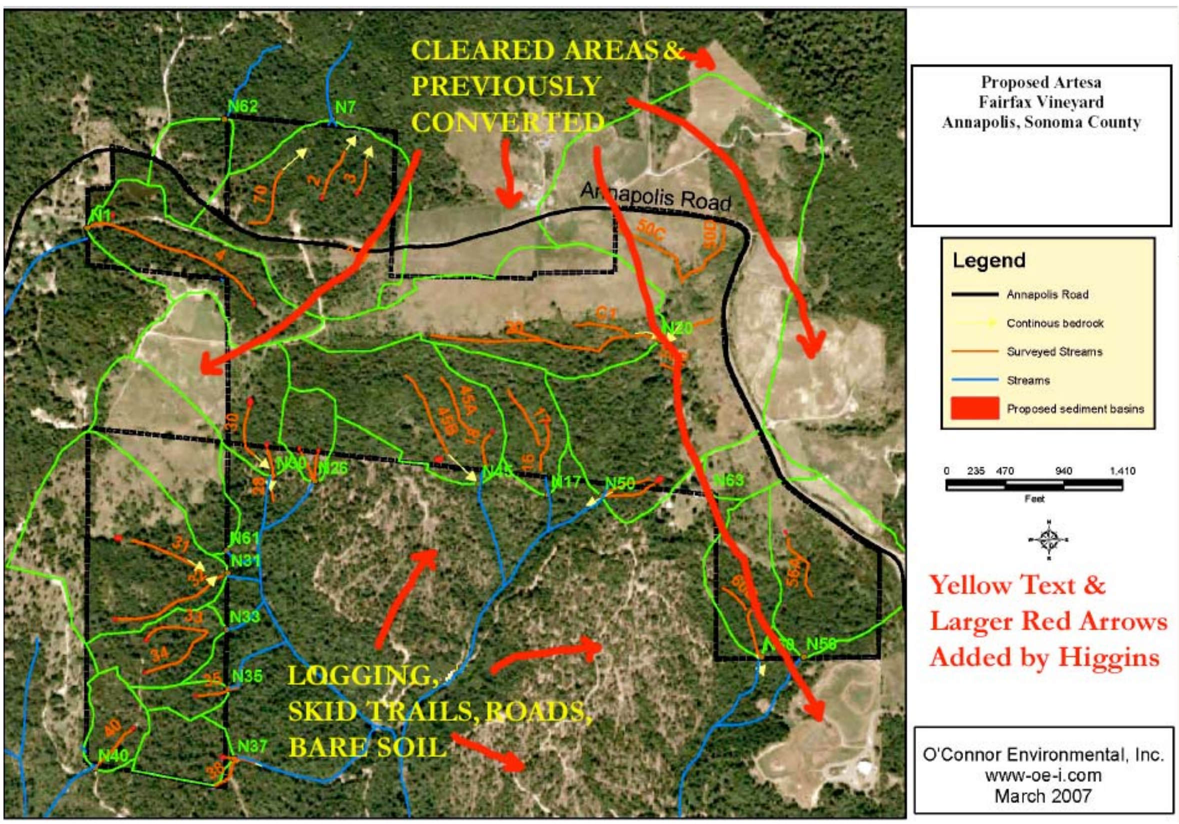
"Furthermore, the No Project Alternative would not result in the long-term reduction of sedimentation from the project site, as would occur with the proposed project."

The following quote from the DEIR should be seriously reconsidered as conversion of a forest is a far more serious impact than acquiring property that is already disturbed or less desirable but looking at existing grasslands for vineyards as the loss of canopy impacts can be avoided.
<u>Offsite Alternative (Pg 1-18)</u>

"However, site-specific surveys of an alternate site would be required to definitively state that impacts associated with the Offsite Alternative would be substantively less than the proposed project."

The excerpt from the DEIR is one of the most serious misstatements in the DEIR, as the majority of the headwaters of Patchett Creek have been block for wildlife corridors as is evidenced by the accompanying areal photograph provided by O'Conner and further edited by Higgins. The Cleared areas on the areal photo are conversion to vineyard that have deer exclusion fencing at this time and the black outlined areas will be converted to the Artesa Vineyard Project.. This clearly shows this last vineyard and fencing will create a virtual wall blocking off animal migration in this upper watershed. This is a very significant impact to wildlife migration and mitigations are required in the DEIR.

3.4-3 Impacts pertaining to loss of wildlife corridors.	LS	*3.4-3 None required.*



Serious deficiencies exist in the evaluation of impacts of this propose conversion and therefore mitigations were either not chosen or severely under designed to offset the impacts of this project.

Sincerely

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